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Brief Report

Differences in cigarette and smokeless tobacco use among American Indian and Alaska Native people living in Alaska and the Southwest United States

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Abstract

Introduction: This study analyzed self-reported tobacco use among American Indian and Alaska Native (AI/AN) people enrolled in the Education and Research Towards Health Study in Alaska ($n = 3,821$) and the Southwest United States ($n = 7,505$) from 2004 to 2006.

Methods: Participants (7,060 women and 4,266 men) completed a computer-assisted self-administered questionnaire on cigarette and smokeless tobacco (ST) use.

Results: Current use of cigarettes was considerably higher in Alaska than in the Southwest United States (32% vs. 8%). Current ST use was also more common in Alaska than in the Southwest United States (18% vs. 8%). Additionally, smoking was more common among men, younger age, those who were not married, and who only spoke English at home, while ST use was more common among men, those with lower educational attainment and those who spoke an AI/AN language at home ($p < .01$). Compared with the U.S. general population, AI/AN people living in Alaska were more likely and those living in the Southwest United States were less likely to be current smokers. Rates of ST use, including homemade ST, in both regions were much higher than the U.S. general population.

Discussion: Tobacco use among AI/AN people in the Southwest United States, who have a tradition of ceremonial tobacco use, was far lower than among Alaska Native people, who do not have a tribal tradition. Tobacco use is a key risk factor for multiple diseases. Reduction of tobacco use is a critical prevention measure to improve the health of AI/AN people.

Introduction

American Indian and Alaska Native (AI/AN) people have the highest prevalence of tobacco use among ethnic minorities in the United States (Carmona et al., 2004; Giovino, Chaloupka, & Hartman, 2009). The 2007 National Health Interview Survey (NHIS) indicated that the prevalence of current cigarette smoking among AI/AN people nationwide was 36% compared with 21% among U.S. Whites (Giovino et al., 2009). Tobacco use, especially cigarette smoking, is directly related to the leading causes of death for AI/AN people—cancer and heart disease (U.S. Department of Health and Human Services, 2004). However, there is considerable heterogeneity in the rates of commercial tobacco use among AI/AN throughout the United States (Winter, 2000).

Tobacco use is now common among Alaska Native people, who first acquired it as a trade good in the 19th century (Fortuine, 1996; Patten et al., 2008). Tobacco is smoked, chewed, or used as snuff. Cigar and pipe smoking are currently rare in this population (Kaplan, Lanier, Merritt, & Siegel, 1997). Additionally, the ashes from a tree fungus (*Phellinus igniarius*) are combined with leaf tobacco to make a homemade mixture known as "iqmik." The ash increases the pH of the mixture, resulting in higher nicotine bioavailability and speed of absorption into the body. Both commercial and homemade chew are used throughout Alaska, but the homemade version is most common in the southwest region (Blanchette, Renner, Held, Enoch, & Angstman, 2002; Renner et al., 2005). Tobacco products are not used ceremonially by Alaska Native people (Blanchette, 2001; Daley et al., 2006).

The Navajo people have a strong tradition of ceremonial tobacco use (Winter, 2000). Cigarette smoking was historically much less frequent among the Navajo than among the Caucasians (Sievers & Cohen, 1961). Secular use of tobacco has been increasing over the last century. The most current data for Navajo tobacco use, the Navajo Health and Nutrition Survey conducted in 1991–1992, documented that 23% of 20- to 39-year-old men reported smoking cigarettes and a substantial portion of younger people reported using chewing tobacco or snuff (Mendlein et al., 1997).

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The Education and Research Towards Health (EARTH) Study is a multicenter study of AI/AN people designed to examine risk and protective factors for chronic diseases. We report on the prevalence of self-reported tobacco use in a large cohort of AI/AN people living in Alaska and the Southwest United States and compare the sociodemographic characteristics of AI/AN persons who reported smoking and smokeless tobacco (ST) use to those reporting no use. These data can be used to provide a baseline for research into associations between health and tobacco use patterns and help inform tobacco cessation efforts among AI/AN people.

Methods

Study population

Details of the EARTH Study design and methods have been reported previously (Slattery et al., 2007). Participants from Alaska (95% Alaska Native and 5% American Indian) were recruited from one urban center and 26 small villages in southwest (Yukon-Kuskokwim Delta, primarily Yupik Eskimo), southeast (Panhandle, primarily Haida, Tlingit, and Tsimshian), and southcentral (Anchorage area, combination of Alaska Native ethnicities) Alaska (see Figure 1). Most participating communities were located off the road system and were accessible only by airplane or seasonal access by snowmobile or boat. Navajo Nation participants living in the Southwest United States were recruited from 48 communities in northern New Mexico and Arizona. Two stationary recruitment sites were used as well as a mobile van that traveled between communities. Methods of recruitment included presentations to tribal groups and health care providers, informational tables staffed by study personnel at community events, house-to-house recruiting, brochures and flyers in public locations, and public service announcements on local radio and in newspapers. All participants received a small incentive to participate (gift value range $20–30 USD).

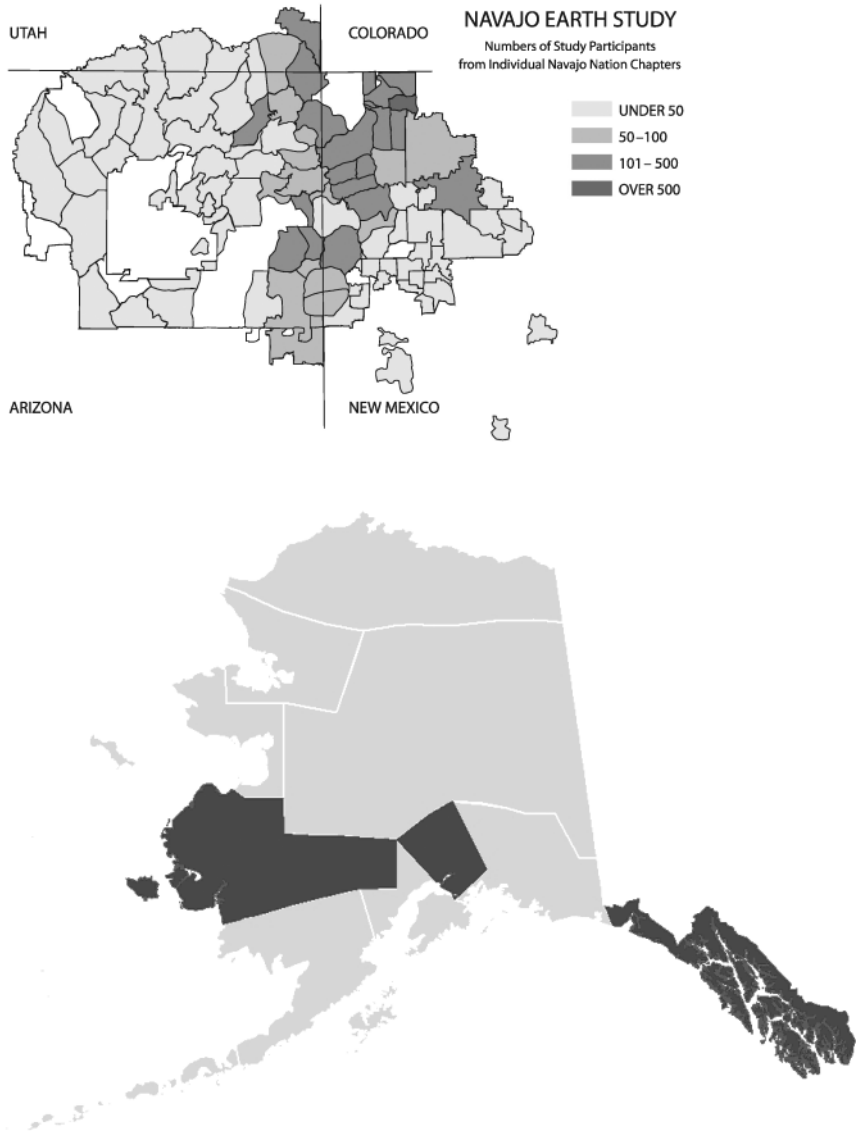

Figure 1. Navajo Nation and Alaska *Education and Research Towards Health* (EARTH) Study regions.

In each community, attempts were made to enroll all residents who met the following criteria: self-identified AI/AN eligible for Indian Health Service care, aged ≥18 years of age, and able to give informed consent. Those who were pregnant and/or receiving chemotherapy were asked to participate at a later date. On the basis of 2000 AI/AN census data in Alaska, participation ranged from 2% to 49% of eligible adults aged 18 years or older; the median participation rate was 29%. Response rates are not available for Navajo participants. This report considers data from 11,326 study participants enrolled from March 2004 through October 2007. A total of 0.2% ($n = 27$) did not answer the smoking tobacco question.

Data collection

EARTH participants completed self- and interviewer-administered questionnaires on demographics, diet, physical activity, lifestyle, and cultural practices, including smoking and ST use, cancer screening practices, and personal and family history of chronic diseases. In addition, a small panel of medical measurements was completed. The tobacco questionnaire was administered via computer-assisted self-interview on touch screen panels accompanied by an audio version of the questionnaire in English, Dine' (Navajo), or Yupik (Eskimo) (Edwards et al., 2007). The study was set up in various locations, including tribal health clinics, community centers, tribal council offices (Alaska), and chapter offices (Navajo).

The study protocol was approved by the Alaska Area Institutional Review Board (IRB), the Navajo Nation Human Research Review Board, the Indian Health Services IRB, the University of Utah IRB, the research and ethics committees and governing boards of each of the participating regional health corporations, and the tribal councils of the participating communities. All participants gave written informed consent before participating in the study.

Measurement of tobacco use

Participants were categorized as current smokers, former smokers, or never-smokers based on responses to three questions modeled after questions from the NHIS and Behavioral Risk Factor Surveillance System (BRFSS): "Have you smoked at least 100 cigarettes in your entire life?" "Have you ever smoked cigarettes regularly, that is at least one cigarette a day for three months or longer?" and "Do you smoke regularly now?" (Gentry et al., 1985). Participants who did not smoke at least 100 cigarettes were categorized as never-smokers and were asked no further questions about smoking. Participants who smoked at least 100 cigarettes and had smoked regularly were categorized as current smokers if they were smoking regularly now and as former smokers if they were not smoking regularly at the time of the baseline interview.

Current ST (commercial and homemade) use status was determined by response to the NHIS question, "Have you ever used chewing tobacco or snuff at least 20 times in your lifetime?" Current users were those participants who responded "yes, currently"; former users were those who responded "yes, but not now"; and never-users were those who responded "no" to the ST question.

Statistical analysis

Responses to tobacco use by study center were analyzed by age, gender, education, employment, martial status, income, and language spoken at home. For categorical factors (gender, level of formal education, and language spoken at home), chi-squared tests were used to test difference in proportions between current and other users. All analyses were two-tailed, and $p < .01$ was considered statistically significant. Two multivariate logistic regression models were fit using a dichotomous outcome of current smoking or ST use versus former/never-users combined. The final logistic models include only those variables that were found to be statistically significant in the univariate models, with the exception that sex was included in the final model for ST use despite lack of statistical significance. For all variables, participants with missing data were excluded from the analysis. All analyses were conducted with the Statistical Packages for the Social Sciences (v. 15.0; SPSS Inc., Chicago, IL, 2007).

Results

Distributions of participants in both Alaska and the Southwest United States were similar in age, sex, education, employment, and marital status, although Southwest United States participants were more likely to have a lower household income and speak a native language at home (data not shown). As shown in Table 1, self-reported current (32% vs. 8%) and former (24% vs. 10%) use of cigarettes was considerably higher among Alaska study participants than among Southwest United States participants ($p < .01$). In both study centers, current cigarette smoking was more common in younger age groups. Among Alaska study participants, almost half (44%) of those in the 18- to 24-year-old age group reported currently smoking compared with less than 9% of those over age 65. A multivariate logistic regression model with all participants combined showed that the following were all significantly associated ($p < .01$) with current use of cigarettes: male sex (odds ratio [*OR*] = 1.77; *CI* = 1.59–1.98), younger age (*OR* = 0.97; *CI* = 0.97–0.97), being unmarried (*OR* = 1.43; *CI* = 1.27–1.61), living in Alaska (*OR* = 4.82; *CI* = 4.29–5.42), and only speaking English in the home (*OR* = 1.50; *CI* = 1.34–1.69).

Similarly to the use of cigarettes, current ST use was more common in Alaska than in the Southwest United States (18% vs. 8%; see Table 2). The percent of former ST users was similar in the Alaska (18%) and the Southwest United States (16%) study center, while the Southwest United States study center had a higher percent of participants who reported never using ST (76% vs. 65%). Current use of ST was most common in the 35- to 44-year-old age group in the Southwest United States study center (11%) but most common in the 65+ age group in Alaska (23%). More men than women used ST in the Southwest United States study center (14% vs. 5%), whereas in Alaska, more women than men used ST (18% vs. 17%). A multivariate logistic regression model with all participants combined showed that male sex (*OR* = 1.59; *CI* = 1.41–1.79), lower educational attainment (*OR* = 1.28; *CI* = 1.12–1.46), living in Alaska (*OR* = 4.20; *CI* = 3.67–4.79), and speaking an AI/AN language in the home (*OR* = 4.16; *CI* = 3.58–4.84) were all significantly associated with current ST use ($p < .01$).

Discussion

The only other large-scale dataset available on Navajo tobacco use patterns, the Navajo Health and Nutrition Survey (1991–1992),

Table 1. General demographics of Alaska and Southwest U.S. Education and Research Towards Health Study population by smoking tobacco status, 2004–2007

	Alaska						Southwest United States					
	Current		Former		Never		Current		Former		Never	
Smoking status[a]	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Total ($N = 11,299$)[b]	1,204	31.6	932	24.4	1,680	44.0	621	8.3	737	9.8	6,125	81.9
Age group (years)												
18–24	301	43.6	116	16.8	274	39.7	212	15.0	183	13.0	1,142	73.8
25–34	271	36.4	174	23.4	300	40.3	181	11.7	225	14.5	1,142	73.8
35–44	306	32.7	196	20.9	435	46.4	135	7.6	157	8.8	1,484	83.6
45–54	223	28.3	223	28.3	343	43.5	67	4.5	110	7.3	1,328	88.2
55–64	80	20.8	139	36.1	166	43.5	23	2.7	53	6.1	789	91.2
65+	23	8.6	84	31.2	162	60.2	3	0.8	9	2.4	366	96.8
Sex												
Male	598	39.9	377	25.2	524	35.0	304	11.0	403	14.6	2,048	74.3
Female	606	26.2	555	24.0	1,156	49.9	317	6.7	334	7.1	4,077	86.2
Education												
Less than high school	290	34.2	147	17.3	412	48.5	182	9.0	155	7.7	1,676	83.3
High school or higher	904	30.9	775	26.5	1,250	42.7	439	8.1	580	10.7	4,424	81.3
Employment status												
Not currently employed	793	35.7	509	22.9	921	41.4	375	8.8	432	10.1	3,456	81.1
Employed or self-employed	411	25.8	423	26.6	759	47.6	246	7.6	305	9.5	2,669	82.9
Marital status												
Married/living as married	373	22.9	451	27.7	803	49.4	214	6.6	319	9.8	2,731	83.7
Separated/divorced/never married	827	38.0	474	21.8	873	40.2	407	9.7	418	9.9	3,386	80.4
Income												
≤$25,000	680	36.4	408	21.8	780	41.8	375	8.4	489	10.9	3,618	80.7
>$25,000	334	24.0	436	31.3	624	44.8	129	6.8	177	9.3	1,592	83.9
Language spoken at home												
Both native and English	328	26.0	261	20.7	671	53.3	336	6.4	259	11.9	4,454	84.6
English only	873	34.4	666	26.2	1,002	39.4	283	13.0	259	11.9	1,634	75.1

Note. Smoking tobacco includes cigarette and cigar products only.

[a]$p < .01$ for all univariate comparisons except smoking tobacco status comparison with education.

[b]Data missing for 27 participants.

found similar demographic trends as the EARTH Study: more men than women currently smoked or used chewing tobacco and tobacco use rates decreased with age (Mendlein et al., 1997). However, male rates of reported cigarette use were higher (16% vs. 10%) than reported by Southwest United States EARTH study center participants (2004–2006). When compared with current rates in the general U.S. population, AI/AN men and women in the Alaska EARTH study center had a higher prevalence of current cigarette smoking (40% and 26%, respectively, vs. 22% and 17%), while rates among men and women in the Southwest U.S. study center (11% and 7%) were much lower than national rates (U.S. Department of Health and Human Services, 2007). BRFSS data from 2000 to 2006 showed very similar cigarette use rates (40% among Alaska AI/AN and 21% among Southwest AI/AN) as the EARTH Study (Steele, Cardinez, Richardson, Tom-Orme, & Shaw, 2008). Overall, AI/AN people were more likely to be current smokers and were less likely to be former or never-smokers compared with the U.S. general population. However, regional variation in cigarette use was substantial, with rates much higher among Alaska study participants and much lower among Southwest U.S. participants.

Rates of ST use in particular were much higher than the U.S. general population and include the use of homemade ST products. Among men and women Alaska study center participants, the current ST use rates were 17% and 18%, respectively, compared with the rates for the general U.S. population (6.9% and 0.3%, respectively). The current ST use rate among men and women in the Southwest U.S. study center (14% and 5%, respectively) was also substantially higher than the U.S. general population.

It has been theorized that traditional sacred use of tobacco combined with increasing commercial availability after the arrival of Europeans sets the stage for the high prevalence of use of tobacco by AI/AN. However, those beliefs and practices associated with traditional use may also serve to limit the use of tobacco (Winter, 2000). This study found that the prevalence of tobacco use among the Navajo, with an historical tradition of ceremonial use, was far lower than among Alaska Native people, who did not have a tribal tradition of tobacco use. This study confirmed high rates of tobacco use, especially ST use, among these two populations of AI/AN people in comparison with the general U.S. population. Interventions to prevent the use of

Table 2. General demographics of Alaska and Southwest U.S. Education and Research Towards Health Study population by ST status, 2004–2007

	Alaska						Southwest United States					
	Current		Former		Never		Current		Former		Never	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Total ($N = 11,326$)	676	17.7	677	17.7	2,468	64.6	604	8.0	1,203	16.0	5,698	75.9
Age group (years)												
18–24	102	14.8	146	21.1	443	64.1	57	4.0	125	8.8	1,231	87.1
25–34	133	17.8	183	24.5	430	57.6	127	8.2	265	17.1	1,158	74.7
35–44	202	21.5	177	18.8	560	59.6	201	11.3	344	19.3	1,234	69.4
45–54	115	14.6	113	14.3	561	71.1	143	9.5	282	18.7	1,085	71.9
55–64	63	16.4	34	8.8	288	74.8	61	7.0	134	15.4	675	77.6
65+	61	22.5	24	8.9	186	68.6	15	3.9	53	13.8	315	82.2
Sex												
Male	253	16.9	402	26.8	846	56.4	376	13.6	761	27.5	1,628	58.9
Female	423	18.2	275	11.9	1,622	69.9	228	4.8	442	9.3	4,070	85.9
Education												
Less than high school	206	24.2	152	17.9	493	57.9	192	9.5	285	14.1	1,545	76.4
High school or higher	465	15.9	517	17.6	1,950	66.5	411	7.5	915	16.8	4,129	75.7
Employment status												
Not currently employed	414	18.6	404	18.1	1,408	63.3	336	7.9	668	15.6	3,273	76.5
Employed or self-employed	262	16.4	273	17.1	1,060	66.5	268	8.3	535	16.6	2,425	75.1
Marital status												
Married/living as married	332	20.4	259	15.9	1,039	63.7	278	8.5	552	16.9	2,442	74.6
Separated/divorced/never married	343	15.8	415	19.1	1,418	65.2	326	7.7	650	15.4	3,249	76.9
Income												
≤$25,000	380	20.3	337	18.0	1,151	61.6	388	8.6	744	16.6	3,354	74.8
>$25,000	168	12.1	242	17.4	984	70.6	134	7.1	324	17.1	1,441	75.9
Language spoken at home												
Both native and English	434	34.4	244	19.3	584	46.3	520	9.9	959	18.2	3,792	71.9
English only	238	9.4	428	16.8	1,875	73.8	83	3.8	238	10.9	1,855	85.2

Note. ST includes chew, snuff, and homemade tobacco products. ST = smokeless tobacco.

[a] $p < .01$ for all univariate comparisons except smokeless tobacco status comparison with employment.

tobacco should make a distinction between recreational smoking and the sacred use of tobacco (Steele et al., 2008).

The major strengths of this study are the size of the cohort and geographic diversity, comprising three regions of Alaska and two regions in Arizona and New Mexico. The sample size was large enough to examine geographic differences in tobacco use, which tend to be obscured in national estimates for AI/AN populations (Steele et al., 2008). Some limitations of this study include the nonrandom sampling design. Although not randomly selected, the distribution of the study population closely resembled the demographic distributions (except for gender) reported by the 2000 U.S. Census for AI/AN in the respective regions (data not shown; U.S. Census Bureau, 2000). It should be noted that although this study included large numbers of AI/AN people, the data cannot be generalized to all Native American groups as the tribes of the United States are quite culturally heterogenous. Another limitation is that all data were collected by self-report versus direct observation. However, data were collected in a highly confidential manner by computer-assisted self-interview, which make the responses less likely to be subject to social desirability bias. The definition of smoking used for this study was slightly different than the BRFSS and NHIS. AI/AN people may have different patterns of smoking than the general population, including being less likely to smoke daily than non-Native people (State of Alaska Department of Health and Social Services, 2009). Because of these differences, this study could potentially have underrepresented the prevalence of smoking in comparison with national data. Lastly, we report here cross-sectional data from a baseline study visit. These data allow for descriptive reporting but not for analysis of causal relationships between variables and outcomes.

Tobacco use is a key risk factor for multiple diseases and conditions. Rates among AI/AN in Alaska and the Southwest United States exceed those of the U.S. general population. Reduction of tobacco use is one of the most critical prevention measures to improve the health of these populations.

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Declaration of Interests

None declared.

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