Culture and Colorectal Cancer Screening on Three American Indian Reservations

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Background: Colorectal cancer (CRC) rates among many American Indian populations are high. Screening by fecal occult blood test (FOBT) and endoscopy is effective for reducing CRC mortality, but little research has examined the extent of such screening in reservation populations. Further, nothing is known of how American Indians' cultural characteristics may be related to screening receipt.

Participants and Setting: We examined data from participants recruited from 2 Northern Plains and 1 Southwest reservation for the Education and Research Toward Health (EARTH) study. All participants aged ≥ 51 years were eligible for inclusion.

Design: After calculating screening rates, we examined bivariate relationships between screening and participant characteristics, including measures of cultural characteristics including ethnic identity and use of traditional healing practices. We applied multivariate regression to relate these cultural variables to odds of lifetime screening by FOBT or endoscopy.

Results: Of 751 American Indians sampled, 35% reported lifetime CRC screening by at least one modality. Multivariate analyses did not reveal significant relationships or trends relating FOBT to respondents' cultural characteristics. By contrast, odds of endoscopy were significantly lower among persons who spoke a tribal language at home (OR .6, 95% C.I. .4–.9), and trend analysis revealed an inverse relationship between endoscopy and number of identity measures endorsed ($P_{trend}<.1$).

Conclusions: The sampled population exhibits disparities in CRC compared to the general population, and cultural characteristics are related to odds of endoscopy. Findings warrant culturally tailored CRC screening initiatives for American Indians. (*Ethn Dis.* 2011;21(3):342–348)

Key Words: American Indians, Cancer Screening, Colorectal Cancer, Culturally Sensitive Health Care, Endoscopy, Fecal Occult Blood Test, Medical Communication, Patient Education

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Introduction

Colorectal cancer (CRC) is the second-leading cause of cancer death in the United States and the leading cause among non-smokers.[1] Incidence rates among American Indian and Alaska Native populations show significant variation; compared to non-Hispanic Whites, these rates are 39% higher in the Northern Plains, 103% higher in Alaska, and 55% lower in the Southwest.[2] Although CRC rates are declining in the United States as a whole, temporal trends reveal no change in the American Indian population.[1]

Screening and surveillance dramatically affect CRC incidence and mortality.[3,4] Although data on adherence to national CRC screening guidelines among American Indian populations are limited, disparities appear significant and studies on prevention behaviors suggest complex relationships with aspects of tribal culture.[5,6] Ethnic identity, as indicated by measures such as tribal language use, has been associated with a lower odds of receiving flexible sigmoidoscopy or colonoscopy screening.[5] Data comparing other measures of ethnic identity and cancer screening are limited to the breast and cervical cancer literature. For example, on the Hopi reservation in Arizona, women who reported seeing traditional healers were less likely to have had yearly clinical breast examinations, but just as likely to have had a mammogram as those who did not see traditional healers.[7] In an urban American Indian population in the same region, ceremonial participation was similarly associated with receipt of clinical breast examinations but not with mammography.[8] In other studies, indicators of American Indian identity have been linked to reduced use of cervical cancer screening, even though women who strongly identify with Native culture may have better knowledge of its benefits.[9] These inconsistencies, along with the likelihood that barriers to screening vary for different types of cancer, encourage attention to relationships between ethnic identity and CRC prevention.

In particular, the relationship of patients' use of traditional healing practices to medical prevention behaviors has received attention and raised concern that reliance on such resources may compete with use of conventional medical care. For example, in the previously-cited study of Hopi women, those who reported seeing tribal healers were less likely than others to have had yearly clinical breast examinations.[7] Research in urban and reservation-based American Indian populations likewise found an inverse relationship between use of traditional healing practices and allopathic medicine.[10] Factors such as

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proximity to Western medical facilities and availability of transportation may play a role in such associations; nevertheless, additional factors are likely in play, as suggested by findings that patients may decide between seeing tribal healers or Western physicians on the basis of culturally-grounded beliefs about the nature and etiology of their symptoms.[11]

Patterns of CRC screening and the relevance of culture to screening are unexplored in American Indian populations. Our study describes the prevalence of self-reported participation in CRC screening among American Indian tribal members aged ≥51 years residing on reservations in South Dakota and Arizona. We hypothesized that respondents who scored high on measures of ethnic identity and use of traditional healing practices would report low rates of CRC screening by fecal occult blood test (FOBT) and endoscopy.

METHODS

Data

Education and Research Toward Health (EARTH) is an ongoing, multi-center, prospective cohort study funded by the National Cancer Institute. It investigates relationships of chronic diseases, including cancer, with diet, lifestyle, physical activity, and cultural factors in American Indians. The study's baseline assessment collected data from rural American Indian adults living on the Pine Ridge and Cheyenne River Sioux Tribe reservations in South Dakota, populated by the Lakota people, and the Gila River Indian Community, a reservation that is home to the Pima and Maricopa tribes in Arizona. After approval by the institutional review boards of participating tribes and academic institutions, multimedia advertisements and community presentations recruited 5,212 individuals aged 18–82 years. Having obtained informed consent, trained facilitators collected data via computer-assisted, in-person interviews covering demographics, diet, physical activity, personal and familial health history, and cultural measures. A complete description of study design and methods has been published, as has a manuscript describing the computer system employed for data collection.[12,13]

CRC Screening

Two items invited respondents to confirm or disconfirm lifetime CRC screening: "Did you ever have a test to see if there is blood in your bowel movement, also called a fecal occult blood test or FOBT?" and "Did you ever have a colonoscopy or sigmoidoscopy? These are tests in which a tube is inserted in the rectum to view the bowel." These items are versions of measures used by the Behavioral Risk Factor and Surveillance System of the Centers for Disease Control and Prevention.[14]

Sociodemographic and Personal Characteristics

Selected on the basis of literature review, these included age, education, employment, marital status, smoking history, reservation of residence, being a single caregiver, and being a current driver.[15–19]

Use of Traditional Healing Practices

Traditional healing practices have been defined as health interventions that use plant-, animal-, and mineral-based medicines, spiritual therapies, and manual techniques and exercises, as applied singularly or in combination, to diagnose, treat, and prevent illnesses or maintain well-being.[20–24] Items measuring use of traditional healing practices were: "Have you ever been treated by a traditional Native healer" (yes/no); "Do you use traditional Native remedies and/or practices to remain healthy or prevent illness?" (yes/no); and "Do you use traditional Native remedies and/or practices when you are sick or ill?" (never/sometimes/usually/not sure, with the middle two choices coded as a positive response). We assessed relationships to screening with each of these measures individually and with a summary measure based on number of practices endorsed.

American Indian Ethnic Identity

American Indian ethnic identity was measured by three questions. Given the demonstrated importance of language to tribal identity,[25] our first question asked, "What language do you usually speak at home?" (your own American Indian language/English/both, with responses indicating an American Indian language alone or in combination with English coded as indicating stronger identity). The second question asked, "How much do you identify with your own tribal tradition?" (a lot/some/a little/none, with the first two response options coded as indicating stronger identity). The last question asked, "Do you ever participate in Native dances, powwows, potlatches, chicken scratch dances, sweats, or other such traditional events as a dancer, drum member, organizer, or other active participant?" (yes/no). We assessed relationships between screening and each of these measures, both individually and with a summary measure based on the number of identity indicators endorsed.

Statistical Analysis

Our analyses excluded participants who did not provide valid data for any variable, along with any persons with a history of CRC. We limited analyses to patients aged≥51 years at the time of interview (n=867) because current guidelines recommend that CRC screening begin at age 50 for average-risk individuals.[26,27] These exclusions yielded an analytic sample of 756. Of these, 717 individuals met the criteria for FOBT recommendation, and 751 for colonoscopy/flexible sigmoidoscopy recommendation.

We calculated frequencies and proportions for all analytic variables by

Table 1. Sociodemographic, personal, and cultural characteristics in EARTH participants by colorectal cancer screening status

	Fecal Occult Blood Test*			Colonoscopy/Sigmoidoscopy†		
	Never Screened *N*=552	Ever Screened *N*=165		Never Screened *N*=581	Ever Screened *N*=170	
Characteristics	*n* (%)	*n* (%)	*P*	*n* (%)	*n* (%)	*P*
Sociodemographic						
Age			.79		§	.04
51–60	320 (58)	94 (57)		350 (60)	84 (49)	
61–70	171 (31)	55 (33)		172 (30)	66 (39)	
≥71	61 (11)	16 (10)		59 (10)	20 (12)	
Male	213 (39)	64 (39)	.96	225 (39)	62 (36)	.59
Yearly household income			.07		§	.03
< $10,000	234 (56)	58 (43)		243 (55)	58 (42)	
$10,001–$20,000	90 (21)	31 (23)		94 (21)	29 (21)	
$20,001–$30,000	41 (10)	21 (15)		47 (11)	21 (15)	
$30,001–$40,000	36 (9)	16 (12)		34 (8)	20 (14)	
$40,001 or more	20 (5)	10 (7)		24 (5)	10 (7)	
Number of dependents			.52			.69
1–2	216 (57)	70 (56)		227 (56)	73 (59)	
3–4	100 (26)	33 (27)		102 (25)	33 (27)	
5–6	37 (10)	16 (13)		48 (12)	10 (8)	
≥7	27 (7)	5 (4)		25 (6)	8 (6)	
Education		§	.02		§	≤.01
Less than high school	195 (35)	45 (27)		204 (35)	46 (27)	
High school or equivalent	172 (31)	44 (27)		180 (31)	41 (24)	
Some college	158 (29)	62 (38)		160 (28)	71 (42)	
Bachelor's degree or higher	27 (5)	14 (8)		37 (6)	12 (7)	
Employed for pay	109 (20)	39 (24)	.28	124 (22)	31 (19)	.37
Married or living as married	218 (39)	66 (40)	.91	215 (37)	83 (49) §	≤.01
Smoking		§	≤.01		§	≤.01
Non-smoker	281 (51)	69 (42)		287 (49)	76 (45)	
Former smoker	115 (21)	61 (37)		131 (23)	57 (34)	
Current smoker	156 (28)	35 (21)		163 (28)	37 (22)	
Ecological						
Reservation‡			.12			.11
Pine Ridge	209 (38)	48 (29)		213 (37)	48 (28)	
Cheyenne River	181 (33)	60 (36)		193 (33)	67 (39)	
Gila River	162 (29)	57 (35)		175 (30)	55 (32)	
Current automobile driver	386 (70)	124 (75)	.19	401 (69)	133 (78)§	.02
Single caregiver	87 (16)	28 (17)	.71	100 (17)	20 (12)	.09
Traditional healing practices						
Ever used a traditional healer	86 (16)	22 (13)	.48	84 (14)	29 (17)	.40
Uses traditional remedies/practices when sick	127 (23)	35 (21)	.63	139 (24)	32 (19)	.16
Uses traditional remedies/practices to stay well	122 (22)	28 (17)	.16	124 (21)	35 (21)	.83
Number of traditional healing practices endorsed			.55			.71
0	367 (66)	119 (72)		392 (67)	117 (69)	
1	87 (16)	20 (12)		83 (14)	26 (15)	
2	46 (8)	13 (8)		54 (9)	11 (6)	
3	52 (9)	13 (8)		52 (9)	16 (9)	
Ethnic identity						
Native language spoken at home	319 (58)	86 (52)	.20	343 (59)	78 (46)§	≤.01
Identifies with native traditions	463 (84)	137 (83)	.80	492 (85)	136 (80)	.15
Participates actively in tribal events	212 (38)	64 (39)	.93	231 (40)	60 (35)	.29
Number of ethnic identity factors endorsed			.27		§	.02
0	44 (8)	20 (12)		47 (8)	19 (11)	
1	144 (26)	43 (26)		143 (25)	59 (35)	
2	242 (44)	62 (38)		250 (43)	61 (36)	
3	122 (22)	40 (24)		141 (24)	31 (18)	

* Missing values for fecal occult blood test: yearly household income = 160; number of dependents = 213; employed for pay = 14; † Missing values for colonoscopy/sigmoidoscopy: yearly household income = 171; number of dependents = 225; employed for pay = 14; ‡ Data collection site; § $P \leq .05$.

Table 2. Associations of ethnic identity and use of traditional healing practices with colorectal cancer screening

Characteristic	Fecal Occult Blood Test Adjusted Odds Ratio* (95% Confidence Interval)	Colonoscopy/Sigmoidoscopy Adjusted Odds Ratio* (95% Confidence Interval)
Traditional healing practices		
Has ever been treated by a traditional Native healer	.7 (.4, 1.1)	1.1 (.7, 1.8)
Uses traditional Native remedies/ practices when ill	.7 (.5, 1.1)	.6 (.4, 1.0)
Uses traditional Native remedies/ practices to prevent illness	.7 (.4, 1.1)	.9 (.6, 1.4)
Number of traditional healing practices endorsed		
0	1.0	1.0
1	.6 (.3, 1.0)	1.0 (.6, 1.6)
2	.7 (.4, 1.4)	.6 (.3, 1.2)
3	.6 (.3, 1.2)	.9 (.5, 1.8)
P_{trend}	.06	.40
Ethnic identity		
Uses American Indian language at home	.8 (.6, 1.2)	.6 (.4, .9)
Identifies with tribal tradition	.9 (.6, 1.5)	.7 (.4, 1.1)
Actively participates in tribal events	.9 (.6, 1.3)	.8 (.5, 1.2)
Number of ethnic identity factors endorsed		
0	1.0	1.0
1	.6 (.3, 1.2)	1.1 (.6, 2.1)
2	.6 (.3, 1.0)	.7 (.4, 1.2)
3	.7 (.3, 1.3)	.6 (.3, 1.1)
P_{trend}	.35	<.01

* Odds ratios compare odds of FOBT test or colonoscopy/sigmoidoscopy receipt among subjects who provided a positive response to those who provided a negative response on each traditional healing practices and ethnic identity question; Adjusted covariate includes age, sex, education, single caregiver, current automobile driver, lifetime smoking and data collection site (reservation).

CRC screening status. We then used logistic regression to examine the association of individual measures of ethnic identity and traditional healing practices with each screening modality, after adjusting for age, sex, education, single caregiver, current automobile driver, lifetime smoking and data collection site (reservation). We also assessed the association of our summary (ordinal) measures of ethnic identify and traditional healing practices with CRC screening by examining tests for trend. To determine whether associations between variables of interest varied by reservation, we fit models that included interaction terms; however, none of the interaction terms were significant, leading us to present only overall odds ratios for all reservations combined.

Logistic models used the Huber-White sandwich variance estimator to accommodate potential deviation from the binomial variance assumption implicit in standard logistic regression procedures. All analyses were conducted by using the Stata statistical package (StataCorp LP, College Station, Texas).

RESULTS

Thirty-five percent of American Indian older adults in our analysis reported lifetime CRC screening with either FOBT or endoscopy, with no significant variations across reservations (data not shown). Table 1 shows the percentage of respondents with varying sociodemographic, personal, and cultural characteristics who received CRC screening by FOBT or colorectal endoscopy (colonoscopy or sigmoidoscopy). It also reveals varying correlations between patient characteristics and the two forms of screening. Odds of FOBT and endoscopy show significant positive association with education ($P \leq .05$) and are higher among former smokers ($P \leq .01$). Endoscopy is significantly more likely among older, married, and wealthier respondents and current drivers. Notably, persons who reported speaking their traditional language at home reported endoscopy significantly less often than those who did not. The correlation between endorsed traditional healing practices and ethnic identity factors was .36 for FOBT screening and .35 for endoscopy.

On the South Dakota reservations of Pine Ridge and Cheyenne River, only 22% of EARTH study participants whose age made them eligible for colorectal cancer screening reported lifetime fecal occult blood test.

Table 2 summarizes the results of logistic regression analyses examining association of ethnic identity indicators and traditional healing practices with CRC screening modalities. No individual or summary measures of ethnic identity or traditional healing practices were associated with altered odds of FOBT. By contrast, the significant association of tribal language use with endoscopy persists; persons speaking an American Indian language were 40%

less likely to report colonoscopy or flexible sigmoidoscopy (odds ratio = .6, 95% confidence interval, .4–.9) as compared to English-only speakers. Similarly, as the number of positive responses to ethnic identity questions increased, odds of endoscopy decreased ($P_{trend} \leq .01$). No similar relationship emerged for endoscopy and number of traditional healing practices reported ($P_{trend} = .40$).

DISCUSSION

On the South Dakota reservations of Pine Ridge and Cheyenne River, only 22% of EARTH study participants whose age made them eligible for CRC screening reported lifetime FOBT. This compares to a general population rate of 27% in the same geographic region. On Arizona's Gila River reservation, 26% (57/219) reported FOBT as compared to 31% for Arizona's general population.[14] These disparities are especially striking in light of an Indian Health Service Colorectal Cancer Screening Initiative, which, at the time of data collection, recommended FOBT screening at least every two years for individuals beginning at age 50. This recommendation has since changed to annual FOBT to be in line with national guidelines.

Data for endoscopy suggested even greater disparities. Less than 24% of Pine Ridge and Cheyenne River and 22% of Gila River participants reported endoscopic examination; these rates are less than half those of the general population in their respective states.[14] The true disparities for both screening modalities are probably even more pronounced because participants in research studies such as EARTH tend to be a self-selected, unusually health-conscious group.[28–30]

The disparities in CRC screening compared to the general population recommend action. Whereas the Indian Health Service has responded to low rates of screening for breast and cervical cancer with programs funded by special appropriations, efforts to encourage screening endoscopy have historically competed with other priorities in a chronically underfunded contract care system. The Indian Health Service's *Improving Patient Care Initiative* and its Colorectal Cancer Task Force seek to improve screening data and resources, and are encouraging tribal health service providers to make CRC screening more widely available.

Multivariate analysis revealed significant associations between screening and a range of variables characterizing our American Indian sample. As in previous studies, married persons were more likely to have had endoscopic screening.[5] As in the general population, individuals with more education were more likely to report FOBT and endoscopy; both age and income were likewise positively associated with endoscopy receipt.[17,31,32] Notably, study participants who had given up smoking were most likely to report both types of screening. Reasons for these relationships are unclear, but have been noted previously in other American Indian and Alaska Native populations.[5] Perhaps comorbidities or other cues to health concerns occur in this patient subgroup, resulting in increased exposure to physicians and screening recommendations. We plan further investigations into such relationships.

Variables of special interest to this analysis included patients' American Indian ethnic identity. Of the several measures, none was significantly associated with differences in FOBT uptake, but one – speaking a tribal language at home – was significantly associated with lower odds of endoscopy. A significant trend away from endoscopic screening also emerged as the number of endorsements of ethnic identity measures increased.

Our observations about the relationship between ethnic identity and endoscopy (but not FOBT) admit several interpretations. First, endoscopy is a more invasive procedure that must occur in a medical facility, and it requires considerable patient education and commitment to negotiate the required bowel preparation. Possibly this screening modality is inadequately explained to persons whose primary language is not English. Physicians should take special precautions to ensure that American Indian patients' linguistic and informational needs regarding endoscopy are satisfied.

Additional interpretations are also possible. The correlation between ethnic identity and endorsement of traditional healing practices in general was low despite being highly correlated in other studies.[11] This could signal a reluctance to admit traditional healing practices among the most traditional participants obscuring a tendency away from screening. Tribal first-language ability, along with the other measures of identity, may imply stronger connections to the more traditional fabric of American Indian communities. Invasion, attempts at extermination through acts of war or elimination of resources, forced removal from traditional lands, broken treaties, and attempts to extinguish culture through relocation programs and boarding schools are all considered recent history by many American Indians. The result is often wariness of outsiders, fatalistic health beliefs, mistrust of Western medical practitioners, and fear of racism, all of which can present barriers to twenty-first century medical care.[33] It seems possible that wariness may be especially pronounced in relation to more invasive procedures. Individuals following more traditional ways as evidenced by traditional medicine use and language use at home may be less likely to seek Western medical care in general, as well as to enroll in Medicare and Medicaid programs that pay for the bulk of endoscopic screening tests.

Other key cultural variables assessed respondents' use of traditional healing practices. No relationships emerged

between any of our measures of such practices and either screening modality. Thus, while previous research raises concern that traditional healing practices compete with conventional medical care,[10] our findings do not support this conclusion for any CRC screening modality.

The strengths of this study are its large reservation-based sample of American Indians in two geographical regions and its comprehensive treatment of factors associated with cancer screening. However, our findings have limitations. This is the first study to examine relationships between patient characteristics and CRC screening among American Indians, which limits comparisons to previous work. Moreover, the broad range of beliefs, traditions, practices, and customs across the country's American Indian tribes means that our findings can be generalized to other reservation or urban Indian populations only with caution.

Several factors known to affect screening were not available from the EARTH dataset. These include insurance status, access to a regular primary care physician, frequency of physician visits, and distance to the nearest facility with endoscopy capability. Another limitation in this dataset is its assessment of CRC screening exclusively by patient self-report. Because self-report has been shown to be far more reliable for endoscopy than for FOBT,[34,35] errors are likely to be more problematic for estimating the real frequency of FOBT screening and may have obscured relationships with other variables. Similarly, although we were most interested in determinants of screening endoscopy, this procedure is also used pursuant to symptom inquiries; thus, the dataset does not allow us conclusively to distinguish patients who received endoscopy for screening purposes.

Finally, we acknowledge that screening disparities are not the only contributor to high rates of CRC in American Indian communities, which may have distinctive risk profiles that are not fully understood; our project did not examine such issues. Yet even if research identifies elevated risk factors, their modification would require a long-term cancer control strategy. Effective screening programs, on the other hand, can immediately influence cancer morbidity and mortality.

In conclusion, our analysis of data drawn from three American Indian reservations found considerable disparities in CRC screening, as compared to the general population, and varying relationships with patients' cultural characteristics. In particular, findings related to the odds of endoscopic screening suggest that patients' ethnic identity is relevant to this prevention modality. At the same time, no findings supported the inference, suggested in some previous studies, that patients' reliance on traditional healing practices interfered with conventional cancer prevention strategies. Although more work is needed to discern relationships between American Indian ethnic identity and endoscopic screening participation, we hope that our research will encourage and inform community-based, culturally-sensitive programs aimed at increasing CRC screening rates.

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