BURDEN OF CARDIOVASCULAR DISEASE AMONG AMERICAN INDIANS AND ALASKA NATIVES IN WISCONSIN

Great Lakes Inter-Tribal Epidemiology Center
A division of Great Lakes Inter-Tribal Council, Inc.
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EXECUTIVE SUMMARY

This report originated from a funding opportunity put forth by Forward Community Investments. The Great Lakes Inter-Tribal Epidemiology Center (GLITEC) was identified as a potential awardee for previous work that has been completed to serve American Indian/Alaska Native communities. GLITEC supports Tribal communities’ health efforts by assisting with partnership development, community-based research, and technical assistance. The grant was awarded to provide GLITEC with the opportunity to explore available epidemiologic data related to cardiovascular disease in American Indian/Alaska Native residents of the state of Wisconsin.

The intent of this report is to:

- Provide a comprehensive and accurate state-wide report on the indicators and burden of cardiovascular disease in the American Indian/Alaska Native population in Wisconsin.
- Explore data gaps and opportunities for successful analysis and reporting in the future.

Cardiovascular disease disproportionately affects American Indians/Alaska Natives when compared to other racial and ethnic groups in the United States. Nationally, mortality rates from cardiovascular disease are 20% higher for American Indians/Alaska Natives compared to the all races population. Likewise, mortality rates due to stroke are 14% greater for American Indians/Alaska Natives than for the all races population. Previous research shows that mortality due to cardiovascular disease and stroke in the Native populations of Wisconsin are some of the highest in the United States.

The findings of this report support previous reports of data showing disproportionate rate of cardiovascular disease and indicators for American Indians/Alaska Natives that report residence in Wisconsin. Age-adjusted mortality rates for all diseases of the circulatory system, all diseases of the heart, ischemic heart disease, arterial disease, and heart attack were all statistically significantly higher for American Indians/Alaska Natives than for whites or the all races population. American Indians/Alaska Natives mortality rates from hypertensive diseases are 21% higher than all races and 28% higher than whites, but the proportion of American Indians/Alaska Natives who report a diagnosis of hypertension is similar to that of whites and people of all races. Besides facing higher than average mortality rates due to cardiovascular disease, American Indians/Alaska Natives also report higher rates of many risk factors that are associated with the development of the condition. Diabetes, overweight and obesity, commercial tobacco use, and physical inactivity are all risk factors which American Indians/Alaska Natives residing in Wisconsin report at higher rates than both whites and the all races population.

The creation of this report was affected by data limitations and gaps. Describing the burden of disease within Native communities presents a unique set of issues which need to be addressed in order to ensure accurate data collection and analysis. Data for American Indians/Alaska Natives are more incomplete and less reliable than for the general statewide population. Sample sizes were often too small for inclusion, and important cardiovascular disease indicators could not be examined because of this. Prevention efforts are necessary to decrease the burden of disease that is experienced by American Indians/Alaska Natives, and access to high quality data is necessary to see such efforts fulfilled.
BACKGROUND

The Great Lakes Inter-Tribal Epidemiology Center (GLITEC) is a division of the Great Lakes Inter-Tribal Council, Inc. GLITEC was created in 1996 to support Tribal communities in an effort to improve Tribal health. GLITEC strives to achieve the mission of supporting Tribal communities’ efforts to improve health by assisting with Tribal data needs through technical assistance, community-based research, and partnership development. GLITEC serves the 34 Federally-recognized Tribes and four Urban Indian Health programs in the Bemidji Area of the Indian Health Service (IHS).

This report originated from a funding opportunity put forth by Forward Community Investments. Forward Community Investments provides funding to “reduce social, racial, and economic disparities across Wisconsin.” GLITEC was identified as a potential awardee for previous work that has been completed to serve American Indian/Alaska Native communities. The grant was awarded to provide GLITEC with the opportunity to explore available epidemiologic data related to cardiovascular disease in American Indian/Alaska Native residents of the state of Wisconsin.

The intent of this report is to:

- Provide a comprehensive and accurate state-wide report on the indicators and burden of cardiovascular disease in the American Indian/Alaska Native population in Wisconsin.
- Explore data gaps and opportunities for successful analysis and reporting in the future.

Demographics

The American Community Survey estimates that 5.2 million individuals in the United States identify as American Indian or Alaska Native alone or in combination with one or more other races. The American Indian/Alaska Native community is growing at a rate that is considerably faster than that of the total population. Between the 2000 and 2010 Censuses, the American Indian and Alaska Native population increased by 26.7%; the total population growth during this same period was 9.7%. The median age of the American Indians/Alaska Natives is comparatively lower than that of the total population at 30.5 years and 37.3 years, respectively (Figure 1).
Heart Conditions

Cardiovascular disease is a group of conditions which affect the vascular system of the body. The cardiovascular system is made up of a series of vessels that carry blood throughout the body; veins and arteries are responsible for the circulation of blood. The following conditions fall within the definition of cardiovascular disease: cerebrovascular disease, coronary heart disease, peripheral arterial disease, deep vein thrombosis and pulmonary embolism, congenital heart disease, and rheumatic heart disease.5

Cerebrovascular disease is more commonly referred to as a stroke. A stroke occurs when either a blood vessel in the brain ruptures or the necessary blood supply to the brain is blocked.6 Blood is responsible for carrying oxygen throughout the body, and loss of oxygen to the brain causes death of brain cells within minutes.6 Beyond the risk of death, strokes are also responsible for long-term disability and irreversible brain damage.

The most common form of heart disease in the United States is coronary heart disease. This condition is also called ischemic heart disease. Deposits of cholesterol and other substances build up in the arteries that lead blood to the heart; these are referred to as plaques. Over time, atherosclerosis may occur, which is the partial or total blockage of blood flow.7 When a plaque is dislodged, a blood clot forms around it and blocks blood flow to the heart.8 The result is a myocardial infarction, or heart attack. Coronary heart disease may also result in angina, or chest pain, and, eventually, the heart muscle may weaken and this may lead to heart failure.7

Another condition that is caused by atherosclerosis is peripheral arterial disease. Peripheral arterial disease is also a narrowing or blockage of blood vessels, but, in contrast to coronary heart disease, the affected vessels are in the lower extremities.9

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FIGURE 1: Age Distribution in the United States, American Indians/Alaska Natives and All Races, 2013

Adapted from American FactFinder Tables S0201 and S0101
Deep vein thrombosis is a condition in which a blood clot forms in a deep vein in the arms or lower extremities. Pulmonary embolism is a complication of deep vein thrombosis in which the clot moves through the blood stream to the lungs. The blood clot then blocks blood flow and oxygen from reaching the lungs.10

The final conditions classified as cardiovascular disease are congenital heart defects and rheumatic heart disease. Heart conditions that are present at birth are called congenital heart defects. Both the structure and function of the heart may be affected.11 Rheumatic heart disease is a condition that arises from rheumatic fever, a streptococcal infection, which causes damage to the heart valves.12

## American Indian/Alaska Native Cardiovascular Disease Disparities

Cardiovascular diseases rank among the leading causes of death for American Indians/Alaska Natives in the United States; heart disease is the number one leading cause of death, and stroke is the number five leading cause of death for these communities nationally.13 Even though the total population also ranks heart disease and stroke as leading causes of death, American Indians/Alaska Natives face disproportionate mortality rates for both heart disease and stroke. Age-adjusted mortality rates from heart disease are 20% greater than among all races. Stroke deaths are 14% greater in this population.13

Beyond the racial disparity that American Indians/Alaska Natives experience in regard to cardiovascular disease and stroke, a geographic disparity also exists. This geographic disparity manifests in higher rates of heart disease and stroke deaths in northern states than in southern states for American Indians/Alaska Natives.14 American Indians/Alaska Natives residing within the state of Wisconsin experience some of the highest death rates from heart disease and stroke in the entire U.S.14 Beyond the risk of premature death, cardiovascular disease impacts quality of life and may result in major disability.13 Prevention efforts are necessary to decrease the burden of disease that is experienced by American Indians/Alaska Natives.

## Risk Factors

There are a number of risk factors associated with cardiovascular disease. Risk factors for cardiovascular disease include both lifestyle and non-modifiable factors. Non-modifiable risk factors include family history of disease, sex, and age. Men are at greater risk of cardiovascular disease until women reach the age of 55. Decreased estrogen post-menopause increases women's risk of cardiovascular disease. Experiencing preeclampsia, a condition during pregnancy that causes high blood pressure, is a non-modifiable risk factor for women as well.15

Lifestyle factors are modifiable behaviors associated with the development of cardiovascular disease. Behaviors that contribute to the development of cardiovascular disease include the use of commercial tobacco, diet, physical activity, body mass index (BMI), and excessive alcohol use.16

The use of commercial tobacco products contributes to the development of cardiovascular disease through a few different mechanisms.17 These include: damaging the lining of blood vessels, lowering “good” cholesterol, raising triglycerides, causing the formation of clots, increasing the buildup of plaque, and causing the thickening and narrowing of blood vessels.18

Diet, physical activity, and BMI are three lifestyle factors which are interrelated. Poor diet and physical inactivity increase the probability of being overweight or obese and, therefore, having a higher BMI. BMI is the ratio of height to weight, and it is a useful measure of adiposity and risk of disease development for populations.19 There are four BMI classifications: underweight, normal, overweight, and obesity (Appendix A).

Excessive alcohol use may seem like an unlikely risk factor for cardiovascular disease, but long-term overconsumption of alcohol has been implicated in the progression of high blood pressure, stroke, and heart disease.20

Particular conditions are also contributors to cardiovascular disease. High cholesterol and hypertension are two conditions which are affected by both lifestyle and non-modifiable risk factors. Both of these conditions, if left untreated, may lead to the development of cardiovascular disease.
Blood pressure is the force at which blood is pushed against the arteries. Sustained high blood pressure, or hypertension, damages the heart and increases one’s risk for heart disease and stroke.\(^{21}\)

Cholesterol is a necessary substance that may build up and form plaques within the arteries when in excess amounts. A total cholesterol level of less than 200 mg/dL is considered within a healthy range; LDL cholesterol should be less than 100 mg/dL to be considered healthy.\(^{22}\) HDL cholesterol, often referred to as “good” cholesterol, is responsible for the transport of cholesterol to the liver; the liver then flushes the cholesterol from the body.\(^{23}\) High cholesterol is an asymptomatic condition. High cholesterol may lead to atherosclerosis, heart attack, and heart failure. Individuals who are diagnosed with high cholesterol have twice the risk of developing cardiovascular disease as those with cholesterol within healthy ranges.\(^{24}\) A national sample of cholesterol diagnoses found that American Indians/Alaska Natives have rates of high cholesterol diagnoses that are comparable to whites.\(^{25}\)
METHODOLOGY

No single database exists which fully encompasses all mortality, morbidity, and lifestyle factors of the American Indian/Alaska Native communities. Therefore, multiple datasets and databases were accessed to best describe the burden of cardiovascular disease for American Indians/Alaska Natives residing in the state of Wisconsin to the fullest extent possible. State of Wisconsin epidemiologists and an Indian Health Service (IHS) statistician were contacted to discuss potential data sources.

The CDC Wide-ranging Online Data for Epidemiologic Research (WONDER) database provided analysis of compressed mortality data. This database was used to access mortality data for the state of Wisconsin for American Indians/Alaska Natives, whites, and the all races population. WONDER mortality data is compiled from death certificates, and bridged race estimates are applied as denominators to calculate race-specific rates. ICD-10 codes were used to select for specific causes of death, and age-adjusted mortality rates were aggregated for the most recent five years available (2009 through 2013) (Appendix A).

The Wisconsin Department of Health Services assisted with data collection by accessing the Wisconsin Hospital Inpatient Discharge Database. Because this database provides information on the number of visits to a hospital and does not include denominators, no percentages or rates could be calculated. GLITEC selected conditions of interest, and principal diagnostic codes were identified using the CDC crosswalk to identify ICD-9 codes (Appendix A). Hospital discharges were assessed for the 2013 calendar year. The Wisconsin Hospital Association Information Center data submission manual and Department of Health Services Office of Health Informatics race and ethnicity code documentation were used to obtain the race code for ‘American Indian or Alaska Native.’

Analysis was completed of data from the Behavioral Risk Factor Surveillance System (BRFSS) from 2006 through 2010. BRFSS is a random-digit dialing telephone survey that collects statewide health-related data. Statistical analysis was undertaken with the use of SAS 9.4. Data were restricted to Wisconsin residents only, and a total of 535 American Indians/Alaska Natives were interviewed over the five year span. Comparison of prevalence rates were made to both whites and the all races population. All data were unweighted.

Three years’ (2012, 2013, and 2014) worth of patient encounter data exported to the IHS National Data Warehouse (NDW) were analyzed using SPSS and Microsoft Excel. The IHS NDW is the national repository for IHS and Tribal Healthcare data and “provides a broad range of clinical and administrative information to managers at all levels for the Indian health system...” Patient data are initially collected at IHS and Tribal hospitals and clinics and then exported to and stored in the NDW. The current query was restricted to verified American Indians/Alaska Natives who reside in Wisconsin but who had an encounter anywhere in the Bemidji IHS Area (Wisconsin, Michigan, or Minnesota). The frequency of the indicators were assessed by dividing the number of cases of the selected outcome by the total number of individuals for which said measure was collected.
SELECTED CARDIOVASCULAR DISEASE INDICATORS IN AMERICAN INDIANS/ALASKA NATIVES

Age Distribution

The age distribution for American Indians/Alaska Natives residing in the state of Wisconsin follows a similar pattern to that of the United States as a whole. That is, American Indians/Alaska Natives are much younger than the all races population (Figure 2).

FIGURE 2: Age Distribution, American Indians/Alaska Natives and All Races, Wisconsin, 2013

Mortality

The disparate distribution of cardiovascular disease and stroke mortality is apparent upon examination of mortality rates. Mortality rates for all diseases of the circulatory system, all diseases of the heart, hypertensive disease, ischemic cardiovascular disease, heart failure, cerebrovascular disease, arterial disease, and myocardial infarction were all assessed through CDC WONDER (Tables 1-8).

American Indians/Alaska Natives had higher mortality rates than whites and the all races population for all of these causes of death. Age-adjusted mortality rates due to all diseases of the circulatory system, all diseases of the heart, ischemic heart disease, arterial disease, and heart attack were all statistically significantly higher for American Indians/Alaska Natives than for whites or the all races population.

Adapted from American FactFinder Tables S0201 and S0101
TABLE 1: Age-Adjusted Mortality due to All Diseases of the Circulatory System, American Indians/Alaska Natives, Whites, and All Races, Wisconsin, 2009-2013

<table>
<thead>
<tr>
<th></th>
<th>Age-Adjusted Rate per 100,000</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indians/Alaska Natives</td>
<td>293.5</td>
<td>264.9-322.2</td>
</tr>
<tr>
<td>Whites</td>
<td>210.8</td>
<td>209.2-212.4</td>
</tr>
<tr>
<td>All Races</td>
<td>215.1</td>
<td>213.5-216.7</td>
</tr>
</tbody>
</table>

'CDC WONDER 2009-2013

TABLE 2: Age-Adjusted Mortality due to All Diseases of the Heart, American Indians/Alaska Natives, Whites, and All Races, Wisconsin, 2009-2013

<table>
<thead>
<tr>
<th></th>
<th>Age-Adjusted Rate per 100,000</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indians/Alaska Natives</td>
<td>223.4</td>
<td>198.7-248.0</td>
</tr>
<tr>
<td>Whites</td>
<td>159.5</td>
<td>158.1-160.9</td>
</tr>
<tr>
<td>All Races</td>
<td>162.4</td>
<td>161.0-163.7</td>
</tr>
</tbody>
</table>

'CDC WONDER 2009-2013

TABLE 3: Age-Adjusted Mortality due to Hypertensive Diseases, American Indians/Alaska Natives, Whites, and All Races, Wisconsin, 2009-2013

<table>
<thead>
<tr>
<th></th>
<th>Age-Adjusted Rate per 100,000</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indians/Alaska Natives</td>
<td>17.5</td>
<td>11.3-25.8</td>
</tr>
<tr>
<td>Whites</td>
<td>12.6</td>
<td>12.2-13.0</td>
</tr>
<tr>
<td>All Races</td>
<td>13.8</td>
<td>13.4-14.2</td>
</tr>
</tbody>
</table>

'CDC WONDER 2009-2013
### TABLE 4: Age-Adjusted Mortality due to Ischemic Heart Disease (Coronary Heart Disease), American Indians/Alaska Natives, Whites, and All Races, Wisconsin, 2009-2013

<table>
<thead>
<tr>
<th>Race</th>
<th>Age-Adjusted Rate per 100,000</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indians/Alaska Natives</td>
<td>148.4</td>
<td>128.7-168.2</td>
</tr>
<tr>
<td>Whites</td>
<td>96.9</td>
<td>95.8-98.0</td>
</tr>
<tr>
<td>All Races</td>
<td>98.3</td>
<td>97.2-99.4</td>
</tr>
</tbody>
</table>

1CDC WONDER 2009-2013

### TABLE 5: Age-Adjusted Mortality due to Heart Failure, American Indians/Alaska Natives, Whites, and All Races, Wisconsin, 2009-2013

<table>
<thead>
<tr>
<th>Race</th>
<th>Age-Adjusted Rate per 100,000</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indians/Alaska Natives</td>
<td>26.2</td>
<td>17.7-37.5</td>
</tr>
<tr>
<td>Whites</td>
<td>20.2</td>
<td>19.7-20.7</td>
</tr>
<tr>
<td>All Races</td>
<td>20.2</td>
<td>19.7-20.7</td>
</tr>
</tbody>
</table>

1CDC WONDER 2009-2013

### TABLE 6: Age-Adjusted Mortality due to Cerebrovascular Disease (Stroke), American Indians/Alaska Natives, Whites, and All Races, Wisconsin, 2009-2013

<table>
<thead>
<tr>
<th>Race</th>
<th>Age-Adjusted Rate per 100,000</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indians/Alaska Natives</td>
<td>46.1</td>
<td>34.9-59.8</td>
</tr>
<tr>
<td>Whites</td>
<td>36.2</td>
<td>35.5-36.8</td>
</tr>
<tr>
<td>All Races</td>
<td>37.1</td>
<td>36.4-37.3</td>
</tr>
</tbody>
</table>

1CDC WONDER 2009-2013
TABLE 7: Age-Adjusted Mortality due to Diseases of the Arteries, Arterioles, and Capillaries, American Indians/Alaska Natives, Whites, and All Races, Wisconsin, 2009-2013¹

<table>
<thead>
<tr>
<th>Race</th>
<th>Age-Adjusted Rate per 100,000</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indians/Alaska Natives</td>
<td>15.5</td>
<td>9.2-24.5</td>
</tr>
<tr>
<td>Whites</td>
<td>8.5</td>
<td>8.2-8.8</td>
</tr>
<tr>
<td>All Races</td>
<td>8.6</td>
<td>8.3-8.9</td>
</tr>
</tbody>
</table>

¹CDC WONDER 2009-2013

TABLE 8: Age-Adjusted Mortality due to Myocardial Infarction (Heart Attack), American Indians/Alaska Natives, Whites, and All Races, Wisconsin, 2009-2013¹

<table>
<thead>
<tr>
<th>Race</th>
<th>Age-Adjusted Rate per 100,000</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indians/Alaska Natives</td>
<td>64.5</td>
<td>52.0-77.1</td>
</tr>
<tr>
<td>Whites</td>
<td>38.1</td>
<td>37.4-38.8</td>
</tr>
<tr>
<td>All Races</td>
<td>37.9</td>
<td>37.3-38.6</td>
</tr>
</tbody>
</table>

¹CDC WONDER 2009-2013
Hospitalizations and Diagnoses

The analysis of morbidity data shows that more Wisconsin American Indians/Alaska Natives report diagnoses of myocardial infarction (Table 10), angina or coronary heart disease (Table 11), or stroke (Table 12) than whites or all races. The greatest number of hospital discharges for the American Indian/Alaska Native population among the selected conditions was for hypertension (Table 9).

### TABLE 9: Hospital Discharges for Selected Cardiovascular Conditions, American Indians/Alaska Natives, Wisconsin, 2013

<table>
<thead>
<tr>
<th>Condition</th>
<th>Number of American Indian/Alaska Native Discharges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>154</td>
</tr>
<tr>
<td>Heart failure</td>
<td>114</td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>40</td>
</tr>
<tr>
<td>Ischemic heart disease</td>
<td>18</td>
</tr>
<tr>
<td>Transient cerebrovascular attack</td>
<td>11</td>
</tr>
</tbody>
</table>

*Wisconsin Hospital Inpatient Discharge Database, Wisconsin Department of Health Services, Division of Public Health, Office of Health Informatics

### TABLE 10: Ever Told Had Myocardial Infarction, American Indians/Alaska Natives, Whites, and All Races, Wisconsin, 2006-2010

<table>
<thead>
<tr>
<th></th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indians/Alaska Natives</td>
<td>9.0</td>
</tr>
<tr>
<td>Whites</td>
<td>5.2</td>
</tr>
<tr>
<td>All Races</td>
<td>5.3</td>
</tr>
</tbody>
</table>

*BRFSS 2006-2010

American Indians/Alaska Natives n=488, Whites n=20,756, All Races n=23,844

### TABLE 11: Ever Told Had Angina or Coronary Heart Disease, American Indians/Alaska Natives, Whites, and All Races, Wisconsin, 2006-2010

<table>
<thead>
<tr>
<th></th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indians/Alaska Natives</td>
<td>9.2</td>
</tr>
<tr>
<td>Whites</td>
<td>5.8</td>
</tr>
<tr>
<td>All Races</td>
<td>5.8</td>
</tr>
</tbody>
</table>

*BRFSS 2006-2010

American Indians/Alaska Natives n=488, Whites n=20,756, All Races n=23,844

### TABLE 12: Ever Told Had a Stroke, American Indians/Alaska Natives, Whites, and All Races, Wisconsin, 2006-2010

<table>
<thead>
<tr>
<th></th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indians/Alaska Natives</td>
<td>5.6</td>
</tr>
<tr>
<td>Whites</td>
<td>3.1</td>
</tr>
<tr>
<td>All Races</td>
<td>3.3</td>
</tr>
</tbody>
</table>

*BRFSS 2006-2010

American Indians/Alaska Natives n=535, Whites n=24,976, All Races n=28,675

Blood pressure, the force at which the heart pumps blood, is an indicator of cardiovascular health. While American Indians/Alaska Natives face mortality rates from hypertensive diseases that are 21% higher than all races and 28% higher than whites (Table 3), the proportion of American Indians/Alaska Natives who report a diagnosis of hypertension is similar to that of whites and people of all races (Table 13).
Diabetes has been directly correlated to heart disease. In fact, individuals with diabetes are at twice the risk of developing cardiovascular disease or suffering a stroke as non-diabetics, and these events often occur at a younger age than in those who do not have diabetes.\textsuperscript{30} Nationally, American Indian/Alaska Native adults have 2.3 times the likelihood of being diagnosed with diabetes as whites. This disparity is even greater for children: American Indian/Alaska Native children are 9 times more likely to be diagnosed with type 2 diabetes than non-Hispanic white children.\textsuperscript{31}

In Wisconsin, 20.2\% of American Indian/Alaska Native adults have been diagnosed with diabetes. Only 9.8\% of whites and 10.6\% of all races have received the same diagnosis (Table 14).

### TABLE 13: Ever Told Had Hypertension\textsuperscript{1}, American Indians/Alaska Natives, Whites, and All Races, Wisconsin, 2006-2010\textsuperscript{2}

<table>
<thead>
<tr>
<th></th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indians/Alaska Natives</td>
<td>37.4</td>
</tr>
<tr>
<td>Whites</td>
<td>35.7</td>
</tr>
<tr>
<td>All Races</td>
<td>36.2</td>
</tr>
</tbody>
</table>

*American Indians/Alaska Natives n=535, Whites n=24,976, All Races n=28,675
\textsuperscript{1}Excludes those with hypertension during pregnancy and prehypertension
\textsuperscript{2}BRFSS 2006-2010

### FIGURE 3: Percent of American Indians/Alaska Natives Diagnosed with Hypertension (Blood Pressure Greater than 130/80) by Age, Wisconsin Residents, 2009-2013\textsuperscript{1}

Diabetes has been directly correlated to heart disease. In fact, individuals with diabetes are at twice the risk of developing cardiovascular disease or suffering a stroke as non-diabetics, and these events often occur at a younger age than in those who do not have diabetes.\textsuperscript{30} Nationally, American Indian/Alaska Native adults have 2.3 times the likelihood of being diagnosed with diabetes as whites. This disparity is even greater for children: American Indian/Alaska Native children are 9 times more likely to be diagnosed with type 2 diabetes than non-Hispanic white children.\textsuperscript{31}

In Wisconsin, 20.2\% of American Indian/Alaska Native adults have been diagnosed with diabetes. Only 9.8\% of whites and 10.6\% of all races have received the same diagnosis (Table 14).
TABLE 14: Ever Told Had Diabetes\(^1\), American Indians/Alaska Natives, Whites, and All Races, Wisconsin, 2006-2010\(^2\)

<table>
<thead>
<tr>
<th></th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indians/Alaska Natives</td>
<td>20.2</td>
</tr>
<tr>
<td>Whites</td>
<td>9.8</td>
</tr>
<tr>
<td>All Races</td>
<td>10.6</td>
</tr>
</tbody>
</table>

American Indians/Alaska Natives \(n=535\), Whites \(n=24,976\), All Races \(n=28,675\)
\(^1\)Excludes those with diabetes during pregnancy or prediabetes
\(^2\)BRFSS 2006-2010

### Lifestyle Factors

The use of commercial tobacco products has been implicated as the leading cause of preventable death, and secondhand exposure is also accountable for deaths. Smoking and exposure to cigarette smoke raises blood pressure and lowers HDL cholesterol. Moreover, smoking affects both the structure and function of the heart and blood vessels, and increases the risk of atherosclerosis.\(^32\)

The use of commercial tobacco is a major issue in most Tribal communities. American Indians/Alaska Natives residing in the state of Wisconsin reported rates of everyday smoking that were more than double those of whites and the all races population, and smoking occasionally was three times higher than those of the comparison groups (Table 15).

TABLE 15: Cigarette Smoking Status (by Percent), American Indians/Alaska Natives, Whites, and All Races, Wisconsin, 2006-2010\(^1\)

<table>
<thead>
<tr>
<th>Smoking Status</th>
<th>American Indians/Alaska Natives</th>
<th>Whites</th>
<th>All Races</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current smoker/smokes every day</td>
<td>29.7</td>
<td>13.3</td>
<td>14.0</td>
</tr>
<tr>
<td>Current smoker/smokes some days</td>
<td>12.2</td>
<td>4.3</td>
<td>4.9</td>
</tr>
<tr>
<td>Former smoker</td>
<td>26.7</td>
<td>32.3</td>
<td>30.3</td>
</tr>
<tr>
<td>Never smoked</td>
<td>31.0</td>
<td>51.0</td>
<td>50.7</td>
</tr>
</tbody>
</table>

American Indians/Alaska Natives \(n=535\), Whites \(n=24,796\), All races \(n=28,675\)
\(^1\)BRFSS 2006-2010
Physical inactivity plays a role in a variety of conditions, including 27% of cases of diabetes and 30% of ischemic cardiovascular disease cases. Furthermore, regular physical activity has been shown to reduce the risk for hypertension, overweight and obesity, coronary heart disease, and stroke.\textsuperscript{33}

When assessing physical activity outside of work, 68.4% of American Indians/Alaska Natives reported exercising within the last 30 days; 76.7% of whites and 75.3% of all races reported likewise (Table 16).

Being overweight or obese is a risk factor for cardiovascular disease. For adults, a body mass index (BMI) of less than 18.5 is considered underweight, 18.5 to 24.9 is normal/healthy weight, 25.0 to 29.9 is considered overweight, and a BMI of 30.0 or greater is considered obese (Appendix A).\textsuperscript{34} For this report, two data sources were available for BMI: a self-reported sample (BRFSS), and direct measurement of clinical patients (IHS NDW).

Analysis of BRFSS revealed that 71.0% of sampled American Indian/Alaska Native adults were overweight or obese; whites and all races reported lower rates at 63.3% and 64.0%, respectively (Figure 4). For IHS NDW data, adults were divided into four BMI categories (underweight, normal weight, overweight, or obese) and five age groups. Greater than 50% of each age group were recorded as being either overweight or obese (Table 17).

\begin{table}[h]
\centering
\begin{tabular}{|l|c|}
\hline
Job, American Indians/Alaska Natives, Whites, and All Races, Wisconsin, 2006-2010\textsuperscript{1} & \%
\hline
American Indians/Alaska Natives & 68.4
\hline
Whites & 76.7
\hline
All Races & 75.3
\hline
\end{tabular}
\end{table}

\begin{table}[h]
\centering
\begin{tabular}{|c|c|}
\hline
Age in years & Percent
\hline
18-24 & 60.6
\hline
25-34 & 76.6
\hline
35-44 & 85.4
\hline
45-54 & 87.5
\hline
55 and older & 81.7
\hline
All patients & 80.4
\hline
\end{tabular}
\end{table}

n=1,534
\textsuperscript{1}IHS NDW 2012-2014

\textsuperscript{1}BRFSS 2006-2010

Percent
\textsuperscript{1}IHS NDW 2012-2014
FIGURE 4: Percent Classified as Neither Overweight Nor Obese or Overweight/Obese, American Indian/Alaska Native, White, and All Race Adults Over the Age of 18, Wisconsin, 2006-2010

American Indians/Alaska Natives n=535, Whites n=24,976, All Races n=28,675

*BRFSS 2006-2010
DATA LIMITATIONS AND GAPS

While constructing this report, a number of data issues and limitations were encountered. These problems were not unique to cardiovascular disease, but rather relate to the persistent issue of data quality in Indian Country. These gaps made the fulfillment of the intent of the report, to provide a comprehensive and accurate picture of cardiovascular disease in American Indians/Alaska Natives in Wisconsin, a difficult task.

Data for Tribal populations are often inaccurate and/or incomplete. American Indians/Alaska Natives are often left out of both state and federal data collection efforts, and, when included, this small population is sometimes combined with other small populations. There is also a lack of recognition that Native peoples are not homogeneous in regards to cultural and traditional practices.

Native populations are often small, rural, and undercounted. Both American Indians/Alaska Natives living on or near reservations and the youth of the community are often disproportionately undercounted. Validity and statistical significance are hard to maintain when the data have a small sample size and large margin of error.

Along with being an undercounted population, American Indians/Alaska Natives are often miscounted. American Indians/Alaska Natives are often misclassified as whites on death certificates, and this leads to inaccurate calculations of mortality rates. CDC WONDER data are derived from death certificates and likely include misclassified Native peoples. Racial misclassification is a prevalent issue when working with American Indian/Alaska Native mortality data. This occurs if the medical professional responsible for the completion of the death certificate misidentifies the race of the deceased. The IHS estimated that 16% of American Indian deaths were misclassified; this results in an underestimation of the deaths of American Indians.

The Wisconsin Hospital Inpatient Discharge Database and IHS NDW both contain areas of data limitations as well. The data retrieved from the Wisconsin Hospital Inpatient Discharge Database were available in the forms of counts only. This presents an issue for epidemiological analysis because of the lack of a denominator and, therefore, the inability to make comparisons to other populations. The data drawn from the IHS NDW did provide for greater sample sizes. However, those included in the sample were only patients that sought medical attention from IHS, Tribal, and Title V urban clinics. This excludes all American Indians/Alaska Natives that visited medical facilities outside of the IHS system.

Analysis of BRFSS data allows for the aggregation of multiple years, and, therefore, a larger sample size. Each year a fixed and rotating core set of questions are asked in each state. The fixed core is required to be completed by each state every year. Analysis outside of the fixed core of the questionnaire may result in sample sizes that are too small for inclusion in data reporting. This is why there is a lack of data on diagnoses of high cholesterol. There were a number of questions that would have been pertinent to this report, but the sample size was severely limited. For example, one year (2006) included questions about secondhand smoke policies, and fruit and vegetable consumption was only asked in odd numbered years (2007 and 2009). Finally, BRFSS is a cross-sectional survey that is conducted through the use of telephone interviews. It is estimated that 32% of American Indian/Alaska Native homes do not have telephone service, making these individuals unreachable for the purpose of epidemiologic telephone-based surveillance.

As can be seen by viewing the methodology section, in order to gain an understanding of cardiovascular disease in Native populations in Wisconsin, four different datasets had to be used. Even with the use of multiple databases and datasets, a number of important indicators were not able to be assessed. All of the selected datasets provided very small sample sizes that hindered representativeness of the data. Many indicators were measured through national surveys such as BRFSS, but some indicators had only a handful of responses. Cholesterol and diet are two very important factors associated with cardiovascular disease, but there was a lack of meaningful data for either of these indicators.
RECOMMENDATIONS

Prevention efforts are necessary to impact the health of Native communities, and it is necessary to improve data quality in order to better understand where to coordinate prevention strategies. Furthermore, data are used in the allocation of resources, and the continued inadequacy of Native data may further exacerbate the health disparities that are experienced by Native populations.

While aggregation of data from multiple years is one strategy to combat small sample sizes, over-sampling, or utilizing a longer sampling timeframe for the American Indian/Alaska Native communities may increase numbers. Beyond these techniques, the creation of culturally-specific surveys is a viable strategy for improved data. For example, BRFSS asks about the use of tobacco, but there is no differentiation between the use of traditional and commercial tobacco, which may lead to inaccurate data. Traditional ceremonial tobacco is culturally important to many Native Tribes, and this form of tobacco is free from many of the carcinogens found in commercial tobacco.42,43

Based on myriad historical interactions, American Indians/Alaska Natives often carry mistrust for outside individuals that come in to conduct research or surveys. In order to better reach Native peoples, it is beneficial to include communities in the process of data collection when possible. Furthermore, the purpose and use of the collected data should be clearly delineated for participants.43

The cardiovascular health of American Indians/Alaska Natives in Wisconsin must be addressed. Although there may be limitations to the data, American Indians/Alaska Natives residing in Wisconsin are experiencing cardiovascular disease deaths, diagnoses, and risk factors at a disproportionately higher rate than whites and the all races population. Funding and culturally-appropriate interventions are necessary to prevent future cardiovascular disease incidents.
REFERENCES


### APPENDIX A: SELECTED REFERENCE TABLES

**TABLE 18: BMI Classifications**

<table>
<thead>
<tr>
<th>Category</th>
<th>BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>Below 18.5</td>
</tr>
<tr>
<td>Normal/healthy weight</td>
<td>18.5-24.9</td>
</tr>
<tr>
<td>Overweight</td>
<td>25.0-29.9</td>
</tr>
<tr>
<td>Obese</td>
<td>30.0 and above</td>
</tr>
</tbody>
</table>

1Adapted from the CDC table for BMI interpretation

**TABLE 19: ICD-10 Codes Assessed through CDC WONDER**

<table>
<thead>
<tr>
<th>ICD-10 code</th>
<th>Cause of death</th>
</tr>
</thead>
<tbody>
<tr>
<td>I00-I99</td>
<td>Diseases of the circulatory system</td>
</tr>
<tr>
<td>I00-I09, I11, I13, I20-51</td>
<td>Disease of the heart</td>
</tr>
<tr>
<td>I10-I15</td>
<td>Hypertensive diseases</td>
</tr>
<tr>
<td>I20-I25</td>
<td>Ischemic heart diseases</td>
</tr>
<tr>
<td>I21, I22</td>
<td>Acute myocardial infarction</td>
</tr>
<tr>
<td>I50</td>
<td>Heart failure</td>
</tr>
<tr>
<td>I60-I69</td>
<td>Cerebrovascular diseases</td>
</tr>
<tr>
<td>I70-I78</td>
<td>Diseases of arteries, arterioles, and capillaries</td>
</tr>
</tbody>
</table>

**TABLE 20: ICD-9 Codes Selected for Assessment of Wisconsin Hospital Discharges**

<table>
<thead>
<tr>
<th>ICD-9 code</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>402-405</td>
<td>Hypertension</td>
</tr>
<tr>
<td>410-414, 429.2</td>
<td>Ischemic heart disease</td>
</tr>
<tr>
<td>428</td>
<td>Heart failure</td>
</tr>
<tr>
<td>430-434, 436-438</td>
<td>Cerebrovascular disease</td>
</tr>
<tr>
<td>435</td>
<td>Transient cerebrovascular attack</td>
</tr>
</tbody>
</table>
TABLE 21: ICD-9 and ICD-10 Crosswalk¹

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>ICD-9 Code</th>
<th>ICD-10 Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>402-405</td>
<td>I10-I15</td>
</tr>
<tr>
<td>Disease of the heart</td>
<td>390-398, 402, 404, 410-429</td>
<td>I00-I09, I11, I13, I20-I51</td>
</tr>
<tr>
<td>Ischemic heart disease</td>
<td>410-414, 429.2</td>
<td>I20-I25</td>
</tr>
<tr>
<td>Transient cerebrovascular attack</td>
<td>435</td>
<td>G45</td>
</tr>
</tbody>
</table>

¹Centers for Disease Control and Prevention/National Center for Chronic Disease Prevention and Health Promotion/Division for Heart Disease and Stroke Prevention

TABLE 22: Blood Pressure Levels¹

<table>
<thead>
<tr>
<th>Blood pressure categories</th>
<th>Blood pressure readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Systolic: less than 120 mmHg</td>
</tr>
<tr>
<td></td>
<td>Diastolic: less than 80 mmHg</td>
</tr>
<tr>
<td>At risk (prehypertension)</td>
<td>Systolic: 120-139 mmHg</td>
</tr>
<tr>
<td></td>
<td>Diastolic: 80-89 mmHg</td>
</tr>
<tr>
<td>High</td>
<td>Systolic: 140 mmHg or higher</td>
</tr>
<tr>
<td></td>
<td>Diastolic: 90 mmHg or higher</td>
</tr>
</tbody>
</table>

¹Adapted from the CDC

TABLE 23: IHS National Data Warehouse Blood Pressure Categories

<table>
<thead>
<tr>
<th>Blood pressure categories</th>
<th>Blood pressure readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Systolic: less than 130 mmHg</td>
</tr>
<tr>
<td></td>
<td>Diastolic: less than 80 mmHg</td>
</tr>
<tr>
<td>High</td>
<td>Systolic: 130 mmHg or higher</td>
</tr>
<tr>
<td></td>
<td>Diastolic: 80 mmHg or higher</td>
</tr>
</tbody>
</table>
APPENDIX B:
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Great Lakes Inter-Tribal Council, Inc. Burden of Cardiovascular Disease among American Indians and Alaska Natives in Wisconsin. Lac du Flambeau, WI: Great Lakes Inter-Tribal Epidemiology Center, Great Lakes Inter-Tribal Council, Inc.; 2015.