Cancer Screening among Native Americans in California

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Objective: To determine the factors associated with cancer screening adherence among Native Americans living in California.

Participants: 2,266 Native Americans identified from the California Health Interview Surveys during 2001, 2003, and 2005 eligible for cervical, breast, or colorectal cancer screening.

Methods: We fit multivariable logistic regression models to identify demographic and healthcare access predictors of adherence to cancer screening.

Results: The presence of a recent physician visit was significantly associated with cervical (odds ratio [OR] 7.34, 95% confidence interval [CI] 4.27, 12.6), breast (OR 3.29, 95% CI 2.0, 5.42), and colorectal (OR 3.02, 95% CI 1.74, 5.23) cancer screening adherence. The report of a usual source of care was similarly positively associated with cervical, breast, and colorectal cancer screening adherence. Additional predictors for colorectal cancer screening included higher educational attainment (OR 1.56, 95% CI 1.07, 2.28), and the presence of a comorbid condition (OR 1.54, 95% CI 1.16, 2.05). Experiencing discrimination (OR .42, 95% CI .20, .89) and never being married (OR .49, 95% CI .27, .89) were negative predictors of breast cancer screening, while having insurance (OR 2.00, 95% CI 1.27, 3.15) was a positive predictor. Cervical cancer screening was positively associated with living at or above 300% of the federal poverty level (OR 2.69, 95% CI 1.50, 4.85).

Conclusions: Regular access to health care and a physician are the most consistent predictors of cancer screening adherence among Native Americans and should represent a focus of activities to improve screening rates in these communities. (*Ethn Dis.* 2011;21(2): 202–209)

Key Words: American Indians, Native Americans, Preventive Medicine, Cancer Screening

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Introduction

Cancer accounts for substantial morbidity and mortality among Native American communities.[1] There is a strong evidence base for the use of routine screening exams to detect cervical, colorectal and breast cancer in the earlier, more treatable, stages of the disease. However, the use of Papanicolaou (Pap) tests, mammography, fecal occult blood testing, flexible sigmoidoscopy, and colonoscopy is lower among Native Americans compared to the non-Hispanic White population.[1] While the incidence rates for these leading causes of cancer death are lower among Native Americans compared to other ethnic groups, the lack of screening leads to the detection of more advanced, and often incurable cancers within Native communities.

The reasons cancer screening rates remain low among Native American populations are not well understood. A broad exploration of these reasons can be guided by the Social Ecological Model, which asserts that behavior is determined by several factors including intrapersonal, interpersonal, and public policy.[2] The existing literature among Native American communities has explored the role of some of these factors in cancer screening behaviors, but not all, and not simultaneously. Intrapersonal and interpersonal factors such as income or perceived discrimination may interact with policy factors such as access to health care.

A comprehensive assessment of these factors can identify their potentially unique interactions in Native American populations. In addition to well-documented disparities in income, education, and access to health insurance among Native Americans,[2–5] there are also important policy issues specific to this population. Native communities are historically clustered in rural areas of the country on or near federal reservations, with limited access to essential services needed to implement effective screening programs, including equipment, laboratory services, and even clinicians. Many rural populations have decreased cancer screening rates, potentially driven by lack of access to essential services, or limited educational or income opportunities.[6,7]

The Indian Health Service (IHS), a federally funded program, provides comprehensive primary care services to members of federally recognized tribes across the country through a network of clinics located on or near reservation communities. This unique system may alleviate barriers to the effective delivery of health care, particularly in rural settings.[8] However, there is an increasingly large urban Native American population, now accounting for over one-half of the total Native population. While this group may not experience geographic barriers to healthcare delivery, urban Native Americans may lose access to essential services provided by the IHS, and therefore other intrapersonal and interpersonal factors may predominate.

The goal of our study was to conduct a multifactorial assessment of the predictors of receipt of cervical, breast, and colorectal cancer screening services among Native Americans.

The goal of our study was to conduct a multifactorial assessment of the predictors of receipt of cervical, breast, and colorectal cancer screening services among Native Americans. We examined: intrapersonal factors including sociodemographic characteristics; interpersonal factors including marital status and reported perceived discrimination in health care; and policy level factors associated with access to care including recent physician visits, presence of a usual source of care, health insurance, rural versus urban residence, and access to IHS services.

METHODS

Participants

Study participants were identified using the 2001, 2003, and 2005 administrations of the California Health Interview Survey (CHIS). CHIS is a population-based survey designed to be broadly representative of California. Data were collected through random, digit-dial telephone surveys for adults, adolescents (aged 12–17 years), and parents of young children (aged 0–11). We included all respondents self-identifying as American Indian/Alaska Native alone, or those indicating a multiracial identity and indentifying Native American as their primary race. Native Americans were purposefully oversampled in 2001 to facilitate more detailed analyses of this smaller subpopulation. The CHIS Native American population is representative of the entire California Native American population, with 1.7% of CHIS respondents self-identifying as Native American compared to 1.1% of California respondents in the 2000 US Census. The weights provided by CHIS to produce population estimates were not employed in this study because using these weights would not have allowed the inclusion of the oversample of Native Americans from 2001, which is weighted differently than the datasets from 2003–05.

We identified 2,266 Native Americans across all three study years, and restricted our analyses to those eligible for cervical, breast, and colorectal cancer screening based on guidelines from the United States Preventive Services Task Force.[9] Colorectal cancer screening is recommended in both men and women aged ≥50 years with no prior history of colorectal cancer (n=981 Native American respondents), breast cancer screening is recommended in women aged ≥40 years (n=891 Native American respondents), and cervical cancer screening is recommended in women aged ≥18 years with no prior history of hysterectomy (n=1,022 Native American respondents).

Study Outcomes

Primary study outcomes included self-reported receipt of a Pap test within the prior 3 years for women aged ≥18; receipt of a mammogram within the prior 2 years for women aged ≥40; and receipt of fecal occult blood testing (FOBT) within the prior year or sigmoidoscopy, colonoscopy or proctoscopy within the prior 5 years for adults aged ≥50. Sigmoidoscopy, colonoscopy and proctoscopy were combined as the survey question assessed ''Have you ever had a sigmoidoscopy, colonoscopy, or proctoscopy to look for signs of cancer or other problems in your colon?''

Independent Variables

Self-reported educational status was categorized as < high school, high school graduate, or > high school. Marital status was categorized as never married, separated/widowed/divorced, or married/living as married. Residence was defined as rural or urban based on metropolitan statistical areas. Respondents directly reported the presence or absence of healthcare coverage through the IHS.

Additional survey items were used to assess the role of access to health care and health status in receipt of appropriate cancer screening. Respondents reported the presence or absence of a usual source of care other than an emergency room and the presence of at least one physician visit in the prior 12 months. Health insurance status was categorized as private insurance, Medicare, Medicaid, and uninsured. The presence or absence of reported perceived discrimination in the healthcare system within the prior year was included based on prior evidence suggesting its importance in the receipt of preventive services.[10,11]

Self-reported health status was collapsed from a 5-point Likert scale (excellent/very good/good/ fair/poor) to a dichotomous variable of excellent/very good/good vs fair/poor. The presence of comorbid conditions was based on three questions that asked the respondents if they had ever been diagnosed with cancer, diabetes, heart disease, or high blood pressure by a physician. Smoking status was categorized as current smokers (smoke every day or some days), past smokers, or never smokers (less than 100 lifetime cigarettes).

Analysis

Multivariable logistic regression models were fit to determine the association of demographic and health utilization characteristics with adherence to screening. For each screening test, the primary independent variables including age, sex, education, rural residence, healthcare discrimination, and IHS access were retained. Additional independent variables were only retained in multivariable models if they demonstrated a statistically significant association with performance of screening in the age-adjusted model and significantly improved the fit of the multivariable model. A variable to control for differences in screening rates according to survey year was assessed and was only significant for the cervical cancer screening model. Chi-square and t tests were used to test for significant differences between categories within each covariate. Data was analyzed using STATA (Version 11.0, College Station,

Table 1. Characteristics of 2,266 American Indian Adults in California

	n (%)
Mean age, years	47.39
Female	1,345 (59)
Education	
Grade <12	401 (18)
High school graduation	736 (32)
>High school	1,129 (50)
Marital status	
Married	965 (43)
Other (divorced, separated, widowed)	908 (40)
Never married	389 (17)
Residence	
Rural	1,767 (78)
Urban	499 (22)
Federal poverty level (FPL)	
0–99% FPL	416 (18)
100–199% FPL	577 (25)
200–299% FPL	364 (16)
≥300% FPL	909 (40)
Comorbid condition present	904 (40)
Insurance status	
Uninsured	374 (17)
Has usual source of care	2,007 (89)
Physician visit in the past year	1,958 (87)
Self-reported health status	
Good/very good/excellent	1,667 (74)
Fair/poor	599 (26)
Access to Indian Health Service care	693 (31)
Previous cancer diagnosis	244 (11)
Smoking status	
Every day	701 (31)
Some days	638 (29)
Not at all	920 (41)
Self report of racial discrimination in health care	83 (4)

Texas 2007). This study was deemed exempt by the Human Studies Committee at the Harvard School of Public Health.

RESULTS

Table 1 presents characteristics of the sample consisting of 2,266 Native Americans across the 3 study years. Of the 981 respondents eligible for colorectal cancer screening, 47.5% were up-to-date with their screening status. In the multivariable model (Table 2), older individuals were more likely to be screened for colorectal cancer, while females were less likely than males to be screened (odds ratio [OR] .71, 95% confidence interval [CI] .54–.94). Respondents with a high school education were more likely to be screened than those without a high school education, (OR 1.56, 95% CI 1.07–2.28). Presence of a comorbid condition was positively associated with colorectal cancer screening adherence (OR 1.54, 95% CI 1.16–2.05). Both usual source of care and a physician visit in the past year were positively associated with up-to-date colorectal cancer screening. Poverty level, smoking status, urban vs rural residence, insurance status, self-reported health status, IHS access, previous cancer diagnosis, marital status, and discrimination were not associated with colorectal cancer screening adherence.

Among age-eligible women (*N*= 891), adherence to mammography in the past two years was 69.1%. In the multivariable model (Table 3), women who were never married were less likely to be screened than married women (OR .49, 95% CI .27–.89). Presence of health insurance (OR 2.00, 95% CI 1.27–3.15) and having a recent physician visit were both positively associated with receipt of a mammogram (OR 3.29, 95% CI 2.00–5.42). Having a usual source of care was not a significant predictor of breast cancer screening (OR 1.75, 95% CI .94–3.27). Self-report of perceived discrimination in a healthcare setting was significantly associated with not obtaining a recent mammogram (OR .42, 95% CI .20–.89). Age, education, residence, poverty level, comorbid condition, health status, IHS access, previous cancer diagnosis, and smoking status were not significantly associated with breast cancer screening.

Cervical cancer screening adherence among age-eligible women (*N*=1,022) was 86.5%. In the multivariable model (Table 4), decreasing age and increasing income were both positively associated with receiving up-to-date cervical cancer screening. The presence of a usual source of care (OR 3.18, 95% CI 1.79–5.63) and a physician visit in the past year (OR 7.34, 95% CI 4.27–12.60) were significant predictors of cervical cancer screening. Education, marital status, insurance status, self-reported health, comorbid condition, previous cancer diagnosis, smoking status and discrimination were not associated with cervical cancer screening adherence.

All three screening adherence models were tested to determine whether IHS access differentially affected rural residents compared to urban residents. This interaction was only statistically significant for cervical cancer screening ($P<.10$). In urban areas, women with-

Table 2. Multivariable predictors of colon cancer screening adherence among 981 eligible patients

	Age-adjusted OR (95% CI)	Multivariable OR (95% CI)
Age, mean 62, range 50–93	1.04 (1.03, 1.06)	1.04 (1.03, 1.06)
Female, ref: male	.74 (.57, .96)	.71 (.54, .94)
Education, ref: grade<12		
High school	1.05 (.72, 1.53)	1.03 (.70, 1.55)
>High School	1.75 (1.23, 2.47)	1.56 (1.07, 2.28)
Marital Status, ref: married		
Other, widowed, separate, divorced, living together	.72 (.56, .94)	
Never Married	.85 (.43, 1.67)	
Residence, ref: rural	1.01 (.75, 1.37)	.91 (.65, 1.26)
Poverty level, ref: 0–99% FPL		
100–199% FPL	1.23 (.81, 1.86)	1.16 (.75 1.79)
200–299% FPL	1.57 (.98, 2.53)	1.46 (.88, 2.42)
300% FPL and above	1.71 (1.15, 2.52)	1.41 (.91, 2.16)
Comorbid condition, ref: none	1.68 (1.29, 2.19)	1.54 (1.16, 2.05)
Insurance status, ref: uninsured	2.60 (1.57, 4.30)	1.61 (.93, 2.78)
Has usual source of care, ref: none	5.33 (2.75, 10.31)	2.82 (1.38, 5.79)
Physician visit in the past year, ref: none	4.72 (2.84, 7.84)	3.02 (1.74, 5.23)
Self-reported health status, ref: good/very good/excellent		
Fair/poor	1.19 (.91, 1.56)	
IHS Access, ref: none	1.00 (.75, 1.33)	1.07 (.79, 1.46)
Previous cancer, ref: none	1.36 (.95, 1.95)	
Smoking status, ref: current smoker		
Quit smoking	1.42 (1.02, 1.97)	
Never smoked regularly	1.57 (1.12, 2.20)	
Discrimination, ref: none	.85 (.38, 1.92)	.94 (.40, 2.22)
Survey year, ref: 2001		
2003	1.00 (.73, 1.38)	
2005	.92 (.68, 1.25)	

Ref, referent group; FPL, federal poverty level.

out IHS access were more likely to undergo screening compared to women with IHS access (OR 1.84), while in rural areas women with IHS access were more likely to be screened compared to women without IHS access (OR 2.11).

DISCUSSION

We used a statewide database in California to examine multiple levels of interconnected influence on cancer screening behaviors, including intrapersonal, interpersonal, and policy level factors. We found that intrapersonal and interpersonal factors were variably related to cancer screening practices, while the most consistent predictor at the policy level was contact with the healthcare system in the form of usual care or a recent visit with a physician. Fortunately, both physician visit in the past year and usual source of care were common among this Native American population (>88%). The finding that these measures of general healthcare access are the most important predictors for screening adherence in this population supports results from previous studies in other populations.[12–15]

We expected that access to care as measured by rural residency and receipt of care within the IHS would be important determinants of cancer screening practices. However, in our study sample of California residents, neither of these factors was identified as a consistently important determinant of cancer screening practices. Several studies examining the differences in cancer screening adherence between urban with rural residents have reported mixed results.[12,16,17] In California, the impact of urban and rural residence may not be the same as for other states. For colorectal cancer rates assessed using the California Cancer Registry, there were no significant differences in stage at diagnosis by urban vs rural status within SES categories.[18] Other studies confirm that there are no differences in cancer screening rates between rural and urban residents in both California and Wisconsin.[19,20]

We also expected that the IHS would fill an important role in ensuring adequate access to care for rural and underserved Native American communities. In one prior national study of

Table 3. Multivariable predictors of breast cancer screening adherence among 891 eligible patients

	Age-Adjusted OR (95% CI)	Multivariable OR (95% CI)
Age, mean 57, range 40–93	1.02 (1.00, 1.03)	1.01 (1.00, 1.02)
Education, ref: grade<12		
High school	.97 (.64, 1.48)	1.03 (.66, 1.61)
>High school	1.12 (.76, 1.64)	1.05 (.68, 1.61)
Marital status, ref: married		
Other, widowed, separate, divorced, living together	.69 (.51, .94)	.80 (.57, 1.12)
Never married	.39 (.23, .67)	.49 (.27, .89)
Residence, ref: rural	.96 (.68, 1.33)	1.10 (.76, 1.58)
Poverty level, ref: 0–99% FPL		
100–199% FPL	1.01 (.67, 1.52)	.90 (.57, 1.40)
200–299% FPL	1.25 (.77, 2.03)	1.03 (.61, 1.76)
300% FPL and above	1.67 (1.12, 2.49)	1.24 (.78, 1.99)
Comorbid condition, ref: none	1.21 (.90, 1.63)	
Insurance status, ref: uninsured	3.21 (2.14, 4.82)	2.00 (1.27, 3.15)
Has usual source of care, ref: none	3.19 (1.84, 5.53)	1.75 (.94, 3.27)
Physician visit in the past year, ref: none	4.62 (2.93, 7.29)	3.29 (2.00, 5.42)
Self-reported health status, ref: good/very good/excellent		
Fair/poor	.96 (.71, 1.30)	
IHS Access, ref: none	1.14 (.83, 1.56)	1.14 (.81, 1.61)
Previous Cancer, ref: none	1.21 (.82, 1.78)	
Smoking Status, ref: currently		
Quit smoking	1.20 (.82, 1.73)	
Never smoked regularly	1.31 (.92, 1.84)	
Discrimination, ref: none	.36 (.18, .74)	.42 (.20, .89)
Survey year, ref: 2001		
2003	1.03 (.72, 1.47)	
2005	.92 (.66, 1.29)	

Ref, referent group; FPL, federal poverty level.

Native patients cared for within the IHS, there were no systematic differences in quality of care between those residing in rural vs urban settings, and rural residents may even have slightly higher breast cancer screening rates.[8] We found a similar benefit for cervical cancer screening associated with access to the IHS, though not for potentially more complex procedures including colorectal and breast cancer screening. This finding of benefit for cervical cancer screening but not others may be related to a lack of necessary equipment and trained personnel required for breast cancer screening (eg, mammogram machines) and colorectal cancer screening (eg, colonoscopy) in both rural and urban clinics that care for Native Americans, and thus access to IHS has no effect on whether a person receives screening in either setting. There is indeed evidence that rates of appropriate screening for breast cancer are low in the IHS compared to the rest of the US population.[21]

The low cancer screening rates for Native Americans in our study are consistent with well-documented disparities in prior studies. These studies document disparities between Native Americans and non-Hispanic Whites for colorectal cancer screening[22] and breast cancer screening.[23] Compared to National Cancer Institute statistics from 2005, colorectal screening adherence among Native Americans in our study (47.5%) was lower than the overall all-races rates (59%), while mammography rates (67% vs 69.1%) and cervical cancer screening rates (78% vs 86.5%) were more comparable.[24] While screening adherence for Native Americans in this study was only slightly less than the Healthy People 2010 goals of 90% for cervical cancer screening, 70% for breast cancer screening, and 50% for colorectal cancer screening adherence, there is still substantial room for improvement.

Differences by Screening Test

The overall differences in the proportion of up-to-date adherence for the three screening tests and the reasons for the differences can be attributed to a few main factors. First, national guidelines recommending cervical cancer screening were established first, followed by breast cancer screening, and finally colorectal cancer screening guidelines. Rates of screening

Table 4. Multivariable predictors of cervical cancer screening adherence among 1,022 eligible patients

	Age-Adjusted OR (95% CI)*	Multivariable OR (95% CI)
Age, mean 44, range 18–93	.98 (.97, .99)	.97 (.96, .99)
Education, ref: grade<12		
High school	1.24 (.74, 2.10)	1.41 (.78, 2.54)
>HS	1.51 (.92, 2.48)	1.10 (.63, 1.93)
Marital status, ref: married		
Other, widowed, separate, divorced, living together	.72 (.47, 1.11)	
Never married	.45 (.26, .77)	
Residence, ref: rural	1.11 (.72, 1.72)	1.84 (1.00, 3.41)
Poverty level, ref: 0–99% FPL		
100–199% FPL	1.59 (.99, 2.57)	1.39 (.81, 2.37)
200–299% FPL	1.89 (1.06, 3.36)	1.29 (.68, 2.43)
300% FPL and above	3.29 (1.98, 5.47)	2.69 (1.50, 4.85)
Comorbid condition, ref: none	1.26 (.84, 1.89)	
Insurance status, ref: uninsured	2.29 (1.46, 3.58)	1.08 (.63, 1.85)
Has usual source of care, ref: none	5.90 (3.60, 9.66)	3.18 (1.79, 5.63)
Physician visit in the past year, ref: none	9.15 (5.70, 14.70)	7.34 (4.27, 12.60)
Self-reported health status, ref: good/very good/excellent		
Fair/poor	.96 (.63, 1.45)	
IHS access, ref: none	1.24 (.82, 1.86)	2.11 (.88, 5.08)
Previous cancer, ref: none	.92 (.52, 1.65)	
Smoking status, ref: currently		
Quit smoking	.92 (.57, 1.49)	
Never smoked regularly	1.12 (.73, 1.74)	
Discrimination, ref: none	.56 (.26, 1.22)	.59 (.25, 1.36)
Residence × IHS		.40 (.14, 1.09)
Survey Year, ref: 2001		
2003	.50 (.32, .77)	.44 (.27, .72)
2005	.53 (.34, .83)	.53 (.32, .88)

Ref, referent group; FPL, federal poverty level.
* Also adjusted for survey year.

follow this pattern with the highest screening adherence for cervical cancer and lowest for colorectal cancer screening. Second, programs focused on increasing cervical cancer and breast cancer screening have been funded to a greater extent and for a longer period than for colorectal cancer screening programs.

Education may not be significant for predicting breast or cervical cancer screening adherence due to a broader based and long standing focus on these practices, which may be available to people at all levels of educational status. In contrast, colorectal cancer screening has not received the same level of attention through funded programs; thus patients with lower educational attainment may have limited access to needed resources. We also found that federal poverty level status remained a significant predictor of cervical cancer screening, but not for the other two cancer screening measures. This finding indicates a persistent need for existing cervical cancer screening programs to focus on reaching those Native Americans in the lowest income brackets.

Our study findings should be interpreted in the context of some limitations. The data in this study were drawn from Native Americans living in California, so the results may not apply to other tribes or geographic regions. Our policy level findings for the influence of rural residency and access to the IHS may not extend to other states. The IHS may play a more important role in other states where rural residency is more impactful and isolating than it is in California. Future work is needed to understand the role of these factors on cancer screening among Native Americans in other areas of the country. In particular, an in-depth exploration of the different challenges that urban Native Americans face as compared to rural Native Americans is needed given the shifting demographics of this population.

We were also not able to explore other important determinants of cancer screening behaviors that may be related to the diverse tribes, cultures, and languages of Native Americans in our study. However, the results from our study provide an assessment of many previously unexplored determinants of

cancer screening behaviors among Native Americans, and their interactions among a large, representative sample of Native Americans. There are few in-depth studies that examine attitudes toward screening in diverse Native American groups,[25–27] and further studies are needed so that appropriate screening interventions can be designed. Our analyses represent an important first step towards achieving that goal.

We were also not able to capture patient perceptions of cancer screening, and their contribution to variation in screening practices. Patients may perceive individual cancer screening tests differently with relation to cost, discomfort, or embarrassment. However, it is important to acknowledge that prior research demonstrates that provider recommendation for screening is the most important influence on cancer screening practices.[15,28–30] Our data appear consistent with this notion as access to usual care or a recent physician visit was the most consistent predictor of receipt of cancer screening.

Finally, our data are limited by self-report of screening behaviors and the telephone-administered survey methodology. The survey excludes people without telephones, potentially leading to underreporting from people of lower socioeconomic status, particularly Native Americans.

Despite these limitations, our study has many strengths. We were able to simultaneously assess rural and urban Native Americans, as well as those receiving care within and outside of the IHS. Prior studies have focused on rural Native Americans using IHS data, or have examined urban Native Americans using small samples that limit the ability to draw reliable conclusions. We also focused explicitly on those who self-identify primarily as Native American, avoiding problems with misclassification documented in prior studies. Finally, California is home to the largest population of Native Americans including many tribes from outside the state, allowing for the examination of a diverse population of Native Americans.

Policy level issues including obtaining a usual source of care and access to a physician need to be addressed to improve cancer screening rates among Native Americans.

Conclusion

We have highlighted the importance of multiple factors that interact to influence cancer screening practices among Native Americans. Policy level issues including obtaining a usual source of care and access to a physician need to be addressed to improve cancer screening rates among Native Americans. This will involve working to improve the availability of healthcare providers in resource poor settings, and increasing the diversity of providers in the healthcare system.[31] Ultimately, the goal is to provide regular and acceptable access to health care for all Native people to increase rates of cancer screening.

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