Health Behaviors and Risk Factors Among American Indians and Alaska Natives, 2000–2010

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Objectives. We provided contextual risk factor information for a special supplement on causes of death among American Indians and Alaska Natives (AI/ANs). We analyzed 11 years of Behavioral Risk Factor Surveillance System (BRFSS) data for AI/AN respondents in the United States.

Methods. We combined BRFSS data from 2000 to 2010 to determine the prevalence of selected risk factors for AI/AN and White respondents residing in Indian Health Service Contract Health Service Delivery Area counties. Regional prevalence estimates for AI/AN respondents were compared with the estimates for White respondents for all regions combined; respondents of Hispanic origin were excluded.

Results. With some regional exceptions, AI/AN people had high prevalence estimates of tobacco use, obesity, and physical inactivity, and low prevalence estimates of fruit and vegetable consumption, cancer screening, and seatbelt use.

Conclusions. These behavioral risk factors were consistent with observed patterns of mortality and chronic disease among AI/AN persons. All are amenable to public health intervention. (*Am J Public Health.* 2014;104: S481–S489. doi:10.2105/AJPH.2014.301879)

American Indians and Alaska Natives (AI/ANs) experience a disproportionate burden from a variety of diseases that may be linked to risk behaviors such as tobacco use, diet, and physical inactivity.[1] Although several AI/AN communities conducted local surveys of the prevalence of such risk factors,[2–4] composite data at the national or regional level depends on population-based surveys, such as the Behavioral Risk Factor Surveillance System (BRFSS), which is conducted annually by state health departments in collaboration with the Centers for Disease Control and Prevention (CDC). There were 2 previous reports of personal risk factors among AI/AN people that used similar methods: 1 that summarized BRFSS data by region for 1997 to 2000,[5] and 1 that focused on cancer risk factors for 2000 to 2006.[6] BRFSS data for AI/AN persons were also reported in various *Morbidity and Mortality Weekly Reports* from the CDC,[7,8] and other publications.[9] None of these previous publications restricted the study population to the Indian Health Service (IHS) Contract Health Service Delivery Area (CHSDA) as we did in this study. Because the prevalence of these behaviors might be changing, and some, such as obesity and tobacco use, have significant effects on the health of this population, we updated and refined the estimates using more recent data, and included some survey questions not previously reported for AI/ANs. We supply demographic characteristics and health risk data to inform and provide context for the disease-specific mortality articles in this special supplement. Although our primary objective was not to compare risk factors directly with any other racial or ethnic group, we included risk behavior data for the US White population for readers who wish to compare such risk factors.

METHODS

The BRFSS is a state-based, cross-sectional telephone survey that is conducted annually by all states using a standardized questionnaire with technical support from the CDC. The questionnaire includes a core set of questions that are asked annually and 2 sets of questions that are alternated biannually. There are also optional modules and state-added questions that were not used for this analysis. The survey uses a multistage cluster design and random-digit dialing to select a representative sample of the US civilian noninstitutionalized population aged 18 years and older.[10] All information collected, including race/ethnicity, is by informant self-report and is not otherwise validated. Survey median response rates ranged from 48.9% to 58.3% during the 11 years included in this article. Because AI/AN people constitute less than 2% of the US population, the number of AI/AN persons included in the survey sample is small, and single year and single state estimates may vary considerably. To approximate the time frame and geographic divisions of the analysis of death records published in this special supplement issue, we combined BRFSS data from 2000 to 2010 and grouped states into the 6 IHS regions (Alaska, East, Northern Plains, Pacific Coast, Southern Plains, and Southwest) used in other articles in this supplement. Within these regions, we used only data for AI/AN and non-Hispanic White respondents residing in IHS CHSDA counties. CHSDA counties contain federally recognized tribal reservations or off-reservation trusts or lands that are adjacent to them. CHSDA residence is used by the IHS to determine eligibility for services not directly available within the IHS. Analyses restricted to CHSDA counties make risk factor estimates more comparable with other publications in the supplement, which also drew their data from this set of counties.[11,12] Additional details about CHSDA counties and IHS regions, including population coverage, are provided elsewhere in the supplement.[12] It should be noted that previous BRFSS-based reports used the entire US population and were not restricted to the CHSDA counties.

Our sample included BRFSS respondents who chose “American Indian or Alaska Native” in response to the question: “Which one of these groups would you say best represents your race?” We included only non-Hispanic AI/AN persons (hereafter referred to as simply

AI/AN persons) to improve comparability with the other publications in this supplement reporting mortality patterns, for which analyses are similarly restricted.[12,13] For comparison, we used BRFSS data for non-Hispanic White respondents (hereafter referred to simply as Whites) for all IHS regions combined. In some cases, sample sizes for specific questions were too small to report results for AI/AN persons. We followed the BRFSS-recommended suppression rule of suppressing items based on less than 50 respondents or a relative SE of greater than 0.30.

Edited BRFSS files were processed by CDC staff according to their standard protocols, which include weighting to the respondents' probability of selection and to the age- and gender-specific population or race-, age-, and gender-specific population from the intercensal population estimates for the state.[14] Prevalence estimates for AI/AN and White persons were age adjusted to the 2000 projected US population. We used SAS callable SUDAAN version 9.0.1 (Research Triangle Institute, Research Triangle Park, NC) to calculate prevalence estimates and 95% confidence intervals (CIs). In comparing populations with respect to any item, we used nonoverlap of the 95% CIs to suggest a difference worth noting. It should be understood that this was not a formal statistical comparison.[15]

We analyzed the following demographic characteristics and health indicator variables: gender, age, marital status, educational attainment, employment status, and annual household income. All results were stratified by gender because risk behaviors vary considerably between men and women. We also assessed health status (excellent or very good or good were combined, as were fair–poor), access to health care (i.e., have insurance coverage and a personal health care provider), and diabetes status (i.e., ever told by a health care provider that you have diabetes). We assessed some risk factors: the prevalence of consuming 5 servings of fruits and vegetables daily and of relating no leisure-time physical activity (i.e., not participating in any physical activities or exercises during the past 30 days). We used body mass index (BMI; measured as kilograms divided by meters squared) to calculate overweight (BMI 25–29.9 kg/m^2) and obesity (BMI $\geq$ 30 kg/m^2) in individuals aged 20 years and older. We assessed 2 alcohol consumption patterns: (1) binge drinkers were defined as adults who reported that they drank in the past 30 days and had 4 or more drinks (for women), 5 or more drinks (for men), on 1 or more occasion in the past month; and (2) heavy drinkers were men who had more than 2 drinks per day or women who had more than 1 drink per day in the past 30 days. Drinking and driving was considered positive if the respondent reported at least 1 incident of driving after having too much to drink in the past 30 days. Seatbelt use was considered positive if it was reported as "always or nearly always." Hypertension was counted if the respondent reported having ever been told they had high blood pressure outside of pregnancy, and cholesterol was counted if they had ever been told their cholesterol was high. Current smokers were those who reported having smoked at least 100 cigarettes (5 packs) in their lifetime and smoked either every day or some days; former smokers were those who reported 100 lifetime cigarettes, but no longer smoked. We also assessed the use of cancer screening tests: women aged 40 years and older who reported a mammogram within the past 2 years; any woman with an intact uterus who reported having a Papanicolaou (Pap) test within the previous 3 years; males aged 50 to 75 years who reported having a prostate-specific antigen test within the past year; and adults aged 50 years or older who had either used a fecal occult blood test within the past year or had undergone endoscopy (sigmoidoscopy or colonoscopy) within the past 5 years were identified as having been screened for colorectal cancer. Because the BRFSS does not include questions about reasons for getting tested, the data could not be interpreted as a direct measure of routine use of screening tests for these cancers.

The exact text of each standard question can be found on the CDC Web site.[16] BRFSS creates calculated variables for some of the more commonly used measures, and we used these calculated variables when possible, merging them over time for compatibility. Tables 1 to 3 include detailed footnotes describing the inclusion years for each variable. When variable definitions were changed, we used only the data from years after the change. For example, the definition of "binge drinking" was changed in 2006, so only 2006 and subsequent years were analyzed.

RESULTS

Prevalence estimates of selected sociodemographic characteristics, access to health care, and selected health indicators are summarized in Table 1.

Our AI/AN sample included 12 088 men and 18 785 women, with 67.8% aged 18 to 49 years and 32.2% aged 50 years and older. The US White comparison group included 300 783 men and 458 134 women, with 54.8% aged 18 to 49 years and 45.2% aged 50 years and older. Compared with Whites, AI/AN respondents were younger, less likely to be married, had attained a lower educational level, had lower household income, were more likely to be unemployed, and were more likely to describe their health as fair or poor.

Despite the fact that all respondents included in our analysis lived in CHSDA counties served by IHS funded facilities, 23.2% of AI/AN persons reported that they had "no health plan" and 28.3% that they had "no personal doctor." This compares with 12.3% and 18.7%, respectively, for the same measures for Whites in the same geographic area. When asked about personal health status, fewer AI/AN individuals reported good to excellent health compared with Whites, and AI/AN persons reported poor–fair health at nearly double the rate of Whites.

Risk Factors and Behaviors

Prevalence estimates of selected chronic disease risk behaviors and risk factors among AI/AN people are shown in Table 2 and are summarized briefly here.

Consumption of fruits and vegetables. AI/AN men reported consuming about the same number of portions of fruits and vegetables as White men, with only the Southern Plains region reporting significantly lower consumption by approximately one third. AI/AN women in all regions ate more fruits and vegetables than AI/AN men, but AI/AN women ate less in the Southern Plains and Alaska than White women nationally.

Leisure-time physical activity. AI/AN men and women in all regions reported less recreational activity than Whites. In general, AI/AN and White women reported less activity than men.

TABLE 1—Prevalence Estimates of Selected Sociodemographic Characteristics, Access to Health Care, and Selected Health Indicators Among American Indian/Alaska Native and White Adults: Behavioral Risk Factor Surveillance System, Contract Health Service Delivery Areas, United States, 2000–2010

Characteristic	Whites		Total AI/ANs		Northern Plains[a]		Alaska[b]		Southern Plains[c]		Southwest[d]		Pacific Coast[e]		East[f]	
	No.[g]	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)
Age group, y																
18–49	303 933	54.8 (54.6, 55.0)	18 155	67.8 (66.5, 69.1)	3287	71.9 (70.0, 73.7)	5593	73.3 (70.9, 75.5)	2920	65.9 (64.3, 67.5)	1800	59.1 (54.7, 63.3)	928	65.0 (60.6, 69.3)	3627	75.6 (73.7, 77.5)
≥ 50	451 048	45.2 (45.0, 45.4)	12 502	32.2 (30.9, 33.5)	1573	28.1 (26.3, 30.0)	3541	26.7 (24.5, 29.1)	2600	34.1 (32.5, 35.7)	1633	40.9 (36.7, 45.3)	897	35.0 (30.7, 39.4)	2258	24.4 (22.5, 26.3)
Gender																
Male	300 783	48.8 (48.6, 49.1)	12 088	50.1 (48.7, 51.5)	3521	48.2 (45.3, 51.1)	2188	48.8 (46.6, 51.0)	1996	50.2 (48.4, 51.9)	2203	44.7 (42.3, 47.1)	1395	51.7 (47.5, 55.9)	785	56.7 (52.3, 61.0)
Female	458 134	51.2 (50.9, 51.4)	18 785	49.9 (48.5, 51.3)	5653	51.8 (48.9, 54.7)	2754	51.2 (49.0, 53.4)	3545	49.8 (48.1, 51.6)	3724	55.3 (52.9, 57.7)	2053	48.3 (44.1, 52.5)	1056	43.3 (39.0, 47.7)
Marital status																
Married	442 422	61.5 (61.3, 61.7)	13 123	48.0 (46.6, 49.3)	3346	44.0 (41.2, 46.7)	2163	48.2 (46.1, 50.4)	2786	56.1 (54.4, 57.7)	2497	44.5 (42.2, 46.9)	1504	46.6 (42.9, 50.3)	827	50.3 (45.7, 55.0)
Divorced/widowed/separated	217 328	16.7 (16.6, 16.8)	9390	24.4 (23.2, 25.6)	3052	24.8 (22.7, 26.9)	1079	19.6 (18.0, 21.3)	1925	24.3 (22.9, 25.6)	1516	20.6 (18.8, 22.5)	1155	27.1 (23.5, 31.0)	663	26.9 (23.6, 30.4)
Never married/member of an unmarried couple	97 198	21.8 (21.6, 22.0)	8252	27.7 (26.6, 28.8)	2750	31.3 (28.9, 33.8)	1674	32.2 (30.6, 33.8)	822	19.7 (18.4, 21.0)	1888	34.9 (33.0, 36.9)	772	26.4 (23.3, 29.6)	346	22.8 (19.2, 26.9)
Education																
< high school	51 379	6.8 (6.6, 6.9)	5672	20.0 (18.9, 21.2)	1821	23.7 (21.4, 26.2)	1006	24.8 (23.0, 26.7)	936	17.0 (15.7, 18.4)	959	18.5 (16.7, 20.4)	555	18.8 (15.8, 22.4)	395	24.7 (20.8, 29.0)
High school	218 309	28.2 (27.9, 28.4)	10 989	36.7 (35.3, 38.1)	2916	35.9 (33.0, 38.8)	2388	44.8 (42.9, 46.9)	1981	36.9 (35.2, 38.7)	2044	34.5 (32.3, 36.8)	1047	35.3 (31.4, 39.4)	613	35.9 (31.6, 40.5)
Some college/technical school	224 817	30.4 (30.1, 30.6)	9205	28.1 (26.9, 29.3)	2913	27.1 (24.7, 29.6)	1126	21.5 (19.8, 23.3)	1594	28.2 (26.7, 29.9)	1929	31.7 (29.4, 34.2)	1158	28.4 (25.3, 31.8)	485	26.2 (22.4, 30.5)
College graduate	263 156	34.7 (34.5, 34.9)	4941	15.2 (14.3, 16.1)	1507	13.3 (11.7, 15.1)	407	8.8 (7.6, 10.3)	1024	17.8 (16.6, 19.2)	987	15.3 (13.6, 17.1)	676	17.4 (14.7, 20.5)	340	13.1 (10.7, 16.0)
Income, $																
< 15 000	60 122	7.7 (7.6, 7.9)	6290	19.1 (18.0, 20.2)	2324	20.2 (18.2, 22.3)	910	20.8 (18.8, 22.9)	1005	17.3 (15.9, 18.7)	1140	19.7 (17.8, 21.8)	568	19.1 (16.2, 22.5)	343	17.5 (14.5, 21.0)
15 000–34 999	200 405	26.8 (26.6, 27.0)	11 777	43.3 (41.8, 44.8)	3673	47.6 (44.7, 50.4)	1655	40.0 (37.6, 42.5)	2152	44.4 (42.5, 46.3)	2370	44.0 (41.3, 46.7)	1259	37.0 (32.9, 41.3)	668	46.3 (41.4, 51.3)
35 000–74 999	242 465	37.2 (36.9, 37.4)	6860	27.8 (26.4, 29.2)	1770	25.1 (22.7, 27.6)	1076	26.7 (24.4, 29.1)	1290	27.3 (25.7, 29.0)	1364	27.9 (25.4, 30.6)	917	31.2 (27.2, 35.5)	443	28.5 (24.1, 33.3)
≥ 75 000	163 268	28.3 (28.0, 28.5)	2374	9.9 (9.1, 10.7)	446	7.2 (5.8, 8.8)	463	12.5 (11.1, 14.1)	496	11.1 (10.0, 12.2)	444	8.3 (7.0, 9.9)	363	12.7 (10.2, 15.7)	162	7.7 (5.9, 9.9)
Employment status																
Employed	414 701	62.6 (62.4, 62.8)	17 063	53.2 (51.9, 54.4)	5096	51.7 (48.9, 54.4)	2862	52.8 (50.6, 54.9)	2908	55.6 (54.0, 57.2)	3476	54.7 (52.5, 56.9)	1761	51.6 (48.0, 55.3)	960	54.1 (49.8, 58.3)
Unemployed	65 797	9.0 (8.9, 9.2)	6399	20.5 (19.3, 21.8)	1938	22.2 (19.6, 25.0)	1215	25.7 (23.9, 27.6)	998	17.4 (16.1, 18.8)	1018	18.2 (16.4, 20.2)	794	21.5 (18.4, 25.1)	436	21.4 (17.9, 25.5)
Homemaker/student/retired	276 774	28.4 (28.2, 28.6)	7270	26.3 (25.1, 27.5)	2115	26.2 (24.2, 28.3)	803	21.5 (19.9, 23.2)	1625	27.0 (25.7, 28.3)	1404	27.1 (25.3, 28.9)	883	26.8 (23.1, 30.9)	440	24.5 (21.5, 27.7)
Health care coverage																
Yes	682 122	87.7 (87.5, 87.8)	22 721	76.8 (75.8, 77.8)	6347	73.7 (71.3, 76.0)	3748	79.5 (77.8, 81.0)	4386	77.2 (75.6, 78.7)	3947	68.8 (66.7, 70.8)	2849	86.9 (84.7, 88.9)	1444	75.3 (71.2, 79.0)
No	75 151	12.3 (12.2, 12.5)	7936	23.2 (22.2, 24.2)	2786	26.3 (24.0, 28.7)	1092	20.5 (19.0, 22.2)	1143	22.8 (21.3, 24.4)	1940	31.2 (29.2, 33.3)	584	13.1 (11.1, 15.3)	391	24.7 (21.0, 28.8)
Have personal provider																
Yes	618 262	81.3 (81.1, 81.5)	20 282	71.7 (70.5, 73.0)	5802	71.8 (68.9, 74.5)	2657	63.9 (61.8, 65.9)	4249	77.5 (75.9, 79.0)	3628	61.3 (58.8, 63.8)	2549	76.8 (73.1, 80.1)	1397	73.4 (69.0, 77.3)
No	103 111	18.7 (18.5, 18.9)	8694	28.3 (27.0, 29.5)	2756	28.2 (25.5, 31.1)	1768	36.1 (34.1, 38.2)	1081	22.5 (21.0, 24.1)	1983	38.7 (36.2, 41.2)	748	23.2 (19.9, 26.9)	358	26.6 (22.7, 31.0)
Health status																
Excellent/very good/good	636 493	88.0 (87.8, 88.1)	23 038	75.6 (74.4, 76.8)	6773	75.5 (73.2, 77.6)	3918	78.5 (76.6, 80.3)	4017	76.0 (74.6, 77.4)	4568	77.0 (74.8, 79.0)	2494	74.9 (71.4, 78.1)	1268	74.3 (70.7, 77.6)
Fair–poor	119 887	12.0 (11.9, 12.2)	7671	24.4 (23.2, 25.6)	2368	24.5 (22.4, 26.8)	987	21.5 (19.7, 23.4)	1497	24.0 (22.6, 25.4)	1312	23.0 (21.0, 25.2)	944	25.1 (21.9, 28.6)	563	25.7 (22.4, 29.3)

Note. AI/ANs = American Indians/Alaska Natives; CI = confidence interval. All prevalence estimates are weighted. Except for age group, estimates are age-adjusted to the 2000 US standard population. "Refused" and "don't know" responses are excluded. Analyses are limited to persons of non-Hispanic origin.
[a]AI/AN persons in IN, IA, MI, MN, MT, NE, ND, SD, WI, and WY.
[b]AI/AN persons in AK.
[c]AI/AN persons in KS, OK, and TX.
[d]AI/AN persons in AZ, CO, NV, NM, and UT.
[e]AI/AN persons in CA, ID, OR, and WA.
[f]AI/AN persons in AL, CT, FL, LA, ME, MA, MS, NY, NC, RI, and SC.
[g]Limited to data from 2001 to 2010.

TABLE 2—Prevalence Estimates of Selected Chronic Disease Risk Behaviors and Risk Factors Among American Indian/Alaska Native and White Adults: Behavioral Risk Factor Surveillance System, Contract Health Service Delivery Areas, 34 US States, 2000–2010

Risk Factor/Behavior	Whites		Total AI/ANs		Northern Plains[a]		Alaska[b]		Southern Plains[c]		Southwest[d]		Pacific Coast[e]		East[f]	
	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)
≥ 5 servings/day of fruits and vegetables[g]																
Male	157 411	19.2 (18.8, 19.6)	6350	20.5 (18.3, 22.9)	1802	18.4 (13.9, 24.0)	1165	19.3 (15.8, 23.2)	1230	13.3 (10.8, 16.3)	1038	22.8 (19.5, 26.6)	738	23.1 (17.2, 30.4)	377	24.6 (18.1, 32.4)
Female	237 842	28.4 (28.0, 28.8)	9881	24.3 (22.3, 26.4)	2914	24.0 (20.2, 28.3)	1467	21.5 (18.2, 25.3)	2143	17.4 (15.2, 19.8)	1776	29.1 (25.3, 33.1)	1075	27.8 (21.8, 34.8)	506	23.5 (18.0, 30.1)
No leisure time physical activity																
Male	299 467	18.0 (17.8, 18.3)	11 994	27.2 (25.4, 29.1)	3506	27.6 (23.9, 31.6)	2150	26.6 (24.0, 29.4)	1987	29.0 (26.6, 31.5)	2185	21.7 (19.1, 24.5)	1388	27.0 (22.3, 32.2)	778	30.2 (25.2, 35.6)
Female	454 733	20.8 (20.6, 21.0)	18 608	31.8 (30.3, 33.3)	5616	33.7 (30.6, 36.9)	2689	36.1 (33.3, 39.0)	3531	35.6 (33.6, 37.6)	3687	28.7 (26.0, 31.6)	2040	25.4 (21.3, 30.0)	1045	35.9 (30.3, 41.9)
Overweight (BMI = 25.0–29.9 kg/m^2)																
Male	297 231	44.2 (43.8, 44.5)	11 862	41.9 (39.8, 44.0)	3478	38.8 (34.3, 43.5)	2127	43.3 (40.2, 46.5)	1967	39.7 (37.0, 42.4)	2155	40.7 (37.3, 44.2)	1371	42.8 (37.4, 48.4)	764	44.5 (38.0, 51.3)
Female	430 245	27.9 (27.7, 28.2)	17 815	31.5 (29.9, 33.2)	5418	33.7 (30.4, 37.2)	2551	33.8 (30.8, 36.9)	3360	29.1 (27.2, 31.1)	3554	33.8 (30.8, 37.0)	1936	29.5 (24.8, 34.6)	996	29.9 (24.9, 35.5)
Obese (BMI ≥ 30.0 kg/m^2)																
Male	297 231	23.3 (23.0, 23.6)	11 862	33.9 (32.0, 35.9)	3478	39.7 (35.2, 44.4)	2127	27.7 (25.0, 30.7)	1967	35.7 (33.0, 38.4)	2155	34.0 (30.8, 37.5)	1371	32.6 (27.5, 38.0)	764	30.2 (24.7, 36.4)
Female	430 245	21.0 (20.8, 21.3)	17 815	35.5 (33.7, 37.3)	5418	37.6 (34.5, 40.9)	2551	35.8 (32.8, 38.9)	3360	33.3 (31.3, 35.4)	3554	34.3 (31.6, 37.1)	1936	38.8 (33.9, 43.9)	996	30.5 (25.0, 36.5)
Binge drinker[h]																
Male	157 146	23.2 (22.7, 23.7)	5782	21.1 (18.9, 23.5)	1690	23.1 (17.8, 29.4)	849	20.1 (16.8, 23.9)	803	19.6 (16.4, 23.3)	1311	19.1 (15.6, 23.1)	721	21.6 (16.5, 27.9)	408	23.6 (15.6, 34.0)
Female	247 244	12.7 (12.4, 13.0)	9367	13.0 (11.4, 14.8)	2765	18.0 (14.2, 22.6)	1042	13.8 (11.2, 16.7)	1505	9.9 (8.3, 11.9)	2372	8.9 (6.5, 12.0)	1106	17.4 (12.7, 23.2)	577	15.3 (9.4, 23.9)
Heavy drinker[i]																
Male	278 413	6.9 (6.7, 7.2)	10 866	7.6 (6.3, 9.2)	3176	8.1 (5.8, 11.0)	1846	4.3 (3.4, 5.4)	1851	5.3 (4.2, 6.7)	1995	6.4 (4.8, 8.4)	1282	8.1 (5.0, 12.7)	716	10.5 (6.7, 16.1)
Female	427 490	5.9 (5.8, 6.1)	17 214	4.2 (3.5, 5.1)	5150	5.0 (3.4, 7.3)	2347	4.9 (3.8, 6.5)	3357	2.5 (1.9, 3.3)	3467	2.6 (1.7, 3.9)	1915	6.1 (3.8, 9.6)	...	...
Current smoker																
Male	298 639	21.6 (21.3, 21.9)	11 945	33.6 (31.7, 35.5)	3497	42.1 (37.9, 46.4)	2132	41.4 (38.6, 44.3)	1981	34.5 (31.8, 37.3)	2177	18.8 (16.5, 21.4)	1382	33.5 (28.4, 38.9)	776	40.4 (34.5, 46.5)
Female	453 293	20.2 (19.9, 20.4)	18 542	29.5 (28.0, 31.0)	5605	42.1 (39.0, 45.4)	2671	36.8 (34.0, 39.7)	3523	31.6 (29.7, 33.7)	3675	14.8 (12.5, 17.5)	2029	27.7 (23.3, 32.5)	1039	36.3 (30.9, 42.2)
Former smoker																
Male	298 639	29.8 (29.5, 30.0)	11 945	29.9 (28.0, 31.8)	3497	28.3 (24.7, 32.1)	2132	33.1 (30.2, 36.1)	1981	26.8 (24.5, 29.2)	2177	29.0 (25.8, 32.4)	1382	35.1 (29.9, 40.6)	776	27.4 (22.3, 33.1)
Female	453 293	23.6 (23.3, 23.8)	18 542	22.9 (21.1, 24.7)	5605	22.7 (20.1, 25.6)	2671	27.9 (25.3, 30.6)	3523	20.5 (18.9, 22.2)	3675	15.4 (13.1, 18.1)	2029	30.6 (25.1, 36.7)	1039	22.3 (17.9, 27.5)
Never smoked																
Male	298 639	48.7 (48.3, 49.0)	11 945	36.5 (34.6, 38.6)	3497	29.7 (25.2, 34.6)	2132	25.5 (22.9, 28.4)	1981	38.8 (36.1, 41.5)	2177	52.2 (48.6, 55.8)	1382	31.5 (26.6, 36.8)	776	32.3 (26.6, 38.5)
Female	453 293	56.3 (56.0, 56.6)	18 542	47.6 (45.8, 49.4)	5605	35.2 (31.9, 38.6)	2671	35.3 (32.5, 38.2)	3523	47.8 (45.7, 50.0)	3675	69.7 (66.5, 72.8)	2029	41.8 (36.5, 47.2)	1039	41.3 (35.5, 47.4)
Ever been told you have diabetes[j]																
Male	221 726	7.3 (7.1, 7.4)	8595	15.1 (13.4, 17.0)	2521	14.7 (11.8, 18.3)	1349	6.7 (4.8, 9.4)	1424	15.2 (13.2, 17.4)	1676	15.3 (12.6, 18.5)	1049	17.9 (13.7, 23.1)	576	11.7 (8.6, 15.8)
Female	344 617	5.8 (5.6, 5.9)	13 588	14.3 (13.2, 15.6)	4024	18.6 (15.8, 21.7)	1631	6.0 (4.6, 7.8)	2598	16.1 (14.3, 17.9)	2931	14.5 (12.6, 16.8)	1617	13.5 (10.5, 17.2)	787	10.9 (8.0, 14.7)
Ever been told you have high cholesterol[k]																
Male	117 339	32.8 (32.2, 33.3)	3819	31.4 (28.3, 34.6)	1059	33.8 (26.7, 41.6)	543	26.8 (21.9, 32.3)	819	32.4 (28.3, 36.8)	619	25.8 (21.1, 31.2)	489	34.6 (27.2, 42.7)	290	29.5 (23.0, 36.9)
Female	183 412	28.9 (28.5, 29.3)	6417	28.5 (25.9, 31.3)	1832	31.6 (26.5, 37.3)	743	23.6 (20.1, 27.4)	1550	29.6 (27.0, 32.5)	1130	21.2 (17.7, 25.1)	772	30.6 (23.2, 39.1)	390	32.3 (24.9, 40.6)
Ever been told you have high blood pressure[k]																
Male	141 930	26.5 (26.1, 26.9)	5763	31.3 (28.7, 34.0)	1595	31.9 (27.1, 37.1)	1050	27.3 (23.6, 31.4)	1103	36.0 (32.5, 39.7)	970	26.5 (22.6, 30.9)	673	33.7 (27.2, 40.9)	372	28.2 (21.6, 35.9)
Female	215 048	22.4 (22.1, 22.7)	8959	28.2 (25.9, 30.6)	2568	25.1 (21.5, 29.0)	1284	29.8 (26.3, 33.5)	1977	33.6 (31.2, 36.2)	1637	23.7 (20.1, 27.7)	1005	27.9 (22.3, 34.2)	488	30.9 (25.6, 36.8)
Seatbelt use: always or nearly always[l]																
Male	93 855	92.7 (92.3, 93.0)	3450	87.0 (84.0, 89.5)	1044	75.3 (66.3, 82.5)	486	66.4 (60.9, 71.5)	479	89.8 (86.2, 92.6)	764	90.5 (86.9, 93.2)	437	94.0 (86.9, 97.4)	240	78.4 (67.0, 86.6)
Female	147 079	96.9 (96.7, 97.1)	5551	92.2 (90.6, 93.6)	1714	89.6 (85.9, 92.5)	607	80.7 (77.0, 84.0)	854	93.9 (91.5, 95.7)	1376	90.4 (84.6, 94.2)	665	96.0 (92.1, 98.0)	335	95.8 (91.9, 97.9)
Ever drive after too much to drink[m]																
Male	87 983	5.7 (5.4, 6.1)	2408	5.9 (4.6, 7.5)	781	9.9 (6.6, 14.5)	...	...	...	...	...	...	...	...	...	...
Female	107 779	2.4 (2.2, 2.7)	2647	2.5 (1.9, 3.3)	878	9.5 (7.3, 12.2)	...	...	...	...	...	...	...	...	...	...

Continued

TABLE 2—Continued

Have you fallen in the last 3 mo, age ≥ 45 y[n]																
Male	85 030	15.4 (15.0, 15.9)	2381	24.3 (19.7, 29.6)	691	22.5 (15.4, 31.7)	341	17.6 (10.9, 27.1)	372	20.2 (15.9, 25.2)	454	15.7 (11.2, 21.5)	334	33.9 (23.4, 46.3)	. . .	. . .
Female	134 178	16.7 (16.4, 17.1)	3881	23.4 (20.2, 26.8)	1134	19.7 (15.4, 24.8)	398	23.2 (17.4, 30.2)	699	17.9 (15.1, 21.2)	852	24.2 (18.9, 30.5)	518	34.3 (26.2, 43.4)	280	21.0 (14.2, 30.0)
Have you ever been tested for HIV, younger than 65 y																
Male	201 293	39.1 (38.6, 39.5)	9278	42.9 (40.6, 45.2)	2747	38.7 (34.1, 43.5)	1671	40.8 (37.3, 44.4)	1462	38.2 (35.0, 41.5)	1747	34.2 (30.6, 38.1)	1066	49.9 (43.6, 56.3)	585	57.0 (50.1, 63.6)
Female	291 626	43.8 (43.5, 44.2)	14 249	50.7 (48.9, 52.6)	4303	50.8 (47.1, 54.5)	2100	54.3 (50.9, 57.7)	2600	44.4 (42.0, 46.9)	2913	41.5 (38.1, 44.9)	1569	62.2 (57.0, 67.1)	764	58.4 (51.3, 65.2)

Note. AI/ANs = American Indians/Alaska Natives; BMI = body mass index; CI = confidence interval. Dash indicates that data was suppressed because count < 50 or the relative SE > 0.30. All prevalence estimates are weighted. Except for age group, estimates are age adjusted to the 2000 US standard population. "Refused" and "don't know" responses are excluded. Analyses are limited to persons of non-Hispanic origin.
[a]AI/AN persons in IN, IA, MI, MN, MT, NE, ND, SD, WI, and WY.
[b]AI/AN persons in AK.
[c]AI/AN persons in KS, OK, and TX.
[d]AI/AN persons in AZ, CO, NV, NM, and UT.
[e]AI/AN persons in CA, ID, OR, and WA.
[f]AI/AN persons in AL, CT, FL, LA, ME, MA, MS, NY, NC, RI, and SC.
[g]Limited to data from 2000, 2002, 2003, 2005, 2007, and 2009.
[h]Limited to data from 2006 to 2010.
[i]Limited to data from 2001 to 2010.
[j]Limited to data from 2004 to 2010. Heavy drinking defined as > 2 drinks/day in the past 30 days for men or > 1 drink/day in the past 30 days for women.
[k]Limited to data from 2001, 2003, 2005, 2007, and 2009.
[l]Limited to data from 2006, 2008, and 2010.
[m]Limited to data from 2002, 2004, 2006, 2008, and 2010.
[n]Limited to data from 2003, 2006, 2008, and 2010.

Overweight or obese. AI/AN men were more likely to be overweight than AI/AN women in all regions, except the Northern Plains, whereas they had a similar prevalence of obesity as AI/AN women, except in Alaska, where women were more obese. Compared with Whites, AI/AN men and women had a higher prevalence of obesity than their White counterparts (33.9% vs 23.3% for men and 35.5% vs 21.0% for women, respectively, for AI/AN and White persons).

Binge drinking, heavy drinking, and driving drunk. For all regions combined, the prevalence of binge and heavy drinking was similar between AI/AN men and White men. In Alaska, AI/AN men reported lower prevalence estimates of heavy drinking than White men nationally. AI/AN women in the Northern Plains were more likely to report binge drinking than White women, whereas AI/AN women in the Southern Plains and Southwest reported lower prevalence estimates of binge drinking than White women. Both AI/AN men and women in the Northern Plains were more likely to have driven a vehicle after having too much to drink compared with Whites.

Current smoker, former smoker, never smoked. AI/AN men and women in all regions except the Southwest were more likely than White men to be current smokers, and the smoking prevalence estimates reported were nearly double the rates in Whites. In the Southern Plains, AI/AN people of both genders were less likely than Whites to report being a former smoker, whereas AI/AN people of both genders in Alaska and males in the Pacific Coast region had higher prevalence estimates of former smoking compared with Whites. Both AI/AN men and women were less likely to report never having smoked in all regions, except the Southwest, where both AI/AN men and women had higher prevalence estimates of never having smoked compared with Whites.

Diabetes. Compared with White men and women, AI/ANs were more than twice as likely to report having diabetes in all regions, except Alaska.

High cholesterol. Both AI/AN men and women in the Southwest and AI/AN women in Alaska were less likely than Whites to have been told that they had elevated cholesterol.

High blood pressure. Compared with White men, AI/AN men overall and in the Northern

Plains, Southern Plains, and Pacific Coast regions reported a higher prevalence of hypertension. AI/AN women had a higher prevalence of hypertension compared with White women overall, and in Alaska, the Southern Plains, and East regions.

Seatbelt use. AI/AN men and women overall had lower rates of seatbelt use compared with US Whites. AI/AN men in the Southern Plains and Pacific Coast, AI/AN women in the East, and AI/ANs of both genders in the Southwest had prevalence estimates that were similar to Whites. AI/AN women in all regions were more likely than AI/AN men to report using a seatbelt when driving.

Fall in the past 3 months. Overall, for those aged 45 years and older, AI/AN people were more likely than White people to have had a fall in the past 3 months. Prevalence estimates for AI/AN men were higher in the Pacific Coast compared with White men, whereas prevalence estimates for AI/AN women were higher in the Alaska, Pacific Coast, and Southwest regions compared with White women.

Tested for HIV. For persons aged younger than 65 years, both AI/AN men and women overall were more likely to have been tested for HIV compared with Whites. AI/AN men in the Southwest were the only group less likely than Whites to have been tested for HIV.

Cancer Screening

Prevalence estimates for cancer screening are shown in Table 3 and are summarized briefly here. AI/AN women older than 40 years were overall less likely to have had a mammogram in the past 2 years than White women (67.8% vs 76.0%). By region, prevalence estimates were lower in the Northern Plains, Pacific Coast, and Southwest compared with White women. AI/AN women overall and in the Southern Plains and Southwest were less likely than White women to have had a Pap test in the past 3 years. AI/AN men aged 50 to 75 years overall, and in Alaska and the Southwest, were less likely than White men to have had a prostate specific antigen test within the past year. Compared with White men, AI/AN men in all regions except the Pacific Coast were less likely to have had colorectal cancer screening (fecal occult blood test within 1 year or endoscopy within 5 years). AI/AN women overall, and in the Northern Plains,

TABLE 3—Prevalence Estimates of Use of Cancer Screening Tests Among American Indian/Alaska Native and White Adults: Behavioral Risk Factor Surveillance System, Contract Health Service Delivery Areas, 34 US States, 2000–2010

Screening Test	Whites		Total AI/ANs		Northern Plains[a]		Alaska[b]		Southern Plains[c]		Southwest[d]		Pacific Coast[e]		East[f]	
	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)
Mammography within 2 y, women aged ≥ 40 y[g]	185 498	76.0 (75.7, 76.4)	5885	67.8 (65.0, 70.5)	1820	69.0 (63.1, 74.3)	743	72.9 (67.3, 77.8)	1021	73.0 (69.6, 76.1)	1220	61.5 (54.9, 67.7)	677	62.9 (54.9, 70.3)	404	72.5 (63.9, 79.6)
Papanicolaou (Pap) test within 3 y, women without hysterectomy[g]	160 794	83.8 (83.5, 84.2)	7115	79.2 (76.8, 81.4)	2311	81.7 (77.5, 85.3)	1111	84.9 (81.4, 87.8)	992	78.4 (75.2, 81.2)	1617	76.0 (71.0, 80.4)	728	80.2 (73.5, 85.5)	356	80.1 (71.4, 86.7)
Prostate specific antigen test within 1 y, men aged 50–75 y[h]	67 051	54.6 (53.9, 55.2)	1902	42.5 (36.7, 48.6)	574	47.0 (37.4, 56.8)	260	20.4 (14.5, 27.8)	304	53.0 (46.1, 59.9)	348	35.1 (27.5, 43.7)	260	44.0 (32.4, 56.3)	156	38.5 (24.8, 54.4)
Fecal occult blood test within 1 y or endoscopy within 5 y, aged ≥ 50 y[h]																
Male	83 651	61.5 (60.8, 62.2)	2162	44.3 (36.2, 52.7)	625	30.9 (23.0, 40.2)	305	35.7 (25.8, 47.1)	371	47.9 (40.7, 55.1)	389	36.6 (27.8, 46.5)	296	49.6 (32.0, 67.2)	176	40.4 (28.6, 53.5)
Female	132 213	56.1 (55.6, 56.5)	3566	46.7 (42.9, 50.6)	1041	48.0 (40.1, 55.9)	366	51.5 (43.3, 59.7)	677	44.6 (40.3, 49.0)	754	35.1 (29.0, 41.7)	466	51.5 (41.1, 61.8)	262	50.8 (41.2, 60.4)

Note. AI/ANs = American Indians/Alaska Natives; CI = confidence interval. All prevalence estimates are weighted. Except for age group, estimates are age adjusted to the 2000 US standard population. "Refused" and "don't know" responses are excluded. Analyses are limited to persons of non-Hispanic origin.
[a]AI/AN persons in IN, IA, MI, MN, MT, NE, ND, SD, WI, and WY.
[b]AI/ANs in AK.
[c]AI/ANs in KS, OK, and TX.
[d]AI/ANs in AZ, CO, NV, NM, and UT.
[e]AI/ANs in CA, ID, OR, and WA.
[f]AI/ANs in AL, CT, FL, LA, ME, MA, MS, NY, NC, RI, and SC.
[g]Limited to data from 2000, 2002, 2004, 2006, 2008, and 2010.
[h]Limited to data from 2002, 2004, 2006, 2008, and 2010.

Southern Plains, and Southwest were also less likely to have been screened than White women.

DISCUSSION

This update of BRFSS findings for AI/AN people was specifically undertaken to complement and inform the analysis of AI/AN causes of death that are the focus of this supplement issue. Native people in the United States continue to have high prevalence estimates of health behaviors that might contribute to excess deaths from chronic diseases, injuries, and cancer. These notable risk factors and health behaviors are tobacco use, obesity, lack of physical activity, not using seatbelts, and lower prevalence estimates of cancer screening compared with Whites.

To be consistent with other articles in this supplement that focus on mortality reporting, this analysis was restricted to the IHS CHSDA counties. Reasons for this geographic restriction are explained elsewhere in this supplement.[12] Because previous BRFSS publications did not include this geographic restriction, we did not attempt to report risk factor trends related to earlier publications cited in this article.

A relatively high proportion of AI/AN people reported having no health plan and no personal doctor, despite living in counties generally served by IHS. This could mean that the barriers to treatment at IHS clinics were so significant (distance, wait times, shortage of staff) that respondents did not consider it a viable "health plan." It was also possible that many respondents simply did not understand the term "health plan" to include their right to use IHS services. Another likely contributing factor for the high percentage of AI/AN persons reporting no personal doctor was the high turnover rate of providers, particularly in facilities in remote regions of the country. It was also likely that some respondents identified themselves as AI/AN persons, but were not eligible for IHS care, because one had to be an enrolled member of a federally recognized tribe. It was likely that less access to health care and fewer persons reporting having a personal provider contributed, along with risk factor burden, to the poorer health status reported by many AI/AN persons, as reflected in Table 1. Questions in the BRFSS related to access were not designed to reflect the unique IHS health care system, and we felt that further analysis of these questions would not be reliable. This is clearly an area for focused study with more precise surveys, especially given the increased participation in tribal self-governance and the Affordable Care Act.

Risk behaviors affected death rates with varying lag times. For example, excess alcohol use might influence deaths in motor vehicle accidents in the short term, and deaths from liver disease only after 10 years or more. Although some of the risk behaviors we reported in this article might not directly influence death rates from the same time period, we felt that it was important to present the most current risk behavior estimates available.

Low intake of fresh fruits and vegetables is considered to be a risk factor for cancer, obesity, and diabetes. Native American diets have changed dramatically over the past century, because subsistence farming and hunting has largely been replaced by fast food and the mainstream American diet.[17] Commodity food assistance programs, common on reservations, have provided high-calorie, high-fat foods that often replace a more healthy menu for low-income populations.[18]

The relatively high prevalence estimates of obesity, diabetes, and hypertension reported in this study were consistent with other studies.[19,20] Although we found some geographic variability, there were few AI/AN communities that were not severely affected by these manifestations of the metabolic syndrome (the co-occurrence of central adiposity, an unfavorable cholesterol profile, and insulin insensitivity), which raises the risk of heart disease, stroke, and type 2 diabetes.[21,22] Although we found that relatively low numbers of AI/AN respondents reported that they had been told they had elevated cholesterol, more in-depth studies would seem to indicate that hypercholesterolemia is a prevalent problem.[23] With the increasing incidence of heart disease among AI/AN people, improvements in diet and exercise habits might be achieved through more education, testing, and community-based interventions.[24]

Although there were some regional differences for the alcohol-related questions—heavy drinking, binge drinking, and drinking too much before driving—the overall prevalence in AI/AN persons was similar to that for Whites for all 3 measures. The questions related to binge drinking were changed in 2006, and we included only responses from 2006 onward, which resulted in wide CIs around the prevalence estimates, although we knew that AI/AN communities continued to have a disproportionately high prevalence of alcohol-related mortality.[25,26] It was suggested that socially stigmatizing questions might be better addressed by trained interviewers in personal, face-to-face interviews, or by self-administered questionnaires under controlled conditions.[27] It was also possible that patterns of some behaviors, such as drinking and smoking, were different in AI/AN communities and should be addressed with differently worded questions.[28]

Relatively high estimates of HIV screening, particularly for women, might be in part a result of IHS policies and practices concerning prenatal care. Prenatal HIV screening is among a group of core Government Performance and Results Act externally reported performance measures, which makes it a highly visible outcome for which facilities are accountable.[29,30] In addition, practices such as bundling HIV into existing prenatal laboratory panels and improved documentation of HIV tests in the IHS standardized electronic health record are believed to have contributed to improvements in both clinical practice and data management of prenatal HIV screening.[31,32]

The prevalence estimates of cancer screening among AI/AN persons continue to improve, although they still lag behind the White estimates. Programs like the National Breast and Cervical Cancer Early Detection Program and the CDC Colorectal Cancer Control Program have focused significant resources on AI/AN communities, and cancer screening is becoming more widely available.[32,33]

The high prevalence of tobacco use among AI/AN persons everywhere, except the Southwest, was particularly troubling, because this is a powerful contributor to heart disease, lung cancer, and vascular complications of diabetes. Despite the fact that tobacco use is the largest preventable cause of death for AI/AN people, the IHS does not currently have a funded tobacco control program.[34]

Study Limitations

Several limitations must be considered when interpreting our findings. First, phone surveys like the BRFSS are problematic in AI/AN communities, where a single landline phone might serve several families, and many may have no phone at all.[6] This might bias the sampled population toward the more urban and economically advantaged groups. BRFSS also focuses on risk factors measured on the individual level and does not capture social and environmental factors that might be contributing to these patterns in risk factors. Second, to be consistent with the death certificate analyses presented in other papers in this supplement, the Hispanic AI/AN population was excluded (7.7% of the sample). This exclusion might disproportionately affect some states. Third, several measures (e.g., driving after having too much to drink, ever being told that cholesterol was elevated, a fall in the last 3 months) have limited usefulness as a result of unstable estimates because of a small number of respondents for these questions. Finally, given the limited number of observations for AI/AN persons in BRFSS for individual years, it was not practical to include time trends. Future analyses of BRFSS for this population would benefit from a focus on time trends where data permit.

Conclusions

AI/AN people in general continue to be at higher risk for chronic diseases, cancer, and injury than Whites. The Guide to Community Preventive Services[35] and the United States Preventive Services Task Force Guide to Clinical Preventive Services[36] are valuable resources for planning interventions to address many of the disparities in the risk behaviors reported here. However, additional research is needed to expand the evidence base for these interventions to address the social and environmental determinants of many of these risk factors and risk behaviors.[37] There is a need to adapt such interventions to the unique context of AI/AN populations. This context includes the complex challenges of chronic unemployment, poverty, cultural beliefs and practices, historical trauma, and remote and rural locations. Federal and tribal agencies charged with improving the health of AI/AN people should consider devoting appropriate attention to strengthening primary prevention in AI/AN communities because the fiscal and human costs of chronic disease and premature death are enormous. ■

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This article was accepted January 7, 2014.

Note. *The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention or that of the Indian Health Service.*

Contributors

N. Cobb conceptualized the study and drafted the article. D. Espey coordinated the writing and analyses. J. King conducted the analyses and wrote relevant sections of the article.

Acknowledgments

We would like to acknowledge Cheryll Thomas' valuable comments on the draft of the article.

Human Participant Protection

No human participants review is required for Behavioral Risk Factor Surveillance System, which is considered public health practice.

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