Cardiovascular Disease

The broad category of cardiovascular disease (CVD) includes any disease involving the heart and blood vessels. Coronary heart disease, cerebrovascular disease (commonly known as stroke), and hypertension are the major cardiovascular diseases (American Heart Association, 2007). In addition to being a major risk factor for heart disease and stroke, hypertension is a commonly diagnosed disease that can also lead to kidney damage and other health problems. Obesity, physical inactivity, and sodium intake are all important risk factors for hypertension (NIH, 2004). Since 1900, CVD has been the leading cause of death in the U.S. every year except 1918 (American Heart Association, 2007) (General Mortality indicator). The U.S. age-adjusted death rate for CVD reached a peak in 1950 (CDC, 1999). Between 1950 and 1999, the age-adjusted death rate for CVD declined 60 percent. The major risk factors for CVD include tobacco use, high blood pressure, high blood cholesterol, diabetes, physical inactivity, and poor nutrition (CDC, 2004; American Heart Association, 2007).

Environmental exposures may also play a role in CVD morbidity and mortality independent of other risk factors. However, susceptible populations such as the elderly and other high-risk populations may be most impacted. For example, studies have shown exposure to ambient airborne particulate matter to be associated with increased hospitalizations and mortality among older individuals, largely due to cardiopulmonary and cardiovascular disease (U.S. EPA, 2004). Environmental tobacco smoke (ETS) may also contribute to CVD. Although the smoke to which a nonsmoker is exposed is less concentrated than that inhaled by smokers, research has demonstrated increased cardiovascular-related health risks associated with ETS (State of California, 2005).

This indicator presents U.S. adult (age 18 and older) prevalence rates for heart disease (all types), coronary heart disease, stroke, and hypertension; and death rates for CVD as a whole as well as coronary heart disease (including myocardial infarction), stroke, and hypertension. CVD prevalence data were compiled between 1997 and 2010 from the National Health Interview Survey (NHIS), conducted by the Centers for Disease Control and Prevention's (CDC's) National Center for Health Statistics (NCHS). The NHIS is the principal source of information on the health of the civilian non-institutionalized population of the U.S. and since 1960 has been one of the major data collection programs of NCHS. CVD prevalence is based on the number of adults who reported that they had ever been told by a doctor or other health practitioner that they had a specified CVD. Mortality data were compiled using the National Vital Statistics System (NVSS), maintained by NCHS. Total mortality data were compiled between 1979 and 2009. Because of the change of reporting requirements for race and ethnicity, data by demographic group (i.e., age, ethnicity, race, and sex) were compiled for the years 1999 and 2009, when data are available to compare more races and ethnicities. The NVSS registers virtually all deaths and births nationwide, with data coverage from 1933 to 2009 and from all 50 states and the District of Columbia. Data were queried and compared separately for years 1979-1998 and those 1999 onward because the NVSS uses different codes to specify causes of death for these two time periods: the International Classification of Diseases 9th Revision (ICD-9) codes for 1979-1998 and the International Classification of Diseases 10th Revision (ICD-10 codes) beginning in 1999.

What the Data Show

CVD Prevalence

Among adults 18 years and older, the prevalence of heart disease and stroke between 1997 and 2010 has remained essentially the same (Exhibit 1). In contrast, the prevalence of hypertension has shown a general increase from 191.0 cases per 1,000 in 1997 to 258.2 cases per 1,000 in 2010.

Gender, race, ethnicity, and age differences in CVD prevalence exist. The prevalence of coronary heart disease is consistently higher among males than among females (80.0 cases per 1,000 for men compared with 53.9 cases per 1,000 for women in 2010). In contrast, hypertension is more prevalent among women (263.5 cases per 1,000 for women compared with 252.6 cases per 1,000 for men in 2010); however, the gap is narrowing as rates for men have been increasing at a faster pace over time compared to women. As would be expected, the prevalence of heart disease (all types), coronary heart disease, hypertension, and stroke increase as people age, with those aged 18 to 44 years having the lowest prevalence and those 75 years and older having the highest prevalence of CVD (Exhibit 1).

Among the racial and ethnic groups reported, American Indians and Alaska Natives had the highest prevalence of coronary heart disease between 1999 and 2001. Between 2002 and 2010, however, the rates of coronary heart disease in this population exhibited much greater fluctuations ranging from 23.5 per 1,000 (2002) to 69.3 per 1,000 (2003). In 2010, the prevalence of coronary heart disease across races was highest among Whites (69.2 cases per 1,000), followed by American Indians and Alaska Natives (57.9 cases per 1,000), Blacks or African Americans (56.7 cases per 1,000), and Asians (41.3 cases per 1,000). Between 1999 and 2010, Blacks or African Americans consistently had the highest prevalence of hypertension (322.7 cases per 1,000 in 2010). Asians consistently had the lowest prevalence of hypertension (183.9 cases per 1,000 in 2010) among the racial groups reported, and the lowest prevalence of stroke (16.2 cases per 1,000 in 2010) with one exception: in 2001, American Indians and Alaska Natives had the lowest prevalence of stroke (11.5 cases per 1,000). When taking only ethnicity into account, the Hispanic or Latino population had a consistently lower prevalence of heart disease (all types), coronary heart disease, hypertension, and stroke compared with the non-Hispanic or Latino population from 1999-2010, the period for which these data are available. For example, in 2010, prevalence in Hispanics or Latinos was lower than in non-Hispanics or Latinos for coronary heart disease (38.5 versus 71.1 cases per 1,000, respectively), hypertension (177.0 versus 271.4 cases per 1,000, respectively), and stroke (18.4 versus 28.5 cases per 1,000, respectively) (Exhibit 1).

CVD Mortality

In 1979, the national age-adjusted CVD death rate (all types) was 531.0 per 100,000 compared to a rate of 352.0 per 100,000 in 1998 (Exhibit 2). This decline continues after 1999, with the rate dropping from 349.3 per 100,000 in 1999 to 234.8 per 100,000 in 2009. Death rates for coronary heart disease, stroke, and myocardial infarction—subcategories of CVD—all declined between 1979 and 1998. The age-adjusted coronary heart disease death rate ranged from 339.2 per 100,000 in 1979 to 197.1 per 100,000 in 1998. For stroke mortality, the age-adjusted rate ranged from 97.1 per 100,000 in 1979 to 59.3 per 100,000 in 1998. The age-adjusted death rate for myocardial infarction ranged from 157.9 in 1979 to 76.0 per 100,000 in 1998. The decline in mortality from these three CVD subgroups continued to be observed between 1999 and 2009. The age-adjusted death rates for coronary heart disease, stroke, and myocardial infarction in 2009 were 116.1, 38.9, and 37.8 per 100,000, respectively, compared to 194.6, 61.6, and 73.2 per 100,000, respectively, in 1999. In contrast, mortality attributed to hypertension fluctuated from both 1979 to 1998 and 1999 to 2009, with a slight decrease of 17.5 per 100,000 in 1979 to 16.6 per 100,000 in 1998, and then a slight increase between 1999 and 2009 from 15.8 per 100,000 to 18.5 per 100,000.

Differences exist in CVD death rates among age, ethnicity, race, and sex. For example, in 2009, those aged 65 and older had the highest CVD (all types), coronary heart disease, stroke,

hypertension, and myocardial infarction mortality (1525.2, 751.5, 263.9, 108.8, and 235.2 per 100,000, respectively). Also in 2009, the age-adjusted CVD (all types), coronary heart disease, stroke, hypertension, and myocardial infarction death rates for those 45 to 64 years of age were 155.6, 83.7, 20.3, 16.9, and 32.1 per 100,000, respectively. Notable differences in CVD (all types), coronary heart disease, and myocardial infarction death rates exist between males and females, but not for stroke mortality or hypertension. CVD (all types), coronary heart disease, and myocardial infarction mortality among males in 2009 was 285.9, 155.8, and 50.0 per 100,000, respectively, compared to 194.9, 86.2, and 28.3 per 100,000, respectively, for females. From 1999 to 2009, Blacks or African Americans and non-Hispanics or Latinos had the highest death rates for the five CVD-related diseases among all reported races and ethnicities, respectively .. Also, from 1999 to 2009, Asians or Pacific Islanders had the lowest death rates for CVD (all types), coronary heart disease, and myocardial infarction; American Indians and Alaska Natives had the lowest death rates throughout this time period for stroke and hypertension (Exhibit 3).

Both coronary heart disease and stroke mortality have been declining over time in each of the 10 EPA Regions (Exhibits 4 and 5, respectively). In 1979, coronary heart disease and stroke age-adjusted death rates ranged from 285.6 (Region 10) to 401.9 (Region 2) per 100,000 and 80.3 (Region 2) to 111.4 (Region 4) per 100,000, respectively. In 1998, coronary heart disease and stroke death rates ranged from 145.6 (Region 8) to 233.2 (Region 2) per 100,000 and 43.2 (Region 2) to 68.5 (Region 10) per 100,000, respectively. The decreases in coronary heart disease and stroke mortality also appear to continue in the 1999-2009 period across all EPA regions. In 1999, coronary heart disease and stroke age-adjusted death rates ranged from 140.4 (Region 8) to 234.8 (Region 2) per 100,000 and 43.8 (Region 2) to 72.8 (Region 10) per 100,000, respectively. In 2009, coronary heart disease and stroke death rates ranged from 86.7 (Region 8) to 146.9 (Region 2) per 100,000 and 28.7 (Region 2) to 44.6 (Region 6) per 100,000, respectively.

Limitations

- Prevalence data reported in the NHIS are based on self-reported responses to specific questions pertaining to CVD-related illnesses, and are subject to the biases associated with self-reported data. Self-reported data can underestimate the disease prevalence being measured if, for whatever reason, the respondent is not fully aware of his/her condition.
- All prevalence data are based on crude rates and are not age-adjusted, as CDC did not report age-adjusted data prior to 2002 in the data sources used for this indicator. Because the possible influence of subgroup age structure has not been removed, the reported disease prevalence rates across time or within different race and gender subgroups may reflect differences in the age distribution of the populations being compared.
- For one or more years for which data are presented, coronary heart disease and stroke prevalence rates presented for Native Americans and Alaska Natives have a relative standard error of greater than 30 percent. As such, these rates do not meet the standard of reliability or precision, and were not displayed in Exhibit 1.
- CVD death rates are based on underlying cause of death as entered on a death certificate by a physician, medical examiner, or coroner. Some individuals may have had competing causes of death. When more than one cause or condition is entered by the physician, medical examiner, or coroner, the underlying cause is determined by the sequence of conditions on the certificate, provisions of the ICD [International Classification of Diseases], and associated selection rules and modifications (CDC, n.d.). Consequently, some misclassification of reported mortality might occur in individuals with competing causes of death, as well as the possible underreporting of CVD as the cause of death.
- The International Classification of Diseases 9th Revision (ICD-9) codes were used to specify

underlying cause of death for years 1979-1998. Beginning in 1999, cause of death is specified with the International Classification of Diseases 10th Revision (ICD-10) codes. The two revisions differ substantially, and to prevent confusion about the significance of any specific disease code, data queries are separate.

Data Sources

CVD prevalence data were obtained from annual reports published by NCHS (NCHS, 1999-2005, 2006a,b, 2007, 2009a,b, 2010, 2012), which summarize health statistics compiled from the NHIS (http://www.cdc.gov/nchs/products/series.htm). CVD mortality statistics were obtained from CDC's "compressed mortality" database, accessed through CDC WONDER (CDC, 2012) (http://wonder.cdc.gov/mortSQL.html). EPA Regional mortality statistics were generated by combining and age-adjusting state-by-state totals for each EPA Region using data from CDC WONDER.

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NCHS. 2006a. Summary health statistics for U.S. adults: National Health Interview Survey, 2005. Vital Health Stat. 10(232). http://www.cdc.gov/nchs/data/series/sr_10/sr10_232.pdf (PDF) (163 pp, 3.7MB).

NCHS. 2006b. Summary health statistics for U.S. adults: National Health Interview Survey, 2004. Vital Health Stat. 10(228). http://www.cdc.gov/nchs/data/series/sr_10/sr10_228.pdf (PDF) (164 pp, 3.8MB).

NCHS. 2005. Summary health statistics for U.S. adults: National Health Interview Survey, 2003. Vital Health Stat. 10(225). http://www.cdc.gov/nchs/data/series/sr_10/sr10_225.pdf (PDF) (161 pp, 3.8MB).

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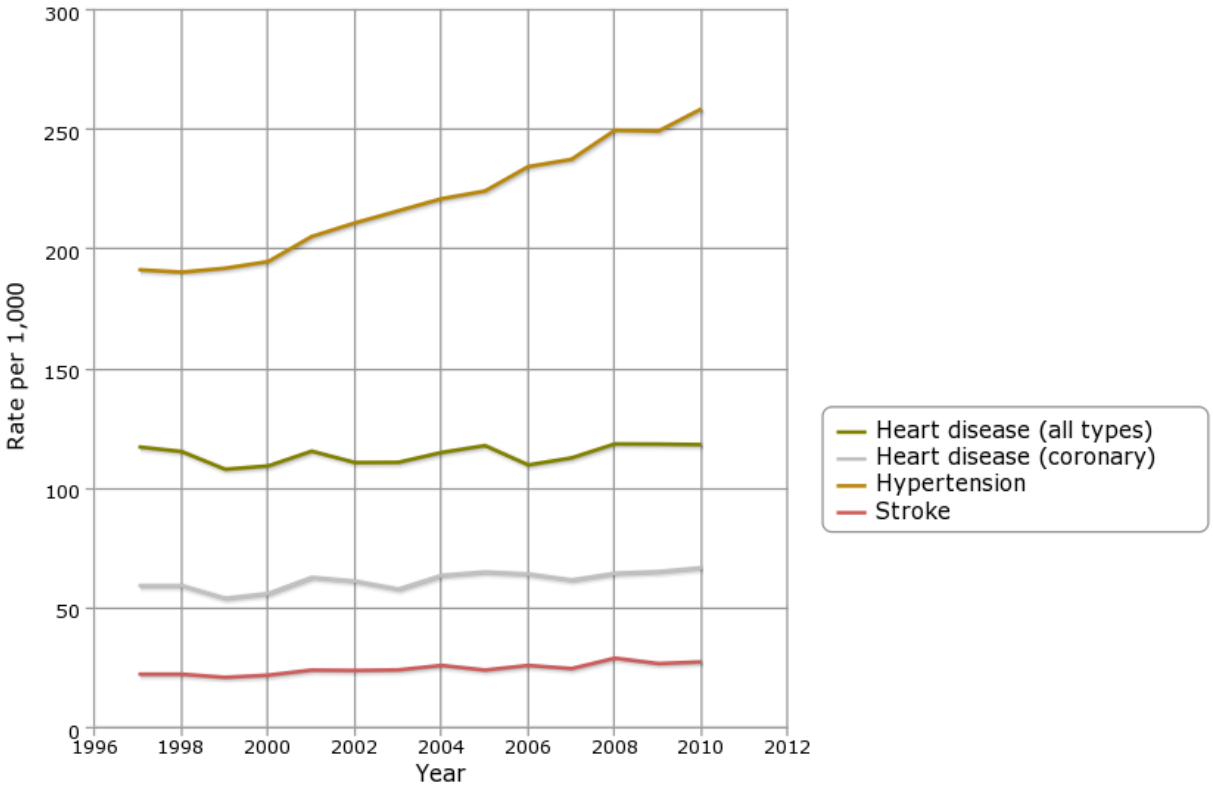
Exhibit 1. Cardiovascular disease prevalence in U.S. adults (age 18 and older) by sex, race, ethnicity, and age group, 1997-2010

All cases



Rates presented are crude rates.

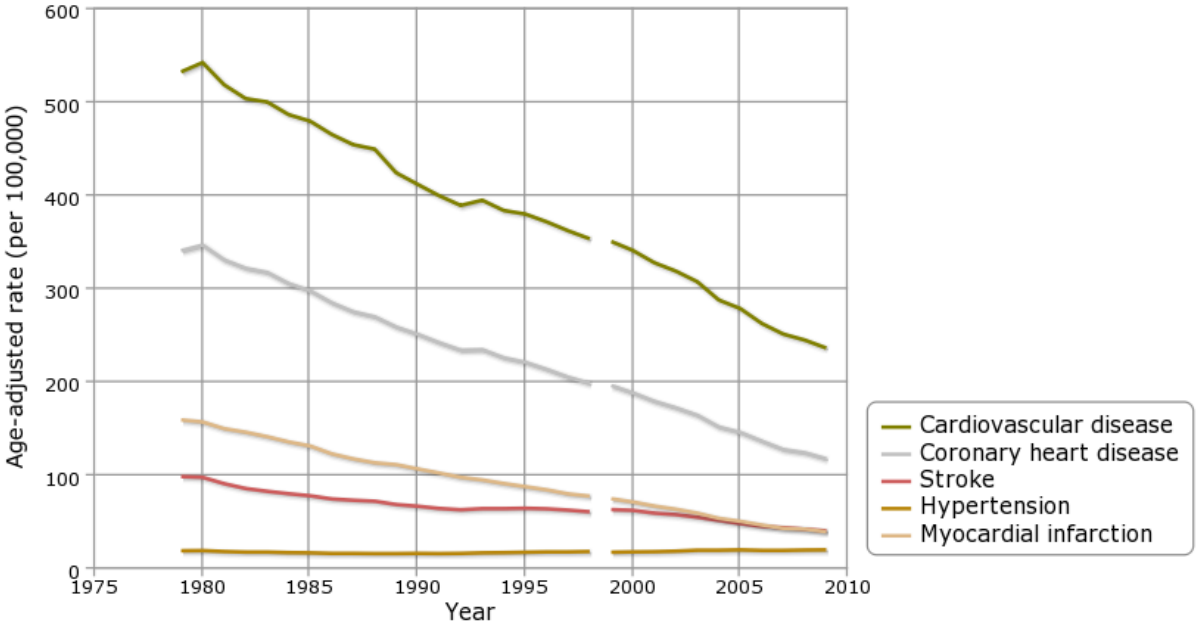
A few data points are not plotted because standards of reliability or precision were not met.

Information on the statistical significance of the trends in this exhibit is not presented here. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

Data source: NCHS, 2001–2005, 2006a,b, 2007, 2009a,b, 2010, 2012

Visit http://www.epa.gov/roe to see the full exhibit.

Exhibit 2. Age-adjusted cardiovascular disease death rates in the U.S., 1979-2009



Due to differences in the ICD system used for classifying mortalities, data from 1979–1998 should not be directly compared with data from 1999–2009 [ICD–9 codes: 390–434, 436–448 (1979–1998); ICD–10 codes: I00–I78 (1999–2009)].

Rates are age-adjusted to the 2000 U.S. standard population.

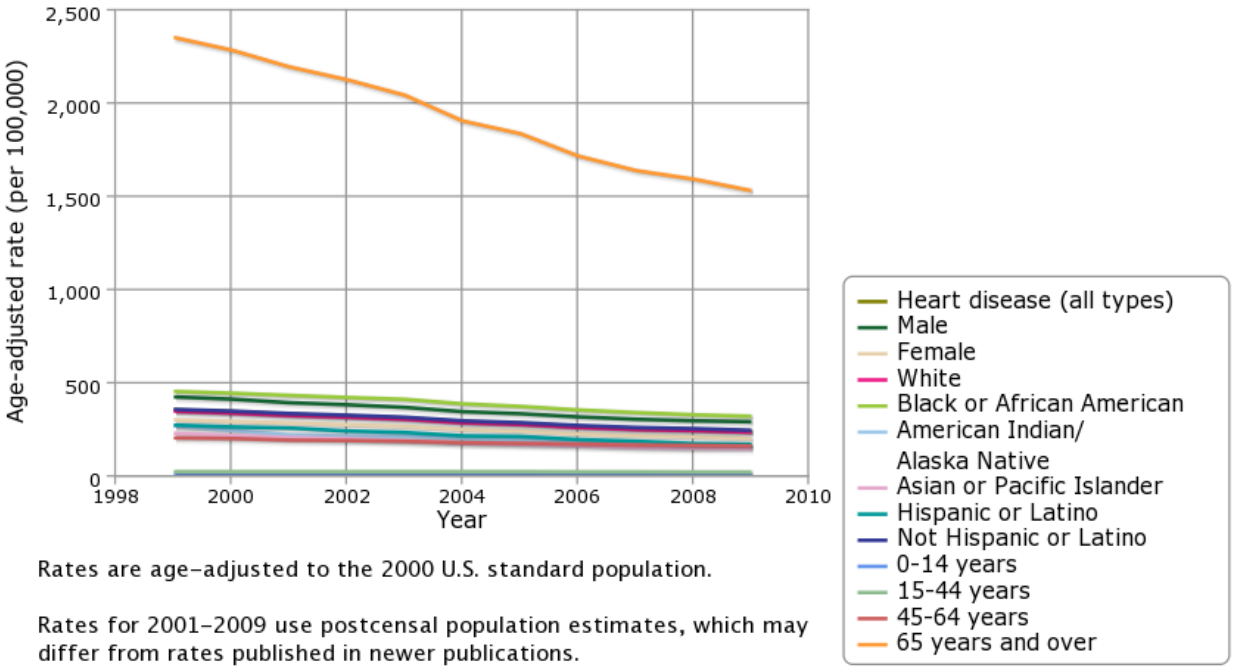
Rates for 2001–2009 use postcensal population estimates, which may differ from rates published in newer publications.

Information on the statistical significance of the trends in this exhibit is not presented here. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

Data source: CDC, 2012

Exhibit 3. Age-adjusted cardiovascular disease death rates in the U.S. by sex, race, ethnicity, and age group, 1999-2009

Heart disease (all types)



Rates are age-adjusted to the 2000 U.S. standard population.

Rates for 2001–2009 use postcensal population estimates, which may differ from rates published in newer publications.

Age-adjusted death rates for American Indian/Alaska Natives, Asians or Pacific Islanders, and Hispanics or Latinos are underestimates resulting from an underreporting on death certificates and undercounts in censuses for these groups.

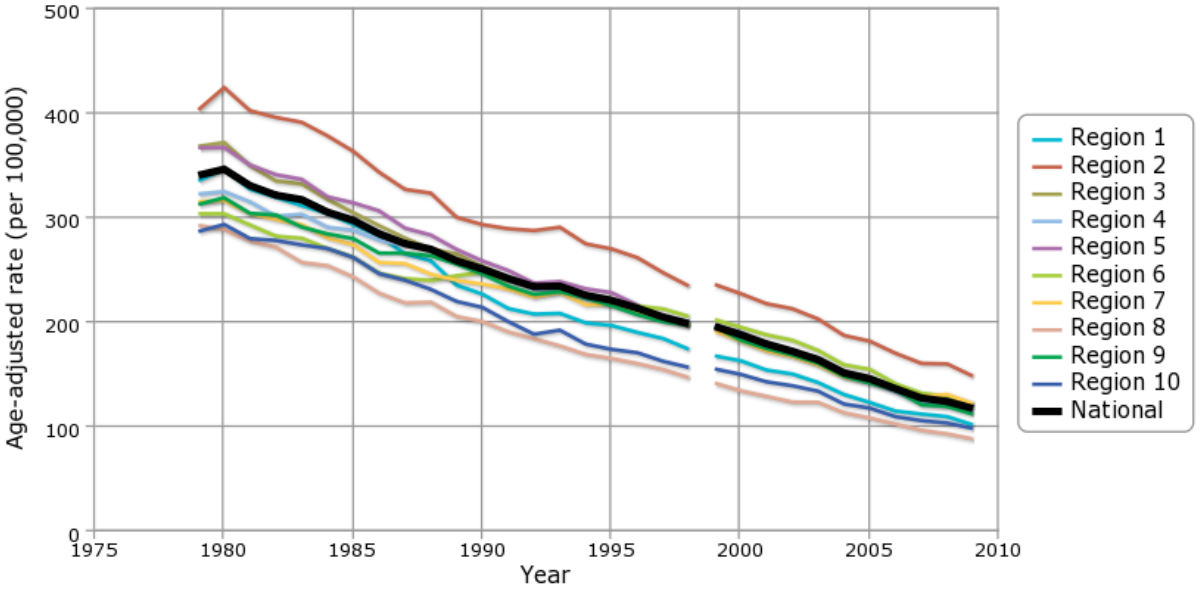
Some data points for age group 0–14 are not plotted because standards of reliability were not met.

Information on the statistical significance of the trends in this exhibit is not presented here. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

Data source: CDC, 2012

Visit http://www.epa.gov/roe to see the full exhibit.

Exhibit 4. Age-adjusted coronary heart disease death rates in the U.S. by EPA Region, 1979-2009



Due to differences in the ICD system used for classifying mortalities, data from 1979–1998 should not be directly compared with data from 1999–2009 [ICD-9 codes: 410–414, 429.2 (1979–1998); ICD-10 codes: I20–I25 (1999–2009)].

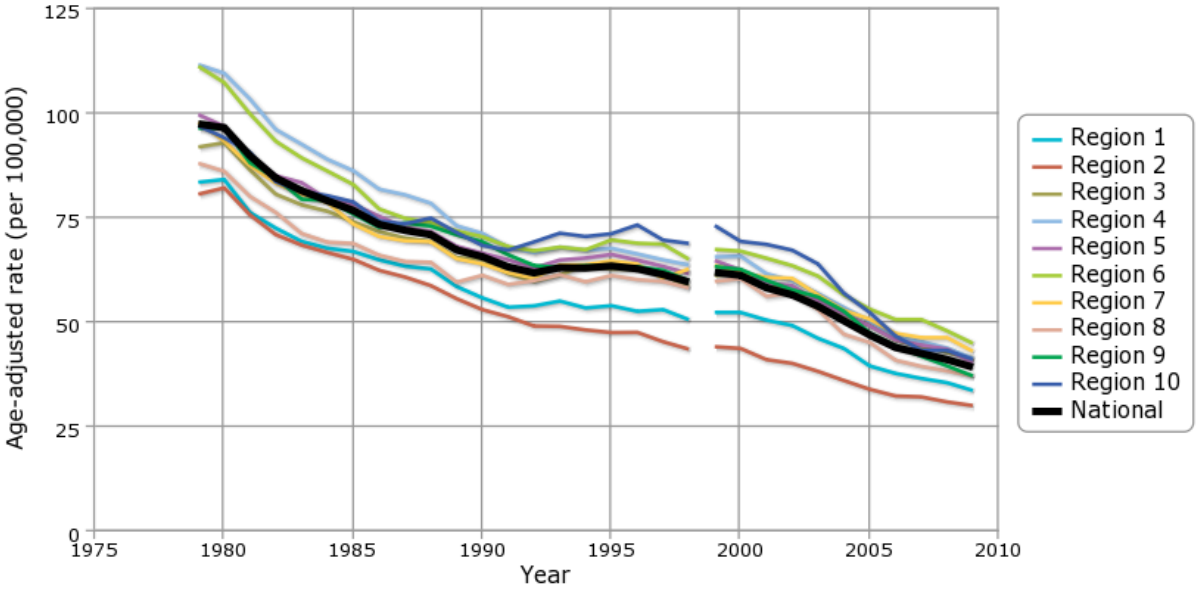
Rates are age-adjusted to the 2000 U.S. standard population.

Rates for 2001–2009 use postcensal population estimates, which may differ from rates published in newer publications.

Information on the statistical significance of the trends in this exhibit is not presented here. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

Data source: CDC, 2012

Exhibit 5. Age-adjusted stroke death rates in the U.S. by EPA Region, 1979-2009



Due to differences in the ICD system used for classifying mortalities, data from 1979–1998 should not be directly compared with data from 1999–2009 [ICD-9 codes: 430–434, 436–438 (1979–1998); ICD-10 codes: I60–I69 (1999–2009)].

Rates are age-adjusted to the 2000 U.S. standard population.

Rates for 2001–2009 use postcensal population estimates, which may differ from rates published in newer publications.

Information on the statistical significance of the trends in this exhibit is not presented here. For more information about uncertainty, variability, and statistical analysis, view the technical documentation for this indicator.

Data source: CDC, 2012