Published in final edited form as:

Womens Health Issues. 2010 ; 20(2): 139–145. doi:10.1016/j.whi.2009.12.004.

Breast cancer screening practices and correlates among American Indian and Alaska Native women in California, 2003

Jan M. Eberth, MSPH [NCI Predoctoral Fellow],

Division of Epidemiology and Disease Control University of Texas Health Science Center at Houston, School of Public Health 7000 Fannin, Suite 2510I Houston, TX 77098

John Charles Huber Jr., PhD [Assistant Professor of Epidemiology & Biostatistics], and
Department of Epidemiology & Biostatistics Texas A&M Health Science Center, School of Rural Public Health 218 SRPH Administration Bldg. College Station, TX 77843 Office Phone: 979-862-3432 Office Fax: 979-458-1877 jchuber@srph.tamhsc.edu

Antonio Rene, PhD [Assistant Professor of Epidemiology & Biostatistics]

Department of Epidemiology & Biostatistics Texas A&M Health Science Center, School of Rural Public Health 218 SRPH Administration Bldg. College Station, TX 77843 Office Phone: 979-458-2239 aarene@srph.tamhsc.edu

Abstract

Background—Breast cancer incidence and mortality have been increasing among American Indian and Alaska Native (AI/AN) women, and their survival rate is the lowest of all racial/ethnic groups. Nevertheless, knowledge of AI/AN women's breast cancer screening practices and their correlates is limited.

Methods—Using the 2003 California Health Interview Survey, we 1) compared the breast cancer screening practices of AI/AN women to other groups and 2) explored the association of several factors known or thought to influence AI/AN women's breast cancer screening practices.

Findings—Compared to other races, AI/AN women had the lowest rate of mammogram screening (ever and within the past 2 years). For clinical breast exam receipt, Asian women had the lowest rate, followed by AI/AN women. Factors associated with AI/AN women's breast cancer screening practices included older age, having a high school diploma or some college education, receipt of a Pap test within the past 3 years, and having visited a doctor within the past year.

Conclusions—Significant differences in breast cancer screening practices were noted between races, with AI/AN women often having significantly lower rates. Integrating these epidemiological findings into effective policy and practice requires additional applied research initiatives.

Keywords

breast cancer screening; American Indian or Alaska Native; women's health

Introduction and Background

Cancer, once thought to be rare among Native populations, has increased dramatically over the past few decades (Hampton, Maher, Key, & Rhoades, 2000; A. P. Lanier, 1998). Researchers have also noted lower cancer survival rates for American Indians and Alaska

Corresponding: Office Phone: 713-500-9770 Office Fax: 713-500-9750 Jan.M.Eberth@uth.tmc.edu .

The authors have no conflicts of interest to disclose.

Natives (AI/ANs) compared to other racial/ethnic groups for multiple cancer sites. (Linda Burhansstipanov & Dresser, 1993; Clegg, Li, Hankey, Chu, & Edwards, 2002; A. Lanier, Holck, Kelly, Smith, & McEvoy, 2001). As such, cancer has become a leading cause of death among AI/ANs (Trends in Indian health, 1998-1999). Among women, cancer is the second leading cause of death among American Indians and the leading cause of death among Alaska Natives (Cobb & Paisano, 1997).

One particularly invasive and prevalent carcinoma site is the breast. In general, AI/AN women have low rates of breast cancer compared to women of other racial/ethnic groups. Nevertheless, survival rates are poor compared to other groups (Frost, Tollestrup, & Hunt, 1996; N. S. Wampler, Lash, Silliman, & Heeren, 2005) and breast cancer has become the second leading cause of death among AI/AN women (Paisano & Cobb, 2003). Mammography screening, with or without clinical breast examination (CBE), is known to reduce breast cancer mortality through early detection (U.S. Preventive Services Task Force, 2002). However, little is known about the utilization of breast cancer screening and its correlates among AI/AN women, particularly in California - a largely urban population (Satter, Seals, Chia, Gatchell, & Burhansstipanov, 2005). Aggregate data on AI/ANs is especially limited, due to a focus on tribes or tribal regions (Coughlin, Uhler, & Blackman, 1999), rather than AI/ANs as a whole, and collapsed data on racial/ethnic minorities (often a result of small sample size). Data quality is another concern due to racial misclassification (L. Burhansstipanov, 1998).

California presents a unique opportunity to examine an aggregate sample of AI/AN women of various geographies and tribal affiliations. The California Health Interview Survey (CHIS) has a greater focus on Native populations than other comparable surveys, asking questions about tribal affiliation, Indian Health Service usage, and other issues specific to the Native experience. Additionally, CHIS collects data on multiple other racial/ethnic groups by which comparisons can be drawn. Finally, California has the largest population of AI/ANs in the U.S. and the second largest urban AI/AN population as well (Ogunwole, 2002), making CHIS a useful resource for policymakers, researchers, and healthcare providers interested in AI/AN health.

Using the 2003 CHIS, we 1) compared the breast cancer screening practices of AI/AN women to other groups, and 2) explored the association of several factors known or thought to influence AI/AN women's breast cancer screening practices.

Methods

The survey instrument used for this analysis was the 2003 CHIS, a complex multi-stage survey designed and implemented by the UCLA Center for Health Policy Research, the California Department of Health Services, and the Public Health Institute. The 2003 CHIS was conducted via random digit dial telephone interview with 42,044 adults. The response rate among those contacted for interviews was 60%. Detailed information on the planning and implementation of the CHIS survey can be found on the UCLA Center for Health Policy Research website (California Health Interview Survey, 2008). This secondary data analysis was approved by the Institutional Review Board at Texas A&M University.

The AI/AN population in California is the largest in the U.S., with 333,346 (1.0%) individuals reporting AI/AN race alone and 627,562 (1.9%) individuals reporting AI/AN race alone or in combination with other races on the 2000 U.S. Census (U.S. Census Bureau, 2000). The 2003 CHIS asked all respondents to identify one or more terms to describe themselves: Pacific Islander, AI/AN, Asian, African American, White, other single race, or more than one race. Individuals who identified themselves as AI/AN alone are classified as AI/AN for this analysis. Those who identified themselves as AI/AN in addition to other race(s) are classified as more

than one race, and are not classified as AI/AN for this analysis. This approach reduces the potential for racial misclassification (L. Burhansstipanov, 1998). Although multiple measures of race/ethnicity are available in the 2003 CHIS, we used the 2000 U.S. Census single race definition because of its widespread use and straightforward interpretation (Swan et al., 2006). Because the 2000 U.S. Census classifies Hispanic heritage as an ethnicity rather than a race, we did *not* exclude individuals who classified their race as AI/AN alone and their ethnicity as Hispanic.

Of the total sample (n= 42,044) surveyed, 882 individuals described themselves as AI/AN. Over 60% of these individuals also reported Hispanic ethnicity. Over half of those identifying as AI/AN were women aged ≥ 18 years (n=477) and 253 were women aged ≥ 40 years.

Data Analysis

In an attempt to produce population-based estimates representative of the state of California, a pre-calculated sampling weight provided by CHIS was applied to all cases. This general weighting variable (i.e. sampling weight or pweight) was applied to reduce the effect of selection bias. The remaining weights, known as replicate weights, were applied to produce valid variance estimates. The replicate weights provided by CHIS were created using the jackknife estimation method.

Frequency distributions, design-based F statistics (a modification of the Pearson chi-square test) and their associated p-values were utilized to make comparisons across groups. For the purpose of data analyses, survey questions related to mammography screening were limited to women aged ≥ 40 years and questions related to CBE were restricted to women aged ≥ 18 years, in conformance with ACS screening recommendations (American Cancer Society, 2005). Since the focus of this paper is AI/AN women's breast cancer screening practices, descriptive analyses compared AI/AN women aged ≥ 18 (unweighted sample size = 477) to women of all other races aged ≥ 18 (unweighted sample size= 24,090), which collapsed all other racial/ethnic groups (i.e. Pacific Islander, Asian, African American, White, other single race, more than one race) into one comparison group (thereafter referred to as "other races combined"). Additional comparisons were made to show how AI/AN women fair in respect to Whites and other minority groups (i.e. African Americans and Asians).

Logistic regression was utilized to explore factors associated with AI/AN women's breast cancer screening practices. Univariate and multivariable models were constructed to explore the relationship between the two binary response variables, mammogram use within the past 2 years and CBE screening within the past 12 months, and multiple explanatory variables (listed in Tables 3 & 4). These variables were chosen because of their known (Coughlin et al., 1999; Giuliano, Papenfuss, de Guernsey de Zapien, Tilousi, & Nuvayestewa, 1998; Risendal, Roe, DeZapian, Papenfuss, & Giuliano, 1999; Wampler, Ryschon, Manson, & Buchwald, 2006) or hypothesized associations with breast cancer screening practices in women of AI/AN descent. Age-appropriate restrictions were applied to both models (≥ 40 for mammography and ≥ 18 for CBE).

Forward variable selection was used to build the initial multivariable model. Statistical significance was determined at the 0.05 level of significance. Confounding was assessed by adding covariates to the initial model one at a time. All variables that were examined univariately, but did not make it into the initial model, were assessed as potential confounders. Covariates that changed one or more odds ratios (ORs) in the initial model by $>10\%$ were retained for adjustment in the final model. All data analyses were conducted using STATA Version 9 or 10.

Results

Descriptive Statistics

For all outcomes (i.e. ever had a mammogram, had a mammogram within the past 2 years, and had a CBE within the past 12 months), AI/AN women had significantly lower rates of breast cancer screening than African Americans, Whites, and other races combined (Table 1). Compared to AI/AN women, Asian women were more likely to have had a mammogram within the past 2 years and less likely to have had a CBE within the past 12 months, although these differences were not statistically significant. AI/AN women were only 4 percentage points away from reaching the Healthy People 2010 Target Goal of 70% of women aged ≥ 40 years receiving a mammogram within the past 2 years (Healthy People 2010, 2000).

Logistic Regression

Tables 3 and 4 present unadjusted and adjusted ORs, along with their associated 95% confidence intervals, for the dependent variables 1) receipt of a CBE in the past 12 months, and 2) receipt of a mammogram within the past 2 years.

Sixteen variables were examined univariately in the CBE model (Table 3, first column). Two variables were selected by forward selection for the initial model (second column): Pap test practices and visited the doctor within the past year. Covariates that meaningfully altered the OR of one or more variables in the initial model (i.e. changed the OR(s) by $>10\%$) included educational attainment and age. Adjusting for these covariates in the final model (third column) increased the OR for Pap test practices and visited the doctor within the past year. Both variables from the initial model retained their statistical significance at the 0.05 level in the final model.

One additional variable was assessed in the mammography model, specifically doctor examined breast for lumps in the past 12 months (Table 4, first column). Three variables were selected by forward selection for the initial model (second column): educational attainment, age, and Pap test practices. Covariates that meaningfully altered the OR of one or more variables in the initial model included Indian Health Service coverage, self breast exam (SBE) practices, speaks English, marital status, employment status, federal poverty level, church attendance in the past 7 days, currently insured, enrollment in a federal/state recognized tribe, and doctor examined breast for lumps within the past 12 months (i.e. CBE). Adjusting for these covariates in the final model (third column) increased the OR for educational attainment, Pap test practices and age. All three variables from the initial model retained their statistical significance in the final model.

Conclusions and Discussion

Results from the 2003 CHIS indicate mammogram screening levels among AI/AN women aged ≥ 40 were significantly lower than Whites, African Americans, and other races combined. Although the trend is the same, only Asian women were not significantly different than AI/AN women with regards to mammogram screening within the past 2 years. Asian women had the lowest rate of CBE within the past 12 months, followed by AI/AN women. Screening rates were relatively high overall, especially for mammograms.

AI/AN women may report fewer CBEs and mammograms than other groups because their lower incidence of breast cancer creates a false sense of security with regards to the necessity of screening. It is also possible that AI/AN women lack access to breast cancer screening services due to geographic isolation, language barriers, lack of insurance, and transportation and childcare issues (Coughlin et al., 1999; Satter et al., 2005). It is equally important to remember that tradition and/or cultural beliefs play a role in AI/AN women's health care decisions (Simon, 2006).

Logistic regression found the following significant correlates of AI/AN women's breast cancer screening practices: age, educational attainment, Pap test practices, and visited a doctor within the past year. Specifically, having visited a doctor within the past 12 months or having had a Pap test within the past 3 years increased the likelihood of receiving a CBE within the past 12 months controlling for meaningful covariates. Additionally, being 60 years or older (vs. 40-49), having had a Pap test within the past 3 years (vs. over 3 years ago or never), or being a high school graduate or having some college, vocational or Associate's training (vs. less than high school) increased the likelihood of receiving a mammogram in the past 2 years controlling for meaningful covariates.

Women with a recent doctor visit or up-to-date Pap test were more likely to have received a CBE in the past 12 months than their counterparts. A possible explanation for this finding is that doctors are providing tests normally associated with a well-woman visit, such as the CBE, at other types of clinical encounters (e.g. sick visit). Since CBEs are typically given in conjunction with Pap tests at the well-woman visit, it is not surprisingly that Pap tests practices are highly correlated with CBE receipt. In the case of mammography, women who are not adherent to screening recommendations may be more likely receive a mammogram if their doctor recommends it, refers them to a screening facility, or is willing and able to perform the test onsite (even if the woman originally came in for another reason).

The 2003 CHIS presents several limitations for analysis. First, the nature of cross-sectional data prohibits the examination of cause and effect. Thus, the associations we report should not be interpreted causally. Second, recall bias can present a methodological concern for the validity of studies using self-reported data. Although medical and administrative databases contain data on CBE and mammogram utilization, accessibility can be a problem and the breadth of covariates is limited. As such, self-reported data is often the best data available to conduct population-based research. Third, using categorical definitions of race/ethnicity may contribute to racial misclassification, a common problem in cross-sectional data. A recent study found that AI/AN women most often were misclassified as "White," and the likelihood of misclassification increased as AI/AN ancestry decreased (Thoroughman, Frederickson, Cameron, Shelby, & Cheek, 2002). To reduce this risk, we chose to exclude individuals from our study that did not classify their race as AI/AN alone. Finally, the use of random-digit dialing excludes segments of the population without land-line telephones. CHIS is now trying to address this problem with their 2007 Adult Module, which includes a cell phone-only sample (UCLA, 2008). For the 2003 Adult Module, results are only representative of non-institutionalized persons with land-line phone accessibility.

Despite these limitations, this report presents vital information on the breast cancer screening practices of AI/AN women in California. Few studies have been conducted to date on the breast cancer screening practices of AI/AN women at the state or national level, and even fewer have explored the correlates of screening in this population. The analysis conducted herein is a step towards closing this gap.

Although investigating health disparities and the factors that contribute to them is important, research that translates into effective health policy and practice is vital to reaching the ultimate goal of improved health and wellness. Future prevention efforts should be directed at integrating these epidemiological findings into cancer screening programs and policies within the Indian Health Service, the Breast and Cervical Cancer Detection Program, urban Indian health organizations, and other prevention efforts.

Acknowledgments

Jan Eberth is the recipient of a National Cancer Institute Cancer Education and Career Development Predoctoral Fellowship (National Cancer Institute/NIH Grant #2R25-CA057712). We would like to acknowledge the Doctoral

Behavioral Science Seminar at the University of Texas Health Science Center, School of Public Health, for their editing assistance on this manuscript. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Cancer Institute or the National Institutes of Health.

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Table 1
Clinical breast exam practices of AI/AN women and women of other races aged >18

	AI/AN	White	Other races combined	African American	Asian
<i>Unweighted Sample</i>	477	16,821	24,090	1,631	2,179
<i>Weighted sample₁</i>	3.2e+0.5	7.9e+0.6	1.3e+0.7	8.7e+0.5	1.6e+0.6
<i>Had a CBE within past 12 months</i>	59.25% SE ± 3.05	68.49% SE ± .46 F ₂ =9.64, p<.01 *	65.97% SE ± .39 F =5.11, p=.03 *	70.75% SE ± 1.34 F=10.99, p<.01 *	56.02% SE ± 1.43 F=1.03, p=.31

¹ Percentages, standard errors, and design-based F tests based on weighted sample

² All pair-wise comparisons by AI/AN race

* Statistically significant at the .05 level

Table 2

Breast cancer screening practices of AI/AN women and women of other races aged >40

	AI/AN	White	Other races combined	African American	Asian
<i>Unweighted Sample</i>	253	12,316	16,376	1,083	1,304
<i>Weighted sample¹</i>	1.4e+05	5.0e+0.6	7.4e+06	5.1e+0.5	9.1e+05
<i>Ever had a mammogram</i>	79.28% SE ± 4.54	91.99% SE ± .37 F ₂ =16.35, p<.01 *	90.46% SE ± .33 F=10.62, p<.01 *	91.42% SE ± 1.05 F=11.57, p<.01 *	87.53% SE ± 1.12 F=3.94, p=.05 *
<i>Had a mammogram within past 2 years</i>	66.39% SE ± 4.59	77.94% SE ± .52 F=7.62, p<.01 *	76.27% SE ± .48 F=5.21, p=.03 *	76.99% SE ± 1.77 F=4.55, p=.04 *	75.53% SE ± 1.61 F=2.07, p=.15

¹ Percentages, standard errors, and design-based F tests based on weighted sample

² All pair-wise comparisons by AI/AN race

* Statistically significant at the .05 level

Table 3

Unadjusted and adjusted odds ratios for the dependent variable, had a CBE within the past 12 months

Explanator Variables	Categories	Univariate, (95% CI)	Initial Model, (95% CI)	Final Model, Adjusted OR ^I (95% CI)
Indian Health Service coverage	No	Ref		
	Yes	0.56 (0.28, 1.15)		
Age	18-39	Ref		
	40-49	0.64 (0.34, 1.22)		
	50-59	0.58 (0.29, 1.16)		
	60 +	0.54 (0.26, 1.14)		
SBE practices	Does not examine own breasts for lumps	Ref		
	Examines own breasts for lumps	1.71* (1.04, 2.80)		
Educational attainment	Less than HS	Ref		
	HS graduate	0.91 (0.46, 1.81)		
	Some college, vocational school or Associates	1.57 (0.88, 2.83)		
	Bachelor's or beyond	0.54 (0.26, 1.14)		
Usual source of care other than ER	No	Ref		
	Yes	1.90 (0.95, 3.81)		
Speak English	Not well or well at all	Ref		
	Only, very well or well	0.49 (0.20, 1.18)		
Currently insured	No	Ref		
	Yes	0.68 (0.38, 1.22)		
Visited the doctor within past year	No	Ref	Ref	Ref
	Yes	8.39* (3.55, 19.85)	6.99* (2.73, 17.88)	7.39* (3.16, 17.28)
Enrolled in a federal/state recognized tribe	No	Ref		
	Yes	0.50* (0.26, 0.98)		
Marital status	Married	Ref		
	Widowed, separated, divorced, living w/ partner	0.80 (0.48, 1.32)		
	Never married	0.55* (0.32, 0.93)		
Social Support	Continuous scale	1.00 (0.95, 1.06)		

Explanator Variables	Categories	Univariate, (95% CI)	Initial Model, (95% CI)	Final Model, Adjusted OR ^I (95% CI)
Employment Status	Employed	Ref		
	Unemployed	0.98 (0.60, 1.62)		
Church attendance in past 7 days	No	Ref		
	Yes	1.18 (0.76, 1.83)		
Federal poverty level	0-199% FPL	Ref		
	200-399% FPL	1.00 (0.57, 1.75)		
Place of residence	Urban	Ref		
	Rural	1.27 (0.73, 2.20)		
Pap test practices	Over 3 years ago or never	Ref	Ref	Ref
	Within past 3 years	5.58* (2.73, 11.38)	4.83* (2.28, 10.25)	6.01* (2.55, 14.14)

* Statistically significant at the .05 level of significance (95% confidence level)

^I Adjusted for educational attainment and age

Table 4

Unadjusted and adjusted models for the dependent variable, had a mammogram within the past 2 years

Explanatory Variables	Categories	Univariate, (95% CI)	Initial Model, (95% CI)	Final Model, Adjusted OR ¹ (95% CI)
Social Support	Continuous scale	1.09 (0.98, 1.20)		
Age	40-49	Ref	Ref	Ref
	50-59	1.05 (0.42, 2.63)	1.57 (0.42, 5.90)	1.92 (0.43, 8.59)
	60 +	2.31* (1.05, 5.09)	11.67* (3.31, 41.09)	22.62* (3.81, 134.13)
SBE practices	Does not examine own breasts for lumps	Ref		
	Examines own breasts for lumps	2.34 (0.61, 9.04)		
Pap test practices	Over 3 years ago or never	Ref	Ref	Ref
	Within the past 3 years	11.66* (4.53, 29.98)	36.32* (11.28, 117.01)	39.55* (8.14, 192.23)
Educational attainment	Less than HS	Ref	Ref	Ref
	HS graduate	2.36 (0.98, 5.69)	3.55* (1.19, 10.60)	6.23* (1.89, 20.50)
	Some college, vocational school or Associates	2.82* (1.15, 6.92)	5.14* (1.39, 19.06)	12.71* (2.74, 58.94)
	Bachelor's or beyond	0.74 (0.22, 2.42)	1.92 (0.47, 7.78)	3.18 (0.54, 18.93)
Visited doctor within the past year	No	Ref		
	Yes	1.99 (0.59, 6.76)		
Speak English	Not well or well at all	Ref		
	Only, very well or well	0.30 (0.07, 1.27)		
Enrollment in a federal/state recognized tribe	No	Ref		
	Yes	0.55 (0.21, 1.44)		
Church attendance in past 7 days	No	Ref		
	Yes	1.28 (0.66, 2.49)		
Federal poverty level	0-199% FPL	Ref		
	200-399% FPL	0.94 (0.49, 1.79)		
Place of residence	Urban	Ref		
	Rural	0.82 (0.38, 1.77)		
Employment status	Employed	Ref		
	Unemployed	1.06 (0.44, 2.54)		
Indian Health Service	No	Ref		

Explanatory Variables	Categories	Univariate, (95% CI)	Initial Model, (95% CI)	Final Model, Adjusted OR ^I (95% CI)
coverage	Yes	0.51 (0.14, 1.85)		
Usual source of care other than ER	No	Ref		
	Yes	2.32 (0.46, 11.71)		
Marital status	Married	Ref		
	Widowed, separated, divorced, living w/ partner	0.89 (0.38, 2.10)		
	Never married	0.41 (0.12, 1.42)		
Currently insured	No	Ref		
	Yes	0.51 (0.11, 2.50)		
Doctor examined breasts for lumps within the past 12 months	No	Ref		
	Yes	3.37* (1.65, 6.86)		

* Statistically significant at the .05 level of significance (95% confidence level)

^I Adjusted for Indian Health Service coverage, SBE practices, speak English, marital status, employment status, federal poverty level, church attendance in the past 7 days, currently insured, enrollment in a federal/state recognized tribe, and doctor examined breast for lumps within the past 12 months