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MORBIDITY &
MORTALITY:
2007 CHART BOOK
ON CARDIOVASCULAR,
LUNG, AND BLOOD
DISEASES



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JUNE 2007

FOR ADMINISTRATIVE USE

*NATIONAL INSTITUTES
OF HEALTH*

*National Heart, Lung,
and Blood Institute*

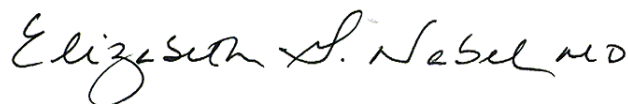
Foreword

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*.



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Director
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1. Introduction

During the past 40 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 a major burden on patients, their families, and the national health care system; the economic cost to the Nation is substantial.

This *Chart Book* provides data that show the magnitude of the problem and time trends that highlight demographic differences in disease burden by 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.

A companion chart book, *Incidence and Prevalence: 2006 Chart Book on Cardiovascular and Lung Diseases*, represents a compendium of data from six cohort community studies and one surveillance study supported by the NHLBI.¹

The “Background Data” chapter provides population and life-expectancy estimates; trends in total mortality, mortality by selected causes or major diagnosis, and days of hospital care; leading causes of death and chronic conditions; prevalence of CVD risk factors; and economic cost data. The “Cardiovascular Diseases,” “Lung Diseases,” and “Blood Diseases” chapters contain detailed morbidity and mortality statistics by racial/ethnic group, sex, and geographic distribution. Diseases included in a chapter are listed in the first table of the chapter together with appropriate diagnostic codes of the ninth revision of the clinical modification of the International Classification (ICD-9-CM) for hospitalizations and physician office visit data, and tenth revisions of the *International Classification of Diseases* (ICD) of the World Health Organization (WHO) for mortality.^{2, 3}

Sources of Data

Most of the data used in this book were obtained from the National Center for Health Statistics (NCHS), including the annual vital statistics of the United States; the annual National Health Interview Survey (NHIS); the National Health and Nutrition Examination Survey (NHANES), 1971–1975, 1976–1980, 1988–1994, and 1999–2004; the National Health Examination Survey, 1960–1962; the annual National Hospital Discharge Survey; and the annual National Ambulatory Medical Care Survey. 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, data tapes, 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 Appendix E.

Population Estimates

The NCHS and the NHLBI used 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 were based on non-institutionalized population estimates that were included in NCHS publications. The annual live births were reported by NCHS and used for infant mortality rates.

Population counts from the 2000 Census and estimates based on it thereafter have been bridged to single race categories, combining multiple race categories found in the Census.

Quality of Data

Quality issues discussed below include accuracy of diagnosis, data comparability, and ICD classification.

Prevalence

Diagnoses for most disease prevalence and smoking habits are based only on self-reports from health interviews. Physical measurements, on the other hand, are used to determine the prevalence of cardiovascular risk factors, such as high serum cholesterol and overweight. Prevalence of hypertension is based on blood pressure readings and health interviews about relevant medication.

Hospital Statistics

Hospitalization statistics measure rates of health care use, length of stay, and hospital case fatality. They have limitations associated with diagnostic accuracy. The magnitude of the rates may be influenced by the billing process, and comparability of rates over time may be influenced by changes in ICD coding and 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 is the one that is used. Because the survey is event-based rather than patient-based, annual estimates pertain to numbers of hospitalizations, not to numbers of patients hospitalized in a given year.

Charts that show hospitalization rates are based on first-listed diagnoses on the hospital record, (i.e., primary diagnosis). Charts that show the numbers of hospitalizations for a particular disease include not only those that are classified as the primary diagnosis but also hospitalizations classified as secondary to some other disease.

Methodological problems in data collection preclude the presentation of hospital data by race.⁴

Cause-of-Death Statistics

Limitations of cause-of-death statistics, apart from discontinuities over time caused by 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 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 the same cause of death 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.

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 may cause over- or underestimation of death rates in racial groups.⁵

ICD Revisions

Revisions in the ICD codes (Appendix A) cause discontinuity in time trends, particularly those associated with mortality. In most charts where more than one ICD revision has been used, breaks in trend lines have been added between revisions or comparability ratios have been applied. Where differences in mortality classification between ICD-9 (1979–1998) and ICD-10 (1999–) exceed 4% (stroke and COPD in Charts 3–5, 3–51, 3–52, and 4–9), NCHS-derived comparability ratios (Appendix B) have been applied to the death rates coded by ICD-9.⁶

Data Presentation

Mortality data (rates per population) are generally expressed by age, race/ethnicity, and sex. Age-adjusted mortality data (rates per population or percent change) are expressed by race/ethnicity and sex and in a few cases by States. Prevalence data are given as a percent of population and are expressed by age, race/ethnicity, and sex. And finally, hospitalization data are shown as comparisons between age groups or by primary or secondary diagnosis.

Rates per Population

Death rates are expressed per 100,000 population using the resident population as of July 1 of the relevant year as the denominator. Hospital discharge rates are per 10,000 population (noninstitutionalized), 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 rates are not affected by age composition differences among the populations.^{7–9} The European standard population is applied for age adjustment of international mortality statistics.¹⁰

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 differences that are not in the same direction over a given age range. For example, the bar chart for mortality from total lung diseases (Chart 4–3) has a higher age-adjusted rate for white females than for black females. The age-specific line chart (Chart 4–4), however, shows that for ages 35–64 years, black females have higher rates than white females, but for ages 65–84 years, white females have higher rates than black females.

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.¹¹ 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, the percent change and other calculations were based on 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 were plotted on an arithmetic scale to show their absolute change relative to zero. Note, however, that 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 appear to be slowing, whereas if plotted on a logarithmic scale, it would not.

Truncated Age Ranges

The age range for death rates in some charts excludes 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, the age range 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 persons of Asian and Pacific Islander descent.

Data on socioeconomic groups are not presented because they are extensively presented elsewhere.¹²

State Mortality

Death rates for the total population by State are shown in maps for CVD, CHD, stroke, and COPD.¹³ Although State death rates that combine all age, race, and sex groups can be misleading, they do 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 Southern States, which is not just high for blacks. Although rankings of certain States for CHD mortality differ considerably from rankings for total heart disease, their geographic patterns are not very different.¹⁴

2. Background Data

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

Cardiovascular Diseases

Table 2–1 contains prevalence estimates for CVD in the U.S. population.^{15–19} It should be noted that individuals with multiple CVD are counted for each condition that applies to them.

CVD	79,400,000
Hypertension	72,000,000
CHD	15,800,000
Acute Myocardial Infarction (AMI)	7,900,000
Angina Pectoris	8,900,000
Stroke	5,700,000
Heart Failure	5,200,000
Congenital CVD Defects	1,000,000
Atrial Fibrillation	2,200,000
Peripheral Arterial Disease	8,000,000

Table 2–2 contains estimates for the annual occurrence of CVD in the United States.^{19–22} The figures are the same as those that appeared in the 2004 *Chart Book* because insufficient new data were available to make any changes.²³

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

An estimated 24 million U.S. adults have COPD: 12 million physician-diagnosed and 12 million undiagnosed.^{24–28} An estimated 23 million individuals have asthma, and 12 million of them experienced at least one asthma attack during the survey year.²⁴ Approximately 30,000 people have cystic fibrosis, and 1 in 3,000 babies are born with the disease; 40,000 infants and 150,000 adults have respiratory distress syndrome; and about 12 million persons have obstructive sleep apnea.

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, and 1 in 600 babies is born with the disease annually. About 500 to 1,000 persons develop aplastic anemia each year. Approximately 18,000 persons have hemophilia, and 400 babies are born with the disease each year. About 1,000 persons have Cooley's anemia.

Population

Population estimates in Chart 2-1 are based on the 2000 U.S. Census and population surveys and projections. Estimates in Charts 2-1 and 2-2 reflect the 1997 Office of Management and Budget (OMB) directive on race and ethnicity that allows survey respondents in Federal data collection programs to select more than one race. For Chart 2-3, designations of race were modified by NCHS to be consistent with the OMB directive.

Chart 2-1

Total Population by Mean Age, Percent Age 65 and Over, Race/Ethnicity, and Sex, U.S., 2004

The mean age and percent population aged ≥ 65 years are lower for minorities than for whites. This is true for both males and females.²⁶

	Total Population			Male			Female		
	Pop. (Mil.)	Mean Age	Percent ≥ 65	Pop. (Mil.)	Mean Age	Percent ≥ 65	Pop. (Mil.)	Mean Age	Percent ≥ 65
Total	293.6	36.4	12.4	144.5	35.1	10.5	149.1	37.6	14.2
White	236.0	37.4	13.5	116.8	36.2	11.4	119.2	38.7	15.4
Hispanic	(38.2)	(28.6)	(5.3)	(19.8)	(28.0)	(4.4)	(18.4)	(29.2)	(6.4)
Non-Hispanic	(197.8)	(39.2)	(15.0)	(97.0)	(37.8)	(12.9)	(100.8)	(40.3)	(17.8)
Black	37.5	32.2	8.1	17.9	30.8	6.5	19.6	33.6	9.6
Hispanic	(1.5)	(28.2)	(4.7)	(0.8)	(27.2)	(3.8)	(0.8)	(29.1)	(5.5)
Non-Hispanic	(35.9)	(32.4)	(8.3)	(17.1)	(30.9)	(6.7)	(18.8)	(33.8)	(9.8)
American Indian*	2.8	31.2	6.4	1.4	30.5	5.6	1.4	31.9	7.3
Asian*	12.3	34.6	8.5	6.0	33.6	7.5	6.4	35.5	9.4
Hispanic [†]	41.3	28.5	5.2	21.3	28.0	4.3	20.0	29.2	6.3

* Estimates for Hispanic American Indians and Hispanic Asians are not available.

[†] Hispanic can be of any race.

Chart 2–2

Total Projected Population by Mean Age, Percent Age 65 and Over, Race/Ethnicity, and Sex, U.S., 2020

By 2020, the U.S. population will be 17.8% Hispanic, 13.5% black, and 5.4% Asian, and 16.3% will be aged ≥65 years.^{7, 27}

	Total Population			Male			Female		
	Pop. (Mil.)	Mean Age	Percent ≥65	Pop. (Mil.)	Mean Age	Percent ≥65	Pop. (Mil.)	Mean Age	Percent ≥65
Total	335.8	38.6	16.3	165.1	37.4	14.4	170.7	39.7	18.1
White	260.6	39.7	17.7	129.0	38.5	15.7	131.6	40.8	19.6
Hispanic	54.7	31.9	8.0	27.8	31.3	7.0	26.9	32.4	9.1
Non-Hispanic	205.9	41.7	20.3	101.2	40.4	18.1	104.7	43.0	22.4
Black	45.4	34.4	11.0	21.8	32.6	9.4	23.6	35.9	12.5
Hispanic	3.9	32.3	6.6	2.2	31.1	7.1	1.6	33.4	6.3
Non-Hispanic	41.5	34.5	11.2	19.6	32.7	9.5	22.0	36.1	12.7
American Indian*	3.1	33.1	10.2	1.5	32.2	8.6	1.6	34.0	11.7
Asian*	18.0	38.6	13.3	8.4	37.3	12.0	9.6	39.6	14.5
Hispanic†	59.8	31.6	7.9	30.3	31.1	6.8	29.4	32.2	9.0

* Estimates for Hispanic American Indians and Hispanic Asians are not available.

† Hispanic can be of any race.

Chart 2–3

Average Remaining Lifetime Years by Age, Race, and Sex, U.S., 2004

In 2004, average life expectancy at birth was 77.8 years: 80.4 years for females and 75.2 years for males, and 78.3 years for whites and 73.1 years for blacks.²⁸

Age (Years)	Total	Male	Female	Total White	White Male	White Female	Total Black	Black Male	Black Female
Birth	77.8	75.2	80.4	78.3	75.7	80.8	73.1	69.5	76.3
15	63.6	61.0	66.1	63.9	61.4	66.4	59.4	55.9	62.5
35	44.5	42.3	46.7	44.8	42.6	46.9	40.8	37.8	43.4
65	18.7	17.1	20.0	18.7	17.2	20.0	17.1	15.2	18.6
75	12.0	10.7	12.8	11.9	10.7	12.8	11.4	10.0	12.2

Chart 2–4**Age-Adjusted Death Rates for All Causes by Race and Sex, U.S., 1950–2004**

From 1950 to 2004, all-cause death rates declined for males, females, blacks, and whites. Males had higher mortality rates than females, and for both sexes, blacks had higher mortality rates than whites.^{13, 28, 29}

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	1,289.6	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	976.9	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	1,644.5	1,165.9	975.1	728.7
1991	1,622.0	1,146.4	968.0	719.8
1992	1,591.4	1,125.6	954.4	709.5
1993	1,629.3	1,143.0	977.7	728.9
1994	1,589.8	1,123.4	965.0	723.5
1995	1,582.3	1,112.7	970.1	726.6
1996	1,513.9	1,086.1	956.3	723.3
1997	1,446.7	1,062.5	940.7	718.3
1998	1,410.6	1,038.5	938.2	715.1
1999	1,432.6	1,040.0	933.6	716.6
2000	1,403.5	1,029.4	927.9	715.3
2001	1,375.0	1,006.1	912.5	706.7
2002	1,341.4	992.9	901.8	701.3
2003	1,319.1	973.9	885.6	693.1
2004	1,269.4	936.9	855.3	666.9

* Nonwhite from 1950 to 1967.

Chart 2–5
Unadjusted Death Rates for Selected Causes, U.S., 1950–2004

From 1950 to the late 1960s, the unadjusted death rate for CHD increased, but the stroke death rate remained fairly stable. From 1968 to 2004, the rates for both diseases declined steeply. In contrast, the death rate for COPD steadily increased from 1950 to 2004.^{13, 28, 29}

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	275.0	75.3	43.8	135.8	22.2
1980	280.6	75.0	45.8	138.1	24.7
1981	272.0	71.1	46.4	137.5	25.6
1982	268.0	67.9	48.1	139.2	25.8
1983	267.3	66.4	49.2	140.3	28.3
1984	260.0	65.3	50.3	142.0	29.3
1985	255.7	64.2	51.5	142.5	31.4
1986	247.1	62.2	52.3	143.2	31.9
1987	241.3	61.7	53.7	143.2	32.3
1988	238.2	61.4	54.5	143.9	33.9
1989	230.5	58.8	55.6	145.5	34.2
1990	224.5	57.8	56.8	146.4	34.8
1991	219.3	56.6	56.8	146.6	35.8
1992	214.0	55.9	56.9	146.0	35.8
1993	216.5	57.6	57.3	146.6	38.9
1994	210.0	58.1	56.8	146.3	38.6
1995	207.5	59.2	56.8	145.4	38.6
1996	202.2	59.2	56.4	143.9	39.3
1997	195.5	58.5	56.2	141.7	40.0
1998	190.9	57.3	56.0	140.3	40.8
1999	189.8	60.0	55.5	145.3	42.8
2000	183.1	59.6	56.1	143.5	41.8
2001	176.3	57.4	55.3	140.7	41.7
2002	171.4	56.4	54.9	138.6	41.8
2003	165.1	54.2	54.1	136.0	42.1
2004	153.7	51.1	53.2	132.6	40.2

Chart 2–6**Number of Days of Inpatients Hospital Care by Major Diagnosis, U.S., 1989–2004**

From 1990 to 2004 (except in 1994), cardiovascular and respiratory diseases ranked first and second, respectively, in the number of days for which patients received hospital care.³⁰

Year	Days of Care (Millions)							
	Cardiovascular	Respiratory	Mental	Digestive	Injury and Poisoning	Neoplasms	Musculoskeletal	Endocrine
1989	39.3	20.1	19.3	20.7	19.1	16.7	10.2	7.5
1990	37.9	20.4	18.8	19.2	18.9	16.8	10.2	7.6
1991	39.0	20.7	19.0	19.3	19.1	16.4	10.2	8.1
1992	39.4	19.8	18.6	18.4	16.9	15.4	10.0	7.5
1993	37.5	21.1	18.8	17.5	17.3	13.6	9.0	8.0
1994	36.1	19.6	20.9	16.8	15.2	13.2	8.2	7.4
1995	33.6	19.9	17.9	15.8	14.6	11.8	7.3	6.8
1996	33.7	19.2	16.5	14.7	13.8	11.2	7.2	6.8
1997	32.5	19.6	15.6	14.6	13.2	10.9	6.8	6.6
1998	32.6	19.2	15.1	14.7	13.6	10.8	6.5	6.3
1999	30.8	20.1	15.1	15.1	13.8	10.5	6.7	6.6
2000	30.4	18.5	15.8	14.9	13.4	9.3	6.3	6.6
2001	29.3	18.2	17.3	15.5	13.9	10.0	6.6	6.7
2002	29.9	18.8	17.5	16.2	14.2	10.2	6.8	6.9
2003	30.0	19.6	16.5	16.4	14.8	10.0	7.5	7.5
2004	29.8	18.4	16.5	16.8	15.5	9.4	7.4	7.0

Chart 2–7**Age-Adjusted Death Rates by Major Diagnosis, U.S., 1989–2004**

From 1989 to 2004, age-adjusted death rates for cardiovascular and respiratory diseases ranked first and third, respectively.^{28, 29}

Year	Deaths/100,000 Population							
	Cardiovascular	Neoplasms	Respiratory	Injury and Poisoning	Endocrine	Digestive	Mental	Musculoskeletal
1989	425.0	217.1	84.1	61.2	27.7	33.9	11.7	3.3
1990	412.5	219.0	85.5	60.4	27.7	33.1	11.9	3.4
1991	401.6	218.7	84.5	59.3	28.0	32.5	12.2	3.3
1992	392.3	217.3	82.3	57.4	28.2	32.1	12.7	3.2
1993	397.6	217.6	87.8	58.9	29.8	31.7	14.3	3.4
1994	387.1	216.1	86.0	58.3	30.7	31.4	15.5	3.5
1995	384.3	214.7	85.9	57.8	31.6	30.7	16.7	3.7
1996	375.5	211.6	86.2	56.9	32.2	30.3	17.5	3.7
1997	366.0	208.6	87.6	56.1	32.5	30.4	18.5	3.9
1998	355.2	205.4	89.6	55.7	33.0	29.8	20.0	3.8
1999	350.7	205.6	84.3	54.3	34.0	30.3	15.5	4.9
2000	341.3	204.5	83.7	53.9	34.1	30.4	16.7	5.0
2001	328.2	200.5	81.6	56.1	34.3	30.3	17.8	5.0
2002	319.0	196.1	81.4	56.7	34.4	30.0	19.2	5.0
2003	307.7	194.7	80.5	57.0	34.2	29.8	20.2	4.9
2004	288.0	190.4	76.1	57.3	33.1	28.8	20.3	4.8

Chart 2–8 Leading Causes of Death, U.S., 2004

In 2004, heart disease, stroke, and COPD and allied conditions were the first, third, and fourth leading causes of death, respectively.²⁹

Cause of Death	Number
Total Deaths	2,397,615
Heart disease*	652,486
Cancer	553,888
Cerebrovascular diseases (stroke)	150,074
COPD and allied conditions†	121,987
Accidents	112,012
Diabetes	73,138
Alzheimer's disease	65,965
Influenza and pneumonia	59,664
Nephritis	42,480
Septicemia	33,373
All other causes of death	532,648

* Includes 451,326 deaths from CHD.

† Chronic lower respiratory diseases.

Chart 2–9 Leading Causes of Death by Age and Rank, U.S., 2004

In 2004, heart disease was the third leading cause of death for those aged 25–44 years, second for those aged 45–64 years, and first for those aged ≥65 years. Stroke ranked fifth for those aged 45–64 years and third for those aged ≥65 years. COPD and allied conditions ranked sixth for those aged 45–64 years and fourth for those aged ≥65 years.³¹

Cause of Death	1–24	25–44	45–64	≥65
Heart disease	5	3	2	1
Cancer	4	2	1	2
Cerebrovascular diseases (stroke)	8	8	5	3
Accidents	1	1	3	9
COPD and allied conditions*	7	—	6	4
Influenza and pneumonia	6	10	—	6
Diabetes mellitus	—	9	4	7
Suicide	3	4	8	—
Chronic liver disease	—	7	7	—
Nephritis and nephrosis	—	—	9	8
Homicide	2	5	—	—
Septicemia	9	—	10	10
HIV infection	10	6	—	—
Alzheimer's disease	—	—	—	5

* Chronic lower respiratory diseases.

Chart 2–10
Leading Causes of Death, White Males, U.S., 2004

In 2004, among white males, heart disease, COPD and allied conditions, and stroke were the first, fourth, and fifth leading causes of death, respectively.²⁹

Cause of Death	Percent of All Deaths
Heart disease	27.7
Cancer	24.6
Accidents	6.1
COPD and allied conditions*	5.3
Stroke	4.9
Diabetes	2.8

* Chronic lower respiratory diseases.

Chart 2–11
Leading Causes of Death, White Females, U.S., 2004

In 2004, among white females, heart disease, stroke, and COPD and allied conditions were the first, third, and fourth leading causes of death, respectively.²⁹

Cause of Death	Percent of All Deaths
Heart disease	27.3
Cancer	22.0
Stroke	7.5
COPD and allied conditions*	5.7
Alzheimer's disease	4.1
Diabetes	3.3

* Chronic lower respiratory diseases.

Chart 2–12
Leading Causes of Death, Black Males, U.S., 2004

In 2004, among black males, heart disease and stroke were the first and fourth leading causes of death, respectively.²⁹

Cause of Death	Percent of All Deaths
Heart disease	24.8
Cancer	22.2
Accidents	5.9
Stroke	5.2
Homicide	4.7
Diabetes	3.8

Chart 2–13
Leading Causes of Death, Black Females, U.S., 2004

In 2004, among black females, heart disease and stroke were the first and third leading causes of death, respectively.²⁹

Cause of Death	Percent of All Deaths
Heart disease	26.9
Cancer	21.3
Stroke	7.4
Diabetes	5.1
Nephritis	3.0
Accidents	2.9

Chart 2–14
Leading Causes of Death, Asian Males, U.S., 2004

In 2004, among Asian males, heart disease, stroke, and COPD and allied conditions were the second, third, and fifth leading causes of death, respectively.²⁹

Cause of Death	Percent of All Deaths
Cancer	26.7
Heart disease	25.4
Stroke	7.6
Accidents	5.5
COPD and allied conditions*	3.5
Diabetes	3.3

* Chronic lower respiratory diseases.

Chart 2–15
Leading Causes of Death, Asian Females, U.S., 2004

In 2004, among Asian females, heart disease and stroke were the second and third leading causes of death, respectively.²⁹

Cause of Death	Percent of All Deaths
Cancer	26.9
Heart disease	23.7
Stroke	9.8
Accidents	4.0
Diabetes	4.0
Influenza/pneumonia	3.4

Chart 2–16
Leading Causes of Death, Hispanic Males, U.S., 2004

In 2004, among Hispanic males, heart disease and stroke were the first and fourth leading causes of death, respectively.²⁹

Cause of Death	Percent of All Deaths
Heart disease	21.9
Cancer	19.0
Accidents	11.4
Stroke	4.7
Diabetes	4.2
Homicide	4.1

Chart 2–17
Leading Causes of Death, Hispanic Females, U.S., 2004

In 2004, among Hispanic females, heart disease and stroke were the first and third leading causes of death, respectively.²⁹

Cause of Death	Percent of All Deaths
Heart disease	23.8
Cancer	21.4
Stroke	6.6
Diabetes	5.8
Accidents	4.8
Influenza/pneumonia	2.8

Chart 2–18
Leading Causes of Death, American Indian Males, U.S., 2004

In 2004, among American Indian males, heart disease and COPD and allied conditions were the first and sixth leading causes of death.²⁹

Cause of Death	Percent of All Deaths
Heart disease	20.1
Cancer	17.4
Accidents	14.2
Diabetes	5.1
Chronic liver disease	4.5
COPD and allied conditions*	3.3

* Chronic lower respiratory diseases.

Chart 2–19
Leading Causes of Death, American Indian Females, U.S., 2004

In 2004, among American Indian females, heart disease and stroke were the first and fifth leading causes of death, respectively.²⁹

Cause of Death	Percent of All Deaths
Heart disease	19.4
Cancer	19.2
Accidents	8.5
Diabetes	6.4
Stroke	5.6
Chronic liver disease	3.9

Chart 2–20
Prevalence of Leading Chronic Conditions Causing Limitation of Activity, U.S., 2005

In 2005, heart disease was the third leading chronic condition causing limitation of activity. Hypertension, lung condition, and stroke were also very common.²⁴

Chronic Condition	Prevalence (Millions)
Arthritis	6.5
Back/neck conditions	6.1
Heart condition	4.5
Diabetes	3.2
Mental conditions	3.2
Hypertension	3.2
Musculoskeletal condition	2.9
Lung condition	2.7
Bone or joint injury	2.7
Nervous condition	2.6
Vision condition	2.1
Stroke	1.6
Cancer	1.4

Chart 2–21**Age-Adjusted Percent of Population Currently Smoking by Race and Sex, Ages 18 and Over, U.S., 1965–2004**

From 1965 to 1990, the percent of the population aged ≥ 18 years who smoked cigarettes decreased markedly. The decline was greater for males, both black and white, than for females, both black and white.³¹

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	28.4	25.0	20.5	22.5
2000	25.7	25.4	20.7	22.0
2001	27.6	24.8	18.0	22.0
2002	26.6	24.9	18.3	21.0
2003	25.3	23.8	17.9	20.1
2004	23.5	23.0	16.9	19.5

Chart 2–22

Age-Adjusted Percent of Population With High Serum Cholesterol* by Race and Sex, Ages 20–74, U.S., 1976–1980, 1988–1994, and 2001–2004

From 1976–1980 to 2001–2004, the prevalence of high total serum cholesterol declined for each sex and racial/ethnic group.³¹

Year	White [†] Male	White [†] Female	Black [†] Male	Black [†] Female	Mexican-American Male	Mexican-American Female
1976–1980	26.4	29.6	25.5	26.3	20.3	20.5
1988–1994	18.7	20.7	16.4	19.9	18.7	17.7
2001–2004	16.5	16.7	14.4	14.3	17.0	12.8

* High serum cholesterol is ≥ 240 mg/dL.

[†] Non-Hispanic.

Chart 2–23

Age-Adjusted Percent of Population That Is Overweight* by Race and Sex, Ages 20–74, U.S., 1976–1980, 1988–1994, and 2001–2004

From 1976–1980 to 2001–2004, the prevalence of overweight males and females increased for each racial/ethnic group.³¹

Year	White [†] Male	White [†] Female	Black [†] Male	Black [†] Female	Mexican-American Male	Mexican-American Female
1976–1980	53.8	38.7	51.3	62.6	61.6	61.7
1988–1994	61.6	47.2	58.2	68.5	69.4	69.6
2001–2004	71.1	57.1	66.8	79.5	75.8	73.2

* Overweight is a body mass index of 25–29 kg/m².

[†] Non-Hispanic.

Chart 2–24

Economic Cost of Cardiovascular, Lung, and Blood Diseases, U.S., 2007

Annual expenditures 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.^{29, 32–38}

Disease	Dollars (Billions)			
	Total	Direct	Morbidity	Mortality
Total CVD	431.8	283.2	36.3	112.3
Heart disease	277.1	164.9	22.3	89.9
Coronary	151.6	83.6	9.8	58.2
Heart Failure	33.2	30.2	*	3.0
Stroke	62.7	41.6	6.5	14.6
Hypertensive disease	66.4	49.3	7.8	9.3
Selected lung diseases	153.6	94.8	27.9	30.9
COPD	42.6	26.7	8.0	7.9
Asthma	19.7	14.7	3.1	1.9
Selected blood diseases	13.8	10.2	0.7	2.9
Anemias	8.5	6.9	0.6	1.0

* No estimate is available.

Chart 2–25
Direct Cost of Cardiovascular, Lung, and Blood Diseases, U.S., 2007

Hospital care was the largest health expenditure among the types of direct costs for cardiovascular, lung, and blood diseases.^{32–38}

Disease	Dollars (Billions)					
	Total	Hospital Care	Physicians Services*	Prescription Drugs	Home Health Care	Nursing Home Care
Total CVD	283.2	133.0	43.3	47.2	14.4	45.3
Heart disease	164.9	94.2	22.2	20.0	6.4	22.0
Coronary	83.6	48.4	12.5	9.2	1.9	11.6
Heart Failure	30.2	17.8	2.3	3.0	2.9	4.2
Stroke	41.6	17.9	3.5	1.2	3.8	15.2
Hypertensive disease	49.3	7.2	12.5	23.0	2.1	4.5
Selected lung diseases	94.8	54.8	13.8	19.1	2.9	4.8
COPD	26.7	11.3	4.9	6.2	1.0	3.3
Asthma	14.7	4.7	3.8	6.2	†	†
Selected blood diseases	10.2	5.1	2.3	0.9	0.9	1.0
Anemias	6.9	3.3	1.5	0.6	0.6	0.9

* Physicians, clinics, and other professional services.

† No estimate is available.

3. Cardiovascular Diseases

The diagnostic group cardiovascular diseases is used here to mean diseases and congenital malformations of the circulatory system as coded in the ICD.

Charts 3–1 through 3–3 show the distribution of deaths in 2004 from specific CVD, heart disease, and stroke. For selected CVD, Chart 3–4 shows, according to ICD-9-CM codes, the number of physician office visits in 2003 and the number of hospitalizations and average length of stay in 2004 and, according to ICD-10 codes, the number of deaths in 2004. Subsequent charts display morbidity and mortality for total CVD and selected subgroups.

Coronary Heart Disease

CHD includes acute myocardial infarction (AMI) and angina pectoris. In the *Chart Book*, charts provide information on the prevalence and hospitalization rates of AMI and angina pectoris. Mortality data are not shown for them individually because good diagnostic information is often not available when death certificates are completed.

Over the years, multiple revisions of the ICD resulted in changes in diagnostic terms and codes included in the CHD category that compromised direct comparability of CHD deaths over time. For example, ICD-10 expanded CHD (over ICD-9) to include “Atherosclerotic CVD.” To maintain comparability over time, the CHD death rates in ICD-9 (1979–1998) were retabulated to include deaths coded to the additional term. As a result, the CHD death rates from 1979 to 1998 included in this *Chart Book* are higher than previous issues of the *Chart Book*.

Heart Failure

Heart failure 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 heart failure 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 heart failure have increased (until very recently), while mortality for total heart diseases has declined.

Cardiomyopathy

In 2004, almost 26,000 deaths were attributed to cardiomyopathy, although no consensus exists on classification and diagnostic criteria for the disease. This limitation presumably has little effect on any mortality differences influenced by age, race, or sex.

Atrial Fibrillation and Other Heart Diseases

The number of hospitalizations for atrial fibrillation has been steadily increasing over the past several years. Charts 3–43 and 3–44 show the number and rates of hospitalizations for atrial fibrillation. Mortality due to atrial fibrillation is not shown because atrial fibrillation is not intrinsically a fatal condition, although it does predispose individuals to potentially fatal conditions such as stroke. Moreover, the inconsistency in which atrial fibrillation is mentioned on death certificates and the difficulty of determining whether it is truly the cause of death make it impossible to gather reliable data.

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, charts pertaining to them have not been included.

Cerebrovascular Diseases (Stroke)

Cerebrovascular disease (i.e., stroke) is the third leading cause of death. Because of inadequate diagnostic information when death certificates are completed, less than 30% of all deaths from stroke can be classified to a specific type: subarachnoid hemorrhage, other hemorrhage, or cerebral infarction (Chart 3–3). As a result, mortality for the entire category is presented in mortality charts related to stroke. Also, although 80% of stroke hospitalizations can be classified to a type of hemorrhage or cerebral infarction, only statistics for the entire group are shown.

Hypertension

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. Mortality statistics are not presented for hypertensive disease 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, except for the total given in Table 2–1.

Congenital Malformations of the Circulatory System

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

Chart 3–1
Cardiovascular Disease Deaths, Percent by Subgroup, U.S., 2004

Cause of Death	Percent
CHD	51.8
Stroke	17.3
Other heart diseases	16.9
Heart failure	6.6
Diseases of arteries	4.1
Other CVD	3.3

Total Deaths = 869,724 (100%), including congenital CVD defects.

Chart 3–2
Heart Disease Deaths, Percent by Subgroup, U.S., 2004

Cause of Death	Percent
Other CHD	45.0
AMI	23.9
Heart failure	8.7
Other	7.0
Rhythmic	5.7
Hypertensive	4.8
Cardiomyopathy	3.9
Rheumatic/congenital	1.0

Total Deaths = 655,454 (100%), including 2,968 from congenital CVD defects.

Chart 3–3
Stroke Deaths, Percent by Subgroup, U.S., 2004

Cause of Death	Percent
Stroke, unspecified	51.0
Other cerebrovascular	19.3
Other hemorrhage	18.4
Cerebral infarction	7.3
Subarachnoid hemorrhage	4.0

Total Deaths = 150,074 (100%).

Chart 3–4
Number of Hospitalizations, Physician Office Visits,* and Deaths for Selected Cardiovascular Diseases, U.S., 2003 and 2004†

Diagnostic Category	ICD-9-CM Codes	Hospitalizations for 2004			Physician Office Visits for 2003 (1,000)	ICD-10 Codes	Deaths for 2004
		First-Listed Discharges (1,000)	Length of Stay (Days)				
Total	390–459, 745–747	6,435	4.8	71,569	I00–I99, Q20–Q28	869,724	
Heart Disease:	390–398, 402, 404–429	4,369	4.2	21,153	I00–I09, I11, I13, I20–I51	652,486	
Rheumatic heart disease	390–398	57	6.3	197	I00–I09	3,254	
Hypertensive heart disease	402, 404	90	5.6	771	I11, I13	31,631	
Coronary heart disease:	410–414, 429.2	1,981	4.3	9,389	I20–I25	451,326	
AMI	410	732	5.8	191	I21, I22	156,816	
Angina pectoris, stable	413	47	2.4	686	I20.1–I20.9	193	
Angina pectoris, unstable	411	108	2.3	93	I20.0	40	
Atherosclerotic CVD	429.2	—	—	290	I25.0	63,661	
Other CHD	412, 414	1,094	3.5	8,220	Other I23–I25	230,616	
Diseases of pulmonary circulation:	415–417	143	6.2	254	I26–I28	13,122	
Pulmonary embolism	415.1	121	6.2	53	I26	8,113	
Other	415.0, 415.2–417	22	6.3	201	I27–I28	5,009	
Subacute bacterial endocarditis	421	12	17.8	—	I33.0	1,145	
Cardiomyopathy	425	33	3.7	650	I42	25,580	
Atrial fibrillation and flutter	427.3	444	3.5	2,745	I48	10,610	
Other arrhythmic disorders	Other 427	318	4.0	1,988	Other I43–I49	26,996	
Heart failure:	428	1,099	5.3	2,890	I50	57,120	
Congestive heart failure	428.0	1,021	5.4	2,710	I50.0	53,191	
Left heart failure and unspecified	428.1–428.9	78	5.2	180	I50.1–I50.9	3,929	
Other heart disease	Other 420–429	192	5.0	2,553	Other I30–I52	31,702	
Other hypertensive disease	401, 403	427	3.2	35,798	I10, I12	23,076	
Cerebrovascular diseases (stroke)	430–438	906	5.2	3,538	I60–I69	150,074	
Diseases of arteries:	440–448	278	6.8	3,953	I70–I79	35,554	
Atherosclerosis	440	123	6.6	445	I70	11,861	
Aortic aneurysm	441	61	7.4	709	I71	13,753	
Other diseases of arteries	442–448	94	6.6	2,798	I72–I78	9,940	
Deep vein thrombosis	451.1	7	3.8	—	I80.2	2,843	
Other and unspecified CVD	Other 451–459	330	4.8	6,238	Other I80–I99	1,830	
Congenital malformations of CV system:	745–747	72	10.4	888	Q20–Q28	3,861	
Congenital heart disease	745, 746	47	7.8	553	Q20–Q24	2,968	
Other congenital cardiovascular disease	747	25	11.4	334	Q25–Q28	893	

* Estimates of hospitalizations and physician office visits are subject to sampling variability. Estimates of hospitalizations below 50,000 have a relative standard error >9%. Estimates of physician office visits below 434,000 have a relative standard error >30%.

† Compiled from references 29, 30, and 37.

Chart 3–5 Change in Age-Adjusted Death Rates, U.S., 1950–2004

The CHD death rate increased almost 10% from 1950 to its peak in 1968; by 2004, it was 66% lower than it was in 1950. Mortality from stroke, on the other hand, declined for most years and by 2004 was 72% lower than it was in 1950. By comparison, the death rate for non-CVD causes decreased only 15% since 1950.^{13, 28, 29}

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	-22.8	-43.6	-21.1
1980	-21.5	-44.1	-18.1
1981	-25.0	-48.0	-19.2
1982	-27.1	-51.1	-20.4
1983	-28.1	-52.8	-18.7
1984	-30.8	-54.3	-17.8
1985	-32.6	-55.6	-15.6
1986	-35.5	-57.5	-14.9
1987	-37.7	-58.4	-14.4
1988	-38.9	-59.0	-12.5
1989	-41.4	-61.1	-12.3
1990	-43.2	-62.0	-13.0
1991	-45.3	-63.4	-13.9
1992	-47.1	-64.3	-15.1
1993	-46.9	-63.6	-12.6
1994	-48.9	-63.6	-12.9
1995	-50.0	-63.3	-13.1
1996	-51.7	-63.7	-14.2
1997	-53.7	-64.5	-15.3
1998	-55.2	-65.5	-14.8
1999	-55.7	-65.8	-13.2
2000	-57.5	-66.4	-12.7
2001	-59.5	-68.0	-12.9
2002	-61.1	-68.8	-12.9
2003	-62.9	-70.4	-13.2
2004	-65.8	-72.3	-15.1

Chart 3–6

Age-Adjusted Death Rates and Percent Change for All Causes and Cardiovascular Diseases, U.S., 1972 and 2004

From 1972 to 2004, the CVD death rate declined 58% compared with 1.6% decline in the death rate for all non-CVD causes. Mortality from CHD and stroke each declined 66%. However, mortality from heart failure more than doubled.^{13, 28, 29}

Cause of Death	Deaths/100,000 Pop.		1972–2004	
	1972	2004	Difference	Percent Change
All causes	1,214.8	800.8	-414.0	-34.1
CVD*	695.4	289.5	-405.9	-58.4
CHD	445.5	150.2	-295.3	-66.3
Heart failure	9.3	18.9	9.6	103.2
Stroke	147.3	50.0	-97.3	-66.1
Other CVD	93.3	70.4	-22.9	-24.5
Non-CVD	519.4	511.3	-8.1	-1.6

* 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., 1965–2004

CVD mortality continued to decline through 2004. The 1999–2004 average annual percent declines in the age-adjusted death rates were 3.7% for CVD, 4.9% for CHD, and 4.1% for stroke.^{13, 28, 29}

Years	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	-4.2	0.7	-0.1
1980–1985	-0.9	-2.3	-2.9	-4.4	1.2	0.5
1985–1990	-1.0	-3.0	-3.3	-3.0	-2.1	0.8
1990–1998	-0.8	-1.7	-2.8	-0.7	0.1	-0.1
1999–2004	-1.7	-3.7	-4.9	-4.1	-1.3	-0.4

* Excludes congenital malformations of the circulatory system.

† Comparability ratios applied to stroke rates from 1979 to 1998.

Chart 3–8

Average Annual Percent Change in Age-Adjusted Death Rates for All Causes and Cardiovascular Diseases by Race and Sex, U.S., 1999–2004

From 1999 to 2004, average annual percent declines in mortality for CVD, CHD, and stroke within sex groups were greater for whites than for blacks. Within racial groups, declines in stroke mortality were greater for males than for females; for CVD mortality, declines were greater for white males than for white females.²⁹

Cause of Death	All Causes	White Male	White Female	Black Male	Black Female
All causes	-1.2	-1.6	-0.9	-2.2	-1.2
CVD*	-3.7	-4.8	-3.7	-3.1	-3.0
Heart disease	-3.8	-4.0	-3.8	-3.3	-3.4
CHD	-4.9	-4.9	-5.1	-4.1	-4.5
Heart failure	-1.5	-1.4	-1.4	-1.6	-1.2
Stroke	-4.1	-4.6	-4.0	-3.6	-2.9
Non-CVD	-0.4	-0.7	0.2	-1.9	-0.8

* Excludes congenital malformations of the circulatory system.

Chart 3–9

Deaths and Age-Adjusted Death Rates for Cardiovascular Diseases, U.S., 1979–2004

Age-adjusted CVD death rates declined considerably from 1979 to 2004, despite only a very modest decline in the total number of CVD deaths.^{13, 28, 29}

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	954	372.1
1997	948	362.4
1998	945	353.8
1999	954	350.8
2000	942	341.4
2001	927	328.2
2002	923	319.0
2003	907	307.7
2004	866	288.0

Chart 3–10
Percent of All Deaths Due to Cardiovascular Diseases* by Age, U.S., 2004

In 2004, the percent of deaths from CVD increased with age among adults: 20% for those aged 35–44 years and 48% for those aged ≥ 85 years.²⁹

Age (Years)	Percent of All Deaths
<1	8.0
1–4	9.5
5–14	7.7
15–24	4.9
25–34	10.7
35–44	19.6
45–54	26.4
55–64	29.8
65–74	32.4
75–84	38.8
≥ 85	48.0

* Includes congenital malformations of the circulatory system.

Chart 3–11
Age-Adjusted Death Rates for Cardiovascular Diseases* by State, U.S., 2001–2003

In 2001–2003, CVD mortality was higher in the East than in the West.¹³

Rank	State	Deaths/100,000 Population
1	Mississippi	420.9
2	Oklahoma	401.5
3	Alabama	380.7
4	Tennessee	380.2
5	West Virginia	378.4
6	Kentucky	374.2
7	Arkansas	371.0
8	Louisiana	364.4
9	Georgia	358.7
10	Missouri	353.8
11	Michigan	342.5
12	Ohio	338.8
13	South Carolina	338.0
14	Texas	336.7
15	Indiana	335.3
16	New York	331.0
17	North Carolina	330.5
18	Nevada	329.3
19	Illinois	321.7
20	Pennsylvania	321.2
21	Maryland	317.8
22	Delaware	314.7
23	Virginia	310.0
24	California	306.0
25	Kansas	305.4
26	New Jersey	304.8
27	Rhode Island	296.0
28	Iowa	295.7
29	Wisconsin	292.3
30	Florida	289.7
31	New Hampshire	289.4
32	Nebraska	287.5
33	Maine	285.4
34	South Dakota	283.3
35	North Dakota	282.4
36	Idaho	281.1
37	Oregon	281.0
38	Wyoming	280.7
39	Washington	280.6
40	Vermont	278.4
41	Connecticut	274.0
42	Montana	271.8
43	Massachusetts	270.2
44	Arizona	269.0
45	Colorado	265.4
46	Alaska	263.7
47	Utah	262.5
48	New Mexico	262.2
49	Hawaii	251.8
50	Minnesota	235.3

* Excludes congenital malformations of the circulatory system.

Chart 3–12**Percent Decline in Age-Adjusted Death Rates for Cardiovascular Diseases* by State, U.S., 1991–1993 to 2001–2003**

From 1991–1993 to 2001–2003, the smallest average annual percent declines in CVD death rates tended to be in the South.¹³

Rank	State	Percent Decline
1	Minnesota	-29.6
2	Vermont	-28.7
3	New York	-25.3
4	Connecticut	-25.1
5	Massachusetts	-24.4
6	Nebraska	-23.7
7	South Carolina	-23.5
8	Virginia	-23.5
9	Maine	-23.3
10	New Hampshire	-22.8
11	South Dakota	-22.7
12	Pennsylvania	-22.3
13	Illinois	-22.3
14	Rhode Island	-22.3
15	Wisconsin	-22.2
16	New Jersey	-22.2
17	Washington	-21.8
18	Arizona	-21.6
19	North Dakota	-21.4
20	Indiana	-20.9
21	North Carolina	-20.7
22	Alaska	-20.7
23	Iowa	-20.2
24	Florida	-19.9
25	Delaware	-19.8
26	Idaho	-19.7
27	Oregon	-19.6
28	California	-19.6
29	Michigan	-19.5
30	Montana	-19.4
31	Wyoming	-19.3
32	Hawaii	-19.0
33	Ohio	-19.0
34	Colorado	-18.7
35	New Mexico	-18.6
36	Louisiana	-18.3
37	Utah	-18.0
38	Maryland	-17.9
39	Kansas	-17.7
40	Georgia	-17.1
41	Nevada	-16.9
42	Missouri	-15.6
43	West Virginia	-15.5
44	Texas	-14.8
45	Kentucky	-14.1
46	Arkansas	-14.1
47	Mississippi	-12.6
48	Tennessee	-11.5
49	Alabama	-11.3
50	Oklahoma	-6.5

* Excludes congenital malformations of the circulatory system.

Chart 3–13**Age-Adjusted Death Rates for Heart Disease by Race/Ethnicity and Sex, U.S., 1985–2004***

From 1985 to 2004, heart disease death rates declined appreciably for blacks, whites, and Asians and more modestly for American Indians and Hispanics.³¹

Year	Male (Deaths/100,000 Population)				
	Black	White [†]	American Indian	Hispanic	Asian
1985	544.9	488.3	294.7	298.2	268.5
1986	532.9	474.3	288.6	292.6	261.3
1987	521.1	460.7	282.6	287.1	254.4
1988	509.5	447.5	276.7	281.6	247.6
1989	498.3	434.6	270.9	276.3	241.0
1990	487.3	422.2	265.3	271.1	234.5
1991	476.5	410.1	259.7	266.0	228.3
1992	465.9	398.3	254.3	261.0	222.2
1993	455.6	386.9	249.0	256.0	216.2
1994	445.5	375.8	243.8	251.2	210.5
1995	435.7	365.0	238.8	246.4	204.9
1996	426.1	354.5	233.8	241.8	199.4
1997	416.6	344.3	228.9	237.2	194.1
1998	407.4	334.5	224.1	232.7	188.9
1999	398.4	324.9	219.5	228.3	183.8
2000	389.6	315.6	214.9	224.0	178.9
2001	381.0	306.5	210.4	219.8	174.2
2002	372.5	297.7	206.0	215.6	169.5
2003	364.3	289.2	201.7	211.6	165.0
2004	356.2	280.9	197.5	207.6	160.6

Year	Female (Deaths/100,000 Population)				
	Black	White [†]	American Indian	Hispanic	Asian
1985	367.4	292.8	175.2	194.4	158.5
1986	360.2	285.9	172.3	191.3	155.0
1987	353.1	279.1	169.4	188.3	151.5
1988	346.2	272.4	166.6	185.2	148.1
1989	339.5	266.0	163.8	182.3	144.8
1990	332.8	259.6	161.0	179.4	141.6
1991	326.3	253.5	158.3	176.5	138.4
1992	319.9	247.4	155.7	173.7	135.3
1993	313.7	241.6	153.0	170.9	132.3
1994	307.5	235.8	150.5	168.1	129.4
1995	301.5	230.2	148.0	165.5	126.5
1996	295.6	224.8	145.5	162.8	123.7
1997	289.8	219.4	143.0	160.2	120.9
1998	284.2	214.2	140.6	157.6	118.2
1999	278.6	209.1	138.3	155.1	115.5
2000	273.1	204.1	136.0	152.6	113.0
2001	267.8	199.3	133.7	150.2	110.4
2002	262.6	194.6	131.4	147.8	108.0
2003	257.4	189.9	129.2	145.4	105.6
2004	252.4	185.4	127.1	143.1	103.2

* Each line is a log linear regression derived from the actual rate.

† Non-Hispanic.

Chart 3–14

Age-Adjusted Death Rates for Heart Disease by Race and Sex, U.S., 2004

In 2004, heart disease mortality overall was 50% higher for males than for females. Among males, it was 28% higher for blacks than for whites, and among females, it was 35% higher for blacks than for whites.²⁹

Sex	Deaths/100,000 Population		
	Total	White	Black
Male	267.9	265.1	338.7
Female	178.2	174.0	235.5

Chart 3–15

Death Rates for Heart Disease by Age, Race, and Sex, U.S., 2004

In 2004, heart disease mortality within sex groups was higher for blacks than for whites of all age groups. Within racial groups, it was higher for males than for females of all age groups.²⁹

Age (Years)	Deaths/100,000 Population			
	Black Male	White Male	Black Female	White Female
35–44	72.8	37.8	42.0	14.5
45–54	240.0	122.2	121.2	40.7
55–64	560.2	294.4	276.0	117.2
65–74	1,096.6	703.2	656.5	365.4
75–84	2,235.5	1,897.1	1,622.9	1,229.1

Chart 3–16

Age-Adjusted Prevalence of Coronary Heart Disease by Race and Sex, Ages 25–74, U.S., 1971–1974 to 1999–2004

The prevalence of CHD tended to increase from 1971–1974 to 1999–2004. One noted exception was a decrease in prevalence for females in 1999–2004.¹⁵

Years	Percent of Population			
	Black	White	Male	Female
1971–1974	5.0	4.8	5.3	4.0
1976–1980	6.2	5.8	6.2	5.5
1988–1994	5.3	6.5	5.6	7.6
1999–2004	7.2	6.6	7.9	5.3

Chart 3–17

Prevalence of Acute Myocardial Infarction by Age and Sex, U.S., 1999–2004

In 1999–2004, the prevalence of AMI was higher for males than for females of all age groups.¹⁵

Age (Years)	Percent of Population	
	Male	Female
35–44	1.3	0.3
45–54	3.2	1.8
55–64	10.6	4.0
65–74	14.9	6.5
≥75	18.0	10.5

Chart 3–18

Prevalence of Acute Myocardial Infarction by Age and Race, U.S., 1999–2004

In 1999–2004, the prevalence of AMI was higher for blacks than for whites aged 35–54 years. But the prevalence was higher for whites than for blacks aged ≥ 55 years.¹⁵

Age (Years)	Percent of Population	
	Black	White
35–44	1.7	0.8
45–54	3.1	2.5
55–64	6.8	7.2
65–74	8.3	11.1
≥ 75	11.4	14.2

Chart 3–19

Prevalence of Angina Pectoris by Age and Sex, U.S., 1999–2004

In 1999–2004, for all age groups except one, the prevalence of angina pectoris was higher for males than for females. It was similar for males and females aged 45–54 years.¹⁵

Age (Years)	Percent of Population	
	Male	Female
35–44	1.7	1.3
45–54	4.5	4.6
55–64	8.8	7.1
65–74	11.7	9.3
≥ 75	13.7	12.2

Chart 3–20

Prevalence of Angina Pectoris by Age and Race, U.S., 1999–2004

In 1999–2004, the prevalence of angina pectoris increased with age for blacks and for whites. The increase, however, did not continue for blacks aged ≥ 75 years.¹⁵

Age (Years)	Percent of Population	
	Black	White
35–44	3.1	1.4
45–54	4.5	4.8
55–64	8.2	8.0
65–74	9.1	10.7
≥ 75	6.1	14.0

Chart 3–21
Hospitalization Rates for Acute Myocardial Infarction, Ages 45–64 and 65 and Over, U.S., 1965–2004

The AMI hospitalization rate for individuals aged 45–64 years increased from 1965 to the mid-1970s and slowly declined thereafter. For individuals aged ≥ 65 years, the rate increased from 1965 to its peak in 1986 and then fluctuated through 2004.³⁰

Year	Hospitalizations/10,000 Population	
	Ages 45–64 Years	Ages ≥ 65 Years
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
2003	33.0	138.2
2004	32.5	126.6

Chart 3–22
Hospital Case-Fatality Rates for Acute Myocardial Infarction, Ages 45–64 and 65 and Over, U.S., 1970–2004

From 1970 to 2004, hospital case-fatality rates for AMI declined substantially for individuals aged 45–64 years and those aged ≥ 65 years.³⁰

Year	Percent Discharged Dead	
	Ages 45–64 Years	Ages ≥ 65 Years
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
2003	3.0	9.9
2004	2.6	12.2

Chart 3–23**Age-Adjusted Death Rates for Coronary Heart Disease, Actual and Expected, U.S., 1950–2004**

CHD accounted for 452,000 deaths in 2004. It would have accounted for 1,447,000 deaths if the rate had remained at its 1968 peak.^{13, 28, 29}

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	339.1	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	194.6	553.5	482.6
2000	186.8	556.3	482.6
2001	177.8	559.1	482.6
2002	170.8	561.9	482.6
2003	162.8	564.7	482.6
2004	150.2	567.6	482.6

Chart 3–24

Age-Adjusted Death Rates for Coronary Heart Disease by Race and Sex, U.S., 1950–2004

In the 1950s and 1960s, CHD death rates increased for all blacks and for white males but were relatively stable for white females. Since then, CHD death rates have declined appreciably for both racial and sex groups.^{13, 28, 29}

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	254.0	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	278.7	251.2	188.0	150.5
2000	269.5	241.3	183.2	143.9
2001	262.0	228.4	176.7	137.4
2002	250.6	220.5	169.7	131.2
2003	243.3	209.6	160.9	125.0
2004	223.9	194.2	148.7	114.7

* Nonwhite from 1950 to 1967.

Chart 3–25

Deaths and Age-Adjusted Death Rates for Coronary Heart Disease, U.S., 1979–2004

Since 1980, the number of deaths and the age-adjusted death rates for CHD decreased almost every year.^{13, 28, 29}

Year	Deaths in 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	194.6
2000	514	186.8
2001	502	177.8
2002	494	170.8
2003	480	162.9
2004	452	150.2

Chart 3–26

Average Annual Percent Change in Age-Adjusted Death Rates for Coronary Heart Disease by Race and Sex, U.S., 1950–2004

Since 1980, white males and females experienced steeper declines in CHD mortality than black males and females, respectively.^{13, 28, 29}

Years	Total Population	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
1999–2004	-4.9	-4.9	-5.1	-4.1	-4.5

* Nonwhite from 1950 to 1967.

Chart 3–27**Average Annual Percent Change in Death Rates for Coronary Heart Disease by Age, Race, and Sex, U.S., 1999–2004**

From 1999 to 2004, the average annual percent declines for CHD mortality were greater for individuals aged ≥ 55 years than for those aged ≤ 54 years.²⁹

Age (Years)	Black Male	White Male	Black Female	White Female
35–44	-3.2	-1.0	-1.8	2.2
45–54	-2.1	-2.7	-2.6	-1.6
55–64	-4.3	-4.6	-4.7	-5.4
65–74	-4.2	-5.9	-6.2	-5.7
75–84	-3.5	-4.7	-4.7	-5.0
≥ 85	-5.4	-5.2	-3.6	-5.3

Chart 3–28**Age-Adjusted Death Rates for Coronary Heart Disease by Race and Sex, U.S., 2004**

In 2004, CHD mortality within sex groups was higher for blacks than for whites and overall was considerably higher for males than for females.²⁹

Sex	Deaths/100,000 Population		
	Total	White	Black
Male	194.1	194.2	223.9
Female	116.7	114.7	148.7

Chart 3–29**Death Rates for Coronary Heart Disease by Age, Race, and Sex, U.S., 2004**

In 2004, CHD mortality within sex groups was higher for blacks than for whites of all age groups. Death rates were also higher for males than for females of all age groups.²⁹

Age (Years)	Deaths/100,000 Population			
	Black Male	White Male	Black Female	White Female
35–44	31.9	24.1	15.5	7.2
45–54	138.4	89.6	59.6	24.4
55–64	362.4	227.1	168.6	79.5
65–74	761.9	539.9	430.7	253.5
75–84	1,537.6	1,422.1	1,077.3	835.6

Chart 3–30**Age-Adjusted Death Rates for Coronary Heart Disease by State, U.S., 2001–2003**

In 2001–2003, a narrow band of states from New York through Appalachia to Oklahoma had high CHD death rates. Many Western and Mountain states had low rates.¹³

Rank	State	Deaths/100,000 Population
1	Oklahoma	227.4
2	New York	221.8
3	Tennessee	211.9
4	West Virginia	205.1
5	Rhode Island	196.9
6	Michigan	190.8
7	Mississippi	190.3
8	Missouri	187.7
9	Arkansas	187.6
10	Kentucky	186.3
11	Ohio	183.1
12	Delaware	181.1
13	Texas	178.5
14	New Jersey	178.0
15	Maryland	176.2
16	Louisiana	176.0
17	California	172.6
18	Pennsylvania	171.8
19	Illinois	171.6
20	Florida	171.4
21	Iowa	170.4
22	Indiana	168.3
23	New Hampshire	167.6
24	North Carolina	164.5
25	North Dakota	156.4
26	South Carolina	155.1
27	South Dakota	152.8
28	Arizona	151.8
29	Vermont	150.6
30	Alabama	149.7
31	Georgia	149.5
32	Maine	146.9
33	Nevada	145.4
34	Wisconsin	145.2
35	Washington	144.9
36	Virginia	144.2
37	New Mexico	143.8
38	Connecticut	142.5
39	Kansas	141.3
40	Idaho	136.4
41	Massachusetts	134.3
42	Wyoming	131.5
43	Oregon	125.2
44	Nebraska	121.2
45	Colorado	120.4
46	Montana	117.7
47	Alaska	115.0
48	Minnesota	105.7
49	Utah	103.2
50	Hawaii	100.0

Chart 3–31**Age-Adjusted Death Rates* for Coronary Heart Disease by Country and Sex, Ages 35–74, 2004†**

In 2004, among 18 industrialized countries, the United States ranked seventh highest for CHD mortality for males and fifth highest for females.³⁹

Country	Deaths/100,000 Population	
	Male	Female
Hungary (2003)	358.0	132.9
Romania	314.3	134.3
Czech Republic	230.9	81.8
Scotland	220.6	80.6
Poland	215.0	65.5
Finland	211.2	47.9
United States of America	174.3	72.6
England and Wales	168.9	55.4
Sweden (2002)	151.1	50.7
Germany	142.2	44.5
Denmark (2001)	141.8	51.0
Norway	117.7	31.1
Australia (2003)	117.2	37.4
Netherlands	95.5	33.9
Spain	92.6	23.9
France (2003)	70.3	16.1
Republic of Korea	52.1	21.0
Japan	50.4	14.9

* Age adjusted to European standard.

† Data for 2004 unless otherwise noted in parentheses.

Chart 3–32**Change in Age-Adjusted Death Rates* for Coronary Heart Disease in Males by Country, Ages 35–74, 1999–2004**

From 1999 to 2004, when compared with the United States, eight countries had a steeper decline in CHD mortality for males.³⁹

Country	Average Annual Percent Change‡
Netherlands	-8.3
Norway	-8.1
Australia†	-7.1
Czech Republic	-6.1
Poland	-5.9
Finland	-5.5
Germany	-5.3
Spain	-4.7
United States of America	-4.6
Hungary†	-3.6
Japan	-1.9
Romania	-1.7
Republic of Korea	-0.6

* Age adjusted to European standard.

† Data for 1998–2003.

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

Chart 3–33
Change in Age-Adjusted Death Rates* for Coronary Heart Disease in Females by Country, Ages 35–74, 1999–2004

From 1999 to 2004, seven countries had a steeper decline in CHD mortality for females than the United States.³⁹

Country	Average Annual Percent Change [‡]
Norway	-11.7
Australia [†]	-8.7
Netherlands	-7.7
Finland	-7.2
Germany	-6.8
Poland	-6.8
Czech Republic	-6.1
United States of America	-5.0
Spain	-4.7
Japan	-4.0
Hungary [†]	-3.6
Romania	-3.5
Republic of Korea	-0.7

* Age adjusted to European standard.

[†] Data for 1998–2003.

[‡] Based on a log linear regression of the actual rates.

Chart 3–34
Age-Adjusted Prevalence of Heart Failure by Race and Sex, Ages 25–74, U.S., 1971–1975 to 1999–2004

From 1971–1974 to 1999–2004, the prevalence of heart failure increased markedly for males, females, whites, and blacks and remained relatively high through 2004.¹⁵

Years	Percent of Population			
	White	Black	Male	Female
1971–1974	1.0	1.5	1.1	1.1
1976–1980	0.9	1.1	1.2	0.8
1988–1994	1.8	3.0	2.3	1.4
1999–2004	1.7	2.5	2.2	1.4

Chart 3–35**Hospitalization Rates for Congestive Heart Failure, Ages 45–64 and 65 and Over, U.S., 1971–2004**

From 1971 to 2004, congestive heart failure hospitalization rates more than tripled for individuals aged 45–64 years and those aged ≥ 65 years.³⁰

Year	Hospitalizations/10,000 Population	
	Ages 45–64 Years	Ages ≥ 65 Years
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
2003	36.6	222.0
2004	33.0	225.0

Chart 3–36**Hospital Case-Fatality Rates for Congestive Heart Failure, Ages 45–64 and 65 and Over, U.S., 1981–2004**

The percent of congestive heart failure hospital discharges that were discharged dead declined appreciably from 1981 to 2004 for individuals aged 45–64 years and those aged ≥ 65 years.³⁰

Year	Percent Discharged Dead	
	Ages 45–64 Years*	Ages ≥ 65 Years
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
2003	3.0	5.0
2004	2.0	4.3

* Unreliable estimate for 1981.

Chart 3–37

Age-Adjusted Death Rates for Heart Failure by Race and Sex, U.S., 1979–2004

From the early 1990s to 2004, heart failure death rates for both black and white males and females leveled off after nearly steady increases since 1979.^{13, 28, 29}

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	24.2	21.6	20.7	19.3
2001	24.4	21.2	20.6	19.3
2002	23.3	20.5	20.5	18.6
2003	23.6	20.7	20.5	18.4
2004	23.4	20.0	19.3	18.1

* 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., 2004

In 2004, death rates from heart failure within sex groups were slightly higher for blacks than for whites and overall were slightly higher for males than for females.²⁹

Sex	Deaths/100,000 Population		
	Total	White	Black
Male	19.9	20.0	23.4
Female	18.0	18.1	19.3

Chart 3–39
Death Rates for Heart Failure by Age, Race, and Sex, U.S., 2004

In 2004, heart failure mortality within sex groups was higher for blacks than for whites of all age groups. Within racial groups, it was higher for males than for females of all age groups.²⁹

Age (Years)	Deaths/100,000 Population			
	Black Male	White Male	Black Female	White Female
35–44	2.2	0.7	1.7	0.4
45–54	9.3	2.3	5.9	1.5
55–64	25.0	8.8	15.0	6.0
65–74	55.7	36.8	42.8	26.8
75–84	176.2	148.2	135.8	121.7

Chart 3–40
Age-Adjusted Death Rates* for Heart Failure by Country and Sex, Ages 35–74, 2004†

Among 18 countries in 2004, the United States ranked ninth highest for heart failure mortality for males and sixth highest for females.³⁹

Country	Deaths/100,000 Population	
	Male	Female
Poland	50.1	20.6
Japan	18.3	8.4
Germany	16.5	9.0
Spain	13.9	7.0
Czech Republic	13.4	6.9
Netherlands	12.7	6.4
France (2003)	12.3	5.2
Denmark (2001)	9.9	5.1
United States of America	9.3	6.7
Norway (2003)	7.3	4.2
Hungary (2003)	4.6	2.3
England and Wales	4.2	2.9
Australia (2003)	3.1	1.9
Scotland	3.1	1.7
Republic of Korea	3.0	2.0
Sweden (2002)	2.7	1.6
Finland	0.7	1.0
Romania (2000)	0.3	0.2

* Age adjusted to European standard.

† Data for 2004 unless otherwise noted in parentheses.

Chart 3–41**Age-Adjusted Death Rates for Cardiomyopathy by Race and Sex, U.S., 2004**

In 2004, cardiomyopathy death rates within sex groups were approximately twice as high for blacks as for whites and overall approximately twice as high for males as for females.²⁹

Sex	Deaths/100,000 Population		
	Total	White	Black
Male	13.3	12.4	23.8
Female	6.8	6.3	12.3

Chart 3–42**Death Rates for Cardiomyopathy by Age, Race, and Sex, U.S., 2004**

In 2004, cardiomyopathy mortality within sex groups was much higher for blacks than for whites of all age groups. Within racial groups, it was higher for males than for females of all age groups.²⁹

Age (Years)	Deaths/100,000 Population			
	Black Male	White Male	Black Female	White Female
35–44	11.5	3.5	5.2	1.4
45–54	22.3	7.1	10.2	2.6
55–64	39.1	12.9	16.7	5.7
65–74	62.9	29.3	32.0	13.7
75–84	102.5	75.5	60.6	38.9

Chart 3–43**Hospitalizations for Atrial Fibrillation by Primary and Secondary Diagnosis, U.S., 1982–2004**

The number of hospitalizations with atrial fibrillation as a primary diagnosis was almost four times higher in 2004 than in 1982. As a secondary diagnosis, it was almost six times higher in 2004 than in 1982.³⁰

Year	Hospitalizations (Thousands)	
	Primary Diagnosis	Secondary Diagnosis
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
2003	470	2,434
2004	444	2,492

Chart 3–44
Hospitalization Rates for Atrial Fibrillation by Age, U.S., 1982–2004

From 1982 to 2004, hospitalizations for atrial fibrillation more than doubled for individuals aged 45–64 years and tripled for those aged ≥ 65 years.³⁰

Year	Hospitalizations/10,000 Population	
	Ages 45–64 Years	Ages ≥ 65 Years
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
2003	18.0	90.5
2004	15.3	84.6

Chart 3–45
Age-Adjusted Prevalence of Stroke by Race and Sex, Ages 25–74, U.S., 1971–1974 to 1999–2004

From 1971–1974 to 1999–2004, the prevalence of stroke increased for males and females and for blacks and whites.¹⁵

Years	Percent of Population			
	Black	White	Male	Female
1971–1974	2.1	1.3	1.5	1.3
1976–1980	2.2	1.4	1.6	1.4
1988–1994	2.5	1.6	2.0	1.4
1999–2004	3.4	1.9	1.9	2.2

Chart 3–46
Prevalence of Stroke by Age and Sex, U.S., 1999–2004

In 1999–2004, the prevalence of stroke was higher for females than for males of all ages, except those aged 65–74 years, where it was higher for males than for females.¹⁵

Age (Years)	Percent of Population	
	Male	Female
35–44	0.9	1.1
45–54	1.0	2.5
55–64	3.0	3.4
65–74	7.2	5.9
≥75	11.0	11.4

Chart 3–47
Prevalence of Stroke by Age and Race, U.S., 1999–2004

In 1999–2004, the prevalence of stroke was higher for blacks than for whites of all age groups.¹⁵

Age (Years)	Percent of Population	
	Black	White
35–44	1.9	1.1
45–54	4.0	1.5
55–64	5.1	2.9
65–74	10.7	6.1
≥75	13.0	11.2

Chart 3–48**Hospitalization Rates for Stroke, Ages 45–64 and 65 and Over, U.S., 1971–2004**

Hospitalization rates for stroke for individuals aged 45–65 years and those aged ≥ 65 years increased from 1971 to the mid-1980s. After that time, the rate for those aged 45–64 years remained reasonably steady until it declined in the early 2000s. The rates for those aged ≥ 65 years fluctuated after the mid-1980s and then declined in the early 2000s.³⁰

Year	Hospitalizations/10,000 Population	
	Ages 45–64 Years	Ages ≥ 65 Years
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
2003	33.6	190.5
2004	30.8	175.6

Chart 3–49**Hospital Case-Fatality Rate for Stroke, Ages 45–64 and 65 and Over, U.S., 1971–2004***

Hospital case-fatality rates for stroke for individuals aged 45–64 years and those aged ≥ 65 years declined appreciably from 1971 to the mid-1980s and modestly thereafter.³⁰

Year	Percent Discharged Dead	
	Ages 45–64 Years	Ages ≥ 65 Years
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	7.0	14.8
1981	9.2	11.6
1982	7.3	11.5
1983	5.8	10.8
1984	6.3	10.1
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
2003	3.4	6.0
2004	6.5	6.8

* Estimates are not available for 1976 and 1977.

Chart 3–50**Age-Adjusted Death Rates for Stroke by Race and Sex, U.S., 1950–2004**

The steep decline in stroke mortality that occurred for all four groups in the 1970s and mid-1980s slowed through the 1990s before resuming after 1999.^{13, 28, 29}

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	89.6	60.8	76.2	58.0
2000	89.6	59.8	76.2	57.3
2001	85.4	56.5	73.7	54.5
2002	81.7	54.2	71.8	53.4
2003	79.5	51.7	69.8	50.5
2004	74.9	48.1	65.5	47.4

* Nonwhite from 1950 to 1967.

Chart 3–51
Deaths and Age-Adjusted Death Rates for Stroke, U.S., 1979–2004*

From 1979 to the early 1990s, the number of deaths and age-adjusted death rates for stroke declined. The number of deaths remained relatively stable after the early 1990s until they declined again from 2000 to 2004. The age-adjusted death rates were stable during the early 1990s and then declined from 1995 to 2004.^{13, 28, 29}

Year	Deaths in Thousands	Deaths/100,000 Population
1979	178	102.0
1980	179	101.0
1981	172	94.0
1982	166	88.4
1983	163	85.3
1984	162	82.7
1985	161	80.2
1986	157	76.8
1987	157	75.2
1988	158	74.1
1989	153	70.3
1990	151	68.6
1991	150	66.1
1992	151	64.6
1993	158	65.8
1994	161	66.1
1995	166	66.3
1996	168	65.6
1997	168	64.2
1998	166	62.3
1999	167	61.6
2000	168	60.9
2001	164	57.9
2002	163	56.2
2003	158	53.5
2004	150	50.0

* The comparability ratio 1.0502 was applied to the deaths and rates reported in vital statistics for 1979–1998.

Chart 3–52

Age-Adjusted Death Rates for Stroke by Race/Ethnicity and Sex, U.S., 1985–2004*

From 1985 to 2004, stroke mortality declined for all sex and racial/ethnic groups. The decrease was relatively modest among Hispanic males and females and American Indian females.³¹

Male (Deaths/100,000 Population)					
Year	Black	White [†]	American Indian	Hispanic	Asian
1985	122.4	81.7	54.1	58.0	74.1
1986	119.6	79.8	53.1	57.1	72.7
1987	116.9	77.9	52.0	56.3	71.3
1988	114.2	76.1	51.0	55.5	69.9
1989	111.6	74.4	50.0	54.7	68.5
1990	109.0	72.7	49.0	53.9	67.2
1991	106.6	71.0	48.1	53.1	65.9
1992	104.1	69.4	47.1	52.4	64.6
1993	101.8	67.8	46.2	51.6	63.3
1994	99.4	66.2	45.3	50.9	62.1
1995	97.2	64.7	44.4	50.1	60.9
1996	94.9	63.2	43.6	49.4	59.7
1997	92.8	61.7	42.7	48.7	58.5
1998	90.7	60.3	41.9	48.0	57.4
1999	88.6	58.9	41.1	47.3	56.3
2000	86.6	57.6	40.3	46.6	55.2
2001	84.6	56.2	39.5	45.9	54.1
2002	82.7	54.9	38.7	45.3	53.0
2003	80.8	53.7	37.9	44.6	52.0
2004	78.9	52.4	37.2	44.0	51.0

Female (Deaths/100,000 Population)					
Year	Black	White [†]	American Indian	Hispanic	Asian
1985	103.1	74.6	48.3	49.5	61.7
1986	100.9	73.2	47.7	48.8	60.6
1987	98.8	71.8	47.2	48.1	59.5
1988	96.7	70.4	46.6	47.4	58.4
1989	94.6	69.1	46.1	46.7	57.4
1990	92.6	67.7	45.6	46.0	56.3
1991	90.6	66.4	45.0	45.3	55.3
1992	88.6	65.1	44.5	44.7	54.3
1993	86.8	63.9	44.0	44.0	53.3
1994	84.9	62.7	43.5	43.3	52.3
1995	83.1	61.4	43.0	42.7	51.4
1996	81.3	60.3	42.5	42.1	50.4
1997	79.6	59.1	42.0	41.5	49.5
1998	77.9	58.0	41.5	40.9	48.6
1999	76.2	56.8	41.0	40.3	47.7
2000	74.6	55.8	40.6	39.7	46.9
2001	73.0	54.7	40.1	39.1	46.0
2002	71.4	53.6	39.6	38.5	45.2
2003	69.9	52.6	39.2	37.9	44.3
2004	68.4	51.6	38.7	37.4	43.5

* Each line is a log linear regression derived from the actual values. The comparability ratio 1.0502 was applied to rates reported in vital statistics for 1985–1998.

† Non-Hispanic.

Chart 3–53

Average Annual Percent Change in Age-Adjusted Death Rates for Stroke by Race and Sex, U.S., 1960–2004

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 reductions for several years. Appreciable declines resumed in 1999–2004.^{13, 28, 29}

Years	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	-0.1	-2.2	-0.2
1999–2004	-4.1	-4.6	-4.0	-3.6	-2.9

* Nonwhite from 1960 to 1967.

Chart 3–54

Age-Adjusted Death Rates for Stroke by Race and Sex, U.S., 2004

In 2004, stroke mortality was appreciably higher for blacks than for whites and overall about the same for males and females.²⁹

Sex	Deaths/100,000 Population		
	Total	White	Black
Male	50.4	48.0	74.9
Female	48.9	47.2	65.5

Chart 3–55

Death Rates for Stroke by Age, Race, and Sex, U.S., 2004

In 2004, stroke mortality was higher for blacks than for whites of all age groups. Within racial groups, it was higher for males than for females of all age groups.²⁹

Age (Years)	Deaths/100,000 Population			
	Black Male	White Male	Black Female	White Female
35–44	12.8	4.7	11.8	4.1
45–54	44.8	12.8	33.9	10.1
55–64	107.4	32.4	65.0	25.1
65–74	235.2	110.8	166.8	89.0
75–84	551.0	393.7	489.5	366.8

Chart 3–56**Age-Adjusted Death Rates for Stroke by State, U.S., 2001–2003**

In 2001–2003, stroke mortality was highest in many of the Southeastern states, most of which comprise “the stroke belt,” and northern Pacific states.¹³

Rank	State	Deaths/100,000 Population
1	Arkansas	74.2
2	South Carolina	72.5
3	Tennessee	71.2
4	Mississippi	68.6
5	North Carolina	68.5
6	Oregon	68.0
7	Oklahoma	67.8
8	Alabama	67.8
9	Georgia	66.6
10	Washington	64.4
11	Kentucky	63.7
12	Louisiana	63.3
13	Texas	63.0
14	Virginia	62.2
15	Missouri	60.9
16	Idaho	60.8
17	Indiana	60.3
18	West Virginia	59.8
19	Kansas	59.1
20	California	58.7
21	Montana	58.3
22	Alaska	57.7
23	Ohio	57.2
24	Wisconsin	57.1
25	Hawaii	56.7
26	Iowa	56.7
27	Illinois	56.5
28	North Dakota	56.5
29	Maryland	56.3
30	Utah	56.1
31	Nevada	56.1
32	Michigan	56.0
33	Nebraska	55.5
34	Wyoming	54.2
35	Maine	53.7
36	Colorado	53.5
37	Pennsylvania	53.3
38	South Dakota	52.4
39	Minnesota	50.2
40	Delaware	49.5
41	Vermont	48.8
42	New Hampshire	47.8
43	Massachusetts	47.3
44	Arizona	46.9
45	Florida	45.9
46	Connecticut	45.6
47	New Mexico	45.3
48	Rhode Island	44.6
49	New Jersey	43.1
50	New York	36.9

Chart 3–57

Age-Adjusted Death Rates* for Stroke by Country and Sex, Ages 35–74, 2004†

In 2004, among 18 industrialized countries, the United States had one of the lowest death rates for stroke. Eastern European countries had markedly higher rates compared with other countries.³⁹

Country	Deaths/100,000 Population	
	Male	Female
Romania	250.9	195.6
Hungary (2003)	180.9	90.5
Republic of Korea	117.2	68.4
Poland	115.9	64.1
Czech Republic	93.7	52.1
Japan	62.3	29.6
Finland	54.4	31.6
Scotland	53.0	40.7
Denmark (2001)	52.2	36.8
Sweden (2002)	43.8	30.1
England and Wales	41.3	30.9
Spain	39.6	20.8
Germany	38.6	23.0
Netherlands	36.8	26.2
Norway	35.9	25.3
United States of America	34.6	27.2
France (2003)	33.3	17.8
Australia (2003)	26.8	20.1

* Age adjusted to European standard.

† Data for 2004 unless otherwise noted in parentheses.

Chart 3–58

Change in Age-Adjusted Death Rates* for Stroke in Males by Country, Ages 35–74, 1999–2004

From 1999 to 2004, when compared with the United States, 10 countries had greater percent declines in stroke mortality for males.³⁹

Country	Average Annual Percent Change‡
Australia†	-6.4
Norway	-6.3
Republic of Korea	-5.8
Germany	-5.8
Czech Republic	-5.3
Finland	-4.3
Spain	-4.3
Netherlands	-4.0
Japan	-3.7
Poland	-3.6
United States of America	-3.2
Hungary†	-2.7
Romania	-1.5

* Age adjusted to European standard.

† Data for 1998–2003.

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

Chart 3–59

Change in Age-Adjusted Death Rates* for Stroke in Females by Country, Ages 35–74, 1999–2004

From 1999 to 2004, when compared with the United States, 10 countries had greater percent declines in stroke mortality for females.³⁹

Country	Average Annual Percent Change [‡]
Republic of Korea	-6.8
Australia [†]	-6.1
Germany	-6.0
Netherlands	-5.6
Poland	-5.5
Czech Republic	-5.3
Spain	-5.2
Japan	-4.7
Finland	-3.8
Hungary [†]	-3.7
United States of America	-3.4
Romania	-1.8
Norway	-1.7

* Age adjusted to European standard.

[†] Data for 1998–2003.

[‡] Based on a log linear regression of the actual rates.

Chart 3–60

Prevalence of Hypertension* and Prehypertension[†] by Age, U.S., 1999–2004

In 1999–2004, the prevalence of hypertension was 44% for individuals aged 50–59 years, with an additional 31% having prehypertension. For those aged ≥ 80 years, 79% had hypertension, with an additional 15% having prehypertension.¹⁵

Age (Years)	Percent of Population	
	Hypertension	Prehypertension
18–29	6.8	25.9
30–39	14.5	28.3
40–49	28.4	33.0
50–59	44.3	30.8
60–69	62.5	24.0
70–79	73.7	17.0
≥ 80	79.4	14.8

* Hypertension is defined as systolic BP ≥ 140 mmHg, or diastolic BP ≥ 90 , or on medication.

[†] Prehypertension is defined as systolic BP 120–139 mmHg or diastolic BP 80–89.

Chart 3–61**Prevalence of Hypertension* by Race/Ethnicity and Sex, Ages 20–74, U.S., 1999–2004**

In 1999–2004, the prevalence of hypertension was appreciably higher for blacks than for whites or Mexican-Americans. Within racial groups, the prevalence was similar for males and females.¹⁵

Sex	Percent of Population		
	Black [†]	White [†]	Mexican-American
Male	35.9	25.2	22.4
Female	37.4	23.2	23.7

* Hypertension is defined as systolic BP \geq 140 mmHg, or diastolic BP \geq 90, or on medication.

[†] Non-Hispanic.

Chart 3–62**Age-Adjusted Prevalence of Hypertension* by Race/Ethnicity and Sex, Ages 20–74, U.S., 1976–1980 to 1999–2004**

Compared with the earliest period, the prevalence of hypertension in the latter two periods was appreciably lower for whites and blacks and for males and females but not for Mexican-Americans, who already had the lowest prevalence.¹⁵

Years	Percent of Population					
	White [†] Male	White [†] Female	Black [†] Male	Black [†] Female	Mexican-American Male	Mexican-American Female
1976–1980	45.0	33.7	50.7	51.1	25.6	22.5
1988–1994	25.8	19.7	36.5	36.4	25.9	22.3
1999–2004	25.2	23.2	35.9	37.4	22.4	23.7

* Hypertension is defined as systolic BP \geq 140 mmHg, or diastolic BP \geq 90, or on medication.

[†] Non-Hispanic.

Chart 3–63**Hypertensive* Population Aware, Treated, and Controlled, Ages 18–74, U.S., 1971–1972 to 1999–2004**

In 1999–2004, 89% of individuals with a high level of hypertension were aware of their condition compared with 51% in 1971–1972. The percent of hypertensive individuals treated and controlled increased from 16% in 1971–1972 to 72% in 1999–2004.¹⁵

Years	Percent of Hypertensive Population			
	Unaware	On Medication Controlled	On Medication Uncontrolled	No Medication Uncontrolled
1971–1972	49	16	20	15
1974–1975	36	20	14	30
1976–1980	27	34	12	27
1988–1994	12	65	14	9
1999–2004	11	72	12	6

* Hypertension is defined as systolic BP \geq 160 mmHg, or diastolic BP \geq 95, or on medication.

Chart 3–64

Hypertensive* Population Aware, Treated, and Controlled, Ages 18–74, U.S., 1976–1980 to 1999–2004

In 1999–2004, 72% of hypertensive individuals were aware of their condition, 61% were on treatment for it, and 37% had it controlled. Those percentages were appreciably greater than the comparable figures (51%, 31%, and 10%, respectively) in 1976–1980.¹⁵

Years	Percent of Hypertensive Population			
	Unaware	On Medication Controlled	On Medication Uncontrolled	No Medication Uncontrolled
1976–1980	49	10	21	20
1988–1991	27	29	26	18
1991–1994	32	27	27	14
1999–2004	28	37	24	11

* Hypertension is defined as systolic BP \geq 140 mmHg, or diastolic BP \geq 90, or on medication.

Chart 3–65

Age-Adjusted Death Rates for Diseases of Arteries by Race and Sex, U.S., 2004

In 2004, death rates for diseases of the arteries within sex groups were slightly higher for blacks than for whites and overall were higher for males than for females.

Sex	Deaths/100,000 Population		
	Total	White	Black
Male	14.3	14.4	15.1
Female	10.1	10.0	11.7

Chart 3–66

Death Rates for Diseases of Arteries by Age, Race, and Sex, U.S., 2004

In 2004, death rates for diseases of arteries within racial groups were higher for males than for females of all ages. Within sex groups, the rates were higher for blacks than for whites of all age groups, with one exception: White males had a higher rate than black males aged 75–84 years.²⁹

Age (Years)	Deaths/100,000 Population			
	Black Male	White Male	Black Female	White Female
35–44	3.2	1.3	1.8	0.6
45–54	8.0	4.0	3.9	1.6
55–64	21.1	11.2	10.1	5.6
65–74	43.8	41.5	29.4	22.9
75–84	110.0	114.6	85.4	76.2

Chart 3–67
Percent of Deaths From Congenital Malformations of the Circulatory System, Age Under 1, U.S., 1940–2004

The percentage of deaths for infants aged <1 year from congenital malformation of the circulatory system declined from 82% in 1940 to 43% in 2004.^{13, 28, 29}

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
2003	42.2
2004	42.6

Chart 3–68**Infant Mortality From Congenital Malformations of the Circulatory System by Race, U.S., 1970–2004**

Infant congenital heart disease mortality declined from 1970 to 2004 for blacks and whites. Mortality from other congenital malformations of the circulatory system did not decline until the early 1980s.^{13, 28, 29}

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	58.2	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
2002	35.7	50.4	5.0	8.4
2003	33.8	45.8	5.7	6.5
2004	32.8	45.3	5.5	10.7

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 2004 by major lung subgroups. For selected lung diseases, Chart 4–2 shows, according to ICD-9-CM codes, the number of hospitalizations and the average length of stay in 2004 and the number of physician office visits in 2003 and, according to ICD-10 codes, the number of deaths in 2004. Subsequent charts display morbidity and mortality for total lung diseases and specific subgroups: COPD, asthma, neonatal respiratory distress syndrome (RDS), and sudden infant death syndrome (SIDS).

Chronic Obstructive Pulmonary Disease

The term *COPD* is used here to include chronic bronchitis and emphysema. It has been defined recently as “the physiologic finding of nonreversible pulmonary function impairment.”²⁴

The COPD prevalence charts in this *Chart Book* are based on physician-diagnosed COPD. Prevalence is determined from annual COPD data, which are obtained from NHIS, on self-reports of lifetime prevalence. In 2005, an estimated 12 million individuals were identified with COPD.²⁵ Additionally, based on spirometry readings of lung function in the 1988–1994 NHANES, COPD was estimated to go undiagnosed in 12 million people.²⁴

Asthma

Three different prevalence estimates derived from NHIS data can 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 the following questions:

- Have you ever been told by a doctor or other health professional that you have asthma?
- During the past 12 months, have you had an episode of asthma or asthma attack?

As a result, the estimates from 1997 to 2004 are not comparable to those based on NHIS data prior to 1997. Chart 4–18 indicates this change by breaking the asthma prevalence trend line between 1996 and 1997.

In 2001, a question was added to the survey to determine “current prevalence” or simply, prevalence. The question is asked 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 this question. (See Chart 4–19.)

Chart 4-1
Deaths From Lung Diseases, Percent by Subgroup, U.S., 2004

Conditions	Percent
COPD	51.6
Influenza and Pneumonia	26.1
External Agents	7.8
Cardiopulmonary Diseases	5.7
Other	5.0
Neonatal Pulmonary Disorders	2.1
Asthma	1.7

Total Deaths = 226,379

Chart 4-2

Number of Hospitalizations, Physician Office Visits,* and Deaths for Selected Lung Diseases, U.S., 2003 and 2004†

Diagnostic Category	ICD-9-CM Codes	Hospitalizations for 2004		Physician Office Visits for 2003 (1,000)	ICD-10 Codes	Deaths for 2004
		First-Listed Discharges (1,000)	Length of Stay (Days)			
Total		3,438	5.3	38,916		228,885
Acute lower respiratory infections:	466, 480-487	1,614	4.1	9,274	J10-J18, J20, J21	59,890
Influenza and pneumonia	480-487	1,349	5.5	5,010	J10-J18	59,664
Acute bronchitis	466	265	3.3	4,264	J20	167
Acute bronchiolitis	Included in 466	—	—	—	J21	59
Chronic lower respiratory disease:	277.0, 490-496	1,149	4.2	28,300	J40-J47, E84	122,446
COPD:	490-492, 494-496	636	4.7	15,401	J40-J44, J47	118,171
Chronic bronchitis	490, 491	511	4.9	10,663	J40-J42	773
Emphysema	492	17	4.9	677	J43	13,639
Other COPD	495-496	100	4.3	4,061	J44	102,801
Bronchiectasis	494	8	6.8	33	J47	958
Asthma	493	497	3.2	12,855	J45	3,523
Status asthmaticus	Included in 493	—	—	—	J46	293
Cystic fibrosis	277.0	16	10.1	11	E84	460
Lung disease due to external agents	500-508	182	8.2	—	J60-J70	17,912
Adult respiratory distress syndrome	518.5	—	—	—	J80	1,736
Pulmonary edema	518.4	6	2.8	—	J81	594
Interstitial lung diseases:	011, 012, 135, 446.2, 446.4, 518.8	271	—	829	A15, A16, A19, A31.0, D86, J96, J99, M31.0, M31.3	7,880
Sarcoidosis	135	10	4.3	146	D86	3,775
Respiratory tuberculosis	011, 012	7	7.1	148	A15, A16, A19, A31.0	3,397
Respiratory failure	518.8	254	8.8	529	J96	358
Pulmonary manifestations of connective tissue disorders	446.2, 446.4	—	—	6	J99, M31.0, M31.3	350
Cardiopulmonary diseases:	415.1-417	142	—	254	I26-I27	13,054
Pulmonary embolism	415.1	121	6.2	53	I26	8,113
Other pulmonary heart disease	415.2-417	21	6.3	201	I27	4,941
Selected HIV-related and other pulmonary infections	114-116, 117.3, 117.5, 117.7, 136.3	—	—	114	B38-40, B44-46, B59	605
Neonatal pulmonary disorders:	745.4-745.6, 769, 770, 798	74	—	145	P22, P25-P28, Q33, R95	4,768
Respiratory distress syndrome	769	19	19.0	—	P22	810
Sudden infant death syndrome	798.0	—	—	—	R95	2,246
Congenital malformation of the lung	745.4-745.6	15	8.1	133	Q33	604
Bronchopulmonary dysplasia	770.7	—	—	12	P27.1	259
Atelectasis of newborn	770.4, 770.5	—	—	—	P28.0, P28.1	420
Other perinatal respiratory diseases	770.1-770.3, 770.6, 770.8, 770.9	40	8.0	—	P25, P26, P27.0, P27.8, P27.9, P28.2-P28.9	429

* Estimates of hospitalizations and physician office visits are subject to sampling variability. Estimates of hospitalizations at 15,000 or below have a relative standard error of more than 16%. Estimates of physician office visits below 434,000 have a relative standard error of more than 30%.

† Compiled from references 29, 30, and 37.

Chart 4–3

Age-Adjusted Death Rates for Total Lung Diseases by Race and Sex, U.S., 2003

In 2003, total lung disease mortality (other than lung cancer) was higher for males than for females. It was lower for black females than for white females.¹³

Sex	Deaths/100,000 Population		
	Total	White	Black
Male	97.4	97.6	103.2
Female	71.2	72.9	62.6

Chart 4–4

Death Rates for Total Lung Diseases by Age, Race, and Sex, U.S., 2003

In 2003, the male–female gap in mortality from total lung diseases increased with increasing age for both blacks and whites.¹³

Age (Years)	Deaths/100,000 Population			
	Black Male	White Male	Black Female	White Female
35–44	18.3	6.5	18.0	6.6
45–54	42.6	20.4	34.9	16.8
55–64	110.4	72.1	73.4	63.1
65–74	296.9	273.5	173.8	215.1
75–84	762.1	785.6	375.6	562.1

Chart 4–5

Prevalence of Chronic Obstructive Pulmonary Disease* by Age, U.S., 1997–2005

From 1997 to 2005, the prevalence of physician-diagnosed COPD decreased slightly for all age groups.²⁵

Year	Percent of Population		
	Ages 18–44 Years	Ages 45–64 Years	Ages ≥65 Years
1997	4.3	7.1	10.6
1998	3.7	6.7	9.9
1999	3.9	6.1	9.5
2000	3.7	6.7	10.1
2001	4.6	7.7	10.5
2002	3.6	6.7	9.1
2003	3.1	6.0	9.4
2004	3.3	6.2	9.8
2005	3.4	6.2	9.6

* Physician-diagnosed COPD only.

Chart 4–6**Prevalence of Chronic Obstructive Pulmonary Disease* by Age, Race, and Sex, U.S., 2005**

In 2005, within racial groups, the prevalence of COPD was higher for females than for males, with one exception: It was slightly higher for white males than for white females aged ≥ 65 years. Within sex groups, the prevalence was similar between races, with one exception: It was much higher for white males than for black males aged ≥ 65 years.²⁵

Age (Years)	Percent of Population			
	Black Male	White Male	Black Female	White Female
18–44	2.6	2.3	4.5	4.5
45–64	4.1	4.9	7.8	7.9
≥ 65	4.6	10.8	9.2	9.4

* Physician-diagnosed COPD only.

Chart 4–7**Hospitalization Rates for Chronic Obstructive Pulmonary Disease, Ages 45–64 and 65 and Over, U.S., 1970–2004**

From 1970 to 2004, COPD hospitalization rates varied considerably.³⁰

Year	Hospitalizations/10,000 Population	
	Ages 45–64 Years	Ages ≥ 65 Years
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	102.8
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	30.8	125.9
2001	28.4	130.0
2002	30.3	123.6
2003	28.0	125.0
2004	26.6	114.6

Chart 4–8
Age-Adjusted Death Rates for Chronic Obstructive Pulmonary Disease by Race and Sex, U.S., 1960–2004

From the early 1980s to 1998, COPD mortality in white males remained high but relatively constant. During the same period, it gradually increased in black males and more than doubled in both black and white females. Since 2000, trends have been constant for both white and black females, but downward for both white and black males.^{13, 28, 29, 40}

Year	Deaths/100,000 Population			
	Black* Male	White Male	Black* Female	White Female
1960	9.7	16.4	2.0	2.8
1961	10.1	17.4	2.3	2.9
1962	11.2	21.2	2.5	3.3
1963	14.2	26.0	2.9	4.1
1964	13.8	26.6	2.2	4.0
1965	15.6	30.7	2.3	4.7
1966	16.4	33.2	2.6	5.0
1967	18.1	33.6	3.2	5.2
1968	21.2	38.1	3.6	6.4
1969	22.5	37.3	3.6	6.6
1970	23.5	38.1	3.8	7.0
1971	23.5	40.8	5.2	7.5
1972	25.5	42.6	4.6	8.0
1973	25.5	44.8	4.4	8.9
1974	24.5	43.9	4.0	9.1
1975	24.7	44.9	4.7	9.5
1976	27.8	47.1	4.8	10.5
1977	27.5	46.4	5.2	10.8
1978	29.2	48.4	6.0	12.4
1979	27.9	46.2	5.3	12.0
1980	29.4	50.3	6.2	14.2
1981	32.2	50.7	6.6	15.2
1982	30.7	50.1	7.5	15.7
1983	34.1	53.3	8.1	17.7
1984	35.4	53.7	9.0	19.0
1985	37.5	56.1	9.9	20.9
1986	38.9	55.4	9.5	21.8
1987	37.8	54.4	10.8	22.5
1988	41.2	55.4	10.8	24.1
1989	40.4	53.5	12.7	25.2
1990	43.2	55.0	12.5	25.8
1991	41.5	55.1	13.2	27.2
1992	44.8	54.0	13.6	27.8
1993	44.8	57.1	14.8	31.0
1994	42.6	55.3	15.5	31.3
1995	42.5	54.7	15.6	31.4
1996	41.4	54.0	16.1	32.8
1997	41.3	54.4	16.0	33.5
1998	40.8	54.9	17.0	35.4
1999	48.0	59.0	19.3	38.0
2000	44.0	56.2	18.6	38.0
2001	43.1	54.6	18.6	38.3
2002	43.0	54.0	19.2	38.3
2003	41.5	52.9	18.7	39.0
2004	37.9	50.3	17.8	37.2

* Nonwhite from 1960 to 1967.

Chart 4-9

Age-Adjusted Death Rates for Chronic Obstructive Pulmonary Disease* by Race/Ethnicity and Sex, U.S., 1985-2004†

From 1985 to 2004, COPD mortality for males increased for American Indians and decreased slightly for blacks, whites, Hispanics, and Asians. For females, it increased for all racial/ethnic groups except for Asians, where it decreased. The rates were highest for whites, both male and female.³¹

Male (Deaths/100,000 Population)					
Year	Black	White‡	American		
			Indian	Hispanic	Asian
1985	48.4	62.3	32.7	30.2	31.1
1986	48.3	62.0	32.9	30.0	30.8
1987	48.2	61.7	33.2	29.9	30.5
1988	48.0	61.3	33.5	29.7	30.2
1989	47.9	61.0	33.9	29.6	29.9
1990	47.8	60.6	34.2	29.4	29.6
1991	47.6	60.3	34.5	29.3	29.4
1992	47.5	60.0	34.8	29.1	29.1
1993	47.4	59.6	35.1	29.0	28.8
1994	47.3	59.3	35.4	28.8	28.5
1995	47.1	59.0	35.7	28.7	28.2
1996	47.0	58.7	36.1	28.5	28.0
1997	46.9	58.3	36.4	28.4	27.7
1998	46.7	58.0	36.7	28.2	27.4
1999	46.6	57.7	37.0	28.1	27.2
2000	46.5	57.4	37.4	28.0	26.9
2001	46.4	57.1	37.7	27.8	26.7
2002	46.2	56.8	38.1	27.7	26.4
2003	46.1	56.4	38.4	27.5	26.2
2004	46.0	56.1	38.8	27.4	25.9

Female (Deaths/100,000 Population)					
Year	Black	White‡	American		
			Indian	Hispanic	Asian
1985	15.7	26.3	13.5	13.6	12.7
1986	16.1	27.0	14.0	13.7	12.5
1987	16.5	27.8	14.6	13.9	12.4
1988	16.8	28.5	15.3	14.1	12.3
1989	17.2	29.3	15.9	14.3	12.2
1990	17.6	30.2	16.6	14.5	12.1
1991	18.0	31.0	17.3	14.7	11.9
1992	18.5	31.9	18.1	14.9	11.8
1993	18.9	32.8	18.9	15.1	11.7
1994	19.3	33.7	19.7	15.3	11.6
1995	19.8	34.6	20.5	15.5	11.5
1996	20.3	35.6	21.4	15.7	11.4
1997	20.7	36.6	22.3	15.9	11.3
1998	21.2	37.6	23.3	16.1	11.1
1999	21.7	38.7	24.3	16.3	11.0
2000	22.2	39.7	25.3	16.5	10.9
2001	22.7	40.9	26.4	16.8	10.8
2002	23.3	42.0	27.6	17.0	10.7
2003	23.8	43.2	28.7	17.2	10.6
2004	24.3	44.4	30.0	17.4	10.5

* COPD and allied conditions.

† Each line is a log linear regression derived from the actual rates. The comparability ratio 1.0411 was applied to rates reported in vital statistics reported for 1985-1998.

‡ Non-Hispanic.

Chart 4–10**Death Rates for Chronic Obstructive Pulmonary Disease for White Males by Age, U.S., 1960–2004**

After increases in the 1960s and 1970s, COPD death rates decreased for white males aged 55–64 years, became relatively stable for those aged 65–84 years, and continued to increase for those aged ≥85 years. In the 2000s, the rates declined for all age groups.^{13, 28, 29, 40}

Year	Deaths/100,000 Population			
	Ages 55–64 Years	Ages 65–74 Years	Ages 75–84 Years	Ages ≥85 Years
1960	36.1	82.8	101.8	111.2
1961	38.7	87.8	111.8	122.2
1962	44.2	107.2	136.7	154.8
1963	52.3	131.2	169.6	202.7
1964	51.8	131.6	181.9	202.3
1965	57.8	153.6	216.6	235.5
1966	61.9	161.9	244.8	258.5
1967	61.2	164.8	248.6	263.9
1968	67.3	186.7	286.5	307.8
1969	67.5	189.5	294.3	305.1
1970	68.1	196.5	311.5	280.9
1971	67.3	195.6	327.4	334.6
1972	67.7	204.8	351.4	354.8
1973	69.8	210.1	378.4	393.5
1974	64.8	204.8	380.4	379.8
1975	64.7	207.6	399.7	402.7
1976	64.0	210.7	419.7	482.8
1977	60.1	206.1	431.5	459.5
1978	60.1	213.2	430.1	515.7
1979	56.2	200.1	412.7	511.5
1980	58.1	213.2	450.3	601.1
1981	57.7	214.4	454.0	622.0
1982	55.2	205.9	462.6	616.1
1983	57.7	215.4	494.2	691.0
1984	58.8	212.7	493.9	724.4
1985	58.1	220.6	516.5	785.6
1986	57.5	216.1	513.3	772.9
1987	57.9	204.5	513.0	766.3
1988	58.6	210.7	512.0	814.6
1989	58.0	199.3	492.8	808.6
1990	56.4	203.1	503.6	830.9
1991	55.5	201.2	501.5	847.6
1992	54.2	199.2	486.3	839.1
1993	55.8	207.6	517.5	895.4
1994	53.8	200.2	496.5	886.5
1995	50.4	195.8	489.7	901.1
1996	49.5	192.1	484.6	902.9
1997	48.3	200.6	476.0	928.0
1998	47.5	201.9	481.8	914.9
1999	51.7	214.8	520.1	1,018.6
2000	47.4	198.9	498.9	966.0
2001	46.9	196.1	485.4	932.3
2002	44.8	190.4	490.6	912.9
2003	46.4	189.9	474.5	883.8
2004	42.9	178.8	459.6	827.4

Chart 4–11
Death Rates for Chronic Obstructive Pulmonary Disease for Black Males* by Age, U.S., 1960–2004

After increases in the 1960s and 1970s, COPD death rates became relatively stable for black males aged 55–74 years and continued to increase for those aged ≥ 75 years. In the 2000s, the rates declined for all age groups.^{13, 28, 29, 40}

Year	Deaths/100,000 Population			
	Ages 55–64 Years	Ages 65–74 Years	Ages 75–84 Years	Ages ≥ 85 Years
1960	24.0	42.6	36.7	66.8
1961	23.0	43.0	49.7	66.6
1962	25.6	54.1	50.3	69.0
1963	31.8	62.4	68.5	131.1
1964	34.7	58.8	71.0	68.8
1965	34.8	61.8	93.8	132.3
1966	35.5	68.3	86.0	111.1
1967	36.9	75.1	104.9	128.2
1968	47.8	84.1	126.1	114.6
1969	50.9	93.0	133.5	145.5
1970	59.4	95.0	148.5	131.8
1971	52.9	99.8	135.5	155.1
1972	55.8	105.8	171.6	153.0
1973	56.6	109.6	153.4	188.7
1974	53.3	120.4	137.8	180.2
1975	51.5	103.4	170.3	156.3
1976	55.1	118.3	179.1	197.0
1977	56.7	120.3	174.5	204.1
1978	59.7	129.9	182.4	270.7
1979	51.0	123.9	195.4	269.5
1980	61.8	133.3	217.5	255.5
1981	56.8	141.5	244.7	262.5
1982	53.0	142.8	217.0	269.0
1983	65.2	147.5	263.2	333.3
1984	59.1	161.5	282.8	311.5
1985	61.8	168.1	311.7	366.1
1986	63.1	181.4	307.7	419.0
1987	57.7	176.2	314.2	425.0
1988	60.9	189.3	360.1	430.8
1989	59.9	180.0	359.3	463.6
1990	59.4	172.4	377.2	483.3
1991	57.5	173.7	347.4	472.5
1992	56.0	166.8	345.6	536.9
1993	56.7	175.6	392.2	545.8
1994	51.4	175.0	362.9	549.9
1995	53.9	166.6	357.0	589.6
1996	53.5	155.2	371.0	552.1
1997	46.7	168.3	366.8	549.1
1998	48.5	159.0	366.8	545.1
1999	53.9	175.5	426.1	683.2
2000	48.5	169.0	363.9	667.7
2001	45.2	161.2	371.7	656.9
2002	46.6	150.7	386.1	620.0
2003	46.3	149.8	373.5	582.9
2004	44.9	134.9	327.1	551.3

*Nonwhite from 1960 to 1967.

Chart 4–12
Death Rates for Chronic Obstructive Pulmonary Disease for White Females by Age, U.S., 1960–2004

Since 1960, COPD death rates have increased for white females of all age groups. Since the early 1990s, however, death rates have been relatively stable for those aged 55–64 years, and since the late 1990s, death rates have leveled off for those aged ≥ 65 years.^{13, 28, 29, 40}

Year	Deaths/100,000 Population			
	Ages 55–64 Years	Ages 65–74 Years	Ages 75–84 Years	Ages ≥ 85 Years
1960	4.2	8.4	18.0	36.5
1961	4.4	9.2	18.8	37.9
1962	5.2	10.2	23.4	44.7
1963	6.1	12.5	26.7	54.1
1964	6.9	13.3	26.8	49.3
1965	8.0	16.0	29.8	53.8
1966	9.2	18.1	29.8	54.1
1967	10.2	18.0	31.4	58.0
1968	13.3	22.8	38.0	70.7
1969	13.3	24.3	39.3	74.5
1970	15.3	27.9	39.9	59.1
1971	15.5	29.8	45.5	66.8
1972	17.1	34.7	47.3	65.8
1973	18.8	37.6	53.4	80.7
1974	20.0	39.7	57.4	70.2
1975	21.5	41.9	58.7	74.0
1976	21.7	46.1	68.6	86.1
1977	22.1	49.6	70.5	91.1
1978	25.3	57.0	80.5	109.6
1979	23.8	55.0	80.8	107.0
1980	26.4	66.8	97.3	134.6
1981	27.4	72.4	107.6	134.9
1982	27.0	75.8	113.0	143.4
1983	29.9	85.5	129.1	164.2
1984	31.7	89.2	143.5	182.5
1985	34.4	95.5	162.5	205.0
1986	35.2	100.9	169.8	211.8
1987	35.7	102.2	177.8	233.3
1988	37.2	109.7	195.3	247.1
1989	40.1	111.7	204.6	262.0
1990	38.3	112.4	215.5	280.7
1991	41.1	120.1	225.7	289.8
1992	39.9	120.8	235.7	305.7
1993	43.6	136.4	263.1	339.0
1994	41.4	134.6	266.7	360.6
1995	40.3	132.7	268.1	377.1
1996	40.4	138.1	281.2	396.6
1997	41.0	138.7	288.1	415.9
1998	39.3	146.4	298.0	440.9
1999	43.2	155.9	333.0	529.7
2000	41.1	155.5	331.4	527.1
2001	42.0	156.7	331.0	557.9
2002	40.5	153.7	338.2	554.5
2003	40.9	155.5	345.7	546.9
2004	39.0	148.1	329.5	521.3

Chart 4–13**Death Rates for Chronic Obstructive Pulmonary Disease in Black Females* by Age, U.S., 1960–2004**

Since 1960, COPD death rates have increased for black females of all age groups. Since the early 1990s, however, death rates have been relatively stable for those aged 55–64 years, and since the late 1990s, death rates have leveled off for those aged ≥ 65 years.^{13, 28, 29, 40}

Year	Deaths/100,000 Population			
	Ages 55–64 Years	Ages 65–74 Years	Ages 75–84 Years	Ages ≥ 85 Years
1960	2.8	5.1	7.2	29.8
1961	3.0	5.5	12.8	37.5
1962	4.3	6.0	14.6	22.5
1963	4.8	8.3	10.5	42.8
1964	4.0	3.6	8.3	24.4
1965	4.7	6.5	9.4	16.3
1966	5.3	8.6	10.9	18.9
1967	5.1	9.6	13.0	22.8
1968	8.1	8.2	17.1	36.0
1969	7.2	8.7	17.2	33.9
1970	8.6	11.9	17.4	26.7
1971	9.3	15.5	18.9	26.3
1972	8.4	14.0	22.1	46.4
1973	11.4	13.2	23.3	27.3
1974	9.5	16.9	18.4	25.8
1975	9.6	16.8	22.6	26.4
1976	12.8	17.3	21.5	30.6
1977	11.5	17.9	27.4	40.1
1978	16.1	17.5	31.3	60.6
1979	13.1	21.4	30.3	41.2
1980	15.8	25.4	34.4	60.5
1981	16.9	23.9	42.9	43.4
1982	19.6	30.0	43.8	52.5
1983	18.2	30.5	50.5	86.3
1984	20.7	35.9	56.1	89.9
1985	23.2	39.1	67.1	85.7
1986	22.4	41.7	59.0	85.5
1987	23.8	44.3	73.6	105.6
1988	24.6	46.2	66.8	100.7
1989	27.9	55.8	84.2	119.6
1990	25.2	54.4	84.3	122.4
1991	24.7	60.4	84.7	133.7
1992	22.7	62.1	91.2	142.3
1993	24.5	67.0	106.2	143.0
1994	26.1	67.1	106.3	175.8
1995	24.1	65.2	116.5	172.4
1996	23.7	71.8	116.0	193.6
1997	26.0	69.9	118.0	198.6
1998	25.0	73.1	129.3	208.5
1999	27.0	78.9	154.9	233.5
2000	27.8	72.7	145.8	234.0
2001	24.8	76.0	140.1	249.5
2002	24.5	73.6	158.8	249.7
2003	26.6	75.1	144.0	242.6
2004	22.5	69.2	149.2	224.9

* Nonwhite from 1960 to 1967.

Chart 4–14**Age-Adjusted Death Rates for Chronic Obstructive Pulmonary Disease by State, U.S., 2001–2003**

In 2001–2003, COPD mortality tended to be highest in the Mountain States.¹³

Rank	State	Deaths/100,000 Population
1	Nevada	63.3
2	Wyoming	59.7
3	West Virginia	56.9
4	Kentucky	56.9
5	Montana	56.8
6	Oklahoma	54.4
7	Colorado	52.0
8	Maine	51.5
9	Tennessee	51.0
10	Indiana	50.6
11	Alabama	48.7
12	Mississippi	48.3
13	Kansas	47.8
14	New Mexico	47.8
15	Ohio	47.6
16	Oregon	47.0
17	Georgia	46.8
18	Idaho	46.8
19	Arkansas	46.8
20	Missouri	46.2
21	Washington	45.9
22	Arizona	45.7
23	Nebraska	45.6
24	Alaska	45.3
25	North Carolina	45.3
26	New Hampshire	44.9
27	Vermont	44.7
28	South Carolina	44.7
29	Texas	43.9
30	Iowa	43.3
31	Michigan	42.0
32	California	41.7
33	Virginia	41.6
34	South Dakota	40.7
35	Louisiana	40.2
36	Florida	39.4
37	Delaware	39.0
38	Wisconsin	38.9
39	Rhode Island	38.8
40	North Dakota	38.1
41	Massachusetts	37.7
42	Maryland	37.3
43	Illinois	37.3
44	Pennsylvania	37.2
45	Minnesota	36.2
46	Connecticut	35.5
47	Utah	33.3
48	New York	32.4
49	New Jersey	30.4
50	Hawaii	18.5

Chart 4–15

Age-Adjusted Death Rates* for Chronic Obstructive Pulmonary Disease by Country and Sex, Ages 35–74, 2004†

In 2004, among 18 industrialized countries, the United States ranked third highest in COPD mortality for females and fourth highest for males.³⁹

Country	Deaths/100,000 Population	
	Male	Female
Hungary (2003)	53.6	19.0
Denmark (2001)	48.9	53.3
Romania	41.2	9.0
United States of America	39.1	31.7
Scotland	38.3	34.7
Poland	31.0	6.8
England and Wales	30.4	22.0
Spain	26.1	3.2
Netherlands	24.5	16.4
Norway	24.1	19.2
Germany	23.5	9.3
Australia (2003)	23.3	14.7
Czech Republic	23.2	6.9
Finland	20.9	5.9
Republic of Korea	20.8	4.0
Sweden (2002)	15.9	16.3
France (2003)	11.1	2.4
Japan	5.0	0.9

* Age adjusted to European standard.

† Data for 2004 unless otherwise noted in parentheses.

Chart 4–16

Age-Adjusted Death Rates for Chronic Obstructive Pulmonary Disease by Race and Sex, U.S., 2004

In 2004, COPD mortality was higher for males than for females. It was one-third higher for white males than for black males and two times higher for white females than for black females.²⁹

Sex	Deaths/100,000 Population		
	Total	White	Black
Male	48.5	50.3	37.9
Female	34.6	37.2	17.8

Chart 4–17**Death Rates for Chronic Obstructive Pulmonary Disease by Age, Race, and Sex, U.S., 2004**

In 2004, COPD mortality increased with age for all racial and sex groups. Within age groups, it was highest for white males aged ≥ 65 years and lowest for black females aged ≥ 55 years.²⁹

Age (Years)	Deaths/100,000 Population			
	Black Male	White Male	Black Female	White Female
35–44	1.7	1.2	1.2	1.1
45–54	10.0	7.8	6.5	5.8
55–64	44.9	42.9	22.5	39.0
65–74	134.9	178.8	69.2	148.1
75–84	327.7	459.6	149.2	329.5

Chart 4–18**Prevalence of Asthma Ages Under 18 and 18 and Over, U.S., 1980–2005***

From 1980 to the mid-1990s, the prevalence of asthma increased for both age groups. From 1997 to 2005, asthma attack prevalence remained relatively stable.²⁵

Year	Ages <18 Years	Ages ≥ 18 Years
1980	3.8	3.0
1981	3.8	3.2
1982	4.0	3.3
1983	4.5	3.6
1984	4.3	3.4
1985	4.8	3.3
1986	5.1	3.7
1987	5.3	3.6
1988	5.0	3.8
1989	6.1	4.3
1990	5.8	3.6
1991	6.3	4.2
1992	6.3	4.4
1993	7.2	4.4
1994	6.9	5.1
1995	7.5	5.0
1996	6.2	5.3
1997	5.5	3.7
1998	5.3	3.4
1999	5.3	3.4
2000	5.5	3.5
2001	5.7	3.8
2002	5.8	3.8
2003	5.5	3.3
2004	5.5	3.7
2005	5.3	4.0

* A change in the question used to determine prevalence resulted in discontinuity between 1996 and 1997.

Chart 4–19
Prevalence of Asthma by Age, Race, and Sex, U.S., 2005

In 2005, current asthma prevalence was highest for black males aged <18 years; it was highest for black females, aged ≥18 years.²⁵

Age (Years)	Percent of Population			
	Black Male	White Male	Black Female	White Female
<18	16.1	9.5	11.3	9.5
18–44	5.6	5.1	11.1	5.1
45–64	5.3	5.2	10.2	5.2
≥65	4.7	6.2	10.1	6.2

Chart 4–20
Physician Office Visits for Asthma, U.S., 1989–2004

From 1989 to 2004, the number of physician office visits for asthma increased.³⁷

Year	Physician Office Visits (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
2002	12.7
2003	12.8
2004	13.6

Chart 4–21**Hospitalizations for Asthma by Primary and Secondary Diagnosis, U.S., 1980–2004**

From 1980 to 2004, hospitalizations for asthma as the primary diagnosis remained relatively stable. However, hospitalizations for asthma as a secondary diagnosis increased significantly during the 1990s through 2004.³⁰

Year	Primary Diagnosis	Secondary Diagnosis
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
2003	574	1,268
2004	497	1,373

Chart 4–22
Hospitalization Rates for Asthma by Age, U.S., 1980–2004

From 1980 to 2004, hospitalization rates for asthma were lowest among individuals aged 15–44 years. Beginning in 1991, rates were highest among those aged <15 years. For those aged ≥45 years, the rates decreased from the late 1980s to about 2000.³⁰

Year	Hospitalizations/10,000 Population			
	Ages <15 Years	Ages 15–44 Years	Ages 45–64 Years	Age ≥65 Years
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
2003	35.0	10.2	18.3	30.5
2004	31.2	7.3	15.9	28.7

Chart 4–23**Age-Adjusted Death Rates for Asthma by Race and Sex, Ages 1–24, U.S., 1980–2004**

Although asthma mortality fluctuated between 1980 and 2004, it tended to increase for each racial and sex group aged 1–24 years until about 1998. In the 2000s, asthma mortality decreased for black females but was relatively stable for white females and for black and white males.^{13, 28, 29}

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
2003	1.31	0.20	0.69	0.16
2004	1.15	0.20	0.55	0.16

Chart 4–24

Age-Adjusted Death Rates for Asthma by Race and Sex, U.S., 2004

In 2004, asthma mortality was almost four times higher for black males than for white males and more than two times higher for black females than for white females. Overall, the death rate was approximately 42% higher for females than for males.²⁹

Sex	Deaths/100,000 Population		
	Total	White	Black
Male	1.01	0.76	3.00
Female	1.44	1.23	3.07

Chart 4–25

Death Rates for Asthma by Age (Ages 1–34), Race, and Sex, U.S., 1999–2004

In 1999–2004, asthma mortality was higher for black males than for black females of all age groups. Within sex groups, asthma mortality was much higher for blacks than for whites of all age groups.²⁹

Age (Years)	Deaths/100,000 Population			
	Black Male	White Male	Black Female	White Female
1–4	1.11	0.14	0.34	0.10
5–9	0.78	0.11	0.48	0.09
10–14	1.52	0.25	0.95	0.18
15–19	1.53	0.28	0.70	0.22
20–24	1.52	0.33	1.04	0.27
25–34	2.38	0.39	1.51	0.43

Chart 4–26

Death Rates for Asthma by Age (Ages 35–84), Race, and Sex, U.S., 1999–2004

In 1999–2004, asthma mortality within sex groups was much higher for blacks than for whites of all age groups and within racial groups was higher for females than for males of all age groups.²⁹

Age (Years)	Deaths/100,000 Population			
	Black Male	White Male	Black Female	White Female
35–44	2.92	0.54	3.26	0.86
45–54	3.92	0.84	5.86	1.44
55–64	5.18	1.19	7.32	2.10
65–74	7.77	2.16	8.96	3.72
75–84	7.83	4.50	10.68	7.40

Chart 4–27**Age-Adjusted Death Rates for Asthma by Sex, U.S., 1951–2004**

From 1950 to 1978, asthma mortality decreased and then increased until the mid-1990s before declining again. Rates were much higher for males than for females before the late 1960s but thereafter, were generally higher for females than for males.^{13, 28, 29}

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	1.34	1.96
2000	1.32	1.82
2001	1.18	1.75
2002	1.22	1.65
2003	1.14	1.59
2004	1.01	1.44

Chart 4–28
Age-Adjusted Death Rates for Asthma by Race, U.S., 1951–2004

From 1979 to 1996, the gap in asthma mortality increased between whites and blacks, with the rates being much higher for blacks than for whites. Through 2004, the gap remained wide, even as rates began to decline.^{13, 28, 29}

Year	Deaths/100,000 Population	
	Black*	White
1951	5.04	6.00
1952	5.81	5.73
1953	4.75	5.56
1954	4.63	4.93
1955	4.49	4.65
1956	4.64	4.52
1957	5.90	4.83
1958	4.44	3.54
1959	4.54	3.35
1960	5.00	3.56
1961	4.71	3.15
1962	4.39	3.10
1963	4.89	3.12
1964	4.41	2.67
1965	4.55	2.64
1966	4.27	2.48
1967	4.37	2.29
1968	3.88	1.34
1969	3.27	1.16
1970	3.18	1.10
1971	2.75	1.05
1972	2.60	1.16
1973	2.38	0.90
1974	2.06	0.92
1975	2.21	0.91
1976	2.12	0.92
1977	1.79	0.78
1978	1.78	0.88
1979	2.36	1.18
1980	2.75	1.28
1981	2.79	1.34
1982	2.99	1.32
1983	3.35	1.44
1984	3.22	1.45
1985	3.48	1.55
1986	3.65	1.52
1987	4.06	1.67
1988	4.40	1.73
1989	4.25	1.84
1990	4.16	1.79
1991	4.23	1.86
1992	4.22	1.78
1993	4.39	1.80
1994	4.51	1.89
1995	4.73	1.88
1996	4.85	1.84
1997	4.31	1.75
1998	4.44	1.69
1999	3.87	1.40
2000	3.87	1.31
2001	3.59	1.22
2002	3.41	1.21
2003	3.17	1.14
2004	2.95	1.02

* Nonwhite from 1951 to 1967.

Chart 4–29**Age-Adjusted Death Rates for Asthma by Race and Sex, U.S., 1951–2004**

From 1970 to 2004, trends in asthma mortality were much more similar for males and females within racial groups than prior to that period. Within sex groups, the rates were higher for blacks than for whites since 1959.^{13, 28, 29}

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	5.69	6.85	3.59	3.20
1955	5.60	6.63	3.26	2.93
1956	5.89	6.45	3.51	2.83
1957	7.49	7.04	4.40	2.92
1958	5.11	5.19	3.84	2.10
1959	5.08	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	4.45	3.75	2.03
1963	5.59	4.43	4.19	2.11
1964	5.08	3.50	3.68	2.02
1965	5.53	3.50	3.52	2.00
1966	5.12	3.24	3.26	1.92
1967	4.79	2.93	3.93	1.88
1968	4.19	1.36	3.70	1.34
1969	3.25	1.16	3.34	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	3.66	1.41	3.31	1.69
1986	3.47	1.43	3.77	1.63
1987	4.18	1.46	3.92	1.84
1988	4.48	1.53	4.35	1.87
1989	4.24	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	4.43	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	4.85	2.19
1996	4.39	1.48	5.20	2.09
1997	4.03	1.43	4.54	2.01
1998	4.09	1.33	4.76	1.95
1999	3.53	1.02	4.09	1.68
2000	3.50	1.02	4.12	1.51
2001	3.23	0.89	3.82	1.46
2002	3.32	0.94	3.43	1.41
2003	2.91	0.88	3.31	1.67
2004	3.00	0.76	3.07	1.23

* Nonwhite from 1951 to 1967.

Chart 4–30**Age-Adjusted Death Rates* for Asthma by Country and Sex, 2004†**

In 2004, among 17 countries, the United States had some of the lowest rates of asthma mortality, ranking 14th for males and 13th for females.³⁹

Country	Deaths/100,000 Population	
	Male	Female
Republic of Korea	11.15	5.98
Poland	2.48	1.24
Hungary (2003)	2.42	1.69
Romania	2.31	1.35
Denmark (2001)	2.24	2.39
Germany	2.02	1.49
Norway	1.88	1.76
Japan	1.76	1.25
England and Wales	1.51	1.86
France (2003)	1.37	1.56
Scotland	1.26	1.42
Sweden (2002)	1.24	1.42
Australia (2003)	0.99	1.56
United States of America	0.75	1.33
Spain	0.72	1.61
Finland	0.58	1.31
Netherlands	0.39	0.41

* Age-adjusted to European standard.

† Data for 2004 unless otherwise noted in parentheses.

Chart 4–31
Infant Mortality Rate for Respiratory Distress Syndrome, U.S., 1968–2004

Infant mortality for RDS declined steeply from 1974 to 1981 and then declined slower but appreciably through 2004.^{13, 28, 29}

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	32.9
1999	27.3
2000	24.4
2001	25.1
2002	23.8
2003	20.2
2004	21.3

Chart 4–32**Infant Mortality Rate for Respiratory Distress Syndrome by Race, U.S., 1979–2004**

Although infant mortality for RDS declined appreciably for both blacks and whites from 1979 to 2004, a gap in such declines endured between the races during that period.^{13, 28, 29}

Year	Deaths/100,000 Live Births	
	Black	White
1979	238.6	142.3
1980	187.9	125.8
1981	178.6	109.8
1982	171.3	100.3
1983	159.4	92.0
1984	149.1	89.3
1985	149.8	90.5
1986	144.2	81.5
1987	145.6	76.5
1988	142.4	70.5
1989	172.2	74.7
1990	143.8	54.6
1991	131.6	50.0
1992	143.3	41.3
1993	104.1	34.9
1994	83.4	32.1
1995	82.7	29.4
1996	79.5	27.3
1997	74.2	26.7
1998	73.9	27.6
1999	61.9	21.5
2000	55.7	19.6
2001	58.2	19.8
2002	56.9	18.4
2003	43.7	16.8
2004	49.4	17.3

Chart 4–33**Infant Mortality Rate for Neonatal Respiratory Distress Syndrome by Race/Ethnicity,* U.S., 2003**

In 2003, infant mortality for neonatal RDS was highest for blacks and Puerto Ricans and lowest for Central and South Americans.⁴¹

	Deaths/100,000 Live Births
All	20.5
Black	44.4
Puerto Rican	34.2
Central and South American	14.6
White†	16.5
Mexican-American	16.3
Asian Pacific Islander	15.5

* No data for American Indians.

† Non-Hispanic.

Chart 4-34**Infant Mortality Rate for Sudden Infant Distress Syndrome by Race/Ethnicity, U.S., 2003**

In 2003, infant mortality for SIDS was highest for American Indians and blacks and lowest for Central and South Americans.⁴¹

	Deaths/100,000 Live Births
All	52.9
American Indian	124.0
Black	108.8
Puerto Rican	53.1
Central and South American	19.9
White*	50.5
Mexican-American	24.8
Asian Pacific Islander	27.7

* Non-Hispanic.

5. Blood Diseases

The term *blood diseases* is used here to include 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-10; hemochromatosis is also included in this chapter of the *Chart Book*. 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 2004 by blood disease subgroups. For selected blood diseases, Chart 5–2 shows, according to ICD-9-CM codes, the number of hospitalizations and average length of stay in 2004 and the number of physician office visits in 2003 and, according to ICD-10 codes, the number of deaths in 2004.

Subsequent charts display morbidity and mortality for aplastic anemia and sickle cell anemia. The annual death rates for these diseases are small and may vary considerably from year to year. Using combined mortality over 4 to 5 years to obtain average annual death rates, rather than statistics for a single year, improves data reliability for race and sex comparisons.

Chart 5–1
Blood Disease Deaths, Percent by Subgroup, U.S., 2004

Blood Diseases	Percent
Other Anemias	32.1
Other Diseases of Blood and Blood-Forming Organs	18.7
Coagulation Defects	18.2
Aplastic Anemia	10.0
Purpura and Other Hemorrhagic Conditions	9.2
Sickle Cell Anemia	5.4
Diseases of White Blood Cells	4.3
Hemochromatosis	2.2

Total Deaths = 9,635 (100%)

Chart 5-2

Number of Hospitalizations, Physician Office Visits,* and Deaths for Selected Blood Diseases, U.S., 2003 and 2004†

Diagnostic Category	ICD-9-CM Codes	Hospitalizations for 2004			Physician Office Visits for 2003 (1,000)	ICD-10 Codes	Deaths for 2004
		First-Listed Discharges (1,000)	Length of Stay (Days)				
Total	280-289, 275	467	4.7	5,620	D50-D89, E83.1	9,635	
Anemias:	280-285	312	4.9	3,752	D50-D64	4,575	
Iron deficiency anemia	280	87	3.5	837	D50	148	
Other deficiency anemia	281	—	—	257	D51-D52	55	
Cooley's anemia	282.4	—	—	—	D56	25	
Sickle cell anemia	282.6	77	5.7	29	D57.0, D57.1	518	
Aplastic anemia	284	29	7.5	87	D60-D61	967	
Other and unspecified anemias	Residual	119	4.7	2,542	Residual	2,862	
Coagulation defects:	286	18	4.1	225	D65-D68	1,757	
Hemophilia: Factor VIII	286.0	—	—	—	D66	76	
Hemophilia: Factor IX	286.1	—	—	—	D67	7	
Other	Residual	18	4.1	225	Residual	1,674	
Purpura and other hemorrhagic conditions:	287	39	3.9	459	D69	882	
Primary thrombocytopenia	287.3	16	3.8	247	D69.3, D69.4	348	
Unspecified thrombocytopenia	287.4	—	—	—	D69.5, D69.6	498	
Other	Residual	23	3.9	212	Residual	36	
Diseases of white blood cells	288	60	4.5	549	D70-D72	411	
Other diseases of blood and blood-forming organs	289	15	4.1	466	D73-D89	1,799	
Hemochromatosis	275	18	4.8	169	E83.1	211	

* 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 434,000 have a relative standard error of more than 30%.

† Compiled from references 29, 30, and 37.

Chart 5–3
Hospitalizations for Aplastic Anemia by Primary and Secondary Diagnosis, U.S., 1982–2004

The number of hospitalizations for aplastic anemia as the primary diagnosis was 1.6 times higher in 2004 than in 1982 and as the secondary diagnosis was slightly more than 6 times higher in 2004 than in 1982.³⁰

Year	Number (Thousands)	
	Primary Diagnosis	Secondary Diagnosis
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
2003	35	158
2004	29	176

Chart 5–4
Age-Adjusted Death Rates for Aplastic Anemia by Race and Sex, U.S., 1999–2003

In 1999–2003, mortality from aplastic anemia within sex groups was higher for blacks than for whites and overall was slightly higher for males than for females.

Sex	Deaths/100,000 Population*		
	Total	White	Black
Male	0.40	0.40	0.48
Female	0.34	0.33	0.39

* Average annual rates.

Chart 5–5
Death Rates for Aplastic Anemia by Age, Race, and Sex, U.S., 1999–2003

In 1999–2003, among blacks, death rates for aplastic anemia were higher for males than for females within the middle three age groups. Among whites aged ≥ 65 years, rates were higher for males than for females. Within sex groups, the rates were higher for blacks than for whites, except in the oldest age group.¹³

Age (Years)	Deaths/100,000 Population*			
	Black Male	White Male	Black Female	White Female
35–44	0.13	0.06	0.13	0.07
45–54	0.28	0.13	0.19	0.13
55–64	0.67	0.30	0.49	0.32
65–74	1.44	0.95	0.90	0.85
75–84	2.18	2.90	2.22	2.27

* Average annual rates.

Chart 5–6
Hospitalization Rates for Sickle Cell Anemia, Ages Under 15 and 15–44, U.S., 1982–2004

Hospitalization rates for sickle cell anemia varied considerably between 1982 and 2004. Overall, however, the rates tended to increase for both age groups, with rates in the older age group remaining higher than those in the younger age group.³⁰

Year	Hospitalizations/10,000 Population	
	Ages <15 Years	Ages 15–44 Years
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	22.7
1990	26.6	23.8
1991	21.0	24.1
1992	19.6	20.6
1993	15.9	22.2
1994	13.5	27.7
1995	22.2	26.2
1996	15.6	24.7
1997	18.9	25.6
1998	15.6	27.8
1999	16.6	25.2
2000	21.0	25.4
2001	19.1	30.1
2002	26.0	29.2
2003	16.0	30.8
2004	16.0	31.8

Chart 5-7**Age-Adjusted Death Rates for Sickle Cell Anemia in Blacks by Sex, U.S., 1980-1984 to 1999-2003**

Mortality from sickle cell anemia in blacks increased from 1980-1984 to 1990-1994. After 1994, death rates began to decrease for black males but remained relatively unchanged for black females.¹³

Years	Deaths/100,000 Population*	
	Male	Female
1980-1984	1.22	0.92
1985-1989	1.30	1.03
1990-1994	1.48	1.26
1995-1998	1.43	1.26
1999-2003	1.33	1.24

* Average annual rates.

Chart 5-8**Death Rates for Sickle Cell Anemia in Blacks by Age and Sex, U.S., 1999-2003**

In 1999-2003, mortality from sickle cell anemia was relatively similar for males and females. Death rates were especially high for individuals aged 15-64 years.¹³

Age (Years)	Deaths/100,000 Population*	
	Black Male	Black Female
1-4	0.52	0.42
5-14	0.29	0.35
15-24	1.15	0.87
25-34	2.25	1.83
35-44	2.08	2.01
45-54	2.10	2.15
55-64	1.41	1.50
65-74	0.43	0.65
75-84	0.12	0.20

* 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 Chart Book	ICD-6 1949–1957	ICD-7 1958–1967	ICDA-8 1968–1978	ICD-9 1979–1998	ICD-10 1999–
Cardiovascular diseases ^a	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	390–398, 402, 404–429	I00–I09, I11, I13, I20–I51
Coronary heart disease ^b	420, 422	420, 422	410–413	410–414, 429.2	I20–I25
Acute myocardial infarction	*	*	410	410	I21, I22
Heart failure ^c	†	†	427.0, 427.1	428	I50
Congestive heart failure	†	†	427.0	428	I50.1
Cardiomyopathy	†	†	†	425	I42
Cerebrovascular disease (stroke) ^d	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 ^e	†	†	746–747	745–747	Q20–Q28
COPD ^f	500–502, 527.1	500–502, 527.1	490–492, 519.3	490–492, 494–496	J40–J44, J47
Asthma	241	241	493	493	J45, J46
Neonatal respiratory distress syndrome ^g	†	†	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 congestive heart failure (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. The ICD-10 term is congenital malformations of the cardiovascular 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		Number of Deaths*		Comparability Ratio [†]
	ICD-10	ICD-9	ICD-10	ICD-9	
Major cardiovascular diseases	I00–I78	390–434, 436–448	942,439	945,945	0.9963
Diseases of the heart	I00–I09, I11, I13, I20–I51	390–398, 402, 404, 410–429	719,631	730,444	0.9852
Coronary heart disease	I20–I25	410–414, 429.2	543,063	542,728	1.0006
Heart failure	I50	428	48,876	47,052	1.0388
Cerebrovascular disease (stroke)	I60–I69	430–434, 436–438	166,837	158,855	1.0502
Diseases of arteries	I70–I78	440–448	41,590	43,762	0.9504
Influenza and pneumonia	J10–J18	480–487	57,915	83,045	0.6974
Chronic lower respiratory disease	J40–J47	490–494, 496	109,746	105,411	1.0411
COPD	J40–J44	490–492, 494, 496	104,775	99,797	1.0499
Asthma	J45, J46	493	4,971	5,614	0.8855
Neonatal RDS [‡]	P22	769	2,904	3,144	0.9237
SIDS [‡]	R95	798.0	3,006	2,844	1.0570

* From a sample of deaths in 1996.⁶

[†] Deaths coded to ICD-10 divided by deaths coded to ICD-9.

[‡] Infant deaths.

Note: The code groups for these causes of death are used by NCHS to compute the comparability ratio. Some of the code groups differ slightly from the coding in Appendix A.

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.^{8, 9, 31}
- 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.³¹
- 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.⁶
- 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.³¹
- Incidence:** Incidence is the number of new cases that began during a specified period of time, usually a year.³¹
- 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.³¹
- Limited in activity:** Also called chronic activity limitation, it refers to the limitation of a person’s usual activity due to a chronic condition.³¹
- Morbidity:** Morbidity refers to incidence, prevalence, hospitalizations, and physician office visits.
- Prevalence:** The prevalence of a condition is the number of persons who have the condition at a given time.³¹

Appendix C

Definition of Terms (continued)

- 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.³¹
- 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.³¹

Appendix D

Abbreviations*

AMI	acute myocardial infarction
BP	blood pressure
CHD	coronary heart disease
CM	clinical modification
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
OMB	Office of Management and Budget
RDS	respiratory distress syndrome
SIDS	sudden infant death syndrome
WHO	World Health Organization

* Country abbreviations are listed on the next page.

Appendix D

Abbreviations (continued)

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

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