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# Cardiovascular Health Among American Indians and Alaska Natives

## Successes, Challenges, and Potentials

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**Abstract:** With low rates of the risk factors for cardiovascular disease as recently as 40 years ago, the rates of cardiovascular disease (CVD) in American Indians and Alaska Natives were exceedingly low. Despite recent large-scale efforts to eliminate health disparities in ethnic and minority populations, the impact among American Indian and Alaska Natives to date has been relatively limited. Indeed, over the past several decades the incidence and prevalence of cardiovascular risk factors has risen significantly, including the development of an epidemic of diabetes.

Evidence suggests that these higher rates of cardiovascular risk factors, including tobacco abuse, diabetes, high blood pressure, and elevated cholesterol levels, may be placing an inordinate burden of cardiovascular disease on the American Indian and Alaska Native population. The rates of heart disease and stroke among American Indians and Alaska Natives are now higher than in the general U.S. population as well as in U.S. whites. Recent evaluations suggest that these rates are also higher than among other ethnic or racial populations in the United States. Additionally, American Indians and Alaska Natives have been found to have a substantially higher proportion of premature death from heart disease when compared with other ethnic and racial populations.

A number of recent prevention initiatives and focused clinical efforts are making promising strides toward reduced disparities in cardiovascular health with primordial, primary, and secondary cardiovascular prevention efforts along with enhanced early identification and therapeutic intervention for more favorable cardiovascular outcomes in the future.

In order to reach our goals of heart-healthy and stroke-free American Indians and Alaska Natives, implementation of an aggressive, reasonably resourced, systemic plan of coordinated health promotion, risk reduction, and disease control efforts are necessary, with appropriate policy and legislative support.

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### Introduction

Significant diversity exists among American Indian and Alaska Native (AI/AN) tribes and communities. The historical experiences of individual tribes have clearly made an impact upon the values and expectations related to health in Indian communities. While tribal similarities do exist, each of the 562 federally recognized tribes and the numerous tribes that are not federally recognized has its own diverse culture and beliefs, and any generalizations must be made—and interpreted—with appropriate caution.

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Treaty negotiations, following historic conflict, provided for the development of a unique government-to-government relationship between the federal government and federally recognized tribes. Federally recognized tribal governments exercise broad sovereign authority for their members and the members of these tribes are eligible for healthcare services provided or funded by the federal government. Over the past 50 years, the Indian Health Service (IHS) has been the agency charged with the primary provision of the healthcare needs of federally recognized tribes, directly or through tribally managed programs. Unfortunately, limitations in the provision of optimal care exist, including funding. In 2004, the *Washington Post* noted that “the Indian Health Service, primary healthcare provider for more than 1.6 million members of federally recognized tribes, is so underfunded that it spends only \$1914 per year [per capita], about half of what the

government spends on prisoners (\$3803) and far below what is spent on the average American (\$5065).<sup>1</sup>

Significant additional barriers to care for American Indians and Alaska Natives exist. Since more than half of AI/AN populations do not permanently reside on a reservation,<sup>2</sup> they may have limited or no access to IHS or tribally managed services, and may be required to use, if the required financial resources are available, nonreimbursed private healthcare services. Additional factors that may influence accessibility to optimal treatment and preventive care include geographic isolation, transportation limitations, economic disparities, inadequate or non-existent home phone access, lack of 911 systems, and language barriers, among others. Other potential issues that may contribute to poorer health outcomes for AI/ANs include racial/ethnic bias, cultural barriers to care, educational status, provider shortages, and lack of appropriate provider cultural sensitivity.<sup>3,4</sup>

Significant limitations in available data regarding the health status of American Indians and Alaska Natives exist as well. For instance, in the Second National Health and Nutrition Examination Survey, there were only 178 Native Americans aged between 12 and 74 years in the 14,479 individual health histories,<sup>5</sup> and only 270 of 20,322 individuals aged 6 months to 74 years who were examined.<sup>6</sup> Even within in the Centers for Disease Control and Prevention's (CDC) current national database for *Healthy People 2010*, of the 12 data elements in the heart disease and stroke focus for American Indians and Alaska Natives, only four have baseline data available. The other data points have been left blank, as they "do not meet the criteria for statistical reliability, data quality or confidentiality." The significant potential for the under-reporting of ethnic/racial data is also well recognized in the document as well.<sup>7</sup>

Prior unethical and/or inappropriate research and the historical misuse of tribal and American Indian and Alaska Native community research samples and data, as well as biased reporting of the results, have produced a negative perception of research within some AI/AN communities. Many have developed a reasonable and healthy skepticism of current research intentions and methodologies. While not opposed to scientific inquiry, there are significant concerns regarding the ethical approach of research to ensure cultural respect and integrity.<sup>8</sup> Some tribes and Indian communities have initiated their own Institutional Review Boards, which not only protect human subjects but ensure that community interests are met. Based on these previous negative experiences, there are also concerns occasionally related to sharing tribal-specific data. The development of tribally managed Epidemiology Centers in several regions in the country has significant potential in the initial implementation of fair and effective data acquisition and dissemination.

Due to these issues and others, much of the limited data available related to CVD incidence, prevalence, and mortality within the AI/AN communities comes from focused research efforts rather than national surveys.<sup>9,10</sup> The Strong Heart Study (SHS) is the largest longitudinal, population-based study of CVD and its risk factors within a diverse group of American Indians, and has followed these individuals since 1988. Contrary to published national data, reports from this study reveal that the incidence of and mortality from CVD in this population exceeded the rates in general U.S. population.<sup>10</sup>

National CVD mortality rates in the AI/AN populations appear to be significantly limited due to racial/ethnic misclassification on death certificates.<sup>11</sup> In an analysis of the effect of this misclassification, and to potentially resolve the disparate results between the SHS and the national data, Rhoades<sup>12</sup> revealed that with the correction for racial misclassification in CVD mortality within this population, CVD mortality rates in 1996–1998, for instance, were approximately 16% greater in American Indians and Alaska Natives than previously reported. These rates were strikingly higher than the U.S. all races and the U.S. white rates. In addition, CVD mortality rates for American Indians and Alaska Natives appear to be increasing, in contrast to rates among U.S. all races and U.S. whites.

Although CVD, primarily heart disease and stroke, remains a leading cause of death in the general U.S. population, there has been a significant decline in mortality rates over the past several decades. This is due, in part, to significant public health efforts focused on reducing associated risk factors as well as the result of improved detection and treatment modalities.<sup>13</sup>

Over the same period, the leading biological and cultural determinants of the health of AI/AN populations have also undergone remarkable transition, resulting in significant change in the major causes of mortality. The incidence and prevalence of many infectious diseases, the leading cause of death and disability among Native Americans early in the last century, have dramatically fallen with the advent of modern medical care and focused public health efforts, including the development of adequate housing and sanitation measures.

Through efforts focused on the eradication of some and the control of other infectious diseases, the adjusted life expectancy at birth of Native Americans of 63.5 years in 1972–1974 was a significant improvement compared to the early 20th century, and improved even further to 70.6 years in 1996–1998. Nevertheless, this is 5.9 years less than the US all races rate (76.5 years), and 6.6 years less than the rate for whites (77.2 years).<sup>14</sup>

These changes have resulted in the emergence of chronic disease as a dominant force related to the morbidity and mortality of Native Americans. Over this period, the prevalence and severity of risk factors for

the development of atherosclerosis and CVD has increased, as the age of onset of many of these risk factors has decreased, often resulting in risk factor rates that surpass those of the general U.S. population.<sup>9,15–22</sup>

Recent data from random cross-sectional surveys of communities participating in the CDC-funded Racial and Ethnic Approaches to Community Health (REACH 2010) initiative show that American Indians now have a higher prevalence of obesity, current smoking, and diabetes compared to Hispanics, African Americans, and Asians. American Indian men were found to have the highest prevalence of hypertension and high blood cholesterol. Of increasing concern, American Indian adults were found to have the highest prevalence of these combined risk factors for CVD, with >80% having one or more (88.2% men, 82.8% women) and over a third with three or more (35.7% men, 33.3% women).<sup>18</sup>

Cigarette smoking among American Indian youth, other than intermittent tobacco for ceremonial use, was also relatively uncommon in the past. However, in the 1999–2001 self-reported National Survey on Drug Use and Health (NSDUH), both American Indian youth and adults had the highest rates of cigarette smoking (27.9% youth, 40.4% adults) when compared with blacks (7% youth, 25.7% adult), whites (16% youth, 27.4% adult), Hispanics (10.8% youth, 23.1% adult), and Asians (8.1% youth, 16.2% adult).<sup>23</sup>

Over a 4-year period, SHS investigators found that among the 3638 American Indians aged 45 to 74 years in 13 tribes enrolled in the study, the prevalence of diabetes increased from 6% to 12% in all centers, high blood pressure prevalence increased overall from 7% to 9%, and mean HDL levels decreased by >9%.<sup>24</sup>

Carotid ultrasound evaluations performed in the SHS revealed that American Indian participants had an increased incidence of discrete carotid atherosclerotic plaques, generally in the range of 15% to 20% higher, than did age-matched participants in the Atherosclerotic Risk in Communities (ARIC) and Cardiovascular Health Studies, which were composed of a population similar to the general U.S. population.<sup>25–27</sup>

Related to these increases in cardiovascular risk factors and evidence for atherosclerosis, recent reports from studies involving individual American Indian tribes and communities reveal significantly increasing rates of heart disease.<sup>9,10,15,17,20,22</sup> Data from the SHS reveal that the incidence rates of coronary heart disease (CHD) among AIs in that study have now not only surpassed, but almost doubled that of the general U.S. population, as approximated by the ARIC, with rates of CHD in AI men of 16.1 per 1000 person years, compared to 9.5 in the non-AI population. In women the rates were 7.5 for AIs and 3.0 for non-AIs.<sup>15</sup>

American Indians have also been found to report the highest prevalence of CVD at 16.4% (confidence interval [CI]=13.6–19.7) when compared with other racial/ethnic minorities in the REACH 2010 analysis, includ-

ing those with national rates previously reported at substantially higher than whites or the general U.S. population: blacks at 9.9% (CI=8.7–11.3), Hispanics at 7.4% (CI=6.0–9.1), and Asians at 7.5% (CI=5.6–10.1).<sup>18</sup>

Heart diseases have now become the leading cause of death among American Indians and Alaska Natives, with adjusted rates of 157.1 per 100,000 in 1996–1998, surpassing those found among the general U.S. population (130.5) and whites (125.9), even using standard national comparisons. Cerebrovascular disease has become the sixth leading cause of death in AI/AN populations, with adjusted rates of 29.5 per 100,000, compared to lower rates in the general U.S. population (25.9) and among whites (24.0).<sup>12,14</sup> The age and racial/ethnic misclassification-adjusted rate for AI/AN CVD mortality was higher as well, at 195.9 per 100,000, as compared with age-adjusted rates of 166.1 and 159.1 for the general population and whites, respectively—and these rates are increasing within AI/AN populations.<sup>12</sup>

Using death certificate data from the National Center for Health Statistics, American Indians and Alaska Natives also now appear to have the highest proportion of premature death (death at <65) from heart disease (36%) when compared with whites (14.7%), blacks (31.5%), Asian/Pacific Islanders (21.1%), and the general U.S. population (16.5%).<sup>3</sup> Unfortunately, premature death is not an unusual marker of disparities with regard to American Indians. Between 1992 and 1994, a full 30% of American Indians who died from any cause were aged <45 years, compared with, 1993, 23% of African Americans, 11% of the general population, and 9% of whites.<sup>14</sup>

### **Current Strategies Toward *Healthy People 2010* Heart Disease and Stroke Goals**

Under the leadership and guidance of tribal and urban Indian leaders, as well as the director of the IHS, there are many exciting and potentially effective initiatives underway that have the potential to make a significant impact on CVD and its risk factors as well as to assist in meeting AI/AN goals within *Healthy People 2010*.<sup>28</sup>

The “Indian Health” system (i.e., programs run by the IHS, tribal programs, and urban Indian clinics) national CVD strategy has evolved, in part, around an action plan developed at a roundtable discussion focused on the prevention of cardiovascular disease among American Indians and Alaska Natives in 2003. The plan was formulated by elected tribal and urban health leaders, with information and support provided by public health and clinical experts in the IHS, Office of Disease Prevention and Health Promotion, American Heart Association (AHA), CDC, American Diabetes Association, American College of Cardiology, and National Institutes of Health (NIH), as well as leading academic experts in CVD prevention from Harvard

University, Northwestern University, Medstar Institute, and the University of Massachusetts.<sup>29</sup>

Tribal and urban leaders developed this national action plan to provide guidance for those working within Indian Health for the development and implementation of an integrated and systemic approach to CVD prevention. The recommendations, while too extensive to detail here, include many that are currently being implemented, often through successful partnerships with other groups, including the CDC, NIH, and AHA, among many others. Examples include the integration and coordination of CVD prevention activities within existing community prevention programs; CVD provider education programs; the development of a CVD care registry and audit system; the intensive education of community and tribal healthcare workers on cardiovascular prevention; and the development of a modification of the AHA's "Get with the Guidelines" program, a markedly successful secondary prevention program used in hospitals. In addition to the development of computerized registries and provider reminder systems, a number of individual tribal-level CVD-prevention initiatives are currently underway with clinical assessments for the evaluation components.

Many tribes and Indian organizations recognized the need for prevention interventions related to chronic disease early, and developed local and regional prevention activities that are primarily focused on diabetes prevention. These efforts were subsequently greatly assisted by directed congressional funding for tribes and Indian communities (Special Diabetes Program for Indians) to initiate or further develop prevention programs. With the most recent funding, guidance for the development of grants for diabetes prevention and for diabetic complications (CVD in particular) was provided. This funding has allowed for the development of additional community CVD prevention programs.

Two of the major indicators of current clinical success within Indian Health is the IHS Diabetes Program and the Tribal Leaders Diabetes Committee, both directly and through the Special Diabetes Program for Indians. Through effective collaboration with tribes and urban programs, numerous interventions have been developed, including national and local audit and analysis systems, guidelines specific to American Indians and Alaska Natives, and education programs, to name but a few. This system has remarkably improved glucose and lipid control, immunization use, and dietary and lifestyle education, as well as appropriate medication use, including aspirin, ACE inhibitors, and statins.<sup>30</sup> Given that 56% of American Indian males with CVD and 78% of American Indian females with CVD have preceding diabetes (according to SHS results), these interventions are of obvious import.<sup>15</sup>

Increasing partnerships and collaborations with and among tribes and tribal organizations, Indian commu-

nities, academic institutions, service organizations, foundations, and government agencies are essential for continued success in meeting the goals of the *Healthy People 2010* initiative.

### **Cardiovascular Health of American Indians and Alaska Natives: Are We on Track for 2010?**

National-level data to answer this question are unfortunately very limited, both by availability and by precision, with potential significant under-reporting, as previously mentioned. According to the CDC Data2010 (the *Healthy People 2010* database, available at: <http://wonder.cdc.gov/scripts/broker.exe>), of the 12 specific objectives listed in the heart disease and stroke focus area among American Indians and Alaskan natives, there are baseline data available for four objectives only and of those, two are below goal and two are above goal. There are more recent (2000–2002) follow-up data on only two of the 12 objectives, CHD and stroke death rates. The CHD death rate (age adjusted per 100,000) in 1999 (baseline), based on the calculations used, is 148 per 100,000. In 2002, the data provided reveal a rate of 118 per 100,000, a 20% decrease. The target goal for this objective (Objective 12-01) is 166. Data are also available for stroke deaths (age adjusted per 100,000) (Objective 12-07) based on 1999 data (baseline); at a rate of 48 per 100,000, this figure exactly meets the target goal rate for this objective. The rate in 2002 reported in the CDC Data2010 is 38 per 100,000, a 21% decrease in this parameter. Objective 12-12, the baseline for blood pressure (BP) monitoring and knowledge of their BP level as normal or high, is 89% for American Indians and Alaska Natives based on the 1998 rate, with a goal of 95%. Finally, Objective 12-15, blood cholesterol screening within preceding 5 years at baseline, based on 1998 rates, is 58% with a national goal of 80%.<sup>7</sup>

The differences in trends and rates between the national databases and the research databases are quite concerning and require further definition. Regardless of the data used, however, the answer to the question of "Are we on track?" is not so ambiguous. The foundation has been laid to assist us in meeting the 2010 goals of a 20% reduction in the CVD and stroke mortality rates for adults, for instance, but much more has yet to be done, both in the capture of available data as well as, presumably, in meeting the goals.

With the increasing rates of cardiovascular risk factors, meeting the *Healthy People 2010*<sup>28</sup> goals for reductions in the proportion of individuals with cardiovascular risk factors, including hypertension, will clearly be a major challenge and, indeed, will likely only be possible with expanded funding and support.

On the clinical side, the current diabetes audit system, implementation of computerized CVD regis-

tries and reminder systems, a computerized CVD audit system, and the Indian Health version of the "Get with the Guidelines" programs nationally are being developed and/or expanded. These will certainly bring us a long way toward meeting intermediate 2010 goals of improved blood pressure and cholesterol measurements and control. With appropriate modification of these efforts in the near future, as well as further implementation of the emerging home telehealth programs for heart failure, decreased rates of hospitalization for these objectives are expected.

Continued aggressive tribal, urban, and IHS community prevention activities will be vital in meeting the awareness components of the 2010 goals, such as the awareness of the signs and symptoms of myocardial infarction, stroke, and presence of hypertension, and for learning the techniques for the administration of cardiopulmonary resuscitation (CPR). This effort, in conjunction with public health, and hospital- and clinic-based programs, can also assist in the education of individuals about the need for additional actions beyond medications in treating hypertension as well as education related to the use of 911 systems where available. However, significant additional efforts will be required to increase the availability of the telephone-based 911 systems in rural Indian communities, where a 911 system is not currently in place and/or few residents have phones.

Given that many of the reservations are extremely rural, there will be considerable difficulty in significantly increasing the percentage of individuals who can receive artery opening therapy within 1 hour, and the percentage who receive cardiac defibrillation within 6 minutes of the onset of sudden death, simply due to distances between communities, homes, and hospitals, as well as the previously discussed lack of phones and 911 systems in some locations.

The availability of other appropriate medical interventions in a timely manner, including some interventions available only in specialized centers or tertiary care centers, will remain a significant issue to rural communities, whether American Indian/Alaska Native or not. Nevertheless, within rural American Indian communities, primary care provider training in the use of thrombolytics and adjunctive medications for use in acute myocardial infarction has been continued and intensified, as has the guideline implementation for transport to a tertiary care center. Similar activities for stroke intervention are planned in the near future. These activities have a significant potential to save additional lives and improve the quality of life of those affected.

Noted improvements in clinical care and secondary prevention have prompted activities related to the development of additional academic-based regional cardiovascular health subspecialty centers, based on a current model, the Native American Cardiology Pro-

gram in Tucson AZ. These types of centers provide culturally appropriate and cutting-edge clinical cardiovascular care and prevention activities specifically to American Indians and Alaska Natives, integrated with traditional belief systems, including traditional medicine. The current model incorporates on-site as well as on-reservation Indian Health primary care provider training in the prevention, diagnosis, and treatment of CVD into a clinical and public health approach, including guideline development, quality evaluative components, and public education and screening. This system has produced impressive and significant results in terms of patient satisfaction, quality of care, cost savings, and secondary prevention activities, both in the hospital and at home in follow-up after leaving the facility.<sup>31,32</sup>

The REACH 2010 data revealed that while American Indians had "a greater burden of health risk factors and chronic disease than other racial/ethnic minority populations," they were also more likely to use prevention services than any of the other groups evaluated. This analysis revealed that 84% of American Indians had received at least one preventive service. The REACH 2010 data note that, for instance, in American Indians with diabetes, the proportion who have had hemoglobin A1C and foot exams has already surpassed national levels. It also revealed that American Indian women, in general, have reached or are already close to reaching the national health objectives for 2010 for mammography and Papanicolaou smear use.<sup>18</sup>

These current achievements and improvements underway in Indian Health are indeed a tribute to the dedication and collaboration of the many facets of the Indian Health team, including community health programs, public health and health promotion, clinical care systems, and federal, tribal, and urban Indian health programs.<sup>18</sup>

## Opportunities for Improvement

As one of the two overarching goals in *Healthy People 2010*, the elimination of disparities among different components of the U.S. populations is a priority.<sup>28</sup> In light of the significant and apparently increasing disparities between American Indians/Alaska Natives and other groups within the general U.S. population, "business as usual" is clearly unacceptable.

Further acceleration of the implementation of best practices throughout AI/AN community prevention efforts and within the clinical realm is necessary, with a special focus on the empowerment and education of the individuals involved.

In order to avoid the development of CVD at a magnitude similar to the current diabetes epidemic within this under-served population, there is a clear and pressing need for aggressive, ecologic, culturally reinforcing, population-based interventions. This must in-

tegrate efforts within multiple components of the AI/AN communities, involve the community and cultural and religious/spiritual components directly, as well as families, healthcare sites, work sites, and schools. A focus on environmental strategies is important as well. In addition, public policy and legislative intervention and support, when necessary, may be required.

Despite the dedicated, strong and significant prevention and control efforts described previously, it is unlikely that these alone can produce the magnitude of change essential to substantially reduce the growing epidemic of CVD and its risk factors within AI/AN communities and populations. Significant additional interventions will be necessary to realize the vision of heart-healthy and stroke-free American Indian and Alaska Native communities, including the augmentation of current efforts for an effective, reasonably resourced public health infrastructure, and the development of a systemic approach to prevention implementation.

## Conclusions

It is a great privilege and honor to work within American Indian and Alaska Native communities, share in their vision of wellness, and assist, where possible, in the achievement of these public health goals. Over the past several decades, we have witnessed significant improvements in the health, longevity, and health care of this population. However, the burden of chronic disease, particularly CVD and its risk factors, appears to be significantly increasing and producing a growing chasm of disparities between American Indians and Alaska Natives and the general U.S. population.

Due to significant data limitations, there is a critical need for precise national data acquisition in order to effectively evaluate the successes and limitations regarding the prevention and control of CVD in American Indians and Alaska Natives. While the Epidemiology Centers offer significant promise in this regard, additional effort for the inclusion of American Indians and Alaska Natives in national sampling protocols and respectful, tribally (or AI/AN community) directed prevention research efforts will be important.

From a clinical perspective, the development of population-based, nonprofit, culturally reinforcing regional specialty centers offers the potential for exceptional prevention and clinical care focused on a specific population that incorporates unique belief systems and successfully integrates activities within existing health systems.

In order to realize our shared vision of heart-healthy and stroke-free American Indian and Alaska Native communities, aggressive, ecologic, systemic, culturally reinforcing, and community-defined interventions are required. Within the Indian Health System, we also must provide dynamic systemic interventions within the clinical settings with a dual focus on the prevention and

control of risk factors as well as the prevention of recurrent events among those with heart disease. Increased resource support focused in this arena from federal and state agencies, service organizations, and foundations along with critical local, state, and national policy support are crucial to this success.

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