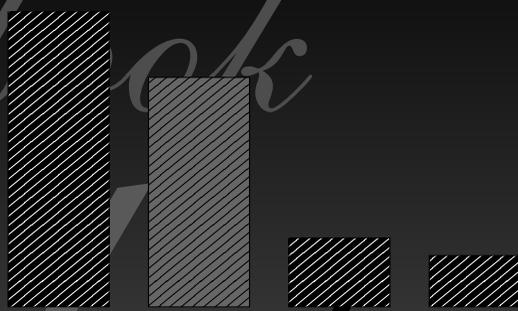


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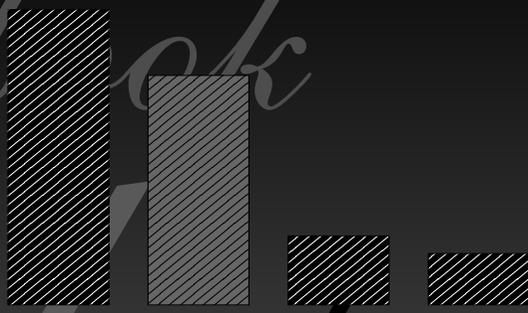
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MORBIDITY &  
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*National Heart, Lung,  
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# Foreword

The mission of the National Heart, Lung, and Blood Institute (NHLBI) is to provide leadership and support for research in cardiovascular, lung, and blood diseases; sleep disorders; women's health; and blood resources. The ultimate goal is to improve the health and well-being of the American people. Although program priorities are determined primarily by research opportunities, other factors have an influence: the magnitude, distribution, and trends of cardiovascular, lung, and blood diseases in the United States, as well as the ability to improve the Nation's health; congressional mandates; the health needs of the Nation as perceived by Institute staff and outside advisory groups; and recommendations from the National Heart, Lung, and Blood Advisory Council, have a significant impact on establishing research priorities.

Evaluation of the Institute's program balance and program impact is a continuous process that relies on assessments of morbidity and mortality in the United States from cardiovascular, lung, and blood diseases. Consideration is given to their distribution among the population; to their trends over time; and to related statistics on population risk factors, lifestyles, medical care, and economic impact.

This *Chart Book*, like its predecessors, provides information on the progress being made in the fight against cardiovascular, lung, and blood diseases. It serves as a resource for the Institute as it plans and prioritizes future activities.

I would like to express my appreciation to Mr. Thomas Thom of the NHLBI for his time and effort in developing the material presented in this *Chart Book*.

Barbara Alving, M.D.  
Acting Director

National Heart, Lung, and Blood Institute

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# 1. Introduction

During the past 35 years, major advances have been made in the prevention, diagnosis, and treatment of cardiovascular, lung, and blood diseases. Death rates from cardiovascular diseases (CVD) have declined significantly and Americans are living longer, healthier lives. Yet, despite tremendous progress, morbidity and mortality from cardiovascular, lung, and blood diseases continue to impose an enormous burden on patients, their families, and the national health care system; the economic cost to the Nation is substantial.

This *Chart Book* describes the magnitude of the problem and contains time trends for cardiovascular, lung, and blood diseases, highlighting demographic differences—age, sex, and minority/ethnic status. Nationally collected data are presented by race and ethnicity to the extent they are available, statistically reliable, and consistently collected.

The “Background Data” chapter provides population and life-expectancy estimates, trends in total mortality, leading causes of death and activity limitation, prevalence of CVD risk factors, and economic cost data. It also includes trends in mortality by major diagnoses and trends in number of days of inpatient hospital care by major diagnoses. The “Cardiovascular Diseases,” “Lung Diseases,” and “Blood Diseases” chapters contain detailed morbidity and mortality statistics by race/ethnic group, sex, and geographic distribution. Diseases included under the three headings are listed in the first table in each chapter together with appropriate diagnostic codes of the 9th and 10th revisions of the International Classification of Diseases (ICD) of the World Health Organization (WHO).<sup>1-2</sup>

## Sources of Data

Most of the data used in this book were obtained from the National Center for Health Statistics (NCHS). They include annual vital statistics of the United States; the annual National Health Interview Survey (NHIS); the National Health and Nutrition Examination Survey (NHANES), 1971–75, 1976–80, 1988–94, and 1999–2000; the National Health Examination Survey, 1960–62; the annual National Hospital Discharge Survey; and the annual National Ambulatory Medical Care Survey. Population data came from the U.S. Bureau of the Census, and international mortality data came from the WHO Web site.

It is beyond the scope of the *Chart Book* to cite all of the NCHS and Bureau of the Census publications and Web sites that were used to prepare this document. Specific data sources for current statistics and general references to hospital and prevalence surveys and vital statistics for earlier data years may be found in the “References” appendix.

## Population Estimates

The NCHS and the NHLBI use annual mid-year U.S. population estimates from the Bureau of the Census to express morbidity and mortality per population. Prevalence and hospital discharge statistics are based on noninstitutionalized population estimates that were included in NCHS publications. The annual live births, reported by NCHS, are used to calculate infant mortality rates.

Population estimates for 1991–98 were revised by the Bureau of the Census to take into account the 2000 Census.<sup>3</sup> Population counts and estimates since the 2000 Census have been bridged to single race categories, combining multiple race categories.

## Quality of Data

Quality issues discussed below include accuracy of diagnosis and data comparability in prevalence, hospitalization, and mortality statistics.

## Prevalence

Diagnoses for most disease prevalence and smoking habits are based only on self reports from health interviews. Physical measurements are used to determine the prevalence of high serum cholesterol and overweight. Prevalence of hypertension is based on blood pressure readings and health interviews about relevant

medication. For hospital, mortality, and economic cost statistics, the accepted diagnosis is the one listed on medical records, death certificates, or survey forms and is consistent with ICD codes.

## Hospital Statistics

Hospital statistics measure rates of health care use, length of stay, and hospital case fatality. They have limitations associated with diagnostic accuracy (e.g., the diagnosis may be influenced by the billing process) and diagnostic comparability over time (e.g., ICD revisions). Time trends may not accurately reflect real changes in incidence and case-fatality because the data occasionally include changes in hospital admission practices.

The term *hospitalizations*, which replaces the National Hospital Discharge Survey term *hospital discharges*, refers to all inpatients, whether discharged alive or dead. The diagnosis given at discharge, and not at admission, is used. Most tabulations of hospitalizations are first-listed diagnoses on the hospital record (i.e., primary diagnosis). Some tabulations are of the “all-listed” diagnoses that include both primary and secondary diagnoses for a particular disease. Because the survey is event-based rather than patient-based, annual estimates pertain to numbers of hospitalizations, not to the number of patients hospitalized in a given year.

Methodological problems in data collection preclude the presentation of hospital data by race.<sup>4</sup>

## Cause-of-Death Statistics

Limitations in cause-of-death statistics, apart from discontinuities over time due to revisions in the ICD, are well known. Inaccuracies in death certification and inconsistencies in selecting and coding the underlying cause of death create uncertainties as to the true magnitude of mortality from a specific cause compared with other causes. These uncertainties must also be kept in mind when comparing the same cause of death over time or between demographic groups or countries.

Selecting only one cause of death as the underlying cause has the advantage of diagnostic specificity, but the disadvantage of an incomplete accounting of the various causes that contributed to a death. Here, mortality statistics are limited to the underlying cause because the complexity of tabulating both the underlying and contributing (secondary) causes are beyond the scope of this book.

Updating population estimates for 1991–98 resulted in changes to the death rates for those years found in the 2002 *Chart Book*. Additionally, death rates for 1999 and 2000 were taken from the CDC Wonder or the NCHS Data Warehouse and, to date, have not been updated.<sup>5,6</sup> This means that mortality time trends over the 1999–2002 period will have to be revised.

Another limitation related to cause-of-death statistics involves international comparisons of vital statistics. Comparisons of mortality data for coronary heart disease (CHD), stroke, and chronic obstructive pulmonary disease (COPD) among countries are affected by differences in diagnostic practices and physician training, interpretation of internationally recommended rules for coding a cause of death, availability of diagnostic aids, and the use of autopsies. Information presented in this book is limited to countries that are known to produce high-quality statistics.

Inconsistent race identification between death certificates and data from the Census Bureau and undercounts of some population groups in the Census cause over- and underestimation of death rates in racial groups.<sup>7</sup>

## ICD Revisions

Revisions in the ICD (Appendix A) have affected the comparability of time trends, particularly those associated with mortality. Wherever this is a significant problem, breaks in trend lines have been added between revisions to alert the reader to this issue. To compensate for the differences in mortality classification between ICD/9 (1979–98) and ICD/10 (1999–) in selected charts (Charts 3–51, 3–52, 4–11), the NCHS-derived comparability ratios shown in Appendix B have been applied to the death rates coded by ICD/9.<sup>8</sup>

## Data Presentation

Death rates are expressed per 100,000 population using the resident U.S. population as of July 1 of the relevant year as the denominator. Prevalence, on the other hand, is expressed as the percent of the population. Hospital discharge rates are per 10,000 population, and the number of discharges is the denominator for percent discharged dead. Infant mortality rates are expressed per 100,000 live births.

## Age Adjustment

Age-adjusted rates are used to compare prevalence or mortality among various population groups or for one group over time. The 2000 standard population is applied in the age adjustment so that when comparisons are made, these rates are not affected by age composition differences among the populations.<sup>9-11</sup> The European standard population is applied for age adjustment of international mortality statistics.<sup>12</sup>

The major disadvantage of using age-adjusted rates is loss of age-specific information. This becomes evident when the population groups being compared have mortality cross-over differences within a given age range. For example, the bar chart for mortality from diseases of the arteries (Chart 3–65) has similar age-adjusted rates for white and for black males. The age-specific line chart (Chart 3–66), however, shows that for ages 35 to 64, black males have higher rates compared to white males, but for ages 65 to 84, black males have lower rates compared with white males.

## Percent Change

Percent changes in death rates over time, whether between 2 specified years or on an average annual basis, are calculated from log-linear regression slopes of rates for each year of a selected period.<sup>13</sup> They may be influenced by unusually high or low values, especially if the period is short, and do not provide information about the levels on which they are based, which might be small. Average annual percent changes should not be summed over a period because the sum will be more than the percent change from the first to the last year in the period. Average annual percent changes give the appearance of small differences in the comparisons being made.

An exception to the use of log-linear regression to calculate percent change is made for Chart 3–6. For this table, it is useful to have the percent change and other calculations based on the actual death rates.

## Horizontal and Vertical Scales

Comparisons between time-trend charts are complicated because ranges of the horizontal and vertical scales are not uniform and may be truncated. Vertical scales for less common diagnoses are magnified to focus on age, race, and sex differences.

## Arithmetic and Logarithmic Scales

In this *Chart Book*, time trends in death rates are plotted on an arithmetic Y-scale to show their absolute change relative to zero. On an arithmetic scale, the absolute increase or decrease for a smaller death rate may appear to be modest compared with the change for a larger death rate, when in fact, the percent change over time is greater for the smaller rate. In addition, on an arithmetic scale, a decline can be slowing whereas the rate of decline, if plotted on a logarithmic scale, might not be slowing.

## Truncated Age Ranges

The age range for death rates in some charts excludes groups of individuals older than 84 years because of the difficulty associated with obtaining accurate diagnoses for patients who often have other contributing comorbidities. Selected truncated age groups are frequently used for U.S. data to highlight specific premature adult morbidity and mortality. For international comparisons, 35–74 years was chosen so that differing age distributions among countries would be minimized in rate calculations.

## Demographic Characteristics

The *Chart Book* provides prevalence and mortality information for various racial and ethnic groups. Several charts show comparisons between blacks and whites. However, for mortality prior to 1968, data for nonwhites instead of blacks are presented. Many charts provide a race/sex comparison. Others present data for total males and total females or for total whites and total blacks to highlight important points that otherwise would be lost if four-way combinations were used.

The term *American Indian* is used to refer to the population that consists of American Indians and Alaska Natives. The term *Asian* is used to include the population that consists of Americans of Asian and Pacific Islander descent. Data on socioeconomic groups are not presented because they are extensively presented elsewhere.<sup>14</sup>

## State Mortality

Death rates for total population by State are shown in maps for CVD, CHD, stroke, and COPD.<sup>5</sup> Although State death rates that combine all age, race, and sex groups can be misleading, they show a reasonably similar geographic pattern compared with maps that are either race and sex specific or confined to a specific age range (not shown). This is true even for stroke mortality, in which high rates in Southern States are not due merely to the large black population. Although rankings of certain States for CHD mortality differ markedly from rankings for total heart disease, the two geographic patterns are not markedly different.<sup>15</sup>

## 2. Background Data

The charts in this chapter provide population estimates, life expectancy, morbidity and mortality information, and economic cost data for cardiovascular, lung, and blood diseases. Most of them focus on the leading causes of death, but a few show prevalence of specific CVD risk factors. Immediately below are selected prevalence and incidence estimates.

### Cardiovascular Diseases

Table 2–1 contains 2001 prevalence estimates of the U.S. population with CVD. Individuals with multiple CVD are counted for each condition that applies to them.<sup>16–18</sup>

CVD	64,400,000
Hypertension	50,000,000
CHD	13,200,000
Acute Myocardial Infarction (AMI)	7,800,000
Angina Pectoris	6,800,000
Stroke	4,800,000
Heart Failure	5,000,000
Congenital Heart Defects	1,000,000
Atrial Fibrillation	2,200,000

Table 2–2 contains 2001 estimates for the annual occurrence of CVD in the United States.<sup>19–22</sup>

Heart Attack	1,200,000
First Event	700,000
Recurrent Event	500,000
Stroke	700,000
First Event	500,000
Recurrent Event	200,000
Heart Failure	550,000
First Event	550,000

### Lung Diseases

In 2002, 11.2 million U.S. adults were estimated to have COPD, i.e., chronic bronchitis (9.1 million) or emphysema (3.1 million).<sup>23</sup> Approximately 20 million people have asthma, of whom 12 million people experienced at least one asthma attack in 2002.<sup>23</sup> Approximately 30,000 people have cystic fibrosis, and 2,500 new cases are reported annually. Respiratory distress syndrome occurs in 40,000 infants and 150,000 adults each year.

In this chapter, charts showing leading causes of death combine asthma with COPD and list the category as *COPD and allied conditions*. The ICD/10 term is *chronic lower respiratory diseases*.

### Blood Diseases

An estimated 72,000 blacks have sickle cell anemia. The incidence is about 1 in 500 births. Approximately 20,000 persons have hemophilia, and 1,000 persons have Cooley’s anemia.

### Population

Population estimates in Chart 2–1 are based on the 1990 U.S. Census and population surveys. Estimates in Chart 2–2 and Chart 2–3 are based on the 2000 U.S. Census and population projections. Designation of race

and ethnicity in Chart 2–2 reflects the 1997 Office of Management and Budget directive on race and ethnicity that allows survey respondents in Federal data collection programs to select more than one race. In Chart 2–3, designations of race were modified by NCHS to be consistent with the directive.

### Chart 2–1

#### Total Population by Mean Age, Percent Ages 65 and Over, Race/Ethnicity, and Sex, U.S., 2002

The mean age and percent population aged  $\geq 65$  are lower for minorities in the United States than for whites. This holds true for both males and females.<sup>24</sup>

	Total Population			Male			Female		
	Pop. (Mil.)	Mean Age	Percent $\geq 65$	Pop. (Mil.)	Mean Age	Percent $\geq 65$	Pop. (Mil.)	Mean Age	Percent $\geq 65$
Total	280.3	36.2	12.6	137.0	35.5	10.8	143.3	38.0	14.3
White	229.5	37.7	13.6	112.8	36.4	11.6	116.7	38.9	15.5
Hispanic	(31.7)	(29.3)	(6.2)	(15.9)	(28.5)	(5.2)	(7.9)	(30.1)	(13.5)
Non-Hispanic	(197.8)	(39.0)	(14.8)	(96.9)	(37.7)	(12.6)	(100.9)	(40.3)	(16.8)
Black	36.2	32.7	8.3	17.2	31.2	6.9	19.0	34.0	9.6
Hispanic	(1.9)	(29.4)	(5.7)	(1.0)	(28.6)	(4.7)	(1.0)	30.2	(6.6)
Non-Hispanic	(34.3)	(32.9)	(8.5)	(16.2)	(31.3)	(7.1)	(18.0)	(34.2)	(9.7)
Indian	2.5	31.0	7.1	1.2	30.2	6.0	1.3	31.8	8.0
Asian	12.0	33.2	7.8	5.8	32.2	6.9	6.3	34.2	8.7
Hispanic*	34.8	29.3	6.1	17.4	28.5	5.1	17.3	30.1	7.1

\* Hispanic can be of any race.

Note: Estimates of numbers of Hispanic American Indians and Hispanic Asians are not provided separately.

### Chart 2–2

#### Projected Population by Race and Hispanic Origin, U.S., 2020–2050

By 2020, 17.8% of the U.S. population will be Hispanic, 13.5% black, 61.3% non-Hispanic white, and 16.3% will be aged  $\geq 65$ .<sup>24</sup>

	2020		2030		2040		2050	
	Pop. (Mil.)	Percent Total						
Total	335.8	100.0	363.6	100.0	391.9	100.0	419.8	100.0
(Aged $\geq 65$ )	(54.6)	(16.3)	(71.4)	(19.6)	(80.0)	(20.4)	(86.7)	(20.6)
White*	260.6	77.6	275.7	75.8	289.7	73.9	302.6	72.1
Black*	45.4	13.5	50.4	13.9	66.9	14.3	61.4	14.6
Asian*	18.0	5.4	22.6	6.2	28.0	7.1	33.4	8.0
All other races	11.8	3.5	14.8	4.1	18.4	4.7	22.4	5.3
Hispanic (of any race)	(59.8)	(17.8)	(73.0)	(20.1)	(87.6)	(22.3)	(102.6)	(24.4)
Non-Hispanic White	(205.9)	(61.3)	(209.2)	(57.5)	(210.3)	(53.7)	(210.3)	(50.1)

\* No other race, includes Hispanics.

### Chart 2–3

#### Average Remaining Lifetime Years by Age, Race, and Sex, U.S., 2002

In 2002, average life expectancy at birth was 77.4 years–79.9 years for females compared with 74.7 years for males and 77.8 years for whites compared with 72.5 years for blacks.<sup>25</sup>

Year	Total	Male	Female	Total White	White Male	White Female	Total Black	Black Male	Black Female
Birth	77.4	74.7	79.9	77.8	75.3	80.3	72.5	68.9	75.7
15	63.1	60.5	65.6	63.5	60.9	65.9	58.8	55.3	61.9
35	44.1	41.8	46.2	44.4	42.1	46.5	40.2	37.3	42.8
65	18.2	16.6	19.5	18.2	16.6	19.5	16.6	14.6	18.0
75	11.6	10.4	12.5	11.6	10.4	12.4	11.0	9.5	11.9

### Chart 2–4

#### Age-Adjusted Death Rates for All Causes by Race and Sex, U.S., 1950–2002

Between 1950 and 2002, the all-cause death rate declined for blacks and whites and for males and females. It remained higher in males than in females. Within sex groups, the rate was higher in blacks than in whites.<sup>5, 25, 26</sup>

Year	Deaths/100,000 Population			
	Black Male*	White Male	Black Female*	White Female
1950	1,949.5	1,642.5	1,574.1	1,184.0
1951	1,902.4	1,621.7	1,539.4	1,178.6
1952	1,889.8	1,588.5	1,496.0	1,157.0
1953	1,865.3	1,589.0	1,469.0	1,146.5
1954	1,726.6	1,516.3	1,326.3	1,081.8
1955	1,707.5	1,544.7	1,326.7	1,095.4
1956	1,724.1	1,554.3	1,331.9	1,089.9
1957	1,797.0	1,581.7	1,374.6	1,104.1
1958	1,779.2	1,573.1	1,354.6	1,090.8
1959	1,724.6	1,552.1	1,304.9	1,065.2
1960	1,777.6	1,586.0	1,334.6	1,074.4
1961	1,725.2	1,547.3	1,296.4	1,038.8
1962	1,801.7	1,579.1	1,324.5	1,052.6
1963	1,859.0	1,614.7	1,347.8	1,062.6
1964	1,768.0	1,572.0	1,282.7	1,030.8
1965	1,791.0	1,589.9	1,266.0	1,026.7
1966	1,832.4	1,595.7	1,274.9	1,024.7
1967	1,767.2	1,566.9	1,209.7	992.9
1968	1,876.9	1,581.8	1,277.5	1,029.4
1969	1,814.1	1,549.8	1,274.9	1,008.4
1970	1,872.8	1,513.7	1,229.4	944.0
1971	1,836.1	1,514.4	1,196.8	933.4
1972	1,871.8	1,520.2	1,181.2	878.9
1973	1,849.5	1,507.2	1,179.7	921.4
1974	1,769.5	1,450.8	1,109.7	884.2
1975	1,697.0	1,391.0	1,042.4	834.1
1976	1,676.0	1,379.5	1,031.2	828.9
1977	1,647.9	1,343.5	1,012.2	799.7
1978	1,625.6	1,332.5	954.4	796.6
1979	1,604.5	1,290.1	969.2	770.2
1980	1,697.8	1,317.6	1,033.3	796.1
1981	1,626.6	1,282.2	986.6	773.6

1982	1,580.4	1,255.9	960.1	758.7
1983	1,600.7	1,259.4	980.7	763.9
1984	1,600.8	1,245.9	976.8	760.7
1985	1,634.5	1,249.8	994.4	764.3
1986	1,650.1	1,230.4	994.4	758.1
1987	1,650.3	1,213.4	989.7	753.3
1988	1,677.6	1,215.9	1,006.8	759.0
1989	1,670.1	1,176.6	998.1	738.8
1990	1,644.6	1,165.9	975.1	728.7
1991	1,626.1	1,143.1	963.3	716.1
1992	1,587.8	1,122.4	942.5	704.1
1993	1,632.2	1,138.9	969.5	724.1
1994	1,592.8	1,118.7	954.6	717.5
1995	1,585.7	1,107.5	955.9	718.7
1996	1,524.2	1,082.9	940.3	713.6
1997	1,458.8	1,059.1	922.1	707.7
1998	1,430.5	1,042.0	921.6	707.3
1999	1,412.7	1,035.8	955.0	725.8
2000	1,371.3	1,019.3	943.9	723.4
2001	1,375.0	1,006.1	912.5	706.7
2002	1,338.4	995.1	900.4	703.2

\* Nonwhite from 1950–1967.

## Chart 2–5 Crude Death Rates for Selected Causes, U.S., 1950–2002

Between 1950 and the late 1960s, the CHD rate increased and the stroke death rate declined modestly. From about 1968 to 2002, the rate for both diseases declined steeply. In contrast, the death rates for COPD and lung cancer increased over most of the 1950 to 2002 period.<sup>5–6, 25–26</sup>

Year	Deaths/100,000 Population				
	CHD	Stroke	Lung Cancer	Other Cancer	COPD
1950	262.8	104.0	12.2	127.6	2.1
1951	265.8	106.7	12.9	127.6	2.4
1952	269.6	106.8	13.9	129.5	2.4
1953	277.2	107.3	14.9	129.8	2.9
1954	272.2	104.1	15.4	130.2	3.1
1955	282.7	106.0	16.3	130.2	3.4
1956	289.2	106.3	17.4	130.4	3.9
1957	298.7	110.2	18.1	130.5	4.8
1958	296.8	110.1	18.6	128.2	5.4
1959	297.4	108.4	19.4	127.9	5.9
1960	304.7	108.0	20.3	128.9	6.9
1961	301.6	105.4	21.3	128.1	7.2
1962	311.1	106.3	22.3	127.6	8.6
1963	317.6	106.7	23.1	128.2	10.3
1964	311.2	103.7	24.0	127.3	10.6
1965	314.0	103.9	25.0	128.4	12.1
1966	318.5	104.7	26.3	128.8	12.9
1967	315.0	102.4	27.6	129.6	13.3
1968	338.4	106.0	29.8	130.0	15.2
1969	332.6	102.9	30.7	129.7	15.6
1970	328.1	101.9	32.1	130.7	16.2
1971	326.0	101.1	33.2	129.8	16.7
1972	327.0	101.9	34.7	130.2	17.5

1973	323.7	101.4	35.5	130.4	18.5
1974	311.6	97.2	37.0	131.7	18.4
1975	298.3	90.1	38.1	131.2	19.1
1976	297.0	86.7	39.7	133.1	20.2
1977	290.5	82.8	41.2	134.2	20.3
1978	289.2	79.1	42.8	135.9	21.9
1979	274.9	75.5	43.8	135.8	21.1
1980	280.5	75.1	45.8	138.0	23.5
1981	272.0	71.3	46.4	137.5	24.3
1982	268.0	68.1	48.1	139.1	24.5
1983	267.3	66.6	49.2	140.3	26.8
1984	259.9	65.4	50.3	141.9	27.8
1985	255.6	64.3	51.5	142.4	29.7
1986	247.1	62.3	52.3	143.2	30.2
1987	241.2	61.8	53.6	143.1	30.5
1988	238.1	61.6	54.5	143.8	32.0
1989	230.3	59.0	55.5	145.3	32.2
1990	224.3	57.9	56.8	146.4	32.9
1991	219.3	56.8	56.8	146.6	33.8
1992	214.0	55.9	56.9	146.0	33.9
1993	216.5	57.6	57.3	146.6	36.9
1994	210.0	58.1	56.8	146.3	36.5
1995	207.5	59.2	56.8	145.4	36.5
1996	202.2	59.2	56.4	143.9	37.2
1997	195.5	58.5	56.2	141.7	38.0
1998	190.9	57.3	56.0	140.3	38.8
1999	195.8	58.4	56.7	144.4	43.8
2000	186.6	57.0	57.2	141.9	42.7
2001	176.3	57.4	54.8	139.6	41.7
2002	171.1	56.5	54.9	138.9	42.1

## Chart 2-6

### Number of Days of Inpatient Hospital Care by Major Diagnosis, U.S., 1989-2002

Between 1989 and 2002, cardiovascular and respiratory diseases ranked first and second, respectively, in the number of days for which inpatients received hospital care.<sup>27</sup>

Year	Days of Care (Millions)							
	Cardiovascular	Respiratory	Mental	Digestive	Injury and Poisoning	Neoplasms	Musculoskeletal	Endocrine
1989	39.29	20.13	19.25	20.73	19.09	16.69	10.23	7.51
1990	37.90	20.43	18.82	19.20	18.89	16.77	10.22	7.61
1991	38.97	20.65	18.97	19.35	19.14	16.41	10.22	8.09
1992	39.38	19.75	18.58	18.40	16.86	15.38	10.02	7.49
1993	37.47	21.09	18.81	17.49	17.29	13.64	9.04	7.95
1994	36.12	19.60	20.94	16.83	15.22	13.23	8.19	7.42
1995	33.64	19.89	17.86	15.79	14.58	11.83	7.30	6.82
1996	33.73	19.15	16.49	14.75	13.83	11.18	7.16	6.77
1997	32.45	19.62	15.63	14.57	13.23	10.89	6.77	6.62
1998	32.59	19.22	15.05	14.68	13.60	10.84	6.53	6.33
1999	30.82	20.05	15.09	15.06	13.83	10.50	6.65	6.59
2000	30.41	18.52	15.76	14.86	13.37	9.26	6.32	6.57
2001	29.32	18.19	17.34	15.50	13.92	10.01	6.58	6.65
2002	29.93	18.83	17.52	16.16	14.24	10.18	6.80	6.91

## Chart 2–7

### Age-Adjusted Death Rates by Major Diagnosis, U.S., 1989–2001

Between 1989 and 2001, age-adjusted death rates for cardiovascular and respiratory diseases ranked first and third, respectively.<sup>5</sup>

Year	Deaths/100,000 Population							
	Cardiovascular	Respiratory	Mental	Digestive	Injury and Poisoning	Neoplasms	Musculoskeletal	Endocrine
1989	425.0	84.1	11.7	33.9	61.2	217.1	3.3	27.7
1990	412.5	85.5	11.9	33.1	60.4	219.0	3.4	27.7
1991	401.6	84.5	12.2	32.5	59.3	218.7	3.3	28.0
1992	392.3	82.3	12.7	32.1	57.4	217.3	3.2	28.2
1993	397.6	87.8	14.3	31.7	58.9	217.6	3.4	29.8
1994	387.1	86.0	15.5	31.4	58.3	216.1	3.5	30.7
1995	384.3	85.9	16.7	30.7	57.8	214.7	3.7	31.6
1996	375.5	86.2	17.5	30.3	56.9	211.6	3.7	32.2
1997	366.0	87.6	18.5	30.4	56.1	208.6	3.9	32.5
1998	355.2	89.6	20.0	29.8	55.7	205.4	3.8	33.0
1999	350.7	84.3	15.5	30.3	54.3	205.6	4.9	34.0
2000	341.3	83.7	16.7	30.3	53.8	204.5	5.0	34.1
2001	326.8	81.3	17.8	30.2	55.0	200.5	5.0	34.2

## Chart 2–8

### Leading Causes of Death, U.S., 2002

In 2002, heart disease, stroke, and COPD and allied conditions were the first, third, and fourth leading causes of death, respectively.<sup>25</sup>

Cause of Death	Number
Total Deaths	2,447,862
<b>Heart disease*</b>	<b>695,754</b>
Cancer	558,847
<b>Cerebrovascular disease (stroke)</b>	<b>163,010</b>
<b>COPD and allied conditions†</b>	<b>125,500</b>
Accidents	102,303
Diabetes	73,119
Influenza and pneumonia	65,984
Alzheimer's disease	58,785
Nephritis	41,018
Septicemia	33,881
All other causes of death	529,661

\* Includes 493,542 deaths from coronary heart disease.

† Chronic lower respiratory diseases.

### Chart 2–9

#### Leading Causes of Death by Age and Rank, U.S., 2002

In 2002, heart disease was the third leading cause of death for those aged 25–44, second for those aged 45–64, and first for those aged ≥65. Stroke ranked fourth for those aged 45–64 and third for those aged ≥65. COPD and allied conditions ranked sixth for those aged 45–64 and fourth for those aged ≥65.<sup>25</sup>

Cause of Death	Rank			
	1–24	25–44	45–64	≥65
<b>Heart disease</b>	<b>6</b>	<b>3</b>	<b>2</b>	<b>1</b>
Cancer	4	2	1	2
<b>Cerebrovascular disease</b>	—	<b>8</b>	<b>4</b>	<b>3</b>
Accidents	1	1	3	9
<b>COPD and allied conditions*</b>	<b>7</b>	—	<b>6</b>	<b>4</b>
Influenza and pneumonia	8	10	—	6
Diabetes mellitus	—	9	5	5
Suicide	3	4	8	—
Chronic liver disease	—	7	7	—
Nephritis and nephrosis	—	—	—	8
Homicide	2	6	—	—
Septicemia	9	—	10	10
HIV infection	—	5	9	—
Congenital anomalies	5	—	—	—
Alzheimer's disease	—	—	—	7
Benign neoplasms	10	—	—	—

\* Chronic lower respiratory diseases.

### Chart 2–10

#### Leading Causes of Death, White Males, U.S., 2002

In 2002, among white males, heart disease, COPD and allied conditions, and stroke were the first, fourth, and fifth leading causes of death, respectively.<sup>28</sup>

Cause of Death	Percent
<b>Heart Disease</b>	<b>28.8</b>
Cancer	24.4
Accidents	5.44
<b>COPD*</b>	<b>5.43</b>
<b>Stroke</b>	<b>5.2</b>
Diabetes	2.7

\* COPD and allied conditions.

**Chart 2–11**  
**Leading Causes of Death, White Females, U.S., 2002**

In 2002, among white females, heart disease, stroke, and COPD and allied conditions were the first, third, and fourth leading causes of death, respectively.<sup>28</sup>

Cause of Death	Percent
<b>Heart Disease</b>	<b>28.7</b>
Cancer	21.6
<b>Stroke</b>	<b>8.1</b>
<b>COPD*</b>	<b>5.6</b>
Alzheimer's Disease	3.6
Influenza/Pneumonia	3.1

\* COPD and allied conditions.

**Chart 2–12**  
**Leading Causes of Death, Black Males, U.S., 2002**

In 2002, among black males, heart disease and stroke were the first and fourth leading causes of death, respectively.<sup>28</sup>

Cause of Death	Percent
<b>Heart Disease</b>	<b>25.0</b>
Cancer	22.2
Accidents	5.6
<b>Stroke</b>	<b>5.3</b>
Homicide	4.6
HIV Disease	3.6

**Chart 2–13**  
**Leading Causes of Death, Black Females, U.S., 2002**

In 2002, among black females, heart disease and stroke were the first and third leading causes of death, respectively.<sup>28</sup>

Cause of Death	Percent
<b>Heart Disease</b>	<b>28.2</b>
Cancer	20.9
<b>Stroke</b>	<b>7.69</b>
Diabetes	5.21
Nephritis	2.83
Accidents	2.59

**Chart 2–14**  
**Leading Causes of Death, Asian Males, U.S., 2001**

In 2001, among Asian males, heart disease, stroke, and COPD and allied conditions were the first, third, and fifth leading causes of death, respectively.<sup>6</sup>

Cause of Death	Percent
<b>Heart Disease</b>	<b>26.0</b>
Cancer	26.0
<b>Stroke</b>	<b>8.2</b>
Accidents	5.7
<b>COPD*</b>	<b>3.6</b>
Pneumonia	3.2

\* COPD and allied conditions.

**Chart 2–15**  
**Leading Causes of Death, Asian Females, U.S., 2001**

In 2001, among Asian females, heart disease and stroke were the second and third leading causes of death, respectively.<sup>6</sup>

Cause of Death	Percent
Cancer	27.0
<b>Heart Disease</b>	<b>24.8</b>
<b>Stroke</b>	<b>10.9</b>
Diabetes	3.7
Accidents	3.6
Influenza/Pneumonia	3.2

**Chart 2–16**  
**Leading Causes of Death, Hispanic Males, U.S., 2001**

In 2001, among Hispanic males, heart disease and stroke were the first and fourth leading causes of death, respectively.<sup>6</sup>

Cause of Death	Percent
<b>Heart Disease</b>	<b>22.4</b>
Cancer	18.7
Accidents	11.3
<b>Stroke</b>	<b>4.7</b>
Homicide	4.4
Diabetes	4.1

**Chart 2–17**  
**Leading Causes of Death, Hispanic Females, U.S., 2001**

In 2001, among Hispanic females, heart disease and stroke were the first and third leading causes of death, respectively.<sup>6</sup>

Cause of Death	Percent
<b>Heart Disease</b>	<b>25.7</b>
Cancer	21.1
<b>Stroke</b>	<b>6.9</b>
Diabetes	6.1
Accidents	4.7
Influenza/Pneumonia	2.8

**Chart 2–18**  
**Leading Causes of Death, American Indian Males, U.S., 2001**

In 2001, among American Indian males, heart disease was the leading cause of death.<sup>6</sup>

Cause of Death	Percent
<b>Heart Disease</b>	<b>21.0</b>
Cancer	17.1
Accidents	14.0
Chronic Liver Disease	4.8
Diabetes	4.3
Suicide	4.0

**Chart 2–19**  
**Leading Causes of Death, American Indian Females, U.S., 2001**

In 2001, among American Indian females, heart disease and stroke were the second and fifth leading causes of death, respectively.<sup>6</sup>

Cause of Death	Percent
Cancer	19.1
<b>Heart Disease</b>	<b>18.9</b>
Accidents	8.2
Diabetes	6.7
<b>Stroke</b>	<b>6.5</b>
Chronic Liver Disease	4.1

**Chart 2–20**  
**Leading Chronic Conditions Causing Limitations of Activity, 2000**

In 2000, heart disease was the third leading chronic condition causing activity limitation. Hypertension, lung condition, and stroke were also very common.<sup>23</sup>

Chronic Condition	Persons (Millions)
Arthritis	5.9
Back/neck conditions	5.2
<b>Heart condition</b>	<b>4.4</b>
Injury	3.7
<b>Hypertension</b>	<b>3.0</b>
Diabetes	2.8
<b>Lung condition</b>	<b>2.6</b>
Mental condition	2.5
Vision condition	2.1
<b>Stroke</b>	<b>1.6</b>
Musculoskeletal condition	1.3
Cancer	1.3
Hearing condition	1.2

**Chart 2–21**  
**Percent\* of Population Currently Smoking by Race and Sex, Ages 18 and Over, U.S., 1965–2001**

Between 1965 and 1990, the percent of the population, aged  $\geq 18$ , who smoked cigarettes decreased significantly. Since then, the percent of the population who smoked remained relatively stable.<sup>29</sup>

Year	Black Male	White Male	Black Female	White Female
1965	58.8	50.4	31.8	33.9
1966				
1967				
1968				
1969				
1970				
1971				
1972				
1973				
1974	53.6	41.7	35.6	32.1
1975				
1976				
1977				
1978				
1979	43.9	36.4	30.5	30.3
1980				
1981				
1982				
1983	41.7	34.2	31.3	29.6
1984				
1985	40.2	31.3	30.9	27.9
1986				
1987				
1988				

1989				
1990	32.8	27.6	20.8	23.5
1991				
1992	33.3	27.7	24.5	25.3
1993	33.7	26.6	20.6	23.4
1994	34.3	27.1	21.6	24.0
1995	29.4	26.2	23.5	23.4
1996				
1997	32.4	26.8	22.5	22.8
1998	29.0	26.0	21.1	23.0
1999	28.5	25.0	20.5	22.5
2000	25.7	25.5	20.7	22.0
2001	27.6	24.9	17.9	22.1

\* Age adjusted.

**Chart 2–22**  
**Percent\* of Population With High Serum Cholesterol by Race and Sex, Ages 20–74, U.S., 1976–80 to 1999–2000**

Between 1976–80 and 1999–2000, the prevalence of high total serum cholesterol declined for each sex and race/ethnic group.<sup>29</sup>

Year	White † Male	White † Female	Black † Male	Black † Female	Mexican- American Male	Mexican- American Female
1976–80	26.4	29.6	25.5	26.3	20.3	20.5
1988–94	18.7	20.7	16.4	19.9	18.7	17.7
1999–2000	18.3	19.3	10.7	16.5	17.8	13.1

\* Age adjusted.

† Non-Hispanic.

Note: High serum cholesterol is 240+ mg/dL.

**Chart 2–23**  
**Percent\* of Population That Is Overweight by Race and Sex, Ages 20–74, U.S., 1976–80 to 1999–2000**

Between 1976–80 and 1999–2000, the prevalence of overweight males and females increased for each race/ethnic group.<sup>29</sup>

Year	White † Male	White † Female	Black † Male	Black † Female	Mexican- American Male	Mexican- American Female
1976–80	53.8	38.7	51.3	62.6	61.6	61.7
1988–94	61.6	47.2	58.2	68.5	69.4	69.6
1999–2000	67.3	57.2	60.3	77.7	74.4	71.0

\* Age adjusted.

† Non-Hispanic.

Note: Overweight is a body mass index of 25 kg/m<sup>2</sup>.

## Chart 2–24

### Economic Cost of Cardiovascular, Lung, and Blood Diseases, U.S., 2004

Annual expenditure for health and lost productivity due to cardiovascular, lung, and blood diseases cost the Nation billions of dollars. Costs for these diseases as secondary causes of morbidity and mortality were not included.<sup>6, 27, 30–37</sup>

Disease	Dollars (Billions)			
	Total	Direct	Morbidity	Mortality
Total CVD	368.4	226.7	33.6	108.1
Heart disease	238.6	130.6	20.6	87.4
Coronary	133.2	66.3	9.1	57.8
Congestive Heart Failure	25.8	23.7	*	2.1
Stroke	53.6	33.0	6.1	14.5
Hypertensive disease	55.5	41.5	7.2	6.8
Selected lung diseases	131.9	75.9	25.9	30.1
COPD	37.2	20.9	7.4	8.9
Asthma	16.1	11.5	2.9	1.7
Selected blood diseases	11.5	8.0	0.7	2.8
Anemias	7.0	5.4	0.6	1.0

\* No estimate available.

## Chart 2–25

### Direct Cost of Cardiovascular, Lung, and Blood Diseases, U.S., 2004

Among the direct cost (health expenditures) for cardiovascular, lung, and blood diseases (except stroke), hospital care ranked highest. For stroke, the expenditure for nursing home care was slightly higher than the cost of hospital care.<sup>27, 30–33, 36–37</sup>

Disease	Dollars (Billions)					
	Total	Hospital Care	Physicians Services*	Prescription Drugs	Home Health Care	Nursing Home Care
Total CVD	226.7	101.7	33.4	43.3	10.3	38.1
Heart disease	130.6	72.0	17.1	18.3	4.6	18.5
Coronary	66.3	37.0	9.6	8.5	1.4	9.7
Congestive Heart Failure	23.7	13.6	1.8	2.7	2.1	3.5
Stroke	33.0	13.7	2.7	1.1	2.7	12.8
Hypertensive disease	41.5	5.5	9.6	21.0	1.5	3.8
Selected lung diseases	75.9	45.0	11.5	12.9	2.6	3.9
COPD	20.9	8.6	3.8	5.0	0.7	2.8
Asthma	11.5	3.6	2.9	5.0	†	†
Selected blood diseases	8.0	4.0	1.8	0.7	0.7	0.8
Anemias	5.4	2.5	1.2	0.5	0.5	0.7

\* Physicians, clinics, and other professional services.

† No estimate available.

### 3. Cardiovascular Diseases

The diagnostic group *cardiovascular diseases* as used here includes diseases and congenital anomalies of the circulatory system as coded in the ICD.

Charts 3–1 through 3–3 show the 2001 distribution of CVD deaths, heart disease deaths, and stroke deaths, respectively. Chart 3–4 contains a list of CVD, their 9th revision ICD codes, 2002 estimates of hospital discharges and length of stay, 2001 estimates of physician office visits for the diagnostic codes, 10th revision ICD codes for the CVD, and number of deaths in 2001 for those codes. Subsequent charts display morbidity and mortality for total CVD, total heart disease, and selected subgroups.

#### Coronary Heart Disease

Identifying CHD as the underlying cause of death is sometimes difficult because the diagnostic information available at the time of death can be insufficient to distinguish accurately among the various forms of heart disease. This applies to AMI and angina pectoris—two conditions included under the CHD category. Although their classification may be of limited use in identifying general mortality, it is useful for prevalence and hospitalization and office visit statistics.

*Acute coronary syndrome* is used increasingly to describe patients who present with AMI or unstable angina (unexpected chest pain or discomfort that usually occurs while at rest). The latter can be more severe or prolonged than typical angina or be the first time a person has angina.

In 2002, 942,000 inpatient hospitalizations comprise the acute coronary syndrome: 818,000 for AMI as a primary diagnosis and 124,000 for unstable angina (Chart 3–4). The total figure is a conservative estimate since it is limited to primary diagnosis. Adding hospitalizations of acute coronary syndrome as a secondary diagnosis would result in a less conservative estimate of 1.6 million hospitalizations.<sup>27</sup>

Over the years, multiple revisions of the ICD have led to changes in the codes for CHD. These revisions complicate the determination of mortality trends because subgroups within the categories change. The category CHD, in the ICD/10, was expanded to include “Atherosclerotic CVD.” Therefore, CHD death rates prior to ICD/10 coding (1999) were tabulated to include the additional term to ensure uniformity in classification of CHD mortality from 1950 to 2002. As a result, these CHD death rates are higher than those in previous issues of the *Chart Book*.

#### Congestive Heart Failure

Congestive Heart Failure (CHF) is a sequela of various heart diseases. It is a heart “condition,” not a heart “disease,” and is more common as a contributing rather than an underlying cause of death. Thus, it is imprecise to classify CHF as an underlying cause of death. The condition, however, is increasingly prevalent and common in hospitalizations and mortality reporting. In fact, hospitalizations and mortality for CHF have increased (until very recently), while mortality for total heart diseases has declined.

In this book, death rates in the Congestive Heart Failure section are coded for heart failure, a broader category that includes CHF; left ventricular failure; and heart failure, unspecified. Most of the deaths in this category are due to CHF.

#### Cardiomyopathy

In 2001, almost 27,000 deaths were attributed to cardiomyopathy even though no consensus exists on classification and diagnostic criteria for the disease. It is assumed that this limitation has little effect on any mortality differences influenced by age, race, or sex.

#### Atrial Fibrillation and Other Heart Diseases

The number of patients hospitalized with atrial fibrillation has been increasing, but the number of deaths caused by it is uncertain because the diagnostic information on the death certificate is inadequate. Diseases

of pulmonary circulation, acute and subacute endocarditis, and cardiac dysrhythmias are additional heart diseases of interest. Because measures of their morbidity, and especially their mortality are of uncertain quality, no charts pertaining to them have been included.

## Cerebrovascular Diseases (Stroke)

Cerebrovascular disease, i.e., stroke, is the third leading cause of death. Only a small proportion of deaths from stroke can be classified as cerebral hemorrhage, occlusion, thrombosis, or embolism. Most are coded to unspecified forms of cerebrovascular disease (Chart 3–3). Thus, mortality for the entire category is presented in charts related to stroke.

## Hypertensive Disease

Prevalence and trend data on awareness, treatment, and control of hypertension are important statistics associated with hypertension morbidity and have therefore been included in this chapter. Prevalence of hypertension is normally determined from an average of at least three blood pressure readings. Data presented in Chart 3–62 and Chart 3–63, however, were determined from just one reading.

Mortality statistics for hypertensive disease are not described because it is not a distinct underlying cause of death. In fact, its presence on death certificates is often arbitrary, and its selection as the underlying cause of death is often characterized by a lack of good diagnostic information at the time of death.

## Diseases of Arteries

The ICD term *diseases of arteries* is used to refer to peripheral arterial disease and includes a variety of atherosclerotic disorders; none of them specifically involve the heart or brain. Examples are aortic aneurysm, atherosclerosis of the extremities, arterial embolism and thrombosis, and generalized atherosclerosis. Mortality data are presented, but valid prevalence estimates are unavailable.

## Congenital Malformations of the Circulatory System

The ICD term *congenital malformations of the circulatory system* includes congenital heart disease. Because most deaths in this category occur in infants younger than 1 year of age, the preferred mortality tabulation is the infant mortality rate.

## Cardiovascular Diseases

### Chart 3–1

#### Cardiovascular Disease Deaths, Percent by Subgroup, U.S., 2001

Cause of Death	Percent
CHD	53.9
Other Heart Diseases	15.6
Stroke	17.6
Diseases of Arteries	4.2
Other CVD	3.0
Congestive Heart Failure	5.7

Total Deaths = 931,108 (100%), including congenital CVD, ICD/10 codes Q20–Q28.

**Chart 3–2**  
**Heart Disease Deaths, Percent by Subgroup, U.S., 2001**

Cause of Death	Percent
Other CHD	45.1
AMI	26.3
Congestive Heart Failure	7.5
Hypertensive	3.9
Rhythmic	5.4
Other	7.0
Cardiomyopathy	3.8
Rheumatic/Congenital	1.1

Total Deaths = 703,455 (100%), including 3,313 from congenital heart disease, ICD/10 codes Q20–Q24.

**Chart 3–3**  
**Stroke Deaths, Percent by Subgroup, U.S., 2001**

Cause of Death	Percent
Stroke, Unspecified	54.2
Other Hemorrhage	16.3
Sequelae of Cerebrovascular Disease	12.2
Cerebral Infarction	7.7
Other	5.8
Subarachnoid Hemorrhage	3.8

Total Deaths = 163,538 (100%)

**Chart 3–4**  
**Number of Hospitalizations, Physician Office Visits, and Deaths for Cardiovascular Diseases, U.S., 2001 and 2002\***

Diagnostic Category	ICD/9 Codes	Hospitalizations		Physician		Deaths
		First-Listed Discharge (1,000)	Length of Stay (Days)	Office Visits (1,000)	ICD/10 Codes	
Total	390–459, 745–747	6,417	4.7	71,416	I00–I99, Q20–Q28	931,108
Heart Disease	390–398, 402, 404–429	4,446	4.6	25,721	I00–I09, I11, I13, I20–I51	700,142
Rheumatic heart disease	390–398	52	7.0	158	I00–I09	3,489
Hypertensive heart disease	402, 404	125	5.3	428	I11, I13	27,515
Coronary heart disease	410–414, 429.2	2,125	4.2	11,799	I20–I25	502,189
AMI	410	818	5.6	193	I21, I22	184,757
Angina pectoris, stable	413	58	2.1	1,216	I20.1–I20.9	298
Angina pectoris, unstable	411	124	2.4	240	I20	83
Atherosclerotic CVD	429.2	0	0.0	157	I25.0	68,103
Other CHD	412, 414	1,125	3.8	10,233	Other I23–I25	248,948
Diseases of pulmonary circulation	415–417	111	6.3	473	I26–I28	13,320
Pulmonary embolism	415.1	99	6.3	237	I26	8,627

Other	415.0, 415.2–417	12	6.1	236	I27–I28	4,693
Subacute bacterial endocarditis	421	18	14.0	19	I33.0	1,145
Cardiomyopathy	425	36	3.6	548	I42	26,863
Atrial fibrillation and flutter	427.3	465	3.6	3,210	I48	9,451
Other arrhythmic disorders	Other 427	323	3.5	2,725	Other I43–I49	29,103
Heart failure	428	973	5.4	4,349	I50	56,934
Congestive heart failure	428.0	970	5.4	4,190	I50.0	52,828
Left heart failure and unspecified	428.1–428.9	3	4.3	159	I50.1, I50.9	4,106
Other heart disease	Other 420–429	212	5.2	2,012	Other I30–I52	30,133
Other hypertensive disease	401, 403	410	3.3	34,580	I10–I12	19,250
Cerebrovascular diseases	430–438	942	5.3	2,855	I60–I69	163,538
Diseases of arteries	440–448	272	6.4	3,083	I70–I79	39,404
Atherosclerosis	440	111	6.8	283	I70	14,086
Aortic aneurysm	441	61	6.9	106	I71	15,234
Other diseases of arteries	442–448	100	5.8	2,194	I72–I78	10,084
Deep vein thrombosis	451.1	8	5.2	0	I80.2	2,730
Other and unspecified CVD	Other 451–459	288	4.8	4,811	Other I80–I99	1,935
Congenital malformations of CV system	745–747	51	7.8	366	Q20–Q28	4,109
Congenital heart disease	745–746	35	7.5	250	Q20–Q24	3,313
Other congenital cardiovascular disease	747	16	8.3	116	Q25–Q28	877

\* 2002 for Hospitalizations and 2001 for Physician Office Visits and Deaths.

Note: Estimates of hospitalizations and physician office visits are subject to sampling variability. Estimates of hospitalizations below 50,000 have a relative standard error of >11%. Estimates of physician office visits below 588,000 have a relative standard error of >30%.

Compiled from references 27, 28, and 32.

### Chart 3–5 Change in Age-Adjusted Death Rates Since 1950, U.S., 1950–2002

The CHD death rate increased 10% from 1950 to its peak in 1968; by 2002, it was 61% lower than it was in 1950. Stroke mortality, on the other hand, declined for most of those years and by 2002 was 69% lower than it was in 1950. By comparison, the death rate for noncardiovascular causes decreased only 12.6% since 1950.<sup>5–6, 25–26, 28</sup>

Year	Percent Change		
	CHD	Stroke	Non-CVD
1950	0.0	0.0	0.0
1951	-1.3	0.4	-2.0
1952	-1.9	-0.3	-4.5
1953	0.0	-0.8	-6.0
1954	-3.1	-4.0	-11.6
1955	0.1	-1.9	-11.8
1956	1.6	-1.8	-12.0
1957	4.1	1.2	-10.6
1958	4.3	1.3	-12.6
1959	3.7	-0.9	-14.0
1960	5.5	-1.6	-11.5
1961	3.7	-4.2	-14.8
1962	6.9	-3.7	-13.2
1963	8.8	-3.8	-10.5
1964	5.4	-7.6	-12.9
1965	6.1	-8.0	-12.2

1966	5.8	-7.5	-11.4
1967	3.3	-11.8	-13.2
1968	9.8	-10.1	-9.8
1969	6.9	-14.0	-11.3
1970	1.9	-18.3	-13.4
1971	2.0	-18.3	-14.8
1972	1.4	-18.5	-14.1
1973	-0.6	-19.7	-14.5
1974	-5.7	-24.3	-17.1
1975	-11.7	-31.7	-18.9
1976	-13.0	-35.0	-18.8
1977	-16.2	-38.9	-20.5
1978	-17.6	-42.6	-19.8
1979	-22.9	-43.0	-21.1
1980	-21.5	-43.5	-18.1
1981	-25.1	-47.5	-19.2
1982	-27.2	-50.6	-20.4
1983	-28.2	-52.3	-18.7
1984	-30.9	-53.7	-17.8
1985	-32.7	-55.1	-15.6
1986	-35.6	-57.1	-14.9
1987	-37.8	-57.9	-14.4
1988	-39.0	-58.6	-12.5
1989	-41.5	-60.8	-12.3
1990	-43.3	-61.7	-13.0
1991	-45.3	-63.1	-13.9
1992	-47.1	-64.0	-15.1
1993	-47.0	-63.3	-13.6
1994	-49.0	-63.3	-12.9
1995	-50.1	-63.0	-13.1
1996	-51.8	-63.4	-14.2
1997	-53.7	-64.2	-15.3
1998	-55.2	-65.3	-14.8
1999	-55.5	-65.8	-12.4
2000	-57.5	-66.4	-12.3
2001	-59.6	-68.0	-12.9
2002	-61.2	-68.8	-12.7

### Chart 3–6

#### Age-Adjusted Death Rates and Percent Change for All Causes and Cardiovascular Diseases, U.S., 1972 and 2002

Between 1972 and 2002, the CVD death rate declined 54% compared with 1.7% increase for all non-CVD causes of death. CHD and stroke mortality declined 62%. CHF, however, more than doubled.<sup>5–6, 25–26, 28</sup>

Cause of Death	Deaths/100,000 Pop.		1972–2002 Difference	Percent Change
	1972	2002		
All causes	1,214.8	846.8	-368.0	-30.3
CVD*	695.4	318.7	-376.7	-54.2
CHD	445.5	170.1	-275.4	-61.8
CHF	9.3	19.5	10.2	109.7
Stroke	147.3	56.3	-91.0	-61.8
Other CVD	93.3	72.3	-21.0	-22.5
Non-CVD	519.4	528.1	8.7	1.7

\* Excludes congenital malformations of the circulatory system.

### Chart 3–7

#### Average Annual Percent Change in Age-Adjusted Death Rates for All Causes and Cardiovascular Diseases, U.S., 1965–2002

CVD mortality declines continued. The latest average annual percent declines were 3.4% for CVD, 4.5% for CHD, and 3.2% for stroke.<sup>5–6, 25–26, 28</sup>

Period	All Causes	Total CVD*	CHD†	Stroke†	Other CVD	All Other Causes
1965–1970	-1.1	-1.9	-0.3	-2.2	-7.0	-0.1
1970–1975	-2.0	-2.7	-2.7	-3.2	-1.8	-1.2
1975–1980	-1.4	-2.4	-2.7	-3.9	-0.5	-0.1
1980–1985	-0.9	-2.4	-2.9	-4.4	-1.0	0.6
1985–1990	-1.0	-2.9	-3.3	-3.1	-2.0	0.8
1990–1998	-0.8	-1.6	-2.8	-0.7	0.4	-0.2
1999–2002	-1.4	-3.4	-4.5	-3.2	-1.2	-0.2

\* Excludes congenital malformations of the circulatory system.

† Comparability ratios applied to CHD and stroke rates 1979–98.

### Chart 3–8

#### Average Annual Percent Change in Age-Adjusted Death Rates for All Causes and Cardiovascular Diseases by Race and Sex, U.S., 1999–2002

Between 1999 and 2002, declines in mortality for CVD, CHD, and stroke were greater for white males than for black males; they were similar for white and black females.<sup>5, 25–26, 28</sup>

Cause of Death	Total	White		Black	
		White Male	Female	Black Male	Female
All causes	-1.4	-1.3	-1.1	-1.8	-2.3
CVD*	-3.4	-3.2	-3.4	-2.3	-3.4
Heart disease	-3.6	-3.3	-3.7	-2.6	-3.7
CHD	-4.5	-4.0	-4.9	-3.0	-4.6
CHF	-1.0	-0.6	-1.0	-1.1	-1.6
Stroke	-3.2	-3.3	-3.3	-2.4	-3.3
Non-CVD	-0.2	-0.1	0.4	-1.5	-1.5

\* Excludes congenital malformations of the circulatory system.

### Chart 3–9

#### Deaths and Age-Adjusted Death Rates for Major Cardiovascular Diseases, U.S., 1979–2002

Age-adjusted CVD death rates declined considerably between 1979 and 2002, despite only a very modest decline in the total number of CVD deaths.<sup>5, 25–26</sup>

Year	Deaths in Thousands	Deaths/100,000 Population
1979	963	535.8
1980	993	543.7
1981	978	519.7
1982	972	505.0
1983	986	501.5
1984	978	487.5
1985	983	480.6
1986	973	466.4
1987	968	455.3
1988	974	450.4
1989	936	425.0
1990	920	412.5
1991	920	400.0
1992	918	389.6
1993	952	395.3
1994	945	384.3
1995	956	380.5
1996	964	372.1
1997	948	362.4
1998	945	353.8
1999	954	352.4
2000	942	341.6
2001	927	328.1
2002	922	318.1

### Chart 3–10

#### Percent of All Deaths Due to Cardiovascular Diseases by Age, U.S., 2001

The percent of deaths due to CVD increased with age among adults. In 2001, it was 19% at ages 35–44 and 51% at ages  $\geq 85$ .<sup>5</sup>

Ages	Percent
<1	8.6
1–4	9.8
5–14	7.5
15–24	5.0
25–34	10.6
35–44	18.8
45–54	26.9
55–64	31.5
65–74	34.7
75–84	41.8
$\geq 85$	51.0

**Chart 3–11****Age-Adjusted Death Rates for Cardiovascular Diseases\* by State, U.S., 1999–2000**

In 1999–2000, CVD mortality was higher in the East than in the West.<sup>5</sup>

Ranking	State	Deaths/100,000 Pop.
1	Mississippi	439.6
2	Oklahoma	414.3
3	West Virginia	404.5
4	Kentucky	398.9
5	Tennessee	398.8
6	Alabama	395.1
7	Arkansas	385.8
8	Louisiana	385.4
9	Georgia	382.8
10	Missouri	381.3
11	South Carolina	378.5
12	Michigan	377.8
13	Indiana	371.5
14	Ohio	369.4
15	North Carolina	366.0
16	New York	360.6
17	Illinois	356.5
18	Pennsylvania	356.2
19	Texas	355.5
20	Maryland	345.7
21	Nevada	345.7
22	Delaware	338.8
23	New Jersey	338.5
24	Virginia	338.0
25	California	335.8
26	Wisconsin	326.8
27	Kansas	325.2
28	Iowa	322.2
29	Maine	316.4
30	New Hampshire	315.3
31	Rhode Island	314.4
32	Florida	314.0
33	South Dakota	309.6
34	Nebraska	307.5
35	North Dakota	307.0
36	Connecticut	306.9
37	Washington	304.6
38	Wyoming	304.3
39	Idaho	301.9
40	Oregon	301.0
41	Vermont	300.4
42	Massachusetts	294.6
43	Arizona	293.3
44	Montana	292.8
45	Alaska	290.1
46	Colorado	280.2
47	New Mexico	279.8
48	Hawaii	278.9
49	Utah	274.7
50	Minnesota	266.9

\* Excludes congenital malformations of the circulatory system.

**Chart 3–12****Percent Decline in Age-Adjusted Death Rates for Cardiovascular Diseases\* by State, U.S., 1989–90 to 1999–2000**

Between 1989–90 and 1999–2000, the smallest average annual percent declines in CVD death rates tended to be in the South.<sup>5</sup>

Ranking	State	Percent
1	Minnesota	-25.0
2	Vermont	-22.2
3	Massachusetts	-21.0
4	New York	-20.7
5	Delaware	-20.7
6	Nebraska	-20.2
7	Rhode Island	-20.1
8	Virginia	-20.1
9	Utah	-19.6
10	South Dakota	-19.5
11	Nevada	-19.4
12	Washington	-18.7
13	New Mexico	-18.6
14	Louisiana	-18.5
15	Illinois	-18.5
16	Maine	-18.3
17	Arizona	-17.8
18	Colorado	-17.7
19	New Hampshire	-17.6
20	Oregon	-17.6
21	South Carolina	-17.5
22	Pennsylvania	-17.2
23	Wisconsin	-17.1
24	New Jersey	-17.0
25	North Dakota	-16.9
26	Connecticut	-16.9
27	California	-16.3
28	Montana	-16.1
29	Idaho	-16.1
30	North Carolina	-16.0
31	Iowa	-15.6
32	Indiana	-15.5
33	Kansas	-15.4
34	Maryland	-15.3
35	Florida	-15.2
36	Alaska	-15.0
37	Ohio	-14.9
38	Georgia	-14.8
39	Wyoming	-14.3
40	Michigan	-14.2
41	Hawaii	-13.9
42	Texas	-12.4
43	West Virginia	-12.3
44	Alabama	-12.1
45	Mississippi	-12.1
46	Kentucky	-11.1
47	Tennessee	-10.5
48	Arkansas	-10.4
49	Missouri	-10.1
50	Oklahoma	-6.2

\* Excludes congenital malformations of the circulatory system.

## Total Heart Disease

**Chart 3–13**

### Age-Adjusted Death Rates for Heart Disease by Race/Ethnicity and Sex, U.S., 1985–2001

Between 1985 and 2001, heart disease death rates declined appreciably in blacks, whites, and Asians, and more modestly in American Indians and Hispanics.<sup>29</sup>

Male: Deaths/100,000 Population					
Year	Black	White*	American Indian	Hispanic	Asian
1985	537.7	480.7	286.8	291.5	258.3
1986	526.7	467.9	281.8	286.8	252.7
1987	515.9	455.3	276.9	282.2	247.2
1988	505.4	443.2	272.1	277.7	241.8
1989	495.1	431.3	267.4	273.2	236.5
1990	484.9	419.8	262.8	268.8	231.3
1991	475.0	408.6	258.2	264.5	226.3
1992	465.3	397.7	253.7	260.3	221.4
1993	455.8	387.0	249.3	256.1	216.5
1994	446.5	376.7	245.0	252.0	211.8
1995	437.4	366.6	240.7	247.9	207.2
1996	428.5	356.8	236.5	244.0	202.7
1997	419.7	347.3	232.4	240.0	198.2
1998	411.1	338.0	228.4	236.2	193.9
1999	402.7	329.0	224.4	232.4	189.7
2000	394.5	320.2	220.5	228.7	185.5
2001	386.4	311.6	216.7	225.0	181.5

Female: Deaths/100,000 Population					
Year	Black	White*	American Indian	Hispanic	Asian
1985	358.9	286.3	169.4	189.4	154.6
1986	353.0	280.3	167.3	187.0	151.6
1987	347.1	274.5	165.2	184.6	148.7
1988	341.3	268.7	163.2	182.3	145.9
1989	335.6	263.1	161.2	179.9	143.1
1990	330.1	257.6	159.2	177.6	140.3
1991	324.6	252.2	157.3	175.4	137.6
1992	319.2	246.9	155.3	173.1	135.0
1993	313.8	241.8	153.4	170.9	132.4
1994	308.6	236.7	151.6	168.7	129.9
1995	303.5	231.7	149.7	166.6	127.4
1996	298.4	226.9	147.9	164.4	124.9
1997	293.5	222.1	146.0	162.3	122.5
1998	288.6	217.5	144.3	160.3	120.2
1999	283.8	212.9	142.5	158.2	117.9
2000	279.1	208.5	140.7	156.2	115.6
2001	274.4	204.1	139.0	154.2	113.4

\* Non-Hispanic.

Note: Each line is a log linear regression derived from the actual rates.

### Chart 3–14

#### Age-Adjusted Death Rates for Heart Disease by Race and Sex, U.S., 2002

In 2002, heart disease mortality was 50% higher in males than in females. Among males, it was 24% higher in blacks than in whites and among females, it was 35% higher in blacks than in whites.<sup>28</sup>

Race	Deaths/100,000 Population	
	Male	Female
Total	296.5	197.2
White	293.7	192.5
Black	365.3	260.6

### Chart 3–15

#### Death Rates for Heart Disease by Age, Race, and Sex, U.S., 2002

Within sex groups, heart disease mortality was higher in blacks than in whites at all ages. Within race groups, it was higher in males than in females.<sup>28</sup>

Ages	Deaths/100,000 Population			
	Black Male	White Male	Black Female	White Female
35–44	72.7	38.2	40.8	14.2
45–54	237.9	125.8	122.4	40.6
55–64	595.0	321.5	302.9	130.2
65–74	1,173.1	809.9	728.7	416.3
75–84	2,421.4	2,115.9	1,803.1	1,374.9

## Coronary Heart Disease

### Chart 3–16

#### Prevalence\* of Coronary Heart Disease by Race and Sex, Ages 25–74, U.S., 1971–74 to 1991–94

The prevalence of CHD increased in blacks between 1971–74 and 1991–94; it decreased in whites, males, and females between 1976–80 and 1991–94.<sup>17</sup>

Year	Percent of Population			
	White	Black	Male	Female
1971–74	4.80	5.04	5.32	4.40
1976–80	5.81	6.22	6.21	5.50
1988–91	5.33	6.75	6.16	4.84
1991–94	4.75	6.97	5.53	4.69

\* Age-adjusted.

**Chart 3–17****Prevalence of Acute Myocardial Infarction by Age and Sex, U.S., 1988–94**

The prevalence of AMI was greater in males than in females at all ages.<sup>17</sup>

Ages	Percent of Population	
	Male	Female
25–34	0.5	0.1
35–44	0.8	0.3
45–54	5.0	1.2
55–64	10.7	4.4
65–74	15.5	7.2
≥75	16.1	12.9

**Chart 3–18****Prevalence of Acute Myocardial Infarction by Age and Race, U.S., 1988–94**

The prevalence of AMI at ages <65 was higher in blacks than in whites, but at ages ≥65 it was higher in whites.<sup>17</sup>

Ages	Percent of Population	
	Black	White
25–34	0.4	0.3
35–44	0.6	0.6
45–54	3.8	3.0
55–64	8.7	6.8
65–74	9.4	11.3
≥75	11.8	14.4

**Chart 3–19****Prevalence of Angina Pectoris by Age and Sex, U.S., 1988–94**

The prevalence of angina pectoris was greater in females aged 25–74; it was greater in males aged ≥75.<sup>17</sup>

Ages	Percent of Population	
	Male	Female
25–34	1.3	1.8
35–44	1.4	3.7
45–54	3.0	4.5
55–64	4.1	4.7
65–74	4.5	5.6
≥75	6.1	5.5

**Chart 3–20**  
**Prevalence of Angina Pectoris by Age and Race, U.S., 1988–94**

The prevalence of angina pectoris was greater in blacks than in whites at all ages.<sup>17</sup>

Ages	Percent of Population	
	Black	White
25–34	3.4	1.3
35–44	3.6	2.6
45–54	5.4	3.5
55–64	5.5	4.3
65–74	6.4	5.1
≥75	6.5	5.7

**Chart 3–21**  
**Hospitalization Rates for Acute Myocardial Infarction, Ages 45–64 and 65 and Over, U.S., 1965–2002**

The AMI hospitalization rate for individuals aged 45–64 increased between 1965 and the mid-1970s; after that, it declined. For individuals aged ≥65, the rate increased from 1965 to its peak in 1986. Since then, it has continued to fluctuate.<sup>27</sup>

Year	Hospitalization/10,000 Population	
	Ages 45–64	Ages ≥65
1965	42.9	98.5
1966	43.3	99.3
1967	45.5	93.5
1968	43.9	99.3
1969	48.4	110.6
1970	53.0	122.0
1971	52.4	119.5
1972	57.6	136.5
1973	53.9	132.0
1974	57.8	137.8
1975	63.9	131.1
1976	63.1	137.6
1977	61.9	136.5
1978	62.5	141.8
1979	56.7	122.4
1980	51.7	129.4
1981	57.9	141.6
1982	57.9	141.5
1983	56.4	139.6
1984	57.5	142.9
1985	59.5	152.7
1986	58.4	155.0
1987	61.5	145.0
1988	52.4	141.6
1989	52.3	143.3
1990	49.6	126.9
1991	48.8	133.5
1992	55.4	137.3
1993	50.5	136.0
1994	51.0	136.7
1995	49.1	140.5
1996	52.2	147.7
1997	47.1	133.5

1998	41.9	146.7
1999	46.4	148.6
2000	39.6	143.2
2001	40.0	140.0
2002	38.9	140.8

**Chart 3–22**

**Hospital Case-Fatality Rates for Acute Myocardial Infarction, Ages 45–64 and 65 and Over, U.S., 1970–2002**

Between 1970 and 2002, AMI hospital case-fatality rates declined substantially for individuals aged 45–64 and  $\geq 65$ .<sup>27</sup>

Year	Percent Discharged Dead	
	Ages 45–64	Ages $\geq 65$
1970	16.0	37.8
1971	14.0	33.0
1972	11.9	32.6
1973	12.7	31.5
1974	10.3	29.6
1975	11.9	28.4
1976	12.1	25.7
1977	10.2	25.9
1978	9.7	28.2
1979	8.5	29.3
1980	8.4	26.6
1981	7.1	23.3
1982	10.0	27.6
1983	8.2	26.4
1984	7.7	22.4
1985	6.9	21.8
1986	7.6	21.0
1987	5.9	19.8
1988	7.4	18.0
1989	4.8	17.2
1990	5.0	17.6
1991	5.9	16.4
1992	3.8	15.7
1993	4.7	13.7
1994	3.8	14.3
1995	3.9	14.0
1996	4.5	14.7
1997	3.7	12.9
1998	3.8	13.6
1999	4.4	12.7
2000	5.8	12.5
2001	4.7	13.2
2002	3.1	11.4

**Chart 3–23**

**Age-Adjusted Death Rates for Coronary Heart Disease, Actual and Expected, U.S., 1950–2002**

CHD accounted for 494,000 deaths in 2002. It would have accounted for 1,394,000 deaths if the rate had remained at its 1968 peak.<sup>5–6, 25–26, 28</sup>

Year	Deaths/100,000 Population		
	Actual Rate	Rate if Rise Continued	Peak Rate
1950	439.5		
1951	433.6		
1952	431.2		
1953	439.5		
1954	426.0		
1955	440.1		
1956	446.7		
1957	457.6		
1958	458.2		
1959	455.8		
1960	463.8		
1961	455.9		
1962	469.7		
1963	478.4		
1964	463.2		
1965	466.4		
1966	465.1		
1967	453.9		
1968	482.6		482.6
1969	469.8		482.6
1970	448.0	479.0	482.6
1971	448.5	481.4	482.6
1972	445.5	483.8	482.6
1973	437.0	486.2	482.6
1974	414.6	488.6	482.6
1975	388.1	491.1	482.6
1976	382.2	493.5	482.6
1977	368.5	496.0	482.6
1978	362.0	498.5	482.6
1979	340.5	501.0	482.6
1980	345.2	503.5	482.6
1981	329.5	506.0	482.6
1982	320.3	508.5	482.6
1983	316.0	511.0	482.6
1984	304.1	513.6	482.6
1985	296.2	516.2	482.6
1986	283.3	518.7	482.6
1987	273.9	521.3	482.6
1988	268.5	524.0	482.6
1989	257.5	526.6	482.6
1990	249.6	529.2	482.6
1991	240.6	531.8	482.6
1992	232.6	534.5	482.6
1993	233.2	537.2	482.6
1994	224.5	539.9	482.6
1995	219.7	542.6	482.6
1996	212.1	545.3	482.6

1997	203.6	548.0	482.6
1998	197.1	550.7	482.6
1999	195.7	553.5	482.6
2000	186.6	556.3	482.6
2001	177.8	559.1	482.6
2002	170.6	561.9	482.6

### Chart 3–24

#### Age-Adjusted Death Rates for Coronary Heart Disease by Race and Sex, U.S., 1950–2002

In the 1950s and 1960s, CHD death rates increased for blacks and white males; they were relatively stable for white females. Since then, the rates have declined appreciably.<sup>5–6, 28</sup>

Year	Deaths/100,000 Population			
	Black Male*	White Male	Black Female*	White Female
1950	365.2	558.6	276.7	346.0
1951	365.7	555.9	269.0	338.0
1952	365.6	553.4	271.5	338.3
1953	386.8	558.2	278.2	342.3
1954	362.1	555.4	263.0	331.0
1955	372.9	568.7	274.0	343.4
1956	388.3	575.4	286.0	347.5
1957	410.8	589.0	297.8	355.8
1958	409.9	592.4	292.3	356.7
1959	407.1	590.7	284.1	355.0
1960	388.8	605.6	292.3	356.5
1961	420.5	598.2	305.2	348.0
1962	444.2	610.4	313.6	354.4
1963	461.9	624.5	318.5	359.8
1964	442.1	611.1	312.8	353.4
1965	419.3	613.9	303.0	358.6
1966	460.6	619.4	314.0	352.9
1967	441.8	608.4	301.3	343.7
1968	556.8	632.4	399.3	367.7
1969	539.5	619.5	381.3	357.2
1970	517.2	592.5	368.0	339.9
1971	511.2	596.7	357.3	340.0
1972	515.9	592.1	352.9	338.4
1973	510.4	584.4	355.5	329.8
1974	485.2	555.4	329.9	313.6
1975	452.7	525.5	304.5	291.2
1976	446.6	517.6	298.3	287.8
1977	441.6	500.2	296.2	275.9
1978	433.1	489.3	287.7	272.9
1979	397.3	462.1	255.8	255.4
1980	418.7	466.3	274.2	262.6
1981	396.2	447.5	258.2	250.2
1982	383.5	435.0	249.6	243.7
1983	383.6	427.3	254.7	241.1
1984	370.0	410.1	244.3	232.9
1985	367.9	399.3	241.0	226.4
1986	359.0	377.8	238.5	218.0
1987	352.6	363.4	232.4	211.5
1988	348.3	355.7	232.5	207.6
1989	345.6	339.5	228.6	198.5
1990	336.9	330.5	220.1	192.1
1991	331.7	317.6	216.1	184.7
1992	319.0	307.6	208.8	178.2

1993	324.6	306.8	215.3	178.9
1994	308.5	295.3	203.9	172.7
1995	308.7	287.3	201.8	169.3
1996	290.7	278.3	195.2	163.4
1997	283.8	266.5	187.6	156.6
1998	277.2	256.7	183.3	152.0
1999	272.6	249.4	192.5	152.5
2000	262.4	238.0	187.5	145.3
2001	262.0	228.4	176.7	137.4
2002	246.6	220.3	167.8	131.4

\* Nonwhite from 1950 to 1967.

**Chart 3–25**  
**Deaths and Age-Adjusted Death Rates for Coronary Heart Disease, U.S., 1979–2002**

Since 1980, the number of deaths and the age-adjusted death rates for CHD have decreased almost every year.<sup>5, 25–26</sup>

Year	Deaths (Thousands)	Deaths/100,000 Population
1979	617	340.5
1980	636	345.2
1981	624	329.5
1982	621	320.3
1983	625	316.0
1984	613	304.1
1985	608	296.2
1986	593	283.4
1987	584	273.9
1988	582	268.5
1989	569	257.5
1990	558	249.6
1991	555	240.6
1992	549	232.6
1993	563	233.2
1994	553	224.5
1995	552	219.7
1996	545	212.1
1997	533	203.6
1998	527	197.1
1999	530	195.8
2000	514	186.6
2001	502	177.8
2002	494	170.6

**Chart 3–26****Average Annual Percent Change in Age-Adjusted Death Rates for Coronary Heart Disease by Race and Sex, U.S., 1950–2002**

Since 1980, white males and females experienced steeper declines in CHD mortality than black males and females.<sup>5-6, 25-26, 28</sup>

Period	Total Pop.	White Male	White Female	Black Male	Black Female
1950–1960	0.7	0.9	0.6	1.2	0.8
1960–1970	-0.1	0.1	-0.1	2.8	2.4
1970–1980	-3.1	-2.8	-3.2	-2.7	-3.5
1980–1990	-3.1	-3.4	-3.0	-1.9	-1.8
1990–1998	-2.8	-3.0	-2.7	-2.4	-2.2
1999–2002	-4.5	-4.0	-4.9	-2.9	-4.5

**Chart 3–27****Average Annual Percent Change in Death Rates for Coronary Heart Disease by Age, Race, and Sex, U.S., 1999–2002**

Between 1999 and 2002, the average annual percent declines in CHD mortality tended to be smaller with advancing age for white males aged  $\geq 65$  and for white females and black males aged  $\geq 55$ .<sup>5, 28</sup>

Ages	White Male	White Female	Black Male	Black Female
35–44	-1.0	1.6	-4.5	-2.8
45–54	-3.6	-2.6	-5.6	-2.5
55–64	-5.2	-6.0	-5.8	-3.8
65–74	-5.7	-5.6	-3.1	-5.3
75–84	-3.7	-4.8	-1.7	-5.4
$\geq 85$	-3.3	-4.8	-1.5	-4.0

**Chart 3–28****Age-Adjusted Death Rates for Coronary Heart Disease by Race and Sex, U.S., 2002**

In 2002, CHD mortality within sex groups was higher in blacks than in whites; it was considerably higher in males than in females.<sup>28</sup>

Sex	Deaths/100,000 Population		
	Total	White	Black
Male	219.8	220.3	246.6
Female	133.5	131.4	167.8

**Chart 3–29****Death Rates for Coronary Heart Disease by Age, Race, and Sex, U.S., 2002**

In 2002, CHD mortality within sex groups was higher in blacks than in whites for all age groups. Death rates were also higher in males than in females.<sup>28</sup>

Ages	Deaths/100,000 Population			
	Black Male	White Male	Black Female	White Female
35–44	34.1	24.9	15.7	7.0
45–54	138.7	94.3	64.0	24.9
55–64	401.4	252.5	188.7	89.0
65–74	824.3	634.6	487.2	293.5
75–84	1,723.4	1,609.7	1,223.0	959.3

**Chart 3–30****Age-Adjusted Death Rates for Coronary Heart Disease by State, U.S., 1999–2000**

In 1999–2000, high CHD death rates were in a narrow band of States from New York through Appalachia to Oklahoma. Many western Mountain States had low rates.<sup>5</sup>

Rank	State	Deaths/100,000 Population
1	New York	242.6
2	Oklahoma	234.4
3	West Virginia	224.9
4	Tennessee	222.8
5	Michigan	215.3
6	Mississippi	213.3
7	Rhode Island	212.9
8	Missouri	211.7
9	Ohio	206.3
10	Kentucky	204.8
11	New Jersey	203.2
12	Delaware	199.9
13	Texas	197.6
14	Illinois	197.4
15	Pennsylvania	196.0
16	California	195.1
17	Indiana	193.1
18	Florida	192.2
19	Maryland	191.6
20	Louisiana	191.5
21	Iowa	190.4
22	North Carolina	188.7
23	Arkansas	187.4
24	South Carolina	184.1
25	New Hampshire	182.5
26	South Dakota	170.9
27	Maine	168.7
28	Alabama	168.1
29	Wisconsin	168.0
30	Arizona	167.7
31	Nevada	167.1
32	North Dakota	167.1
33	Connecticut	166.7

34	Vermont	166.1
35	Georgia	165.5
36	Washington	161.1
37	Virginia	160.9
38	Kansas	157.2
39	New Mexico	152.8
40	Idaho	152.4
41	Wyoming	150.3
42	Massachusetts	149.7
43	Oregon	137.0
44	Nebraska	136.9
45	Alaska	132.7
46	Colorado	131.2
47	Montana	127.7
48	Minnesota	123.3
49	Hawaii	119.9
50	Utah	115.4

### Chart 3–31

#### Age-Adjusted Death Rates\* for Coronary Heart Disease by Country and Sex, Ages 35–74, 2002

In 2002, among 15 industrialized countries, the United States ranked seventh highest for CHD mortality in males and fifth in females.<sup>38</sup>

Country	Male	Female
HUN	343.6	137.5
ROM	342.2	152.1
SCO (00)	291.4	111.5
CZR (01)	279.3	100.8
POL (01)	255.2	80.5
FIN	230.9	57.7
USA	196.9	81.5
GER (01)	169.6	55.0
DEN (99)	164.3	58.6
SWE (01)	161.5	52.4
NOR (01)	152.4	46.7
NTH (00)	140.9	48.4
AUL (01)	138.4	46.9
KOR (01)	53.9	22.4
JPN (00)	53.7	17.2

\* Age-adjusted to European standard.

Note: Data for 2002 unless otherwise indicated in parentheses.

### Chart 3–32

#### Change in Age-Adjusted Death Rates\* for Coronary Heart Disease in Males by Country, Ages 35–74, 1995–2002

Between 1995 and 2002 (or latest data year), eight countries had a steeper decline in CHD mortality in males than the United States.<sup>38</sup>

Country	Percent Change <sup>†</sup>
DEN (95–99)	-8.7
NOR (96–01)	-7.8
AUL (98–01)	-7.1
CZR (95–01)	-6.7
POL (99–01)	-6.3
NTH (96–00)	-6.1
SWE (97–01)	-5.8
GER (98–01)	-5.5
USA (99–02)	-5.2
FIN (96–02)	-5.1
HUN (96–02)	-3.9
JPN (95–00)	-1.8
ROM (99–02)	-1.0
KOR (99–01)	4.9

\* Age-adjusted to the European standard.

† Based on a log linear regression of the actual rates.

Note: Data for years indicated in parentheses.

### Chart 3–33

#### Change in Age-Adjusted Death Rates\* for Coronary Heart Disease in Females by Country, Ages 35–74, 1995–2002

Between 1990 and 1999, eight countries had a steeper decline in CHD mortality in females than the United States.<sup>38</sup>

Country	Percent Change <sup>†</sup>
DEN (95–99)	-9.2
CZR (95–01)	-7.6
AUL (98–01)	-7.5
GER (98–01)	-7.2
NTH (96–00)	-6.3
KOR (99–01)	-6.2
FIN (99–02)	-6.0
POL (99–01)	-5.8
USA (99–02)	-5.2
JPN (95–00)	-4.9
NOR (96–01)	-4.7
SWE (97–01)	-4.5
HUN (96–02)	-3.1
ROM (99–02)	-2.8

\* Age-adjusted to the European standard.

† Based on a log linear regression of the actual rates.

Note: The latest data years are indicated in parentheses.

## Congestive Heart Failure

### Chart 3–34

#### Prevalence\* of Congestive Heart Failure by Race and Sex, Ages 25–74, U.S., 1971–74 to 1999–2000

Between 1976–80 and 1988–94, the prevalence of CHF increased substantially in each group: male and female, black and white; it then declined in 1999–2000.<sup>17</sup>

Years	Percent of Population			
	White	Black	Male	Female
1971–74	0.93	1.34	0.96	0.97
1976–80	0.84	1.01	1.08	0.68
1988–94	1.86	2.72	2.32	1.54
1999–2000	1.65	2.39	2.24	1.24

\* Age-adjusted.

### Chart 3–35

#### Hospitalization Rates for Congestive Heart Failure, Ages 45–64 and 65 and Over, U.S., 1971–2002

Between 1971 and 2002, CHF hospitalization rates more than tripled for individuals aged 45–64 and  $\geq 65$ .<sup>27</sup>

Year	Hospitalizations/10,000 Population	
	Ages 45–64	Ages $\geq 65$
1971	9.5	60.1
1972	11.3	73.3
1973	12.0	78.2
1974	12.8	82.7
1975	13.2	88.3
1976	13.7	97.3
1977	14.2	106.4
1978	14.9	112.5
1979	15.5	127.7
1980	14.3	133.5
1981	15.6	130.8
1982	16.2	132.6
1983	20.1	132.7
1984	20.6	151.7
1985	21.4	156.3
1986	23.1	158.2
1987	22.7	161.8
1988	24.4	175.5
1989	25.6	168.5
1990	26.0	182.0
1991	27.0	193.6
1992	31.5	206.4
1993	34.1	207.6
1994	29.8	210.0
1995	27.2	208.0
1996	28.5	202.7
1997	31.3	223.2
1998	30.6	226.7
1999	29.4	221.1
2000	31.9	220.2
2001	31.2	216.8
2002	32.8	201.4

**Chart 3–36****Hospital Case-Fatality Rates for Congestive Heart Failure, Ages 45–64 and 65 and Over, U.S., 1981–2002**

The percent of CHF hospital discharges that were discharged dead declined during the 1981–2002 period for individuals aged 45–65 and  $\geq 65$ .<sup>27</sup>

Year	Percent Discharged Dead	
	Ages 45–65	Ages $\geq 65$
1981		11.6
1982	4.5	10.5
1983	5.9	10.7
1984	5.2	9.8
1985	4.5	9.0
1986	3.7	9.9
1987	4.6	7.9
1988	5.4	9.3
1989	4.1	7.6
1990	4.0	8.1
1991	3.9	8.9
1992	2.7	8.0
1993	2.6	7.2
1994	2.2	7.1
1995	3.4	5.0
1996	3.3	5.4
1997	1.6	5.6
1998	2.3	4.8
1999	1.3	6.0
2000	1.5	5.0
2001	2.4	4.6
2002	1.1	4.4

**Chart 3–37****Age-Adjusted Death Rates for Heart Failure by Race and Sex, U.S., 1979–2002**

In the 1990s–2002, heart failure death rates for whites and blacks tended to level off after steady increases.<sup>5,28</sup>

Year	Deaths/100,000 Population			
	Black Male	White Male	Black Female	White Female
1979	22.4	16.9	17.2	12.0
1980	24.4	18.2	19.1	13.1
1981	23.8	18.7	18.1	13.7
1982	23.8	19.4	18.7	14.3
1983	24.8	20.2	19.4	15.2
1984	26.3	20.9	20.9	15.9
1985	27.0	21.3	21.8	16.9
1986	27.2	22.6	23.2	17.6
1987	26.7	22.3	21.5	18.0
1988	27.4	22.9	22.4	18.4
1989	23.8	19.7	20.8	16.4
1990	24.3	19.3	19.0	16.0
1991	22.6	19.1	19.0	16.0
1992	21.8	19.1	18.3	16.0
1993	23.8	21.0	20.1	17.9

1994	22.5	20.4	18.6	17.5
1995	23.0	20.3	18.7	17.6
1996	22.6	20.4	18.7	17.4
1997	21.8	20.4	19.0	17.8
1998	23.1	20.2	19.1	18.0
1999	25.3	21.4	20.9	19.3
2000	24.1	21.6	20.7	19.3
2001	24.1	21.1	20.5	19.3
2002	23.1	20.5	20.5	18.8

Note: The break in the trend lines is intended to signal a discrepancy arising from the adoption of new cause-of-death coding instructions on death certificates in 1989.

**Chart 3–38**  
**Age-Adjusted Death Rates for Heart Failure by Race and Sex, U.S., 2002**

In 2002, death rates for heart failure within sex groups were slightly higher in blacks than in whites; they were slightly higher in males than in females.<sup>28</sup>

Race	Deaths/100,000 Population	
	Male	Female
Total	20.5	18.7
White	20.5	18.8
Black	23.1	20.5

**Chart 3–39**  
**Death Rates for Heart Failure by Age, Race, and Sex, U.S., 2002**

In 2002, heart failure mortality within sex groups was higher in blacks than in whites at all ages. Within race groups, it was higher in males than in females.<sup>28</sup>

Ages	Deaths/100,000 Population			
	Black Male	White Male	Black Female	White Female
35–44	2.3	0.6	1.5	0.4
45–54	9.0	2.5	5.6	1.3
55–64	22.9	9.5	15.4	6.7
65–74	64.7	38.0	45.2	28.2
75–84	172.6	151.6	144.8	123.3

### Chart 3–40

#### Age-Adjusted Death Rates\* for Heart Failure by Country and Sex, Ages 35–74, 2002

In 2002, the United States ranked seventh highest for heart failure mortality in males and in females.<sup>38</sup>

Country	Deaths/100,000 Population	
	Male	Female
POL (01)	55.5	24.5
GER (01)	22.3	12.1
JPN (00)	20.7	9.2
NTH (00)	15.0	8.4
CZR (01)	12.4	6.9
DEN (99)	11.3	12.5
USA	9.7	6.9
NOR (01)	7.0	3.8
HUN	6.4	2.8
SCO (00)	6.0	2.6
SWE (01)	3.4	2.0
AUL (01)	3.2	2.3
KOR (01)	3.1	2.4
FIN	2.2	1.1
ROM (99)	1.3	1.1

\* Age-adjusted to European standard.

Note: Data for 2002 unless otherwise indicated in parentheses.

## Cardiomyopathy

### Chart 3–41

#### Age-Adjusted Death Rates for Cardiomyopathy by Race and Sex, U.S., 2001

In 2001, the cardiomyopathy death rate was approximately twice as high in blacks as in whites. It was also approximately twice as high in males as in females.<sup>28</sup>

Race	Deaths/100,000 Population	
	Male	Female
Total	13.11	6.84
White	12.20	6.22
Black	23.29	12.49

### Chart 3–42

#### Death Rates for Cardiomyopathy by Age, Race, and Sex, U.S., 2001

In 2001, within sex groups, cardiomyopathy mortality was higher in blacks than in whites at each age; within race groups, it was higher in males than in females.<sup>28</sup>

Ages	Deaths/100,000 Population			
	Black Male	White Male	Black Female	White Female
35–44	13.09	3.71	6.14	1.28
45–54	23.75	7.22	11.98	2.82
55–64	43.33	14.95	19.72	6.37
65–74	67.19	35.24	36.27	17.22
75–84	127.71	83.03	69.07	42.41

## Atrial Fibrillation

**Chart 3–43**  
**Hospitalizations for Atrial Fibrillation, U.S., 1982–2002**

Between 1982 and 2002, hospitalizations with atrial fibrillation as a primary or secondary diagnosis increased significantly.<sup>27</sup>

Year	Number (Thousands)	
	Primary	Secondary
1982	115	429
1983	115	473
1984	111	553
1985	142	612
1986	150	693
1987	146	749
1988	171	820
1989	162	888
1990	181	922
1991	210	1,031
1992	227	1,133
1993	240	1,215
1994	277	1,309
1995	270	1,348
1996	286	1,528
1997	319	1,692
1998	327	1,774
1999	347	1,872
2000	399	2,001
2001	416	2,097
2002	465	2,258

**Chart 3–44**  
**Hospitalization Rates for Atrial Fibrillation by Age, U.S., 1982–2002**

Between 1982 and 2002, the hospitalization rate for atrial fibrillation in patients aged 45–65 doubled; it more than tripled for those aged  $\geq 65$ .<sup>27</sup>

Year	Hospitalizations/10,000 Population	
	Ages 45–64	Ages $\geq 65$
1982	6.8	28.3
1983	7.0	27.4
1984	6.3	26.7
1985	8.7	34.0
1986	8.2	37.0
1987	6.8	35.9
1988	8.5	40.2
1989	8.4	36.8
1990	9.6	40.2
1991	10.1	47.9
1992	10.4	51.1
1993	9.9	54.3
1994	10.6	62.4
1995	10.5	60.5
1996	11.4	62.3
1997	11.6	70.5

1998	13.5	68.6
1999	12.4	74.2
2000	14.8	84.4
2001	13.2	88.1
2002	14.6	96.9

## Cerebrovascular Diseases (Stroke)

### Chart 3–45

#### Prevalence\* of Stroke by Race and Sex, Ages 25–74, U.S., 1971–74 to 1991–94

Between 1971–74 and 1991–94, the prevalence of stroke increased in males and females and in blacks and whites.<sup>17</sup>

Years	Percent of Population			
	White	Black	Male	Female
1971–74	1.2	2.0	1.3	1.2
1976–80	1.3	2.0	1.4	1.2
1988–91	1.6	1.9	1.6	1.1
1991–94	1.6	2.6	2.0	1.5

\* Age-adjusted.

### Chart 3–46

#### Prevalence of Stroke by Age and Sex, U.S., 1988–94

In 1988–94, the prevalence of stroke was higher in males than in females at all ages.<sup>17</sup>

Ages	Percent of Population	
	Male	Female
35–44	0.5	0.4
45–54	2.2	1.0
55–64	4.0	2.7
65–74	5.9	5.8
>75	12.5	10.7

### Chart 3–47

#### Prevalence of Stroke by Age and Race, U.S., 1988–94

In 1988–94, the prevalence of stroke was higher in blacks than in whites at all ages.<sup>17</sup>

Ages	Percent of Population	
	Black	White
35–44	0.6	0.5
45–54	2.1	1.6
55–64	4.6	3.3
65–74	10.1	5.5
≥75	15.8	10.8

**Chart 3–48****Hospitalization Rates for Stroke, Ages 45–64 and 65 and Over, U.S., 1971–2002**

Hospitalization rates for stroke in patients aged 45–64 and  $\geq 65$  increased between 1971 and the mid-1980s; no clear trend followed to 2002.<sup>27</sup>

Year	Hospitalizations/10,000 Population	
	Ages 45–64	Ages $\geq 65$
1971	30.1	192.6
1972	34.8	207.1
1973	35.0	211.0
1974	35.2	214.9
1975	34.8	202.1
1976	33.9	207.3
1977	34.8	204.8
1978	35.4	204.1
1979	37.4	237.1
1980	38.5	231.6
1981	39.7	226.2
1982	40.6	230.1
1983	41.5	234.1
1984	42.9	237.8
1985	42.9	240.3
1986	39.5	231.0
1987	42.3	223.0
1988	37.2	190.4
1989	33.6	192.6
1990	33.2	193.1
1991	33.5	201.5
1992	35.6	193.6
1993	34.7	192.0
1994	35.1	204.4
1995	34.8	209.8
1996	34.8	214.7
1997	36.5	228.6
1998	38.2	218.7
1999	36.3	205.5
2000	37.4	204.1
2001	31.6	194.1
2002	34.4	187.9

**Chart 3–49****Hospital Case-Fatality Rate for Stroke, Ages Under 65 and 65 and Over, U.S., 1971–2002**

Hospital case-fatality rates for stroke in both groups declined appreciably between 1971 and the mid-1980s and modestly thereafter.<sup>27</sup>

Year	Percent Discharged Dead	
	Ages <65	Ages $\geq 65$
1971	17.7	20.1
1972	16.7	20.8
1973	15.2	20.2
1974	13.4	16.9
1975	12.9	17.8
1976		
1977		

1978	11.3	15.5
1979	9.5	14.0
1980		
1981	9.6	11.5
1982		
1983	5.9	10.7
1984		
1985	6.2	9.5
1986	6.9	9.9
1987	7.2	9.8
1988	5.9	11.1
1989	5.2	9.1
1990	6.0	8.9
1991	6.1	8.9
1992	7.4	7.3
1993	5.4	7.8
1994	5.9	7.2
1995	5.9	7.7
1996	4.9	7.0
1997	6.3	6.2
1998	6.1	6.6
1999	5.4	7.6
2000	5.8	6.6
2001	6.5	6.1
2002	5.3	6.9

**Chart 3–50**  
**Age-Adjusted Death Rates for Stroke by Race and Sex, U.S., 1950–2002**

The steep decline in stroke mortality that occurred for all four groups in the 1970s slowed in the 1980s and 1990s. Declines resumed between 1999 and 2002.<sup>5-6, 28</sup>

Year	Deaths/100,000 Population			
	Black Male*	White Male	Black Female*	White Female
1950	231.3	182.1	240.6	169.7
1951	230.3	180.7	237.3	172.1
1952	233.7	180.1	235.0	170.0
1953	226.5	178.7	228.6	169.9
1954	221.1	173.0	223.7	163.9
1955	222.8	178.8	221.9	167.0
1956	221.8	178.8	225.0	166.9
1957	231.8	185.4	231.5	171.1
1958	237.7	184.3	229.3	172.0
1959	227.2	181.6	229.2	167.2
1960	230.4	181.6	225.2	164.9
1961	219.7	176.7	219.5	160.6
1962	229.0	178.7	225.5	161.6
1963	234.1	179.1	222.0	160.7
1964	220.5	171.9	209.6	153.5
1965	222.9	171.8	210.1	152.3
1966	222.0	171.2	205.0	152.0
1967	206.5	166.5	190.6	145.9

1968	232.8	169.2	208.9	148.4
1969	221.7	162.4	197.2	141.9
1970	206.4	153.7	189.3	135.5
1971	200.4	156.6	179.7	134.3
1972	200.8	156.2	178.8	134.2
1973	197.6	151.7	175.7	133.6
1974	184.6	144.1	160.6	125.9
1975	167.8	130.9	145.1	113.3
1976	162.3	123.3	138.2	108.3
1977	153.1	116.1	132.4	101.4
1978	145.7	107.8	124.4	95.8
1979	139.7	100.4	117.5	89.9
1980	142.1	99.0	119.8	89.2
1981	132.2	91.5	112.7	83.3
1982	123.9	86.3	105.9	78.2
1983	118.2	83.5	104.4	75.0
1984	115.1	80.4	100.3	73.1
1985	112.7	77.4	99.4	70.9
1986	110.7	73.7	93.5	68.1
1987	108.3	72.0	91.6	66.7
1988	109.6	71.6	92.4	65.0
1989	104.0	67.3	89.5	61.7
1990	102.2	65.5	84.0	60.3
1991	100.9	63.1	80.7	57.7
1992	94.7	62.2	78.1	56.6
1993	96.2	63.5	78.9	57.8
1994	96.5	63.1	78.8	57.7
1995	97.0	62.9	79.4	58.6
1996	94.4	62.6	77.3	58.0
1997	89.7	61.4	74.4	56.8
1998	88.0	58.1	73.7	55.8
1999	87.4	60.0	78.1	58.7
2000	87.1	58.8	78.1	57.8
2001	85.4	58.5	73.7	54.5
2002	81.0	54.4	71.3	53.6

\* Nonwhite from 1950 to 1967.

### Chart 3–51 Deaths and Age-Adjusted Death Rates for Stroke, U.S., 1979–2002

Between 1979 and the early 1990s, the number of deaths and the age-adjusted death rates for stroke declined. The number of deaths remained relatively stable after the mid-1990s, while the adjusted rates continued to drop.<sup>5, 25–26</sup>

Year	Deaths (Thousands)	Deaths/100,000 Population
1979	179	103.0
1980	180	102.1
1981	174	95.0
1982	167	89.4
1983	165	86.2
1984	163	83.6
1985	162	81.1
1986	159	77.6

1987	159	76.0
1988	160	75.0
1989	156	71.0
1990	152	69.4
1991	151	66.6
1992	152	65.1
1993	159	66.4
1994	162	66.3
1995	167	66.8
1996	169	66.2
1997	169	64.7
1998	167	62.8
1999	167	61.8
2000	168	60.8
2001	164	57.9
2002	163	56.3

Note: The comparability ratio 1.0588 was applied to the deaths and rates reported in vital statistics for 1979–98.

### Chart 3–52 Age-Adjusted Death Rates for Stroke by Race/Ethnicity and Sex, U.S., 1985–2001

Between 1985 and 2001, stroke mortality declined for all groups. The decrease was modest among Hispanic and Asian males and American Indian females.<sup>29</sup>

#### Male: Deaths/100,000 Population

Year	Black	White*	American			Asian
			Indian	Hispanic	Asian	
1985	120.9	79.6	52.1	56.8	69.8	
1986	118.5	78.1	51.4	56.2	69.0	
1987	116.0	76.6	50.7	55.6	68.3	
1988	113.7	75.2	50.0	55.0	67.5	
1989	111.4	73.7	49.3	54.4	66.8	
1990	109.1	72.3	48.6	53.8	66.1	
1991	106.9	71.0	48.0	53.2	65.4	
1992	104.7	69.6	47.3	52.6	64.7	
1993	102.5	68.3	46.7	52.0	64.0	
1994	100.4	67.0	46.0	51.5	63.3	
1995	98.4	65.8	45.4	50.9	62.6	
1996	96.4	64.5	44.8	50.4	61.9	
1997	94.4	63.3	44.2	49.8	61.2	
1998	92.5	62.1	43.6	49.3	60.6	
1999	90.6	60.9	43.0	48.8	59.9	
2000	88.8	59.8	42.4	48.2	59.3	
2001	87.0	58.6	41.8	47.7	58.6	

#### Female: Deaths/100,000 Population

Year	Black	White*	American			Asian
			Indian	Hispanic	Asian	
1985	102.9	73.1	45.3	49.3	59.7	
1986	100.9	71.9	45.2	48.7	58.9	
1987	98.8	70.8	45.1	48.0	58.2	
1988	96.8	69.7	45.0	47.4	57.4	
1989	94.8	68.6	44.9	46.7	56.6	
1990	92.9	67.5	44.8	46.1	55.9	
1991	91.0	66.5	44.7	45.5	55.2	
1992	89.2	65.4	44.6	44.9	54.4	
1993	87.4	64.4	44.5	44.3	53.7	

1994	85.6	63.4	44.4	43.7	53.0
1995	83.8	62.4	44.3	43.1	52.3
1996	82.1	61.4	44.2	42.6	51.6
1997	80.5	60.4	44.1	42.0	51.0
1998	78.8	59.5	44.0	41.4	50.3
1999	77.2	58.5	43.9	40.9	49.6
2000	75.7	57.6	43.8	40.3	49.0
2001	74.1	56.7	43.7	39.8	48.3

\* Non-Hispanic.

Note: Each line is a log linear regression derived from the actual rates. The comparability ration 1.0588 was applied to rates reported in vital statistics for 1985–98.

### Chart 3–53 Average Annual Percent Change in Age-Adjusted Death Rates for Stroke by Race and Sex, U.S., 1960–2002

The steep declines in stroke mortality that occurred in males and females and in whites and blacks during the 1970s and 1980s were followed by modest changes from 1990 to 1995 and appreciable declines from 1999 to 2002.<sup>5-6, 28</sup>

Period	Total Population	White Male	White Female	Black Male	Black Female
1960–1965	-1.3	-1.0	-1.5	-0.4	-1.4
1965–1970	-2.2	-2.0	-2.2	-0.8	-1.5
1970–1975	-3.2	-3.0	-3.1	-3.6	-4.7
1975–1980	-5.2	-5.8	-5.0	-3.7	-4.2
1980–1985	-4.4	-4.6	-4.4	-4.5	-3.6
1985–1990	-3.0	-3.1	-3.1	-1.9	-2.7
1990–1995	-0.5	-0.5	-0.4	-1.1	-1.0
1995–1998	-2.1	-1.5	-0.4	-2.2	-0.2
1999–2002	-3.2	-3.3	-3.3	-2.4	-3.3

### Chart 3–54 Age-Adjusted Death Rates for Stroke by Race and Sex, U.S., 2002

In 2002, stroke mortality was appreciably higher in blacks than in whites and about the same in males and females.<sup>28</sup>

Race	Deaths/100,000 Population	
	Male	Female
Total	56.6	55.3
White	54.4	53.6
Black	81.0	71.3

### Chart 3–55 Death Rates for Stroke by Age, Race, and Sex, U.S., 2002

In 2002, stroke mortality was higher in blacks than in whites at all ages. Within race groups, it was higher in males than in females.<sup>28</sup>

Ages	Deaths/100,000 Population			
	Black Male	White Male	Black Female	White Female
35–44	12.1	4.2	13.1	4.1

45–54	45.3	12.8	35.0	10.4
55–64	107.8	35.6	69.3	27.5
65–74	260.9	125.3	180.5	100.3
75–84	583.7	439.7	529.4	415.8

**Chart 3–56**  
**Age-Adjusted Death Rates for Stroke by State, U.S., 1999–2000**

In 1999–2000, stroke mortality was highest in many of the southeastern States, most of which comprise “the stroke belt”; Indiana; and the northern Pacific States.<sup>5</sup>

Rank	State	Deaths/100,000 Population
1	South Carolina	82.4
2	North Carolina	78.2
3	Arkansas	77.4
4	Tennessee	77.4
5	Oregon	75.1
6	Georgia	73.6
7	Mississippi	71.6
8	Alabama	71.5
9	Indiana	70.3
10	Oklahoma	69.5
11	Washington	69.3
12	Kentucky	69.0
13	Alaska	68.6
14	Virginia	68.0
15	Texas	66.2
16	Louisiana	65.8
17	Missouri	65.4
18	Wisconsin	64.8
19	Idaho	64.6
20	California	64.2
21	Maryland	63.4
22	Utah	63.1
23	Illinois	62.9
24	Michigan	62.9
25	Hawaii	62.8
26	West Virginia	62.2
27	Ohio	61.8
28	Kansas	61.1
29	Montana	61.1
30	South Dakota	60.8
31	Iowa	60.2
32	Wyoming	59.5
33	North Dakota	59.3
34	Maine	59.1
35	Pennsylvania	58.2
36	Nebraska	58.0
37	Colorado	57.9
38	Nevada	57.9
39	Minnesota	57.8
40	New Hampshire	57.1
41	Vermont	55.3
42	Arizona	54.1
43	Delaware	53.5
44	New Mexico	51.5
45	Massachusetts	50.9
46	Connecticut	50.7
47	Florida	50.0
48	New Jersey	48.2

49	Rhode Island	48.0
50	New York	41.6

### Chart 3–57

#### Age-Adjusted Death Rates\* for Stroke by Country and Sex, Ages 35–74, 2002

In 2002, among 15 industrialized countries, the United States had one of the lowest death rates for stroke. Eastern European countries and Korea had markedly higher rates compared with other countries.<sup>38</sup>

Country	Deaths/100,000 Populations	
	Male	Female
ROM (01)	275.0	180.8
HUN	183.9	93.1
KOR (01)	150.4	88.1
POL (01)	130.6	76.0
CZR (01)	106.9	66.6
JPN (00)	71.7	35.7
SCO (00)	70.3	52.9
DEN (99)	64.2	41.6
FIN	58.2	37.7
GER (01)	47.1	27.8
NTH (00)	45.1	33.5
NOR (01)	42.7	26.2
SWE (01)	42.0	28.9
USA	37.4	33.5
AUL (01)	30.9	22.1

\* Age-adjusted to the European standard.

Note: Data for 2002 unless otherwise indicated in parentheses.

### Chart 3–58

#### Change in Age-Adjusted Death Rates\* for Stroke in Males by Country, Ages 35–74, 1995–2002

Between 1995 and 2002, nine countries had greater percent declines in stroke mortality for males than the United States.<sup>38</sup>

Country	Percent Change <sup>†</sup>
AUL (98–01)	-6.4
GER (98–01)	-5.7
NOR (96–01)	-5.5
SWE (97–01)	-5.2
KOR (95–01)	-5.2
FIN (96–02)	-4.9
CZR (95–01)	-4.8
NTH (96–00)	-3.8
JPN (95–00)	-3.5
USA (99–02)	-3.3
HUN (96–02)	-2.7
POL (99–01)	-2.6
DEN (95–99)	-1.5
ROM (99–01)	-0.6

\* Age-adjusted to the European standard.

† Based on a log linear regression of the actual rates.

Note: Data for years indicated in parentheses.

### Chart 3–59

#### Change in Age-Adjusted Death Rates\* for Stroke in Females by Country, Ages 35–74, 1995–2002

Between 1995 and 2002, nine countries had greater percent declines in stroke mortality for females than the United States.<sup>38</sup>

Country	Percent Change <sup>†</sup>
GER (98–01)	-7.2
NOR (96–01)	-6.8
AUL (98–01)	-6.2
KOR (95–01)	-6.2
POL (99–01)	-5.7
JPN (95–00)	-5.3
CZR (95–01)	-4.4
FIN (96–02)	-3.9
HUN (96–02)	-3.6
USA (99–02)	-3.1
SWE (97–01)	-2.7
DEN (95–99)	-0.5
NTH (96–00)	-0.3
ROM (99–02)	-0.1

\* Age-adjusted to the European standard.

† Based on a log linear regression of the actual rates.

Note: Data for years indicated in parentheses.

## Hypertension

### Chart 3–60

#### Prevalence of Hypertension and Prehypertension by Age, U.S., 1999–2000

In 1999–2000, the prevalence of hypertension was 39% at ages 50–59 and 79% at ages  $\geq 80$ . The prevalence of prehypertension was 30–35% for ages 18–69.<sup>17</sup>

Ages	Percent of Population	
	Hypertension	Prehypertension
18–29	5.0	30.1
30–39	10.2	33.8
40–49	23.3	34.6
50–59	39.4	35.2
60–69	57.2	29.8
70–79	72.2	18.3
$\geq 80$	79.4	15.6

Note: Hypertension is defined as systolic BP 140+ mmHg, or 90+ diastolic BP, or on medication. Prehypertension is defined as BP 120–139/80–89 mmHg.

**Chart 3–61****Prevalence of Hypertension by Race/Ethnicity and Sex, Ages 20–74, U.S., 1999–2000**

In 1999–2000, the prevalence of hypertension at ages 20–74 was appreciably higher in blacks than in whites or Mexican-Americans. Within race groups, it was similar for males and females.<sup>29</sup>

Race	Percent of Population	
	Male	Female
Black*	38.6	42.4
White*	28.2	27.6
Mexican-American	28.0	28.0

\* Non-Hispanic.

Note: Hypertension is defined as systolic BP 140+ mmHg, or 90+ diastolic BP, or on medication.

**Chart 3–62****Prevalence\* of Hypertension by Race/Ethnicity and Sex, Ages 20–74, U.S., 1976–80 to 1999–2000**

The prevalence of hypertension was appreciably lower in 1988–94 compared with earlier years for white and black males and females but not for Mexican-Americans, who had the lowest prevalence.<sup>17</sup>

Years	Percent of Population					
	White Male <sup>†</sup>	White Female <sup>†</sup>	Black Male <sup>†</sup>	Black Female <sup>†</sup>	Mexican-American Male	Mexican-American Female
1976–80	45.0	33.7	50.7	51.1	25.6	22.5
1988–94	25.8	19.7	36.5	36.4	25.9	22.3
1999–2000	28.9	24.7	38.0	41.0	30.6	25.0

\* Age-adjusted.

† Non-Hispanic.

Note: Hypertension is defined as systolic BP 140+ mmHg, or 90+ diastolic BP, or on medication.

**Chart 3–63****Hypertensive Population Aware, Treated, and Controlled, Ages 18–74, U.S., 1971–72 to 1999–2000**

Eighty-eight percent of persons with a high level of hypertension were aware of their condition in 1999–2000 compared with 51% in 1971–72. The percent of hypertensive persons treated and controlled increased from 16% in 1971–72 to 68% in 1999–2000.<sup>17</sup>

Years	Percent of Hypertensive Population			
	Unaware	On Medication Controlled	On Medication Uncontrolled	No Medication Uncontrolled
1971–72	49	16	20	15
1974–75	36	20	14	30
1976–80	27	34	12	27
1988–94	12	65	14	9
1999–2000	12	68	14	6

Note: Hypertension is defined as systolic BP 160+ mmHg, or 95+ diastolic BP, or on medication.

### Chart 3–64

#### Hypertensive Population Aware, Treated, and Controlled, Ages 18–74, U.S., 1976–80 to 1999–2000

In 1988–91, 73% of hypertensive patients were aware of their condition, 55% were receiving treatment for it, and 29% had it controlled. Those percentages were appreciably greater than the comparable figures for the 1976–80 period and increased modestly for the treatment and control groups in 1999–2000.<sup>39</sup>

	Percent of Hypertensive Population			
	1976–80	1988–91	1991–94	1999–2000
Awareness	51	73	68	70
Treatment	31	55	54	59
Control	10	29	27	34

Note: Hypertension is defined as systolic BP 140+ mmHg, or 90+ diastolic BP, or on medication.

## Diseases of Arteries

### Chart 3–65

#### Age-Adjusted Death Rates for Diseases of Arteries by Race and Sex, U.S., 2002

In 2002, death rates for diseases of arteries were higher in males than in females, and about the same in blacks as in whites.<sup>28</sup>

Race	Deaths/100,000 Population	
	Male	Female
Total	16.5	11.2
White	16.6	11.2
Black	16.9	12.6

### Chart 3–66

#### Death Rates for Diseases of Arteries by Age, Race, and Sex, U.S., 2002

In 2002, death rates for diseases of arteries within race groups were higher in males than in females at all ages. For females, they were higher in blacks than in whites at all ages, but only below age 65 were they higher in black males than in white males.<sup>28</sup>

Ages	Deaths/100,000 Population			
	Black Male	White Male	Black Female	White Female
35–44	2.6	1.3	1.4	0.6
45–54	9.5	3.7	3.7	1.6
55–64	22.4	13.9	10.9	6.8
65–74	47.3	49.3	32.4	25.7
75–84	122.4	130.5	94.5	83.2

## Congenital Anomalies of the Circulatory System

### Chart 3–67

#### Percent of Deaths From Congenital Malformations of the Circulatory System, Age Under 1, U.S., 1940–2000

The percentage of deaths from congenital anomalies of the circulatory system, age <1, declined from 82% in 1940 to 43% in 2000.<sup>5-6</sup>

Year	Percent of Deaths
1940	82.0
1950	75.1
1960	67.3
1970	63.7
1980	57.5
1990	53.3
2000	42.7

### Chart 3–68

#### Infant Mortality From Congenital Malformations of the Circulatory System by Race, U.S., 1970–2001

Infant congenital heart disease mortality declined between 1970 and 2001 in blacks and in whites. For other congenital anomalies of the circulatory system, the trend has been downwards only since the early 1980s.<sup>5-6, 26</sup>

Year	Deaths/100,000 Live Births			
	Heart White	Heart Black	Other CVD White	Other CVD Black
1970	120.2	113.4	19.8	19.8
1971	114.2	105.2	22.4	20.9
1972	114.7	106.5	16.1	17.9
1973	107.8	103.3	20.7	19.6
1974	100.0	100.1	19.6	22.1
1975	96.6	92.3	21.9	24.0
1976	91.5	87.6	21.0	25.5
1977	90.6	84.6	22.0	27.4
1978	85.2	83.6	23.6	33.0
1979	83.3	80.3	22.8	32.5
1980	80.3	78.9	24.5	34.4
1981	74.2	73.7	22.7	37.8
1982	77.1	76.6	21.7	39.7
1983	70.3	74.1	23.6	36.9
1984	69.8	74.9	20.3	32.1
1985	69.2	72.7	17.4	25.6
1986	65.1	69.2	14.5	25.4
1987	62.0	71.4	14.5	21.7
1988	67.7	64.6	14.0	20.5
1989	62.1	71.2	11.1	18.4
1990	61.3	72.2	11.4	16.7
1991	56.3	70.3	10.7	17.7
1992	55.0	71.8	10.1	15.3
1993	54.0	64.7	9.6	14.6
1994	53.4	62.1	9.5	16.0
1995	50.1	58.5	7.7	10.1
1996	48.7	58.5	8.5	11.4
1997	45.2	51.3	7.9	11.3

1998	44.5	51.3	7.2	12.3
1999	40.0	47.9	4.9	9.4
2000	38.6	50.9	4.7	7.9
2001	37.0	51.3	4.5	6.4

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## 4. Lung Diseases

The term *lung diseases* is used here to mean:

- Acute lower respiratory infections
- Chronic lower respiratory diseases
- Lung diseases due to external agents
- Adult respiratory distress syndrome
- Pulmonary edema
- Interstitial lung diseases
- Cardiopulmonary diseases
- Selected HIV-related and other pulmonary infections
- Neonatal pulmonary diseases.

Chart 4–1 shows the distribution of deaths in 2001 by major lung subgroups. Chart 4–2 contains a detailed list of lung diseases, their 9th revision ICD codes, 2002 estimates of hospital discharges and length of stay, 2001 estimates of physician office visits for the diagnostic codes, 10th revision ICD codes for lung diseases, and number of deaths in 2001 for those codes. Subsequent charts display morbidity and mortality for total lung diseases and specific subgroups—chronic bronchitis, emphysema, COPD, asthma, neonatal respiratory distress syndrome (RDS), and sudden infant death syndrome (SIDS).

### Chronic Obstructive Pulmonary Disease

The term *COPD* includes chronic bronchitis and emphysema. In 1997, the survey used to determine the prevalence of chronic bronchitis and emphysema in the United States changed. Prior to 1997, prevalence was based on individuals who had, or knew someone in the family who had, chronic bronchitis or emphysema during the past 12 months. The new survey asks, “During the past 12 months, have you been told by a doctor or other health professional that you have chronic bronchitis? Have you ever been told by a doctor or other health professional that you have emphysema?” As a result, the 1997 to 2002 estimates are not comparable to those based on the NHIS of 1996 and earlier. A break in the prevalence trend lines between 1996 and 1997 in Charts 4–5 and 4–7 is used to indicate the discontinuity.

### Asthma

Three different prevalence estimates derived from NHIS data may be found in this chapter. Prior to 1997, prevalence was based on NHIS estimates of individuals who had, or knew someone in the family who had, asthma during the past 12 months. Beginning in 1997, “attack prevalence” was introduced to limit the count to individuals who responded *yes* to questions: “Have you ever been told by a doctor or other health professional that you have asthma?” and “During the past 12 months, have you had an episode of asthma or asthma attack?” As a result, the 1997 to 2002 estimates are not comparable to those based on the NHIS prior to 1997. A break in the asthma prevalence trend line between 1996 and 1997 shown in Chart 4–18 is used to indicate the change. In 2001, a question was added to the survey to determine “current prevalence” or simply, prevalence. It asks of those who have been told by a doctor or other health professional that they have asthma, “Do you still have it?” Current prevalence is based on individuals who respond *yes* to the question. (See Chart 4–19.)

## Lung Diseases

**Chart 4–1**  
**Deaths From Lung Diseases, Percent by Subgroup, U.S., 2001**

Conditions	Percent
COPD	50.9
Asthma	1.8
Influenza and Pneumonia	26.8
External Agents	8.0
Neonatal Pulmonary Disorders	2.2
Cardiopulmonary Diseases	6.0
Other	4.3

Total Deaths = 231,545 (100%)

**Chart 4–2**  
**Number of Hospitalizations, Physician Office Visits, and Deaths for Selected Lung Diseases, U.S., 2001 and 2002\***

Diagnostic Category	ICD/9 Codes	Hospitalizations			ICD/10 Codes	Deaths
		First-Listed Discharge (1,000)	Length of Stay (Days)	Physician Office Visits (1,000)		
Total		3,356	5.9	48,374		231,545
Acute lower respiratory infections						
Influenza and pneumonia	480–487	1,337	5.7	4,493	J10–J18	62,034
Acute bronchitis	466	279	3.4	3,102	J20	201
Acute bronchiolitis	included in 466	0	0	0	J21	62
Chronic lower respiratory disease						
COPD	490–492, 494–496	673	5.2	13,841	J40–J44	117,773
Chronic bronchitis	490, 491	547	5.2	9,163	J40–J42	959
Emphysema	492	16	5.7	113	J43	16,242
Other COPD	495–496	101	4.9	4,404	J44	100,572
Bronchiectasis	494	9	5.9	161	J47	971
Asthma	493	484	3.2	11,280	J45	3,897
Status asthmaticus	included in 493	0			J46	372
Cystic fibrosis	277.0	12	9.3	20	E84	482
Lung disease due to external agents	500–508	189	8.3	44	J60–J70	18,524
Adult respiratory distress syndrome	518.5	0	0	0	J80	2,079
Pulmonary edema	518.4	0	0	0	J81	735
Interstitial lung diseases						
Sarcoidosis	135	7	5.6	292	D86	831
Respiratory tuberculosis	011, 012	6	14.7		A15, A16, A19, A31.0	836
Respiratory failure	518.8	193	9.5	759	J96	3,246
Pulmonary manifestations of connective tissue disorders	446.2, 446.4				J99, M31.0, M31.3	420
Cardiopulmonary diseases						

Pulmonary embolism	415.1	99	6.3	237	I26	8,627
Other pulmonary heart disease	415.2–417	22	3.3	236	I27	4,639
Selected HIV-related and other pulmonary infections	114–116, 117.3, 117.5, 117.7, 136.3	5	12.3	0	B38–40, B44–46, B59	701
Neonatal pulmonary disorders						
Respiratory distress syndrome	769	17	31.0	29	P22.0	912
Sudden infant death syndrome	798.0	0	0	0	R95	2,234
Congenital malformation of the lung	745.4, 745.5, 745.6	7	0	134	Q33	577
Bronchopulmonary dysplasia	770.7	0	0	0	P27.1	296
Atelectasis of newborn	770.4, 770.5	0	0	0	P28.0, P28.1	503
Other perinatal respiratory diseases	770.1–770.3, 770.6, 770.8, 770.9	32	7.8	66	P25, P26, P27.0, P27.8, P27.9, P28.2–P28.9	593

\* 2002 for Hospitalizations and 2001 for Physician Office Visits and Deaths.

Note: Estimates of hospitalizations and physician office visits are subject to sampling variability. Estimates of hospitalizations 15,000 or below have a relative standard error of more than 16%. Estimates of physician office visits below 1 million have a relative standard error of more than 30%.

Compiled from references 27, 28, and 32.

### Chart 4–3

#### Age-Adjusted Death Rates for Total Lung Diseases by Race and Sex, U.S., 2000

In 2000, total lung disease mortality (other than lung cancer) was higher in males than in females. Within sex groups, it was slightly higher in black males than in white males, but lower in black females than in white females.<sup>5</sup>

	Deaths/100,000 Population		
	Total	White	Black
Male	105.0	104.2	110.9
Female	72.6	73.8	53.4

### Chart 4–4

#### Death Rates for Total Lung Diseases by Age, Race, and Sex, U.S., 2000

In 2000, the male–female gap in mortality from total lung diseases increased for blacks and whites with increasing age.<sup>5</sup>

Ages	Deaths/100,000 Population			
	Black Male	White Male	Black Female	White Female
35–44	18.8	6.8	18.0	6.7
45–54	46.8	19.3	36.9	16.9
55–64	113.8	74.8	76.6	63.9
65–74	331.2	286.9	179.1	219.4
75–84	766.3	827.2	399.1	554.7

## Chronic Obstructive Pulmonary Disease

### Chart 4–5

#### Prevalence of Chronic Bronchitis by Age, U.S., 1980–2002

The prevalence of chronic bronchitis increased from 1980 to 1995 for all age groups. No clear trend was apparent between 1997 and 2002.<sup>23</sup>

Year	Percent of Population		
	Ages 18–44	Ages 45–64	Ages ≥65
1980	3.12	4.06	5.69
1981	2.81	4.09	4.61
1982	2.45	4.42	5.20
1983	3.79	4.47	5.83
1984	3.95	5.46	6.30
1985	4.05	5.43	6.27
1986	3.65	4.58	6.00
1987	4.04	5.69	7.59
1988	3.90	5.61	6.48
1989	4.45	5.37	5.55
1990	4.15	5.74	7.04
1991	4.67	5.39	5.25
1992	4.70	5.83	6.96
1993	4.58	6.12	6.17
1994	4.67	6.39	6.05
1995	5.02	6.39	6.41
1996	4.54	5.91	6.35
1997	4.14	5.56	6.61
1998	3.53	5.50	6.31
1999	3.67	5.05	5.87
2000	3.57	5.54	6.50
2001	4.54	6.52	6.75
2002	3.48	5.51	5.41

Note: Discontinuity between 1996 and 1997 is due to change in the question used to determine prevalence.

### Chart 4–6

#### Prevalence of Chronic Bronchitis by Age, Race, and Sex, U.S., 2002

In 2002, within race groups, chronic bronchitis was higher in females than in males for all ages. For females, it was similar in blacks and in whites. For males aged 18–44, it was higher in blacks than in whites, but higher in whites than in blacks aged ≥45.<sup>23</sup>

Ages	Percent of Population			
	White Male	White Female	Black Male	Black Female
18–44	2.36	4.75	3.15	4.94
45–64	3.29	7.68	2.75	7.94
≥65	4.87	6.25	1.56	6.58

**Chart 4–7**  
**Prevalence of Emphysema by Age, U.S., 1980–2002**

The prevalence of emphysema declined from 1980 to 1996. No clear trend was apparent between 1997 and 2002.<sup>23</sup>

Year	Percent of Population	
	Ages 45–64	Ages ≥65
1980	2.21	5.42
1981	2.10	4.29
1982	2.54	4.03
1983	2.06	3.93
1984	2.16	4.20
1985	1.52	4.58
1986	1.84	4.00
1987	1.69	4.17
1988	1.68	3.75
1989	1.72	3.63
1990	1.28	4.54
1991	1.28	3.24
1992	1.50	3.46
1993	1.56	2.98
1994	0.99	4.65
1995	1.30	3.41
1996	1.32	3.24
1997	2.24	5.33
1998	1.87	5.06
1999	1.60	5.04
2000	1.89	5.28
2001	1.76	5.13
2002	1.97	4.76

Note: Discontinuity between 1996 and 1997 is due to change in the question used to determine prevalence.

**Chart 4–8**  
**Prevalence of Emphysema by Race and Sex, Ages 45–64 and 65 and Over, U.S., 2002**

In 2002, the prevalence of emphysema was higher in individuals aged ≥65 than those aged 45–64. In the older group, it was higher in males than females. In the younger group, it was higher in whites than blacks.<sup>23</sup>

Ages	Percent of Population			
	White Male	White Female	Black Male	Black Female
45–64	2.38	1.66	0.54	0.58
≥65	6.28	3.84	7.25	3.14

**Chart 4–9****Hospitalization Rates for Chronic Obstructive Pulmonary Disease, Ages 45–64 and 65 and Over, U.S., 1970–2002**

Between 1970 and 2002, COPD hospitalization rates varied considerably.<sup>27</sup>

Year	Hospitalization/10,000 Population	
	Ages 45–64	Ages ≥65
1970	31.5	83.0
1971	28.7	64.8
1972	26.1	67.8
1973	27.2	60.8
1974	30.5	63.0
1975	42.3	98.3
1976	43.0	105.2
1977	47.4	109.9
1978	47.1	117.8
1979	39.8	103.9
1980	43.4	126.5
1981	43.9	129.1
1982	47.5	128.3
1983	42.9	133.7
1984	36.2	109.1
1985	34.3	99.8
1986	29.8	91.2
1987	23.4	68.7
1988	15.4	42.6
1989	14.4	42.6
1990	14.7	49.1
1991	18.4	54.5
1992	23.5	86.2
1993	26.2	96.1
1994	27.5	114.0
1995	28.6	110.6
1996	29.8	114.0
1997	30.8	123.8
1998	31.0	132.0
1999	32.7	139.9
2000	45.3	143.2
2001	28.4	130.0
2002	30.3	123.6

**Chart 4–10**  
**Age-Adjusted Death Rates for Chronic Obstructive Pulmonary Disease by Race and Sex,**  
**U.S., 1960–2002**

COPD mortality, though highest in white males, remained relatively constant for them since the early 1980s. During the same period, it gradually increased in black males, but doubled in black and in white females.<sup>5–6, 28</sup>

Year	Deaths/100,000 Population			
	White Male	White Female	Black Male*	Black Female*
1960	16.4	2.8	9.7	2.0
1961	17.4	2.9	10.1	2.3
1962	21.2	3.3	11.2	2.5
1963	26.0	4.1	14.2	2.9
1964	26.6	4.0	13.8	2.2
1965	30.7	4.7	15.6	2.3
1966	33.2	5.0	16.4	2.6
1967	33.6	5.2	18.1	3.2
1968	38.1	6.4	21.2	3.6
1969	37.3	6.6	22.5	3.6
1970	38.1	7.0	23.5	3.8
1971	40.8	7.5	23.5	5.2
1972	42.6	8.0	25.5	4.6
1973	44.8	8.9	25.5	4.4
1974	43.9	9.1	24.5	4.0
1975	44.9	9.5	24.7	4.7
1976	47.1	10.5	27.8	4.8
1977	46.4	10.8	27.5	5.2
1978	48.4	12.4	29.2	6.0
1979	46.2	12.0	27.9	5.3
1980	50.3	14.2	29.4	6.2
1981	50.7	15.2	32.2	6.6
1982	50.1	15.7	30.7	7.5
1983	53.3	17.7	34.1	8.1
1984	53.7	19.0	35.4	9.0
1985	56.1	20.9	37.5	9.9
1986	55.4	21.8	38.9	9.5
1987	54.4	22.5	37.8	10.8
1988	55.4	24.1	41.2	10.8
1989	53.5	25.2	40.4	12.7
1990	55.0	25.8	43.2	12.5
1991	54.9	26.9	41.8	13.2
1992	53.9	27.6	41.5	13.5
1993	56.9	30.8	45.1	14.6
1994	55.1	31.0	42.9	15.3
1995	54.4	31.1	42.9	15.4
1996	53.9	32.3	42.4	16.3
1997	54.4	33.0	42.7	16.3
1998	54.3	34.2	42.3	17.1
1999	55.5	36.4	44.0	18.6
2000	53.2	36.9	39.6	18.0
2001	54.6	38.3	43.1	18.6
2002	54.4	38.6	40.3	19.1

\* Nonwhite from 1960 to 1967.

**Chart 4–11**

**Age-Adjusted Death Rates for Chronic Obstructive Pulmonary Disease\* by Race/Ethnicity and Sex, U.S., 1985–2001**

Between 1985 and 2001, COPD mortality (including asthma) increased substantially in women of various racial and ethnic groups, except Asian. For this group the increase was modest. In males, mortality increased in blacks and American Indians, but remained virtually unchanged in whites, Hispanics, and Asians.<sup>29</sup>

Male: Deaths/100,000 Population

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Year	American				
	White†	Black	Indian	Hispanic	Asian
1985	61.4	46.8	31.2	29.0	29.5
1986	61.4	46.9	31.7	29.0	29.5
1987	61.3	47.1	32.3	29.1	29.5
1988	61.2	47.3	32.8	29.2	29.5
1989	61.1	47.5	33.4	29.3	29.5
1990	61.1	47.7	34.0	29.3	29.5
1991	61.0	47.9	34.6	29.4	29.5
1992	60.9	48.2	35.2	29.5	29.4
1993	60.8	48.4	35.8	29.6	29.4
1994	60.8	48.6	36.5	29.7	29.4
1995	60.7	48.8	37.1	29.7	29.4
1996	60.6	49.0	37.8	29.8	29.4
1997	60.5	49.2	38.4	29.9	29.4
1998	60.5	49.4	39.1	30.0	29.4
1999	60.4	49.6	39.8	30.0	29.4
2000	60.3	49.8	40.5	30.1	29.4
2001	60.2	50.0	41.2	30.2	29.4

Female: Deaths/100,000 Population

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Year	American				
	White†	Black	Indian	Hispanic	Asian
1985	25.2	14.6	12.5	12.7	11.7
1986	26.1	15.2	13.2	13.0	11.7
1987	27.0	15.7	13.9	13.3	11.7
1988	28.0	16.3	14.7	13.6	11.8
1989	29.0	16.8	15.5	14.0	11.8
1990	30.1	17.4	16.4	14.3	11.9
1991	31.2	18.1	17.3	14.7	11.9
1992	32.3	18.7	18.3	15.1	12.0
1993	33.5	19.4	19.3	15.4	12.0
1994	34.7	20.1	20.4	15.8	12.1
1995	36.0	20.8	21.6	16.2	12.1
1996	37.3	21.5	22.8	16.6	12.2
1997	38.7	22.3	24.1	17.0	12.2
1998	40.1	23.1	25.4	17.5	12.3
1999	41.6	23.9	26.8	17.9	12.3
2000	43.1	24.8	28.4	18.4	12.4
2001	44.7	25.6	29.9	18.8	12.4

\* COPD and allied conditions.

† Non-Hispanic.

Note: Each line is a log-linear regression derived from the actual rates. The comparability ratio 1.0563 was applied to rates reported in vital statistics reported for 1985–98.

**Chart 4–12**

**Death Rates for Chronic Obstructive Pulmonary Disease in Males by Age and Race, U.S., 1960–2002**

After initial increases, COPD death rates declined in white and in black males aged 45–64, became relatively stable for those aged 65–84, and continued to increase for those aged  $\geq 85$ .<sup>5–6, 28</sup>

Year	White: Deaths/100,000 Population					Black*: Deaths/100,000 Population				
	Ages 45–54	Ages 55–64	Ages 65–74	Ages 75–84	Ages $\geq 85$	Ages 45–54	Ages 55–64	Ages 65–74	Ages 75–84	Ages $\geq 85$
1960	8.5	36.1	82.8	101.8	111.2	9.7	24.0	42.6	36.7	66.8
1961	7.6	38.7	87.8	111.8	122.2	9.4	23.0	43.0	49.7	66.6
1962	9.5	44.2	107.2	136.7	154.8	9.0	25.6	54.1	50.3	69.0
1963	11.7	52.3	131.2	169.6	202.7	12.6	31.8	62.4	68.5	131.1
1964	12.1	51.8	131.6	181.9	202.3	10.8	34.7	58.8	71.0	68.8
1965	12.4	57.8	153.6	216.6	235.5	15.5	34.8	61.8	93.8	132.3
1966	12.4	61.9	161.9	244.8	258.5	16.2	35.5	68.3	86.0	111.1
1967	12.4	61.2	164.8	248.6	263.9	15.1	36.9	75.1	104.9	128.2
1968	13.1	67.3	186.7	286.5	307.8	21.6	47.8	84.1	126.1	114.6
1969	13.9	67.5	189.5	294.3	305.1	19.9	50.9	93.0	133.5	145.5
1970	13.6	68.1	196.5	311.5	280.9	16.6	59.4	95.0	148.5	131.8
1971	13.5	67.3	195.6	327.4	334.6	19.0	52.9	99.8	135.5	155.1
1972	13.0	67.7	204.8	351.4	354.8	21.0	55.8	105.8	171.6	153.0
1973	12.7	69.8	210.1	378.4	393.5	18.8	56.6	109.6	153.4	188.7
1974	12.8	64.8	204.8	380.4	379.8	15.2	53.3	120.4	137.8	180.2
1975	11.9	64.7	207.6	399.7	402.7	16.7	51.5	103.4	170.3	156.3
1976	12.2	64.0	210.7	419.7	482.8	19.1	55.1	118.3	179.1	197.0
1977	11.4	60.1	206.1	431.5	459.5	18.0	56.7	120.3	174.5	204.1
1978	11.1	60.1	213.2	430.1	515.7	18.6	59.7	129.9	182.4	270.7
1979	10.2	56.2	200.1	412.7	511.5	16.4	51.0	123.9	195.4	269.5
1980	10.5	58.1	213.2	450.3	601.1	16.8	61.8	133.3	217.5	255.5
1981	10.3	57.7	214.4	454.0	622.0	16.7	56.8	141.5	244.7	262.5
1982	9.6	55.2	205.9	462.6	616.1	15.1	53.0	142.8	217.0	269.0
1983	9.9	57.7	215.4	494.2	691.0	12.6	65.2	147.5	263.2	333.3
1984	9.1	58.8	212.7	493.9	724.4	16.6	59.1	161.5	282.8	311.5
1985	9.5	58.1	220.6	516.5	785.6	14.9	61.8	168.1	311.7	366.1
1986	9.3	57.5	216.1	513.3	772.9	15.7	63.1	181.4	307.7	419.0
1987	8.0	57.9	204.5	513.0	766.3	12.8	57.7	176.2	314.2	425.0
1988	8.5	58.6	210.7	512.0	814.6	14.7	60.9	189.3	360.1	430.8
1989	7.6	58.0	199.3	492.8	808.6	12.7	59.9	180.0	359.3	463.6
1990	7.5	56.4	203.1	503.6	830.9	13.0	59.4	172.4	377.2	483.3
1991	7.3	55.5	201.2	501.5	847.6	14.2	57.5	173.7	347.4	472.6
1992	7.3	54.2	199.2	486.3	839.1	11.1	56.0	166.8	345.6	524.1
1993	7.8	55.8	207.6	517.5	895.4	13.0	56.7	135.6	392.2	552.9
1994	7.6	53.8	200.2	496.5	886.5	11.2	51.4	175.0	362.9	558.6
1995	7.1	50.4	195.8	489.7	901.1	11.3	53.9	166.6	357.0	599.7
1996	7.2	49.5	192.1	484.6	902.9	10.1	53.5	155.2	371.0	583.8
1997	7.1	48.3	200.5	476.0	928.0	10.2	46.7	168.3	366.8	596.6
1998	6.5	47.5	201.9	481.8	914.9	10.4	48.5	159.0	366.8	600.3
1999	7.1	49.8	206.3	487.2	934.2	11.4	53.5	159.9	393.1	599.8
2000	7.1	46.1	195.1	454.3	909.6	10.5	48.1	153.3	332.1	557.1
2001	7.8	46.9	196.1	485.4	932.3	9.2	45.2	161.2	372.0	637.9
2002	7.8	44.9	191.9	495.0	919.0	10.1	46.8	149.0	386.1	636.4

\* Nonwhite from 1960 to 1967.

**Chart 4–13**  
**Death Rates for Chronic Obstructive Pulmonary Disease in Females by Age and Race, U.S., 1960–2002**

Since 1960, COPD death rates have increased in white and in black females at all ages. For the last several years, however, the rates have been relatively stable among those in the younger age range, but continued to increase among those in older age ranges.<sup>5–6, 28</sup>

Year	White: Deaths/100,000 Population					Black*: Deaths/100,000 Population				
	Ages 45–54	Ages 55–64	Ages 65–74	Ages 75–84	Ages ≥85	Ages 45–54	Ages 55–64	Ages 65–74	Ages 75–84	Ages ≥85
1960	1.7	4.2	8.4	18.0	36.5	1.8	2.8	5.1	7.2	29.8
1961	1.7	4.4	9.2	18.8	37.9	1.2	3.0	5.5	12.8	37.5
1962	2.4	5.2	10.2	23.4	44.7	1.7	4.3	6.0	14.6	22.5
1963	2.9	6.1	12.5	26.7	54.1	2.3	4.8	8.2	10.5	42.8
1964	2.9	6.9	13.3	26.8	49.3	3.3	4.0	3.6	8.2	24.4
1965	3.4	8.0	16.0	29.8	53.8	2.7	4.7	6.5	9.4	16.3
1966	3.7	9.2	18.1	29.8	54.1	2.8	5.3	8.5	10.9	18.9
1967	3.8	10.2	18.0	31.4	58.0	2.3	5.1	9.5	13.0	22.8
1968	4.5	13.3	22.8	38.0	70.7	3.5	8.1	8.2	17.1	36.0
1969	5.0	13.3	24.3	39.3	74.5	4.3	7.2	8.7	17.2	33.9
1970	5.7	15.3	27.9	39.9	59.1	4.2	8.6	11.9	17.4	26.7
1971	5.7	15.5	29.8	45.5	66.8	5.9	9.3	15.5	18.9	26.3
1972	5.6	17.1	34.7	47.3	65.8	4.1	8.4	14.0	22.1	46.4
1973	5.8	18.8	37.6	53.4	80.7	5.7	11.4	13.2	23.3	27.3
1974	6.0	20.0	39.7	57.4	70.2	3.9	9.5	16.9	18.4	25.8
1975	6.0	21.5	41.9	58.7	74.0	5.3	9.6	16.8	22.6	26.4
1976	6.2	21.7	46.1	68.6	86.1	5.2	12.8	17.3	21.5	30.6
1977	5.9	22.1	49.6	70.5	91.1	5.5	11.5	17.9	27.4	40.1
1978	6.8	25.3	57.0	80.5	109.6	5.5	16.1	17.5	31.3	60.6
1979	5.9	23.8	55.0	80.8	107.0	4.5	13.1	21.4	30.3	41.2
1980	6.4	26.4	66.8	97.3	134.6	5.0	15.8	25.4	34.4	60.5
1981	6.8	27.4	72.4	107.6	134.9	5.2	16.9	23.9	42.9	43.4
1982	6.5	27.0	75.8	113.0	143.4	5.5	19.6	30.0	43.8	52.5
1983	7.0	29.9	85.5	129.1	164.2	4.9	18.2	30.5	50.5	86.3
1984	6.6	31.7	89.2	143.5	182.5	5.3	20.7	35.9	56.1	89.9
1985	7.5	34.4	95.5	162.5	205.0	6.0	23.2	39.1	67.1	85.7
1986	7.3	35.2	100.9	169.8	211.8	5.6	22.4	41.7	59.0	85.5
1987	6.7	35.7	102.2	177.8	233.3	5.3	23.8	44.3	73.6	105.6
1988	6.6	37.2	109.7	195.3	247.1	6.6	24.6	46.2	66.8	100.7
1989	7.0	40.1	111.7	204.6	262.0	6.6	27.9	55.8	84.2	119.6
1990	6.5	38.3	112.4	215.5	280.7	6.3	25.2	54.4	84.3	122.4
1991	6.6	41.1	120.1	225.7	289.8	7.4	24.7	60.4	84.7	133.7
1992	5.6	39.9	120.8	235.7	305.7	7.7	22.7	62.1	91.2	142.3
1993	6.1	43.6	136.4	263.1	339.0	5.7	24.5	67.0	106.2	143.0
1994	6.3	41.4	134.6	266.7	360.6	6.3	26.1	67.1	106.3	175.8
1995	6.4	40.3	132.7	268.1	377.1	5.5	24.1	65.2	116.5	172.4
1996	6.1	40.4	138.1	281.2	396.6	6.3	23.7	71.8	116.0	193.6
1997	5.9	41.0	138.7	288.1	415.9	5.2	26.0	69.9	118.0	198.6
1998	5.9	39.3	146.4	298.0	440.9	6.2	25.0	73.1	129.3	208.5
1999	6.2	41.4	149.4	320.6	488.6	5.9	25.4	74.2	153.1	227.1
2000	6.3	39.7	152.3	323.6	504.8	6.4	26.1	69.8	141.3	231.1
2001	6.5	42.0	156.7	331.0	540.3	6.7	24.8	76.0	140.1	249.3
2001	6.8	40.7	155.2	341.5	540.8	5.6	24.3	73.2	158.2	252.8

\* Nonwhite from 1960 to 1967.

**Chart 4–14****Age-Adjusted Death Rates for Chronic Obstructive Pulmonary Disease by State, U.S., 1999–2000**

In 1999–2000, COPD mortality tended to be high in the western Mountain States.<sup>5</sup>

State Name	Deaths/100,000 Population
Wyoming	67.5
Nevada	61.2
West Virginia	58.9
Kentucky	55.4
Montana	54.5
Colorado	54.0
Maine	51.8
Oklahoma	50.6
Indiana	49.9
Alaska	49.7
Tennessee	49.5
New Hampshire	48.9
Ohio	48.9
Washington	48.7
Arizona	48.6
Vermont	48.2
New Mexico	47.9
Missouri	47.6
Idaho	47.5
Kansas	47.2
Georgia	47.1
Oregon	47.0
North Carolina	46.8
Nebraska	45.6
Alabama	45.5
Arkansas	45.4
Mississippi	45.0
South Carolina	44.7
Texas	44.2
California	43.9
Iowa	43.5
Michigan	43.5
Virginia	42.5
Delaware	41.7
Florida	40.5
Massachusetts	40.3
Maryland	39.6
Rhode Island	39.5
Illinois	39.3
Pennsylvania	39.3
Wisconsin	39.2
Louisiana	39.1
South Dakota	39.1
Minnesota	38.1
Connecticut	37.4
North Dakota	35.3
Utah	34.2
New York	34.0
New Jersey	33.7
Hawaii	20.5

#### Chart 4–15

#### Age-Adjusted Death Rates\* for Chronic Obstructive Pulmonary Disease by Country and Sex, Ages 35–74, 2002

Among 15 industrialized countries, the United States ranked third in COPD mortality for females and fifth for males in 2002.<sup>38</sup>

Country	Male	Female
DEN (99)	46.4	15.1
SCO (00)	54.2	57.8
HUN	52.2	39.1
ROM (01)	41.2	32.9
USA	45.2	11.0
NTH (00)	34.9	19.2
POL (01)	30.8	6.2
AUL (01)	26.8	18.4
FIN	25.9	6.4
CZR (01)	24.5	9.1
GER (01)	23.5	21.9
NOR (01)	25.3	7.3
KOR (01)	15.6	14.9
SWE (01)	17.4	4.2
JPN (00)	6.4	1.1

\* Age-adjusted to European standard.

Note: Data for 2002 unless otherwise indicated in parentheses.

#### Chart 4–16

#### Age-Adjusted Death Rates for Chronic Obstructive Pulmonary Disease by Race and Sex, U.S., 2002

In 2002, COPD mortality was higher in males than in females. For males, it was 26% higher in whites than in blacks, and for females, it was two times higher in whites than in blacks.<sup>28</sup>

Sex	Deaths/100,000 Population		
	Total	White	Black
Male	52.5	54.4	43.0
Female	36.1	38.6	19.1

#### Chart 4–17

#### Death Rates for Chronic Obstructive Pulmonary Disease by Age, Race, and Sex, U.S., 2002

In 2002, COPD mortality increased significantly with age for all race and sex groups. It was highest in white males aged  $\geq 65$  and lowest in black females aged  $\geq 45$ .<sup>28</sup>

Ages	Deaths/100,000 Population			
	White Male	Black Male	White Female	Black Female
35–44	1.2	2.1	1.0	1.5
45–54	7.8	10.1	6.8	6.0
55–64	44.9	46.8	40.7	24.3
65–74	191.9	149.0	155.2	73.7
75–84	495.0	386.1	341.5	158.2

### Asthma

#### Chart 4–18

#### Prevalence of Asthma, Ages Under 18 and 18 and Over, U.S., 1980 to 2002

Between 1980 and the mid-1990s, the prevalence of asthma increased; from 1997 to 2002, asthma attack prevalence increased for persons aged  $<18$  and declined for persons aged  $\geq 18$ .<sup>23</sup>

Year	Percent of Population	
	Ages $<18$	Ages $\geq 18$
1980	3.75	3.0
1981	3.79	3.2
1982	4.01	3.3
1983	4.52	3.6
1984	4.25	3.4
1985	4.78	3.3
1986	5.11	3.7
1987	5.25	3.6
1988	4.99	3.8
1989	6.10	4.3
1990	5.76	3.6
1991	6.25	4.2
1992	6.34	4.4
1993	7.16	4.4
1994	6.91	5.1
1995	7.49	5.0
1996	6.20	5.3
1997	5.44	4.1
1998	5.31	4.1
1999	5.28	3.9
2000	5.53	4.0
2001	5.70	3.8
2002	5.76	3.8

Note: Discontinuity between 1996 and 1997 is due to change in the question used to determine prevalence.

### Chart 4–19

#### Asthma Prevalence by Age, Race, and Sex, U.S., 2002

In 2002, asthma prevalence within racial groups was higher for females than for males aged  $\geq 18$ ; for those aged  $< 18$ , it was higher for males than for females. Within sex groups, the prevalence was higher in blacks than in whites for each age group except for ages  $\geq 65$ , where it was higher in white than in black males.<sup>23</sup>

Ages	Percent of Population			
	White Male	White Female	Black Male	Black Female
<18	8.56	6.57	14.44	10.63
18–44	5.22	8.52	6.01	10.37
45–64	4.86	8.91	4.87	11.57
$\geq 65$	4.74	6.79	2.53	8.24

### Chart 4–20

#### Physician Office Visits for Asthma, U.S., 1989–2001

Between 1989 and 2001, the number of physician office visits for asthma increased.<sup>32</sup>

Year	Number (Millions)
1989	6.8
1990	7.1
1991	8.8
1992	9.7
1993	11.3
1994	10.8
1995	9.0
1996	9.0
1997	9.8
1998	12.9
1999	9.5
2000	9.3
2001	11.3

### Chart 4–21

#### Hospitalizations for Asthma, U.S., 1980–2002

Hospitalizations with asthma as the primary diagnosis remained relatively stable between 1980 and 2002; hospitalizations with asthma as a secondary diagnosis, however, increased significantly from 1990 to 2002.<sup>27</sup>

Year	Number (Thousands)	
	Primary	Secondary
1980	379	192
1981	418	210
1982	434	230
1983	459	250
1984	465	274
1985	462	281
1986	477	303
1987	454	331
1988	479	349
1989	475	360
1990	476	385

1991	490	433
1992	463	493
1993	468	532
1994	451	602
1995	511	665
1996	474	709
1997	484	758
1998	423	833
1999	479	869
2000	465	926
2001	454	1,032
2002	484	1,002

**Chart 4–22**  
**Hospitalization Rates for Asthma by Age, U.S., 1980–2002**

From 1980 to 2002, hospitalization rates for asthma were lowest among individuals aged 15–44. Beginning in 1991, they were highest among those aged <15. For those aged ≥45 the rates have been decreasing since the mid-1980s.<sup>27</sup>

Year	Hospitalizations/10,000 Population			
	Ages <15	Ages 15–44	Ages 45–64	Ages ≥65
1980	24.3	9.5	22.9	34.5
1981	25.0	10.6	23.3	28.3
1982	29.3	9.7	22.1	30.4
1983	26.4	10.1	26.7	34.2
1984	28.9	9.9	22.8	37.3
1985	27.8	11.1	21.5	34.1
1986	30.3	10.8	22.0	33.7
1987	28.4	9.7	20.4	33.8
1988	30.9	9.6	20.2	31.0
1989	31.2	11.0	18.9	30.0
1990	30.8	10.3	18.3	32.3
1991	33.9	10.9	18.2	28.5
1992	34.6	9.9	16.5	23.7
1993	28.0	10.9	19.0	26.6
1994	29.5	10.7	15.8	23.0
1995	36.7	11.4	16.7	23.0
1996	33.8	11.1	16.4	17.4
1997	35.8	9.6	15.9	19.2
1998	27.7	8.6	16.2	17.7
1999	31.5	10.0	15.9	21.2
2000	34.7	9.2	13.7	19.5
2001	30.1	8.4	14.3	21.5
2002	30.8	8.8	16.4	22.5

**Chart 4–23****Age-Adjusted Death Rates for Asthma by Race and Sex, Ages 1–24, U.S., 1980–2002**

Although asthma mortality fluctuated between 1980 and 2002, it tended to increase for each race/sex group, aged 1–24 until 1995. Since then, mortality has declined modestly in whites.<sup>5, 28</sup>

Year	Deaths/100,000 Population			
	Black Male	White Male	Black Female	White Female
1980	1.03	0.18	0.57	0.14
1981	1.17	0.20	0.48	0.22
1982	1.49	0.27	0.64	0.27
1983	1.41	0.18	0.56	0.27
1984	0.97	0.20	0.56	0.22
1985	1.53	0.20	0.83	0.28
1986	1.44	0.28	0.68	0.28
1987	1.61	0.28	0.77	0.28
1988	1.67	0.28	0.75	0.31
1989	1.59	0.32	0.62	0.31
1990	1.57	0.32	0.61	0.28
1991	1.83	0.32	0.84	0.37
1992	1.83	0.31	0.93	0.31
1993	1.75	0.33	0.81	0.37
1994	2.49	0.40	0.95	0.39
1995	2.30	0.41	0.82	0.49
1996	1.77	0.34	1.01	0.43
1997	1.96	0.44	0.77	0.33
1998	2.37	0.29	0.92	0.33
1999	1.36	0.27	0.66	0.20
2000	1.28	0.23	0.80	0.19
2001	1.13	0.18	0.88	0.15
2002	1.30	0.19	0.64	0.16

**Chart 4–24****Age-Adjusted Death Rates for Asthma by Race and Sex, U.S., 2002**

In 2002, asthma mortality was 3.5 times higher in black males than in white males, 2.4 times higher in black females than in white females, and approximately 39% higher in females than in males.<sup>28</sup>

Sex	Deaths/100,000 Population		
	Total	White	Black
Male	1.17	0.90	3.14
Female	1.63	1.42	3.35

**Chart 4–25**  
**Death Rates for Asthma by Age, Race, and Sex, U.S., 2002**

In 2002, for males and females aged 1–34, asthma mortality was much higher in blacks than in whites.<sup>28</sup>

Ages	Deaths/100,000 Population			
	Black Male	White Male	Black Female	White Female
1–4	1.16	0.26	0.48	0.03
5–14	0.93	0.13	0.78	0.12
15–24	1.74	0.23	0.55	0.28
25–34	1.82	0.39	1.02	0.45

**Chart 4–26**  
**Death Rates for Asthma by Age, Race, and Sex, U.S., 2002**

In 2002, asthma mortality was much higher in blacks than in whites aged 35–84. Within race groups, it was almost always higher in females than in males.<sup>28</sup>

Ages	Deaths/100,000 Population			
	Black Male	White Male	Black Female	White Female
35–44	3.3	0.5	3.1	0.9
45–54	3.3	0.8	5.3	1.3
55–64	5.4	1.2	6.8	1.9
65–74	7.4	1.9	8.6	3.4
75–84	7.2	4.5	9.2	7.4

**Chart 4–27**  
**Age-Adjusted Death Rates for Asthma by Sex, U.S., 1951–2002**

Asthma mortality declined from 1950 to 1978, then increased until the mid-1990s and subsequently declined again. Rates were much higher in males than in females before the late-1960s, and after that became higher in females than in males.<sup>5, 28</sup>

Year	Deaths/100,000 Population	
	Male	Female
1951	8.11	4.06
1952	7.88	3.85
1953	7.62	3.60
1954	6.77	3.24
1955	6.61	3.05
1956	6.41	2.91
1957	7.13	3.10
1958	5.24	2.30
1959	4.87	2.29
1960	5.14	2.55
1961	4.58	2.30
1962	4.49	2.22
1963	4.49	2.32
1964	3.67	2.18
1965	3.71	2.17
1966	3.41	2.09
1967	3.08	2.08

1968	1.61	1.60
1969	1.37	1.38
1970	1.26	1.40
1971	1.14	1.31
1972	1.24	1.36
1973	0.99	1.11
1974	1.00	1.03
1975	1.00	1.11
1976	0.97	1.10
1977	0.84	0.89
1978	0.85	1.04
1979	1.30	1.30
1980	1.50	1.41
1981	1.43	1.50
1982	1.39	1.54
1983	1.56	1.77
1984	1.59	1.72
1985	1.63	1.87
1986	1.64	1.89
1987	1.78	2.06
1988	1.82	2.15
1989	1.85	2.29
1990	1.87	2.22
1991	1.85	2.34
1992	1.81	2.25
1993	1.83	2.33
1994	1.91	2.38
1995	1.88	2.49
1996	1.82	2.44
1997	1.72	2.33
1998	1.66	2.26
1999	1.51	2.22
2000	1.44	2.05
2001	1.19	1.77
2002	1.17	1.63

**Chart 4–28**  
**Age-Adjusted Death Rates for Asthma by Race, U.S., 1951–2002**

Between 1978 and 1996, the black–white gap in asthma mortality increased, with the rate being much higher in blacks than in whites. Between 1996 and 2002, the gap remained wide as the rates began to decline.<sup>5,28</sup>

Year	Deaths/100,000 Population	
	White	Black*
1951	6.00	5.04
1952	5.73	5.81
1953	5.56	4.75
1954	4.93	4.63
1955	4.65	4.49
1956	4.52	4.64
1957	4.83	5.90
1958	3.54	4.44
1959	3.35	4.54
1960	3.56	5.00
1961	3.15	4.71
1962	3.10	4.39

1963	3.12	4.89
1964	2.67	4.41
1965	2.64	4.55
1966	2.48	4.27
1967	2.29	4.37
1968	1.34	3.88
1969	1.16	3.27
1970	1.10	2.96
1971	1.05	2.75
1972	1.16	2.51
1973	0.90	2.28
1974	0.92	1.96
1975	0.91	2.14
1976	0.92	2.05
1977	0.78	1.73
1978	0.88	1.78
1979	1.18	2.36
1980	1.28	2.75
1981	1.34	2.79
1982	1.32	2.99
1983	1.44	3.35
1984	1.45	3.22
1985	1.55	3.41
1986	1.52	3.59
1987	1.67	4.06
1988	1.73	4.40
1989	1.84	4.25
1990	1.79	4.16
1991	1.86	4.23
1992	1.78	4.22
1993	1.80	4.39
1994	1.89	4.51
1995	1.88	4.73
1996	1.84	4.83
1997	1.75	4.31
1998	1.69	4.31
1999	1.41	3.95
2000	1.31	3.80
2001	1.11	3.58
2002	1.18	3.28

\* Nonwhite from 1951 to 1967.

**Chart 4–29**  
**Age-Adjusted Death Rates for Asthma by Race and Sex, U.S., 1951–2002**

Trends in asthma mortality have been much more similar for males and females within race groups since 1970. The rates, however, have been higher for blacks than for whites.<sup>5,28</sup>

Year	Deaths/100,000 Population			
	Black Male*	White Male	Black Female*	White Female
1951	5.60	8.29	4.47	3.96
1952	6.36	7.97	5.18	3.69
1953	5.64	7.75	3.91	3.56
1954	5.19	6.85	3.59	3.20
1955	5.59	6.63	3.26	2.93

1956	5.71	6.45	3.51	2.83
1957	7.05	7.04	4.40	2.92
1958	5.11	5.19	3.84	2.10
1959	5.16	4.78	3.97	2.09
1960	5.69	5.03	4.35	2.32
1961	5.76	4.48	3.79	2.07
1962	5.12	4.46	3.75	2.03
1963	5.70	4.43	4.19	2.11
1964	5.25	3.50	3.68	2.02
1965	5.56	3.50	3.67	2.00
1966	5.19	3.24	3.47	1.92
1967	4.91	2.93	3.93	1.88
1968	4.19	1.36	3.70	1.34
1969	3.14	1.16	3.21	1.17
1970	3.05	1.08	3.29	1.18
1971	2.70	1.00	2.81	1.10
1972	2.81	1.06	2.51	1.21
1973	2.39	0.87	2.41	0.94
1974	2.08	0.90	2.04	0.93
1975	2.25	0.85	2.20	0.98
1976	2.14	0.86	2.17	0.97
1977	1.76	0.76	1.80	0.78
1978	1.90	0.75	1.76	0.95
1979	2.53	1.20	2.29	1.20
1980	2.90	1.32	2.64	1.26
1981	3.00	1.27	2.60	1.38
1982	2.96	1.23	2.99	1.37
1983	3.37	1.36	3.35	1.54
1984	3.25	1.37	3.22	1.50
1985	3.59	1.41	3.31	1.69
1986	3.39	1.43	3.77	1.63
1987	4.03	1.46	3.92	1.84
1988	4.33	1.53	4.35	1.87
1989	4.08	1.57	4.30	2.03
1990	4.39	1.58	4.06	1.97
1991	4.25	1.55	4.23	2.09
1992	3.95	1.50	4.46	1.98
1993	4.09	1.52	4.61	2.00
1994	4.43	1.58	4.63	2.09
1995	4.50	1.54	4.90	2.19
1996	4.33	1.52	5.13	2.09
1997	4.03	1.43	4.61	2.01
1998	3.79	1.33	4.70	1.95
1999	3.19	1.14	4.64	1.89
2000	3.72	1.11	4.60	1.71
2001	3.17	0.90	3.80	1.47
2002	3.14	0.90	3.35	1.42

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\* Nonwhite from 1950 to 1967.

**Chart 4–30**  
**Age-Adjusted Death Rates\* for Asthma by Country and Sex, 2002**

In 2002, among 15 countries, asthma mortality ranked 11th for males and 9th for females.<sup>38</sup>

Country	Deaths/100,000 Population	
	Male	Female
KOR (01)	18.87	10.65
NOR (01)	3.54	2.76
POL (01)	3.5	1.75
JPN (00)	2.76	1.67
GER (01)	2.72	1.76
DEN (99)	2.38	2.64
ROM (01)	2.18	1.46
HUN	1.91	1.04
AUL (01)	1.48	1.74
SCO (00)	1.34	1.97
USA	1.11	1.55
SWE (01)	1.01	1.43
FIN	0.98	1.17
CZR (01)	0.93	0.90
NTH (00)	0.41	0.41

\* Age-adjusted to European standard.

Note: Data for 2002 unless otherwise indicated in parentheses.

**Neonatal Respiratory Distress Syndrome**

**Chart 4–31**  
**Infant Mortality Rate for Respiratory Distress Syndrome, U.S., 1968–2002**

Infant mortality for RDS declined steeply from 1974 to 1981, followed by a slower but appreciable decline.<sup>5, 25–26</sup>

Year	Deaths/100,000 Live Births
1968	236.2
1969	247.9
1970	261.6
1971	267.6
1972	274.8
1973	277.8
1974	263.4
1975	248.0
1976	222.9
1977	198.3
1978	179.7
1979	156.2
1980	138.1
1981	119.0
1982	109.7
1983	101.2
1984	96.9
1985	98.2
1986	90.6

1987	86.2
1988	81.4
1989	89.9
1990	68.5
1991	62.5
1992	50.8
1993	45.4
1994	39.6
1995	37.3
1996	35.0
1997	33.5
1998	33.7
1999	27.3
2000	24.4
2001	25.1
2002	23.8

**Chart 4–32**  
**Infant Mortality Rate for Respiratory Distress Syndrome by Race, U.S., 1979–2002**

Although the decrease in infant mortality for RDS has been appreciable in both blacks and whites from 1979 to 2002, a black–white gap still remained in 2002.<sup>5, 25–26</sup>

Year	Deaths/100,000 Live Births	
	White	Black
1979	142.3	238.6
1980	125.8	187.9
1981	109.8	178.6
1982	100.3	171.3
1983	92.0	159.4
1984	89.3	149.1
1985	90.5	149.8
1986	81.5	144.2
1987	76.5	145.6
1988	70.5	142.4
1989	74.7	172.2
1990	54.6	143.8
1991	50.0	131.6
1992	41.3	143.3
1993	34.9	104.1
1994	32.1	83.4
1995	29.4	82.7
1996	27.3	79.5
1997	26.7	74.2
1998	27.6	73.9
1999	21.9	60.3
2000	19.5	54.7
2001	19.8	58.2
2002	18.8	57.0

### Chart 4–33

#### Infant Mortality Rate for Neonatal Respiratory Distress Syndrome by Race/Ethnicity, U.S., 2001

In 2001, infant mortality for neonatal RDS was highest in blacks and Puerto Ricans and lowest in Asian and Pacific Islanders.<sup>40</sup>

Race/Ethnicity	Deaths/100,000 Live Births
	RDS
All	25.3
Black	57.1
Puerto Rican	43.4
Central and S. American	17.3
White*	18.9
Mexican-American	21.1
Asian and Pacific Islanders	15.5

\* Non-Hispanic.

Note: No data for American Indians.

## Sudden Infant Death Syndrome

### Chart 4–34

#### Infant Mortality Rate for Sudden Infant Death Syndrome by Race/Ethnicity, U.S., 2001

In 2001, infant mortality for SIDS was highest in American Indians and blacks and lowest in Mexican-Americans and Asian and Pacific Islanders.<sup>40</sup>

Race/Ethnicity	Deaths/100,000 Live Births
	SIDS
All	55.5
American Indian	145.7
Black	113.5
Puerto Rican	76.4
White*	52.5
Mexican-American	23.2
Asian and Pacific Islanders	18.5

\* Non-Hispanic.

Note: No data for Central and South Americans.

## 5. Blood Diseases

The term *blood diseases* is used here to mean diseases within the diagnostic categories listed in “Diseases of the Blood and Blood-Forming Organs and Certain Disorders Involving the Immune Mechanism” of the ICD; hemochromatosis is also included in this chapter. Blood-clotting diseases, most of which are subsumed under CVD, have been excluded, as have other blood diseases such as bleeding and red blood disorders of the newborn and serum hepatitis.

Chart 5–1 shows the distribution of deaths in 2001 by blood disease subgroups. Chart 5–2 contains a list of blood diseases; their 9th revision ICD codes; 2002 estimates of hospital discharges and length of stay, 2001 estimates of physician office visits for the diagnostic codes; 10th revision ICD codes for the blood diseases; and number of deaths in 2001 for those codes. Subsequent charts display morbidity and mortality for aplastic anemia and sickle cell anemia.

The annual death rates for these diseases are very small and may vary considerably from year to year. By using combined mortality over 2 to 5 years to obtain average annual death rates rather than statistics for a single year, it is possible to improve data reliability for race and sex comparisons.

### Blood Diseases

**Chart 5–1**  
**Blood Disease Deaths, Percent by Subgroup, U.S., 2001**

Blood Diseases	Percent
Aplastic Anemia	11.2
Sickle Cell Anemia	4.8
Other Diseases of Blood and Blood-Forming Organs	18.8
Hemochromatosis	2.3
Diseases of White Blood Cells	4.6
Purpura and Other Hemorrhagic Conditions	9.2
Coagulation Defects	17.7
Other Anemias	31.5

Total Deaths = 9,755 (100%)

**Chart 5–2**  
**Number of Hospitalizations, Physician Office Visits, and Deaths for Selected Blood Diseases, U.S., 2001 and 2002\***

Diagnostic Category	ICD/9 Codes	Hospitalizations			ICD/10 Codes	Deaths
		First-Listed Discharge (1,000)	Length of Stay (Days)	Physician Office Visits (1,000)		
Total	280–289, 275	446	4.4	3,836	D50–D89, E83.1	9,755
Anemias	280–285	312	4.2	2,410	D50–D64	4,627
Iron deficiency anemia	280	79	3.4	477	D50	130
Other deficiency anemia	281	5	4.4	130	D51–D52	81
Cooley’s anemia	282.4	0	0	7	D56	21
Sickle cell anemia	282.6	84	5.3	45	D57.0, D57.1	471
Aplastic anemia	284	29	5.0	101	D60–D61	1,096

Other and unspecified anemias	Residual	115	3.7	1,650	Residual	2,828
Coagulation defects	286	23	4.3	0	D65–D68	1,729
Hemophilia: factor VIII	286.0	0	0	0	D66	87
Hemophilia: factor IX	286.1	0	0	0	D67	4
Other	Residual	23	4.3	0	Residual	1,638
Purpura and other hemorrhagic conditions	287	31	5.2	423	D69	903
Primary thrombocytopenia	287.3	16	6.0	224	D69.3, D69.4	367
Unspecified thrombocytopenia	287.4	0	0	0	D69.5, D69.6	498
Other	Residual	15	4.3	199	Residual	38
Diseases of white blood cells	288	59	5.2	224	D70–D72	444
Other diseases of blood and blood-forming organs	289	21	3.3	714	D73–D89	1,832
Hemochromatosis	275	0	0	65	E83.1	220

\* 2002 estimates for Hospitalizations; 2001 estimates for Physician Office Visits and Deaths.

Note: Estimates of hospitalizations and physician office visits are subject to sampling variability. Estimates of hospitalizations below 15,000 have a relative standard error of more than 16%. Estimates of physician office visits below a million have a relative standard error of more than 30%.

Compiled from references 27, 28, and 32.

## Aplastic Anemia

### Chart 5–3 Hospitalizations for Aplastic Anemia, U.S., 1982–2002

Hospitalizations for aplastic anemia nearly quadrupled by 2002 compared with 1982. The increase was due to aplastic anemia as a secondary diagnosis.<sup>27</sup>

Year	Number (Thousands)	
	Primary	Secondary
1982	18	29
1983	20	38
1984	20	41
1985	16	45
1986	18	46
1987	19	63
1988	14	81
1989	15	73
1990	18	86
1991	24	93
1992	23	124
1993	25	119
1994	20	113
1995	23	130
1996	23	146

1997	23	134
1998	28	143
1999	32	151
2000	28	140
2001	28	141
2002	29	154

#### Chart 5–4

##### Age-Adjusted Death Rates for Aplastic Anemia by Race and Sex, U.S., 1999–2000

Mortality from aplastic anemia was higher in males than in females. Within sex groups, it was higher in blacks than in whites.<sup>5</sup>

	Deaths/100,000 Population*	
	Male	Female
Total	0.43	0.37
White	0.42	0.36
Black	0.53	0.41

\* Average annual rates.

#### Chart 5–5

##### Death Rates for Aplastic Anemia by Age, Race, and Sex, U.S., 1999–2000

Among blacks aged  $\geq 45$ , aplastic anemia death rates were higher in males than in females; among whites aged  $\geq 65$  they were higher in males than in females. Within sex groups, the rates were higher in blacks than in whites except in the oldest age group.<sup>5</sup>

Ages	Deaths/100,000 Population*			
	Black Male	White Male	Black Female	White Female
35–44	0.09	0.07	0.20	0.07
45–54	0.31	0.13	0.20	0.15
55–64	0.74	0.31	0.60	0.33
65–74	1.17	1.10	0.89	0.85
75–84	2.75	2.90	1.97	2.41

\* Average annual rates.

## Sickle Cell Anemia

### Chart 5–6

#### Hospitalization Rates for Sickle Cell Anemia in Blacks, Ages Under 15 and 15–44, U.S., 1982–2002

Hospitalization rates for sickle cell anemia varied considerably between 1982 and 2002. Overall they increased for both age groups, with rates in the older group remaining higher than those in the younger group.<sup>27</sup>

Year	Hospitalizations/10,000 Population	
	Ages <15	Ages 15–44
1982	11.7	21.0
1983	12.9	20.6
1984	14.2	21.6
1985	12.8	17.8
1986	17.9	21.6
1987	16.5	21.2
1988	18.8	20.3
1989	25.0	27.8
1990	26.6	23.8
1991	21.0	24.1
1992	19.6	20.6
1993	15.9	22.7
1994	13.5	27.7
1995	22.4	26.1
1996	15.6	24.7
1997	18.9	25.6
1998	15.6	27.8
1999	16.6	25.2
2000	23.0	26.4
2001	22.1	31.2
2002	25.2	31.0

### Chart 5–7

#### Age-Adjusted Death Rates for Sickle Cell Anemia in Blacks by Sex, U.S., 1980–84 to 1999–2001

Sickle cell anemia mortality in blacks increased between 1980–84 and 1990–94 and then declined. The rate is higher in males than in females, but the gap between them is narrowing.<sup>5–6</sup>

Year	Deaths/100,000 Population*	
	Male	Female
1980–84	1.22	0.92
1985–89	1.30	1.03
1990–94	1.48	1.26
1995–98	1.43	1.26
1999–2001	1.34	1.25

\* Average annual rates.

**Chart 5–8****Death Rates for Sickle Cell Anemia in Blacks by Age and Sex, U.S., 1999–2001**

Sickle cell anemia mortality was relatively similar for males and for females. Death rates were especially high for individuals between ages 25 and 64 years.<sup>5</sup>

Ages	Deaths/100,000 Population*	
	Black Male	Black Female
1–4	0.63	0.52
5–14	0.29	0.35
15–24	1.18	0.78
25–34	2.23	1.84
35–44	2.06	2.09
45–54	2.25	1.96
55–64	1.28	1.59
65–74	0.49	0.72
75–84	0.20	0.34

\* Average annual rates.

# **Appendixes**

**International Classification of Diseases**

**Estimated Comparability Ratios**

**Definition of Terms**

**Abbreviations**

**References**

## Appendix A

### International Classification of Diseases: Codes for Selected Diagnostic Categories (6th, 7th, 8th, 9th, and 10th Revisions)

Diagnostic Term in Chartbook	ICD/6 1949–1957	ICD/7 1958–1967	ICDA/8 1968–1978	ICD/9 1979–1998	ICD/10 1999–
Cardiovascular diseases <sup>a</sup>	330–334, 400–468	330–334, 400–468	390–458	390–459	I00–I99
Heart disease	400–402, 410–443	400–402, 410–443	390–398, 402, 404–429	390–398, 402, 404–429	I00–I09, I11, I13, I20–I51
Coronary heart disease <sup>b</sup>	420, 422	420, 422	410–413	410–414, 429.2	I20–I25
Acute myocardial infarction	*	*	410	410	I21, I22
Heart failure <sup>c</sup>	†	†	427.0, 427.1	428	I50
Congestive heart failure	†	†	427.0	428	I50.1
Cardiomyopathy	†	†	†	425	I42
Cerebrovascular diseases (stroke) <sup>d</sup>	330–334	330–334	430–438	430–438	I60–I69
Diseases of arteries	450–456	450–456	440–448	440–448	I70–I78
Congenital anomalies of the circulatory system <sup>e</sup>	†	†	746–747	745–747	Q20–Q28
Chronic obstructive pulmonary disease <sup>f</sup>	500–502, 527.1	500–502, 527.1	490–492, 519.3	490–492, 494–496	J40–J44
Asthma	241	241	493	493	J45–J46
Neonatal respiratory distress syndrome <sup>g</sup>	†	†	776.1–776.2	769	P22

a The ICD term is diseases of the circulatory system.

b The ICD/6 and ICD/7 term is arteriosclerotic heart disease; the ICDA/8, ICD/9, and ICD/10 term is ischemic heart disease.

c The ICDA/8 terms are congestive heart failure and left ventricular failure. The ICD/9 and ICD/10 term is heart failure (428) or CHF (428.0).

d The ICD/6 and ICD/7 term is vascular diseases affecting the central nervous system; the ICDA/8, ICD/9, and ICD/10 term is cerebrovascular disease.

e The ICDA/8 terms are congenital anomalies of heart and other congenital anomalies of circulatory system. The ICD/9 terms are bulbus cordis anomalies and anomalies of cardiac septal closure, other congenital anomalies of heart, and other congenital anomalies of circulatory system.

f The ICD/6 and ICD/7 terms are chronic bronchitis, unqualified bronchitis, and emphysema without mention of bronchitis; the ICDA/8 terms are chronic bronchitis, unqualified bronchitis, emphysema, and chronic obstructive lung disease; the ICD/9 and ICD/10 terms are chronic bronchitis, bronchitis not specified as acute or chronic, emphysema, bronchiectasis, extrinsic allergic alveolitis, and chronic airways obstruction not elsewhere classified.

g The ICDA/8 terms are hyaline membrane disease and respiratory distress syndrome. The ICD/9 term is respiratory distress syndrome. The ICD/10 is respiratory distress of newborns.

\* No code for this category exists in this ICD revision.

† No data for this category are presented in the *Chart Book* in this period.

## Appendix B

### Estimated Comparability Ratios for Selected Causes of Death, U.S.

Cause of Death	Codes of the International Classification of Diseases		Numbers of Deaths*		Comparability
	ICD/10	ICD/9	ICD/10	ICD/9	Ratio†
Malignant neoplasms	C00–C97	140–208	464,688	461,544	1.0068
Major cardiovascular diseases	I00–I78	390–434, 436–448	796,919	798,435	0.9981
Diseases of the heart	I00–I09, I11, I13, I20–I51	390–398, 402, 404, 410–429	615,564	624,405	0.9858
Coronary heart disease	I20–I25	410–414, 429.2	466,459	466,935	0.9990
Heart failure	I50	428	44,297	42,554	1.0410
CVD (stroke)	I60–I69	430–434, 436–438	137,264	129,640	1.0588
Diseases of arteries	I70–I78	440–448	32,133	33,706	0.9533
Influenza and pneumonia	J10–J18	480–487	50,526	72,371	0.6982
Chronic lower respiratory disease	J40–J47	490–494, 496	94,326	90,022	1.0478
COPD	J40–J44	490–492, 494, 496	90,109	85,304	1.0563
Asthma	J45–J46	493	4,217	4,718	0.8938
Neonatal RDS	P22	769	917	894	1.0257
SIDS	R95	798.0	2,575	2,485	1.0362

\* From a sample of deaths in 1996.<sup>8</sup>

† Deaths coded to ICD/10 divided by deaths coded to ICD/9.

# Appendix C

## Definition of Terms

Age-adjusted death rate:	An age-adjusted rate is a summary rate for a given age range and is computed by multiplying the age-specific rates for a given diagnosis (or cause of death) by the standard population for the age range and summing those products. The standard population is the U.S. population in 2000 as it is distributed proportionately in 10-year age groups. <sup>10-11, 29</sup>
Chronic condition:	A condition is considered chronic if (1) the respondent (in a health interview) indicates it was first noticed more than 3 months before the initial date of the interview, or (2) it is a type of condition that ordinarily has a duration of more than 3 months. <sup>29</sup>
Comparability ratio:	A comparability ratio is the number of deaths from a cause as coded by an ICD revision divided by the number of deaths from the closest similar cause as coded by the preceding ICD revision. A sample of death certificates from a chosen year is used for the calculation. The ratios measure discontinuities in mortality trends resulting from the introduction of a new ICD revision. <sup>8</sup>
Hospitalization:	Hospitalization refers to hospital discharge, the formal release of a hospital inpatient. It may be the result of death or transfer to a place of residence, nursing home, or another hospital. First-listed diagnosis is the coded diagnosis identified as the primary diagnosis or the diagnosis first listed on the face sheet of the hospital medical record. Hospital refers to non-Federal, short-stay (average length of patient's stay is less than 30 days), general (e.g., medical or surgical) or children's general hospitals, with six or more beds for inpatient use. <sup>29</sup>
Incidence:	Incidence is the number of cases that had their onset during a specified period of time, usually a year. <sup>29</sup>
Infant mortality rate:	Infant mortality is the number of deaths occurring in infants younger than 1 year of age from a cause (or all causes) divided by the number of live births occurring the same year, and then expressed as the rate per 100,000 live births for that year. <sup>29</sup>
Limited in activity:	Also called chronic activity limitation, it refers to the limitation of a person's usual activity due to a chronic condition. <sup>29</sup>
Morbidity:	Morbidity refers to incidence, prevalence, hospitalizations, and physician office visits.

# Appendix C

## Definition of Terms (continued)

Prevalence:	The prevalence of a condition is the number of persons who have the condition at a given time. <sup>29</sup>
Relative standard error:	The standard error is primarily a measure of sampling error—not measurement error—that is, the variation that might occur by chance because only a sample of the population is surveyed. The relative standard error of an estimate is obtained by dividing the standard error of the estimate by the estimate itself. <sup>29</sup>
Underlying cause of death:	The underlying cause of death is the disease or injury that initiated the events leading directly to death. It is selected from the conditions entered in the cause-of-death section of the death certificate. When more than one cause or condition is entered by the physician, the underlying cause is determined by the sequence of conditions on the certificate, provisions of the ICD, and associated classification rules. <sup>29</sup>

# Appendix D

## Abbreviations\*

AMI	acute myocardial infarction
CHD	coronary heart disease
CHF	congestive heart failure
CMS	Centers for Medicare & Medicaid Services
COPD	chronic obstructive pulmonary disease
CVD	cardiovascular diseases
ICD	International Classification of Diseases
NCHS	National Center for Health Statistics
NHANES	National Health and Nutrition Examination Survey
NHIS	National Health Interview Survey
NHLBI	National Heart, Lung, and Blood Institute
RDS	respiratory distress syndrome
SIDS	sudden infant death syndrome
WHO	World Health Organization

\* Country abbreviations may be found on the following page.

# Appendix D

## Abbreviations (continued)

AUL	Australia
CZR	Czech Republic
DEN	Denmark
FIN	Finland
GER	Germany
HUN	Hungary
JPN	Japan
KOR	Republic of Korea
NOR	Norway
NTH	Netherlands
POL	Poland
ROM	Romania
SCO	Scotland
SWE	Sweden
USA	United States of America

# Appendix E

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