
Relationship Between Socioeconomic Status, Health Status, and Lifestyle Practices of American Indians: Evidence from a Plains Reservation Population

ALLEN CHEADLE, PhD
DAVID PEARSON, PhD
EDWARD WAGNER, MD, MPH
BRUCE M. PSATY, MD, PhD
PAULA DIEHR, PhD
THOMAS KOEPEL, MD, MPH

Five of the authors are with the University of Washington, Seattle. Dr. Cheadle, Dr. Wagner, Dr. Psaty, Dr. Diehr, and Dr. Koepsell are with the Department of Health Services. Further, Dr. Diehr is also with the Department of Biostatistics; Dr. Psaty, the Department of Medicine and the Department of Epidemiology; and Dr. Koepsell, the Department of Epidemiology. Two authors are with the Group Health Cooperative of Puget Sound, Seattle—Dr. Pearson, Centers for Health Promotion, and Dr. Wagner, Health Studies.

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Tearsheet requests to Allen Cheadle, PhD, Department of Health Services, JD-43, University of Washington, Seattle, WA 98195, telephone 206-543-3736, FAX 206-685-3467.

Synopsis

This paper presents information on the prevalence of a variety of health behaviors and health conditions on an American Indian reservation in the Plains

region of the western United States. In addition, data from two non-Indian comparison groups were used to examine the extent to which differences in health status and health behaviors between Indians and non-Indians could be explained by differences in socioeconomic status.

The American Indian data were from a survey conducted in 1988 during an evaluation of a local community-based health promotion program, part of the Kaiser Family Foundation's Community Health Promotion Grants Program. The comparison groups were 12 communities in California surveyed in evaluating the Community Health Promotion Grants Program and three Plains States participating in the Behavioral Risk Factor Surveillance Survey.

The results show that the higher prevalences of risk-taking behavior among Indians and their poorer self-reported health status remained after adjustment for socioeconomic status. Also, among Indians, higher levels of income and education were not associated with improved self-reported health status and lower prevalence of tobacco use, as was the case with the comparison groups. The higher prevalences of risk-taking behaviors and ill health among American Indians residing on one reservation, even among those with higher socioeconomic status, suggests a need for the investigation of other social and environmental influences.

MONITORING THE HEALTH of American Indians (AI) is an important national public health goal (1). While systematic nationwide monitoring of a wide range of risk factors has begun only recently (2,3), there have been a number of previous studies looking at particular tribes, typically focused on a small set of diseases or behavioral risk factors: alcohol and drug use (4-6), cardiovascular disease (7), diabetes (7,8), and suicide (9,10).

These data-gathering efforts have two aims. The first is to assess the incidence or prevalence of health conditions and health behaviors of public health importance among AIs (3,11,12). A second related aim is to understand the causes of disease and

determinants of lifestyle practices in order to design appropriate and effective interventions (9,11,13). For example, explanations offered for high levels of alcohol abuse among Indians range from the poverty and hopelessness associated with reservation life to problems of adapting traditional Indian values to a majority white culture with conflicting values and hostile institutions (9,13,14).

In this paper we provide information relevant to both of these data-gathering goals. First, we present descriptive information on a variety of health-status measures, health-related attitudes, and lifestyle practices among AI adults, ages 18-49 years, residing on a Plains-region reservation in the western United

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States. Second, by comparing the AI survey findings with findings in surveys of two non-Indian comparison groups, we examine the extent to which poverty, lack of education, and unemployment are associated with the higher prevalence of disease and risk behaviors on the reservation.

Methods

American Indian survey. The AI survey conducted in 1988 was a collaborative effort between the Indian Health Service (IHS), the Centers for Disease Control and Prevention (CDC), the University of Washington, and Group Health Cooperative of Puget Sound. Its purpose was to evaluate the impact of a reservation-based health promotion project directed at substance abuse and related health problems, a part of the Kaiser Family Foundation's Community Health Promotion Grants Program (CHPGP) (15). Because the potential impact of the health-promotion intervention on older adults was expected to be small, the survey sample was limited to adults ages 18–49.

All interviews were conducted in person by interviewers of the same sex and tribe as the respondent. Questions regarding demographics and health behaviors were drawn primarily from CDC's Behavioral Risk Factor Surveillance System (BRFSS) (16); additional questions about health-related attitudes were developed by the evaluation team (15). The sampling frame included all tribal members who had used an IHS health clinic on the reservation at least once during the previous 5 years. Since the reservation is geographically isolated and all members of federally-recognized tribes are eligible for free care at IHS clinics, the vast majority of reservation residents obtain health care at local IHS clinics. An unknown, but probably small, percent of residents did not visit an IHS clinic at all during the previous 5 years. Estimates from census data show that there were actually more registered clinic users than residents,

although this is probably due to undercounting of AI residents by the census.

Among adult clinic users ages 18–49 whose address was on or near the reservation, a random sample was drawn stratified by sex and tribe. Since a large percentage of IHS clinic users either had no address or had an address outside the study area, protocols were developed for locating or replacing subjects. To document that a person was absent from the area, deceased, incompetent, institutionalized, or away at school, we required information from one formal source (tribal enrollment or housing lists) or two informal sources (family member, interview staff knowledge). Subjects not available or ineligible based on this information were replaced by others on the sampling lists.

The original sample included 1,115 names, of which 52 percent were eligible to be interviewed, 23 percent no longer resided in the area, 2 percent were temporarily away, 14 percent had no address, 6 percent had died, and 4 percent were not reachable for other reasons. Among those eligible, interviews were completed with 435 respondents (75 percent), 14 percent refused, 10 percent could not be found at home, and 1 percent were not competent to complete the interview. At the end of the survey, a random sample of 25 percent of respondents with telephones were telephoned to verify interview information. All of those contacted confirmed that they had been interviewed, in person, by a member of the survey team.

Two-thirds of the AI sample reported having a telephone in the home. Analyses indicated that those without phones on the reservation were likely to have lower levels of income and education, and higher levels of risk behaviors (table 1 and Results section which follows). Including respondents without phones would therefore have exaggerated the differences between AI and the comparison groups, who were all surveyed by phone. Thus, for the comparisons between AI and non-Indians, the AI sample was restricted to respondents with telephones.

Comparison groups. Two surveys were used as a basis for comparison with the AI respondents: (a) 12 communities in California surveyed as part of the CHPGP evaluation and (b) BRFSS survey data from three Plains States with characteristics similar to the State where the reservation was located. (BRFSS survey data were not available for the State containing the reservation.)

The CHPGP survey instrument was nearly identical to the AI instrument, resulting in more potential comparison variables than the BRFSS survey.

Table 1. Characteristics of American Indians ages 18–49 years, with and without telephones (percentages)

Variable	Has telephone			P ¹
	No (N = 162)	Yes (N=245)	Overall (N=407)	
Demographics:				
Female.....	42.0	53.5	48.9	.02
18–24 years of age.....	26.5	22.0	23.8	.23
25–34 years of age.....	38.9	35.1	36.6	...
35–49 years of age.....	34.6	42.9	39.6	...
Annual income less than \$10,000.....	64.2	32.2	45.0	<.01
Some college.....	30.9	44.5	39.1	.01
Married, living together.....	55.6	59.2	57.7	.47
Unemployed.....	40.7	14.7	25.1	<.01
Health status:				
Fair or poor health (self-rated).....	22.2	15.9	18.4	.12
Dissatisfied with physical ability.....	14.2	11.0	12.3	.35
More than 2 years since last visit to the physician.....	12.4	21.6	18.0	.01
Medical conditions:				
High blood pressure.....	11.2	9.4	10.1	.57
Heart trouble.....	6.9	4.1	5.2	.24
Cancer.....	0.0	2.4	1.5	.01
Diabetes.....	8.8	4.9	6.4	.15
Broken or fractured bone.....	13.1	11.9	12.4	.71
Health behaviors:				
Seldom or never use seatbelts.....	49.7	40.8	44.3	.08
No frequent exercise.....	30.9	28.3	29.3	.58
Percent calories from fat.....	42.3	41.5	41.8	.20
Current smokers.....	48.1	46.5	47.2	.75
Had 5 or more drinks on an occasion, past 2 weeks.....	49.0	45.9	47.2	.55
Chronic drinkers (2 or more drinks per day).....	17.6	10.2	13.1	.04
Driven while intoxicated.....	15.6	17.3	16.6	.66
Used marijuana, past year.....	28.8	18.0	22.3	.01
Used cocaine or crack, past year.....	1.9	3.3	2.7	.37

¹ P-value for t-test comparing those with and without telephones, except for age where P-value is based on a chi-square test.

CHPGP communities were generally entire counties or cities but, occasionally, program target areas were collections of census tracts (15). Random-digit-dialing telephone surveys of adults (18 years of age and older) were carried out in 14 of the communities, 12 in California. The two other communities—one in Utah and one in Hawaii—had unique religious or cultural features and were excluded to obtain a more homogeneous comparison group.

The telephone survey assessed self-reported health behaviors related to smoking, substance abuse, injuries, cardiovascular disease, cancer, and teen pregnancy. The Waksberg method of random digit dialing (17) was used to identify a probability sample of households. Completed interviews of 500 to 900 adults (ages 18 and older) were obtained in each site. The response rate for the screening interview to enumerate the household was 72.1 percent and the response rate for the extended interview was 74.1 percent, for an overall response rate of 53.4 percent of those eligible to be interviewed. Characteristics of nonrespondents to the extended interview were examined; they were more likely to be male, older, and of Asian descent, but the differences were

generally small in magnitude. The response rate to the extended interview was slightly higher for those ages 18–49 years compared with those 50 and older (75.5 percent versus 72.4 percent).

The BRFSS survey instrument and methods of administration have been described in detail elsewhere (3). Three years of data, 1987–89, were pooled from three Plains States near the State where the reservation was located. The survey response rates for the three States ranged from 71 percent to 81 percent in 1987; response rates in the other 2 years were comparable. The method of computing response rates in the BRFSS survey would yield a higher response rate than the one used in computing the CHPGP response rates. For example, only a proportion of phones that rang without an answer were included in the BRFSS survey denominator, while all such numbers were included in the CHPGP denominator. However, the different response rate computation methods account for only a small fraction of the overall difference in response rates between the BRFSS survey and CHPGP survey. Both surveys, CHPGP and BRFSS samples, were limited to adults ages 18–49 to maintain comparability with the AI survey.

Table 2. Characteristics of American Indian (AI) and California Community Health Promotion Grants Program (CHPGP) communities, ages 18–49¹

Variable	Men			Women		
	AI	CHPGP	P ²	AI	CHPGP	P ²
Number of observations	114	2,353	...	131	2,817	...
Demographics:						
18–24 years of age	24.6	18.3	.11	19.8	18.7	.93
25–34 years of age	30.7	39.1	...	38.9	40.3	...
35–49 years of age	44.7	42.6	...	41.2	41.0	...
Income less than \$10,000	29.8	8.2	<.01	34.4	14.0	<.01
Some college	37.7	65.4	<.01	50.4	60.7	.02
Married or living together	62.3	57.4	.30	56.5	56.1	.93
Unemployed	17.5	4.0	<.01	12.2	7.0	.02
Health status:						
Fair or poor health (self-rated)	9.6	4.7	.02	21.4	7.3	<.01
Dissatisfied with physical ability	3.5	4.7	.55	17.6	8.3	<.01
More than 2 years since last visit to the physician ...	22.8	31.5	.05	20.6	17.2	.32
Medical conditions:						
High blood pressure	12.3	7.5	.06	6.9	7.1	.91
Heart trouble	3.5	1.2	.03	4.6	1.8	.03
Cancer	0.9	0.4	.48	3.8	1.0	...
Diabetes?	5.3	1.0	<.01	4.6	1.4	<.01
Broken or fractured bone	16.7	4.5	<.01	7.7	2.8	<.01
Mental health:						
Nervous trouble or depression	6.2	6.3	.97	7.8	9.4	<.01
Thoughts of suicide	1.8	2.8	.52	3.1	2.9	.91
Saying most of the time:						
Felt peaceful and calm	66.7	70.3	.41	67.9	62.8	.23
Felt downhearted and blue	2.6	3.6	.59	6.9	5.3	.43
Been a happy person	80.7	79.4	.74	74.0	78.2	.25
So down nothing could cheer you up	1.8	1.4	.79	1.5	2.2	.59

¹All figures in percentages, except where indicated.

²P-value for t-test: American Indian versus California CHPGP communities (by sex), except for age where P-value is based on a chi-square test.

Statistical methods. Items common to both AI and CHPGP surveys included demographics, health status, mental health, and health-related attitudes and health behaviors. Comparable BRFSS variables included demographics and selected health behaviors.

Respondents were included in the analysis if complete demographic information, including sex, age, marital status, education, employment, and income, was available. We compared the differences in means and proportions of the AI respondents with the comparison groups using *t*-tests and chi-square tests. To examine the extent to which differences between the reservation and comparison groups were attributable to differences in socioeconomic status (SES), ordinary least-squares regressions were run for a subset of key variables. The dependent variable in each case was a health status indicator or health behavior.

Sociodemographic control variables included age, sex, employment, marital status, education, income, and the interaction between education and income. A dummy variable set equal to 1 if the respondent was from the reservation provided the adjusted between-group differences. We also examined the extent to

which the relationship between socioeconomic status and health behaviors differed between the reservation and comparison groups. For example, was the association between education and smoking status the same among Indians and non-Indians? This analysis used logistic regression of pooled data, where the dependent variables were the health status and behavior measures.

For each dependent variable, three separate regressions were run, each including a different socioeconomic status indicator: (a) education (high school or less, reference: some college or more), (b) employment (unemployed, reference: employed, not looking for work), and (c) income (less than \$15,000, reference: more than \$15,000). Age, sex, and marital status were controlled for in each of the three regressions. We tested whether there were differences in the impact of SES on behavior between the reservation and comparison groups by examining the significance of the coefficient for an interaction term consisting of the SES indicator multiplied by the dummy variable for reservation status. Odds ratios were used to show the relative impact of SES on behavior in the AI survey and comparison groups.

Table 3. Health-related attitudes and health behaviors among adults ages 18–49, American Indians (AI) and California Community Health Promotion Grants Program (CHPGP) communities¹

Variable	Men			Women		
	AI	CHPGP	P ²	AI	CHPGP	P ²
Number of observations	114	2,353	...	131	2,817	...
<i>Attitudes and opinions</i>						
Percent agreeing that:						
Drinking and driving is O.K. if you've only had a few.....	30.7	13.6	<.01	29.5	4.7	<.01
Holiday DUI ³ checkpoints are important.....	80.7	87.2	.04	87.5	94.6	<.01
People drink less now at parties.....	42.3	58.2	<.01	21.9	52.1	<.01
It is easy for minors to buy alcohol here.....	77.9	66.0	<.01	90.6	69.5	<.01
Workplaces should ban smoking.....	47.4	64.1	<.01	49.6	70.6	<.01
Smoking in public is O.K. if no signs are posted.....	85.1	70.3	<.01	90.1	66.8	<.01
Percent of friends ⁴ who:						
Break DUI ³ laws occasionally	31.3	21.5	<.01	27.9	18.9	<.01
Expect you to drink with them.....	29.2	19.7	<.01	13.7	10.9	.22
Would ask a smoker to put out a cigarette.....	45.0	49.9	.19	45.7	51.5	.09
Regularly smoke cigarettes	49.1	26.8	<.01	53.7	26.3	<.01
<i>Health behaviors</i>						
Seldom or never use seatbelts	35.1	8.9	<.01	45.8	6.0	<.01
No frequent exercise	19.5	42.9	<.01	35.9	40.9	.25
Percent calories from fat	44.2	36.9	<.01	39.2	36.3	<.01
Current smokers	38.6	27.0	.01	53.4	24.7	<.01
Had 5 or more drinks on an occasion, past 2 weeks	52.8	37.1	<.01	39.8	14.1	<.01
Chronic drinkers (2 or more drinks per day).....	13.5	13.8	.93	7.2	2.9	.01
Driven while intoxicated	23.9	8.2	<.01	11.5	2.8	<.01
Used marijuana, past year.....	19.6	17.3	.52	16.5	9.4	.01
Used cocaine or crack, past year.....	2.7	5.2	.23	3.8	2.5	.33

¹ All figures in percentages, except where indicated.

² P-value for t-test: American Indian versus California CHPGP communities (by sex).

³ DUI = driving under the influence.

⁴ "Friends" are "3 people close to you."

Results

Table 1 compares AI respondents with and without telephones for selected demographic, health status, and health behavior measures. Of the 407 total AI respondents, 162 (39.8 percent) reported not having a telephone in the home. Those without phones were more likely to be male, unemployed, and have low levels of income and education. Respondents without phones reported higher levels of all risk behaviors except driving while intoxicated and cocaine use; however, the differences were statistically significant only for chronic drinking ($P=.04$) and marijuana use.

Tables 2 and 3 show and compare mean values for demographic characteristics, health status indicators, health-related attitudes, and health behaviors for AI survey respondents with telephones and the CHPGP comparison group. The race-ethnicity of the CHPGP communities (not shown) was roughly two-thirds white, 20 percent Hispanic, and 7 percent each black and Asian. Fewer than 1 percent of the CHPGP respondents reported their race as being Native American, Aleutian, or Pacific Islander. These percentages were very close to the overall statewide

'Heart trouble, diabetes, and broken bones were all more common on the reservation. For males, health-care access, as measured by the percent who had not seen a physician in more than 2 years, was actually greater off the reservation, 31.5 percent, than on the reservation, 22.8 percent; . . .'

mix of race and ethnicity found in the statewide BRFSS California sample (1987–89), although the CHPGP communities were not selected to be representative of the State population.

Income and education levels were substantially lower on the reservation and the unemployment rate was significantly higher. There were no significant differences in age or marital status between the two groups. As shown in table 2, the self-evaluated health status of those on the reservation was poorer: 9.6

Table 4. Demographics and health behaviors among adults ages 18-49, American Indians (AI) versus selected BRFSS¹ Plains States²

Variable	Men			Women		
	AI	BRFSS ¹	P ³	AI	BRFSS ¹	P ³
Number of observations	114	3,213	...	131	3,740	...
Demographics:						
18-24 years of age	24.6	17.5	.07	19.8	17.1	.70
25-34 years of age	30.7	39.6	...	38.9	41.6	...
35-49 years of age	44.7	42.9	...	41.2	41.3	...
Income less than \$10,000	29.8	11.0	<.01	34.4	17.2	<.01
Some college	37.7	60.3	<.01	50.4	60.1	.02
Married or living together	62.3	66.8	.32	56.5	67.2	.01
Unemployed	17.5	4.7	<.01	12.2	4.3	<.01
Health behaviors:						
Seldom or never use seatbelts	35.1	36.0	.84	45.8	27.1	<.01
No frequent exercise	19.5	46.9	<.01	35.9	52.5	<.01
Current smokers	38.6	26.5	<.01	53.4	25.6	<.01
Had 5 or more drinks on an occasion, past 2 weeks	52.8	39.2	<.01	39.8	16.1	<.01
Chronic drinkers (2 or more drinks per day)	13.5	9.2	.12	7.2	1.3	<.01
Driven while intoxicated	23.9	12.1	<.01	11.5	3.8	<.01

¹ BRFSS = Behavioral Risk Factor Surveillance System.

² All figures in percentages, except where indicated. Plains States included

Montana, South Dakota, North Dakota. Data from 1987-89 were pooled.

³ P-value for t-test: American Indian versus BRFSS Plains States (by sex).

Table 5. Effect of adjusting for socioeconomic status on differences between American Indian (AI) and comparison group health status and behavior

Variable	AI	Comparison	Unadjusted		Adjusted ¹	
			Difference	P	Difference	P
California Community Health Promotion Grants						
Program communities:						
Fair or poor health	15.9	6.1	9.8	<.01	4.4	<.01
Broken bone	11.9	3.6	8.3	<.01	7.4	<.01
Poor mental health ²	16.3	16.1	0.2	.93	-7.4	<.01
Thoughts of suicide	2.4	2.8	-0.4	.73	-1.9	.08
Had 5 or more drinks on an occasion	45.9	24.5	21.4	<.01	21.1	<.01
Chronic drinkers (2 drinks or more per day)	10.2	7.8	2.4	.19	1.4	.43
Current smokers	46.5	25.8	20.7	<.01	14.5	<.01
Used marijuana past year	18.0	13.0	5.0	.03	3.8	.09
BRFSS Plains States:³						
Had 5 or more drinks on an occasion	45.9	26.8	19.1	<.01	17.9	<.01
Chronic drinkers (2 or more drinks per day)	10.2	5.0	5.2	<.01	4.5	<.01
Current smokers	46.5	26.0	20.5	<.01	10.7	<.01

¹ Difference adjusted for age, sex, income, employment, marital status, education, education and income interaction.

² Percent with average of 2 or more on a 5-question scale of mental health assessment (4 point scale: 1 = none of the time, 2 = a little of the time, 3 = some of the time, 4 = most of the time). Four questions are shown at bottom of table 2.

Felt peaceful and calm, ... So down nothing could cheer you up. An additional question used in the scale was Social life limited by health. "Positive" items (for example, felt peaceful and calm) were reverse coded.

³ BRFSS = Behavioral Risk Factor Surveillance System. Plains States included Montana, South Dakota, North Dakota. Pooled data from 1987-89.

percent of males on the reservation rated themselves in fair or poor health compared with 4.7 percent in the CHPGP sample; the difference was even larger among females (21.4 percent versus 7.3 percent).

Heart trouble, diabetes, and broken bones were all more common on the reservation. However, for males, health-care access, as measured by the percent who had not seen a physician in more than 2 years was actually greater off the reservation, 31.5 percent, than on the reservation, 22.8 percent; among females,

there was no significant difference between groups. There were few significant differences in mental health indicators between Indians and the CHPGP comparison group, including no difference in the percent reporting thoughts of suicide.

Table 3 presents comparisons between the AI and CHPGP surveys for health-related attitudes and behavior. In general, Indians were less likely to endorse "healthful" norms. For example, 30.7 percent of male AIs agreed versus 13.6 percent of the

comparison group that “drinking and driving is ok if you’ve only had a few.” Those on the reservation were more likely to characterize the environment as permissive of alcohol (“easy for minors to buy alcohol”: 90.6 percent versus 69.5 percent of women), and were more likely to have role models that smoked, drank occasionally before driving, and expected you to drink with them.

Apart from lack of exercise and illicit drug use, risky health behaviors were all more prevalent on the reservation. The prevalence of smoking and having five or more drinks on an occasion for women on the reservation were more than double that of the comparison group. Almost three times as many reservation men reported driving while intoxicated as did men from the CHPGP communities.

Table 4 compares reservation respondents and the BRFSS Plains State sample for those demographic and health behavior items common to the two surveys. In general, the results were similar to the California CHPGP comparisons, with the exception of seatbelt use; the BRFSS use rate was comparable to that on the reservation. Rates of smoking and drinking were again substantially higher on the reservation than in the BRFSS comparison group.

Table 5 examines the impact of adjusting for SES on the differences between AI survey and comparison groups. For example, the unadjusted difference in the percent of respondents reporting fair or poor health status between the two groups was 9.8 percent (15.9 – 6.1); after adjustment for SES the difference dropped to 4.4 percent. In some cases (fair or poor health status, smoking, marijuana use) adjustment reduced but did not eliminate the differences; in others (five or more drinks on an occasion and broken bone), adjusting for SES had virtually no impact. For the mental health indicators, it appears that SES was masking (positive) differences, that is, given their lower socioeconomic status, we would expect higher levels of poor mental health and suicidal thoughts on the reservation than those actually found. The BRFSS results again were similar to those using the CHPGP respondents.

Table 6 shows the relationships between various indicators of SES and health status, with behavior in reservation respondents and comparison groups. This display enables us to compare the effects of lower SES between the two groups. The *P*-values in table 6 represent the significance of the test for differences between the odds ratios—the test of whether being on the reservation modifies the effect of SES on health status and behavior. For example, on the reservation, the relative odds of being in fair or poor health were 1.2 times as great for the unemployed (versus other

Table 6. Association between socioeconomic status, health status, and health behaviors: American Indians (AI) versus comparison groups¹

Variable	AI	Comparison	<i>P</i> ²
<i>California Community Health Promotion Grants Program</i>			
Fair or poor health:			
High school or less.....	1.2	3.3	.01
Unemployed.....	1.3	4.2	.02
\$15,000 or less	1.9	3.6	.09
Broken bone:			
High school or less.....	1.4	0.9	.36
Unemployed.....	1.3	1.9	.52
\$15,000 or less	2.4	1.3	.17
Poor mental health ³ :			
High school or less.....	0.9	1.7	.06
Unemployed.....	0.8	3.3	.01
\$15,000 or less	2.0	2.6	.45
Had 5 or more drinks:			
High school or less.....	1.7	1.4	.46
Unemployed.....	1.6	1.1	.36
\$15,000 or less	1.2	0.9	.24
Current smoker:			
High school or less.....	0.9	2.4	.01
Unemployed.....	1.4	2.6	.13
\$15,000 or less	1.0	1.5	.07
<i>BRFSS⁴ Plains States</i>			
Had 5 or more drinks:			
High school or less.....	1.6	1.2	.33
Unemployed.....	1.5	1.0	.28
\$15,000 or less	1.1	1.0	.59
Current smoker:			
High school or less.....	0.9	2.3	.01
Unemployed.....	1.4	1.7	.64
\$15,000 or less	1.0	1.8	.02

¹ Figures represent relative odds of behavior by education, employment, and income status, after adjusting for age, sex, and marital status. Socioeconomic categories include education, high school or less (reference: some college or more); employment, unemployed (reference: employed, not looking for work); income, \$15,000 or less (reference: \$15,000).

² *P*-value for difference between American Indian and comparison group odds ratios.

³ See footnote 2, table 5.

⁴ BRFSS = Behavioral Risk Factor Surveillance System. Plains States included Montana, South Dakota, and North Dakota. Pooled data from 1987–89.

employment categories), but in the CHPGP comparison group the relative odds were 4.2 times as great for the unemployed. We found significantly weaker relationships between SES and mental and physical health status indicators (for education and employment) and smoking (for education) among Indians.

Discussion

Before discussing the results, some limitations of our study should be noted. The results are obviously specific to a particular reservation, and the AI sample size was relatively small—407 total respondents, 245 with telephones. Problems associated with gaining trust in order to do research in Indian populations

‘ . . . there may have been too few high-income residents on the reservation to test adequately whether their health and lifestyle practices improved as a result of their relative affluence. In fact, those who achieve some economic success may leave the reservation and become assimilated into white culture, along the way adopting similar (white) lifestyle practices.’

have been noted (5). Interviewers were matched by tribe and sex to minimize some of these problems, but respondents may have been reluctant to answer sensitive items truthfully. For example, the lack of differences in reported mental health status, which have been found in other studies (9,13), may have been due to a reluctance on the part of respondents to reveal personal problems to an interviewer.

Using California communities as a comparison sample for Plains Indians has obvious drawbacks. Sugarman and coworkers (3) noted that differences in Indian and non-Indian risk factor rates tended to be similar across regions; that is, where risk factor rates were higher among Indians, they were also higher among non-Indians. This geographic pattern argues for using a non-Indian comparison group from the Plains region, and for this reason, the BRFSS comparison sample from the Plains States was included when items were available. Using the California CHPGP sample as a comparison group allowed us to examine variables not on the BRFSS. We compared the BRFSS and CHPGP samples for those variables in common, both for risk factor levels and the relationship between risk factors and SES (see tables 2–6). In virtually all cases, the results were similar across the two groups. Obviously, there is no guarantee that items contained only on the CHPGP survey would yield similar results if they were asked of Plains States respondents, but the observed similarities make the argument more plausible.

Finally, the lack of association between SES and some risk factors on the reservation may have been the result of a narrower range of education and income levels there. That is, there may have been too few high-income residents on the reservation to test adequately whether their health and lifestyle practices improved as a result of their relative affluence. In

fact, those who achieve some economic success may leave the reservation and become assimilated into white culture, along the way adopting similar (white) lifestyle practices. Surveys of urban Indians have revealed comparable or higher rates of risky lifestyle practices compared with reservation Indians, but the urban samples have been drawn primarily from low-SES populations (14,19). Another possibility is that there was an income effect at very low levels of income that was missed because our income question (taken from the BRFSS) did not distinguish between income levels below \$10,000—the most common category on the reservation (45 percent overall, table 1).

The results presented in this paper do nothing to contradict the common stereotype of reservation life, characterized by poverty, unemployment, higher prevalence of alcohol and tobacco use, and poorer self-evaluations of health. Among the few positive findings were relatively low rates of (reported) mental health problems, adequate access to IHS health care, and higher levels of physical activity. Adjusting for socioeconomic status did little to reduce the differences between Indians and non-Indian comparison groups, suggesting that poverty and unemployment alone can not account for differences in health and lifestyle practices. Higher levels of education and employment were associated with better health status and lower smoking rates among non-Indians, but there was no association between SES and either health status or smoking among those on the reservation.

The lack of association of SES with poor health and risk-taking behavior is perhaps not surprising given results from previous studies. For example, Sugarman and coworkers (3) found a wide range of prevalence of smoking and having five or more drinks on an occasion nationwide among American Indians: among women, the rate of having five or more drinks on an occasion varied from 27.0 percent on the Plains to 2.6 percent in the Southwest (31.6 to 20.0 percent among men); smoking among women ranged from 57.3 percent on the Plains to 14.7 percent in the Southwest (48.4 to 18.1 percent among men). This wide variation within Indian populations, all of whom live in relative poverty, suggests that factors specific to tribe and region may be more important than income and education in determining lifestyle practices. Welte and Barnes (18) draw a similar conclusion from a study of minority youth in New York: American Indian youth had a higher prevalence of drinking than other minority groups (blacks and Hispanics) also living in poverty.

As noted in the introduction, the purpose of the AI

survey was to provide baseline data for the evaluation of a community health promotion program on the reservation directed at substance abuse. The results presented in this paper suggest that the program's emphasis on changing prevailing attitudes and norms about alcohol and other substance use may be very appropriate. The data also confirm in a more formal way what other studies have concluded anecdotally, namely, that problems of poor health, smoking, and alcohol abuse can only be partly explained by the relative poverty, unemployment, and lack of education among American Indians living on reservations. The results also suggest, tentatively, that there may be less variation in risk factor levels across education and income groups than is found in non-Indian populations. Therefore, a strategy of targeting particular high-risk groups (for example, "blue-collar" workers for smoking) may be less effective among Indians, since the whole group is equally at risk. If so, a community-based approach including educational efforts to change beliefs and norms is likely to be a more effective method of health promotion on AI reservations.

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