

1 Introduction

During the last four decades, significant changes have occurred in the health of American Indian and Alaska Native (AI/AN) people. Although infectious diseases such as tuberculosis and gastroenteritis were rampant among Native Americans in the first half of the 20th century, they are no longer ranked in the leading causes of death and disability for this population.¹ With many infectious diseases under control today, AI/AN people are living longer. Like many other Americans, they are now experiencing chronic diseases such as heart disease and stroke as dominant risks to their health and longevity.

Disease Burden

Heart disease and stroke are the first and sixth leading causes of death, respectively, among AI/AN people,² as well as major causes of disability. Mortality trends for heart disease indicate that the rate of decline among AI/AN people has been relatively slow since 1972, with virtually no decline from 1989 through 1997.² This trend is in stark contrast to the large declines in heart disease mortality reported for the total U.S. population since the early 1970s.^{2,3} Consequently, although heart disease death rates for AI/AN people were 21% lower than the total U.S. population in the early 1970s, they were 20% higher by the late 1990s.²

A similar trend exists for stroke mortality. From 1972 through 1985, stroke death rates for AI/AN people declined, but at a slower rate than that reported for the total U.S. population.² From 1985 through 1997, virtually no decline in stroke death rates was reported for the AI/AN population. By the end of the 1990s, stroke death rates were 14% higher for AI/AN people than for the total U.S. population.²

Recent studies of individual AI/AN tribes and communities highlight the heavy burden of heart disease among AI/AN people.^{4,5} In 1999, the National Heart, Lung, and Blood Institute (NHLBI) funded the Strong Heart Study, which was conducted among 13 tribes. The study reported that the incidence of coronary heart disease among American Indians was nearly double that reported in the Atherosclerotic Risk in

Communities (ARIC) Study of atherosclerosis in four non-Indian communities.⁶ Other recent studies have reported that both the prevalence of heart disease and the percentages of premature deaths are higher among Native Americans than among any other racial or ethnic group in the United States.^{7,8}

Risk Factors

During the past several decades, marked increases in the prevalence of many risk factors for heart disease and stroke have been reported among AI/AN people.⁴ These increases place AI/AN populations at increased risk for subsequent rises in death rates from heart disease and stroke. In 2003, the Centers for Disease Control and Prevention (CDC) reported that the prevalence of self-reported obesity among AI/AN people was 23.9%, diabetes was 9.7%, cigarette smoking was 32.2%, and physical inactivity was 32.5%.⁹ All are risk factors for heart disease and stroke.

In addition, two recent studies that collected extensive data on heart disease and stroke risk factors among specific AI/AN communities found high prevalences of insulin resistance syndrome, renal injury, lower extremity arterial disease, hypertension, elevated cholesterol levels, and diabetes. These studies included the Inter-Tribal Heart Project conducted collaboratively by CDC, the Indian Health Service (IHS), and tribal leaders of the Menominee Reservation in Wisconsin and two Chippewa Reservations in Minnesota,^{10–16} as well as the Strong Heart Study conducted among 13 tribes in Arizona, Oklahoma, North Dakota, and South Dakota.^{17–20}

Diabetes is a particularly important risk factor for heart disease and stroke among AI/AN people because diabetes prevalence in this population is increasing so rapidly. Before World War II, diabetes was uncommon in this population.²¹ Today, an estimated 9.7% of the AI/AN population has diabetes, compared with 5.7% of non-AI/AN populations in the United States.⁹ The diabetes death rate was 52.8/100,000 among AI/AN people during 1996–1998, compared with 13.5/100,000 for all U.S. racial and ethnic groups.² In a study of people hospitalized for stroke in

Arizona during 1990–1996, the prevalence of diabetes was nearly twice as high for AI/AN people (62%) as it was for Hispanics (36%) and more than three times as high as for whites (17%).²²

Data Limitations

There is a paucity of data on the burden of heart disease and stroke among AI/AN people in the United States. Data that are collected as part of national surveys are limited by very small sample sizes. For example, the series of National Health and Nutrition Examination Surveys (NHANES I, II, and III), which collected information on medical histories, demographics, and behaviors related to health and nutrition for the civilian, noninstitutionalized population of the United States, did not report data for AI/AN populations because the sample sizes were too small. Data that are collected for individual tribes and communities do not necessarily represent the overall Native American population because of the large variations in the prevalence of risk factors, as well as the disparities in mortality observed among different tribes and communities across the United States.^{9,23}

Mortality data for AI/AN people are more readily available than survey data. CDC’s National Center for Health Statistics maintains a database of death certificates for all U.S. citizens. However, AI/AN people are sometimes misreported as “white” on death certificates, especially in areas distant from traditional AI/AN reservations.² A 1996 study by the IHS found that the degree of misreporting varied from 1.2% in Arizona to 28% in Oklahoma and 30.4% in California.²⁴ Another report found that race was coded incorrectly on death certificates for 26.6% of AI/AN people nationwide.²⁵

To address the problem of misreporting of AI/AN race on death certificates, the death rates presented in the most recent edition of *Trends in Indian Health* have been adjusted to account for misreporting.² A recent study highlights how the misreporting of AI/AN race has led to underestimates of mortality rates for heart disease and stroke among AI/AN people when the data were not adjusted to account for this misreporting.²⁶ The results of this

study indicate that after adjustment for misreporting, the mortality rates for heart disease and stroke among AI/AN people (195.9 per 100,000) were substantially higher than those among whites (159.1) or those among the total U.S. population (166.1) and that the magnitude of these disparities is increasing over time.²⁶ Unfortunately, because adjustment factors are not available at the county level, the maps of heart disease and stroke mortality rates in this atlas are based on data that have not been adjusted for misreporting of race among AI/AN decedents.

Looking Ahead

The data that are available for AI/AN people have increased awareness among members of the public health community, health care practitioners, and Native Americans of the significance and severity of heart disease and stroke among AI/AN populations. Effectively preventing heart disease and stroke in this population and reducing disparities in both the prevalence of these conditions and the quality of care available requires an innovative and multidimensional approach. Prevention strategies should be more intensive to address the growing risk factors, and they should be culturally appropriate, taking into account the wide variations among tribes and communities. These strategies should be developed in partnership with tribal and AI/AN communities with input from individuals, their families, and community organizations.

As part of CDC’s Racial and Ethnic Approaches to Community Health (REACH) 2010 project, eight AI/AN communities are establishing community coalitions, identifying priority concerns, and implementing programs and policies designed to reduce people’s risk for chronic diseases such as heart disease and stroke. During 2001–2002, the REACH 2010 Risk Factor Survey was conducted in 21 minority communities, including two AI communities. The study reported that American Indians had the highest prevalences of cardiovascular disease, obesity, current smoking, and diabetes.²⁷ These results underscore the need for enhanced national efforts to eliminate the heavy burden of cardiovascular disease and its risk factors among AI/AN populations.

Strong support from national public health agencies and institutions—such as that provided currently by IHS, CDC, and NHLBI—is also important. These agencies are part of the U.S. Department of Health and Human Services (HHS), which has established national health objectives for the next decade, including the overarching goals of increasing quality and years of healthy life and eliminating health disparities among racial and ethnic groups.²⁸ By highlighting the burden of heart disease and stroke among Native Americans, this *Atlas of Heart Disease and Stroke Among American Indians and Alaska Natives* can help achieve these goals.

Indian Health Service

The IHS is a subagency of HHS and is responsible for providing federal health services to AI/AN people.²⁹ This responsibility is based on the special relationship between the federal government and the 560 Native American tribes that it recognizes. This government-to-government relationship is based on Article 1, Section 8, of the U.S. Constitution and has been given form and substance by numerous treaties, laws, Supreme Court decisions, and executive orders.

The IHS is the federal health care provider and health advocate for AI/AN people. Services are provided directly and through health programs contracted to and operated by individual tribes. The federal system consists of 36 hospitals, 61 health centers, 49 health stations, and 5 residential treatment centers. Another 34 urban health projects provide a variety of health and referral services.

The agency strives to ensure that comprehensive, culturally acceptable personal and public health services are available and accessible to AI/AN people. Its mission is to work in partnership with AI/AN people to raise the physical, mental, social, and spiritual health of this population to the highest level possible.

In addition, the IHS is responsible for educating people who work in health delivery programs that AI/AN people are American citizens who are eligible for services from all

federal, state, and local health programs. In addition, the IHS is the principal federal health advocate for building health coalitions, networks, and partnerships with tribal nations, other government agencies, and nonfederal organizations (e.g., academic medical centers, private foundations) for the benefit of AI/AN people.

The delivery of IHS health services is managed by local administrative units called service units, which serve the same function as county or city health departments. Some service units are responsible for several small reservations, while some large reservations are served by several different service units.

Service units also are grouped into larger management jurisdictions on the basis of cultural, demographic, and geographic characteristics of different tribes. These larger jurisdictions are administered by the following 12 area offices: Aberdeen, Alaska, Albuquerque, Bemidji, Billings, California, Nashville, Navajo, Oklahoma, Phoenix, Portland, and Tucson.

1. Young TK. *The Health of Native Americans—Towards a Biocultural Epidemiology*. New York: Oxford Press; 1994.
2. Indian Health Service. *Trends in Indian Health, 2000–2001* Rockville, MD: U.S. Department of Health and Human Services; February 2004.
3. CDC. Decline in deaths from heart disease and stroke—United States, 1900–1999. *Morbidity and Mortality Weekly Report* 1999;48(30):649–56.
4. Galloway JM. The epidemiology of atherosclerosis and its risk factors among Native Americans. *Current Diabetes Reports* 2002;2(3):274–81.
5. Sewell JL, Malasky BR, Gedney CL, Gerber TM, Brody EA, Pacheco EA, et al. The increasing incidence of coronary artery disease and cardiovascular risk factors among a Southwest Native American tribe: the White Mountain Apache Heart Study. *Archives of Internal Medicine* 2002;162(12):1368–72.
6. Howard BV, Lee ET, Cowan LD, Devereux RB, Galloway JM, Go OT, et al. Rising tide of cardiovascular disease in American Indians: the Strong Heart Study. *Circulation* 1999;99(18):2389–95.
7. CDC. Health status of American Indians compared with other racial/ethnic minority populations—selected states, 2001–2002. *Morbidity and Mortality Weekly Report* 2003;52(47):1148–52.

8. CDC. Disparities in premature deaths from heart disease—50 states and the District of Columbia, 2001. *Morbidity and Mortality Weekly Report* 2004;53(6):121–5.
9. CDC. Surveillance for health behaviors of American Indians and Alaska Natives. Findings from the Behavioral Risk Factor Surveillance System, 1997–2000. *Morbidity and Mortality Weekly Report* 2003;52(SS-7).
10. Lamar Welch VL, Casper M, Greenlund K, Zheng ZJ, Giles W, Rith-Najarian S. Prevalence of lower extremity arterial disease defined by the ankle-brachial index among American Indians: the Inter-Tribal Heart Project. *Ethnicity and Disease* 2002;12(1):S1-63-7.
11. Greenlund KJ, Valdez R, Casper ML, Rith-Najarian SJ, Croft JB. Prevalence and correlates of the insulin resistance syndrome among Native Americans. The Inter-Tribal Heart Project. *Diabetes Care* 1999;22(3):441–7.
12. Fischer ID, Brown DR, Blanton CJ, Casper ML, Croft JB, Brownson RC. Physical activity patterns of Chippewa and Menominee Indians: the Inter-Tribal Heart Project. *American Journal of Preventive Medicine* 1999;17(3):189–97.
13. Kasiske BL, Rith-Najarian SJ, Casper ML, Croft JB. American Indian heritage and risk factors for renal injury. *Kidney International* 1998;54(4):1305–10.
14. CDC. The Inter-Tribal Heart Project: Results from the Cardiovascular Health Survey. Atlanta: U.S. Department of Health and Human Services; 1996.
15. Casper ML, Rith-Najarian SJ, Croft JB, Giles W, Donehoo R, and the Inter-Tribal Heart Project Working Group. Blood pressure, diabetes and body mass index among Chippewa and Menominee Indians: the Inter-Tribal Heart Project preliminary data. *Public Health Reports* 1996;111(Suppl 2):37–9.
16. Struthers R, Savik K, Hodge FS. American Indian women and cardiovascular disease: response behaviors to chest pain. *Journal of Cardiovascular Nursing* 2004;19(3):158–63.
17. Howard BV, Lee ET, Yeh JL, Go O, Fabsitz RR, Devereux RB, et al. Hypertension in adult American Indians: the Strong Heart Study. *Hypertension* 1996;28(2):256–64.
18. Welty TK, Lee ET, Yeh JL, Cowan LD, Fabsitz RR, Le NA, et al. Cardiovascular disease risk factors among American Indians: the Strong Heart Study. *American Journal of Epidemiology* 1995;142(3):269–87.
19. Lee ET, Howard BV, Savage PJ, Cowan LD, Fabsitz RR, Oopik AJ, et al. Diabetes and impaired glucose tolerance in three American Indian populations aged 45–74 years: the Strong Heart Study. *Diabetes Care* 1995;18(5):599–610.
20. Howard BV, Lee ET, Cowan LD, Fabsitz RR, Howard WJ, Oopik AJ, et al. Coronary heart disease prevalence and its relation to risk factors in American Indians: the Strong Heart Study. *American Journal of Epidemiology* 1995;142:254–68.
21. Gohdes D. Diabetes in North American Indians and Alaska Natives. In: *Diabetes in America*. Bethesda, MD: National Institutes of Health, National Institute of Diabetes and Digestive Kidney Diseases; 1995. NIH publication no. 95-1468.
22. Frey JL, Jahnke HK, Bullfinch EW. Differences in stroke between white, Hispanic, and Native American patients: the Barrow Neurological Institute stroke database. *Stroke* 1998;29(1):29–33.
23. Indian Health Service. *Regional Differences in Indian Health, 2000–2001*. Rockville, MD: U.S. Department of Health and Human Services; 2000.
24. Indian Health Service. *Adjusting for Miscoding of Indian Race on State Death Certificates*. Rockville, MD: U.S. Department of Health and Human Services, Public Health Service; 1996.
25. Sorlie PD, Rogot E, Johnson NJ. Validity of demographic characteristics on the death certificate. *Epidemiology* 1992;3(2):181–4.
26. Rhoades DA. Racial misclassification and disparities in cardiovascular disease among American Indians and Alaska Natives. *Circulation* 2005;111(10):1250–6.
27. CDC. REACH 2010 Surveillance for Health Status in Minority Communities—United States, 2001–2002. *Morbidity and Mortality Weekly Report* 2004;53(SS-6).
28. U.S. Department of Health and Human Services. *Healthy People 2010*. 2nd edition. Two volumes. Washington, DC: U.S. Government Printing Office; 2000.
29. Indian Health Service Web site. Available at <http://www.ihs.gov>.