

## 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, 2016a). 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 (American Heart Association, 2016b; NIH, 2004). Since 1900, CVD has been the leading cause of death in the U.S. every year except 1918 (American Heart Association, 2016a) ([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, poor nutrition, and being overweight or obese (American Heart Association, 2016a; CDC, 2004).

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 (American Lung Association, 2016; Brook et al., 2010; U.S. EPA, 2009, 2013). 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 (HHS, 2006; 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 2002 and 2015 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 2015. 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 to 2015, when data are available to compare more races and ethnicities. The NVSS registers virtually all deaths and births nationwide 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 9<sup>th</sup> Revision (ICD-9) codes for 1979-1998 and the International Classification of Diseases 10<sup>th</sup> Revision (ICD-10) codes beginning in 1999.

### What the Data Show

#### *CVD Prevalence*

Among adults 18 years and older, the age-adjusted prevalence of coronary heart disease and stroke between 2002 and 2015 has remained essentially the same. In contrast, the prevalence of hypertension showed a general increase from 2002 to 2008, but has fluctuated since then (Exhibit 1).

Sex, race, ethnicity, and age differences in CVD prevalence exist. The age-adjusted prevalence of coronary heart disease is consistently higher among males than among females (72 cases per 1,000 for men compared with 43 cases per 1,000 for women in 2015). The prevalence of hypertension and stroke varies by year, with rates among women higher some years while other years' rates were higher among men. 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).

In 2015, the prevalence of coronary heart disease across races was highest among American Indians and Alaska Natives (93 cases per 1,000), followed by Whites (56 cases per 1,000), Blacks or African Americans (54 cases per

1,000), and Asians (37 cases per 1,000). Between 2002 and 2015, Blacks or African Americans consistently had the highest prevalence of hypertension (344 cases per 1,000 in 2015). Asians consistently had the lowest prevalence of hypertension (206 cases per 1,000 in 2015) among the racial groups reported. Asians had the lowest prevalence of stroke (14 cases per 1,000 in 2015) except for three years (2002, 2007, and 2011) when Whites had the lowest rates. When taking only ethnicity into account, the Hispanic or Latino population had a consistently lower prevalence of heart disease (all types), coronary heart disease, and hypertension from 2002-2015, but rates fluctuated for stroke, when compared with the non-Hispanic or Latino population. In 2015, prevalence in Hispanics or Latinos was lower than in non-Hispanics or Latinos for coronary heart disease (51 versus 56 cases per 1,000, respectively), hypertension (230 versus 254 cases per 1,000, respectively), and stroke (24 cases versus 25 cases per 1,000) (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 continued from 1999 to 2014, with the rate dropping from 349.3 per 100,000 in 1999 to 218.6 per 100,000 in 2014, but then increased in 2015 to a rate of 221.5 per 100,000. 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. 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 coronary heart disease and myocardial infarction continued to be observed between 1999 and 2015. For stroke mortality, the age-adjusted rate ranged from 97.1 per 100,000 in 1979 to 59.3 per 100,000 in 1998. A decline in stroke mortality was also seen from 1999 through 2013, but then slightly increased in 2014 and again in 2015. The age-adjusted death rates for coronary heart disease, stroke, and myocardial infarction in 2015 were 97.2, 37.6, and 30.3 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 2015, 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 2015 from 15.8 per 100,000 to 21 per 100,000 (Exhibit 2).

Differences exist in CVD death rates among age, sex, ethnicity, and race groups. For example, in 2015, those aged 65 and older had the highest CVD (all types), coronary heart disease, stroke, hypertension, and myocardial infarction mortality (1,429.9, 618.9, 256.0, 122.8, and 183.3 per 100,000, respectively). Also in 2015, 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 150.8, 75.3, 19.1, 19.6, and 27.9 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 2015 was 266.6, 131.2, and 40.0 per 100,000, respectively, compared to 184.4, 70.5, and 22.3 per 100,000, respectively, for females. From 1999 to 2015, 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 2015, 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, except for hypertension in 2005, 2006, 2010, and from 2012 to 2015, when Asians or Pacific Islanders had the lowest death rates (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 overall decreases in coronary heart disease and stroke mortality also appear to continue in the 1999-2014 period across all EPA regions; however, slight increases occurred in 2015 for coronary heart disease mortality in Region 9 and stroke mortality in several EPA regions (1, 3, 4, 5, 6, and 9) and nationwide. 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 2015, coronary heart disease and stroke death rates ranged from 76.7 (Region 10) to 116.1 (Region 2) per 100,000 and 27.6 (Region 2) to 42.8 (Regions 4 and 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.

- 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, 2017). 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 9<sup>th</sup> 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 10<sup>th</sup> 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 and standalone tables published by NCHS (NCHS, 2004, 2005, 2006a,b, 2007, 2009a,b, 2010, 2012a,b, 2014, 2015a,b, 2016), which summarize health statistics compiled from the NHIS <https://www.cdc.gov/nchs/products/series.htm>. CVD mortality statistics were obtained from CDC's "compressed mortality" database, accessed through CDC WONDER (<https://wonder.cdc.gov/mortSQL.html>) (CDC, 2016). 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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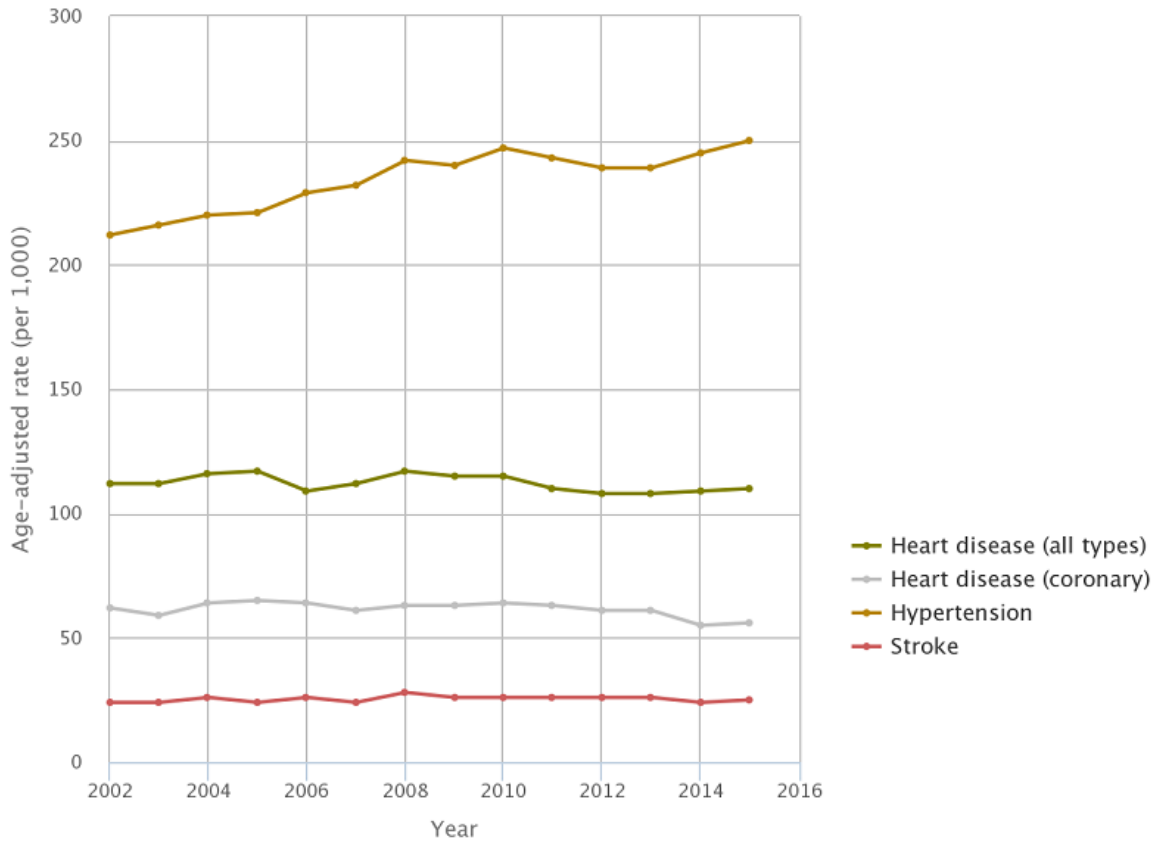
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### Exhibit 1. Age-adjusted cardiovascular disease prevalence in U.S. adults (age 18 and older) by sex, race, ethnicity, and age group, 2002–2015

All cases



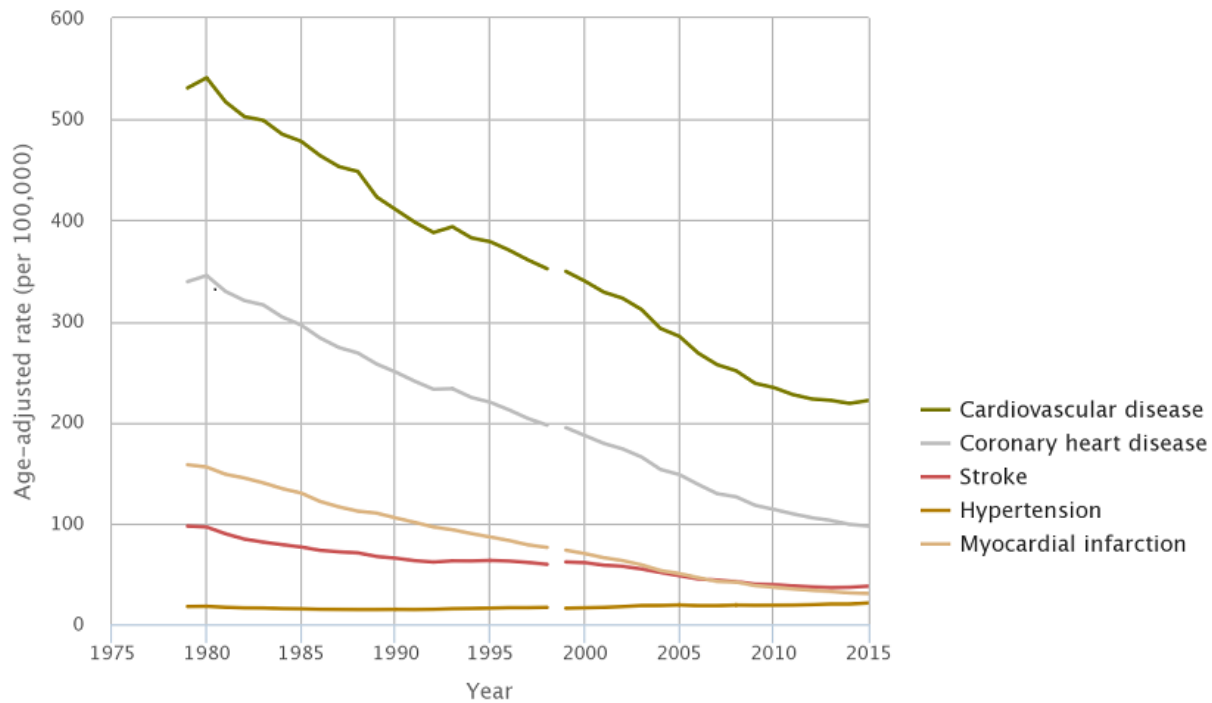
Rates are age-adjusted to the 2000 U.S. standard population.

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, 2004, 2005, 2006a,b, 2007, 2009a,b, 2010, 2012a,b, 2014, 2015a,b, 2016

Visit <https://www.epa.gov/roe> to see the full exhibit.

## Exhibit 2. Age-adjusted cardiovascular disease death rates in the U.S., 1979-2015



Due to differences in the ICD system used for classifying mortalities, data from 1979-1998 should not be directly compared with data from 1999-2015 [ICD-9 codes: 390-434, 436-448 (1979-1998); ICD-10 codes: I00-I78 (1999-2015)].

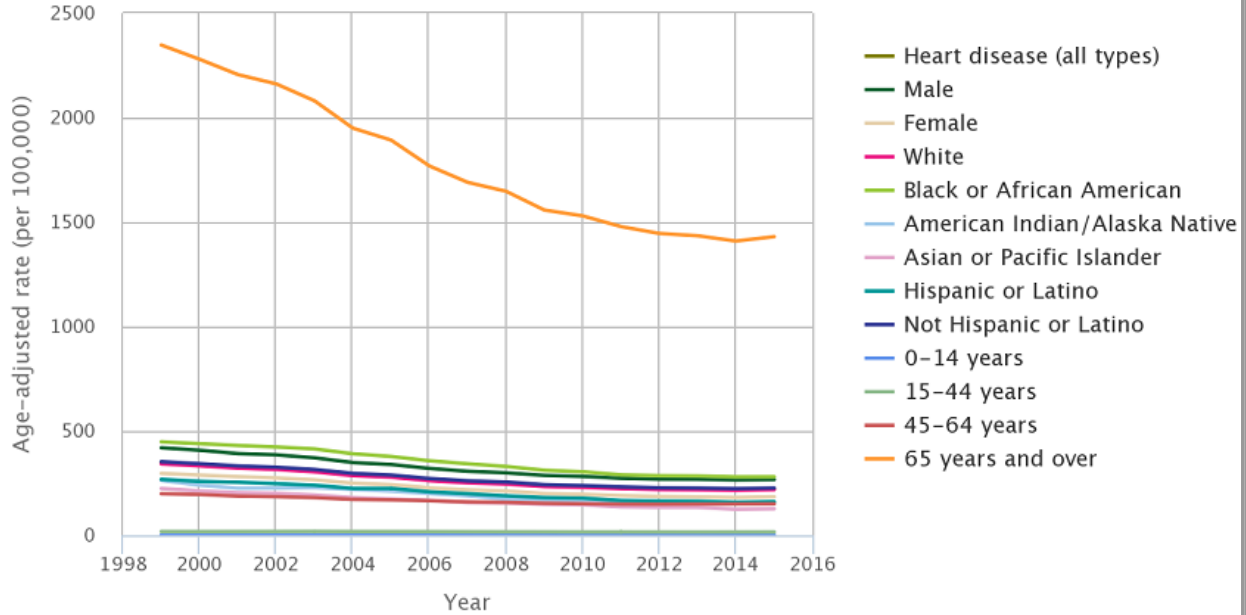
Rates are age-adjusted to the 2000 U.S. standard population.

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, 2016

### Exhibit 3. Age-adjusted cardiovascular disease death rates in the U.S. by sex, race, ethnicity, and age group, 1999-2015

#### Heart disease (all types)



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

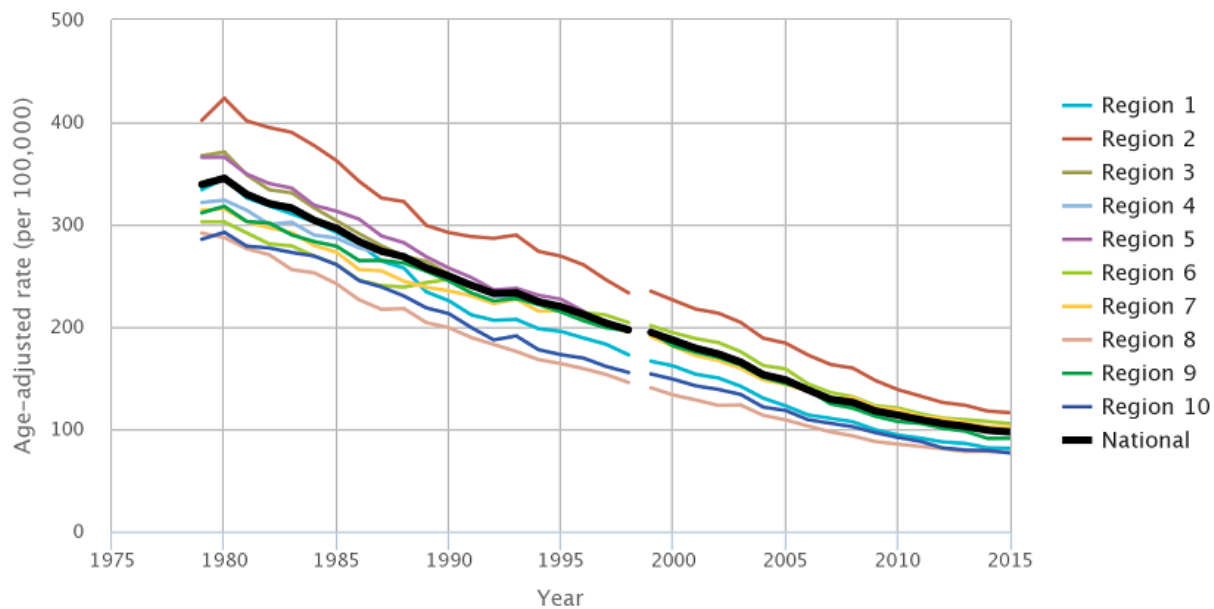
Age-adjusted death rates for American Indian/Alaska Natives, Asians or Pacific Islanders, and Hispanics or Latinos are underestimates resulting from an underreporting on death certificates and undercounts in censuses for these groups.

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, 2016

Visit <https://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, 1979–2015



Due to differences in the ICD system used for classifying mortalities, data from 1979–1998 should not be directly compared with data from 1999–2015 [ICD-9 codes: 410–414, 429.2 (1979–1998); ICD-10 codes: I20–I25 (1999–2015)].

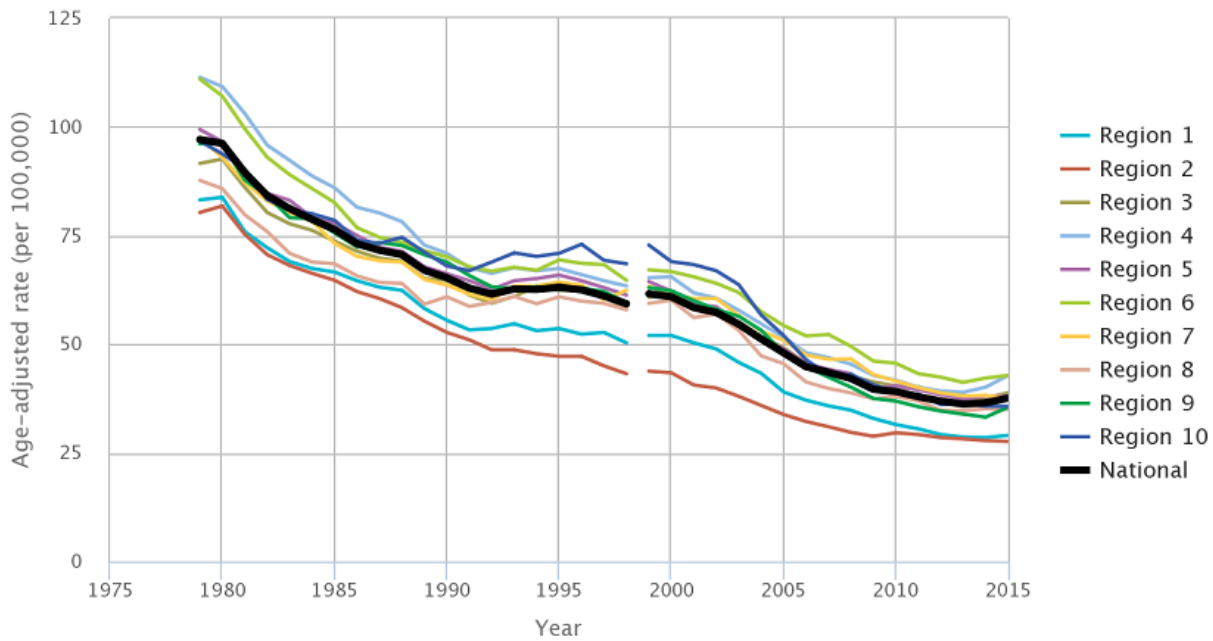
Rates are age-adjusted to the 2000 U.S. standard population.

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, 2016



**Exhibit 5. Age-adjusted stroke death rates in the U.S. by EPA Region, 1979–2015**



Due to differences in the ICD system used for classifying mortalities, data from 1979–1998 should not be directly compared with data from 1999–2015 [ICD-9 codes: 430–434, 436–438 (1979–1998); ICD-10 codes: I60–I69 (1999–2015)].

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

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, 2016