

chart book
chart book
chart book
chart book
chart book
chart book



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



The bar graph on the front cover depicts the four leading causes of death in 2004: HEART DISEASE, cancer, STROKE, and COPD AND ALLIED CONDITIONS.

chart book
chart book
chart book
chart book
chart book
chart book
chart book



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

JUNE 2007
FOR ADMINISTRATIVE USE
NATIONAL INSTITUTES
OF HEALTH
National Heart, Lung,
and Blood Institute

Foreword

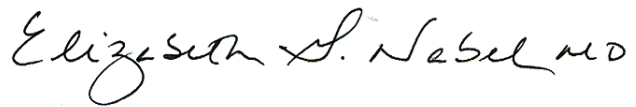
The mission of the National Heart, Lung, and Blood Institute (NHLBI) is to provide leadership and support for research in cardiovascular, lung, and blood diseases; sleep disorders; women's health; and blood resources. The ultimate goal is to improve the health and well-being of the American people. Although 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*.



Elizabeth G. Nabel, M.D.
Director
National Heart, Lung, and Blood Institute

Contents

List of Charts	vii
1. Introduction.....	1
Sources of Data	1
Quality of Data	1
ICD Revisions	2
Data Presentation.....	3
2. Background Data	5
Cardiovascular Diseases	5
Lung Diseases.....	5
Blood Diseases	5
Population	5
3. Cardiovascular Diseases.....	19
Coronary Heart Disease.....	19
Heart Failure.....	19
Cardiomyopathy	19
Atrial Fibrillation and Other Heart Diseases	19
Cerebrovascular Diseases (Stroke).....	19
Hypertension	20
Diseases of Arteries	20
Congenital Malformations of the Circulatory System	20
4. Lung Diseases	55
Chronic Obstructive Pulmonary Disease	55
Asthma.....	55
5. Blood Diseases	73
Appendixes.....	79
Appendix A. International Classification of Diseases: Codes for Selected Diagnostic Categories (6th, 7th, 8th, 9th, and 10th Revisions).....	81
Appendix B. Estimated Comparability Ratios for Selected Causes of Death, U.S.	83
Appendix C. Definition of Terms	85
Appendix D. Abbreviations	87
Appendix E. References	89

List of Charts

2. Background Data

2-1	Total Population by Mean Age, Percent Age 65 and Over, Race/Ethnicity, and Sex, U.S., 2004	6
2-2	Total Projected Population by Mean Age, Percent Age 65 and Over, Race/Ethnicity, and Sex, U.S., 2020	6
2-3	Average Remaining Lifetime Years by Age, Race, and Sex, U.S., 2004.....	6
2-4	Age-Adjusted Death Rates for All Causes by Race and Sex, U.S., 1950–2004.....	7
2-5	Unadjusted Death Rates for Selected Causes, U.S., 1950–2004	7
2-6	Number of Days of Inpatients Hospital Care by Major Diagnosis, U.S., 1989–2004.....	8
2-7	Age-Adjusted Death Rates by Major Diagnosis, U.S., 1989–2004.....	8
2-8	Leading Causes of Death, U.S., 2004	9
2-9	Leading Causes of Death by Age and Rank, U.S., 2004	9
2-10	Leading Causes of Death, White Males, U.S., 2004.....	10
2-11	Leading Causes of Death, White Females, U.S., 2004	10
2-12	Leading Causes of Death, Black Males, U.S., 2004	11
2-13	Leading Causes of Death, Black Females, U.S., 2004	11
2-14	Leading Causes of Death, Asian Males, U.S., 2004	12
2-15	Leading Causes of Death, Asian Females, U.S., 2004.....	12
2-16	Leading Causes of Death, Hispanic Males, U.S., 2004	13
2-17	Leading Causes of Death, Hispanic Females, U.S., 2004	13
2-18	Leading Causes of Death, American Indian Males, U.S., 2004	14
2-19	Leading Causes of Death, American Indian Females, U.S., 2004.....	14
2-20	Prevalence of Leading Chronic Conditions Causing Limitation of Activity, U.S., 2005	15
2-21	Age-Adjusted Percent of Population Currently Smoking by Race and Sex, Ages 18 and Over, U.S., 1965–2004.....	15
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	16
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	16
2-24	Economic Cost of Cardiovascular, Lung, and Blood Diseases, U.S., 2007	17
2-25	Direct Cost of Cardiovascular, Lung, and Blood Diseases, U.S., 2007.....	17

3. Cardiovascular Diseases

3-1	Cardiovascular Disease Deaths, Percent by Subgroup, U.S., 2004	21
3-2	Heart Disease Deaths, Percent by Subgroup, U.S., 2004	21

3-3	Stroke Deaths, Percent by Subgroup, U.S., 2004	21
3-4	Number of Hospitalizations, Physician Office Visits, and Deaths for Selected Cardiovascular Diseases, U.S. 2003 and 2004	22
3-5	Change in Age-Adjusted Death Rates, U.S., 1950–2004	23
3-6	Age-Adjusted Death Rates and Percent Change for All Causes and Cardiovascular Diseases, U.S., 1972 and 2004.....	23
3-7	Average Annual Percent Change in Age-Adjusted Death Rates for All Causes and Cardiovascular Diseases, U.S., 1965–2004	24
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	24
3-9	Deaths and Age-Adjusted Death Rates for Cardiovascular Diseases, U.S., 1979–2004.....	25
3-10	Percent of All Deaths Due to Cardiovascular Diseases by Age, U.S., 2004.....	25
3-11	Age-Adjusted Death Rates for Cardiovascular Diseases by State, U.S., 2001–2003.....	26
3-12	Percent Decline in Age-Adjusted Death Rates for Cardiovascular Diseases by State, U.S., 1991–1993 to 2001–2003	26
3-13	Age-Adjusted Death Rates for Heart Disease by Race/Ethnicity and Sex, U.S., 1985–2004	27
3-14	Age-Adjusted Death Rates for Heart Disease by Race and Sex, U.S., 2004.....	27
3-15	Death Rates for Heart Disease by Age, Race, and Sex, U.S., 2004.....	28
3-16	Age-Adjusted Prevalence of Coronary Heart Disease by Race and Sex, Ages 25–74, U.S., 1971–1974 to 1999–2004	28
3-17	Prevalence of Acute Myocardial Infarction by Age and Sex, U.S., 1999–2004.....	29
3-18	Prevalence of Acute Myocardial Infarction by Age and Race, U.S., 1999–2004.....	29
3-19	Prevalence of Angina Pectoris by Age and Sex, U.S., 1999–2004.....	30
3-20	Prevalence of Angina Pectoris by Age and Race, U.S., 1999–2004.....	30
3-21	Hospitalization Rates for Acute Myocardial Infarction, Ages 45–64 and 65 and Over, U.S., 1965–2004	31
3-22	Hospital Case-Fatality Rates for Acute Myocardial Infarction, Ages 45–64 and 65 and Over, U.S., 1970–2004.....	31
3-23	Age-Adjusted Death Rates for Coronary Heart Disease, Actual and Expected, U.S., 1950–2004	32
3-24	Age-Adjusted Death Rates for Coronary Heart Disease by Race and Sex, U.S., 1950–2004	32
3-25	Deaths and Age-Adjusted Death Rates for Coronary Heart Disease, U.S., 1979–2004.....	33
3-26	Average Annual Percent Change in Age-Adjusted Death Rates for Coronary Heart Disease by Race and Sex, U.S., 1950–2004	33
3-27	Average Annual Percent Change in Death Rates for Coronary Heart Disease by Age, Race, and Sex, U.S., 1999–2004.....	34
3-28	Age-Adjusted Death Rates for Coronary Heart Disease by Race and Sex, U.S., 2004.....	34

3-29	Death Rates for Coronary Heart Disease by Age, Race, and Sex, U.S., 2004.....	35
3-30	Age-Adjusted Death Rates for Coronary Heart Disease by State, U.S., 2001–2003	35
3-31	Age-Adjusted Death Rates for Coronary Heart Disease by Country and Sex, Ages 35–74, 2004	36
3-32	Change in Age-Adjusted Death Rates for Coronary Heart Disease in Males by Country, Ages 35–74, 1999–2004.....	36
3-33	Change in Age-Adjusted Death Rates for Coronary Heart Disease in Females by Country, Ages 35–74, 1999–2004.....	37
3-34	Age-Adjusted Prevalence of Heart Failure by Race and Sex, Ages 25–74, U.S., 1971–1975 to 1999–2004	37
3-35	Hospitalization Rates for Congestive Heart Failure, Ages 45–64 and 65 and Over, U.S., 1971–2004	38
3-36	Hospital Case-Fatality Rates for Congestive Heart Failure, Ages 45–64 and 65 and Over, U.S., 1981–2004.....	38
3-37	Age-Adjusted Death Rates for Heart Failure by Race and Sex, U.S., 1979–2004.....	39
3-38	Age-Adjusted Death Rates for Heart Failure by Race and Sex, U.S., 2004.....	39
3-39	Death Rates for Heart Failure by Age, Race, and Sex, U.S., 2004.....	40
3-40	Age-Adjusted Death Rates for Heart Failure by Country and Sex, Ages 35–74, 2004.....	40
3-41	Age-Adjusted Death Rates for Cardiomyopathy by Race and Sex, U.S., 2004	41
3-42	Death Rates for Cardiomyopathy by Age, Race, and Sex, U.S., 2004	41
3-43	Hospitalizations for Atrial Fibrillation by Primary and Secondary Diagnosis, U.S., 1982–2004	42
3-44	Hospitalization Rates for Atrial Fibrillation by Age, U.S., 1982–2004.....	42
3-45	Age-Adjusted Prevalence of Stroke by Race and Sex, Ages 25–74, U.S., 1971–1974 to 1999–2004	43
3-46	Prevalence of Stroke by Age and Sex, U.S., 1999–2004.....	43
3-47	Prevalence of Stroke by Age and Race, U.S., 1999–2004.....	44
3-48	Hospitalization Rates for Stroke, Ages 45–64 and 65 and Over, U.S., 1971–2004.....	44
3-49	Hospital Case-Fatality Rate for Stroke, Ages 45–64 and 65 and Over, U.S., 1971–2004	45
3-50	Age-Adjusted Death Rates for Stroke by Race and Sex, U.S., 1950–2004.....	45
3-51	Deaths and Age-Adjusted Death Rates for Stroke, U.S., 1979–2004.....	46
3-52	Age-Adjusted Death Rates for Stroke by Race/Ethnicity and Sex, U.S., 1985–2004.....	46
3-53	Average Annual Percent Change in Age-Adjusted Death Rates for Stroke by Race and Sex, U.S., 1960–2004.....	47
3-54	Age-Adjusted Death Rates for Stroke by Race and Sex, U.S., 2004.....	47
3-55	Death Rates for Stroke by Age, Race, and Sex, U.S., 2004.....	48
3-56	Age-Adjusted Death Rates for Stroke by State, U.S., 2001–2003	48

3-57	Age-Adjusted Death Rates for Stroke by Country and Sex, Ages 35-74, 2004.....	49
3-58	Change in Age-Adjusted Death Rates for Stroke in Males by Country, Ages 35-74, 1999-2004	49
3-59	Change in Age-Adjusted Death Rates for Stroke in Females by Country, Ages 35-74, 1999-2004	50
3-60	Prevalence of Hypertension and Prehypertension by Age, U.S., 1999-2004.....	50
3-61	Prevalence of Hypertension by Race/Ethnicity and Sex, Ages 20-74, U.S., 1999-2004	51
3-62	Age-Adjusted Prevalence of Hypertension by Race/Ethnicity and Sex, Ages 20-74, U.S., 1976-1980 to 1999-2004	51
3-63	Hypertensive Population Aware, Treated, and Controlled, Ages 18-74, U.S., 1971-1972 to 1999-2004	52
3-64	Hypertensive Population Aware, Treated, and Controlled, Ages 18-74, U.S., 1976-1980 to 1999-2004	52
3-65	Age-Adjusted Death Rates for Diseases of Arteries by Race and Sex, U.S., 2004.....	53
3-66	Death Rates for Diseases of Arteries by Age, Race, and Sex, U.S., 2004.....	53
3-67	Percent of Deaths From Congenital Malformations of the Circulatory System, Age Under 1, U.S., 1940-2004.....	54
3-68	Infant Mortality From Congenital Malformations of the Circulatory System by Race, U.S., 1970-2004	54
 4. Lung Diseases		
4-1	Deaths From Lung Diseases, Percent by Subgroup, U.S., 2004.....	55
4-2	Number of Hospitalizations, Physician Office Visits, and Deaths for Selected Lung Diseases, U.S., 2003 and 2004	56
4-3	Age-Adjusted Death Rates for Total Lung Diseases by Race and Sex, U.S., 2003	57
4-4	Death Rates for Total Lung Diseases by Age, Race, and Sex, U.S., 2003	57
4-5	Prevalence of Chronic Obstructive Pulmonary Disease by Age, U.S., 1997-2005	58
4-6	Prevalence of Chronic Obstructive Pulmonary Disease by Age, Race, and Sex, U.S., 2005	58
4-7	Hospitalization Rates for Chronic Obstructive Pulmonary Disease, Ages 45-64 and 65 and Over, U.S., 1970-2004.....	59
4-8	Age-Adjusted Death Rates for Chronic Obstructive Pulmonary Disease by Race and Sex, U.S., 1960-2004.....	59
4-9	Age-Adjusted Death Rates for Chronic Obstructive Pulmonary Disease by Race/Ethnicity and Sex, U.S., 1985-2004.....	60
4-10	Death Rates for Chronic Obstructive Pulmonary Disease for White Males by Age, U.S., 1960-2004	60
4-11	Death Rates for Chronic Obstructive Pulmonary Disease for Black Males by Age, U.S., 1960-2004	61

4-12	Death Rates for Chronic Obstructive Pulmonary Disease for White Females by Age, U.S., 1960–2004	61
4-13	Death Rates for Chronic Obstructive Pulmonary Disease in Black Females by Age, U.S., 1960–2004	62
4-14	Age-Adjusted Death Rates for Chronic Obstructive Pulmonary Disease by State, U.S., 2001–2003	62
4-15	Age-Adjusted Death Rates for Chronic Obstructive Pulmonary Disease by Country and Sex, Ages 35–74, 2004.....	63
4-16	Age-Adjusted Death Rates for Chronic Obstructive Pulmonary Disease by Race and Sex, U.S., 2004.....	63
4-17	Death Rates for Chronic Obstructive Pulmonary Disease by Age, Race, and Sex, U.S., 2004	64
4-18	Prevalence of Asthma Ages Under 18 and 18 and Over, U.S., 1980–2005	64
4-19	Prevalence of Asthma by Age, Race, and Sex, U.S., 2005	65
4-20	Physician Office Visits for Asthma, U.S., 1989–2004.....	65
4-21	Hospitalizations for Asthma by Primary and Secondary Diagnosis, U.S., 1980–2004.....	66
4-22	Hospitalization Rates for Asthma by Age, U.S., 1980–2004.....	66
4-23	Age-Adjusted Death Rates for Asthma by Race and Sex, Ages 1–24, U.S., 1980–2004.....	67
4-24	Age-Adjusted Death Rates for Asthma by Race and Sex, U.S., 2004.....	67
4-25	Death Rates for Asthma by Age (Ages 1–34), Race, and Sex, U.S., 1999–2004.....	68
4-26	Death Rates for Asthma by Age (Ages 35–84), Race, and Sex, U.S., 1999–2004.....	68
4-27	Age-Adjusted Death Rates for Asthma by Sex, U.S., 1951–2004.....	69
4-28	Age-Adjusted Death Rates for Asthma by Race, U.S., 1951–2004.....	69
4-29	Age-Adjusted Death Rates for Asthma by Race and Sex, U.S., 1951–2004.....	70
4-30	Age-Adjusted Death Rates for Asthma by Country and Sex, 2004.....	70
4-31	Infant Mortality Rate for Respiratory Distress Syndrome, U.S., 1968–2004.....	71
4-32	Infant Mortality Rate for Respiratory Distress Syndrome by Race, U.S., 1979–2004.....	71
4-33	Infant Mortality Rate for Neonatal Respiratory Distress Syndrome by Race/Ethnicity, U.S., 2003	72
4-34	Infant Mortality Rate for Sudden Infant Distress Syndrome by Race/Ethnicity, U.S., 2003	72

5. Blood Diseases

5-1	Blood Disease Deaths, Percent by Subgroup, U.S., 2004	73
5-2	Number of Hospitalizations, Physician Office Visits, and Deaths for Selected Blood Diseases, U.S., 2003 and 2004.....	74
5-3	Hospitalizations for Aplastic Anemia by Primary and Secondary Diagnosis, U.S., 1982–2004	75

5-4	Age-Adjusted Death Rates for Aplastic Anemia by Race and Sex, U.S., 1999–2003	75
5-5	Death Rates for Aplastic Anemia by Age, Race, and Sex, U.S., 1999–2003	76
5-6	Hospitalization Rates for Sickle Cell Anemia, Ages Under 15 and 15–44, U.S., 1982–2004	76
5-7	Age-Adjusted Death Rates for Sickle Cell Anemia in Blacks by Sex, U.S., 1980–1984 to 1999–2003	77
5-8	Death Rates for Sickle Cell Anemia in Blacks by Age and Sex, U.S., 1999–2003	77

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 noninstitutionalized 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 compari-

sons, 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.

Background Data

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.

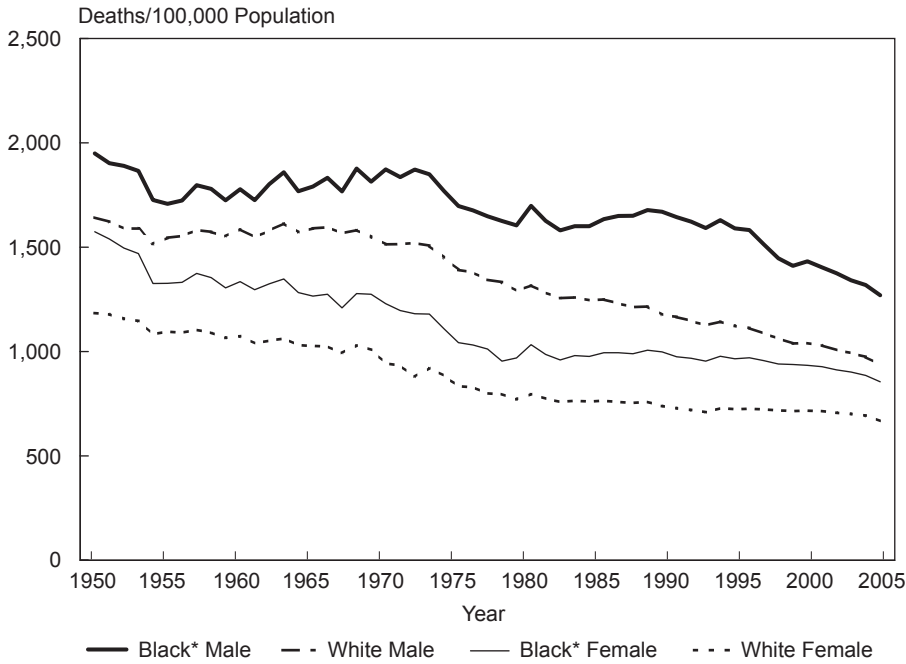
Chart 2–3
Average Remaining Lifetime Years by Age, Race, and Sex, U.S., 2004

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

Background Data

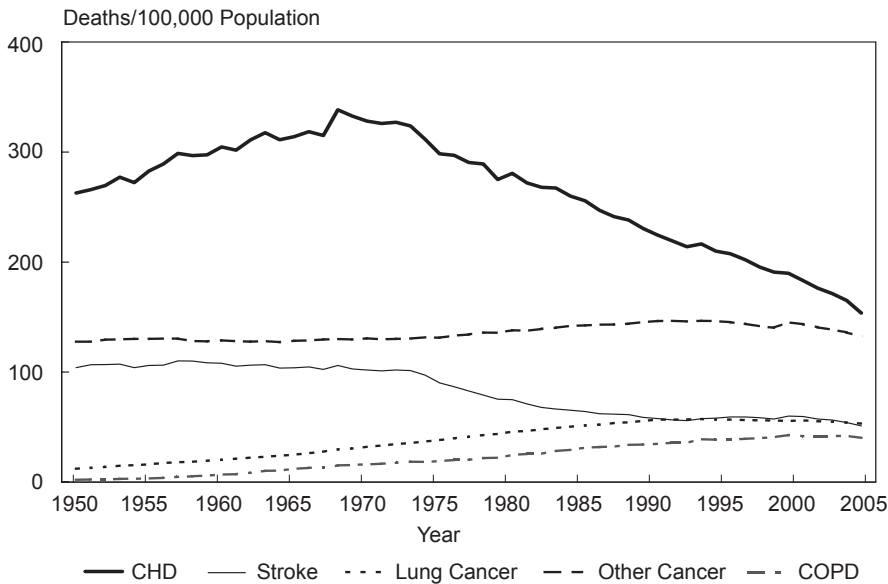
Chart 2-4
Age-Adjusted Death Rates for All Causes
by Race and Sex, U.S., 1950-2004



* Nonwhite from 1950 to 1967.

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}

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}

Background Data

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

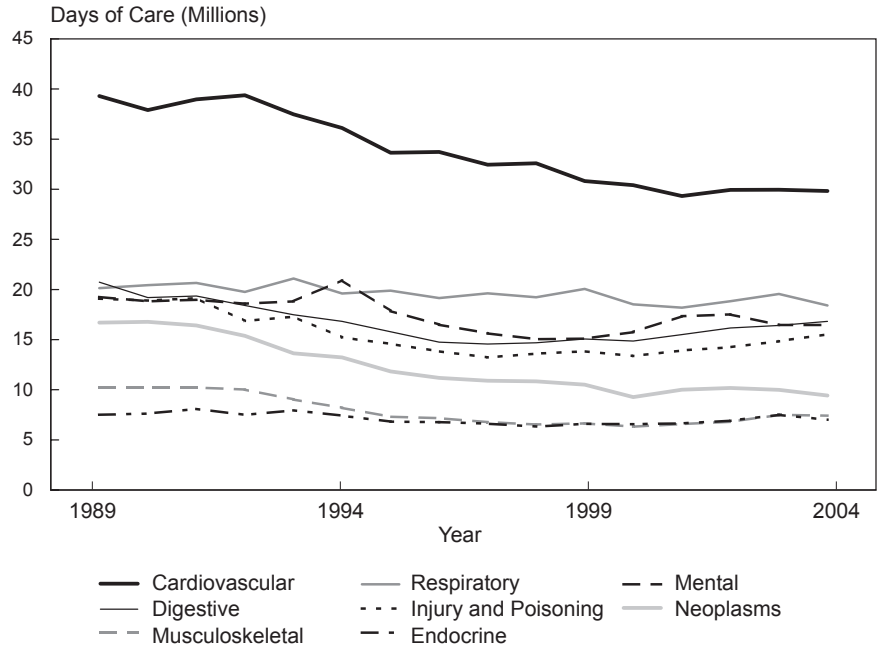
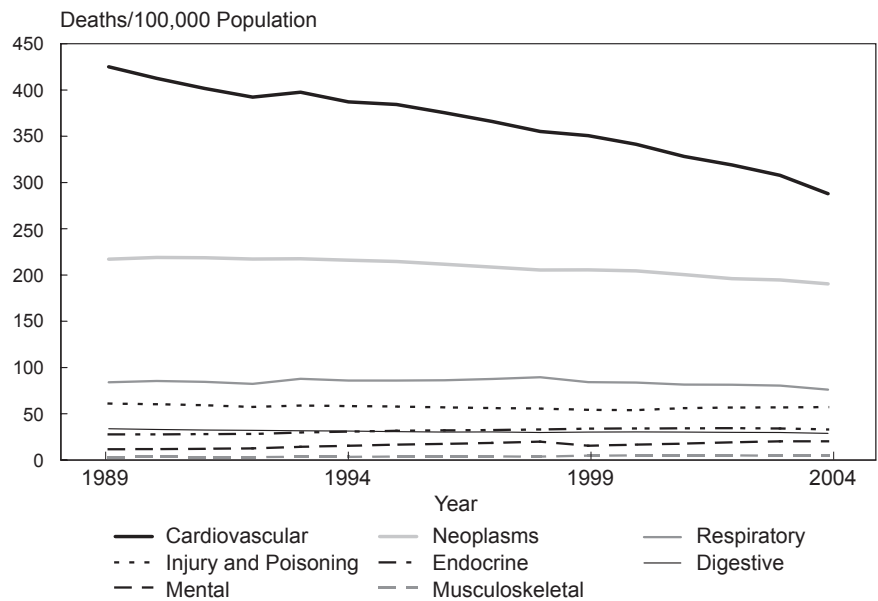


Chart 2-7
Age-Adjusted Death Rates
by Major Diagnosis, U.S., 1989-2004

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



Background Data

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

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.

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

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

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

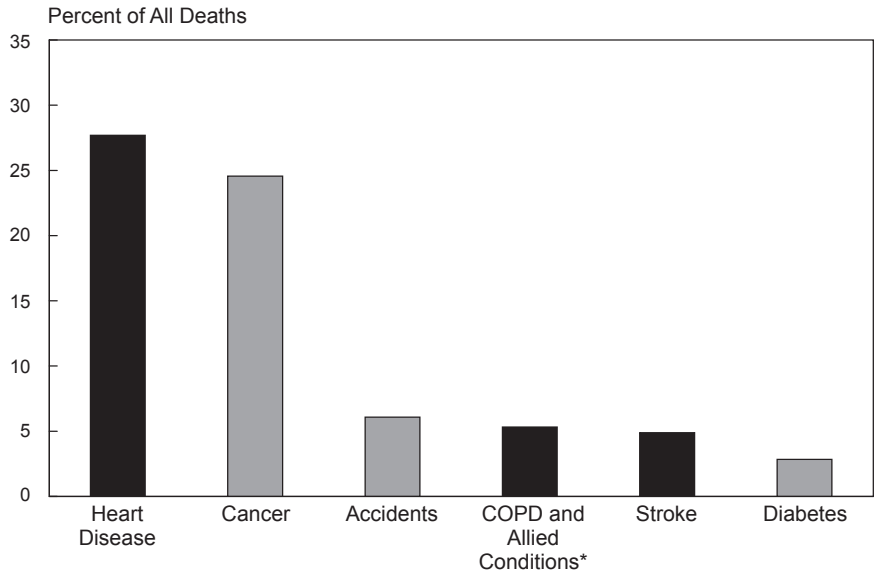
* Chronic lower respiratory diseases.

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

Background Data

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

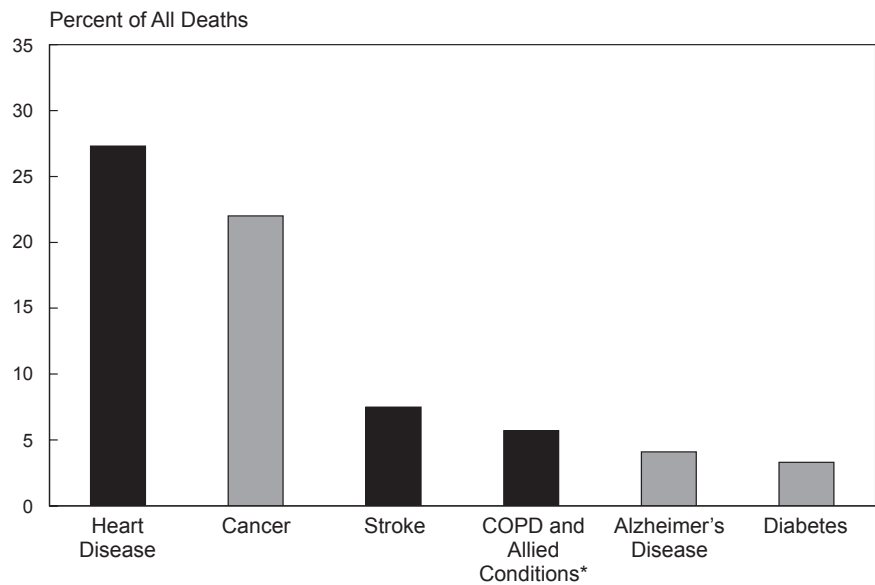
In 2004, among white males, heart disease, COPD and allied conditions, and stroke were the first, fourth, and fifth leading causes of death, respectively.²⁹



* Chronic lower respiratory diseases.

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

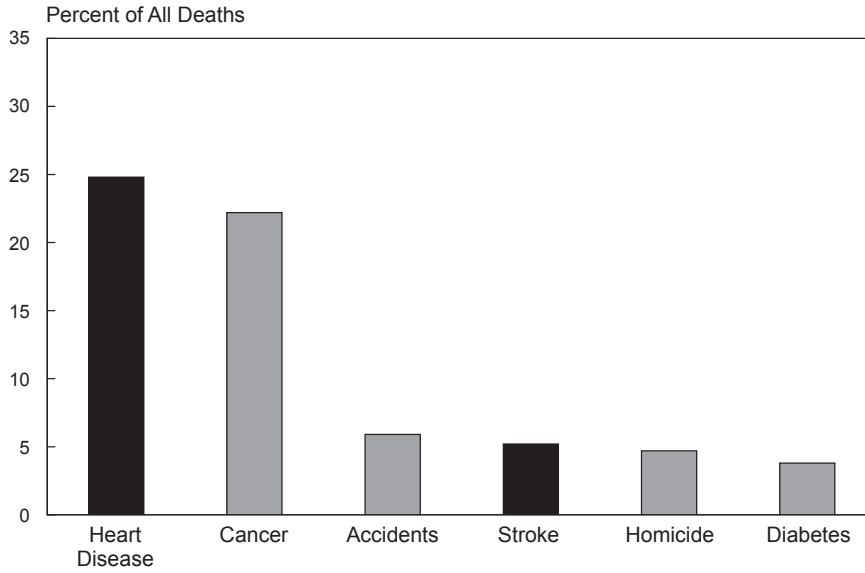
In 2004, among white females, heart disease, stroke, and COPD and allied conditions were the first, third, and fourth leading causes of death, respectively.²⁹



* Chronic lower respiratory diseases.

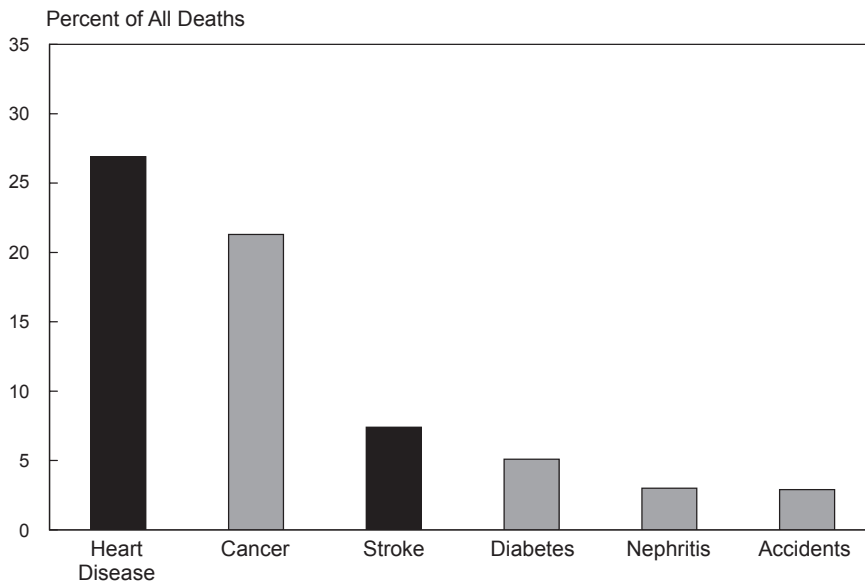
Background Data

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

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

Background Data

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

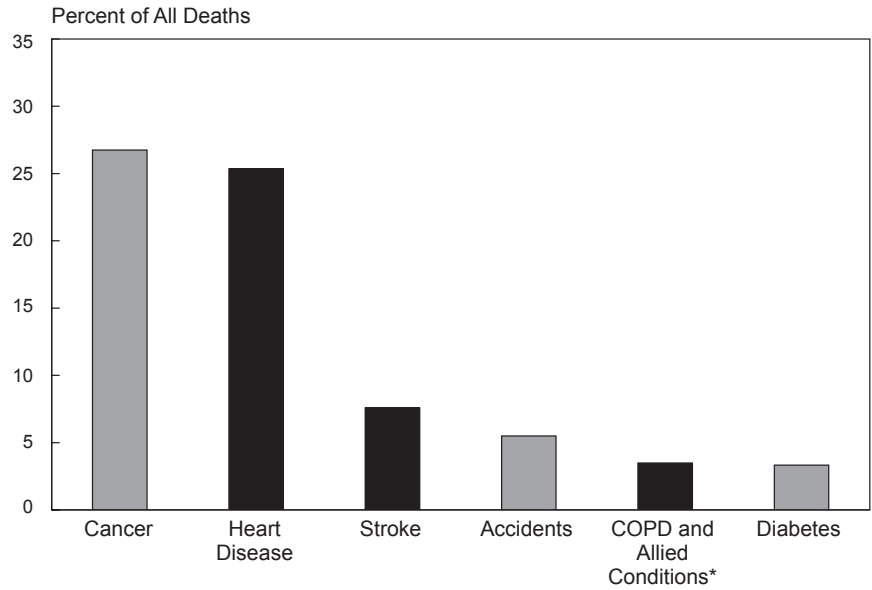
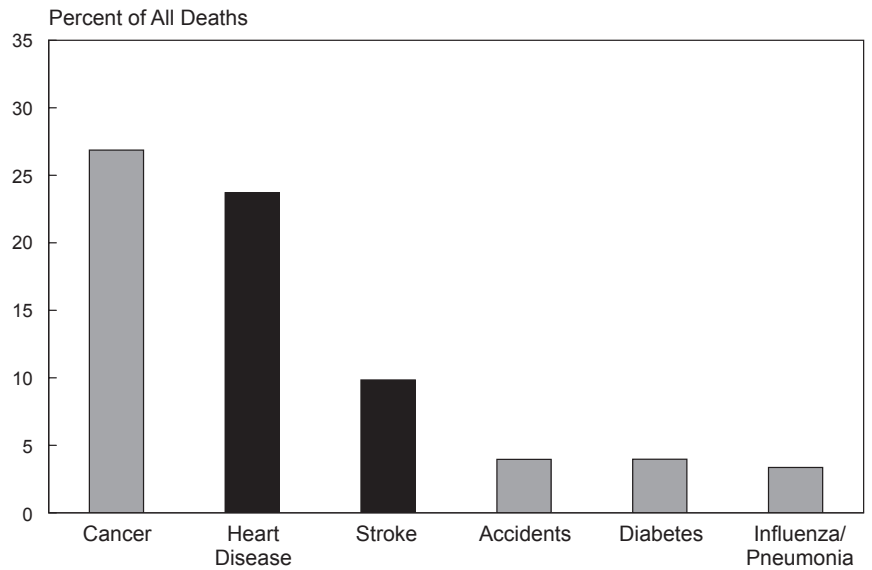


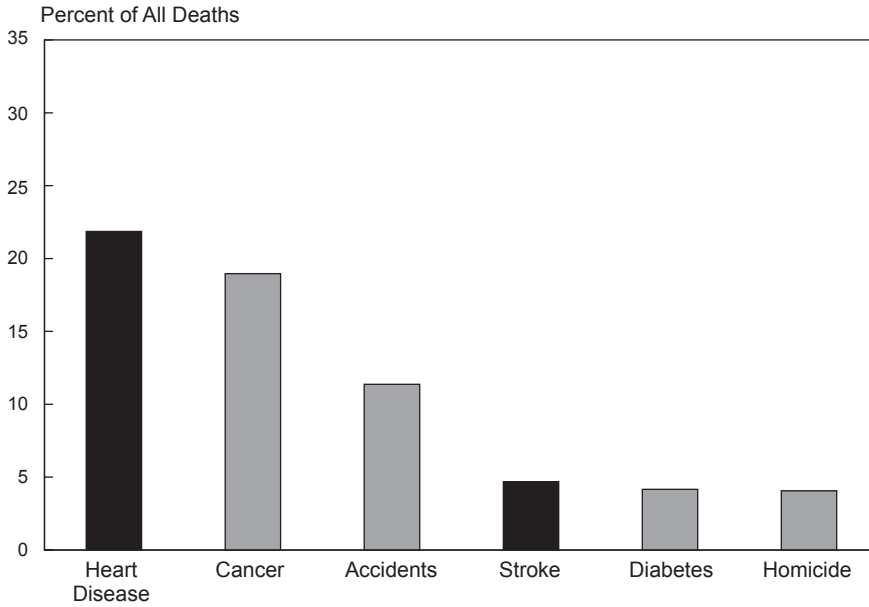
Chart 2-15
Leading Causes of Death,
Asian Females, U.S., 2004

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



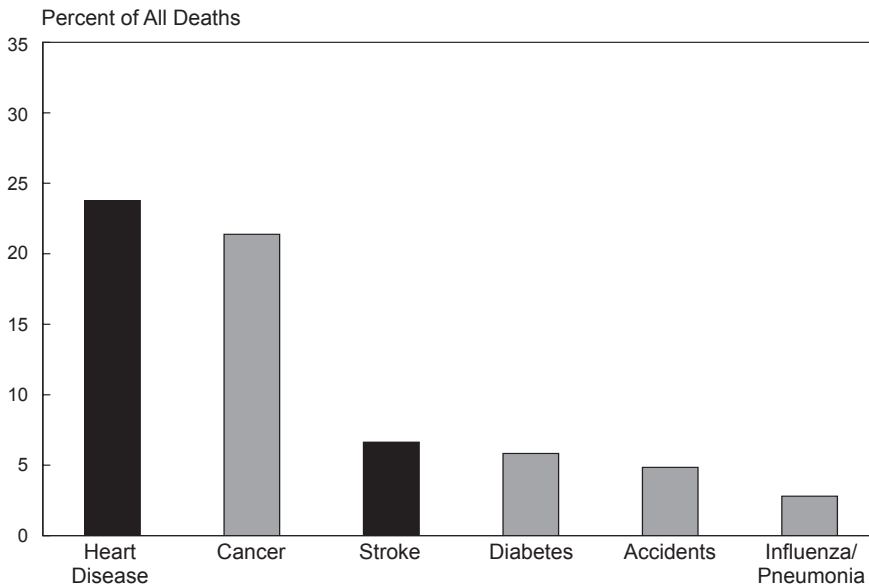
Background Data

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

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

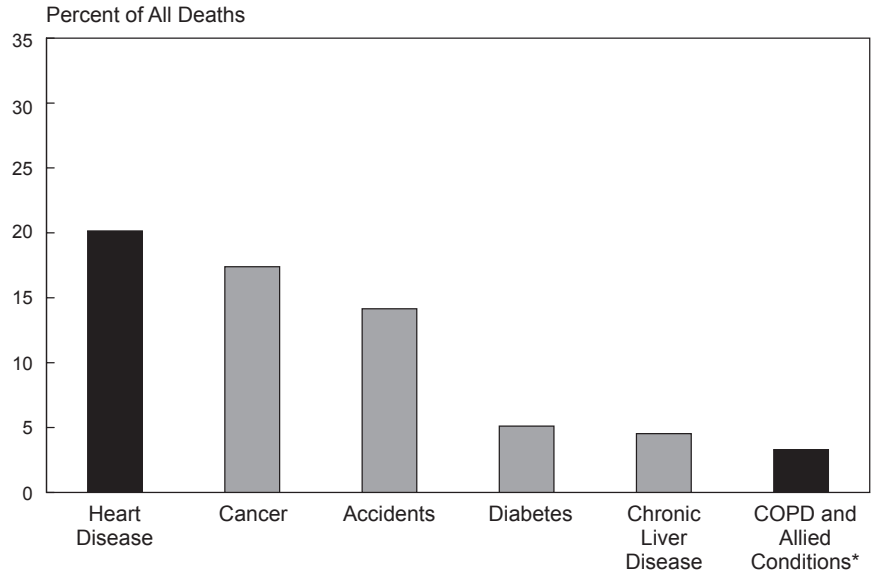


In 2004, among Hispanic females, heart disease and stroke were the first and third leading causes of death, respectively.²⁹

Background Data

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

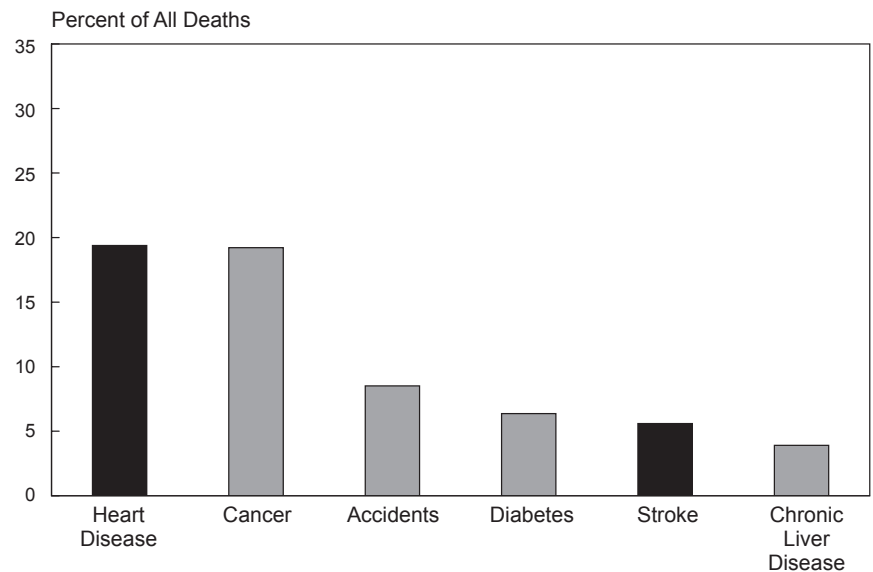
In 2004, among American Indian males, heart disease and COPD and allied conditions were the first and sixth leading causes of death.²⁹



* 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



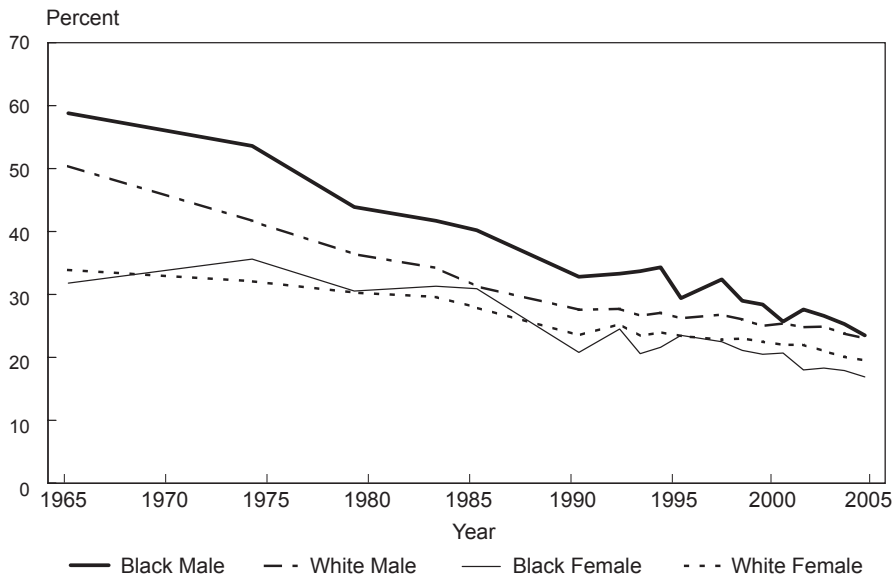
Background Data

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

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

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

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

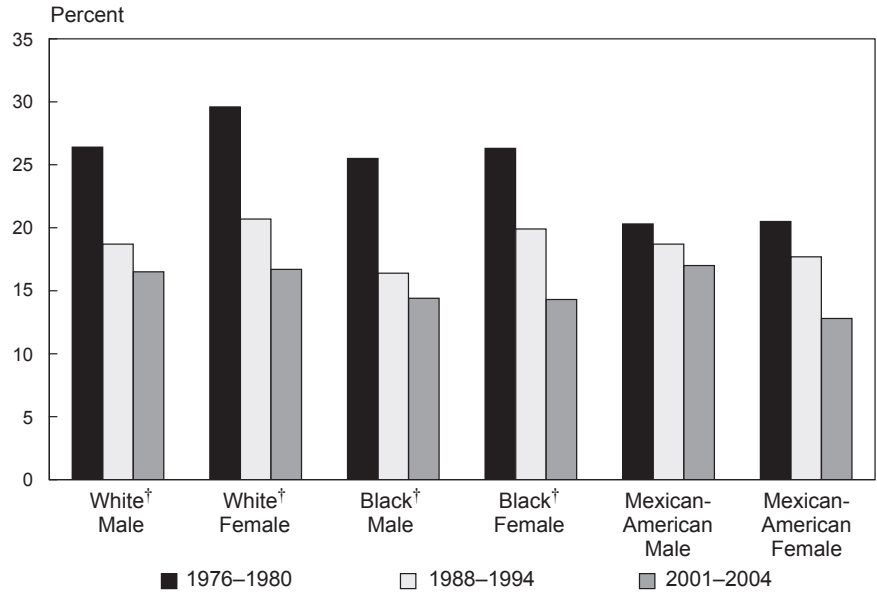


From 1965 to 1990, the percent of the population aged ≥ 18 years who smoked cigarettes decreased markedly. The decline was greater for males, both black and white, than for females, both black and white.³¹

Background Data

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

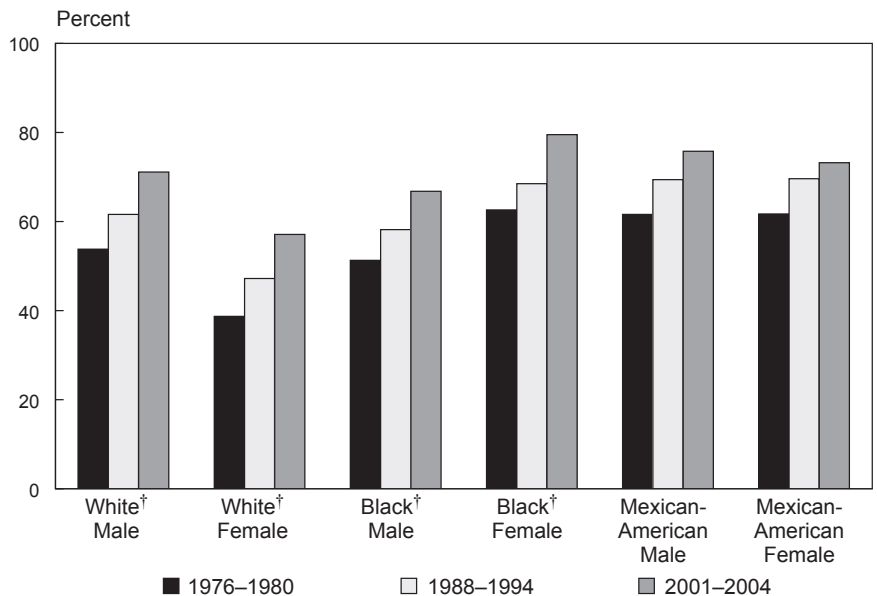
From 1976–1980 to 2001–2004, the prevalence of high total serum cholesterol declined for each sex and racial/ethnic group.³¹



* 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



* Overweight is a body mass index of 25–29 kg/m².
 † Non-Hispanic.

Background Data

Chart 2–24
Economic Cost of Cardiovascular, Lung,
and Blood Diseases, U.S., 2007

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

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.

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}

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

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

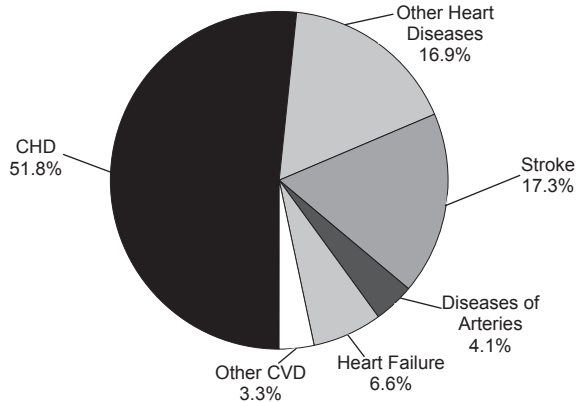
The ICD term *diseases of arteries* is used to refer to peripheral arterial disease and includes a variety of atherosclerotic disorders; none of them specifically involve the heart or brain. Examples are aortic aneurysm, atherosclerosis of the extremities, arterial embolism and thrombosis, and generalized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

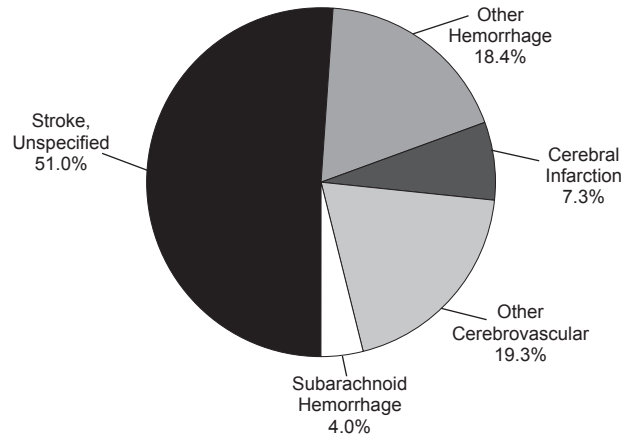
Cardiovascular Diseases

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



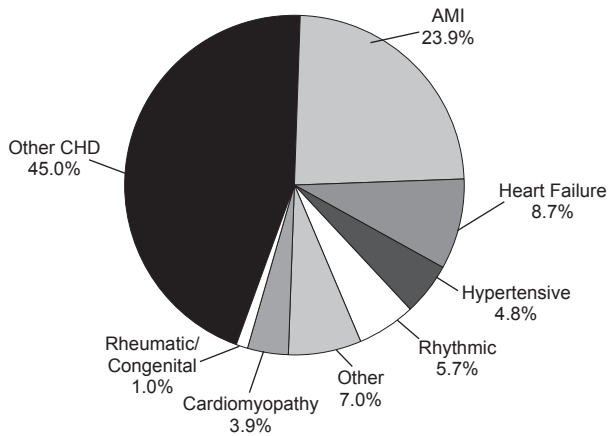
Total Deaths = 869,724 (100%), including congenital CVD defects.

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



Total Deaths = 150,074 (100%).

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



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

Cardiovascular Diseases

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

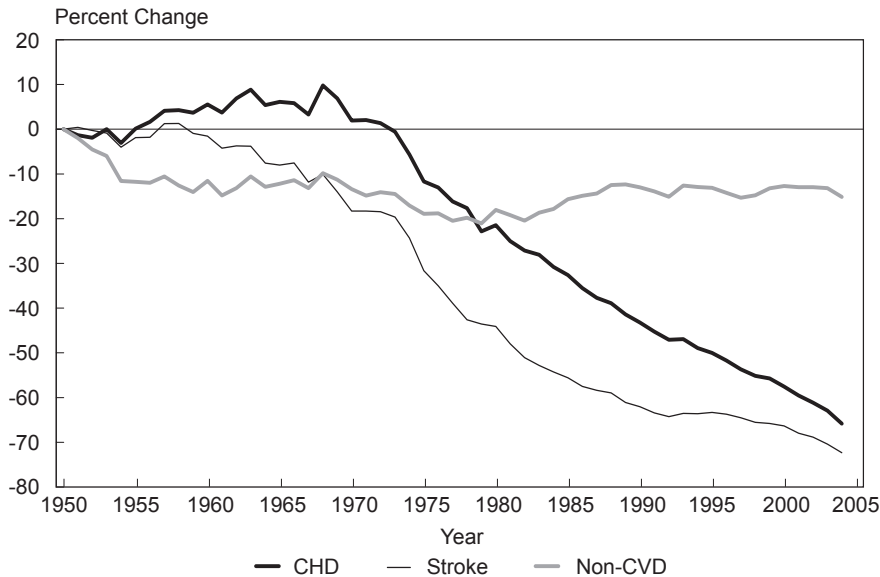
Diagnostic Category	ICD-9-CM Codes	Hospitalizations for 2004		Physician Office Visits for 2003 (1,000)	ICD-10 Codes	Deaths for 2004
		First-Listed Discharges (1,000)	Length of Stay (Days)			
Total	390–459, 745–747	6,435	4.8	71,569	I00–I99, Q20–Q28	869,724
Heart Disease:	390–398, 402, 404–429	4,369	4.2	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.

Cardiovascular Diseases

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}

Chart 3–6
Age-Adjusted Death Rates and Percent Change for All Causes
and Cardiovascular Diseases, U.S., 1972 and 2004

Cause of Death	Deaths/100,000 Pop.		1972–2004 Difference	Percent Change
	1972	2004		
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.

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}

Cardiovascular Diseases

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

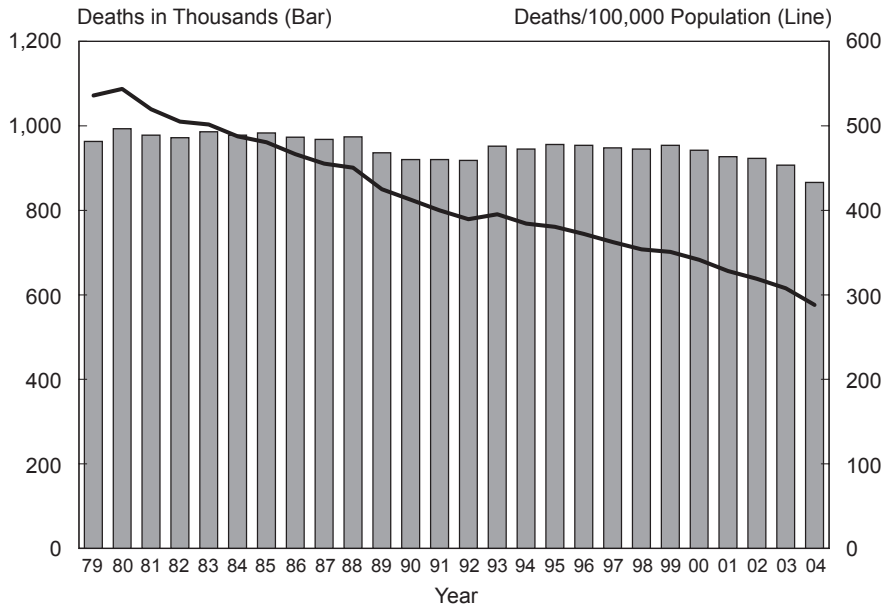
From 1999 to 2004, average annual percent declines in mortality for CVD, CHD, and stroke within sex groups were greater for whites than for blacks. Within racial groups, declines in stroke mortality were greater for males than for females; for CVD mortality, declines were greater for white males than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

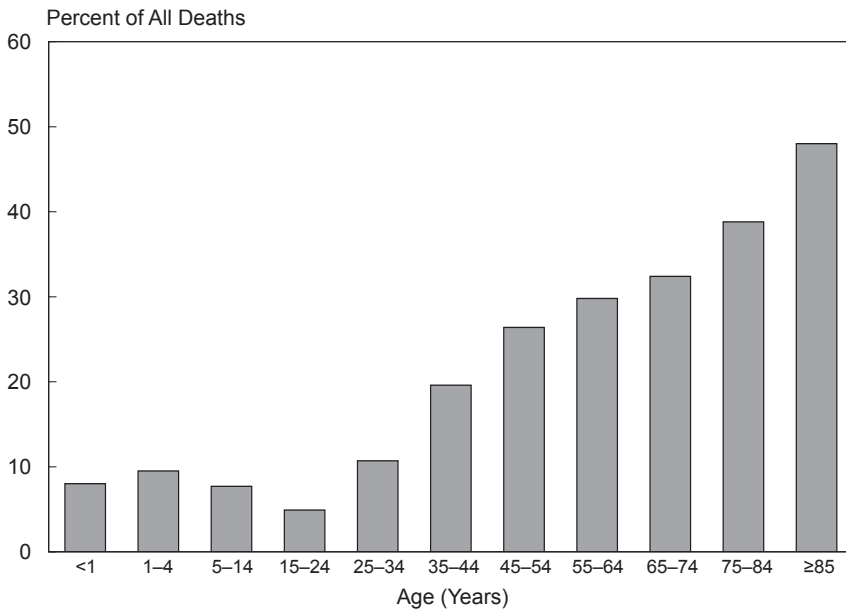
Cardiovascular Diseases

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}

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



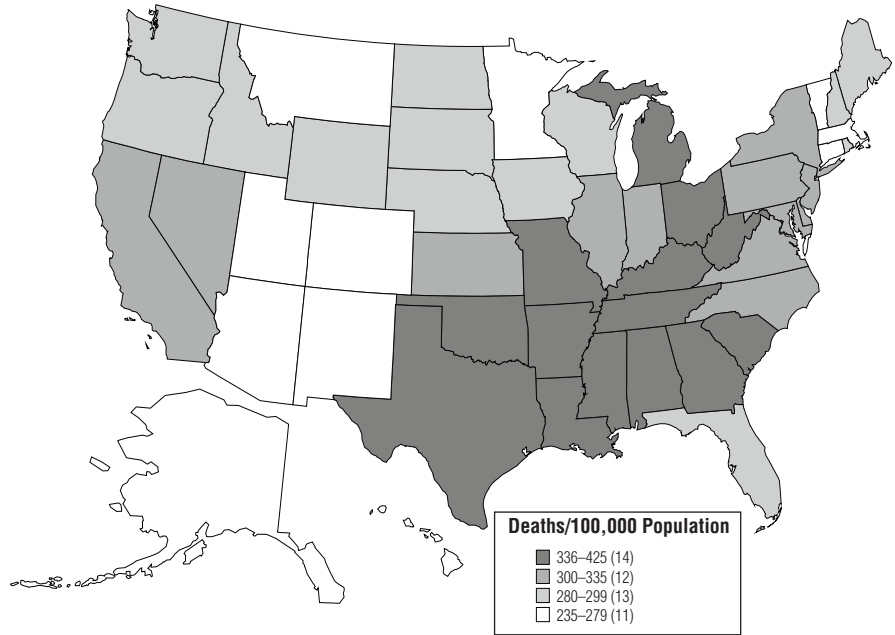
In 2004, the percent of deaths from CVD increased with age among adults: 20% for those aged 35–44 years and 48% for those aged ≥85 years.²⁹

* Includes congenital malformations of the circulatory system.

Cardiovascular Diseases

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

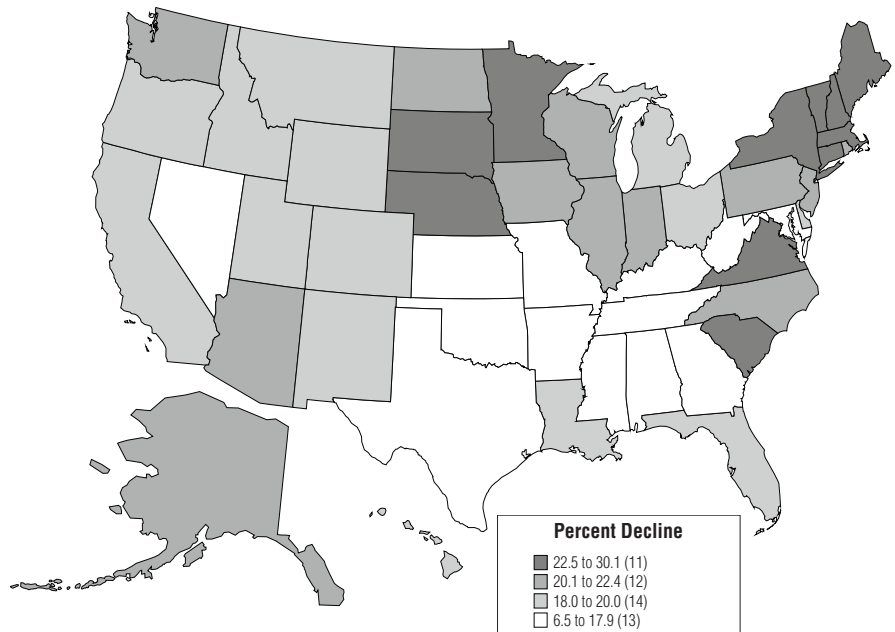
In 2001–2003, CVD mortality was higher in the East than in the West.¹³



* 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

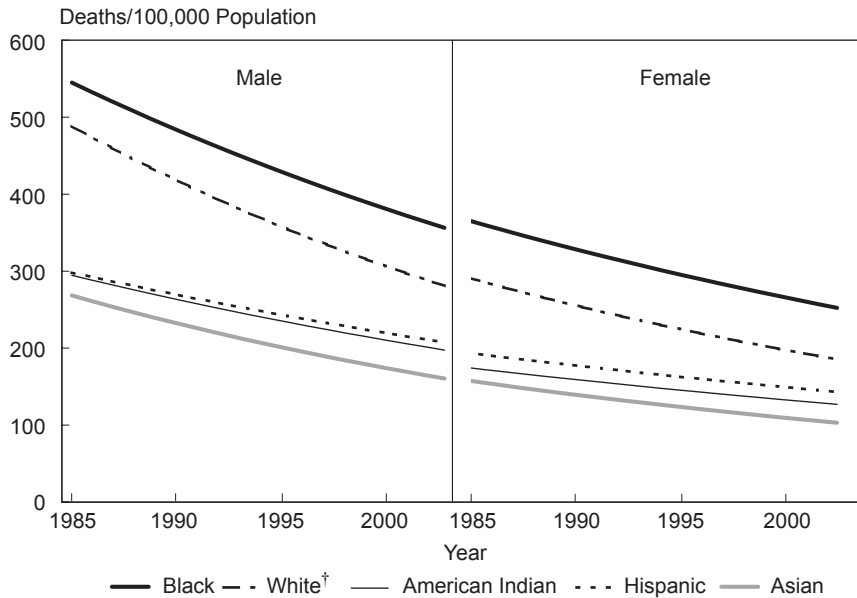
From 1991–1993 to 2001–2003, the smallest average annual percent declines in CVD death rates tended to be in the South.¹³



* Excludes congenital malformations of the circulatory system.

Total Heart Disease

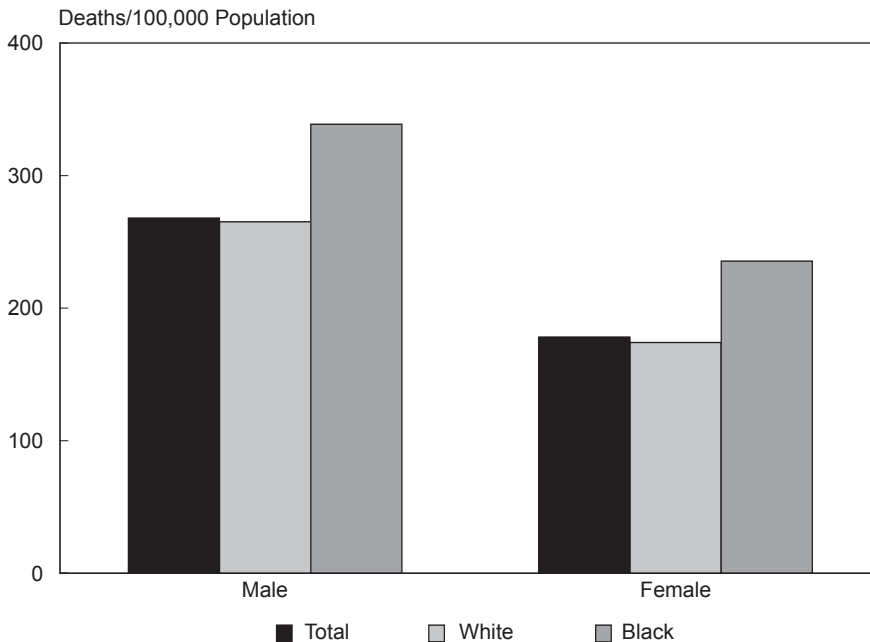
Chart 3-13
Age-Adjusted Death Rates for Heart Disease
by Race/Ethnicity and Sex, U.S., 1985-2004*



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

* 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

Total Heart Disease/Coronary Heart Disease

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

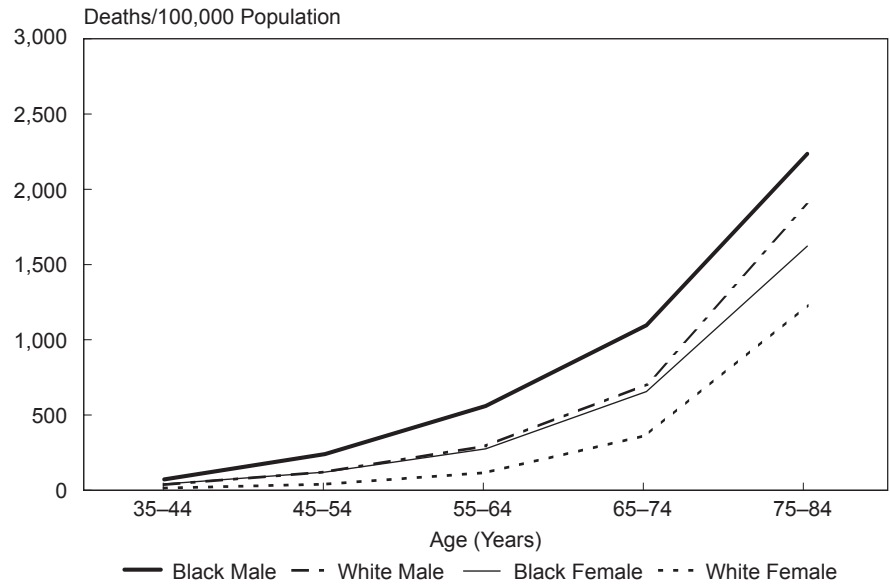
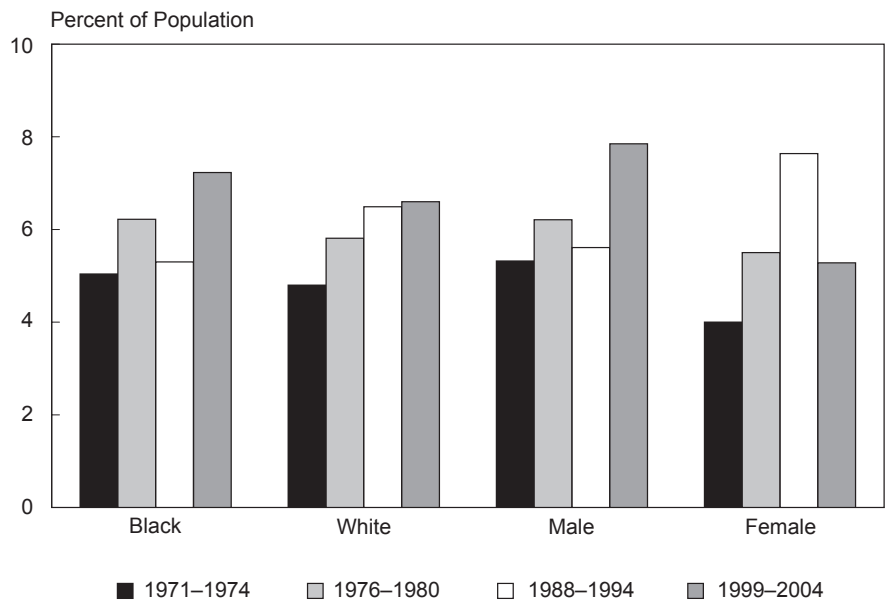


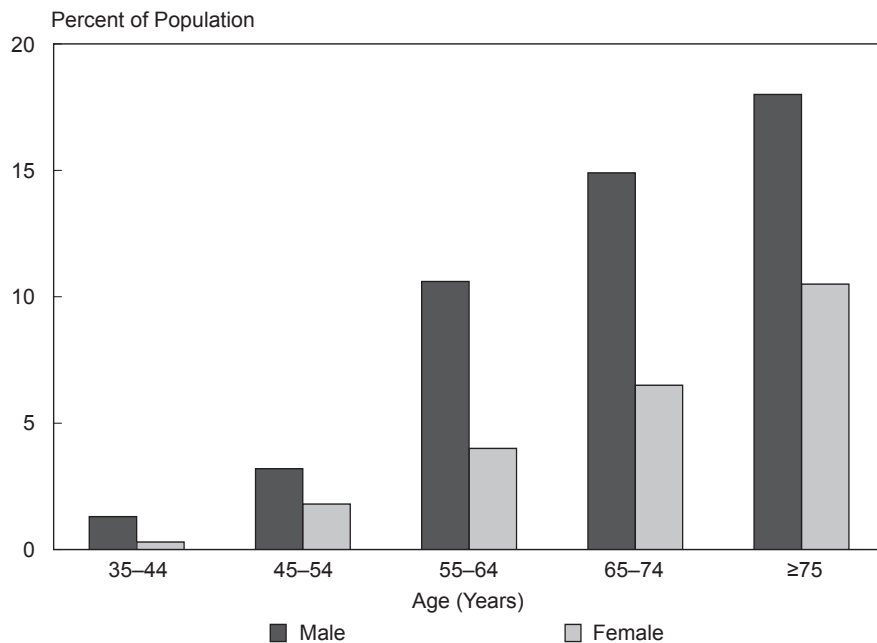
Chart 3-16
Age-Adjusted Prevalence of Coronary Heart Disease by
Race and Sex, Ages 25-74, U.S., 1971-1974 to 1999-2004

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



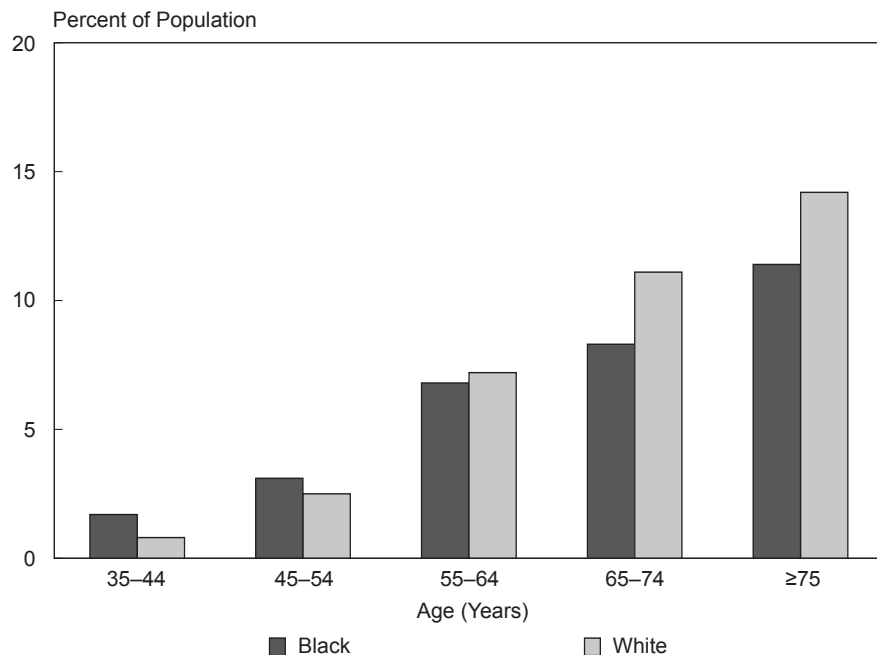
Coronary Heart Disease

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

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

Coronary Heart Disease

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

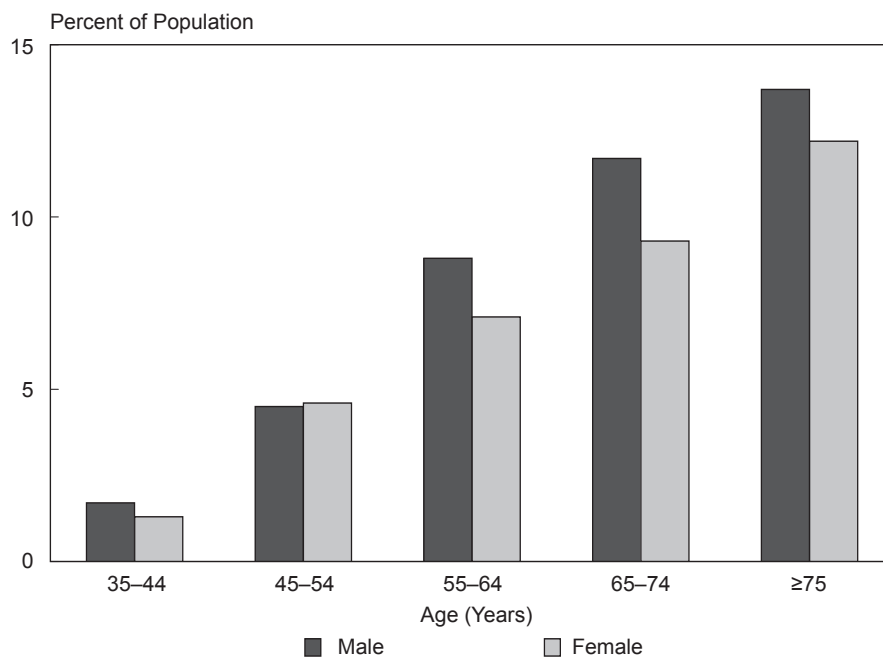
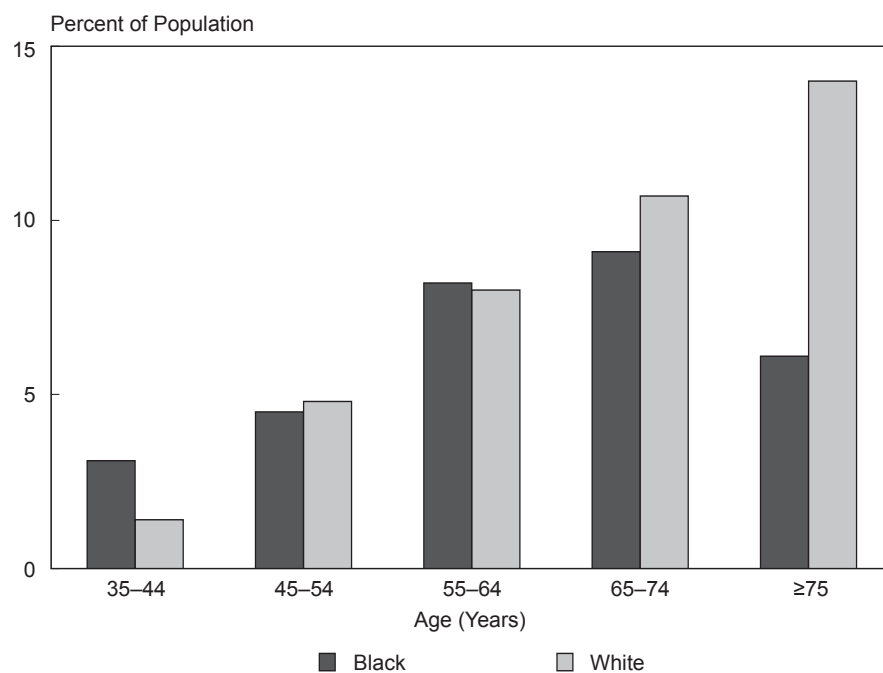


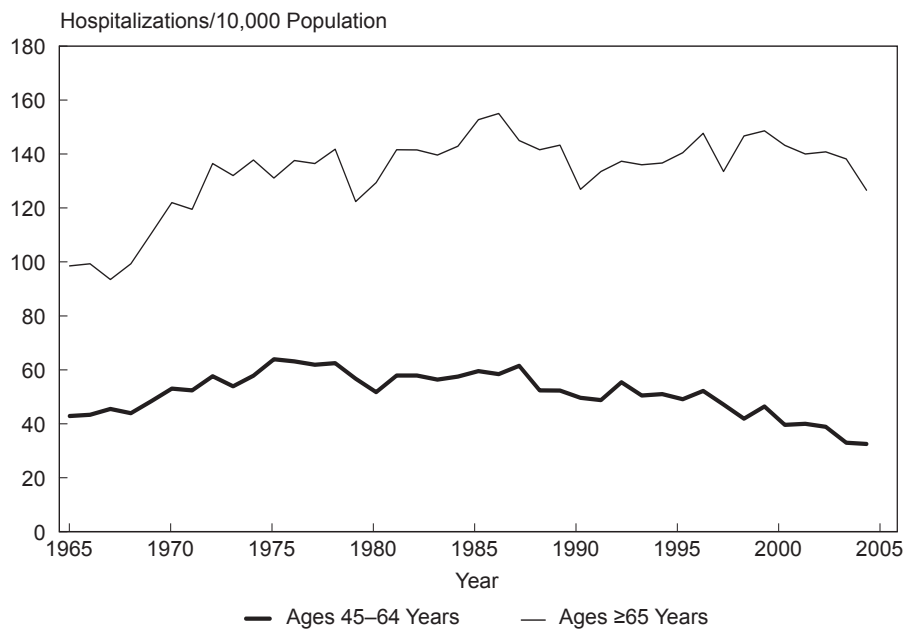
Chart 3–20
Prevalence of Angina Pectoris by Age and Race,
U.S., 1999–2004

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



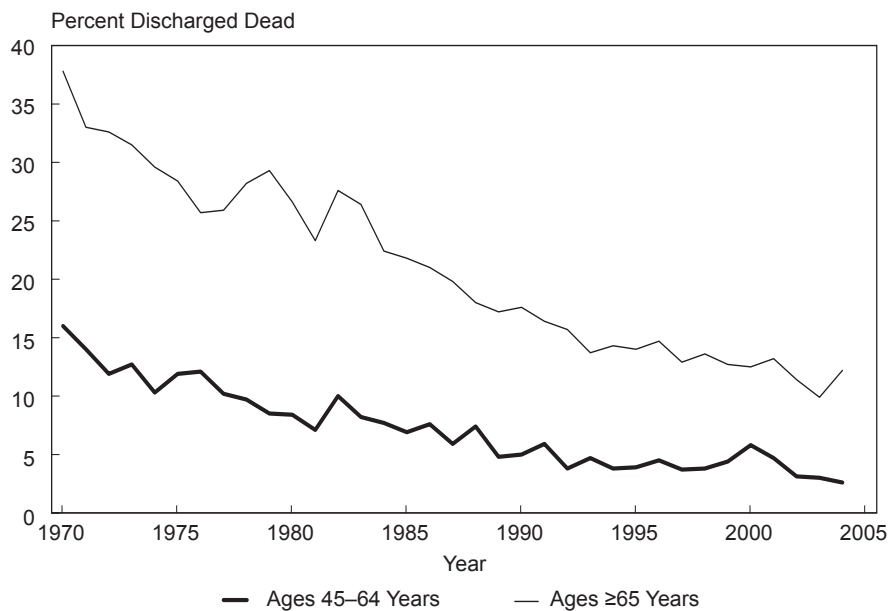
Coronary Heart Disease

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

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

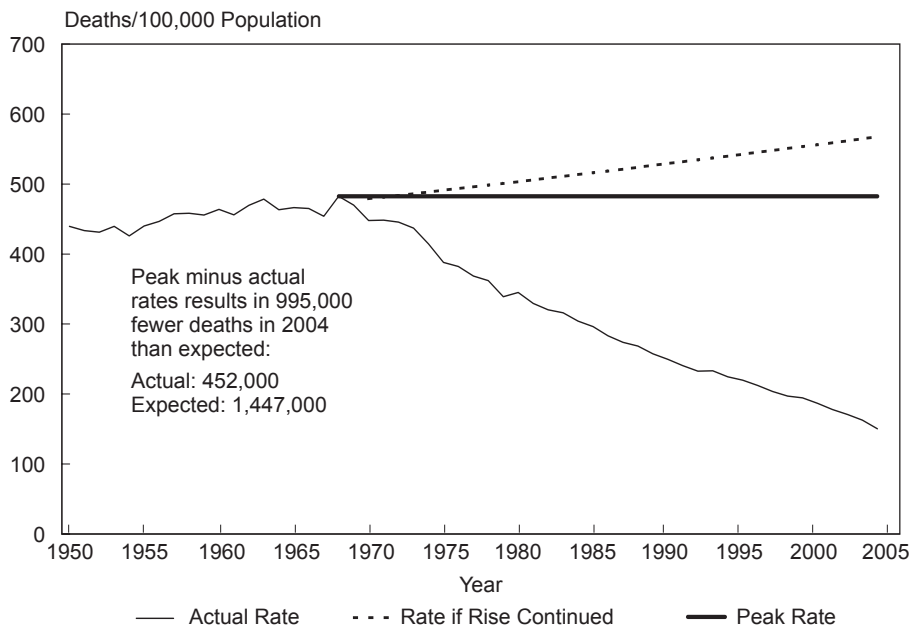


From 1970 to 2004, hospital case-fatality rates for AMI declined substantially for individuals aged 45-64 years and those aged ≥ 65 years.³⁰

Coronary Heart Disease

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

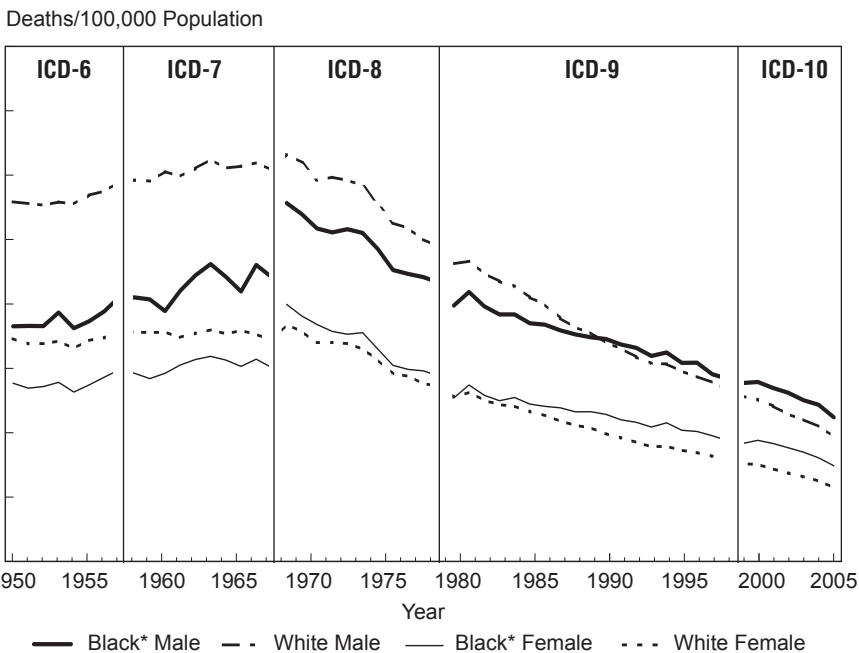
CHD accounted for 452,000 deaths in 2004. It would have accounted for 1,447,000 deaths if the rate had remained at its 1968 peak.^{13, 28, 29}



— Actual Rate - - - Rate if Rise Continued — Peak Rate

Chart 3-24
Age-Adjusted Death Rates for Coronary Heart Disease by Race and Sex, U.S., 1950-2004

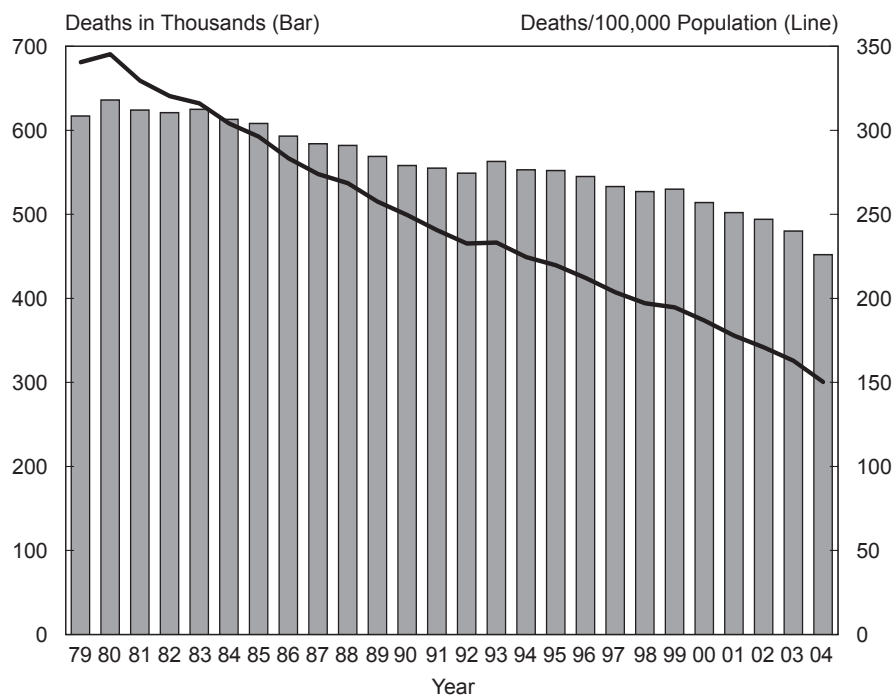
In the 1950s and 1960s, CHD death rates increased for all blacks and for white males but were relatively stable for white females. Since then, CHD death rates have declined appreciably for both racial and sex groups.^{13, 28, 29}



* Nonwhite from 1950 to 1967.

Coronary Heart Disease

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}

Chart 3–26
Average Annual Percent Change in Age-Adjusted Death Rates for
Coronary Heart Disease by Race and Sex, U.S., 1950–2004

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

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

* Nonwhite from 1950 to 1967.

Coronary Heart Disease

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

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

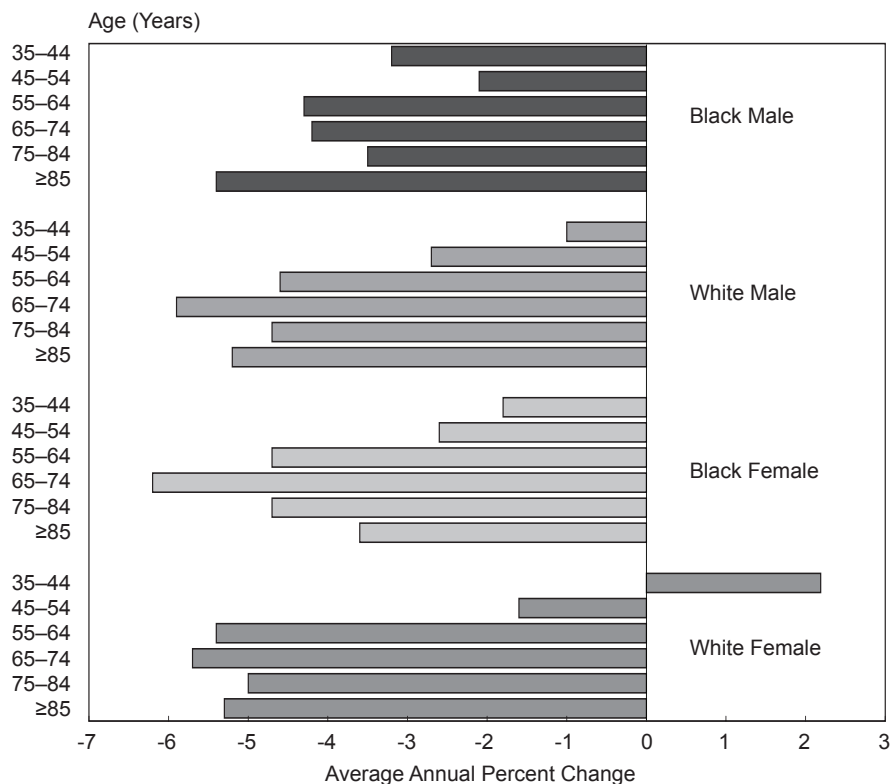
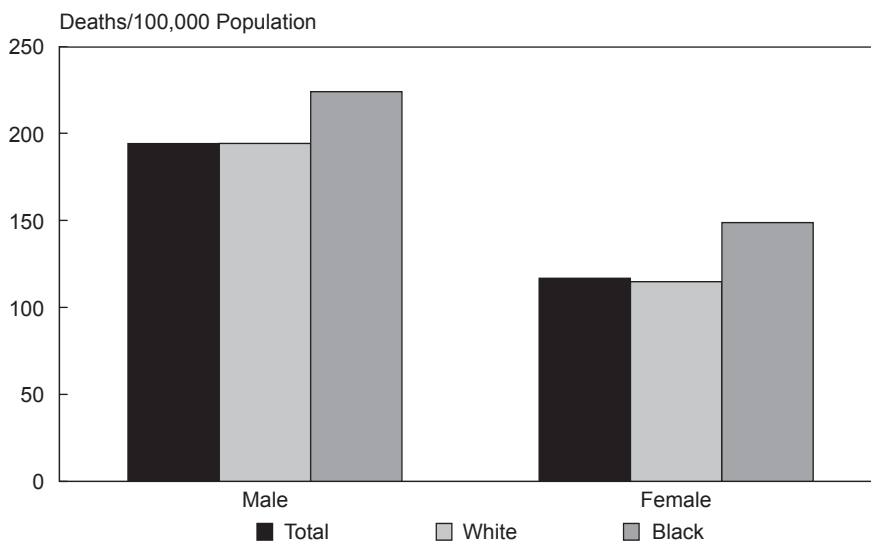


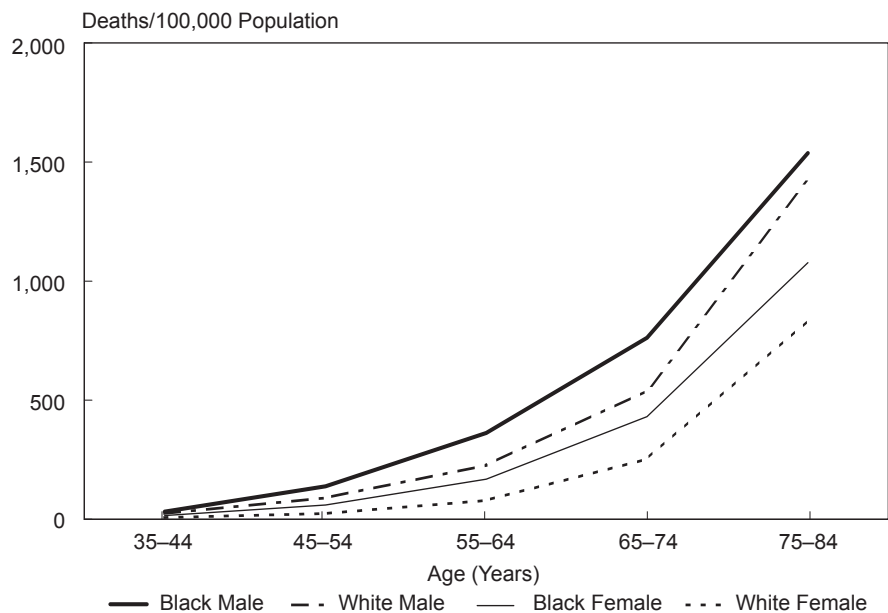
Chart 3-28
Age-Adjusted Death Rates for Coronary Heart Disease by Race and Sex, U.S., 2004

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



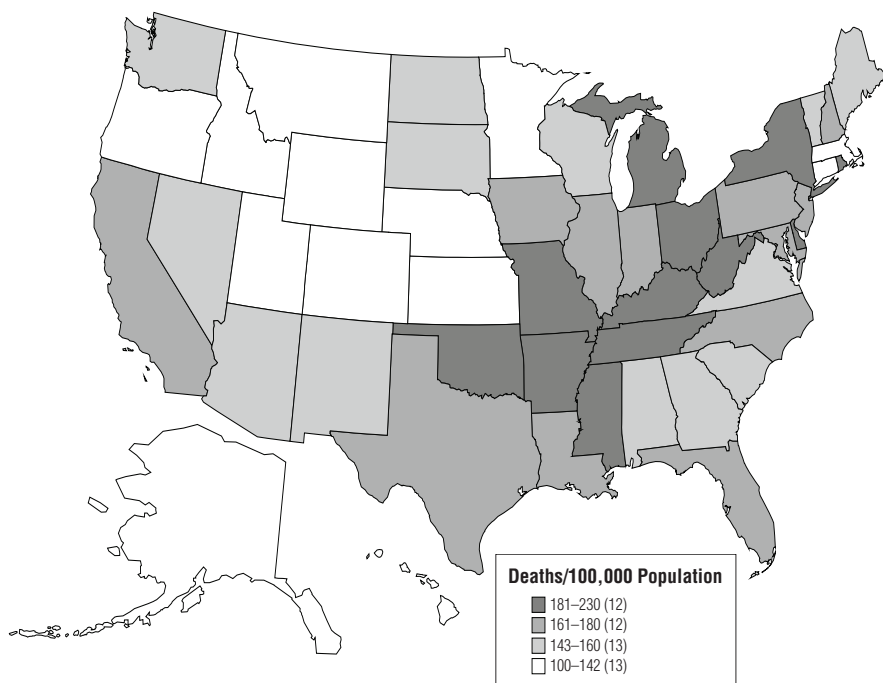
Coronary Heart Disease

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

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

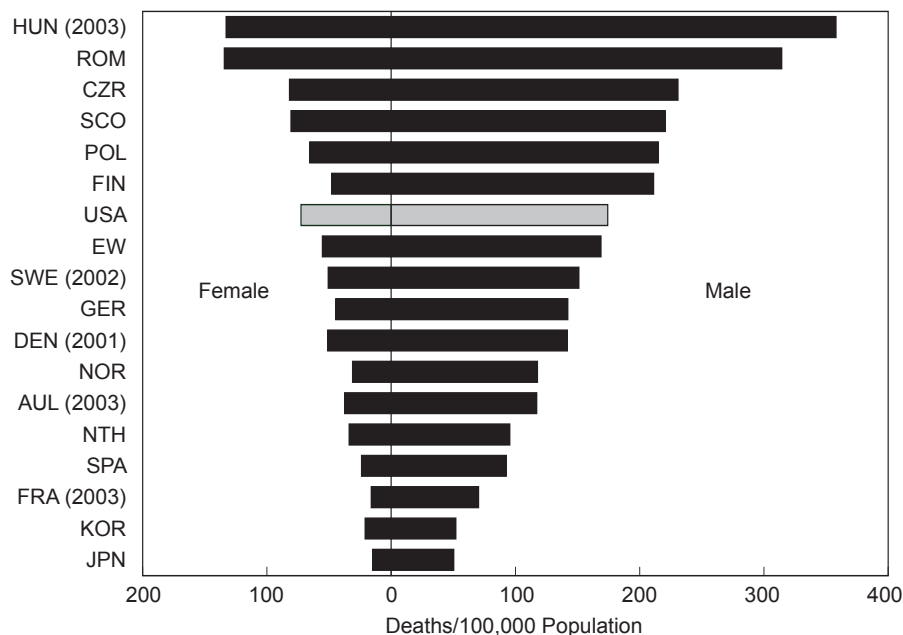


In 2001–2003, a narrow band of states from New York through Appalachia to Oklahoma had high CHD death rates. Many Western and Mountain states had low rates.¹³

Coronary Heart Disease

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

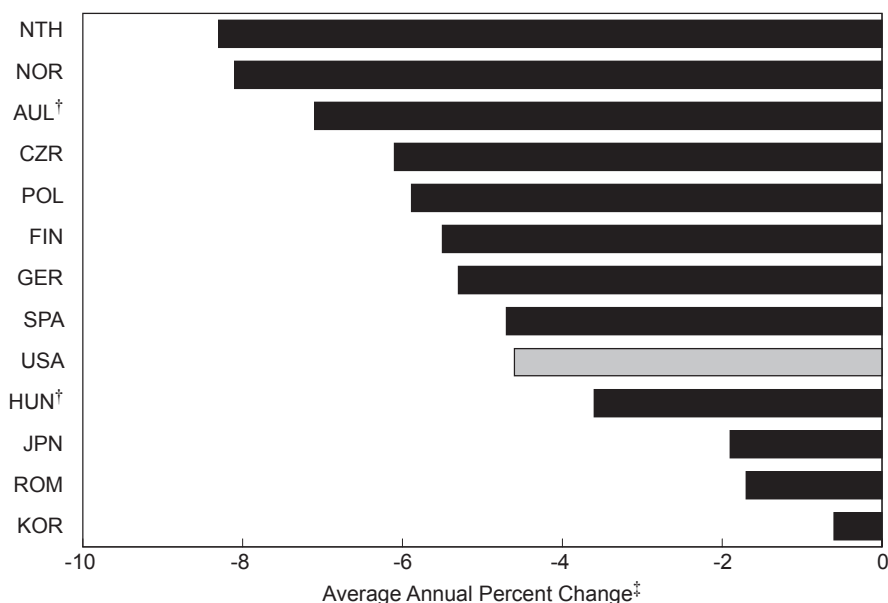
Chart 3–31
Age-Adjusted Death Rates* for Coronary Heart Disease by Country and Sex, Ages 35–74, 2004[†]



* Age adjusted to European standard.
[†] Data for 2004 unless otherwise noted in parentheses.

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

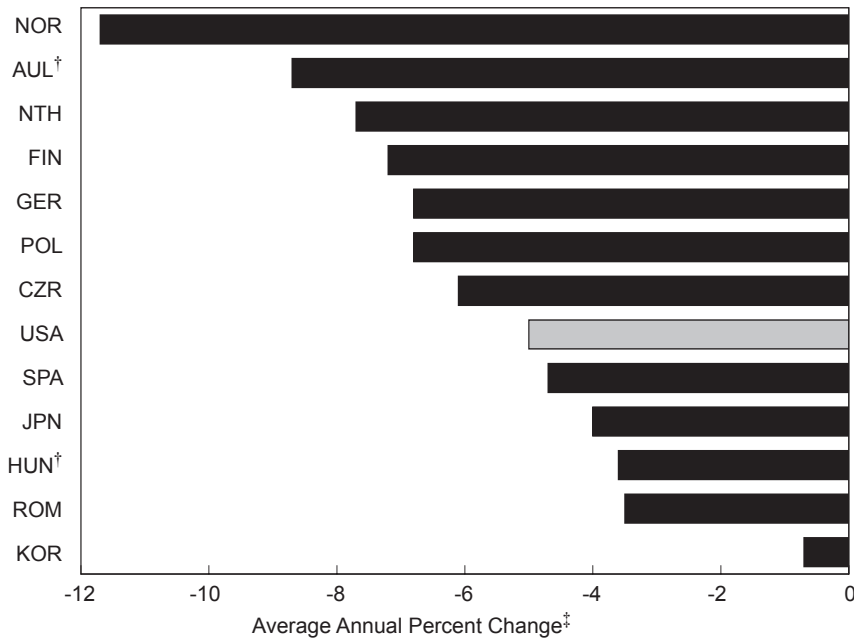
Chart 3–32
Change in Age-Adjusted Death Rates* for Coronary Heart Disease in Males by Country, Ages 35–74, 1999–2004



* Age adjusted to European standard.
[†] Data for 1998–2003.
[‡] Based on a log linear regression of the actual rates.

Coronary Heart Disease/Heart Failure

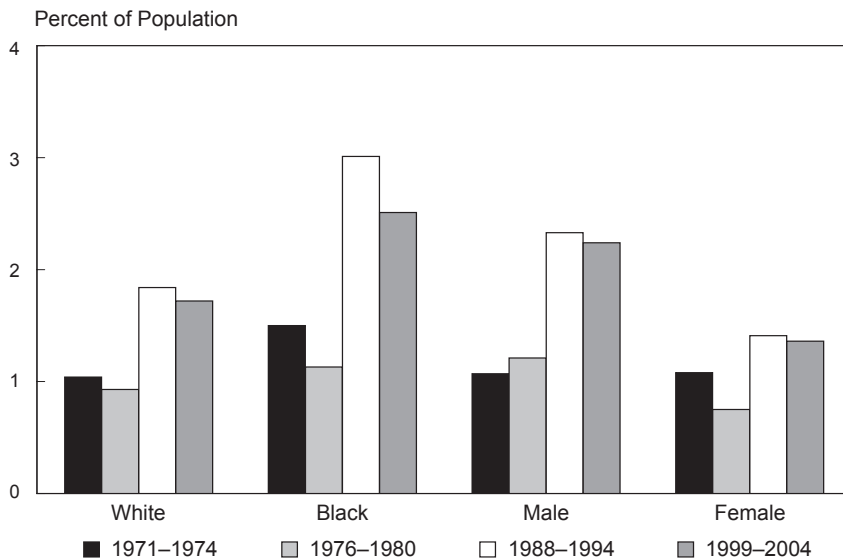
Chart 3-33
Change in Age-Adjusted Death Rates* for Coronary Heart Disease in Females by Country, Ages 35-74, 1999-2004



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

* 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

Congestive Heart Failure

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

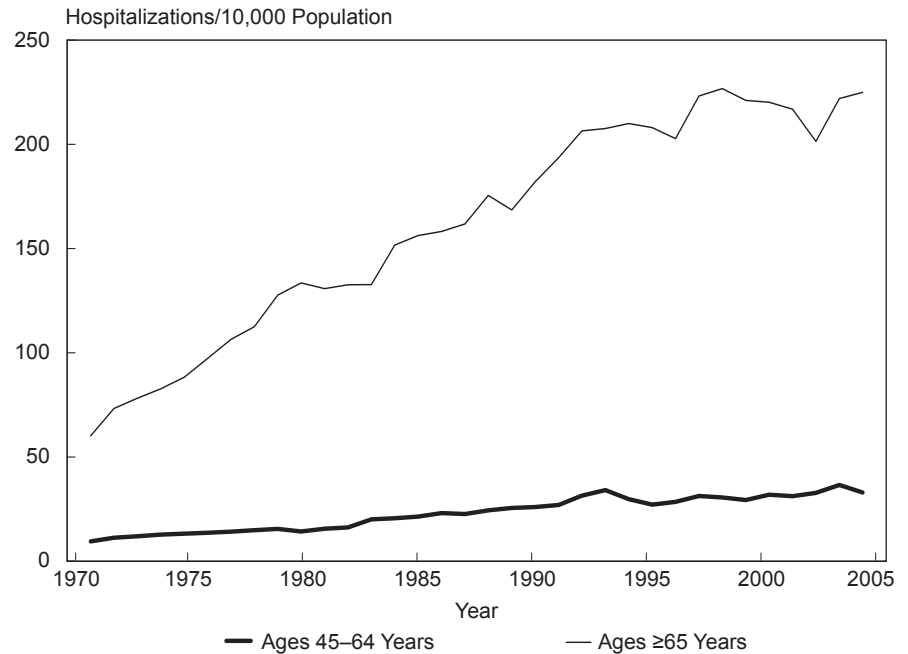
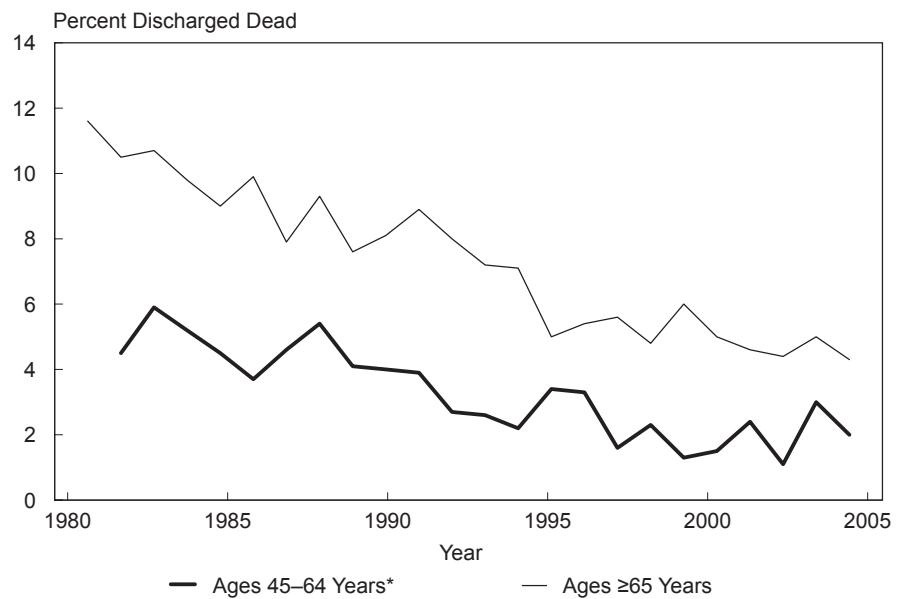


Chart 3-36
Hospital Case-Fatality Rates for Congestive Heart Failure,
Ages 45-64 and 65 and Over, U.S., 1981-2004

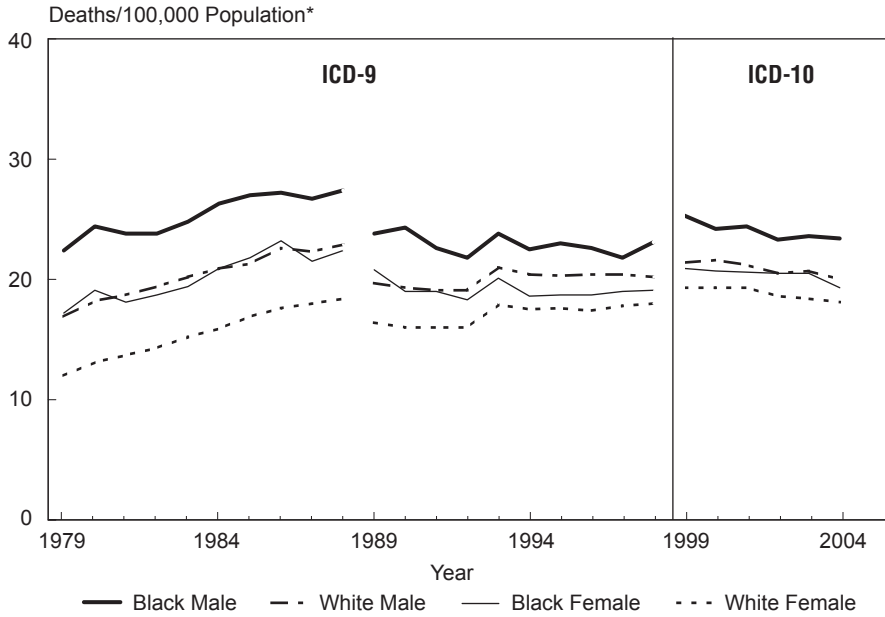
The percent of congestive heart failure hospital discharges that were discharged dead declined appreciably from 1981 to 2004 for individuals aged 45-64 years and those aged ≥ 65 years.³⁰



* Unreliable estimate for 1981.

Heart Failure

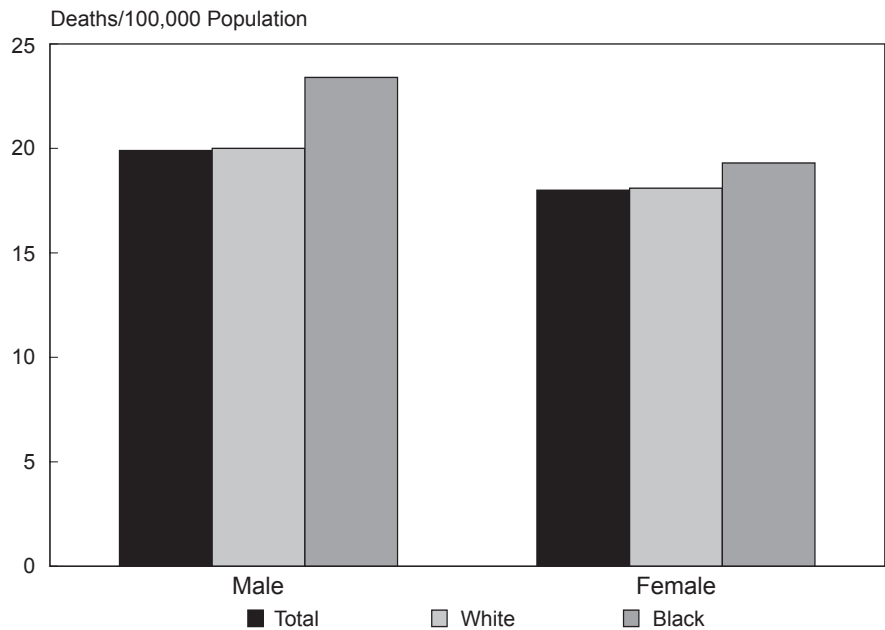
Chart 3-37
Age-Adjusted Death Rates for Heart Failure
by Race and Sex, U.S., 1979-2004



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}

* 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

Heart Failure

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

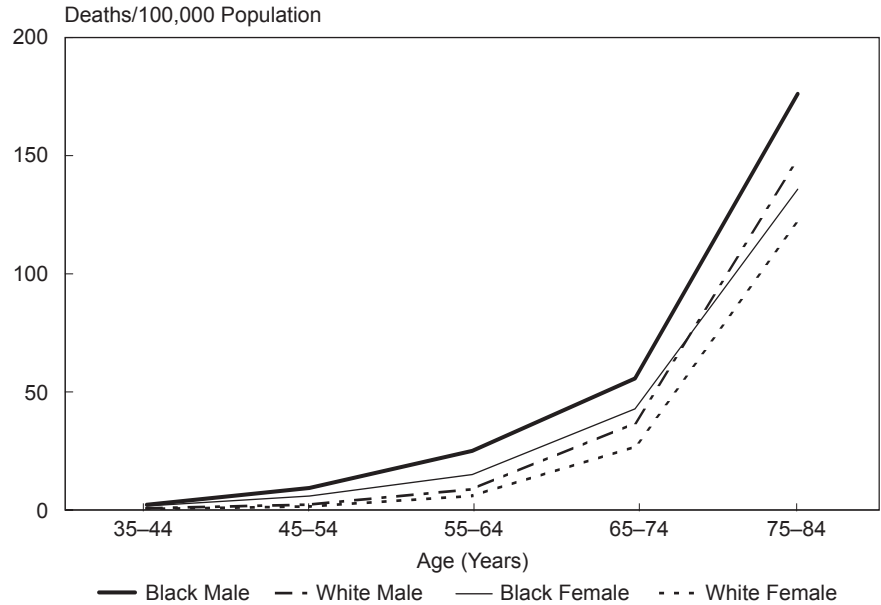
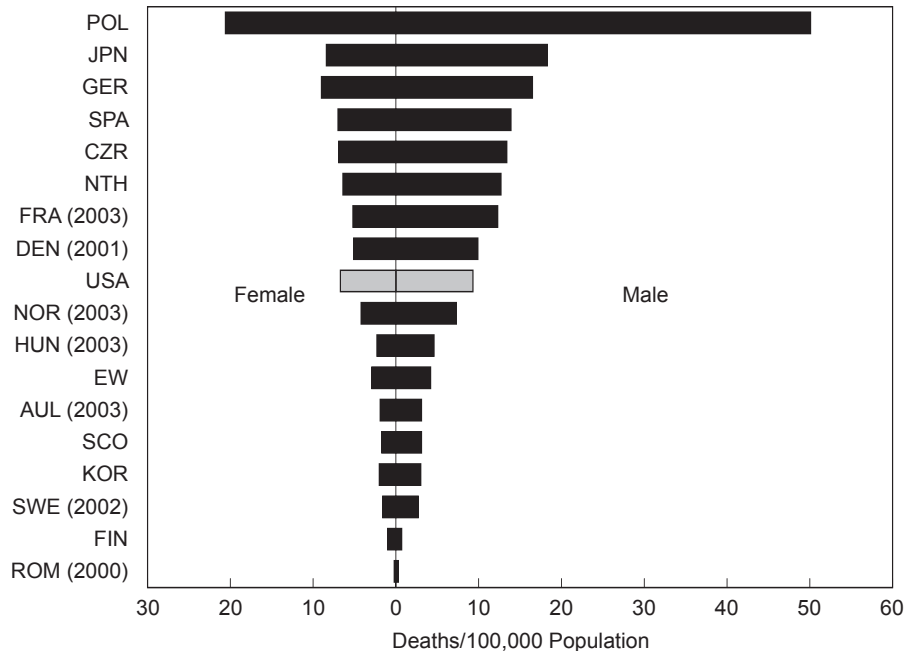


Chart 3–40
Age-Adjusted Death Rates* for Heart Failure
by Country and Sex, Ages 35–74, 2004†

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

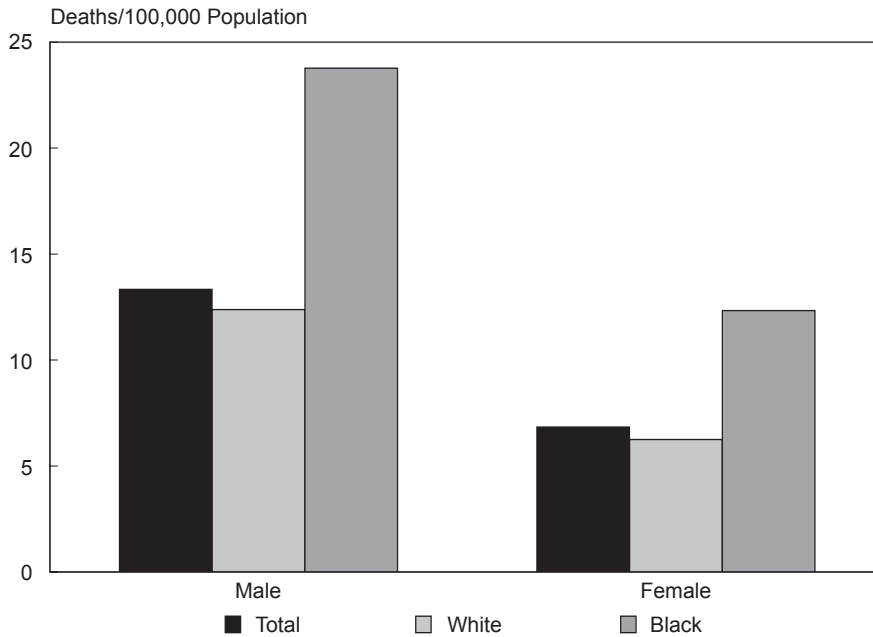


* Age adjusted to European standard.

† Data for 2004 unless otherwise noted in parentheses.

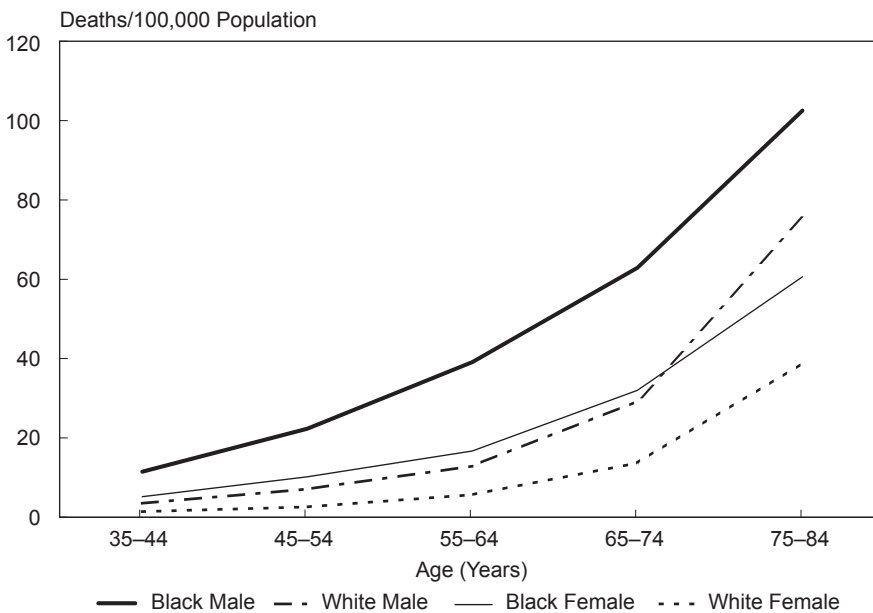
Cardiomyopathy

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

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

Atrial Fibrillation

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

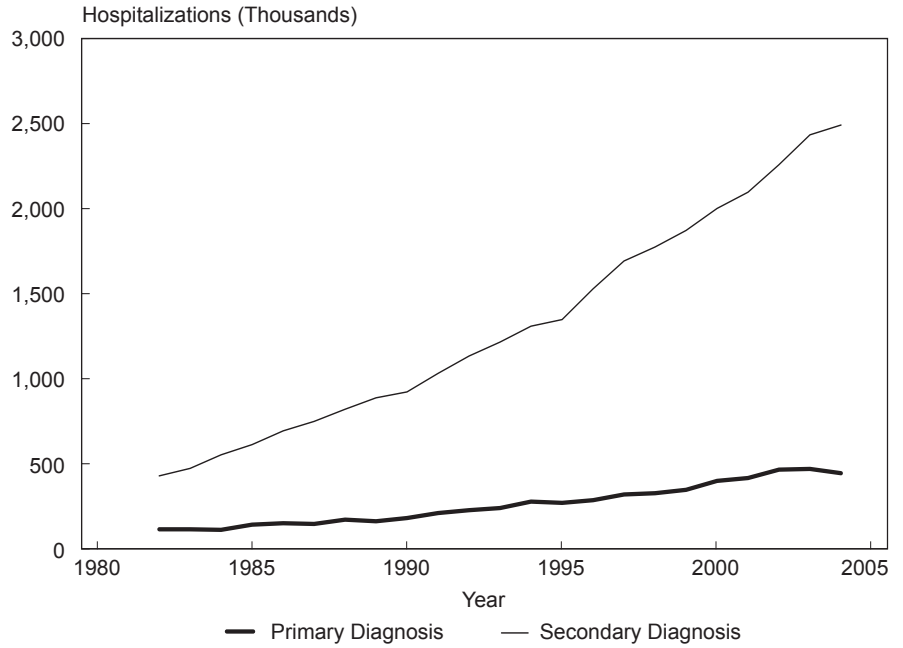
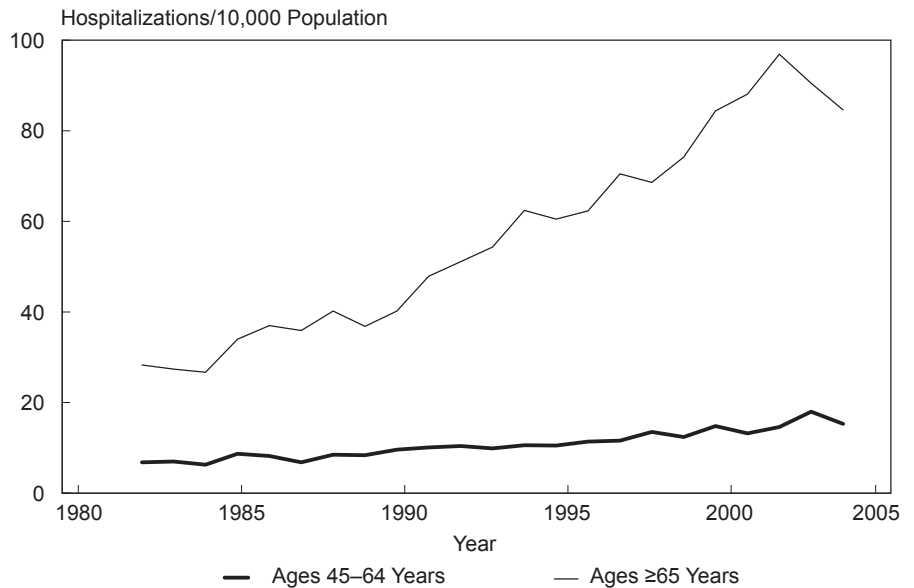


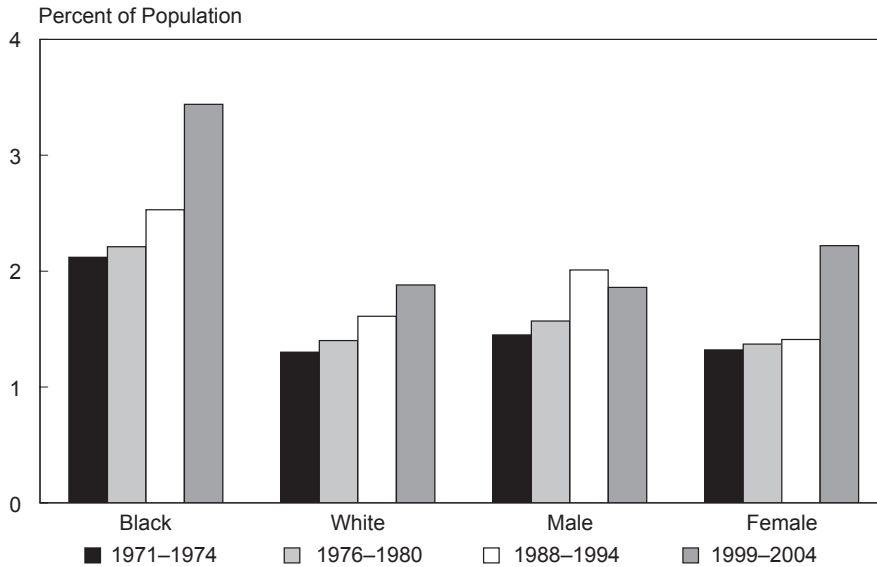
Chart 3-44
Hospitalization Rates for Atrial Fibrillation by Age, U.S., 1982-2004

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



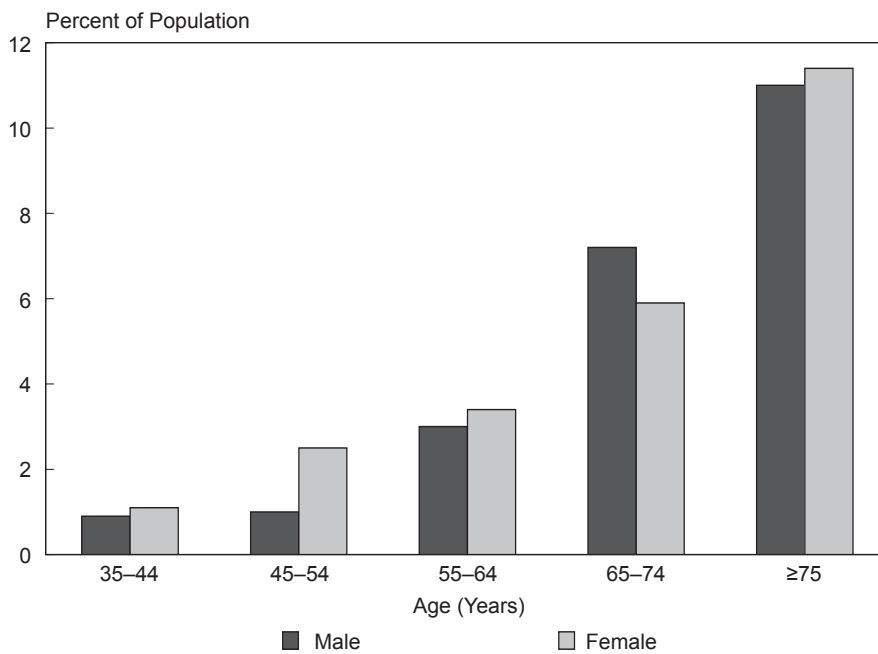
Cerebrovascular Diseases (Stroke)

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

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

Cerebrovascular Diseases (Stroke)

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

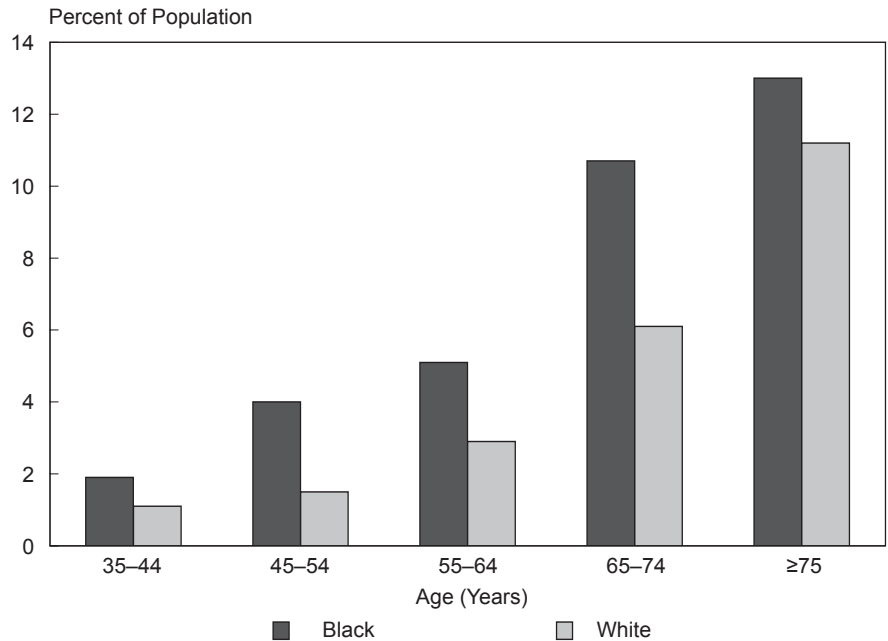
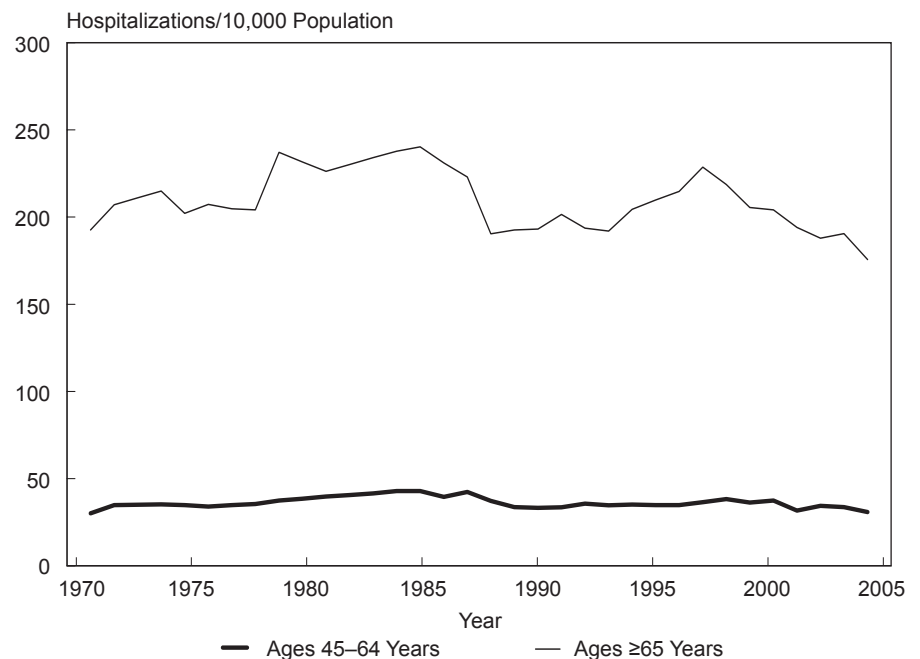


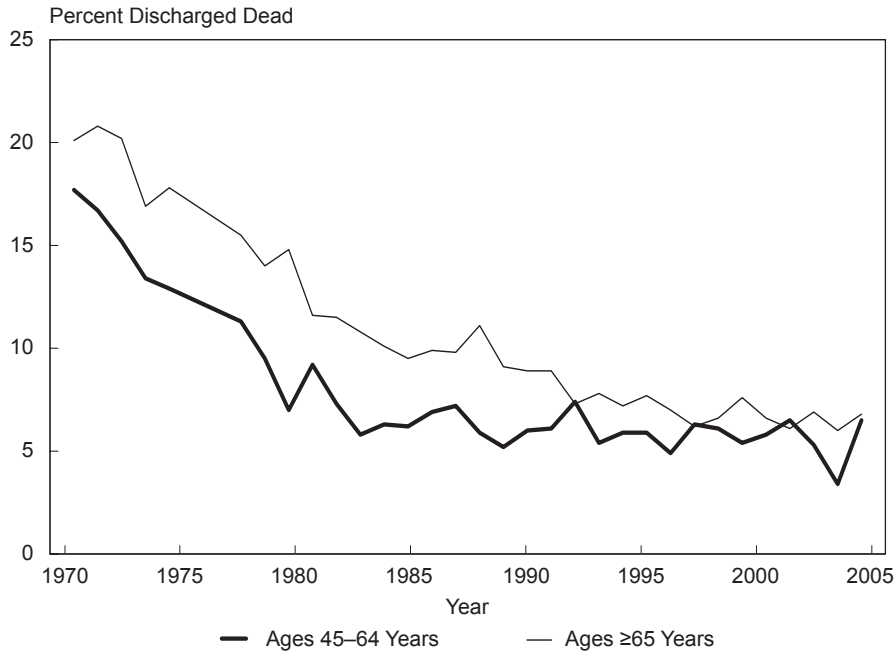
Chart 3-48
Hospitalization Rates for Stroke,
Ages 45–64 and 65 and Over, U.S., 1971–2004

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



Cerebrovascular Diseases (Stroke)

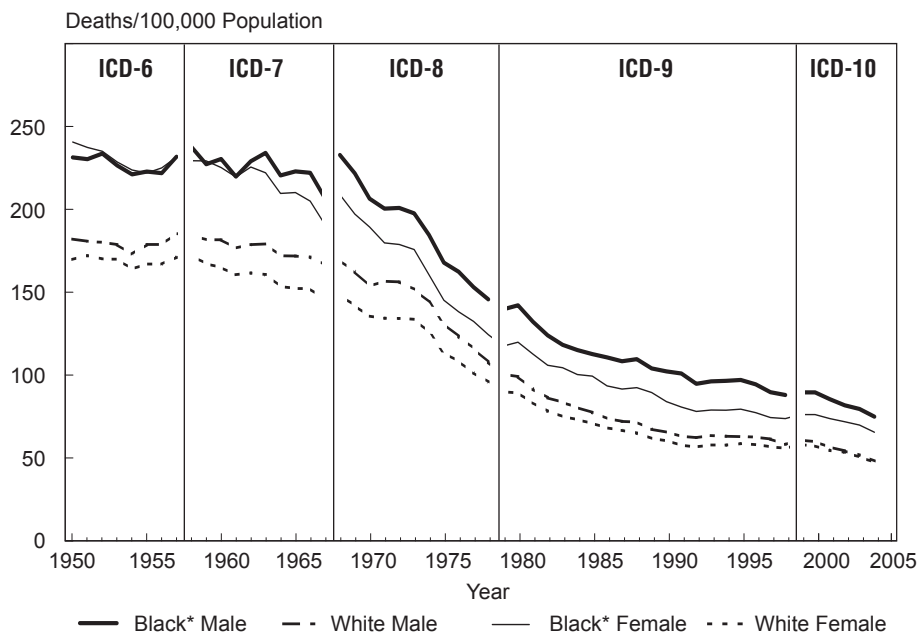
Chart 3-49
Hospital Case-Fatality Rate for Stroke,
Ages 45-64 and 65 and Over, U.S., 1971-2004*



* Estimates are not available for 1976 and 1977.

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

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



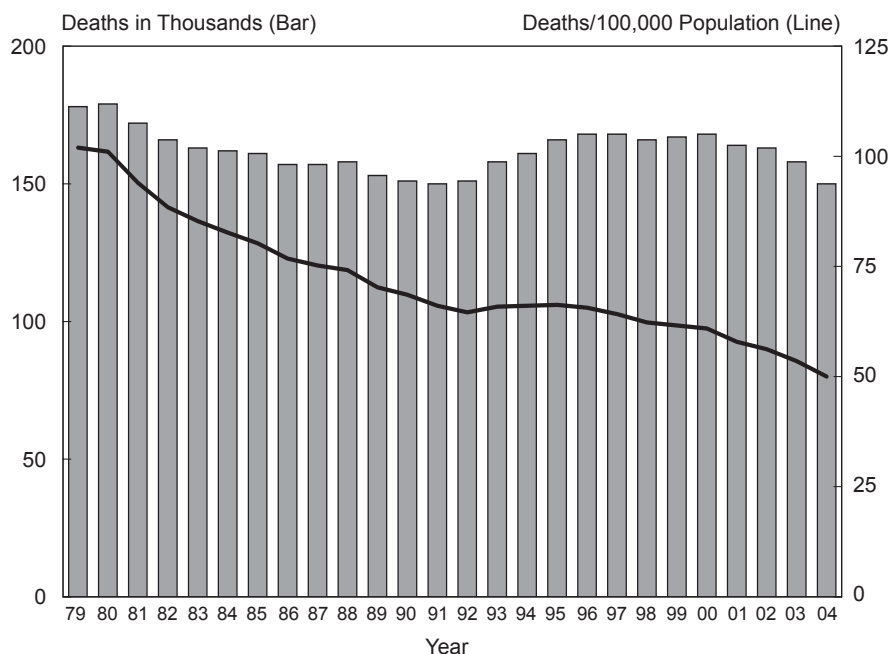
* Nonwhite from 1950 to 1967.

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}

Cerebrovascular Diseases (Stroke)

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

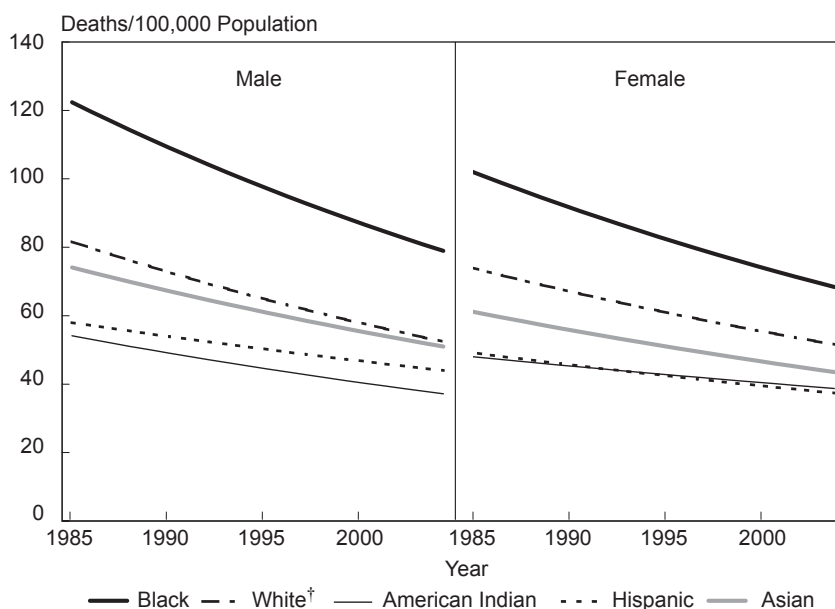
From 1979 to the early 1990s, the number of deaths and age-adjusted death rates for stroke declined. The number of deaths remained relatively stable after the early 1990s until they declined again from 2000 to 2004. The age-adjusted death rates were stable during the early 1990s and then declined from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



* 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



* 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.

Cerebrovascular Diseases (Stroke)

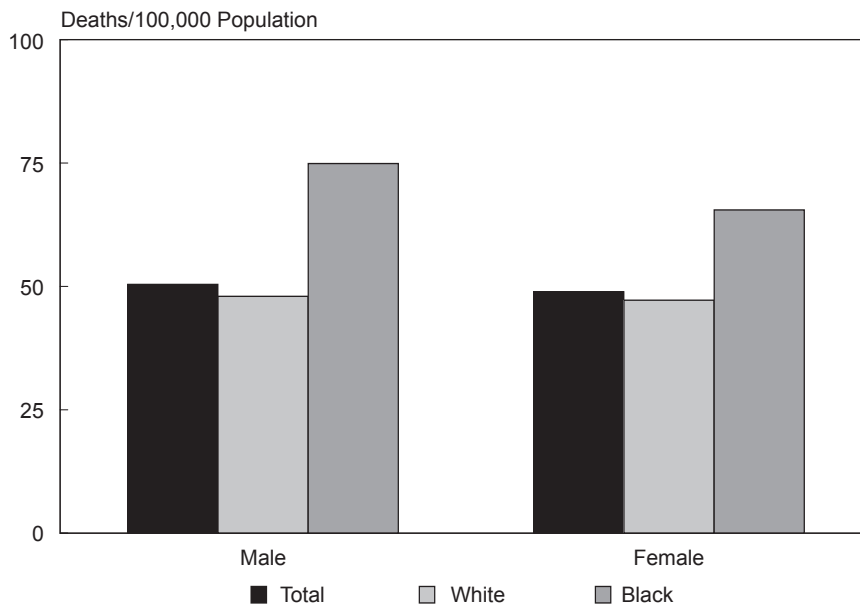
Chart 3–53
Average Annual Percent Change in Age-Adjusted Death Rates for Stroke by Race and Sex, U.S., 1960–2004

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.

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}

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

Cerebrovascular Diseases (Stroke)

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

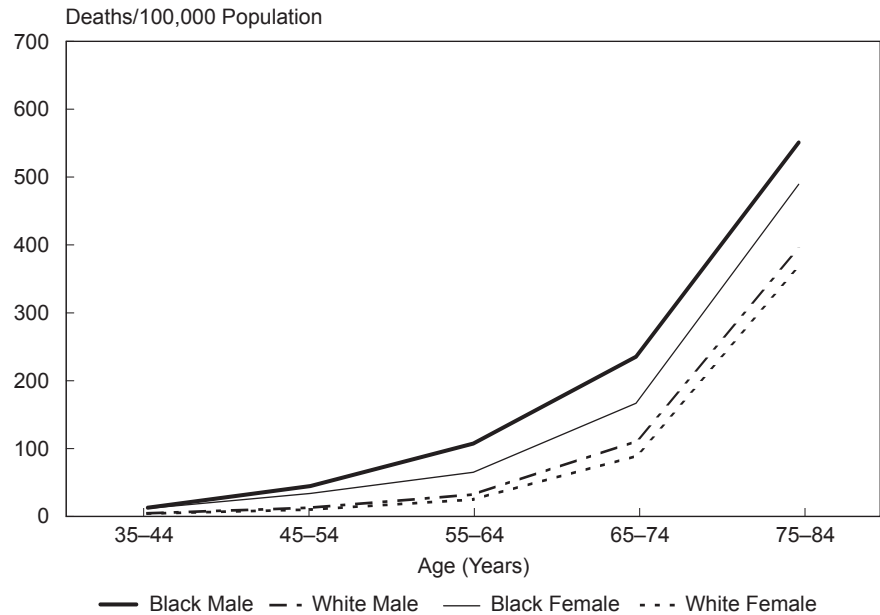
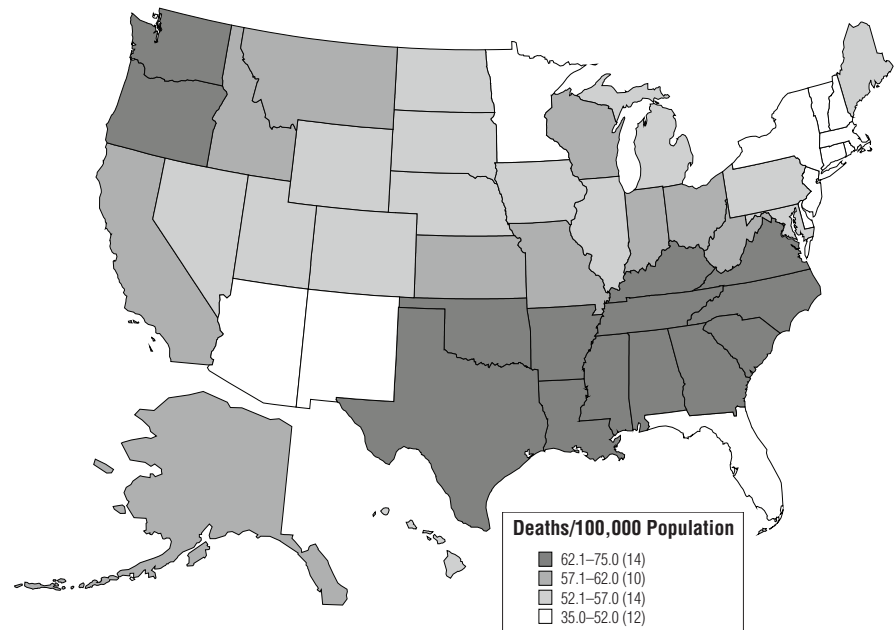


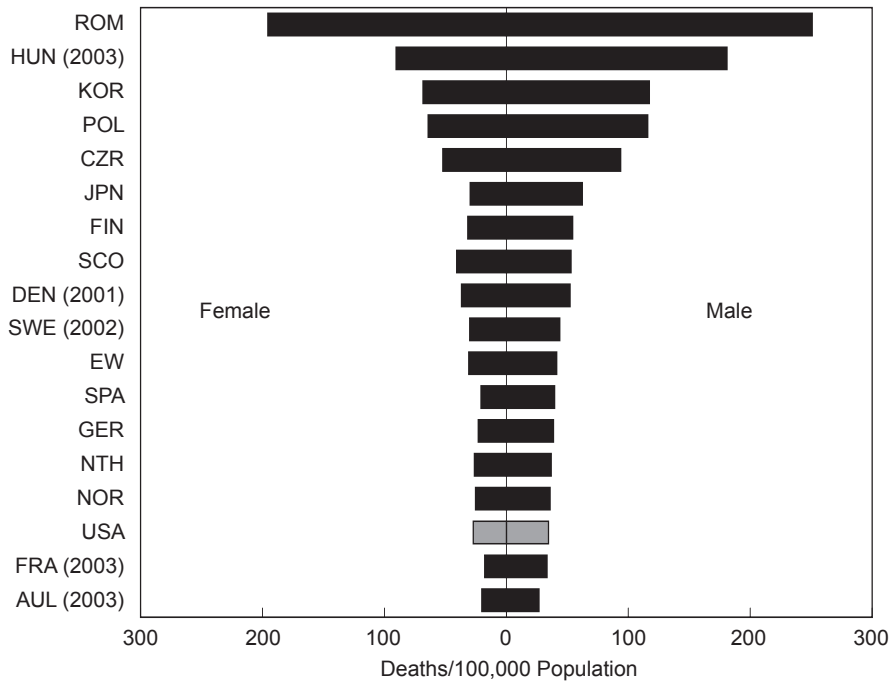
Chart 3–56
Age-Adjusted Death Rates for Stroke by State, U.S., 2001–2003

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



Cerebrovascular Diseases (Stroke)

Chart 3-57
Age-Adjusted Death Rates* for Stroke by
Country and Sex, Ages 35-74, 2004†

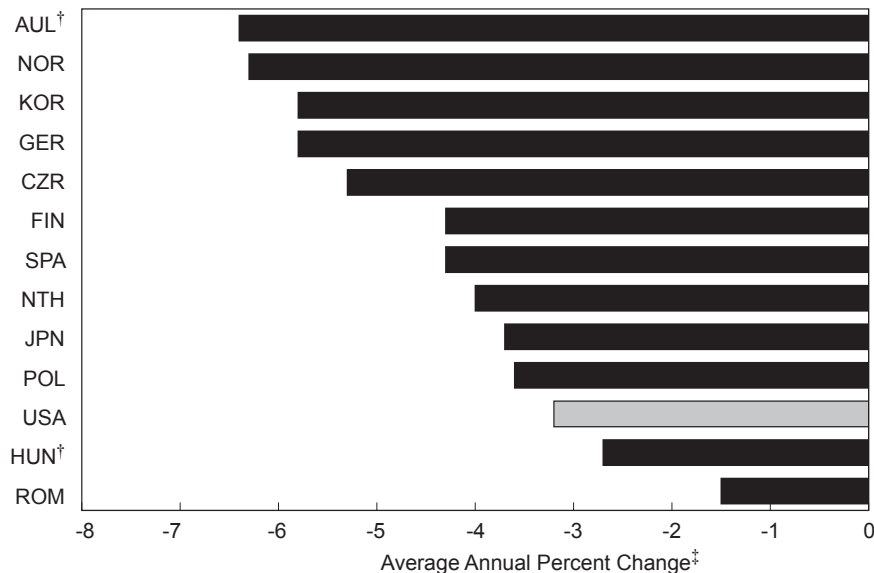


In 2004, among 18 industrialized countries, the United States had one of the lowest death rates for stroke. Eastern European countries had markedly higher rates compared with other countries.³⁹

* 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

* Age adjusted to European standard.

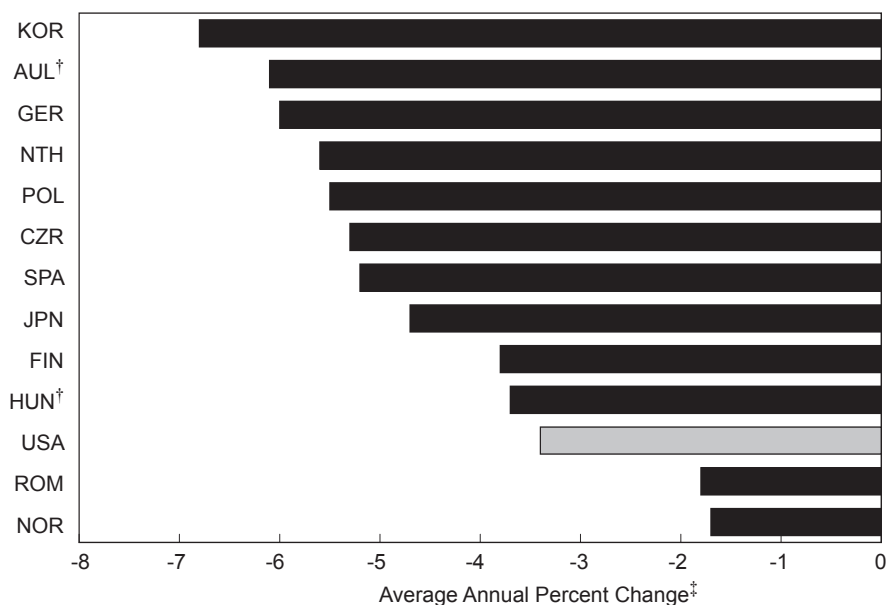
† Data for 1998-2003.

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

Cerebrovascular Diseases (Stroke)/Hypertension

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



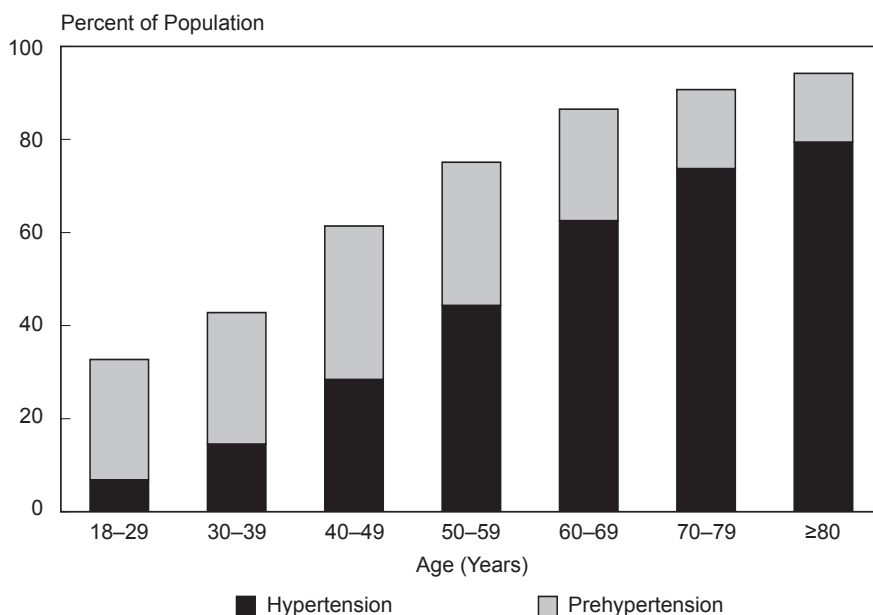
* Age adjusted to European standard.

[†] 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

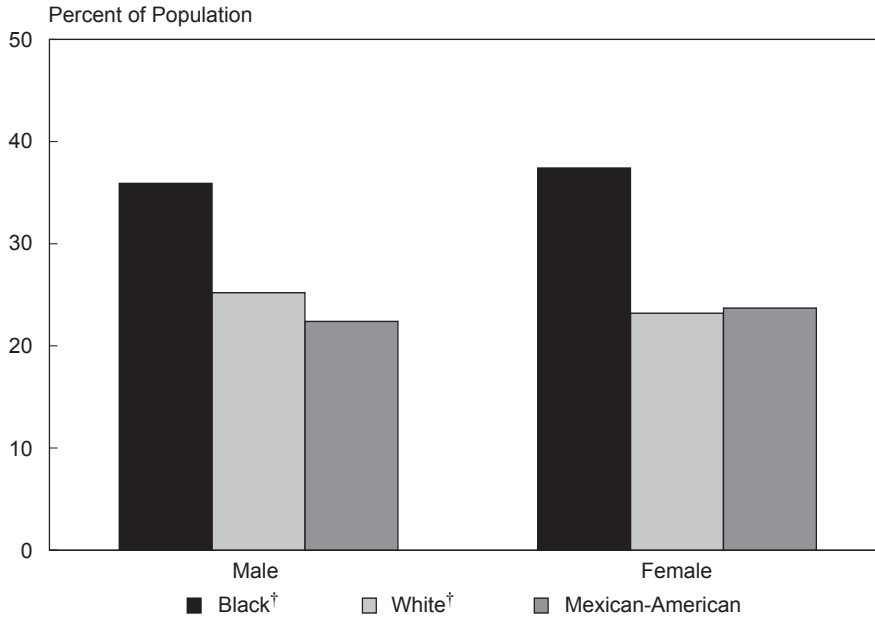


* Hypertension is defined as systolic BP ≥ 140 mmHg, or diastolic BP ≥ 90 , or on medication.

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

Hypertension

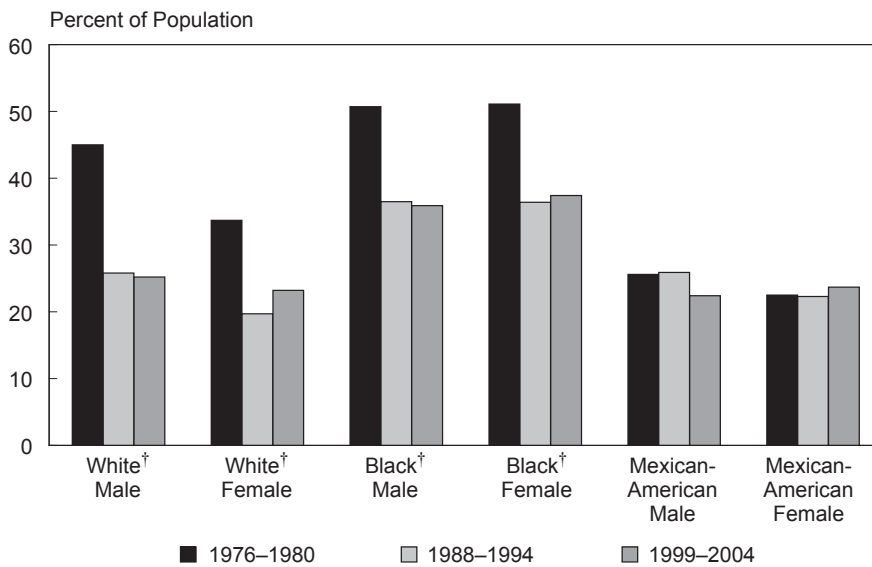
Chart 3–61
Prevalence of Hypertension* by Race/Ethnicity and Sex,
Ages 20–74, U.S., 1999–2004



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

* 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

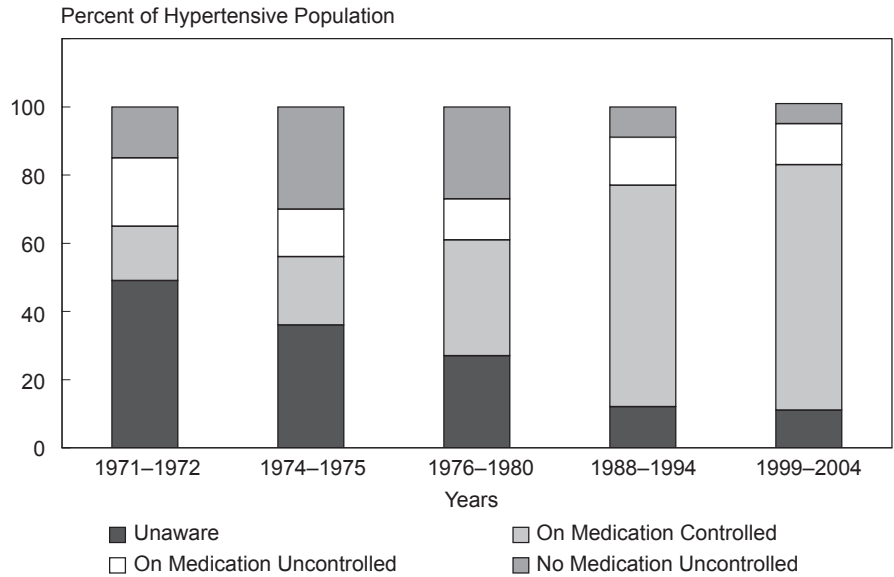
* Hypertension is defined as systolic BP \geq 140 mmHg, or diastolic BP \geq 90, or on medication.
 † Non-Hispanic.

Hypertension

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

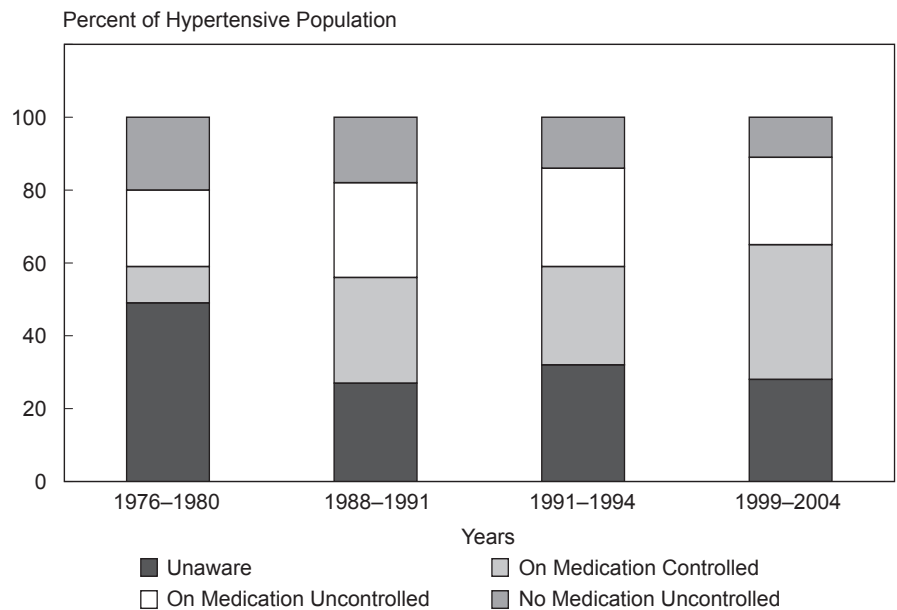


* Hypertension is defined as systolic BP ≥ 160 mmHg, or diastolic BP ≥ 95 , or on medication.

Chart 3-64

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

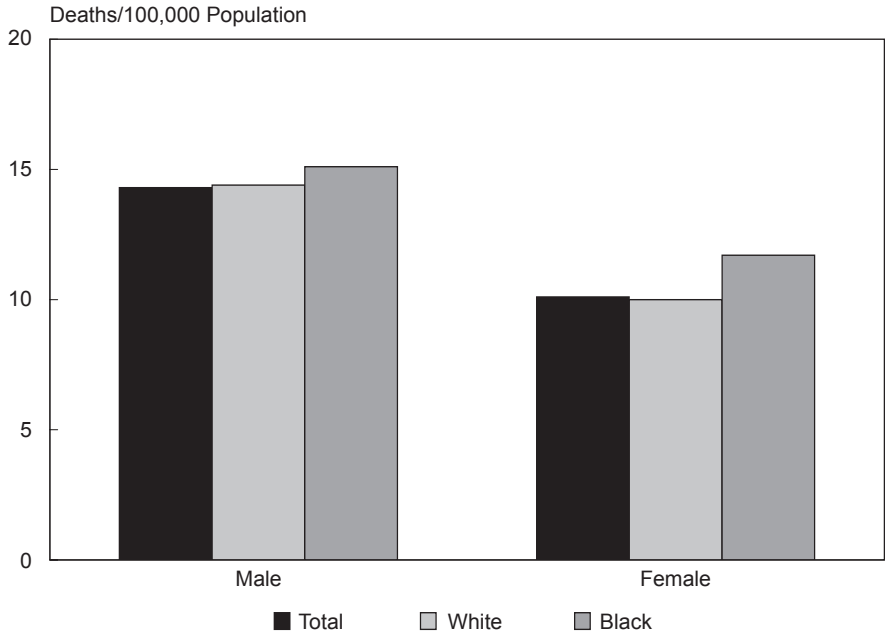
In 1999-2004, 72% of hypertensive individuals were aware of their condition, 61% were on treatment for it, and 37% had it controlled. Those percentages were appreciably greater than the comparable figures (51%, 31%, and 10%, respectively) in 1976-1980.¹⁵



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

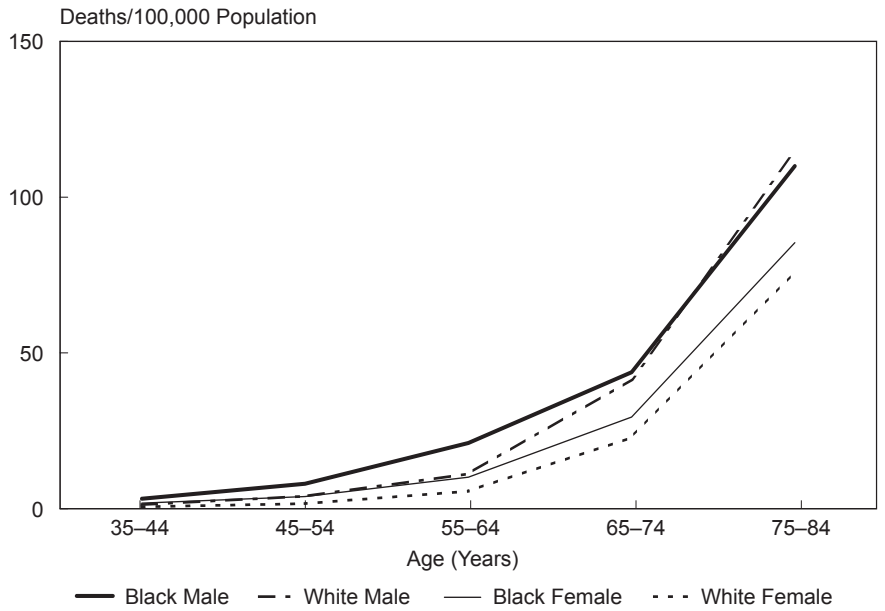
Diseases of Arteries

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.

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

Congenital Malformations of the Circulatory System

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}

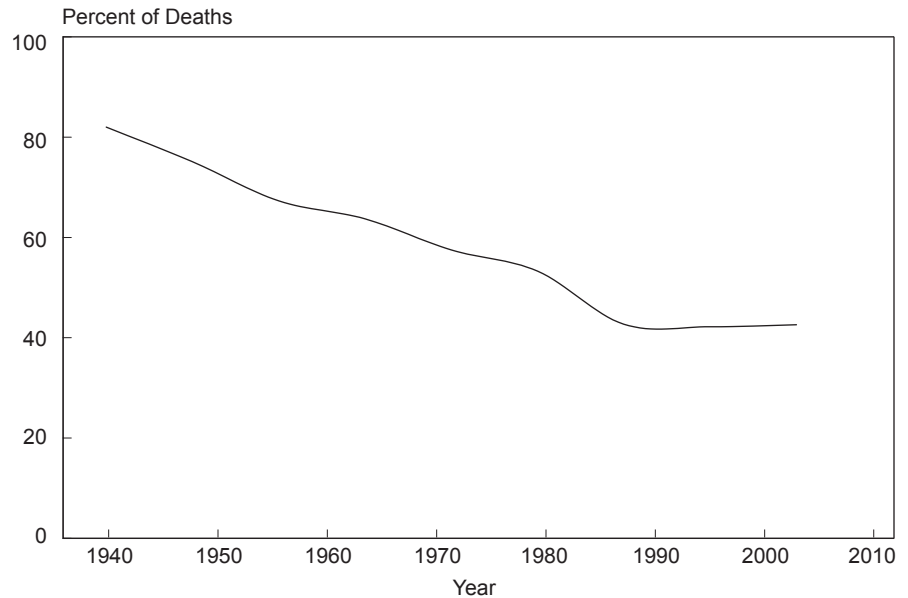
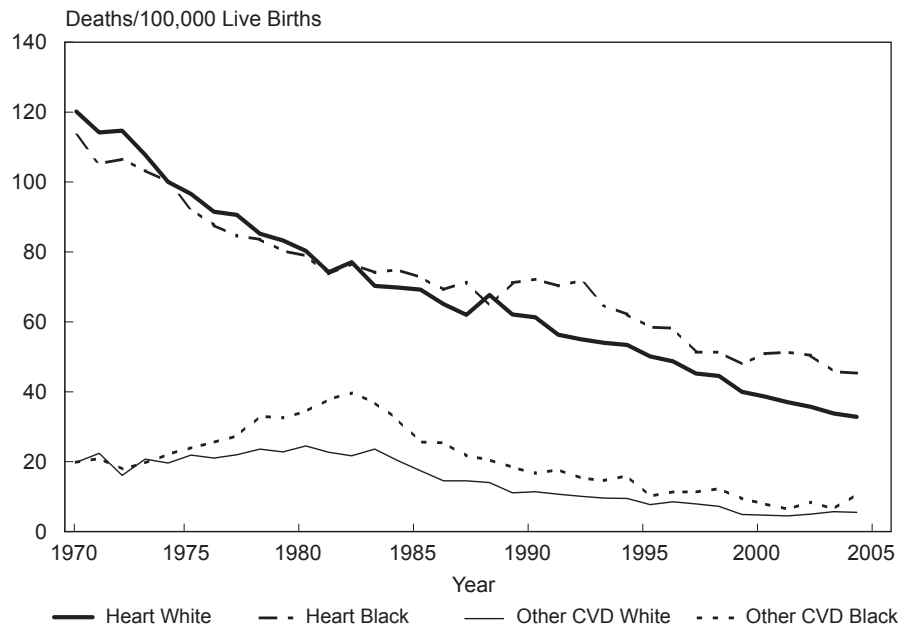


Chart 3-68
Infant Mortality From Congenital Malformations of the Circulatory System by Race, U.S., 1970-2004

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}



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

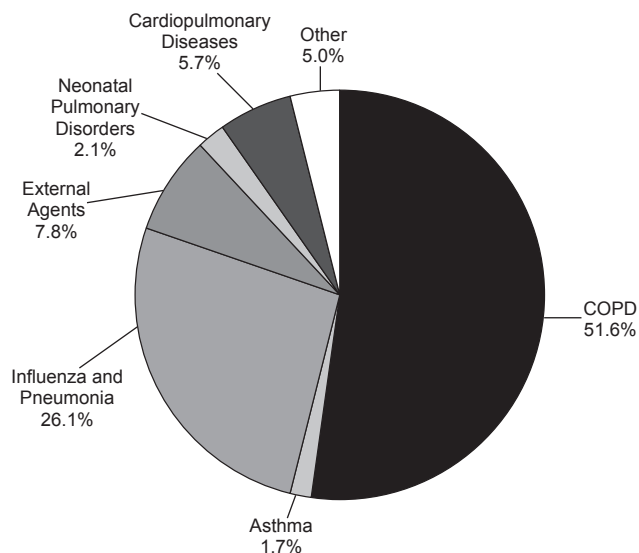
Three different prevalence estimates derived from NHIS data can be found in this chapter. Prior to 1997, prevalence was based on NHIS estimates of individuals who had or knew someone in the family who had asthma during the past 12 months. Beginning in 1997, “attack prevalence” was introduced to limit 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



Lung Diseases

Chart 4–2
Number of Hospitalizations, Physician Office Visits,*
and Deaths for Selected Lung Diseases, U.S., 2003 and 2004†

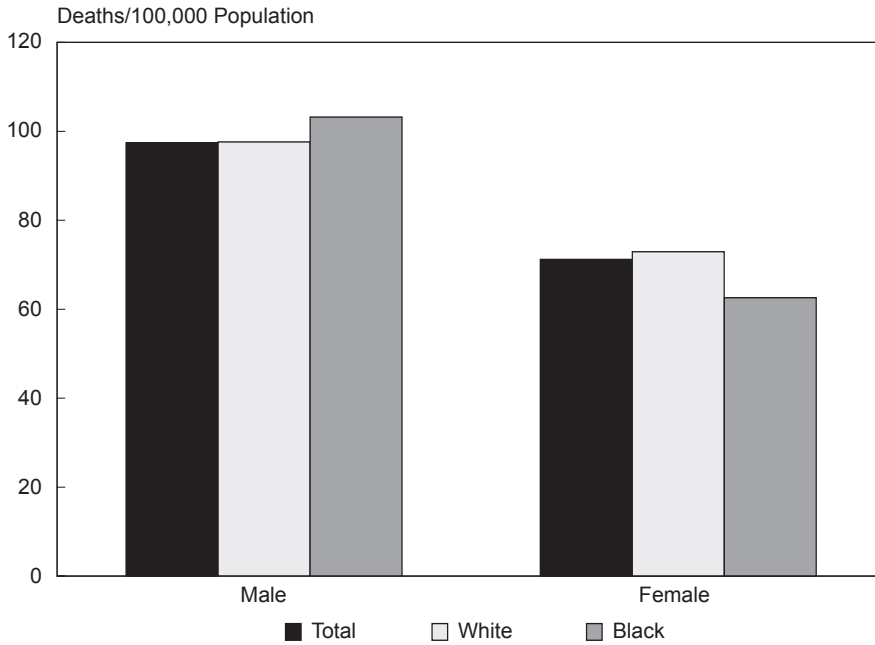
Diagnostic Category	ICD-9-CM Codes	Hospitalizations for 2004			ICD-10 Codes	Deaths for 2004
		First-Listed Discharges (1,000)	Length of Stay (Days)	Physician Office Visits for 2003 (1,000)		
Total		3,438	5.3	38,916		228,885
Acute lower respiratory infections:	466, 480–487	1,614	4.1	9,274	J10–J18, J20, 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.

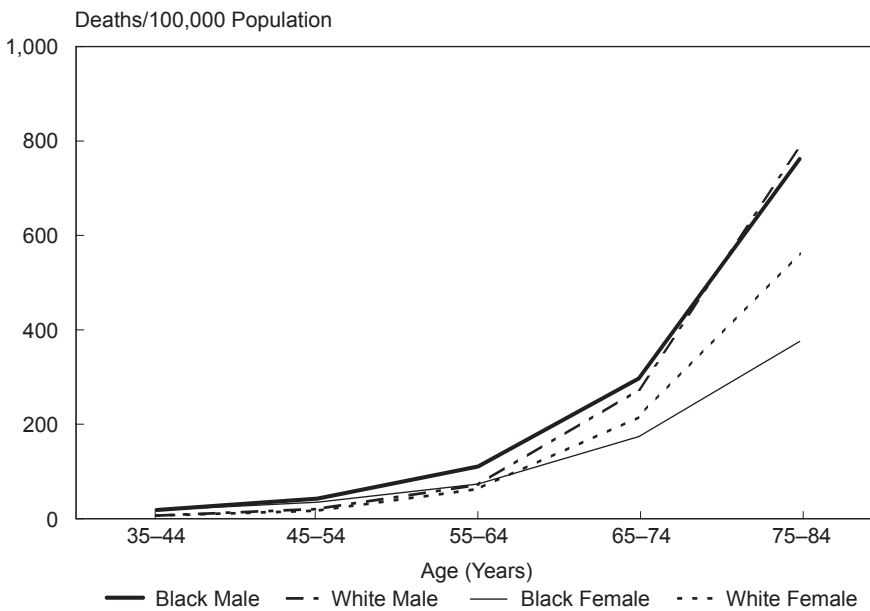
Lung Diseases

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

Chart 4-4
Death Rates for Total Lung Diseases
by Age, Race, and Sex, U.S., 2003

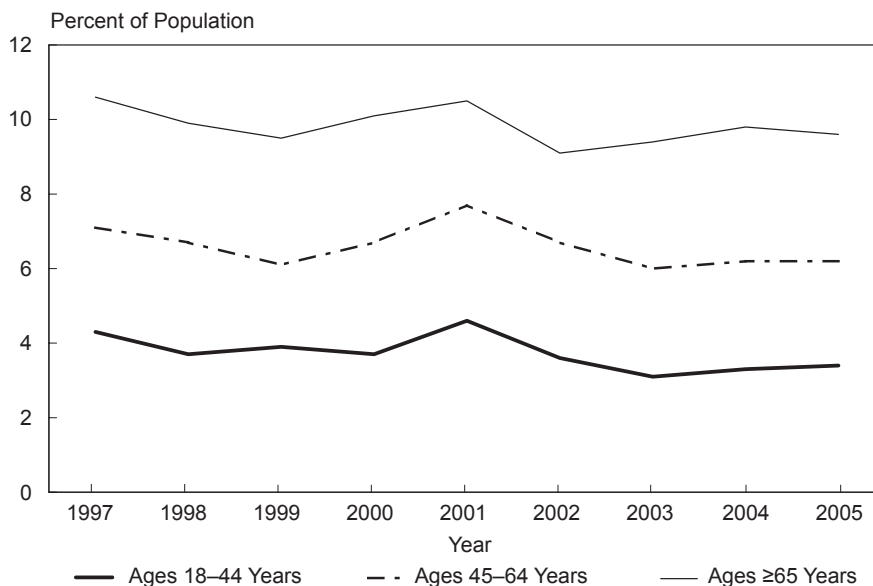


In 2003, the male-female gap in mortality from total lung diseases increased with increasing age for both blacks and whites.¹³

Chronic Obstructive Pulmonary Disease

Chart 4-5
Prevalence of Chronic Obstructive Pulmonary Disease*
by Age, U.S., 1997-2005

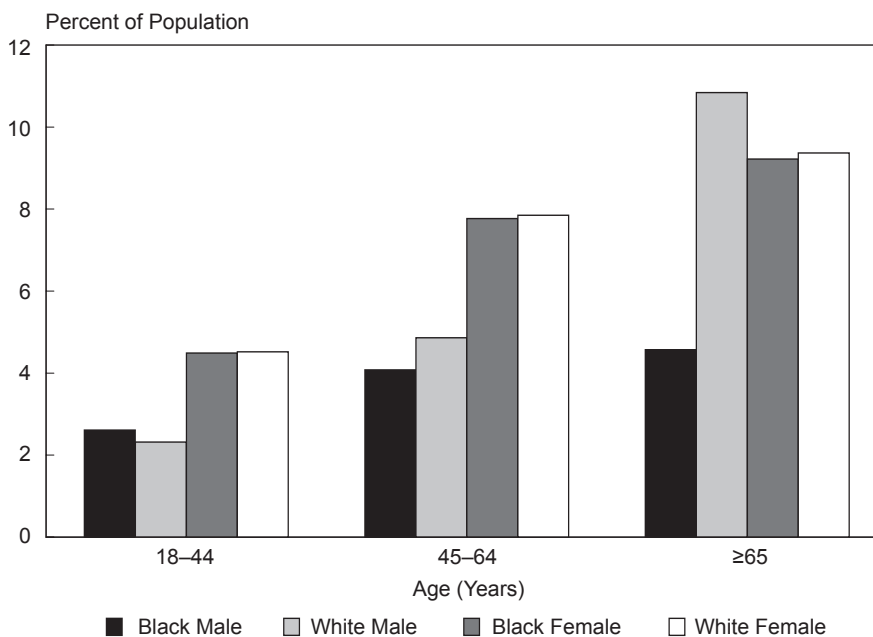
From 1997 to 2005, the prevalence of physician-diagnosed COPD decreased slightly for all age groups.²⁵



* Physician-diagnosed COPD only.

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

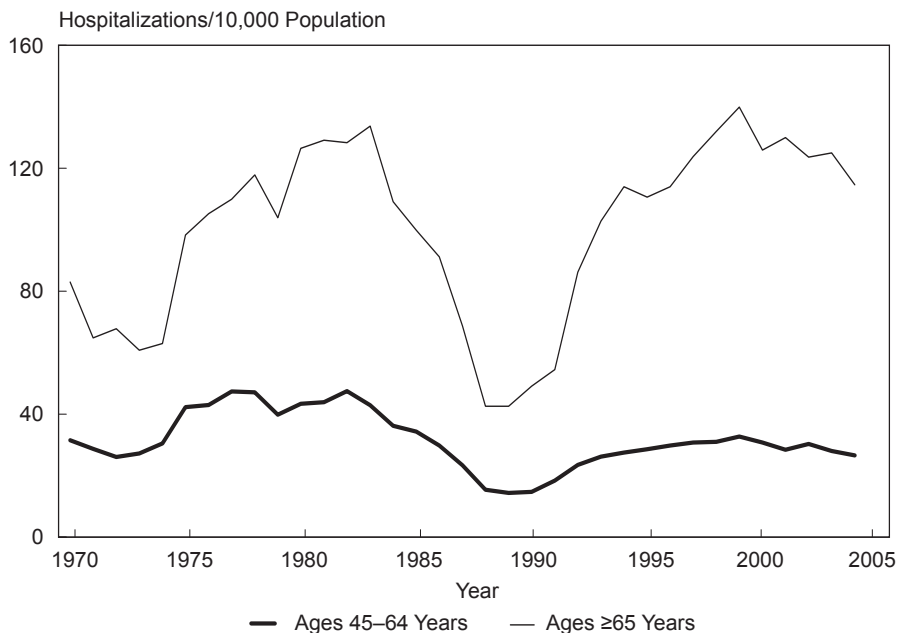
In 2005, within racial groups, the prevalence of COPD was higher for females than for males, with one exception: It was slightly higher for white males than for white females aged ≥65 years. Within sex groups, the prevalence was similar between races, with one exception: It was much higher for white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



* Physician-diagnosed COPD only.

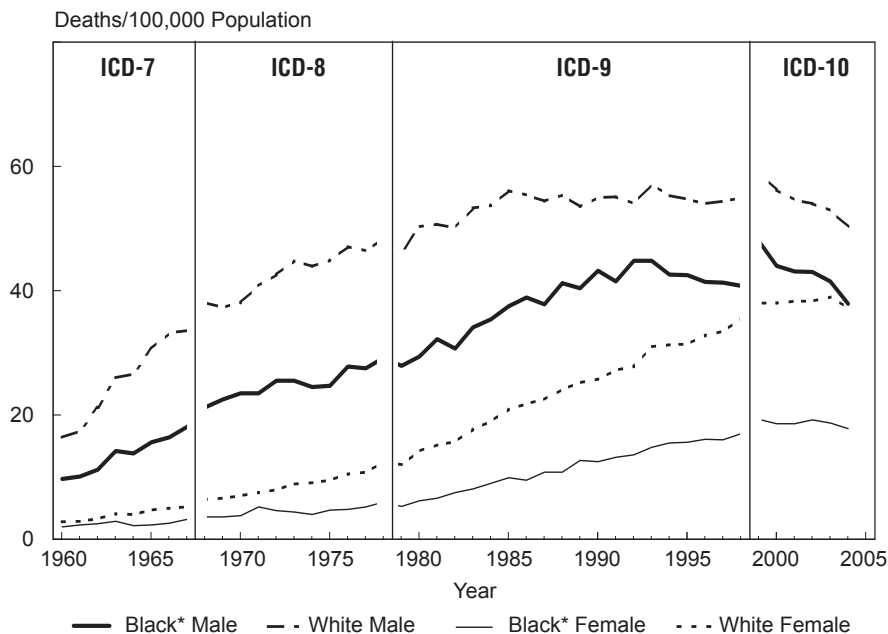
Chronic Obstructive Pulmonary Disease

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

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



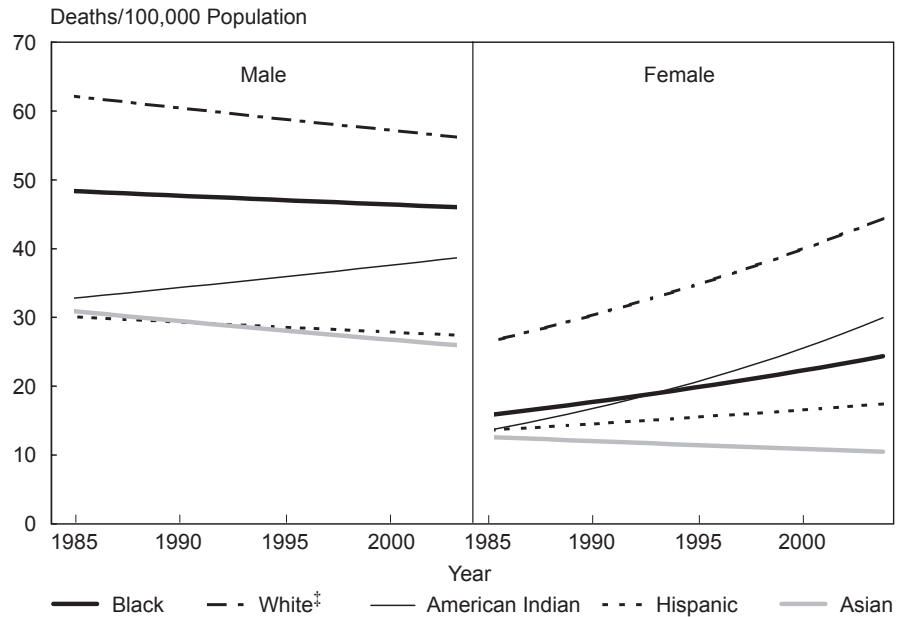
From the early 1980s to 1998, COPD mortality in white males remained high but relatively constant. During the same period, it gradually increased in black males and more than doubled in both black and white females. Since 2000, trends have been constant for both white and black females, but downward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

* Nonwhite from 1960 to 1967.

Chronic Obstructive Pulmonary Disease

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



* 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.

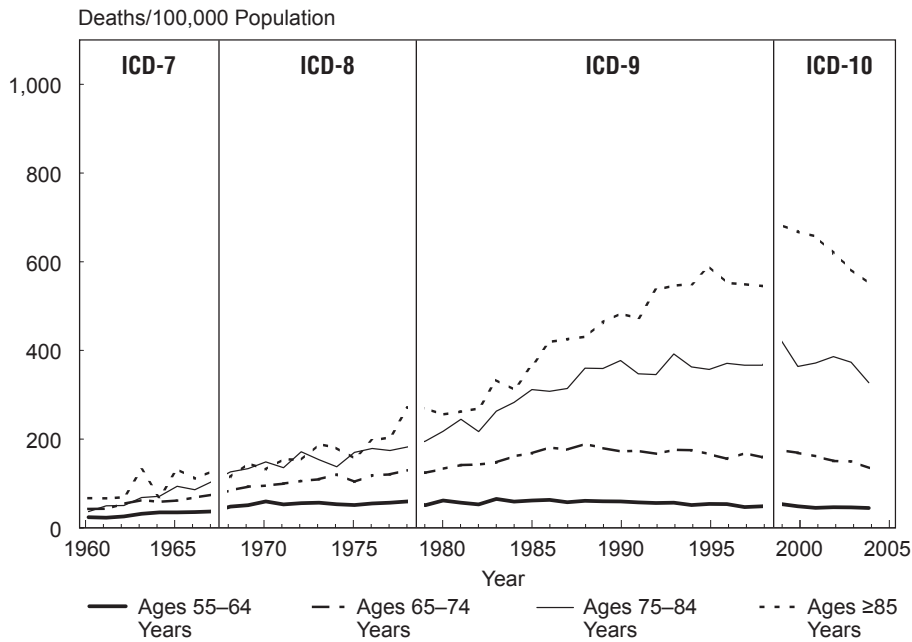
Chart 4-10
Death Rates for Chronic Obstructive Pulmonary Disease for White Males by Age, U.S., 1960–2004

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}



Chronic Obstructive Pulmonary Disease

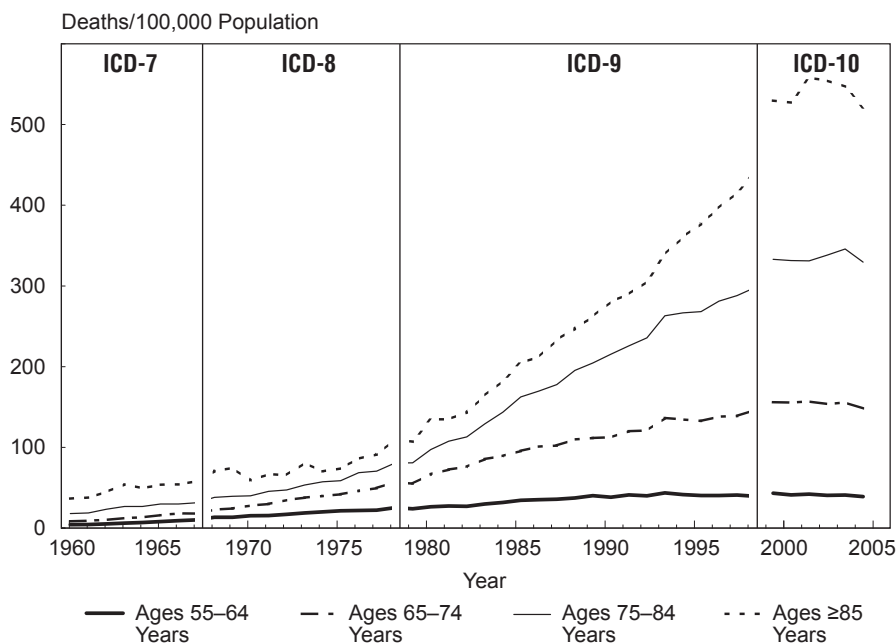
Chart 4-11
Death Rates for Chronic Obstructive Pulmonary Disease
for Black Males* by Age, U.S., 1960-2004



*Nonwhite from 1960 to 1967.

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}

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



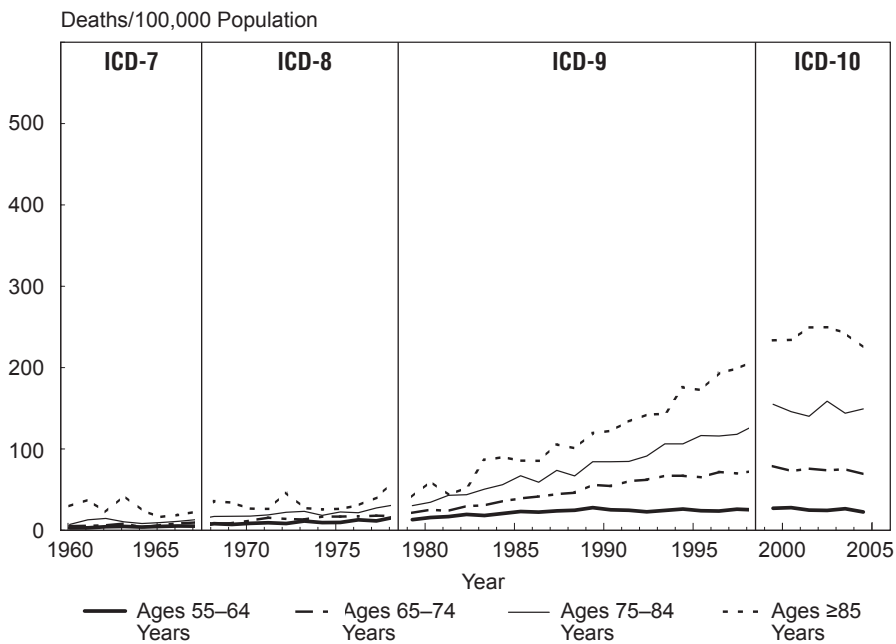
Since 1960, COPD death rates have increased for white females of all age groups. Since the early 1990s, however, death rates have been relatively stable for those aged 55-64 years, and since the late 1990s, death rates have leveled off for those aged ≥65 years.^{13, 28, 29, 40}

Chronic Obstructive Pulmonary Disease

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}

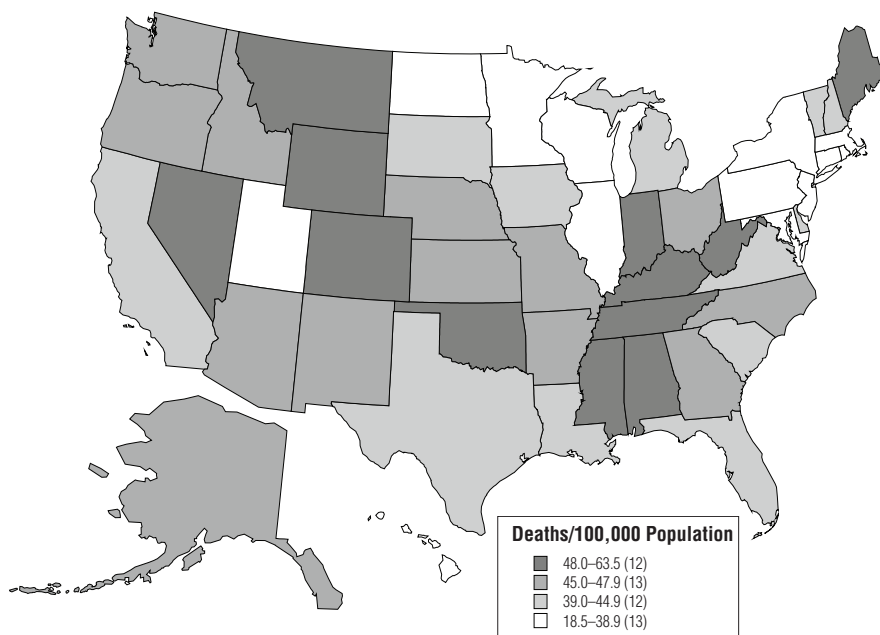


* Nonwhite from 1960 to 1967.

Chart 4-14

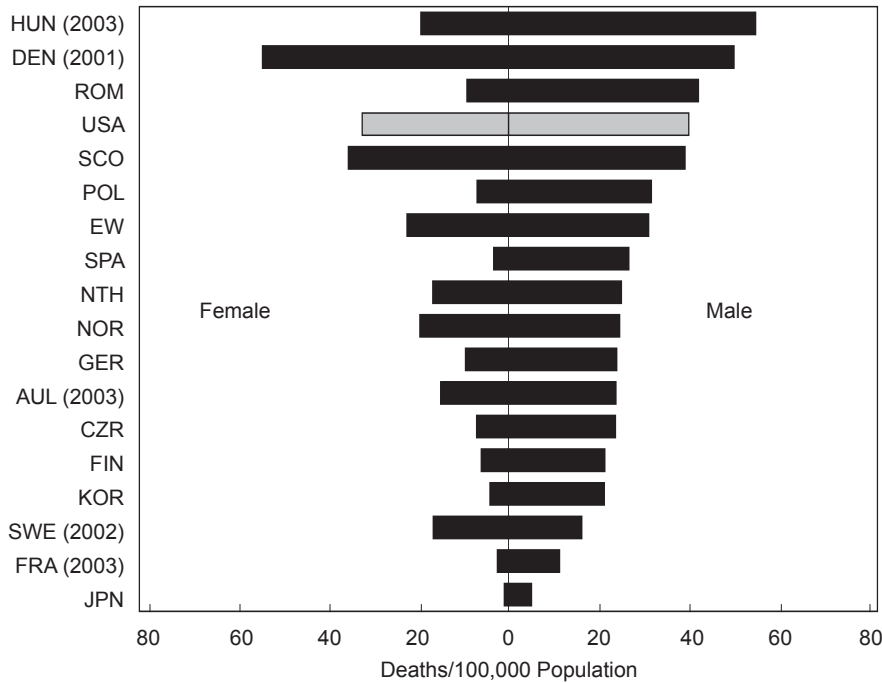
Age-Adjusted Death Rates for Chronic Obstructive Pulmonary Disease by State, U.S., 2001–2003

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



Chronic Obstructive Pulmonary Disease

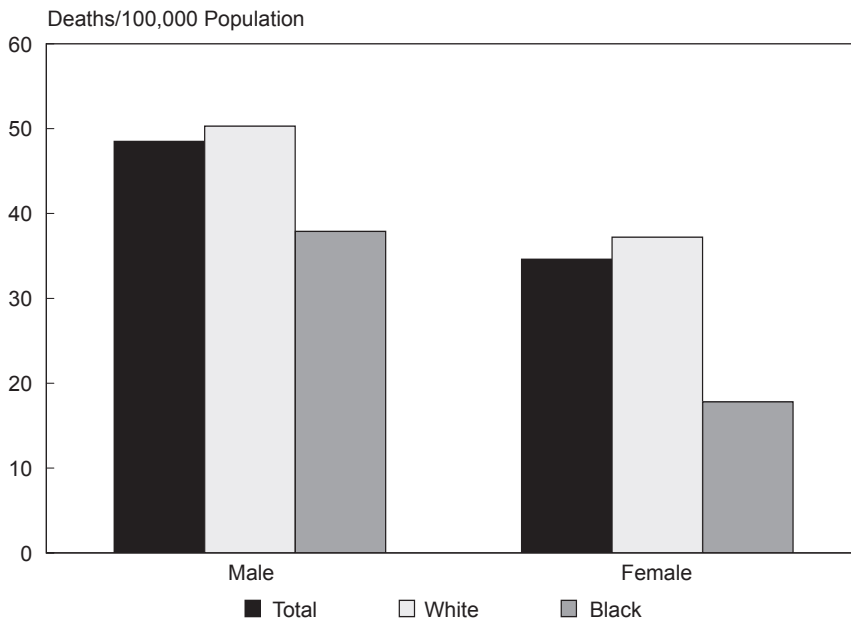
Chart 4-15
Age-Adjusted Death Rates* for Chronic Obstructive Pulmonary Disease by Country and Sex, Ages 35-74, 2004†



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

* 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

Chronic Obstructive Pulmonary Disease/Asthma

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

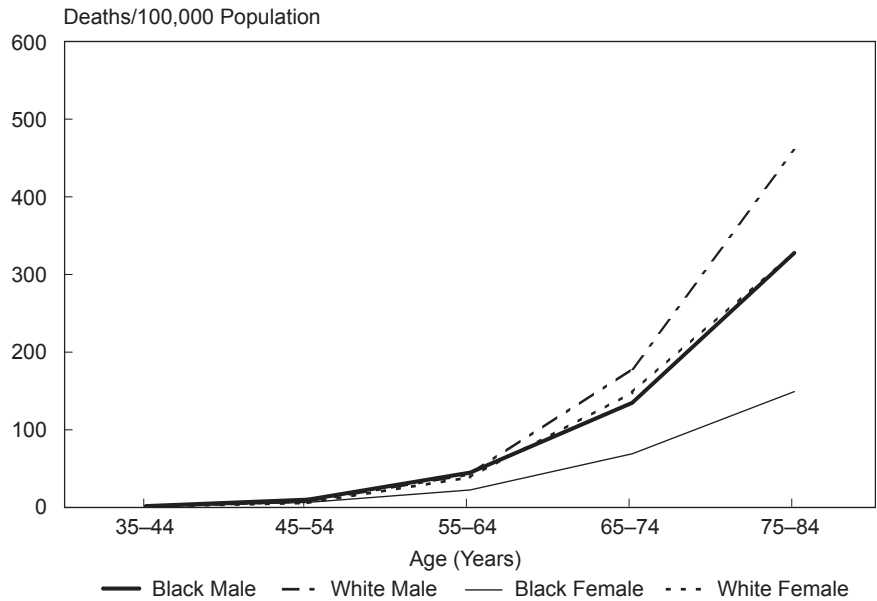
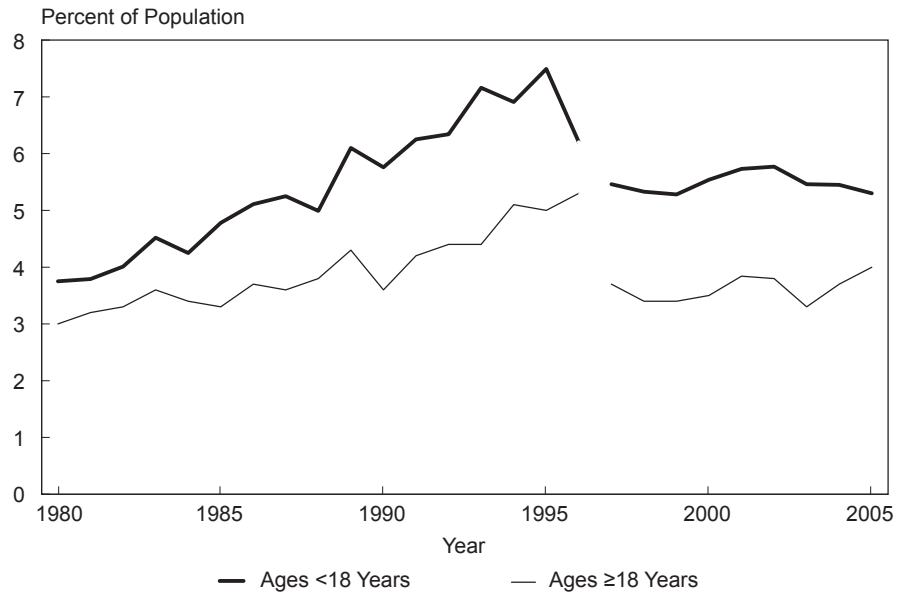


Chart 4-18
Prevalence of Asthma Ages Under 18 and 18 and Over, U.S., 1980-2005*

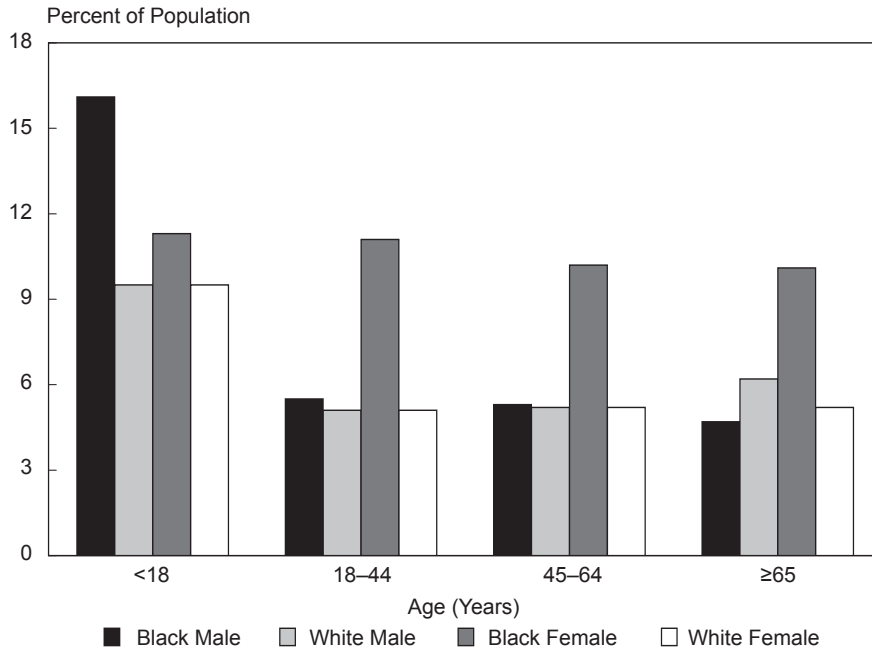
From 1980 to the mid-1990s, the prevalence of asthma increased for both age groups. From 1997 to 2005, asthma attack prevalence remained relatively stable.²⁵



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

Asthma

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

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

Asthma

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

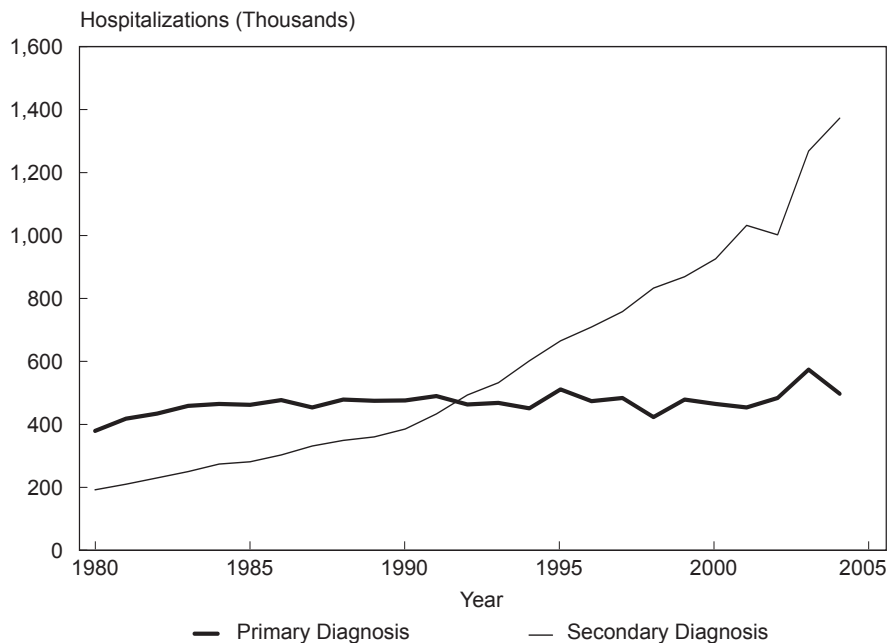
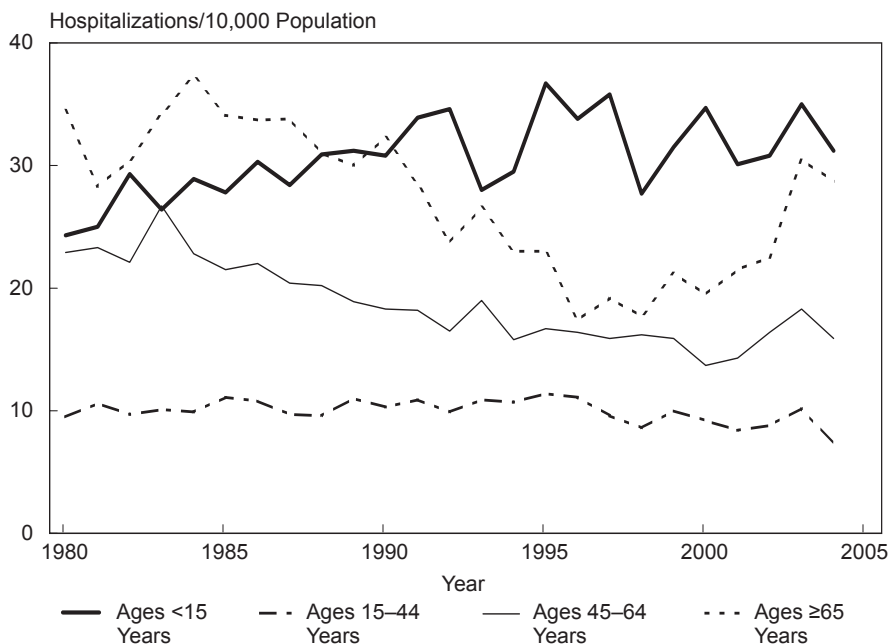


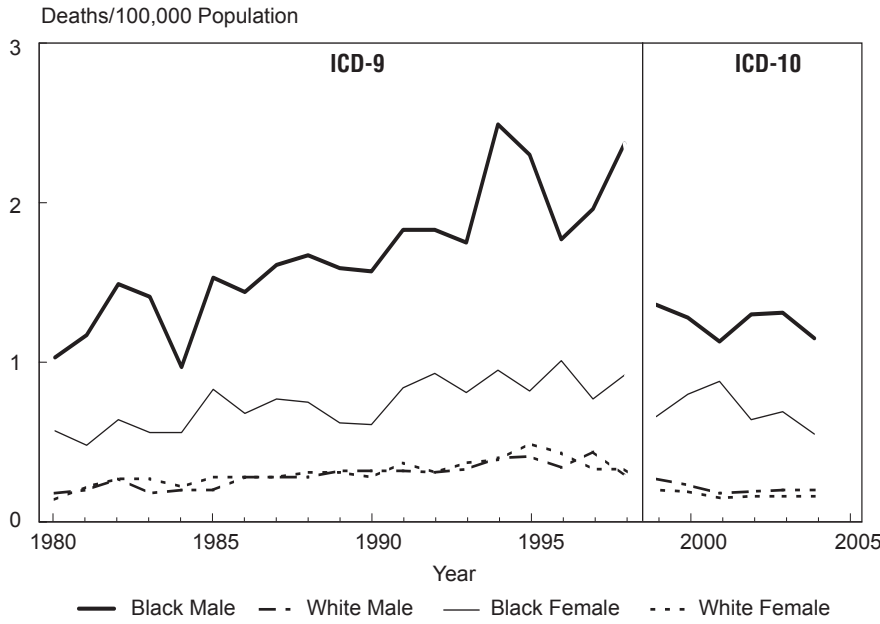
Chart 4-22
Hospitalization Rates for Asthma by Age, U.S., 1980-2004

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



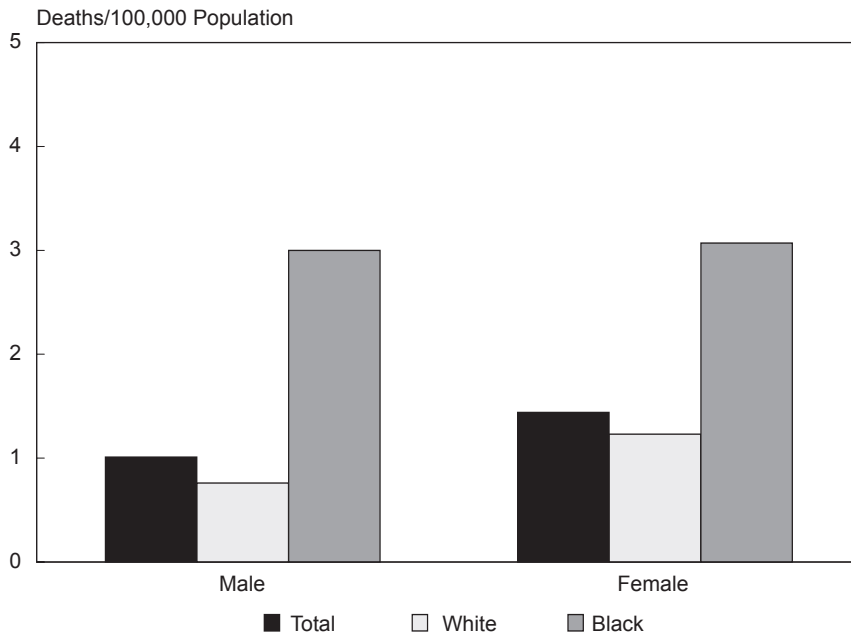
Asthma

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}

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

Asthma

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

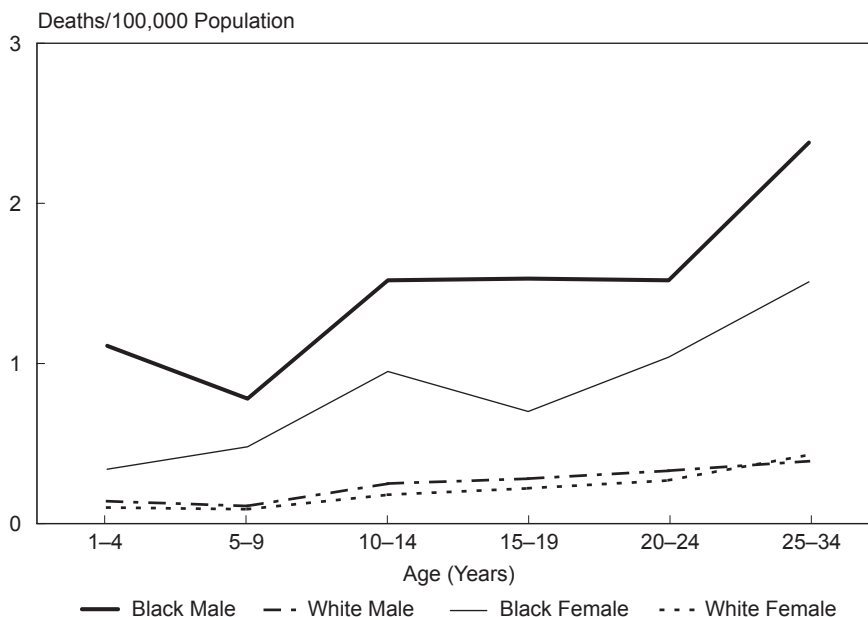
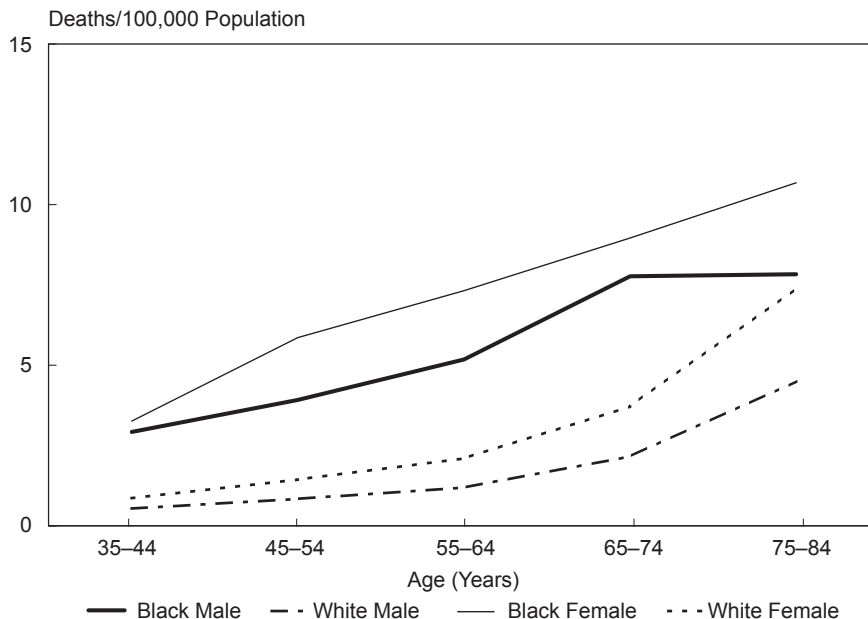


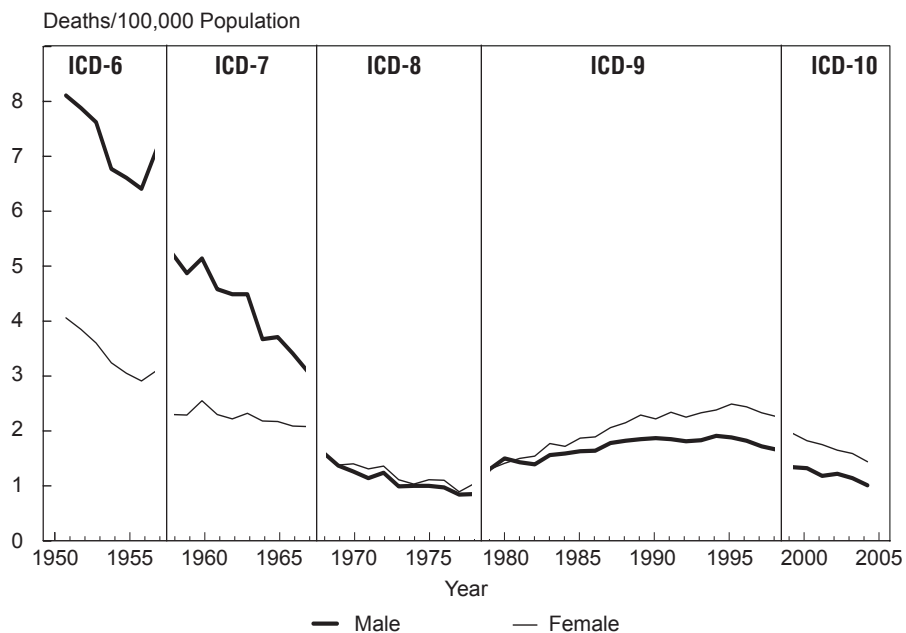
Chart 4-26
Death Rates for Asthma by Age (Ages 35-84),
Race, and Sex, U.S., 1999-2004

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



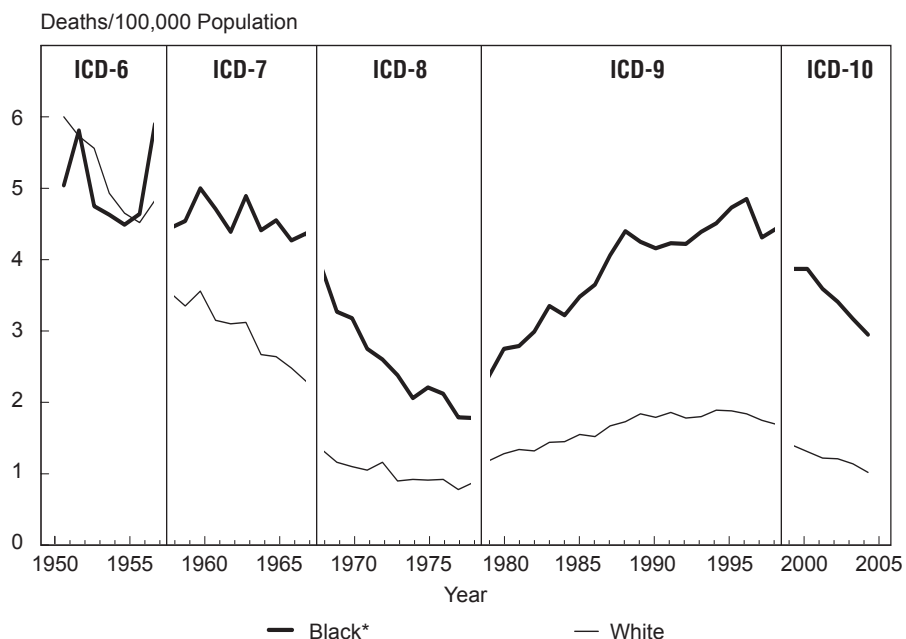
Asthma

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}

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}

* Nonwhite from 1951 to 1967.

Asthma

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}

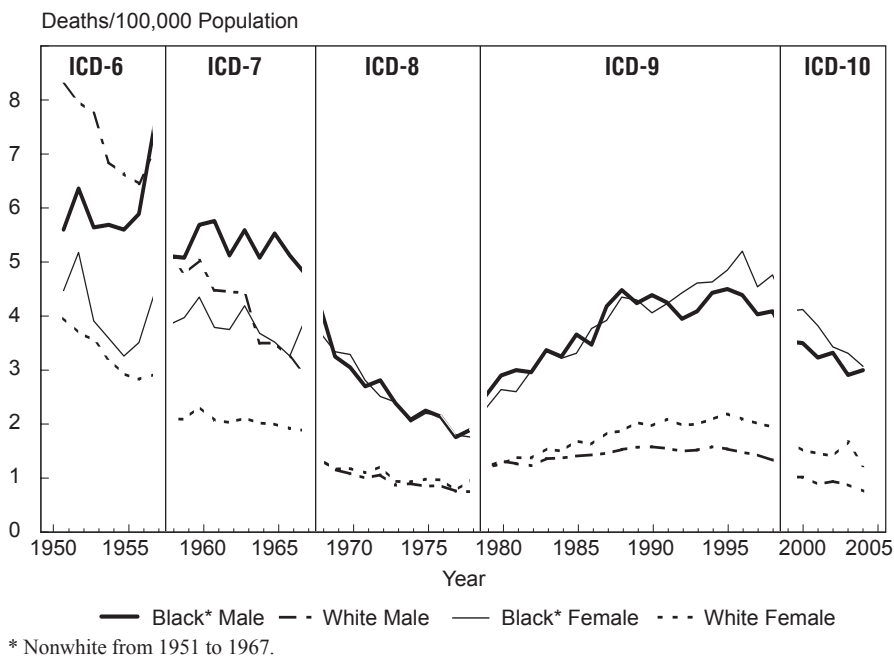
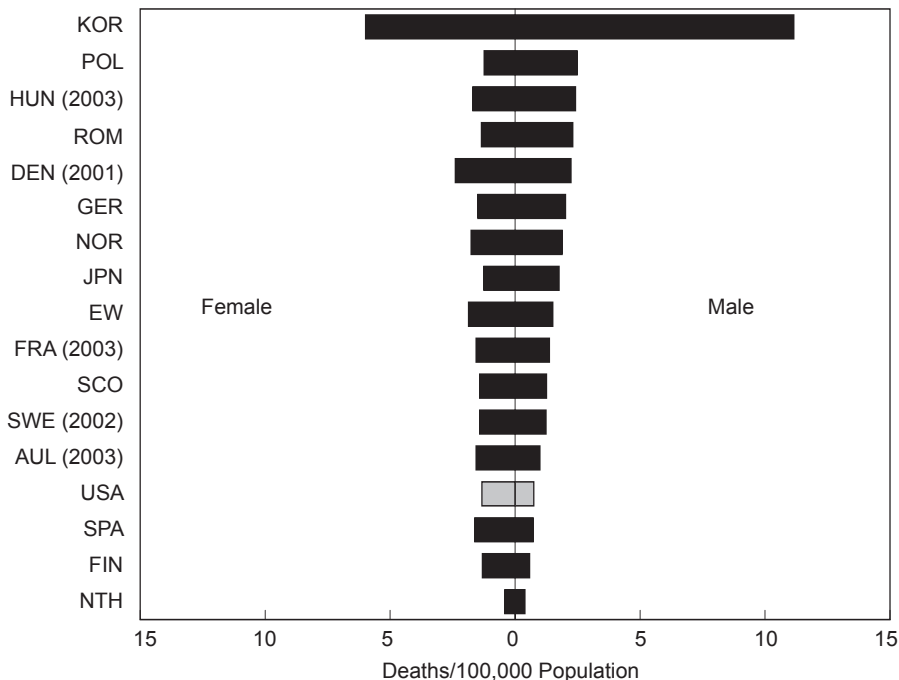


Chart 4-30
Age-Adjusted Death Rates* for Asthma
by Country and Sex, 2004[†]

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

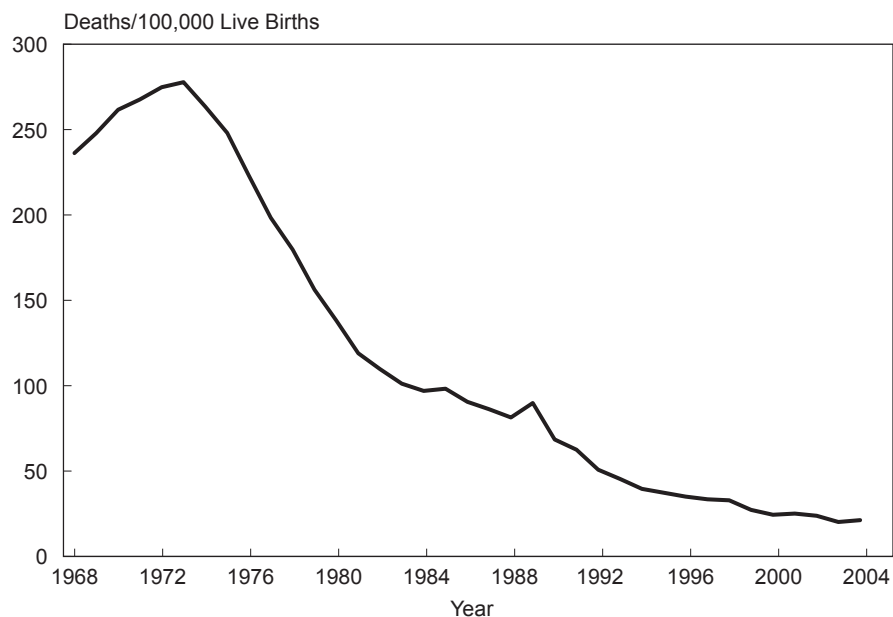


* Age-adjusted to European standard.

[†] Data for 2004 unless otherwise noted in parentheses.

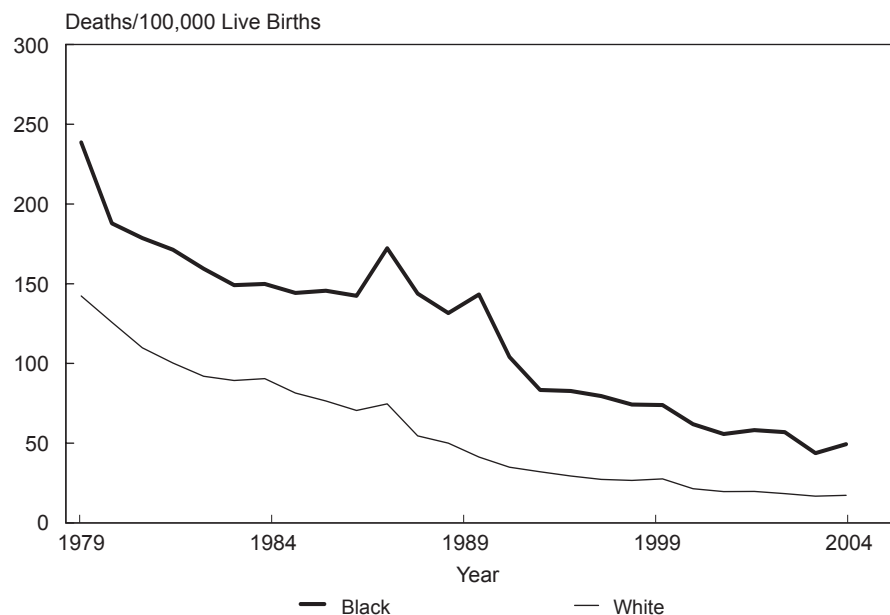
Neonatal Respiratory Distress Syndrome

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}

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



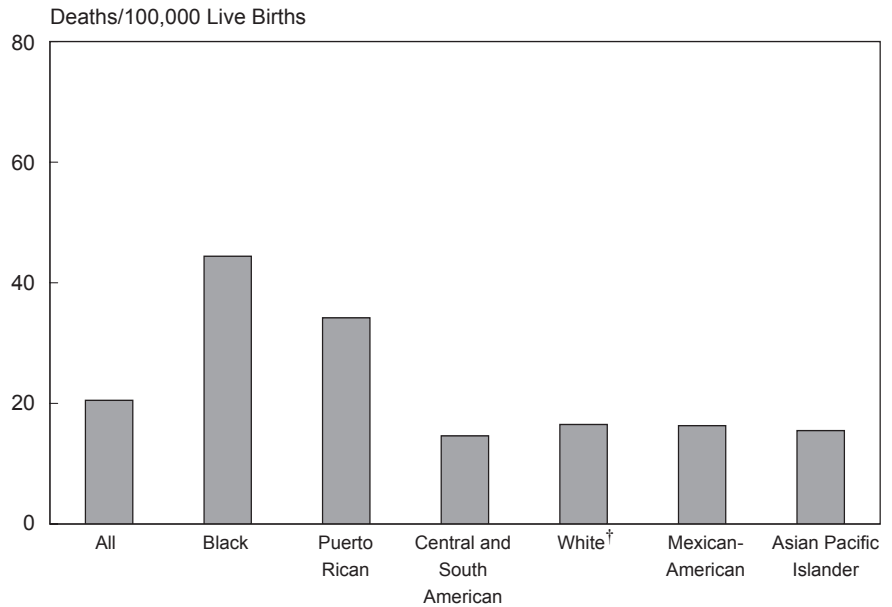
Although infant mortality for RDS declined appreciably for both blacks and whites from 1979 to 2004, a gap in such declines endured between the races during that period.^{13, 28, 29}

Neonatal Respiratory Distress Syndrome/SIDS

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



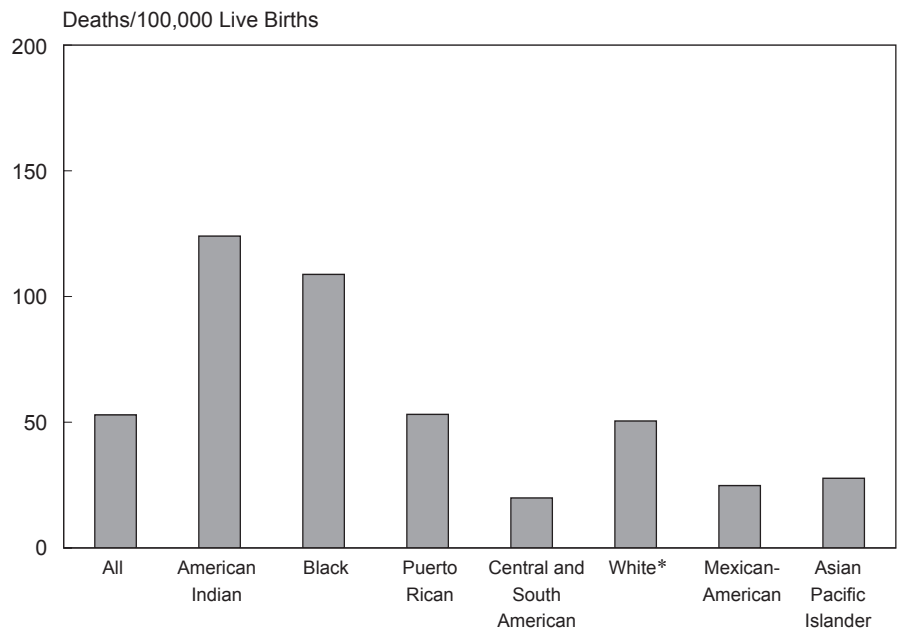
* No data for American Indians.

† 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



* Non-Hispanic.

5. Blood Diseases

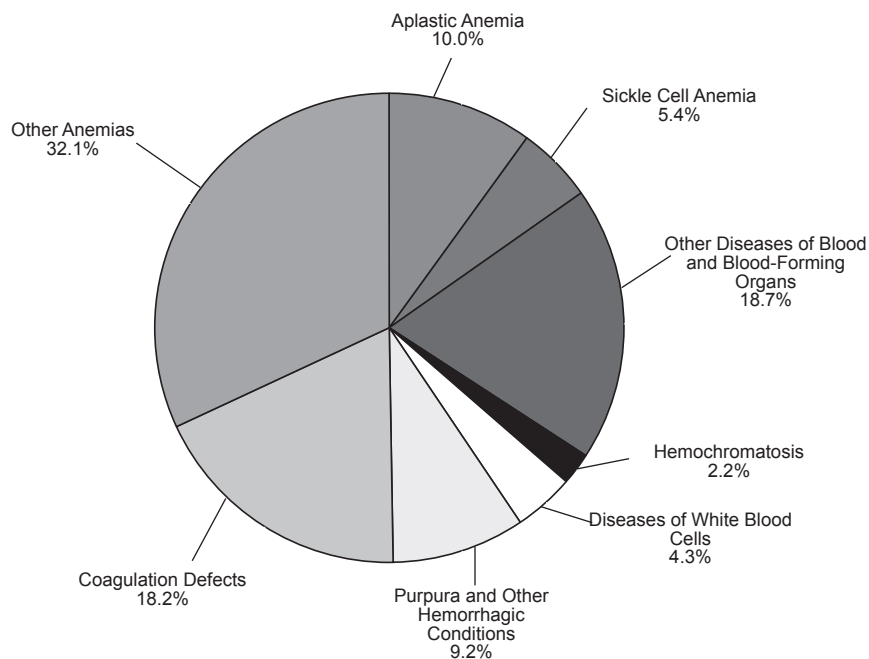
The term *blood diseases* is used here to include diseases within the diagnostic categories listed in *Diseases of the Blood and Blood-Forming Organs and Certain Disorders Involving the Immune Mechanism* of the ICD-10; hemochromatosis is also included in this chapter of the *Chart Book*. Blood-clotting 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



Total Deaths = 9,635 (100%)

Blood Diseases

Chart 5–2
Number of Hospitalizations, Physician Office Visits,*
and Deaths for Selected Blood Diseases, U.S., 2003 and 2004†

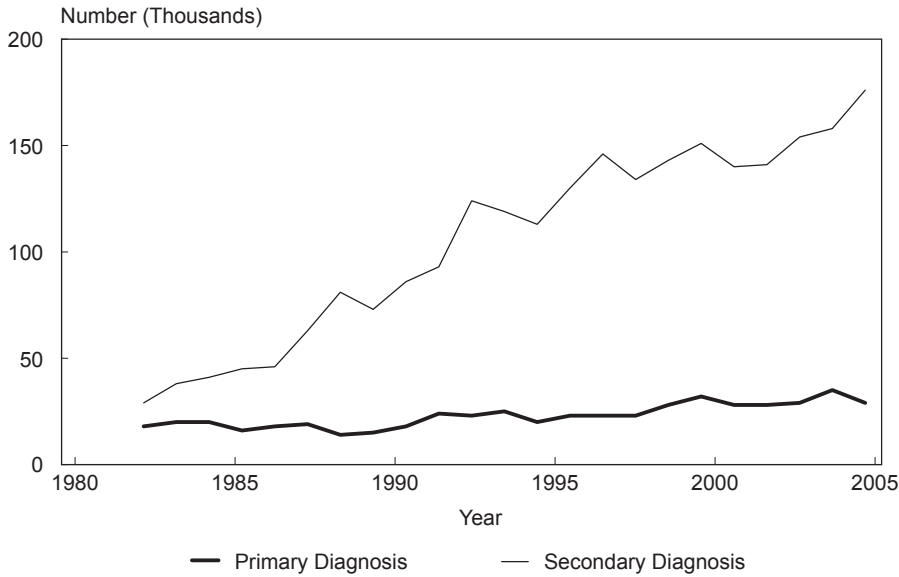
Diagnostic Category	ICD-9-CM Codes	Hospitalizations for 2004		Physician Office Visits for 2003 (1,000)	ICD-10 Codes	Deaths for 2004
		First-Listed Discharges (1,000)	Length of Stay (Days)			
Total	280–289, 275	467	4.7	5,620	D50–D89, E83.1	9,635
Anemias:	280–285	312	4.9	3,752	D50–D64	4,575
Iron deficiency 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.

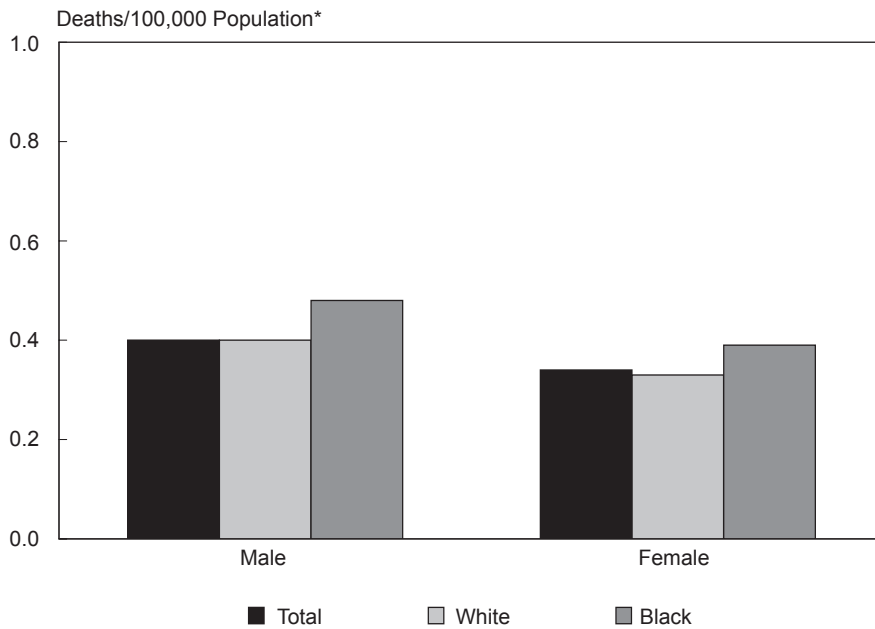
Aplastic Anemia

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

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.

* Average annual rates.

Aplastic Anemia/Sickle Cell Anemia

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

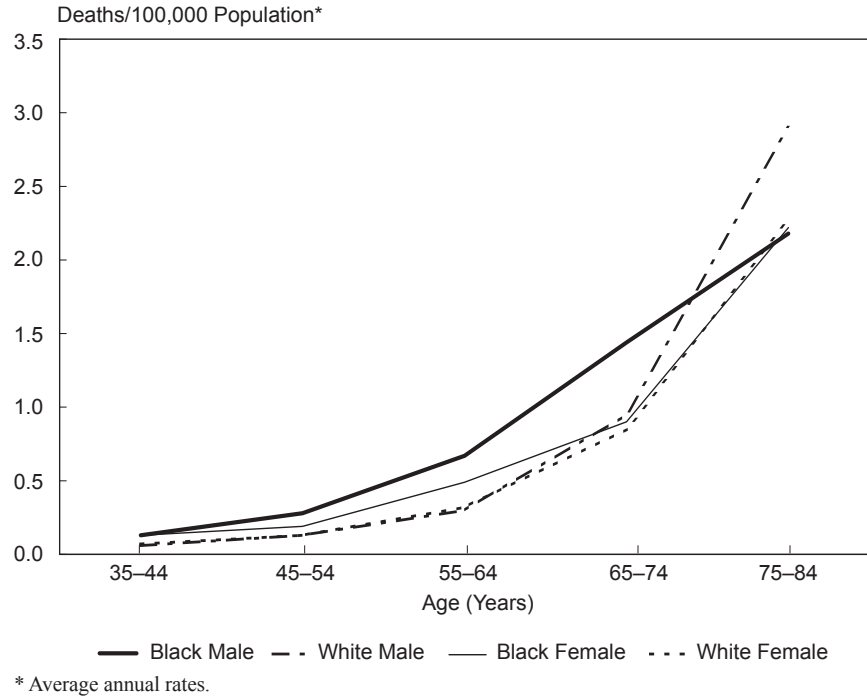
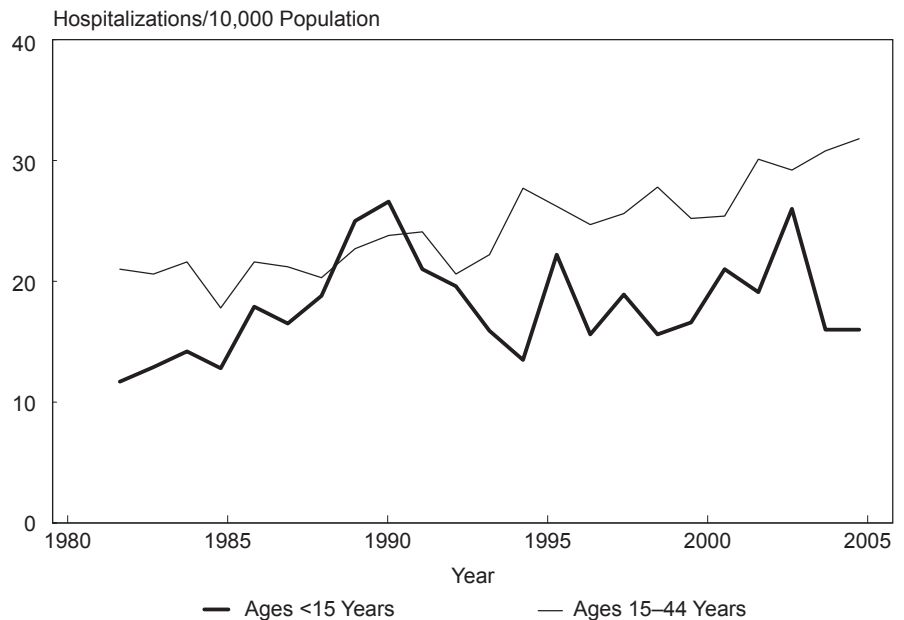


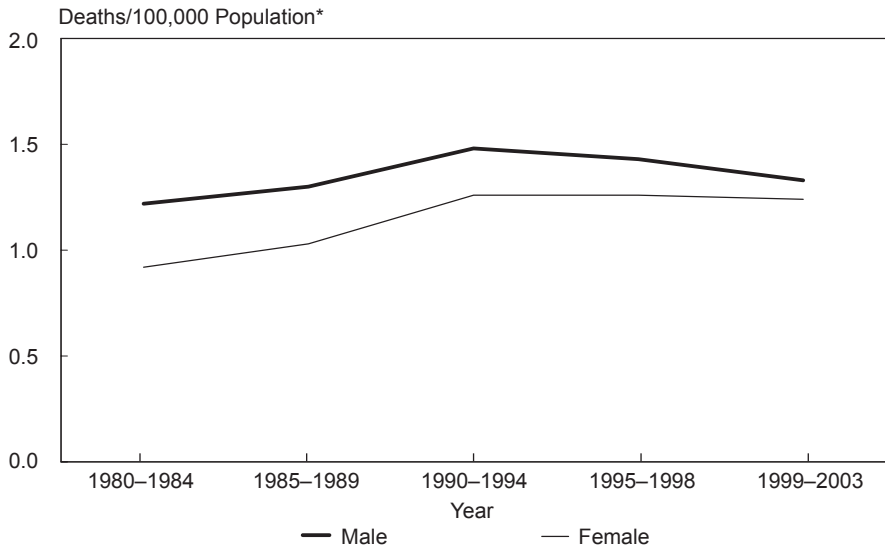
Chart 5-6
Hospitalization Rates for Sickle Cell Anemia,
Ages Under 15 and 15-44, U.S., 1982-2004

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



Sickle Cell Anemia

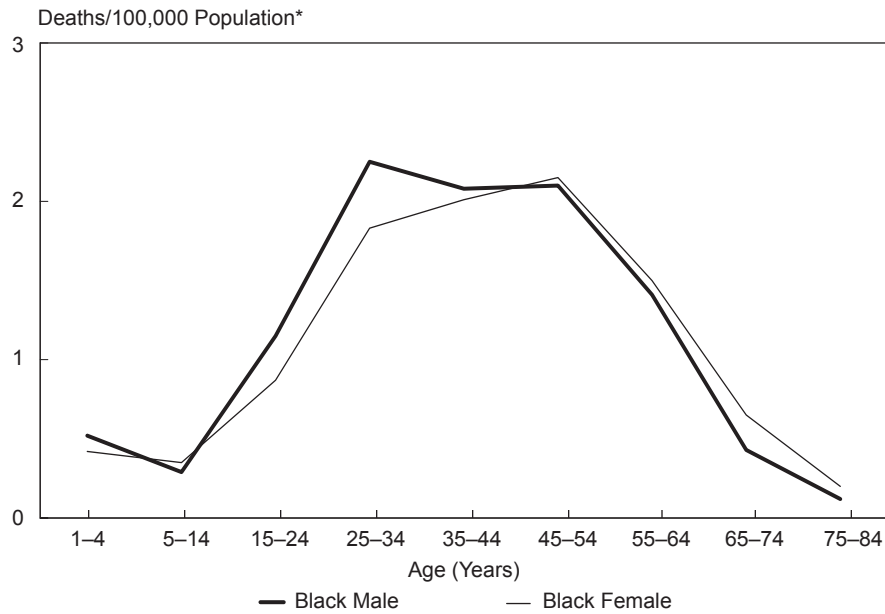
Chart 5-7
Age-Adjusted Death Rates for Sickle Cell Anemia
in Blacks by Sex, U.S., 1980-1984 to 1999-2003



* Average annual rates.

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

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



* Average annual rates.

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

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

Appendix E

References

1. National Heart, Lung, and Blood Institute. *Incidence and Prevalence: 2006 Chart Book on Cardiovascular and Lung Diseases*. Bethesda, MD: National Institutes of Health; 2006.
2. National Center for Health Statistics and Centers for Medicare and Medicaid Services. *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)*. Hyattsville, MD: National Center for Health Statistics. Available at: <http://www.cdc.gov/nchs/about/otheract/icd9/abtcd9.htm>.
3. World Health Organization. *International Statistical Classification of Diseases and Related Health Problems*. 10th Revision. Geneva: World Health Organization; 1992.
4. Kozak LJ. *Underreporting of Race in the National Hospital Discharge Survey*. Hyattsville, MD: National Center for Health Statistics; 1995. Advance Data From Vital and Health Statistics, No. 265. Available at: <http://www.cdc.gov/nchs/products/pubs/pubd/ad/270-261/ad265.htm>.
5. Rosenberg HM, Maurer JD, Sorlie RD, et al. *Quality of Death Rates by Race and Hispanic Origin: A Summary of Current Research, 1999*. Hyattsville, MD: National Center for Health Statistics; 1999. Vital and Health Statistics, Series 2, No. 128. Available at: http://www.cdc.gov/nchs/data/series/sr_02/sr02_128.pdf.
6. Minino AM, Anderson RN. *Documentation for the Public Use Multiple Cause of Death File on Comparability Between ICD-9 and ICD-10: A Double-Coded File Based on the 1996 Data Year Multiple Cause of Death File*. Hyattsville, MD: National Center for Health Statistics. This file was provided to the National Heart, Lung, and Blood Institute in May 2004.
7. Cheeseman JD. *Population Projections of the United States by Age, Sex, Race, and Hispanic Origin: 1995 to 2050*. Washington, DC: U.S. Bureau of the Census; 1996. Current Population Reports, Series P25-1130. Available at: <http://www.census.gov/prod/1/pop/p25-1130/p251130.pdf>.
8. Anderson RN, Rosenberg HM. *Age-Standardization of Death Rates: Implementation of the Year 2000 Standard*. Hyattsville, MD: National Center for Health Statistics; 1998. National Vital Statistics Reports, Vol. 47, No. 3. Available at: http://www.cdc.gov/nchs/data/nvsr/nvsr47/nvs47_03.pdf.
9. Hoyert DL, Anderson RN. *Age-adjusted Death Rates: Trend Data Based on the Year 2000 Standard Population*. Hyattsville, MD: National Center for Health Statistics; 2001. National Vital Statistics Reports, Vol. 49, No. 9. Available at: http://www.cdc.gov/nchs/data/nvsr/nvsr49/nvsr49_09.pdf.
10. World Health Organization. *World Health Statistics Annual*. Geneva: World Health Organization; 1998.
11. Klienman JC. State trends in infant mortality, 1968-83. *Am J Public Health*. 1986;76(6):681-687.

Appendix E

References (continued)

12. Rogot E, Sorlie PD, Johnson NJ, Schmitt C. *A Mortality Study of 1.3 Million Persons by Demographic, Social, and Economic Factors: 1979-85 Follow-up, U.S. National Longitudinal Mortality Study*. Bethesda, MD: National Institutes of Health; 1992. NIH Publication No. 92-3297.
13. Centers for Disease Control and Prevention. *Compressed Mortality File: Underlying Cause of Death, 1979-2003*. Atlanta, GA: Centers for Disease Control and Prevention. Available at: <http://wonder.cdc.gov/mortSQL.html>.
14. Sorlie PD, Gold EB. The Effect of Physician Terminology Preferences on Coronary Heart Disease Mortality: An Artifact Uncovered by the Ninth Revision ICD. *Am J Public Health*. 1987;77(2):148-152.
15. National Heart, Lung, and Blood Institute. Unpublished tabulation of NHANES, 1999-2004, and Extrapolation to the U.S. Population, 2004.
16. Hoffman JI, Kaplan S, Liberthson RR. Prevalence of Congenital Heart Disease. *Am Heart J*. 2004;147(3):425-439.
17. Go AS. The Epidemiology of Atrial Fibrillation in Elderly Persons: The Tip of the Iceberg. *Am J Geriatr Cardiol*. 2005;14(2):56-61.
18. Hirsch AT, Criqui MH, Treat-Jacobson D, et al. Peripheral Arterial Disease Detection, Awareness, and Treatment in Primary Care. *JAMA*. 2001;286(11):1317-1324.
19. Rosamond W, Flegal K, Friday G, et al. Heart Disease and Stroke Statistics—2007 Update: A Report From the American Heart Association Statistics Committee and Stroke Statistics Committee. *Circ*. 2007;115:e69-e171. Available at: <http://cir.ahajournals.org/cgi/content/full/CIRCULATIONAHA.106.179918>.
20. National Heart, Lung, and Blood Institute. Extrapolation to the U.S. Population from unpublished data received in 2003 from the Atherosclerosis Risk in Communities Study (Surveillance) and the Cardiovascular Health Survey.
21. National Heart, Lung, and Blood Institute. Extrapolation to the U.S. Population from unpublished data of the Greater Cincinnati/Northern Kentucky Stroke Study, received from Dr. Joseph Broderick in 2003.
22. National Heart, Lung, and Blood Institute. Extrapolation to the U.S. Population from unpublished data of the Framingham Heart Study, received from Dr. Phillip Wolf in 1999.
23. National Heart, Lung, and Blood Institute. *Morbidity and Mortality: 2004 Chart Book on Cardiovascular, Lung, and Blood Diseases*. Bethesda, MD: National Institutes of Health; 2004. Available at: http://www.nhlbi.nih.gov/resources/docs/04_chtbk.pdf.

Appendix E

References (continued)

24. National Heart, Lung, and Blood Institute. Unpublished data tabulated in 2007 from the National Health Interview Survey, 2005.
25. Mannino DM, Homa DM, Akinbami LJ, et al. Chronic Obstructive Pulmonary Disease Surveillance—United States, 1971-2000. *MMWR*. August 2, 2002;51(SS06):1-16. Available at <http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5106a1.htm>.
26. U.S. Bureau of the Census. *National Population Projections*. Available at: http://www.census.gov/popest/national/asrh/files/NC_EST2005-ALLDATA-R-File10.txt.
27. U.S. Census Bureau. *U.S. Interim Projections by Age, Sex, Race, and Hispanic Origin*. Washington, DC: U.S. Census Bureau; 2004. Available at: <http://www.census.gov/ipc/www/usinterimproj>.
28. National Center for Health Statistics. *Data Warehouse, Mortality Tables*. Available at: <http://www.cdc.gov/nchs/datawh/statab/unpubd/mortabs.htm>.
29. National Center for Health Statistics. Unpublished final 1999-2004 mortality tabulations. Personal communication With Sherry L. Murphy in 2007.
30. National Center for Health Statistics. *National Hospital Discharge Survey*. Hyattsville, MD: National Center for Health Statistics. Vital and Health Statistics, Series 13 (1970-2006).
31. National Center for Health Statistics. *Health, United States, 2006, With Chartbook on Trends in the Health of Americans*. Hyattsville, MD: National Center for Health Statistics; 2006. Available at: <http://www.cdc.gov/nchs/data/hus/06.pdf>.
32. Hodgson TA, Cohen AJ. Medical Care Expenditures for Selected Circulatory Diseases: Opportunities for Reducing National Health Expenditures. *Med Care*. 1999;37(10):994-1012.
33. Rice DP, Hodgson TA, Kopstein AN. The Economic Costs of Illness: A Replication and Update. *Health Care Financ Rev*. 1985;7:61-80.
34. Max W. University of California at San Francisco. Unpublished Table of Present Value of Lifetime Earnings by Age and Sex, U.S., 2000. Personal Communication in 2002.
35. Centers for Medicare and Medicaid Services. *Table 2: National Health Expenditures, Amounts and Average Annual Percent Change by Type of Expenditure: Selected Calendar Years 1970-2012*. Available at: <http://www.cms.hhs.gov/NationalHealthExpendData/downloads/proj2006.pdf>.
36. U.S. Bureau of the Census. *Historical Income Tables, People—All Races. Table P37: Full-Time, Year Round Workers by Mean Income and Sex: 1955-2005*. Available at: <http://www.census.gov/hhes/www/income/histinc/p37ar.html>.

Appendix E

References (continued)

37. National Center for Health Statistics. *NCHS Public-use Data Files and Documentation*. Unpublished tabulations by the National Heart, Lung, and Blood Institute on the National Ambulatory Medical Care Survey. Available at: <http://www.cdc.gov/nchs/dataawh/ftpserv/ftpdata/ftpdata.htm>.
38. Jones A. *The National Nursing Home Survey: 1999 Summary*. Hyattsville, MD: National Center for Health Statistics; 2002. Vital and Health Statistics, Series 13, No. 152. Available at: http://www.cdc.gov/nchs/data/series/sr_13/sr13_152.pdf.
39. World Health Organization. Unpublished tabulations on mortality by the National Heart, Lung, and Blood Institute From the World Health Organization Web Site. Available at: <http://www.who.int/whosis/mort/en/index.html>.
40. Klebba, AJ. *Mortality From Diseases Associated With Smoking. United States, 1960-77*. Hyattsville, MD: National Center for Health Statistics; 1982. Vital and Health Statistics, Series 20, No. 17.
41. Matthews TJ, MacDorman MF. *Infant Mortality Statistics From the 2003 Period Linked Birth/Infant Death Data Set*. Hyattsville, MD: National Center for Health Statistics; 2006. National Vital Statistics Report, Vol. 54, No. 6. Available at: http://www.cdc.gov/nchs/data/nvsr/nvsr54/nvsr54_16.pdf.

Discrimination Prohibited:
Under provisions of applicable public laws enacted by Congress since 1964, no person in the United States shall, on the grounds of race, color, national origin, handicap, or age, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity (or, on the basis of sex, with respect to any education program or activity) receiving Federal financial assistance. In addition, Executive Order 11141 prohibits discrimination on the basis of age by contractors and subcontractors in the performance of Federal contracts, and Executive Order 11246 states that no federally funded contractor may discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. Therefore, the Heart, Lung, and Blood Institute must be operated in compliance with these laws and Executive Orders.



U.S. Department of Health and Human Services
National Institutes of Health



**National Heart
Lung and Blood Institute**