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Health Risks and Conditions among American Indians in North Carolina

by

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ABSTRACT

Objectives: North Carolina has the eighth largest American Indian population in the United States. American Indians have high death rates for a number of specific causes of death. However, North Carolina has lacked comprehensive statewide information about health risks in its American Indian populations. The objective of this study is to examine health risks and conditions among adult North Carolina American Indians, in comparison to whites and African Americans, and to provide baseline data for health indicators among American Indians.

Data: The 2002-2003 North Carolina Behavioral Risk Factor Surveillance System (BRFSS) data.

Methods: Unadjusted and age-adjusted percentages and adjusted odds ratios were calculated using weighted BRFSS data for 20 selected health indicators from five major areas: chronic conditions, risk factors, access to health care, preventive behavior, and quality of life.

Results: Seventeen of the 20 age-adjusted health indicators examined in this study showed a significant health disparity between American Indians and whites: diabetes (14.1% among American Indians vs. 6.8% among whites); high blood pressure (40.2% vs. 26.6%); asthma (16.4% vs. 11.1%); arthritis (36.3% vs. 29.1%); obesity (33.2% vs. 20.9%); not getting the recommended level of physical activity (71.0% vs. 59.0%); having no leisure-time physical activity (32.4% vs. 23.7%); consuming less than 5 servings of fruits and vegetables a day (80.3% vs. 74.8%); not getting a flu shot in the last year (73.0% vs. 66.1%); not having current health insurance (19.2% vs. 13.4%); not being able to see a doctor due to cost (29.4% vs. 12.4%); not having a personal doctor (21.8% vs. 16.4%); fair or poor health (25.9% vs. 17.5%); disability (38.5% vs. 24.9%); 14 or more poor mental health days a month (13.9% vs. 8.8%); 14 or more poor physical health days a month (14.2% vs. 9.7%); and 14 or more activity-limited days a month (11.6% vs. 5.7%). Many of these differences persisted even after controlling for socio-demographic characteristics.

Conclusions: North Carolina American Indians adults have significantly higher rates of chronic conditions and risk factors, less access to health care, and lower quality of life compared to whites. The levels of these health problems are similar for American Indians and African Americans. To eliminate health disparities between American Indians and whites and improve the quality of life among American Indians (Healthy People 2010 goals), North Carolina needs to tailor health promotion and disease control programs to the American Indian population. The prevalence estimates provided in this study can serve as baseline information for designing and evaluating these programs.



Introduction

North Carolina has the eighth largest American Indian population in the nation. According to 2002 United States population estimates, 111,255 American Indians live in North Carolina, approximately 4 percent of all American Indians in the country. American Indians have higher overall death rates than whites, particularly for heart disease, diabetes, homicide, AIDS, and motor vehicle injuries, both in North Carolina and nationwide.^{1,2} Yet there has not been comprehensive North Carolina statewide information available regarding American Indian health risks, conditions, and behaviors that are associated with these leading causes of death.

A few studies have examined health risks and behaviors of American Indians nationwide. These studies found that American Indians were at significantly higher risk than whites for fair-to-poor general health status, lack of access to health care, binge drinking, cigarette smoking, being diagnosed with diabetes, and obesity.³⁻⁵ Regional differences have also been reported among American Indians in prevalence estimates for health risks and conditions.⁶ For example, the prevalence of current cigarette smoking was higher among Northern Plain Indians (44.1%) than among American Indians overall in the United States (21.2%).

Some studies have examined the health behaviors and conditions of American Indians only at state or regional levels, often with findings similar to the national results. American Indians had higher rates of health risks and conditions than the general population in Oklahoma,⁷ and drastically higher rates of smoking and other cardiovascular disease risk factors than did non-Indians in Montana^{8,9} and in Washington State.¹⁰ In contrast, the rate of non-ceremonial smoking among New Mexico rural American Indians was lower than among the general population of New Mexico.¹¹ A study in Minnesota showed that American Indian-Alaska Native adolescents reported higher rates of health-compromising behaviors and risk factors than rural white youths in that state.¹²

Studies focusing on health risks at tribal levels also found that many tribes had higher health risks and conditions than the general populations of the states where these tribes lived. In Montana, more than half of American Indians were current smokers and a third were using smokeless tobacco on the Black-foot Reservation and in Great Falls.¹³ Hopi Indian women had a higher obesity rate than other Arizona adult women,¹⁴ and Catawba and Lumbee Indians, along with upper Midwest Indians, had higher rates of cardiovascular disease, diabetes, hypertension, fair/poor perceived health status, and current tobacco use compared to other adults in their states, respectively.^{15,16}

North Carolina has eight organized American Indian tribes: Coharie, Eastern Band of Cherokee, Haliwa-Saponi, Lumbee, Waccamaw-Siouan, Meherrin Indian, Occaneechi, and Sappony tribes. Only the Eastern Band of the Cherokee Nation is federally recognized and has access to Indian Health Service facilities. Approximately 60 percent of North Carolina's American Indians belong to the Lumbee or Cherokee tribes and live in a few counties (Hoke/Robeson/Scotland and Jackson/Swain). Large population sizes and high concentrations in a few counties have made the Lumbee and Eastern Band of Cherokee tribes more attractive to public health researchers to study. A study of Lumbee Indian women in Robeson County found that the prevalence of current smokeless tobacco use was 20.6 percent, much higher than the 1.3 percent rate for all North Carolina women, according to the 2003 BRFSS survey.¹⁷ Another study found that prevalence rates of cardiovascular risk factors such as diabetes, hypertension, and high cholesterol were much higher among Lumbees, compared to the state's adult population.¹⁶ Women from the Eastern Band of the Cherokee Nation had a smoking rate of 39 percent, compared to the state rate of 25 percent.¹⁸

More than 40 percent of North Carolina American Indians live in the rest of the 100 North Carolina counties. Comprehensive data have not been available on health risks and behaviors among all American Indians in North Carolina. Recent

expansion of the Behavioral Risk Factor Surveillance System (BRFSS) has yielded a large enough sample size to study all American Indian adults in North Carolina. This study examines health risks and conditions among adult American Indians in North Carolina in comparison to whites and African Americans, using 2002-2003 North Carolina BRFSS data, and provides baseline data for leading health indicators among North Carolina American Indians.

Methods

The data used for this study were from the 2002 and 2003 North Carolina Behavioral Risk Factor Surveillance System (BRFSS), a multistage, random-digit dialing, statewide telephone survey of non-institutionalized adult residents age 18 and older. During the two-year study period, 16,203 North Carolina adults were interviewed. Of these, 12,050 were white, 2,933 were African American, and 434 were American Indian, based on responses to two questions about race. (Hispanic ethnicity was not considered in racial grouping.) The first question was “Which one or more of the following would you say is your race?” If a respondent reported a single race, the response from the first question was used as the race variable. If a respondent reported more than one race, a second question was asked: “Which one of these groups would you say best represents your race?” and the response to the second question was used as the race variable. The response categories for both questions were “White, Black or African American, Asian, Native Hawaiian or Other Pacific Islander, American Indian or Alaska Native, and Other.” For this study, we used data from white, African American, and American Indian respondents for all data analyses. The numbers of respondents in the other racial groups were too small for meaningful analyses. Counties such as Robeson, Hoke, Swain, and Jackson, where many American Indians live, were over-sampled to increase American Indians in the BRFSS sample in both 2002 and 2003.

We chose 20 health indicators covering the topics of chronic disease, health and behavioral risk, preventive practices, access to health care, and quality of life. Two indicators – high blood pressure and not being able to see a doctor due to cost in the past year – were asked only during 2003. For all other indicators, the two years of data were aggregated.

Chronic diseases were determined by self-reports of doctor-diagnosed arthritis, asthma, diabetes, and high blood pressure. The risk factors examined were current smoking, not getting the recommended level of physical activity (at least 30 minutes per day of moderate physical activity on 5 or more days per week or at least 20 minutes per day of vigorous physical activity on three or more days per week), no leisure-time physical activity, consumption of less than 5 servings of fruits and vegetables per day, binge drinking, and obesity (a risk condition). The two preventive behaviors examined were not having a flu shot within the past year and never having a pneumonia vaccination. No current health insurance coverage, not being able to see a doctor due to cost, and having no personal doctor were the measures chosen to examine access to health care. Fair or poor general health status, perceived disability, and three “healthy days” measures (14 or more poor mental health days, 14 or more poor physical health days, and 14 or more activity-limited days in the past month) were used to examine quality of life. Activity-limited is defined as not being able to do some of the usual activities of daily living. Perceived disability and the questions that were used to derive the disability measure are explained elsewhere.¹⁹

In assessing American Indian health behaviors, the estimates from these 20 health indicators were compared between whites and American Indians. Estimates for African Americans are provided to give another perspective for comparing American Indian health risks and conditions, because African Americans – the state’s largest minority group – often have some of the worst health outcomes with respect to leading causes of mortality and morbidity.

All analyses were performed with the SUDAAN software, designed for the analysis of complex sample designs such as the BRFSS survey. The percentages were weighted to reflect North Carolina adult population characteristics. To account for differences in age distributions between the three racial groups, age-adjusted percentages were also calculated using the 2000 United States standard population and five age groups (18-24, 25-34, 35-44, 45-64, and 65+).²⁰ Age-adjusted percentages were used for presenting the results because age-adjusted percentages are more suited for making risk comparisons across the three racial groups. The age-adjusted rate differences between American Indians and whites and between African Americans and whites were tested using a two-tailed t-test.

Logistic regression analysis was performed to generate adjusted odds ratios for each risk category to measure the association between being American Indian and the likelihood of having the chronic disease or risk factor, while controlling for age, sex, education level (high school or less, some college, and college graduate) and household income levels (less than \$35,000, \$35,000-\$49,999, \$50,000+, and unknown household income). Whites were used as the referent group.

Results

Demographic Characteristics of Sample

Table 1 includes weighted point estimates of demographic characteristics for American Indians, African Americans, and whites, along with 95 percent confidence intervals, based on the 2002-2003 BRFSS sample. Demographic characteristics of American Indians were very similar to the state's largest minority, African Americans, with respect to age, education level, household income, and employment status. The demographic characteristics of these two minority groups in the BRFSS sample differed substantially from whites. A higher percentage of whites were in older age groups, higher education level groups, and higher

household income categories, compared to Americans Indians and African Americans. For example, only 10.4 percent of American Indians were ages 65 and older, compared to 18.2 percent of whites. Approximately 50 percent of American Indians were living in households with an annual income less than \$25,000, compared to 27.1 percent of whites. One in five whites lived in a household with an income of more than \$75,000, compared to approximately one in eighteen American Indians.

The distribution of employment status across racial groups was similar, with the exception of the "retired" and "unable to work" categories. The percentages of whites who reported being retired was twice as high as for American Indians, and the percentage of whites who reported being unable to work was half of that for American Indians. Also, a lower percentage of American Indians reported their occupational status as "homemaker" (4.7%), compared to whites (6.8%)

Health Indicators

Health indicators in this study were grouped into five major domains: chronic conditions, risk factors, preventive behavior, access to health care, and quality of life. **Table 2** includes unadjusted percentages and confidence intervals and age-adjusted percentages. Percentages for all North Carolinians (data not shown here) were only slightly different from the percentages for whites, because whites comprise more than 70 percent of the North Carolina adult population.

Table 3 shows odds ratios adjusted for gender, age, household income, and education level for all 20 indicators in the five domains. There are large age, education, and household income differences contributing to health disparities across the three racial groups. For example, if age-adjusted percentages for a health indicator are significantly different between American Indians and whites, but the adjusted odds ratio is not significantly different from 1.00, then the difference in the percentage is likely due to education and household income level

Table 1. Demographic Characteristics of American Indians, African Americans and Whites, 2002-2003 North Carolina BRFSS*

Demographics	American Indians			African Americans			Whites		
	N	%	95% C.I.	N	%	95% C.I.	N	%	95% C.I.
Gender									
Male	167	53.0	44.6-61.3	979	43.1	40.2-46.0	4,549	48.3	46.8-49.7
Female	267	47.0	38.7-55.4	1,954	56.9	54.0-59.8	7,501	51.7	50.3-53.2
Age Group									
18-24	34	19.7	12.1-30.4	239	15.8	13.3-18.7	694	11.5	10.3-12.8
25-34	78	20.0	14.0-27.7	479	19.8	17.6-22.3	1,754	17.5	16.4-18.6
35-44	77	14.1	10.0-19.6	610	20.8	18.6-23.1	2,215	20.2	19.1-21.3
45-54	107	23.0	17.2-30.0	635	19.3	17.2-21.5	2,344	18.4	17.3-19.4
55-64	68	12.8	8.3-19.4	417	10.8	9.4-12.4	1,962	14.3	13.4-15.2
65+	69	10.4	7.1-14.9	517	13.5	11.9-15.3	3,000	18.2	17.3-19.2
Education Level									
<High School	132	26.2	19.6-34.2	652	19.5	17.3-21.8	1,596	13.2	12.3-14.2
High School	136	28.7	22.0-36.5	1,009	36.4	33.6-39.3	3,507	31.0	29.7-32.4
Some College	95	25.1	17.8-34.0	718	26.7	24.1-29.4	2,992	26.1	24.9-27.5
College +	71	20.0	13.9-27.8	538	17.5	15.6-19.5	3,927	29.6	28.4-30.9
Household Income									
<\$15,000	88	15.3	11.1-20.8	501	17.3	15.1-19.8	1,090	9.4	8.5-10.3
\$15,000-24,999	115	32.7	24.5-42.2	673	30.3	27.2-33.6	1,803	17.9	16.7-19.2
\$25,000-34,999	51	22.5	14.3-33.4	391	18.4	15.9-21.2	1,343	14.7	13.6-15.9
\$35,000-49,999	46	14.3	9.3-21.3	324	17.3	14.8-20.0	1,718	18.8	17.6-20.1
\$50,000-74,999	32	9.4	5.8-14.9	181	8.2	6.6-10.2	1,498	18.6	17.3-20.0
\$75,000 +	22	5.7	2.6-12.3	153	8.5	6.9-10.4	1,798	20.6	19.4-21.8
Employment Status									
Employed for Wages	232	65.3	57.7-72.1	1,654	62.1	59.3-64.8	6,749	61.0	59.6-62.3
Out of Work	24	4.6	2.7- 7.5	215	8.0	6.5- 9.7	431	3.7	3.2- 4.2
Homemaker	32	4.7	3.0- 7.4	85	2.8	2.1- 3.8	822	6.8	6.1- 7.5
Student	13	4.0	1.7- 9.3	103	4.7	3.4- 6.3	318	4.2	3.5- 5.0
Retired	63	10.7	7.2-15.6	536	13.4	11.8-15.1	3,076	19.4	18.4-20.4
Unable to Work	70	10.7	7.4-15.3	332	9.1	7.7-10.6	638	5.1	4.5- 5.7

*N = Number of respondents, % = Weighted Percentage, and 95% C.I. = Confidence Interval of the weighted percentage.

Table 2. Unadjusted and Age-Adjusted Percentages of Selected Risk Indicators for American Indians, African Americans, and Whites: Results from the 2002-2003 North Carolina BRFSS#

Health Indicators	Unadjusted Percentages and 95% Confidence Intervals			Age-Adjusted Percentages		
	American Indians	African Americans	Whites	American Indians	African Americans	Whites
Chronic Conditions						
Arthritis	33.9 (26.3-42.3)	27.6 (25.2-30.1)	30.4 (29.1-31.6)	36.3 ¹	29.5	29.1
Asthma Ever	16.9 (10.6-25.9)	13.0 (11.2-15.1)	11.1 (10.2-12.0)	16.4 ¹	12.9 ¹	11.1
Diabetes	12.1 (8.0-17.9)	11.4 (9.9-13.1)	7.1 (6.5-7.8)	14.1 ³	12.6 ³	6.8
High Blood Pressure	35.1 (25.3-46.4)	37.1 (33.8-40.5)	28.3 (26.7-29.9)	40.2 ³	38.6 ³	26.6
Risk Factors/Conditions						
Current Smoking	28.6 (21.1-37.6)	23.3 (20.9-25.9)	26.5 (25.2-27.8)	26.9	22.9 ³	26.9
Did Not Get Recommended Level of Physical Activity	69.9 (61.5-77.2)	66.8 (63.8-69.6)	59.5 (58.1-60.9)	71.0 ³	67.9 ³	59.0
No Leisure-time Physical Activity	31.6 (24.7-39.5)	33.0 (30.4-35.7)	24.2 (23.0-25.4)	32.4 ²	33.8 ³	23.7
Consumption of Less than 5 Servings of Fruit and Vegetables/Day	78.6 (69.1-85.8)	81.3 (79.0-83.4)	74.7 (73.5-75.9)	80.3 ¹	81.2 ³	74.8
Binge Drinking	5.4 (2.6-10.7)	7.1 (5.7-8.8)	10.1 (9.2-11.1)	5.8 ²	6.9 ³	10.6
Obese	31.0 (24.1-39.0)	36.2 (33.5-39.1)	21.1 (19.9-22.4)	33.2 ³	37.2 ³	20.9
Preventive Behaviors						
No Flu Shot in the Last Year	75.9 (68.2-82.3)	72.2 (69.5-74.7)	64.9 (63.6-66.2)	73.0 ²	71.4 ³	66.1
No Pneumonia Vaccination Ever	78.1 (68.7-85.2)	83.0 (80.8-85.0)	77.9 (76.8-79.0)	75.9	81.6 ³	79.1
Access to Health Care						
No Current Health Insurance	21.1 (14.8-29.2)	19.6 (17.3-22.3)	13.0 (12.0-14.0)	19.2 ²	19.0 ³	13.4
Could Not See a Doctor Due to Cost	27.6 (18.6-39.0)	20.7 (18.2-23.6)	12.2 (11.0-13.5)	29.4 ³	20.6 ³	12.4
No Personal Doctor	25.8 (18.7-34.4)	18.5 (16.2-21.0)	15.8 (14.7-16.9)	21.8 ¹	17.9	16.4
Quality of Life						
Fair or Poor Health	22.2 (16.8-28.8)	23.5 (21.2-25.8)	18.2 (17.1-19.3)	25.9 ²	25.1 ³	17.5
Disability	36.9 (29.1-45.4)	28.2 (25.7-30.8)	25.5 (24.3-26.8)	38.5 ³	29.7 ³	24.9
14+ Poor Mental Health Days/Month	12.8 (8.7-18.2)	11.6 (9.8-13.6)	8.8 (8.1-9.6)	13.9 ²	11.5 ³	8.8
14+ Poor Physical Health Days/Month	12.6 (9.1-17.2)	11.5 (9.9-13.3)	10.0 (9.3-10.9)	14.2 ²	12.4 ³	9.7
14+ Activity-limited Days/Month	10.4 (6.8-15.5)	6.6 (5.4-8.0)	5.9 (5.3-6.5)	11.6 ²	7.0 ¹	5.7

Note: Unadjusted percentages are weighted. The age-adjusted percentages are weighted and adjusted for age differences among the three racial groups for comparison purposes using the age distribution of the 2000 United States population.

^{1, 2, 3} Denote that age-adjusted percentages are significantly different from the referent group (whites) at the 0.1, 0.05, and 0.01 probability levels, respectively.

Table 3. Adjusted Odds Ratios for Selected Risk Indicators for American Indians, African Americans, and Whites: Results from the 2002-2003 North Carolina BRFSS

Health Indicators	Adjusted Odds Ratios [#]		
	American Indians	African Americans	Whites
Chronic Conditions			
Arthritis	1.47	0.92	1.00
Asthma Ever	1.58	1.07	1.00
Diabetes	2.00 ²	1.84 ³	1.00
High Blood Pressure	2.02 ²	1.86 ³	1.00
Risk Factors/Conditions			
Current Smoking	0.85	0.63 ³	1.00
Did Not Get Recommended Level of Physical Activity	1.64 ²	1.32 ²	1.00
No Leisure-time Physical Activity	1.32	1.32 ³	1.00
Consumption of Less than 5 Servings of Fruit and Vegetables/Day	1.33	1.36 ³	1.00
Binge Drinking	0.39 ²	0.64 ³	1.00
Obese	1.68 ³	2.05 ³	1.00
Preventive Behaviors			
No Flu Shot in the Last Year	1.36	1.21 ²	1.00
No Pneumonia Vaccination Ever	0.87	1.27 ²	1.00
Access to Health Care			
No Current Health Insurance	1.04	1.08	1.00
Could Not See a Doctor Due to Cost	2.15 ²	1.33 ²	1.00
No Personal Doctor	0.89	1.05	1.00
Quality of Life			
Fair or Poor Health	1.20	1.17	1.00
Disability	1.88 ³	1.03	1.00
14+ Poor Mental Health Days/Month	1.21	1.07	1.00
14+ Poor Physical Health Days/Month	1.28	1.02	1.00
14+ Activity-limited Days/Month	1.73 ²	0.93	1.00

[#] Adjusted odd ratios are adjusted for sex, age, education level (high school or less, some college, and college graduate) and household income levels (less than \$35,000, \$35,000-\$49,999, \$50,000+, and unknown household income). Whites were the referent group.

^{2,3} Denotes that odds ratios are significantly different from the referent group (whites) at the 0.05, and 0.01 probability levels, respectively.

differences between the two groups. If both the difference in age-adjusted percentages and the odds ratio are significant, then other factors are contributing to the difference. Finally, race is a social construct: being classified as white or American Indian does not create health differences biologically; however, lifetime experiences related to being and being seen as American Indian may affect health.

Chronic Conditions: In this study we examined doctor-diagnosed arthritis, asthma, diabetes, and high blood pressure. Age-adjusted percentages for all four chronic conditions for American Indians were higher than those for both African Americans and whites (Table 2). While none of these differences were significant between American Indians and African Americans, they were all statistically significant between American Indians and whites. In cases of diabetes and high blood pressure, the disparities were large.

The age-adjusted diabetes prevalence among American Indian adults (14.1%) was more than double the rate of diabetes among white adults (6.8%). Two in five American Indian adults reported being diagnosed with high blood pressure, compared to one in four whites. The rate of ever being diagnosed with asthma was approximately 50 percent higher among American Indians than among whites (16.4% vs. 11.1%). After adjusting for gender, age, education, and household income, the odds of arthritis and of ever being diagnosed with asthma were not significantly different between American Indians and whites (Table 3). However, American Indians had significantly higher odds of having diabetes and high blood pressure than whites (Adj. OR=2.00 and 2.02, respectively, $p < 0.05$), even after adjusting for socio-demographic characteristics.

Risk Factors: Five risk factors – current smoking, recommended level of physical activity, any leisure-time physical activity, consumption of less than 5 servings of fruits and vegetables per day, and binge drinking – and one risk condition, obesity, were

examined between American Indians and the other two racial groups.

The health risks and conditions of American Indians were similar to those of African Americans, but American Indians had significantly higher age-adjusted percentages than did whites for four of the six risk factors and conditions (Table 2). The largest risk disparity between American Indians and whites was for obesity. One in three American Indians was obese, compared to approximately one in five whites. Even after controlling for gender, age, education, and household income, the odds of obesity were much higher among American Indians than whites (OR=1.68, $p < 0.01$, Table 3). The second largest disparity was in physical activity level. The rate of not participating in the recommended level of physical activity was 1.2 times as high among American Indians (71.0%) than among whites (59.0%, Table 2). A larger proportion of American Indians (80.3%) than whites (74.8%) reported consuming less than five servings of fruits and vegetables a day. The unadjusted risk of current smoking was somewhat higher among American Indians (28.6%) than whites (26.5%) when not accounting for age differences; however, the age-adjusted percentages were identical (26.9%) for American Indians and whites. The only risk factor for which American Indians were at lower risk than whites was binge drinking (5.8% vs. 10.6%). After controlling for gender, age, education, and household income, the odds of reporting binge drinking were lower among American Indians than whites (OR=0.39, $p < 0.05$, Table 3).

Preventive Behaviors: The two preventive behaviors examined were not having a flu shot within the past year and never having had a pneumonia vaccination. A significantly higher percentage of American Indians than whites reported not receiving a flu shot in the past year (73.0% vs. 66.1%, $p < 0.05$, Table 2). A larger percentage of African Americans than American Indians or whites reported never receiving a pneumonia vaccination. After controlling for gender, age, education, and household income, the odds of not engaging in preventive behaviors were

not significantly higher for American Indians than for whites (Table 3).

Access to Health Care: We used three indicators – no current health insurance coverage, not being able to see a doctor due to cost, and having no personal doctor – in comparing access to health care among American Indians, whites, and African Americans. All three health care indicators showed that American Indians had significantly less access to health care than whites (see Table 2). Approximately 19 percent of American Indian adults did not have health insurance, compared to 13.4 percent of whites. Twenty-nine percent of American Indian adults reported not being able to see a doctor due to cost in the past year, compared to only 12 percent of whites. After controlling for age, gender, education, and household income, the odds of not being able to see a doctor due to cost in the past year was significantly higher (OR=2.15, $p < 0.05$) for American Indians compared to whites (Table 3). Nearly 22 percent of American Indian adults did not have a personal doctor, compared to 16 percent of whites (Table 2). Levels of the three indicators were slightly more favorable for African Americans than for American Indians.

Quality of Life: Fair or poor general health status, perceived disability, and three “healthy days” measures (14 or more poor mental health days a month, 14 or more poor physical health days a month, and 14 or more activity-limited days a month) were used to examine quality of life among American Indians in comparison to whites and African Americans.

For all five measures of quality of life, American Indians had significantly higher percentages of unfavorable outcomes than whites ($p < 0.05$, Table 2). Though all five prevalence estimates were higher for American Indians than for African Americans, they were not significantly different. More than a quarter of American Indian adults rated their health as fair or poor, compared to 17.5 percent of white adults. The disparity with respect to disability was even larger. Nearly 39 percent of

American Indians reported having some form of disability, compared to 25 percent of whites. American Indians also had significantly more unhealthy days per month than whites ($p < 0.05$). Approximately 14 percent of American Indians reported having 14 or more poor mental health days and 14 or more poor physical health days within the past month, compared to approximately 9 percent of whites. The percentage reporting 14 or more activity-limited days per month was more than twice as high among American Indians (11.6%) as among whites (5.7%).

Logistic regression analysis results showed that after controlling for age, gender, education, and household income, American Indians had a higher odds of reporting lower quality of life for all five measures than whites (Table 3). Three of these odds ratios (fair/poor health status, poor mental health days, and poor physical health days) were not significant for American Indians, but the odds ratios for the other two quality of life measures were significant. American Indians were significantly more likely to report having a disability (OR=1.88, $p < 0.01$) and having 14 or more activity limitation days in the past month (OR=1.73, $p < 0.05$) than whites, after controlling for demographics.

Discussion

Using a relatively large sample from North Carolina, this study provides estimates on a broad range of health indicators for American Indians. It shows that North Carolina American Indians adults have significantly higher rates of chronic conditions and risk factors, less access to health care, and lower quality of life than whites. In fact, 17 of the 20 health indicators examined in this study showed a significant health disparity between American Indians and whites. For only one health indicator – binge drinking – were American Indians at lower risk than whites. The health status of American Indians, based on these 20 indicators, was similar to that for African Americans. The results from this

study clearly indicate that public health interventions need to be developed to reduce health risks and increase access to care and quality of life among the American Indian population. The prevalence estimates shown here can provide North Carolina public health programs with baseline information for planning intervention programs and evaluating future prevention efforts.

This study found that North Carolina American Indians had higher rates of all chronic conditions compared to whites and rates that were similar to the rates of chronic conditions for African Americans. In comparison to earlier studies, we found that the diabetes prevalence among North Carolina American Indian adults (14.1%) was similar to that for Catawba Indians in the Carolinas (12.9%),¹⁵ higher than for American Indians in Oklahoma (8.1%)⁷ and in New Mexico (8.8%),²⁰ and lower than for Midwest American Indians (20.1%).¹⁶ Age-adjusted prevalence of high blood pressure among North Carolina American Indian adults (40.2%) was higher than for Catawba Indians in the Carolinas (29.1%)¹⁵ and higher than for Navajo Indians (19%).²² Our findings further support that diabetes and hypertension rates are high among American Indians across the United States.

The prevalence of current smoking in this study was lower than that reported in most earlier studies. This could partially be due to a decline in smoking rates over the past few years. Using current (2002-2003) North Carolina BRFSS data, North Carolina American Indians had a lower rate of smoking than American Indians in Oklahoma,⁷ in the Northern Plains,⁸ and in Montana.²³ However, the North Carolina American Indian smoking rate was higher than that for American Indians overall in the Southwestern United States.⁶ The rates for no leisure-time physical activity and self-reported health status were similar for North Carolina American Indians and Oklahoma Indians.

An unusual observation in this study was significantly lower rates of reported binge drinking among American Indians in North Carolina

compared to whites. The rate of binge drinking among North Carolina American Indians was much lower than among all American Indians in the United States (5.4% vs. 21.1%), according to 2002-2003 BRFSS data from all states. The rate of reported binge drinking was also lower among North Carolina American Indians than among Oklahoma Indians (5.4% vs. 18%).⁷ One possible reason for the low rate of binge drinking is that strong conservative religious values prohibiting drinking may be more prevalent among North Carolina American Indians. An earlier study showed that higher church-going was associated with lower rates of smoking and alcohol consumption among North Carolina Lumbee Indians.²⁴

In this study, significantly worse quality of life measures were observed for both American Indians and African Americans than for whites. The prevalence of disability and activity-limited days were very high among American Indians, even compared to African Americans. Lower reported quality of life and a higher rate of disability among American Indians could be due to higher rates of chronic conditions.

Low socio-economic status for American Indians in North Carolina may be a major factor contributing to the poor health outcomes observed in this study, mainly by limiting access to health care and reducing opportunities for good living conditions. North Carolina American Indian adults are younger, less likely to have a college degree, and more likely to have lower household incomes than whites. The majority of American Indians in North Carolina live in Hoke, Robeson, and Swain counties. According to the 2000 Census these counties rank 1st, 4th, and 3rd, respectively, in lowest per capita incomes in North Carolina. American Indians have a poverty rate that is two and a half times that of whites. Our finding that there was no significant difference in having health insurance between American Indians and whites, after controlling for sex, age, education, and household income (Table 3), indicates that lack of access to health care is strongly associated with low socio-economic status. The rate of no health insurance

coverage adjusted for only age was significantly higher among American Indians (Table 2).

The primary source of health care benefits for most Americans is through employment.²⁵ American Indians have a slightly higher rate than whites of being employed for wages, yet they have a significantly lower rate of access to health care, indicating that American Indians in North Carolina have jobs with less health benefits. The Eastern Band of Cherokee tribe has access to Indian Health Service facilities, and therefore may have more access to health care than other tribes. However, the Eastern Band of Cherokee tribe constitutes only about 15 percent of North Carolina's American Indian population. We do not have tribal-level information on health care access among North Carolina American Indians.

Two overarching goals of Healthy people 2010 are to eliminate health disparities and to improve the quality of life among all Americans. Given the large health disparities between American Indians and whites in most of the health indicators and the lower quality of life among American Indians found in this study, we must enhance our efforts to improve access to preventive care and manage chronic diseases among American Indians.

There are some limitations to this study. First, telephone surveys are limited to persons living in households with telephones; thus, they may underrepresent groups such as the poor, those located in rural or inner city areas, and renters.²⁶ However, approximately 95 percent of households in North Carolina do have one or more telephones. Furthermore, post-stratification weights are used to help correct for any bias caused by non-telephone coverage. Second, estimates for American Indian adults were based on a relatively small sample size (434), making these estimates less reliable than the

estimates for other two racial groups. Finally, the data are self-reported by the respondents, which may result in misreporting of certain health conditions.

This study has some strengths as well. First, all data were collected at the same time, with the same survey instrument and using the same survey protocols, making comparisons across racial groups more objective. Second, this is the first statewide study of American Indians in North Carolina that includes a wide range of health topics covering many areas of public health interest. And, finally, the current and future sample sizes of the North Carolina BRFSS will be large enough to provide regular updates of the health information presented in this study, which can be used to monitor American Indian health and evaluate health programs that target this population.

Conclusion

This study shows that North Carolina American Indian adults have significantly higher rates of chronic conditions and risk factors, less access to health care, and lower quality of life than whites. Seventeen of the 20 health indicators examined in this study showed a significant health disparity between American Indians and whites. Two broad goals of Healthy People 2010 are to eliminate health disparities and to improve the quality of life among all Americans. North Carolina needs to tailor health improvement programs to American Indians. The prevalence estimates provided in this study can serve as baseline information for designing and evaluating these programs. Also, the current and future sample sizes of the North Carolina BRFSS will be large enough to provide regular updates of the health information presented in this study.

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