

**Cardiovascular Health in American Indians & Alaska Natives**  
**A Scientific Statement from the American Heart Association**

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**Key Words:** cardiovascular disease, coronary heart disease, American Indian, Alaska Native, health disparities

**Abbreviations:**

CDC: Centers for Disease Control and Prevention

CHD: coronary heart disease

CVD: cardiovascular disease

GOCADAN: Genetics of Coronary Artery Disease in Alaska Natives Study

SANDS: Stop Atherosclerosis in Native Diabetes Study

**ABSTRACT**

**Background:** Cardiovascular disease (CVD) is the leading cause of death among American Indians and Alaska Natives. Over the past 50 years, the prevalence of CVD has been rising among American Indians and Alaska Natives. The objective of this statement is to summarize population-level risk factors and management techniques tailored for the American Indian and Alaska Native populations.

**Methods:** PubMed/Medline, Centers for Disease Control and Prevention, and the annual Heart Disease and Stroke Statistics report from the American Heart Association were used to identify risk factors and interventions specific to American Indians and Alaska Natives.

**Results:** Diabetes is a major contributor to disproportionately higher rates of coronary heart disease among American Indians and Alaska Natives compared to other racial and ethnic groups. Additional risk factors for CVD include LDL-C levels, hypertension, renal disease, age, and sex. Smoking and exposure to toxic metals are risk factors for some sub-populations. A quarter of American Indians live below the federal poverty line, thus low socioeconomic status is an important social determinant of cardiovascular health. Community-based interventions have reduced CVD risk in American Indians and Alaska Natives. Underreporting of American Indian and Alaska Native race may underestimate extent of CVD in this population.

**Conclusions:** Prevention and treatment of CVD in American Indians and Alaska Natives should focus on control of risk factors and community-based interventions that address social determinants of health, particularly among individuals with diabetes. Accurate reporting of race/ethnicity is encouraged to address race-specific risk factors.

## SIGNIFICANCE

Cardiovascular disease (CVD) is the leading cause of death among American Indians and Alaska Natives.<sup>1</sup> CVD rates are particularly high in younger American Indians and Alaska Natives.<sup>1</sup>

Over a third of CVD deaths occur before the age of 65 and most are secondary to coronary heart disease (CHD).<sup>1</sup>

American Indians and Alaska Natives are disproportionately affected by CHD compared to other racial and ethnic groups in the U.S.<sup>2,3</sup> CHD prevalence rates are higher than 12% among American Indians and Alaska Natives<sup>2</sup> and believed to be underreported by 21%.<sup>3</sup> The largest population-based cohort study of American Indians, the Strong Heart Study, reported double the incidence of CHD previously observed in American Indians or studies of other ethnic groups.<sup>4</sup> Death rates from CHD are the highest in the nation for American Indians residing in North and South Dakota, Wisconsin, and Michigan.<sup>1</sup>

Stroke is the 6<sup>th</sup> leading cause of death for American Indians and Alaska Natives,<sup>1</sup> who also have the highest reported history of stroke compared to other U.S. racial and ethnic groups.<sup>2</sup> Stroke mortality rates are declining among American Indians and Alaska Natives, but remain highest among younger adults less than 45 years of age.<sup>2</sup>

Other forms of CVD such as heart failure and arrhythmia are understudied in American Indians and Alaska Natives. However, the limited data suggest that heart failure mortality rates in American Indians and Alaska Natives approach rates present in whites.<sup>2</sup>

Multiple risk factors contribute to high CVD rates in American Indians and Alaska Natives. This statement will highlight the historical context of care, pertinent risk factors, and social determinants of health contributing to CVD, particularly CHD. We will also address

management approaches that have been tailored by and for American Indian and Alaska Native populations.

## **HISTORICAL CONTEXT**

European colonization and U.S. policies have contributed to health disparities in American Indian and Alaska Native populations.<sup>5,6</sup> Early consequences of colonization included war, infectious disease, and ethnic cleansing.<sup>7</sup> Colonization preceded attempts at cultural genocide with decimation of tribal governance and forced removal from tribal lands.<sup>7</sup> Treaty obligations between Indigenous populations and the U.S. resulted in a dependence on the U.S. government for healthcare in the 1800s.<sup>7</sup> Unfulfilled agreements contributed to a general mistrust in the government among many American Indians and Alaska Natives.<sup>7</sup> Similarly, a history of unethical research practices and culturally insensitive care resulted in mistrust among many American Indian and Alaska Native communities.<sup>7</sup>

Indigenous populations have developed cultural resilience.<sup>8</sup> American Indian and Alaska Native populations have worked to revitalize traditional languages and cultures. They exert sovereignty in their social, political, and economic ways of life, including those that relate directly to health and well-being but continue to have high rates of CVD.<sup>1</sup> American Indian and Alaska Native researchers, teams, and communities are increasingly partnering to develop and test culturally centered, community-driven health promotion interventions to improve the lives of American Indians and Alaska Natives.<sup>8</sup>

Partnership among American Indian and Alaska Native communities and researchers is essential. The first and largest study to accomplish this is the Strong Heart Study whose research teams used community-based participatory approaches before it became a validated

methodology.<sup>9</sup> Strong Heart Study researchers consistently obtained community input and consent for all activities and returned study findings to the community members for tribal use and community improvement, thus resulting in high participation rates.<sup>10</sup> The expansion of the study to include a genetic component that included family members and the progressive involvement of native investigators in leadership roles demonstrate the commitment of the communities to future generations.<sup>11</sup>

## **DEMOGRAPHICS**

American Indians and Alaska Natives represent a growing part of the U.S. population.<sup>12</sup> From 2000 to 2010, this population has increased by 39%.<sup>12</sup> Approximately 5.2 million people, 1.7% of U.S., currently self-identify as American Indian and Alaska Native, either alone or in combination with one or more other races.<sup>12</sup>

American Indians and Alaska Natives are frequently misclassified by race. Multiple levels of American Indian and Alaska Native identity exist beyond self-identification as a result of varied tribal affiliation guidelines, complex tribal histories, and sociopolitical processes. Tribes, Pueblos, and Nations can be federally recognized, state recognized, or unrecognized by either federal or state government. To date, there are 573 federally recognized tribes<sup>13</sup> and 63 state recognized tribes.<sup>14</sup>

American Indian and Alaska Native individuals have struggled to maintain their culture. With colonial expansion in the 19<sup>th</sup> century, many tribes were forced to leave ancestral lands. In exchange for ceding their land in government-to-government agreements, tribes were offered treaties that provided access to reservation land, health care, and education resources. Tribes that did not sign these treaties were marginalized politically and socially.<sup>15,16</sup>

An allotment period from 1887 to 1934 displaced thousands of American Indians.<sup>15</sup> The U.S. government integrated the term “blood quantum,” fraction of American Indian ancestry, into the legal status of native identity for the purpose of dividing reservation land into individual allotments.<sup>15</sup> Following the allotment period, the federal government mandated that every federally recognized tribe determine criteria for tribal enrollment, and they suggested using a predetermined blood quantum policy to which many tribes have adhered over time.<sup>15</sup> Other tribes have adopted enrollment criteria that add to the complexity of indigenous identity. For an American Indian and Alaska Native individual, regardless of legal status, often the most important aspect is their personal sense of tribal affiliation, which is expressed by self-report.<sup>15</sup>

American Indians and Alaska Natives live in all U.S. regions. The largest proportion of the population resides in the West (40.7%), followed by the South (32.8%), Midwest (16.8%) and Northeast (9.7%). In 2010, 78% of the American Indian and Alaska Native population lived outside of American Indian and Alaska Native reservations or communities, and 71% live in urban areas.<sup>12</sup>

## **RISK FACTORS FOR CVD**

### **Clinical Risk Factors**

In 2006 a risk calculator for CHD in American Indians was published and adopted by health care professionals for this population.<sup>17</sup> It was based on longitudinal data from the Strong Heart Study. Significant predictors included age, sex, diabetes, LDL cholesterol, hypertension, smoking, and albuminuria. This section will discuss the important roles that these risk factors as well as obesity, and markers of inflammation, play in the etiology of CHD and stroke in American Indians.

Diabetes is the most important risk factor for CHD in American Indians (**Figure 1**).<sup>18</sup> Diabetes has a three-fold higher age-adjusted prevalence in American Indians than in whites, approaching 24% in American Indians and 8% in whites in 2018.<sup>19</sup> Rates vary by region with rates in adults 45-74 years of age reaching 72% in women and 65% of men in Southwestern U.S., and 33-38% in men and 40-42% in women in the Northern U.S. plains and Oklahoma.<sup>20</sup> In the Strong Heart Study cohort, almost all of the CHD in women occurred in those with diabetes. Over 50% of the CHD cases in men had diabetes. Diabetes also has a large impact on cardiac structure and function in American Indians,<sup>21</sup> thus contributing to other cardiac outcomes such as heart failure and arrhythmias. Diabetes associated abnormalities such as metabolic syndrome are not independent risk factors for CHD.<sup>22</sup>

Average LDL cholesterol levels are lower in American Indians than in whites, and thus were initially ignored as an important factor in controlling CHD in American Indians. However, it is now recognized as a strong independent predictor of CHD in American Indians, especially in those with diabetes in whom most of the CHD occurs.<sup>23</sup> HDL cholesterol is low in this population, because of the high prevalence of obesity and diabetes, and although it is a predictor of CHD, HDL is not independent of other risk factors. However, non-HDL cholesterol is an independent predictor; hazard ratios are two-fold higher for non-HDL in diabetic American Indians than for LDL.<sup>24</sup> Other lipids such as lipoprotein (a) are generally low and not independently predictive,<sup>25</sup> and apoE4 may confer a modestly higher risk.<sup>26</sup>

Hypertension is common in American Indians, especially among those with diabetes.<sup>27</sup> Although blood pressure levels are generally lower in American Indians than other populations,<sup>3</sup> hypertension is a strong independent predictor of CVD risk,<sup>28</sup> and also has a large impact on left ventricular structure and function.<sup>29</sup>



Direct evidence of the efficacy and safety of controlling LDL cholesterol and blood pressure in American Indians was demonstrated in the Stop Atherosclerosis in Native Diabetes Study (SANDS) trial, which tested lower targets for blood pressure and LDL in a randomized trial of 499 American Indian men and women with diabetes.<sup>30</sup> Reduction in LDL and systolic blood pressure to lower targets for 3 years (72 versus 104 mg/dl and 117 versus 129 mmHg) resulted in significant regression of carotid intima media thickness and decrease in left ventricular mass.<sup>30</sup> These targets were achieved using common algorithms for LDL and blood pressure control with minimal adverse effects. U.S. guidelines are feasible for controlling LDL and blood pressure among American Indians and will be impactful in reducing CVD events. In addition, cost effectiveness has been demonstrated using data from the SANDS trial.<sup>31</sup>

Renal function is a unique risk factor for predicting CHD in American Indians. Because of the high rates of diabetes, the prevalence rate of renal disease in American Indians is very high. In the Strong Heart cohort, 20-48% of all participants had either micro- or macroalbuminuria; prevalence rates are significantly higher in those who are older, diabetic, or hypertensive.<sup>32</sup> Renal disease has been associated with subsequent cardiovascular morbidity and overall mortality.

Similar risk factors contribute to the high rates of stroke among American Indians.<sup>33</sup> A risk calculator from the Strong Heart Study demonstrates that age and diabetes are important predictors as well as smoking status, hypertension, ratio of HDL/LDL, renal function, history of CHD or left ventricular hypertrophy, parental history of stroke, waist circumference, and alcohol consumption.<sup>33</sup> When echocardiographic measures were added to the model for risk prediction, they did not improve the estimate of risk.<sup>34</sup> In the Strong Heart Study, high levels of vascular

brain injury were also identified among older American Indians with subclinical cerebrovascular disease.<sup>35</sup>

The obesity epidemic among American Indians is outpacing that of the general U.S. population with prevalence estimates ranging from 30-40%.<sup>36</sup> State-specific comparisons of American Indian populations in the “lower 48” U.S. demonstrate consistent differences in obesity rates between American Indians and other residents of the same states, and marked heterogeneity in rates among American Indians across the continent. The highest rates and disparities occur in North Carolina. From 2001-2002 the prevalence of obesity in American Indian men was 45.7% versus 22.6% for other racial groups; in women, the rates were 42.3% versus 23.2%, respectively that year.<sup>37</sup> By 2009, data obtained among the Eastern Band of Cherokee Indians in North Carolina showed rates of 53.6% for American Indian men versus 29.9% non-American Indian men, and 50.2% American Indian women versus 29.8% non-American Indian women.<sup>38</sup>

Inflammatory processes may play a prominent role in American Indian and Alaska Native CVD. Atherosclerosis is in large part an inflammatory disease.<sup>39</sup> Median levels of inflammatory markers such as C-reactive protein were elevated in some studies of American Indians and Alaska Natives, and such markers may carry special prognostic importance among obese American Indians and Alaska Natives for the development of CVD. C-reactive protein has been shown to be an independent predictor of CVD in the Strong Heart Study.<sup>40</sup> In a separate Strong Heart Study analysis, elevated levels of fibrinogen predicted increased risk of heart failure in both diabetic and non-diabetic subgroups.<sup>41</sup> However, it should be noted that there may be considerable heterogeneity among American Indian and Alaska Native subgroups with regards to basal inflammatory markers. For example, the circumpolar populations which

consume large amounts of fish and other marine animals have been shown in some studies to have lower levels of inflammation, lower levels of platelet activation, and prolonged bleeding times—all of which may be protective against the major forms of CVD.<sup>42</sup>

During the past several years, guidelines from the Adult Treatment panel recommended an equation, derived from a pooled cohort of whites and African Americans, that predicted risk for atherosclerotic CVD, the combination of CHD and stroke.<sup>43</sup> The predictive value of this equation has been examined using the Strong Heart Study, and models that provide better fit have been recently developed for men and women. The addition of a measure of renal disease improved the predictive value. Other variables include age, diabetes, hypertension, smoking, and LDL and HDL cholesterol (in women only). The models will be available on the internet for use by clinicians. It is essential to assess CHD risk in younger American Indians, given their high prevalence of obesity, diabetes, and preclinical disease.<sup>18</sup> In younger American Indians, it would be prudent to consider renal disease status in the assessment of CHD risk.

There are fewer analyses of CVD risk factor for Alaska Natives. The Genetics of Coronary Artery Disease in Alaska Natives Study (GOCADAN) study of Western Alaska Natives showed that gender, hypertension, diabetes, albuminuria, high LDL-C, high apolipoprotein B and low HDL are strong correlates of CVD.<sup>44</sup>

### **Behavioral Risk Factors**

Modifiable behaviors such as cigarette smoking and physical inactivity are associated with an increased risk for CVD and related risk factors including hypertension, obesity, diabetes, heart failure, and stroke.<sup>2</sup> In addition, heavy alcohol use increases the risk of atrial fibrillation and

dilated cardiomyopathy.<sup>2</sup> Understanding these factors among American Indians and Alaska Natives is key to cardiovascular prevention efforts in this population.

Cigarette smoking is a leading cause of preventable deaths due to CVD in the U.S.<sup>2</sup> Rates of smoking among American Indians and Alaska Natives are higher than for other U.S. adults. Based on data from the 2016 National Health Interview Survey, the Centers for Disease Control and Prevention (CDC), an estimated 31.8% of American Indian and Alaska Native adults smoke. In contrast, the rates of smoking were almost half that for African Americans (16.5%) and whites (16.5%).<sup>45</sup> Unlike other groups, smoking rates have not declined significantly over the past two decades. Smoking rates among American Indian and Alaska Native also vary by region with the highest rates reported in the Northern Plains at 40% and lowest in the Southwest at 20%.<sup>46</sup> The Strong Heart Study, observed higher smoking rates among men (40.5%) compared to women (29.3%).<sup>47</sup>

Interventions for reducing smoking among American Indians have included media campaigns, behavioral interventions, and efforts to modify smoking policies. In a systematic review of anti-tobacco media messages targeted to Indigenous populations, including populations from North American, data on effectiveness were limited, but culturally-tailored messages were preferred.<sup>48</sup> Clinical trials examined the efficacy of culturally adapted programs for American Indian and Alaska Native smokers conducted in outpatient clinics, and found self-reported quit rates were improved; however, cotinine verified abstinence was not different from control groups.<sup>49</sup>

As with smoking, there is geographic variation in alcohol intake among American Indians, and generalized reports of widespread excessive alcohol abuse are unfounded. Rates of current drinkers range from 12% among American Indian women from the Southwest to over

60% of younger American Indian men from the Northern Plains.<sup>50</sup> Among American Indians who consumed alcohol, rates of binge drinking were higher among younger American Indian men than women.<sup>51</sup>

Clinical studies to prevent or reduce alcohol use among American Indians have been limited. A recent systematic review of indigenous populations found inconclusive evidence for interventions due to small sample sizes and methodological issues.<sup>52</sup> The authors did note that among the six culturally-adapted interventions, improvements were seen in several studies related to alcohol use, particularly cultural adaptations, including community reinforcement, sweat lodge ceremonies, and talking circles. A second systematic review examined programs aimed at preventing substance abuse among Indigenous youth. A gap was identified in the development and evaluation of culturally-informed interventions, including programs which incorporate families and communities of Indigenous youth.<sup>53</sup>

Only 14.7% of American Indian and Alaska Native adults meet current recommendations for physical activity.<sup>2</sup> The proportion of American Indian and Alaska Natives who meet physical activity guidelines has changed little between 1998 and 2017.<sup>54</sup> In a cohort of adults from the Chickasaw and Choctaw Nations of Oklahoma, 71% of respondents reported low physical activity (< 5 days per week of 30 minutes or more of physical activity). Among those 65 years or older, 81% reported low physical activity; 77% of women participants reported low physical activity.<sup>55</sup>

Among studies which reported on interventions to improve physical activity, the authors noted the need for large sample size, and objective measures of physical activity and associated outcomes.<sup>56</sup> Community-based exercise classes targeted to American Indian elders (aged 55 to 75) observed improved self-reported physical and emotional wellbeing and self-reported physical

activity compared to baseline. In addition, systolic blood pressure improved significantly among participants in the intervention group.<sup>57</sup>

### **Demographic and Genetic Risk Factors**

CVD risk varies by age, sex, and genetic risk. Understanding the role of demographics and genetics in American Indians and Alaska Natives can help structure risk assessment for CVD. American Indians and Alaska Natives develop CVD at earlier ages than whites. CVD mortality rates were close to U.S. averages in Arizona and Oklahoma, but they were more than two-fold higher in American Indians from North and South Dakota among those between 45-to-64 years of age.<sup>58</sup> Compared to whites, Alaska Natives in the 25-to-44 year age group had a 30% higher mortality rate from heart disease, and Alaska Natives in the 45-to-54 year age groups had a 40% higher mortality rate.<sup>59</sup> Conversely, those in the 75+ year age group had a 20% lower mortality rate from heart disease. The age-related differences may reflect either age, birth cohort effects, or generational changes in lifestyle and warrants further analyses.

American Indian and Alaska Native men have higher rates of CVD than women, particularly CHD.<sup>4,59</sup> Strong Heart Study revealed that fatal and nonfatal CHD rates were significantly higher among American Indian men than women.<sup>4</sup> Similarly, the CHD mortality rate for Alaska Native men has been reported as 90% of the U.S. rate for white men, whereas the rate for Alaska Native women was approximately 50% of the U.S. rate for white women.<sup>59</sup>

The Strong Heart Study and GOCADAN study are the largest studies to investigate the genetic role in CVD among American Indians and Alaska Natives. To date, the Strong Heart Study has observed that heritability pattern contributes to 20 to 50% of phenotype of CVD risk factors such as obesity, dyslipidemia, hypertension, and diabetes.<sup>60</sup> The GOCADAN study

observed that a single set of genes regulates LDL size and obesity.<sup>61</sup> This may provide insight into heightened risk of diabetes and CVD in Alaska Natives.

In the era of precision medicine, it is particularly important to study the impact of genetics, epigenetics, and behavioral factors on the risk of CVD in American Indians and Alaska Natives. Future research needs to examine the heterogeneity in demographic risk factors and CVD across tribal nations to really highlight the disparities within the American Indian and Alaska Native populations.

## **SOCIAL DETERMINANTS OF HEALTH**

As above, American Indians and Alaska Natives experience inequities in a number of health outcomes, largely shaped by broken treaties, exclusionary governmental policies, and structural discrimination. Social determinants of health are not uniform across minority populations, and these determinants may vary even more among American Indians and Alaska Native tribal groups. Cardiovascular morbidity and mortality may be related to lower socioeconomic status and exposure to psychosocial stressors, which can lower access to quality healthcare and interfere with preventative healthcare practices.<sup>62</sup>

Educational attainment is a stable and reliable predictor of CVD,<sup>63</sup> and is related to employment opportunities. As of 2006-2010, 80.2% of American Indians and Alaska Natives over age 25 attained high school graduation or higher, and 14.7% had a bachelor's degree or higher. Of the total American Indian and Alaska Native population, urban American Indians and Alaska Natives alone or in combination, had a lower percentage of persons with a bachelor degree or higher.<sup>64</sup> Among American Indians and Alaska Natives over age 16, 51.3% were employed. Of the civilian employed population 16 years and over, approximately half were employed in management, business, science, arts, and service occupations.<sup>64</sup> The other half were

employed in sales and office, natural resources, construction, maintenance, production, transportation, and material moving occupations.

Poverty impacts social and physical environmental risk exposure, family and community well-being, and economic life chances.<sup>65</sup> For American Indian and Alaska Native families in 2017, median household income was \$41,882 while the poverty rate was 21%.<sup>64</sup> In 2016, 26.2% of single-race American Indian and Alaska Native people lived below the poverty level, compared to whites (11%), Asians (13%), and African Americans (28%).<sup>66</sup> However, poverty rates are particularly high among select tribal nations. The 2012 poverty rate at Standing Rock Sioux Tribe Reservation in North Dakota was 43.2%, nearly triple the national rate.<sup>67</sup> The 2000 poverty rate for families in the Navajo nation was 40.1%.<sup>65</sup> Although the poverty rate for American Indians and Alaska Natives on and off reservations declined between 2011 and 2012, American Indians and Alaska Natives remained the highest racial and ethnic group in poverty.

Wealth inequality has implications for health inequities. Housing value is an indicator of wealth, and a disparity in 2017 median housing value existed between the total U.S. population and American Indians and Alaska Natives (\$217,600 versus \$135,200).<sup>67</sup> Revenue generated by casinos among American Indians and Alaska Natives is another mechanism for wealth. While wealth generated from casinos may produce tribal self-sufficiency and improved living conditions for many tribes (e.g., the Mdewakanton Sioux of Minnesota), care must be taken to avoid social problems, gambling addictions, alcoholism, and family dysfunction.<sup>68</sup>

American Indian and Alaska Natives are underinsured. Among the American Indian and Alaska Native alone population, in 2017, 43.7% reported having private health insurance, 45.3% public health insurance coverage, and 19.3% no health insurance coverage.<sup>67</sup> The Indian Health Service provides health care to 1.6 million American Indian and Alaska Native people, which



represents less than one third of the American Indian and Alaska Native population. The Indian Health Service provides programs and services mostly in primary outpatient and emergency care and supports tribal operated health services including contract/compact tribal health facilities.<sup>69,70</sup> Most Indian Health Service facilities are small and rural, requiring patients and providers to travel long distances. Many facilities lack sufficient number of primary care providers, and specialty care or advanced therapies are frequently not available.<sup>69</sup> Furthermore, advocates for American Indian and Alaska Native people have longstanding concerns regarding insufficient Indian Health Services funding. In 2017, the Indian Health Service per capita spending was \$4,078 compared to \$8,109 for Medicaid, \$10,692 for Veterans Health Administration, and \$13,185 for Medicare.<sup>69</sup>

American Indians and Alaska Natives are disproportionately affected by exposure to environmental chemicals including toxic metals. Exposure to toxic metals has contributed to CVD in the American Indian and Alaska Native communities. In the Strong Heart Study, chronic exposure to arsenic and cadmium was associated with increased incidence of CHD and stroke over 20 years of follow-up, with higher risk among participants with diabetes.<sup>71,72</sup> Arsenic and/or cadmium were also related to higher incidence of peripheral arterial disease,<sup>73</sup> left ventricular hypertrophy,<sup>74</sup> and diabetes. Elevated exposure to arsenic reflects groundwater contamination, common in small water systems in the Midwest and Southwest and in private wells, which are unregulated. These findings support initiatives to install and maintain water systems in affected communities (e.g. the Mni Wiconi Project brought safe water to the Oglala Sioux community). Many tribal members, however, rely on private wells. The Strong Heart Water Study for Private Wells is a multi-level participatory study evaluating the efficacy of a water filter and educational intervention in tribal communities in South Dakota.<sup>75</sup> Other strategies might be needed such as

improving diet to mitigate the health effects of environmental exposures or removing persistent metals with chelating agents.<sup>76</sup>

Resilience is another domain of psychosocial functioning, which is the ability to effectively cope with adversity.<sup>77</sup> Markers of resilience (i.e., optimism, purpose in life) are associated with cardiovascular health among African Americans<sup>78</sup> and Latinos.<sup>79</sup> One study found that cultural resilience among American Indians and Alaska Natives compensated for the detrimental effect of perceived discrimination on stress in a modest manner.<sup>80</sup> A review study concluded that resilience is accessed through cultural knowledge and practice in the face of adversity.<sup>81</sup> Furthermore, social support was associated with a reduced prevalence of traumatic stress, and that tribal cultural spirituality was associated with better mental health among American Indians.<sup>82</sup> Future studies may need to consider the protective effects of resilience against CVD risk among the American Indians and Alaska Natives.

## MANAGEMENT APPROACHES

Established guidelines for CVD prevention and treatment should be followed in all populations irrespective of race and ethnicity. Guidelines do not vary according to the racial or ethnic group of the patient. A key approach is aggressive control of CVD risk factors, particularly in individuals with diabetes. Community-based interventions have been a key part of successful implementation of guidelines-based care among diverse patient populations (**Figure 2**).<sup>83–85</sup>

Several community-based programs were developed in order to reduce the impact of diabetes among American Indians and Alaska Natives. The Special Diabetes Program for Indians has led the way in improving longitudinal risk factors for CVD among American Indians and Alaska Natives.<sup>84,86</sup> It includes two programs: Diabetes Prevention Program and Healthy Heart.<sup>87</sup>

Indian Health Services provides public access to the toolkits necessary for implementation of the Special Diabetes Program. Key elements for achieving risk reduction include: 1) obtaining tribal and organizational support, 2) evaluating individual barriers to care and identifying resources, 3) developing relationships with the community, 4) identifying the professional team (including program coordinator, case manager, health educator, clinicians), 5) creating a means of public communication, and 6) monitoring progress with an action plan.<sup>87</sup>

The Native-Controlling Hypertension and Risks through Technology (Native-CHART) is working to improve control of blood pressure and associated CVD and stroke risk factors among American Indians, Alaska Natives, and Asia-Pacific Islanders diagnosed with hypertension.<sup>88</sup> This project establishes collaborations with research partners across private, tribal, and public constituencies that address blood pressure control within a multi-level intervention framework. Four community-based projects aimed at blood pressure control are operative, and eight other centers are focusing on education about blood pressure control.

The Racial and Ethnic Approaches to Community Health program has contributed to better disease management among multiple racial and ethnic groups.<sup>85</sup> The CDC developed this program, which has contributed to increased adherence to hypertension medications among American Indians.<sup>85</sup> Fundamentals of the Racial and Ethnic Approaches to Community Health are similar to the Special Diabetes Program. Success requires trust, patient and community empowerment, uplifting racial and ethnic culture and history, focus on causes, community investment and expertise, and trust.<sup>89</sup>

Shared decision-making is becoming the standard of care for CVD. The process of shared decision-making has been longstanding among American Indians and Alaska Natives who participate in community-talking circles where each individual in the group has the right to

provide uninterrupted perspectives.<sup>90</sup> Talking circles have been instrumental in providing diabetes education and empowering the American Indian and Alaska Native community to manage diabetes.<sup>90</sup>

Physician bias influences healthcare delivery among racial and ethnic minorities.<sup>91,92</sup> Experiences of discrimination and microaggressions in the healthcare setting have correlated with worse physical and mental health among American Indians with chronic diseases.<sup>93</sup> Implicit bias training may help reduce the impact of bias in decision-making.<sup>94-96</sup> Strategies for cultural competence include searching for shared identities or passions, considering the perspective of the individual patient, activating the mind for equality among each patient irrespective of background, and particularly countering stereotypes.<sup>91,96,97</sup>

## CONCLUSIONS

CVD disproportionately affects American Indians and Alaska Natives compared to whites, particularly CHD and stroke. The greatest risk factor for CVD among American Indians and Alaska Natives is diabetes. Programs to reduce diabetes risk through physical activity and weight loss, aggressive control of risk factors such as LDL cholesterol, hypertension, and albuminuria, and promotion of tobacco cessation, and toxic metal mitigation will greatly reduce risk of CVD in these populations. Intervening at multiple levels of structural and intermediary social determinants of health will also reduce and ultimately eliminate inequities faced by American Indians and Alaska Natives. Usage of community-based interventions may increase implementation of CVD guidelines-based care and eventually eliminate existing social determinants of health.

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**Figure Legend**

**Figure 1. Cardiovascular Disease in American Indians and Alaska Natives Risk Factors**

**Figure 2. Cardiovascular Disease in American Indians and Alaska Natives Solutions**

# Cardiovascular Disease in American Indians and Alaska Natives

Problem

**#1** Diabetes  
Cause of Heart  
Disease



Social  
Determinants of  
Health



- LDL Cholesterol
- Hypertension
- Renal Disease
- Sex 
- Age
- Underreporting of Ethnicity
- Tobacco 

- Toxic Metal Exposure 
- Income
- Wealth
- Insurance
- Discrimination 



Prevention



Guidelines Based  
Treatment



Community Based Interventions &  
Research

Solution

- ❑ Strong Heart Study
- ❑ Genetics of Coronary Artery Disease in Alaska Natives study
- ❑ Stop Atherosclerosis in Native Diabetics Study
- ❑ Native – Controlling Hypertension & Risk through Technology Study