

A swim team works out at a public pool
in the District of Columbia.



© Rick Reinhard

1 Racial and Ethnic Disparities in Stroke

The disparities in stroke death rates between blacks and whites in the United States have been well documented, with blacks consistently having dramatically higher stroke death rates than whites.^{1–4} The national health agenda outlined in *Healthy People 2000* called for a 49% reduction in age-adjusted stroke death rates from 1987 through 2000 for blacks and a 34% reduction for the total population.⁵ Neither of these objectives have been met. During 1990–1998, stroke death rates decreased only 11% for blacks and 9% for the total population.⁶ Although the amount of the reduction was slightly greater for blacks than whites, the substantial gap between age-adjusted stroke death rates (for those ages 35 years and older) for blacks (156/100,000) and whites (113/100,000) still existed in 1998.

Disparities in stroke death rates among other racial and ethnic groups in the United States have not been examined as extensively, but a 2001 study indicated substantial gaps among the largest racial and ethnic groups in the United States.⁷ The largest disparities occurred among adults ages 35–64 years. To address these problems, the Department of Health and Human Services launched the Initiative to Eliminate Racial and Ethnic Disparities in Health in 1998. This initiative seeks to eliminate disparities in six targeted health status areas, including heart disease and stroke. In addition, one of the two overarching goals of the updated *Healthy People 2010* is to “eliminate health disparities among segments of the population including differences that occur by gender, race or ethnicity, education or income, disability, geographic location, or sexual orientation.”⁸

In this section, we provide information regarding racial and ethnic disparities in the distribution of types of stroke (i.e., hemorrhagic and ischemic) and the age distribution

of stroke deaths. We also present frequency distributions of county death rates for the following racial and ethnic groups: American Indians and Alaska Natives, Asians and Pacific Islanders, blacks, Hispanics, and whites (see Appendix B for definitions of these groups). We use the terms “black” and “African American,” as well as the terms “Latina/Latino” and “Hispanic,” interchangeably throughout this publication.

The Social Construction of Race

Like several experts in human evolution, we recognize race and ethnicity as valid scientific categories, but not as valid biological or genetic categories.^{9–10} The health sciences include both biological and social sciences, and from a social science perspective, racial and ethnic categories reflect the reality of socially distinct groups in the United States. Ethnic groups typically share certain characteristics, such as culture and language, and they are often multiracial. Contemporary race divisions are the result of historical events—in particular, the often hostile encounters (e.g., wars, colonizations) between population groups that were formerly isolated geographically.

Differences in physical appearance between population groups engaged in political conflict have often acquired inflated social significance compared with differences in physical appearance among individuals of the same group. The idea that geographically defined human social groups, such as “Africans” or “Japanese,” were actually biologically and genetically distinct human “races” or “subspecies” gained popular credence in the nineteenth and early twentieth centuries.¹¹ Most of the scientific evidence generated during those times to support theories of biologically distinct human races has since been discredited and disavowed by many scientists.^{11–13} These

scientists have demonstrated that the significance attributed to these physical characteristics is wholly social and historical in origin and does not reflect biologically or genetically important differences among people.²

Empirical evidence from population biology demonstrates why the theory of genetically distinct races is incorrect. First, all human beings share the same genes. This is what defines us as a species. We all have two copies of essentially all genes because our chromosomes come in pairs—one inherited from our mother, the other inherited from our father. Slight variations in the form, and sometimes the function, of individual genes do exist in human populations. These gene variations are called alleles. However, 75% of all human genes are monomorphic, meaning that only one allele exists in all people.⁹ Only a tiny fraction of all human alleles affect gene function in a way that leads to disease. Most importantly, no specific alleles (whether detrimental, beneficial, or neutral) have been proven to exist only in one racial or ethnic population and not in others. For example, the allele of the hemoglobin gene that leads to sickle cell disease, typically thought to be solely found in Africans, is also found in some Asian populations. It is also important to note that the genetic variation within each racial group is larger than the variation between racial groups.¹³

In summary, the five racial and ethnic groups described in this *Atlas of Stroke Mortality* are socially, but not biologically, distinct groups. Moreover, we recognize that each of these broad racial and ethnic groups includes people of tremendous diversity with regard to culture, socioeconomic status, heritage, and area of residence. If we accept the idea that different racial and ethnic groups do not vary systematically in their inherent genetic suscepti-

bility to disease, then to what can we attribute racial and ethnic disparities in stroke death rates? Current research suggests a number of possibilities, including differences in social class, culture, behavioral risk factors, psychosocial risk factors, and the direct effects of racism, segregation, and discrimination.¹⁴

Misreporting of Race and Ethnicity on Death Certificates

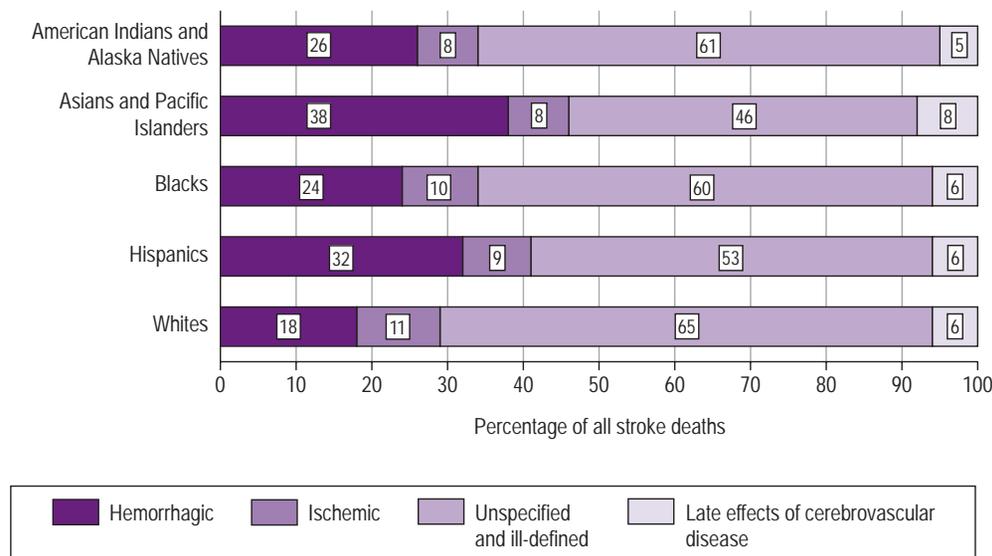
An important concern when examining racial and ethnic disparities in stroke death rates is the accuracy of race and ethnicity information reported on death certificates. If a close family member is not available to report the race and ethnicity of the decedent, then the person filling out the death certificate (e.g., medical examiner, funeral director) must rely on factors such as physical appearance and surname to determine race and ethnicity. Separate entries are available for race (American Indian or Alaska Native, Asian or Pacific Islander, black, and white) and Hispanic origin (yes or no).

Unfortunately, evidence from several studies indicates that race and ethnicity are not always reported accurately on death certificates.^{15–19} In some instances, American Indians and Alaska Natives, as well as Asians and Pacific Islanders, are mistakenly identified as white, and Hispanics are mistakenly reported as non-Hispanics. This misreporting results in artificially low death rates for those minority groups. Race is rarely misreported for blacks. Misreporting of race and ethnicity on death certificates does not significantly increase death rates for whites given the small number of decedents who are misidentified as white on their death certificates relative to the large white population.

One study compared racial and ethnic information from the Current Population Survey (a monthly survey conducted by the Bureau of the Census) with similar data on death certificates for 43,000 people who died during 1979–1985.¹⁵ The study reported that race was coded incorrectly on death certificates for 0.8% of whites, 1.8% of blacks, 17.6% of Asians and Pacific Islanders, and 26.6% of American Indians and Alaska Natives. Hispanic ethnicity was miscoded for 10.3% of persons who self-identified as Hispanic on the survey, with the greatest errors reported among those who identified themselves as Cuban or “other Hispanic.”

A similar study reported high rates of disagreement between case reports for people who died of acquired immunodeficiency syndrome (AIDS) and death certificates for American Indians and Alaska Natives (46%), Asians and Pacific Islanders (12%), and Hispanics (14%).¹⁶ A study of infant mortality in California reported substantial underestimation of rates for American Indians and Asians.¹⁷ Correct reporting of American Indian origin on death certificates was found to be associated with tribal affiliation and percentage of American Indian ancestry in a study that linked Indian Health Service records and death certificates in Washington State.¹⁸

Figure 1.1
Categories of Stroke Deaths
Among People Ages ≥35 Years,
by Racial and Ethnic Group,
1991–1998



A recent report from CDC’s National Center for Health Statistics estimates that if misreporting of race and ethnicity on death certificates and population undercounts in census files were corrected, national death rates (for all causes of death combined) would be 21% higher than currently reported for American Indians and Alaska Natives, 11% higher for Asians and Pacific Islanders, and 2% higher for Hispanics.¹⁹ No studies to date have evaluated the extent of geographic variation in the accuracy of reporting race and ethnicity on death certificates or in the degree of population undercounts.

Specific Categories of Stroke Deaths

There are two main types of stroke: ischemic and hemorrhagic. Ischemic strokes are caused by a blockage of the arterial blood supply to the brain. According to research

studies in which detailed tests were performed to determine the type of stroke, 70%–80% of all stroke deaths are ischemic.²⁰ Hemorrhagic strokes are less prevalent but more lethal. Hemorrhagic strokes occur when blood vessels rupture and cause bleeding either in the brain or the space between the brain and the skull.

The percentage of definite hemorrhagic strokes varied substantially among racial and ethnic groups (Figure 1.1). Asians and Pacific Islanders had the largest percentage (38%), followed by Hispanics (32%), American Indians and Alaska Natives (26%), blacks (24%), and whites (18%). The range of percentages for definite ischemic stroke was much narrower—from 8% for American Indians and Alaska Natives and Asians and Pacific Islanders to 11% for whites. Unspecified and ill-defined stroke deaths accounted for a large percentage of stroke deaths among all racial and ethnic groups. This was due in part to the low rate of CT scans performed on people who died of a stroke and the difficulty in accurately diagnosing the exact type of stroke in the absence of a CT scan.

Age Distribution of Stroke Deaths

Stroke death rates increase dramatically with age, but there are substantial racial and ethnic disparities in the age distribution of stroke deaths (Figure 1.2). Among whites, only 25% of stroke deaths occurred before age 75; among the other racial and ethnic groups, the percentage of deaths before age 75 ranged from 45% for Asians and Pacific Islanders to 49% for blacks. For each of the younger adult age groups, whites consistently experienced a relatively smaller proportion of total stroke deaths.

Trends in Stroke Death Rates During 1991–1998

Although stroke death rates declined substantially in the 1970s and 1980s, the rate of decline slowed in the 1990s.²¹ Trend data presented in this publication indicate that stroke death rates for all racial and ethnic groups declined little in the 1990s for people ages 35 years and

Figure 1.2
Age Distribution of Stroke Deaths
Among People Ages ≥35 Years,
by Racial and Ethnic Group,
1991–1998

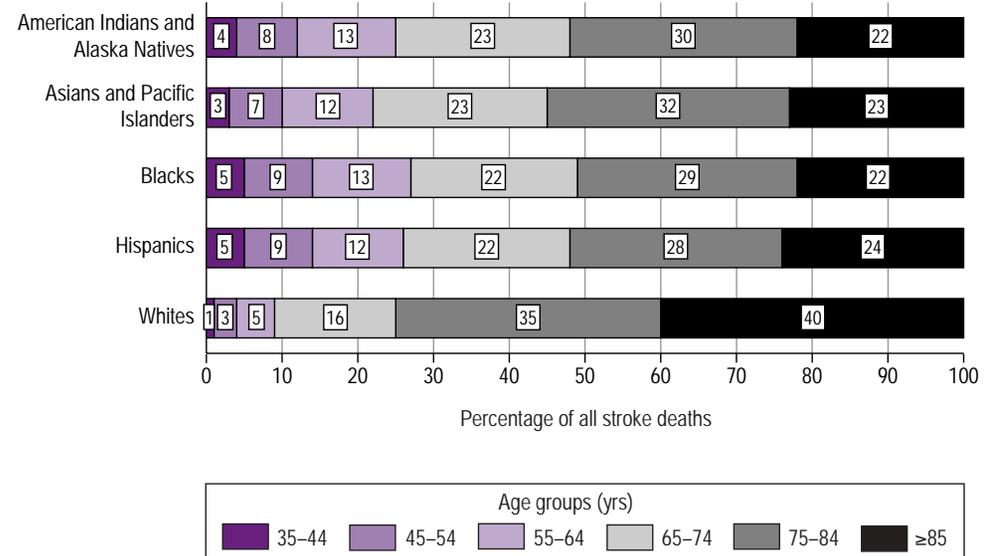
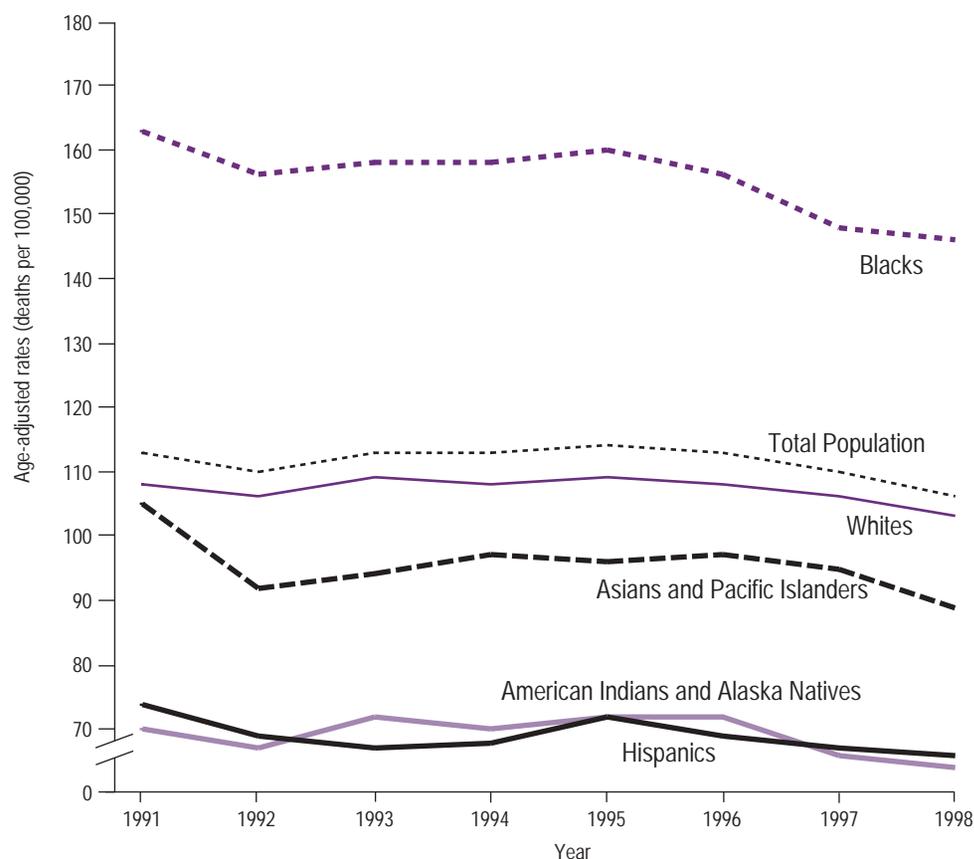


Figure 1.3
Trends in Stroke Death Rates
Among People Ages ≥ 35 Years,
by Racial and Ethnic Group,
1991–1998



older (Figure 1.3). On average, stroke death rates during 1991–1998 fell only 0.8% per year for all racial and ethnic groups combined. (The average annual percentage change in death rate was calculated by subtracting the 1991 rate from the 1998 rate, dividing by the 1991 rate, and then dividing by 7.) The largest declines were experienced by Asians and Pacific Islanders (2.0% per year),

followed by Hispanics and blacks (1.4% per year for both groups). American Indians and Alaska Natives experienced a decline of only 1.1% per year, and whites experienced a decline of 0.8% per year.

In addition, disparities in the level of stroke death rates among the five racial and ethnic groups were observed during 1991–1998 (Figure 1.3). African Americans experienced dramatically higher death rates than the other groups. Rates for whites were the next highest, followed by those for Asians and Pacific Islanders. Hispanics and American Indians and Alaska Natives had the lowest rates, and their rates were similar. Throughout this period, the differences between the lowest rates (Hispanics, American Indians and Alaska Natives) and the highest rates (blacks) were more than twofold.

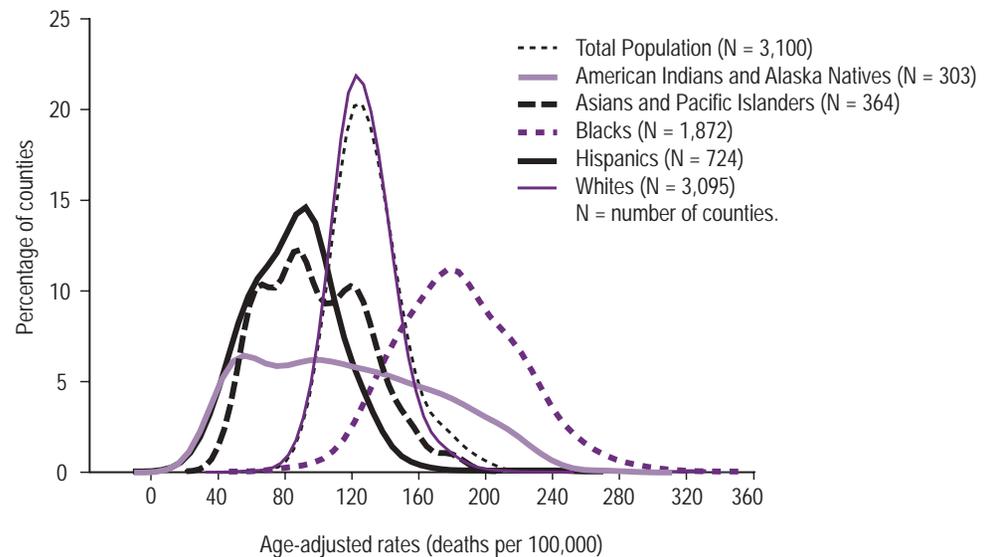
In 1998, stroke death rates for blacks were 2.1 times higher than the rates for Hispanics and American Indians and Alaska Natives, 1.6 times higher than the rates for Asians and Pacific Islanders, and 1.4 times higher than the rates for whites. However, as discussed previously, death rates for American Indians and Alaska Natives, Asians and Pacific Islanders, and Hispanics may be underestimated because of misreporting of race and ethnicity on death certificates. Furthermore, the relatively low stroke death rates for Asians and Pacific Islanders mainly reflect the mortality experience of Asians because Pacific Islanders make up only 5% of this population. Mortality studies conducted in the 1980s and 1990s reported that stroke death rates among Native Hawaiians were higher than those among Chinese, Filipino, and Japanese people living in Hawaii.^{22,23}

County Variations in Stroke Death Rates

County distributions of stroke death rates highlight the geographic disparities in the burden of stroke for each racial and ethnic group during 1991–1998 (Figure 1.4). Examination of the tails of the distributions suggests there is little overlap in the county rates for Hispanics and African Americans. In other words, the highest county stroke death rates for Hispanics were among the lowest for blacks. For whites, the high end of the distribution tail is near the midpoint in the distribution of county rates for African Americans.

The peaks in each distribution's graph indicate the most common county stroke death rates for the corresponding racial or ethnic group. The distribution of county stroke death rates for American Indians and Alaska Natives is much broader than for other groups, with no clear peak. This distribution highlights the magnitude of the geographic variation in the burden of stroke across the many Tribal Nations that were combined into one category (i.e., American Indians and Alaska Natives), given current procedures for reporting race and ethnicity on death certificates.

Figure 1.4
Frequency Distribution of Smoothed
County Stroke Death Rates
Among People Ages ≥ 35 Years,
by Racial and Ethnic Group,
1991–1998



1. Cooper R, Sempos C, Hsieh SC, Kovar MG. Slowdown in the decline of stroke mortality in the United States, 1978–1986. *Stroke* 1990;21(9):1274–9.
2. Soltero I, Liu K, Cooper R, Stamler J, Garside D. Trends in mortality from cerebrovascular diseases in the United States, 1960 to 1975. *Stroke* 1978;9(6):549–58.
3. Gaines K, Burke G. Ethnic differences in stroke: black-white differences in the United States population. SECORDS investigators. Southeastern Consortium on Racial Differences in Stroke. *Neuroepidemiology* 1995;14(5):209–39.
4. Gillum RF. Stroke in blacks. *Stroke* 1988;19(1):1–9.
5. US Department of Health and Human Services. *Healthy people 2000: national health promotion and disease prevention objectives*. Washington, DC: US Department of Health and Human Services, Public Health Service; 1991.
6. Keppel KG, Percy JN, Waegner DK. Trends in racial and ethnic-specific rates for the health status indicators: United States, 1990–98. *Healthy People 2000 Statistical Notes* 2002;23:1–16.
7. Ayala C, Greenlund KJ, Croft JB, et al. Racial/ethnic disparities in mortality by stroke subtype in the United States, 1995–1998. *American Journal of Epidemiology* 2001;154(11):1057–63.
8. US Department of Health and Human Services. *Healthy people 2010*. 2nd ed. With understanding and improving health and objectives for improving health. 2 vols. Washington, DC: US Government Printing Office; November 2000.
9. Lewontin RC. *Human diversity*. New York: Scientific American Books; 1995.
10. Gould SJ. *The Mismeasure of man*. New York: WW Norton & Company; 1981.
11. Smedley A. *Race in North America: origin and evolution of a worldview*. Boulder: Westview Press; 1993.
12. Freeman HP. The meaning of race in science—considerations for cancer research: concerns of special populations in the National Cancer Program. *Cancer* 1998;82(1):219–25.
13. Cooper R. A note on the biologic concept of race and its application in epidemiologic research. *American Heart Journal* 1984;108(3 pt 2):715–22.
14. Williams DR, Collins C. U.S. socioeconomic and racial differences in health: patterns and explanations. *Annual Review of Sociology* 1998;21:349–86.
15. Sorlie PD, Rogot E, Johnson NJ. Validity of demographic characteristics on the death certificate. *Epidemiology* 1992;3(2):181–4.
16. Kelly JJ, Chu SY, Diaz T, Leary LS, Buehler JW. Race/ethnicity misclassification of persons reported with AIDS: The AIDS Mortality Project Groups and The Supplement to HIV/AIDS Surveillance Project Group. *Ethnicity and Health* 1996;1(1):87–94.
17. Farley DO, Richards T, Bell RM. Effects of reporting methods on infant mortality rate estimates for racial and ethnic subgroups. *Journal of Health Care for the Poor and Underserved* 1998;6(1):60–75.
18. Frost F, Tollestrup K, Ross A, Sabotta E, Kimball E. Correctness of racial coding of American Indians and Alaska Natives on the Washington State death certificate. *American Journal of Preventive Medicine* 1994;10(5):290–4.
19. Rosenberg HM, Maurer JD, Sorlie PD, et al. Quality of death rates by race and Hispanic origin: a summary of current research, 1999. *Vital and Health Statistics Reports: Series 2, Data Evaluation and Methods Research* 1999;128:1–13.
20. Rosamond WD, Folsom AR, Chambless LE, et al. Stroke incidence and survival among middle-aged adults: 9-year follow-up of the Atherosclerosis Risk in Communities (ARIC) cohort. *Stroke* 1999;30(4):736–43.
21. Cooper R, Cutler J, Desvigne-Nickens P, et al. Trends and disparities in coronary heart disease, stroke and other cardiovascular disease in the United States: findings of the National Conference on Cardiovascular Disease Prevention. *Circulation* 2000;102(25):3137–47.
22. Blaisdell RK. The health status of Kanaka Maoli (indigenous Hawaiians). *Asian American and Pacific Islander Journal of Health* 1993;1(2):116–60.
23. Blaisdell RK. 1995 update on Kanaka Maoli (indigenous Hawaiian) health. *Asian American and Pacific Islander Journal of Health* 1996;4(1–3):160–5.

