

Brief Report

Tobacco use among Alaska Native people in the EARTH study

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Abstract

Introduction: While aggregate rates of tobacco use for Alaska Native (AN) and American Indian people are high, use rates vary among populations and factors associated with use are not fully understood. For AN people living in three regions of Alaska, we present prevalence of tobacco use as well as factors associated with use.

Methods: Using data from 3,828 participant questionnaires, associations with tobacco use are examined with chi-square tests and multivariate logistic regression. Covariates investigated include demographic factors, identification with tribal tradition, language spoken in the home, binge drinking, and depression screening results.

Results: Current smoking was more prevalent among men. In multivariate analysis, higher likelihood of current smoking was found for participants with these characteristics: younger, unmarried, low income, and increased frequency of binge drinking. For women, additional characteristics included no high school diploma and positive depression screening. Participants from southeastern Alaska were less likely to be current smokers. Current smokeless tobacco use rates were similar across gender. Higher likelihood of current smokeless use was found in southwestern Alaska and among those with positive depression screening. Women with low income and who reported at least some identification with tribal tradition had increased odds of current smokeless use. More than 20% of smokeless tobacco users reported initiating by age 10.

Discussion: Rates of tobacco use by AN people continue to be higher than other U.S. populations. Tobacco initiation prevention efforts targeting AN youth at an early age are recommended, given the early age of initiation demonstrated in this study.

Introduction

Alaska Native and American Indian (AN/AI) people have the highest rates of tobacco use in the United States (U.S. Department of Health and Human Services [U.S. DHHS], 1998, 2007a). However, use rates vary among AN/AI populations,

with some groups using at rates similar to or lower than non-Native people. Unlike other Indigenous populations, AN people did not use tobacco in traditional ceremony. However, tobacco has gained cultural and social significance since its introduction to AN people in the late 1700s (Alaska Department of Health and Social Services [ADHSS], 2007; Renner et al., 2004). Today, AN people have tobacco use rates twice that of non-Native Alaskans (ADHSS; Peterson, Fenaughty, & Eberhart-Phillips, 2004). Additionally, many AN people in southwestern Alaska use a unique form of smokeless tobacco called iq'mik, which is a mixture of punk fungus ash and tobacco leaf (Renner et al., 2005).

With higher use rates, AN people are at higher risk of tobacco-related health problems. Cancer is the leading cause of death among AN people, and the AN rate of cancer-related deaths is 1.3 times higher than the U.S. population rate (164 vs. 127 per 100,000; Day & Lanier, 2003). Lung cancer is the leading cause of AN cancer deaths (Lanier, Day, Kelly, & Provost, 2008), and the AN oral cancer rate is higher than the non-Native rate (18 vs. 11 per 100,000; Lanier, Kelly, Maxwell, McEvoy, & Homan, 2006).

Past studies have shown similar correlates of tobacco use between AN people and the general Alaska and U.S. populations. Specifically, studies have shown that tobacco use is more common among men; unmarried people; and people of low income, less education, and younger age (ADHSS, 2007; Peterson et al., 2004; Tomar, 2003; U.S. DHHS, 2007a, 2009). Other findings include associations between heavy drinking and smoking (ADHSS; National Institute on Alcohol Abuse and Alcoholism, 1998; Peterson et al.) and higher smokeless tobacco use rates in rural regions (ADHSS; Tomar; U.S. DHHS, 2009). In a study among Yup'ik people, one subgroup of AN people, smokeless tobacco users more frequently reported speaking Yup'ik and identification with Yup'ik lifestyle, while cigarette users were more likely to identify with non-Native culture (Wolsko & Mohatt, 2009).

Many surveys are conducted by phone and may lack representation from AN people in remote areas due to language barriers and lack of telephones (ADHSS, 2007; Renner et al., 2005). The Alaska Education and Research Towards Health (EARTH) study allowed participants to hear and answer questions in Yup'ik and included urban, rural, and frontier sites. Using study

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data, we estimate tobacco use prevalence for three regions of Alaska and report associations with demographic factors, language spoken in the home, identification with tribal tradition, frequency of binge drinking, and depression screening results.

Methods

Study sample

Eight of the largest Alaskan tribal health organizations (THOs), which provide health care to AN/AI people in a prepaid system, were invited to participate in the EARTH study. Three THOs in the southcentral, southeastern, and southwestern regions and tribal health councils of 27 communities within these three THOs approved participation. The southcentral region contains Alaska's largest urban center, while the southwestern and southeastern regions consist primarily of rural towns and frontier villages, most of which are not accessible by road. Community members were invited to participate through brochures, posters, presentations, and advertisements in local media, with most recruitment performed by locally hired personnel. Baseline visits occurred with an itinerant research team at fixed sites and temporary sites separate from health care delivery, with temporary sites more common in smaller communities. Individuals presented at sites and could participate if they met the following criteria: AN/AI, eligible for Indian Health Service care, at least 18 years old, not pregnant, not undergoing chemotherapy, able to understand the consent form, and able to complete the interview in English or Yup'ik. Except for the exclusions mentioned, the attempt was made to enroll all eligible community members, regardless of medical history. Over 95% of consented participants ($n = 3,828$) completed the study; each received \$20 and a gift such as a t-shirt, water bottle, or hat. Between 2% and 49% of eligible members (median 29%) participated in each community, with lower rates in more populous communities.

Data collection

The EARTH study design is detailed elsewhere (Slattery et al., 2007). Briefly, the baseline visit included informed consent, medical measurements, and two questionnaires administered in English or Yup'ik via an audio computer-assisted self-interview tool. The baseline visit took approximately 2 hr to complete, after which participants received a consultation and personalized risk factor report. This report uses only questionnaire data.

Tobacco use definitions

Participants were categorized as current, former, or never-cigarette smokers based on responses to three questions modeled after questions from the National Health Interview Survey (NHIS) and Behavioral Risk Factor Surveillance System: "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?" Participants who did not smoke 100 cigarettes were categorized as never-smokers. Participants who smoked at least 100 cigarettes and had smoked regularly were categorized as current smokers if they reported smoking "regularly now" and as former smokers otherwise.

Participants were categorized as current, former, or never-users of smokeless tobacco based on responses to two questions: "Have you ever used commercially manufactured chewing

tobacco or snuff at least 20 times in your lifetime?", an NHIS question, and "Have you ever used homemade chew from tobacco leaves mixed with ash such as iq'mik at least 20 times in your lifetime?", a question addressing the unique form of tobacco used by some AN people. Never-users responded "no" to both questions; current users responded "yes, currently" to either question; and former users responded "yes, but not now" to at least one question and were not current users.

Analyses

Chi-squared tests were used to examine difference in proportions between current, former, and never-users. Multivariate logistic regression models were fit separately for men and women using a dichotomous outcome of current versus other user types. Variables with univariate logistic association at the 25% significance level were included in multivariate analysis, as suggested by Hosmer and Lemeshow (2000). Language spoken in the home was excluded due to multicollinearity. Finally, differences in characteristics of tobacco use, such as daily cigarette use, were examined using the Wilcoxon's rank-sum test. Data were analyzed with SAS v. 9.1 (SAS Institute Inc., Cary, NC), and p values $<.05$ were considered significant.

Results

Cigarette use

Table 1 shows univariate associations by smoking status. Across gender, 1,207 participants (32%) were classified as current smokers, 933 (24%) as former smokers, and 1,346 (35%) as never-smokers. More men than women were current smokers ($p < .001$), while rates of former smoking were similar across gender ($p = .15$).

In multivariate analysis, the following associations remained significant: higher odds of current smoking among men and women who were in younger age groups, were not married, had lower income, were from the southcentral or southwestern regions, and had higher frequency of binge drinking. There were higher odds of current smoking for women with less education and with positive depression screening.

More than 75% of current and former smokers reported smoking by age 18, with no significant gender difference (both medians 16 years, $p = .35$). The majority of smokers reported smoking less than 10 cigarettes/day, with only 15% reporting more than a pack. The median daily cigarette use was higher among men than women (medians 10 and 7 cigarettes, respectively; $p < .001$).

Smokeless tobacco use

Table 2 shows univariate associations of current smokeless tobacco use. Across gender, 678 (18%) were classified as current smokeless tobacco users, 677 (18%) as former users, and 2,463 (64%) as never-users. Rates of current smokeless use were not significantly different across gender ($p = .30$).

Results that remained significant in multivariate analysis follow. Men and women from the southwestern region were most likely to currently use smokeless tobacco, and women in southcentral Alaska were more likely than those in southeastern Alaska. Among both genders, there were higher odds of current use for those who screened positive for depression. There were

Table 1. Associations by smoking status

Smoking status	Men (<i>n</i> = 1,344)			<i>p</i> Value	Women (<i>n</i> = 2,142)			<i>p</i> Value
	Current <i>n</i> (%)	Former <i>n</i> (%)	Never <i>n</i> (%)		Current <i>n</i> (%)	Former <i>n</i> (%)	Never <i>n</i> (%)	
Overall	600 (44)	378 (28)	366 (27)		607 (28)	555 (26)	980 (46)	
Age group, years								
18–24	161 (59)	46 (17)	67 (25)		141 (40)	71 (20)	143 (40)	
25–34	126 (52)	66 (27)	50 (21)		146 (34)	108 (25)	176 (41)	
35–44	153 (47)	74 (23)	98 (30)		153 (29)	122 (23)	260 (49)	
45–54	115 (40)	93 (32)	81 (28)		108 (25)	130 (30)	194 (45)	
55–64	31 (24)	63 (48)	37 (28)		49 (22)	76 (34)	102 (45)	
65+	14 (17)	36 (43)	33 (40)	<.001	10 (6)	48 (30)	105 (64)	<.001
Education (missing 0, 3)								
Less than high school diploma	156 (49)	69 (22)	96 (30)		135 (32)	73 (17)	212 (51)	
Diploma/GED or higher	444 (43)	309 (30)	270 (26)	.01	471 (27)	482 (28)	766 (45)	<.001
Employment (missing 4, 7)								
Unemployed ^b	167 (41)	127 (31)	117 (29)		214 (28)	190 (25)	358 (47)	
Employed	431 (46)	250 (27)	248 (27)	.13	388 (28)	365 (27)	620 (45)	.65
Marital status (missing 4, 10)								
Not married ^c	453 (52)	204 (23)	215 (25)		376 (34)	271 (25)	457 (41)	
Married/living as married	146 (31)	172 (37)	150 (32)	<.001	228 (22)	279 (27)	521 (51)	<.001
Income (missing 205, 290)								
At most \$25,000	366 (50)	187 (25)	187 (25)		315 (33)	221 (23)	408 (43)	
Greater than \$25,000	124 (31)	151 (38)	124 (31)	<.001	212 (23)	285 (31)	411 (45)	<.001
Region								
Southcentral	211 (49)	121 (28)	100 (23)		283 (32)	270 (31)	332 (38)	
Southeastern	92 (31)	114 (39)	89 (30)		135 (26)	163 (32)	213 (42)	
Southwestern	297 (48)	143 (23)	177 (29)	<.001	189 (25)	122 (16)	435 (58)	<.001
Language in home (missing 1, 0)								
English only	412 (47)	242 (28)	215 (25)		467 (31)	428 (29)	591 (40)	
Some or all Native Alaskan	188 (40)	135 (29)	151 (32)	<.01	140 (21)	127 (19)	389 (59)	<.001
Identify w/tribal tradition (missing 2, 2)								
Not at all or a little	194 (47)	106 (26)	110 (27)		214 (32)	171 (26)	278 (42)	
Some or a lot	406 (44)	272 (29)	254 (27)	.36	393 (27)	383 (26)	701 (48)	.02
Frequency of binge drinking ^d (missing 8, 19)								
Never	161 (28)	190 (33)	223 (39)		205 (16)	338 (27)	708 (57)	
1 to 5 times	224 (54)	93 (23)	96 (23)		198 (38)	129 (25)	196 (38)	
6 or more times	213 (61)	90 (26)	46 (13)	<.001	196 (56)	82 (24)	71 (20)	<.001
Depression screening (missing 50, 29)								
Not positive for depression	510 (44)	334 (29)	310 (27)		448 (26)	442 (26)	818 (48)	
Positive for depression	84 (50)	39 (23)	46 (27)	.25	148 (37)	109 (27)	148 (37)	<.001

Note. GED = General Equivalency Diploma.

^aOf 3,828 participants, 337 participants were not included due to skip pattern in tobacco questions. Five additional participants refused to answer smoking questions.

^bUnemployed includes homemakers, students, retired persons, disabled persons, and those who were out of work for more than 1 year.

^cNot married includes people who are single, divorced, or widowed.

^dFrequency of binge drinking is the number of reported occasions when a participant drank five or more drinks in the year prior to the baseline visit.

higher odds of current use for women with low income and who reported at least some identification with tribal tradition.

Similar to cigarette smokers, more than three quarters of current and former smokeless tobacco users initiated use before age 18. However, among smokeless tobacco users, 22% had initiated by age 10 compared with 5% of cigarette users. Men reported initiating smokeless tobacco use later than women (medians 15 and 13, respectively; $p < .001$). Initiation age was also significantly different across regions with 23% of smokeless tobacco

users initiating use by age 10 in southwestern and southcentral Alaska compared with 5% in southeastern Alaska ($p < .001$).

Discussion

Among men and women in this study, rates of current smoking (45% and 28%, respectively) were higher than rates for the general U.S. (24% and 18%, respectively; U.S. DHHS, 2007b) and non-Native Alaskan populations (26% and 21%, respectively;

Table 2. Associations by smokeless tobacco use status

Smokeless tobacco use status	Men (n = 1,502)			p Value	Women (n = 2,316)			p Value
	Current n (%)	Former n (%)	Never n (%)		Current n (%)	Former n (%)	Never n (%)	
Overall	255 (17)	402 (27)	845 (56)		423 (18)	275 (12)	1,618 (70)	
Age group, years								
18–24	49 (16)	82 (27)	177 (58)		54 (14)	64 (17)	267 (69)	
25–34	51 (19)	101 (37)	120 (44)		82 (17)	82 (17)	310 (65)	
35–44	76 (21)	115 (32)	171 (47)		126 (22)	63 (11)	386 (67)	
45–54	45 (14)	65 (20)	210 (66)		70 (15)	47 (10)	351 (75)	
55–64	19 (13)	24 (17)	102 (70)		44 (18)	10 (4)	185 (77)	
65+	15 (16)	15 (16)	65 (68)	<.001	47 (27)	9 (5)	119 (68)	<.001
Education (missing 0, 3)								
Less than high school diploma	60 (16)	90 (24)	219 (59)		143 (31)	61 (13)	260 (56)	
Diploma/GED or higher	195 (17)	312 (28)	626 (55)	.37	280 (15)	213 (11)	1,356 (73)	<.001
Employment (missing 6, 8)								
Unemployed ^b	72 (16)	115 (25)	269 (59)		168 (21)	79 (10)	569 (70)	
Employed	182 (18)	287 (28)	571 (55)	.34	251 (17)	196 (13)	1,045 (70)	<.01
Marital status (missing 5, 10)								
Not married ^c	146 (15)	266 (27)	571 (58)		199 (17)	149 (13)	844 (71)	
Married/living as married	109 (21)	136 (27)	269 (52)	<.01	223 (20)	123 (11)	768 (69)	.09
Income (missing 228, 323)								
At most \$25,000	150 (18)	213 (25)	475 (57)		230 (22)	124 (12)	677 (66)	
Greater than \$25,000	68 (16)	127 (29)	241 (55)	.29	101 (11)	115 (12)	746 (78)	<.001
Region								
Southcentral	30 (7)	133 (29)	295 (64)		50 (5)	77 (8)	805 (86)	
Southeastern	18 (6)	72 (22)	237 (73)		3 (1)	24 (4)	531 (95)	
Southwestern	207 (29)	197 (28)	313 (44)	<.001	370 (45)	174 (21)	282 (34)	<.001
Language in home								
English only	95 (10)	268 (28)	592 (62)		148 (9)	165 (10)	1,288 (81)	
Some or all Native Alaskan	160 (29)	134 (25)	253 (46)	<.001	275 (39)	110 (15)	330 (46)	<.001
Identify w/tribal tradition (missing 2, 2)								
Not at all or a little	51 (11)	136 (30)	263 (58)		75 (11)	77 (11)	550 (78)	
Some or a lot	204 (19)	266 (25)	580 (55)	<.001	348 (22)	198 (12)	1,066 (66)	<.001
Frequency of binge drinking ^d (missing 9, 19)								
Never	108 (17)	145 (23)	377 (60)		272 (20)	125 (9)	936 (70)	
1 to 5 times	100 (21)	129 (27)	247 (52)		99 (17)	93 (16)	386 (67)	
6 or more times	46 (12)	128 (33)	213 (55)	<.001	49 (13)	56 (15)	281 (73)	<.001
Depression screening (missing 22, 31)								
Not positive for depression	206 (16)	346 (27)	734 (57)		312 (17)	220 (12)	1,304 (71)	
Positive for depression	43 (22)	53 (27)	98 (51)	.08	103 (23)	53 (12)	293 (65)	.01

Note. GED = general equivalency diploma.

^aOf the 3,828 participants, 10 participants refused to answer smokeless tobacco questions.

^bUnemployed includes homemakers, students, retired persons, disabled persons, and those who were out of work for more than 1 year.

^cNot married includes people who are single, divorced, or widowed.

^dFrequency of binge drinking is the number of reported occasions when a participant drank five or more drinks in the year prior to the baseline visit.

Wells, 2004). Yet, participants reported smoking fewer cigarettes per day: The average cigarettes smoked daily for men and women in this study (9.9 and 8.5, respectively) was approximately four less than the general U.S. population (14.2 and 12.1, respectively; U.S. DHHS, 2003).

Among male and female participants, current smokeless tobacco use rates (17% and 18%, respectively) were higher than rates for the general U.S. (7% and 0.3%, respectively; U.S. DHHS, 2006) and non-Native Alaskan populations (9% and less than 0.1%, respectively; Wells, 2004). Additionally, the smokeless tobacco use rate among AN participants is

higher than the aggregate U.S. AN/AI rate (7%; U.S. DHHS, 2006).

Tobacco use began in early youth for many participants with more than one of five smokeless tobacco users initiating before age 10. This is concerning considering findings from other studies that indicate earlier initiation is associated with heavier use and inability to quit (Levy, Biener, & Rigotti, 2009; McGrady & Pederson, 2002; U.S. DHHS, 2000).

Current cigarette users were more frequent binge drinkers, and female cigarette users were likely to have positive depression

screening. These relationships among substance use, mental health, and cigarette smoking are consistent with findings among other populations (Anda et al., 1990; Degenhardt & Hall, 2001; Hurt et al., 1995; Wiesbeck, Kuhl, Yaldizli, & Wurst, 2008). Positive depression screening was more common among smokeless tobacco users of either gender, which is also in accord with other studies (Coogan, Geller, & Adams, 2000; Rouse, 1989).

The EARTH study is one of the largest studies involving AN people, and the socioeconomic distribution (age, education, and marital distribution) of participants is regionally similar to that of AN men and women according to the 2000 U.S. Census (U.S. Census Bureau, 2000). Still, there are some limitations to the data. There was a nonrandom sampling design, and it is not possible to directly compare participants with nonparticipants. Recruiters attempted to enroll all eligible community members with minimal exclusions related to medical history, whether users of prepaid services or not, and participation rates were high, especially in small rural communities. Another limitation resulted from a skip pattern in the questionnaire and missing information on smoking history for 337 individuals who had smoked 100 cigarettes in their lifetime, but never regularly; thus, smoking rates may be underestimated. Over half of these people were smokeless tobacco users, and their smokeless tobacco use is analyzed. Lastly, tobacco use was self-reported and not validated with biomarkers. However, this limitation is present in most surveys to which we have compared our findings.

This study confirms tobacco use rates by AN people continue to be considerably higher than rates for the general U.S. and non-Native Alaskan populations. It documents variation in tobacco use patterns of AN populations within Alaska, with high rates of smokeless tobacco use particularly in the southwestern region. Tobacco initiation prevention efforts targeting AN youth at an early age are recommended given the early age of initiation demonstrated in this study. Tobacco use prevention efforts should be sensitive to the cultural and social significance placed on tobacco use in some regions of Alaska.

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Declaration of Interests

None declared.

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