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Racial Differences in Knowledge, Attitudes, and Cancer Screening Practices among a Triracial Rural Population

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Abstract

BACKGROUND—Low-income, minority, and rural women face a greater burden with regard to cancer-related morbidity and mortality and are usually underrepresented in cancer control research. The Robeson County Outreach, Screening and Education Project sought to increase mammography use among low-income, minority, and rural women age > 40 years. The current article reports on racial disparities and barriers to screening, especially those related to knowledge, attitudes, and behaviors.

METHODS—A baseline survey was administered to 897 women age > 40 years who lived in rural Robeson County in North Carolina. The sample consisted of three principal racial groups: whites, African Americans, and Native Americans. Survey comparisons were made among racial groups with respect to knowledge, attitudes, and behaviors regarding breast and cervical carcinoma screening.

RESULTS—Overall, Native American and African-American women had lower levels of knowledge, more inaccurate beliefs, and more barriers to screening compared with white women. Among the notable findings were that 43% of the patient population did not mention mammograms and 53% did not mention Pap smears as breast and cervical carcinoma screening tests, respectively; furthermore, compared with white women, significantly fewer African-American and Native American women mentioned these tests ($P < 0.001$). Sixty-seven percent of

all women reported that a physician had never encouraged them to receive a mammogram, although 75% reported having received a regular checkup in the preceding year.

CONCLUSIONS—Although all low-income rural women experienced significant barriers to receiving cancer screening tests, these barriers were more common for minority women compared with white women. More research is needed to identify ways to overcome such barriers, especially among Native American women. The results of the current study have important implications with respect to the designing of interventions aimed at improving cancer screening for all women.

Keywords

racial differences; cancer screening; rural population; mammography

The American Cancer Society estimates that there were 211,300 new breast carcinoma cases and 39,800 deaths due to breast carcinoma among women in the United States during 2003.¹ Despite increases in early detection and improved treatment, breast carcinoma mortality rates have remained relatively stable for the past 50 years, with a slight decrease (2.3%) occurring between 1999 and 2000.² Women of lower socioeconomic status (SES), compared with women of higher SES, have a lower incidence of breast carcinoma but experience higher mortality rates, mainly due to a higher prevalence of late-stage tumors at diagnosis.³

Early detection of small, curable lesions has been shown to reduce breast carcinoma morbidity and mortality rates. The use of clinical breast examination (CBE) and mammography has been demonstrated to reduce breast carcinoma mortality rates by up to 30% in women age 50 years^{4–6} and women age > 40 years.^{7–10} Although screening mammography usage rates have improved over the last several years, estimates indicate that only 41% of women age 50 years (approximately half of the national goal of 80%) undergo annual mammography.^{11,12} In addition, minority women, older women, and women with low SES have had poorer mammography usage rates.¹³

With regard to minority populations, African-American women have lower breast carcinoma screening examination usage rates and higher breast carcinoma mortality rates compared with white women. Reasons for these differences are believed to include lack of insurance, lack of a regular source of health care, communication barriers, poverty, and late stage of disease at diagnosis.^{1,14–17} In North Carolina, racial differences in screening and mortality rates are believed to be even more pronounced among rural women, because these women are more likely to be poor. Data from a study conducted in 2 rural eastern North Carolina counties found that white women ages 50–74 years were twice as likely to have ever had a mammogram compared with African-American women of similar age (54% vs. 27%).¹⁸ Even among these rural white women, screening rates are slightly lower than national estimates.

Studies have demonstrated that Native Americans exhibit the poorest cancer screening rates of any racial group in the United States. Dignan et al.¹⁹ reported that 33% of rural, non-reservation-dwelling Native American women (Lumbees from Robeson County, NC) had not undergone a Papanicolaou (Pap) smear in the preceding year. Among Southwestern American Indian women age > 40 years, 61% reportedly received a yearly CBE, only 45%

had ever received a mammogram, and only 26% had received a mammogram in the preceding 2 years.²⁰

The goal of the Robeson County Outreach, Screening and Education (ROSE) Project was to improve breast carcinoma screening in specific population groups—namely, rural, white, African-American, and Native American women who were traditionally underserved by cancer control efforts and services. The current study was designed to assess the effects that an individualized health education intervention delivered to three racial groups had on mammography use. The purpose of the current study was to describe the baseline characteristics of the study population, with a focus on differences among the three racial groups in terms of knowledge, beliefs, and behaviors related to cancer screening.

MATERIALS AND METHODS

Setting

Robeson County, a rural county in southeastern North Carolina, has a population of 123,339,²¹ and it contains the largest concentrated Native American population east of the Mississippi River. There are 3 primary racial groups in the county: Native Americans (population, 46,896 [38%]), most of whom are Lumbees; African Americans (population, 30,973 [25%]); and whites (population, 40,460 [33%]). Hispanics and Asians/Pacific Islanders account for the remaining 4% of the population. The county is 80% rural and had the eighth highest statewide poverty rate (24.7%, compared with 13% for the state overall) at the time of the study.²¹ In addition, the unemployment rate of 7.5% was 2.4 percentage points higher than the state unemployment rate and 0.8 percentage points higher than the national rate, and fewer than one-half of all adults in the county were high school graduates. Due to the lack of a countywide public transportation system, access to health care was limited for Robeson County residents. As a result, morbidity and mortality rates were higher than overall state rates for many diseases.

Robeson Health Care Corporation (RHCC), a major health care provider in Robeson County, administers four sites. Collectively, RHCC served approximately 12,778 patients in 1996. RHCC clients represented the 3 largest racial groups within Robeson County: 15% were white, 26% were African American, and 59% were Native American (1996 data). Approximately 68% were women, 51% of whom were 15–44 years old. The majority (63%) of RHCC clients had incomes below the poverty level, compared with 24% of the Robeson County population. One-third of all RHCC users had no health insurance, and another 32% were covered by Medicaid. Noninsured patients received services based on a sliding scale schedule.

Sample Selection

Women were selected randomly from a list of RHCC patients age > 40 years. To be eligible, women were required to have been RHCC clients for at least 2 years before chart review. A total of 2954 women were selected randomly for review. To be enrolled in the study, a woman had to be in need of a mammogram (i.e., she had not received a mammogram in the previous 12 months) as of the date of her chart review. For each potential participant,

Lumberton Radiology Associates (Lumberton, NC), the main mammography facility in the study area, was contacted to ascertain whether a mammogram had recently been obtained. A total of 1503 (51%) women were identified as being eligible to participate in the trial.

The primary care physician for each identified eligible patient was sent a letter stating that the patient had been selected to participate in the ROSE Project and asking whether the physician had any objections. If no objection was received after 1 week, the woman was sent a recruitment letter from the medical director of the RHCC. The letter described the study and informed the woman that an interviewer would contact her within the next few days. A trained study interviewer from the community contacted each woman for a telephone screening interview. If a contacted patient was eligible and willing, an in-person visit was arranged to obtain informed consent and to complete the baseline interview. Women were then randomized to either the lay health educator group (i.e., the intervention group) or the comparison group. As an incentive and as a token of appreciation for completing the survey, each woman received a \$10.00 grocery store gift certificate.

After the telephone screening interview, 353 women were deemed ineligible to participate (i.e., they had moved, were deceased, or were mentally/physically unable). Of the remaining 1150 women, 1022 (89%) were contacted. Of these 1022 women, 901 were interviewed and randomized, for a response rate of 88%. The remaining 121 women refused to participate.

As a quality-control measure, 10% of all participants were recontacted by phone to verify the interviewer's visit and survey status, and no problems were reported. All women received their usual medical care from RHCC, regardless of their status in the project. The study was approved by the institutional review boards at the Wake Forest University School of Medicine (Winston-Salem, NC) and The Ohio State University (Columbus, OH).

Statistical Analysis

After randomization, 4 women were found to have received a mammogram and were not included in the study, leaving 897 women to be randomized to 1 of the 2 study groups. Of these, 453 were placed in the intervention group, and 444 were placed in the comparison group. Because there were no differences between groups in terms of any of the baseline variables, treatment group was not included as a factor in the analysis. The sample consisted of 295 African-American women, 371 Native American women, 226 white women, and 5 women who were classified as being multiracial. The five multiracial participants were excluded from the analyses so as to provide large cell counts and so that the study would focus on the three primary racial groups of interest. Thus, data from 892 women were analyzed in the current study.

Women in each racial group were compared with regard to demographics, cancer screening habits, breast carcinoma risk factors, and mammography adherence, as well as with regard to barriers to and beliefs and knowledge regarding cancer screening. Two-sided chi-square tests were used to evaluate the association between each categorical variable and race. If a significant relation was found ($\alpha = 0.05$), then pairwise comparisons were conducted to assess the specific differences among racial groups. Significance levels for these comparisons were interpreted according to the Bonferroni correction for multiple

comparisons.²² A significance level of $P = 0.0167$ ($0.05/3$) for each of the 3 comparisons provided an overall type I error rate of 0.05. Analysis of variance was used to assess age differences across racial groups. All analyses were performed using SAS statistical software (Version 8.2; SAS Institute, Cary, NC).²³

RESULTS

Demographic data for the 892 women who completed the baseline survey are summarized in Table 1. Women ages 40–49 years represented the largest age group in the current study (42%); another 27% of all participants were 50–59 years old, and 30% were 60 years old. There was a statistically significant difference in age across racial groups ($P = 0.016$). White women had a higher average age (57.2 years) compared with both African-American women (54.5 years; $P = 0.009$) and Native American women (54.7 years; $P = 0.012$).

The data in Table 1 also show that white women were significantly more likely to report having private health insurance (45%) compared with African-American women (34%; $P = 0.014$) and Native American women (32%; $P = 0.004$). White women also were more likely (24%) to be in the highest SES group (private insurance, high school graduate, and household income > \$20,000 per year) compared with African-American women (15%; $P = 0.007$) and Native American women (15%; $P = 0.005$).

Approximately 44% of the sample reported receiving less than a high school education, with Native Americans (51%) differing significantly from both whites (41%; $P = 0.044$) and African Americans (38%; $P = 0.001$) in terms of this characteristic. Although there were no significant racial differences in employment status, significant differences in terms of marital status were documented ($P < 0.001$). White women were more likely to be married or living with a partner (54%) and less likely to have never been married (2%) compared with all other participants. In addition, compared with African Americans, Native Americans were more likely to be currently married or living with a partner (50% vs. 35%) and less likely to have never been married (7% vs. 15%).

Women were asked about breast and cervical carcinoma screening awareness and behaviors. Although, due to study eligibility requirements, all women were in need of a mammogram, information regarding previous screening was obtained. When asked to name a breast carcinoma screening test, 43% of all women did not mention mammography (data not shown); compared with African-American (54%; $P < 0.001$) and Native American women (52%; $P < 0.001$), significantly more white women (70%) did mention mammography in response to this question. Before asking about previous mammography use, the study interviewer carefully explained what a mammogram was. The data in Table 2 show that approximately one-fourth of all participants had never received a mammogram (24%) and that there were significant differences in previous mammography use by racial group ($P = 0.003$). Compared with Native American (19%; $P < 0.001$) and white women (26%; $P = 0.054$), a larger proportion of African-American women (28%) had never received a mammogram. Greater than one-half of all women (58%) had received a mammogram within the preceding 3 years. In addition, one-half of all women reported having received a CBE

within the preceding year, and 43% reported having received a CBE > 1 year before the time of the survey, with no significant differences observed across the 3 racial groups.

Fewer than one-half of all participants (47%) mentioned the Pap smear as a cervical carcinoma screening test (data not shown), although more white women (60%) than African-American women (42%; $P < 0.001$) or Native American women (42%; $P < 0.001$) did mention this screening technique. After the interviewers explained what a Pap smear was, almost all of the women (98%) reported having received a Pap smear, with 81% reporting having received one within the preceding 3 years (Table 2). There were no significant differences by race in terms of Pap smear use.

Table 3 presents information on breast carcinoma risk factors. Only 2% of all participants had reportedly been treated for colon, ovarian, or breast carcinoma. Approximately 21% of them—27% of all white women, 21% of all Native American women, and 16% of all African-American women ($P = 0.023$ overall; $P = 0.006$ for white vs. African-American women)—reported having a family history of breast carcinoma in a first-degree relative. Only 11% of all women reported never having given birth or reported a late age at first birth. Thirty percent of the participants were current smokers, and there were no significant differences across racial groups in terms of current smoking status.

Data on barriers to and beliefs and knowledge regarding mammography use are summarized in Tables 4–6. Overall, 23% of women reported having insufficient time to receive a mammogram, and there were statistically significant differences across racial groups ($P = 0.003$). White women were more likely to report experiencing this barrier than were African-American women (30% vs. 17%; $P < 0.001$) or Native American women (30% vs. 24%; $P = 0.035$). Approximately 27% of women reported not wanting to receive a mammogram at an institution other than the institution at which they received medical care. Only 10% of women did not know where to go to receive a mammogram. Two-thirds of women reported that they had not been “encouraged by a physician to get a mammogram” (as stated in the survey), despite the fact that 75% of them reported having had a regular checkup within the preceding 12 months (data not shown). African Americans were the most likely to receive checkups (81%), whereas Native Americans were the least likely (69%; $P < 0.001$; data not shown). Among women who had ever received a mammogram, 29% reported receiving one without being instructed to do so by a physician. Relatively few women (13%) reported having asked a physician to order a mammogram. Differences across racial groups were noted ($P = 0.009$) in terms of the proportion of women reporting that they had never been encouraged by anyone to receive a mammogram (overall proportion, 45%); fewer African-American women (48%) had ever been encouraged to receive a mammogram compared with white (62%; $P = 0.002$) and Native American women (56%; $P = 0.070$). In most cases, the encouragement was reported to have come from a physician, a family member, or a friend.

With regard to insurance coverage for mammography, 28% of women reported not being covered. Differences were apparent by racial group ($P = 0.016$), with more Native American women than white women (32% vs. 22%; $P = 0.005$) reporting a lack of insurance coverage.

Eighty-nine percent of participants had never heard of the Breast and Cervical Cancer Detection Program (BCCDP), which provides free mammography to low-income women.

Data on beliefs regarding mammography are summarized in Table 5. Approximately one-fourth of the women believed that receiving a mammogram was an embarrassing experience ($P < 0.001$). African Americans were less likely to report embarrassment (13%) than were whites (30%; $P < 0.001$) or Native Americans (27%; $P < 0.001$). Seventeen percent of women believed that radiation from a mammogram could cause cancer, and 37% believed that mammograms were painful. Thirty percent believed that if they did not feel unwell, then mammographic screening was unnecessary. When women were asked to rate their perceived risk of developing breast carcinoma, racial differences were marginally significant ($P = 0.057$). Native American women rated their risk as being “somewhat or much higher than average” slightly more often (24%) than did white women (16%; $P = 0.066$). Differences by racial group were more prominent in terms of how concerned women were about developing breast carcinoma ($P < 0.001$). Native American women expressed the most worry, with 22% listing their level of concern as “extreme or quite a bit”, compared with 14% of African-American women ($P = 0.002$) and 11% of white women ($P = 0.002$).

The data presented in Table 6 relate to patients’ knowledge regarding breast carcinoma and mammography. When asked at what age they believed women should begin receiving mammograms, only 32% of all women provided the correct response (40–44 years). When asked at what age women should stop receiving mammograms, almost three-fourths correctly answered that they should “never stop.” Racial differences in terms of the response to this question were documented ($P = 0.007$), with more African-American women (34%) than white (23%; $P = 0.009$) or Native American women (24%; $P = 0.006$) selecting an age at which they could stop receiving screening. Almost three-fourths of women knew that mammograms should be obtained annually. Seventy-nine percent disagreed with the statement that a woman could self-diagnose breast carcinoma. Fifty-nine percent of all participants correctly indicated that African-American women were not more likely to develop breast carcinoma. Fifty-six percent of respondents disagreed with the statement that “the only good cure for breast carcinoma is to have the breast removed.” White women (65%) disagreed with this statement more often than did African-American women (56%; $P = 0.034$) or Native American women (51%; $P < 0.001$). Sixty-one percent of women were aware that giving birth decreases one’s chances of developing breast carcinoma. White women were more likely to be aware of this fact (65%) than were African-American women (63%; $P = 0.048$) or Native American women (56%; $P = 0.029$). Finally, 54% of women were aware that older women are more likely to develop breast carcinoma than are younger women.

DISCUSSION

Breast carcinoma is a serious public health problem in the United States.¹ Although regular mammographic screening has been proven to reduce breast carcinoma–related mortality,^{24–27} mammography use is not sufficiently widespread to lead to a significant reduction in mortality rates.²⁸ Certain subgroups of women—namely, older women, women

in lower socioeconomic groups, and minority women—underuse mammography,²⁹ and this disparity has been the focus of numerous researchers and health care agencies.

The population included in the ROSE study was underserved, with almost 30% not having health insurance, the majority having annual incomes < \$20,000, and most lacking a high school degree. Overall, knowledge about breast and Pap smear screening was poor; however, almost all women reported receiving regular checkups. Nonetheless, two-thirds of these women reported not having mammography recommended to them by their physicians. Other studies have also reported this phenomenon of a “missed opportunity” for conducting or recommending screening.^{30–32}

The rural women in the current study reported real barriers to receiving mammograms, such as “no time to get the test” and “having to go to a different facility to get the test.” In general, women knew where to go to receive mammographic screening. However, they reported lacking encouragement, time, and the funds to do so. Despite the existence of the BCCDP, few women knew of and/or took advantage of this program. This is unfortunate, as this program would serve most women in this population and would address the cost barrier. Pain and embarrassment associated with the test were reported by approximately 30% of respondents. Overall, perceived risk of and levels of concern regarding breast carcinoma development were low, which may reflect either poor knowledge of the risk factors for breast carcinoma or competing demands in respondents’ lives.³³

Because all of the women in the current study were in need of a mammogram, comparisons with previous studies examining overall and recent mammography use are not truly appropriate. In general, however, previous studies have found that women who are older, have lower SES, lack insurance, are unmarried, smoke, lack a regular source of health care, and have a lower risk of developing breast carcinoma are less likely to have ever or to have recently received a mammogram.^{28,34–38} The current cohort can be characterized in the same way as previous study populations, in that barriers and lack of knowledge have also been reported to hinder adherence to mammographic screening guidelines in past studies.^{28,35,39,40}

Racial disparities were evident among the current population of underserved women. In comparison with other patients, whites were significantly more likely to have private insurance, to have graduated from high school, to have a higher SES, and to be married. White women also showed a greater awareness of screening tests for breast and cervical carcinoma and demonstrated greater knowledge of breast carcinoma risk factors. With regard to screening barriers, white women cited insufficient time significantly more often than did women in the other two groups.

African Americans reported experiencing the least mammography-related embarrassment but were significantly less likely to report encouragement from a physician or family member regarding screening. African-American women also underestimated their risk of cancer significantly more often compared with other women and were less likely than white women to have accurate knowledge regarding breast carcinoma. Compared with all other women, Native American women had the lowest levels of education, insurance coverage,

and accurate knowledge regarding breast carcinoma, as well as the highest perceived breast carcinoma risk and elevated levels of concern regarding the development of this malignancy. Although more research is needed to clarify the reasons for these findings, our results may nonetheless assist others in designing future interventions aimed at improving cancer screening.

To our knowledge, few studies of breast carcinoma screening in Native American populations have been conducted.⁴¹ Gilliland et al.⁴² reported that even after vigorous implementation of breast carcinoma screening programs that lowered the barriers of cost, availability, and access to Native American and Hispanic women in New Mexico, the annual screening rates for women age > 50 years remained low (37% and 40%, respectively). Those investigators stressed the need for research aimed at identifying barriers and designing effective intervention strategies for the women in their study. Another report revealed that older Native American women in the United States were less likely to be screened for breast and cervical carcinoma and that those with less formal education had even lower screening rates.⁴³ However, women who had visited a physician in the preceding year were more likely to be screened. Additional barriers that have been reported are geographic isolation, rural residence, lack of transportation, poverty, unemployment, language barriers, lack of knowledge, and cultural factors.^{20,43,44}

In conclusion, the current study describes the characteristics of women in a poor, rural county who did not adhere to mammographic screening guidelines. Barriers to mammography use varied among the three racial groups studied, with significant disparities evident among African-American and, especially, Native American women compared with white women. The results of the current study point to groups of women who require interventions to change their beliefs, minimize their barriers, and improve their level of knowledge, thereby making them more likely to adhere to screening guidelines. In addition, according to our findings, low-income women are in need of encouragement to be screened and of information regarding opportunities to obtain low-cost mammography.

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TABLE 1

Demographic Characteristics of Participants by Racial Group

Characteristic	% of patients				P value ^b
	African American (n = 295)	Native American (n = 371)	White (n = 226)	All (n = 892)	
Age (yrs)					
40–49	49	40	36	42	0.016 (African American vs. Native American 0.051; African American vs. white 0.037)
50–59	22	31	28	27	
60–69	15	16	18	16	
70–79	10	11	12	11	
80	3	2	6	3	
Mean (SD)	54.5 (11.6)	54.7 (10.7)	57.2 (12.0)	55.3 (11.4)	0.016 (African American vs. white 0.009; Native American vs. white 0.012)
Education					
Less than high school graduate	38	51	41	44	0.002 (African American vs. Native American 0.001; Native American vs. white 0.044)
High school graduate	38	26	30	31	
Some college/college graduate	25	23	30	25	
Work status					
Work full-time/part-time	45	39	42	42	0.075
Retired	12	11	18	13	
Homemaker	11	16	14	14	
Disabled	25	27	22	25	
Other	7	6	4	6	
Highest SES ^a	15 (43/292)	15 (55/370)	24 (53/219)	17 (151/881)	0.006 (African American vs. white 0.007; Native American vs. white 0.005)
Marital status					
Married/living together	35	50	54	46	< 0.001 (African American vs. Native American < 0.001; African American vs. white < 0.001; Native American vs. white 0.014)
Divorced/separated	27	23	19	23	
Widowed	24	20	26	23	
Never married	15	7	2	8	
Insurance					
Private	34	32	45	36	0.012 (African American vs. white 0.014; Native American vs. white 0.004)
No private insurance	65	66	53	62	

Characteristic	% of patients				P value ^b
	African American (n = 295)	Native American (n = 371)	White (n = 226)	All (n = 892)	
Unknown	1	2	3	2	

SD: standard deviation; SES: socioeconomic status.

^a Highest of four SES categories is defined as follows: had private insurance, high school graduate or more, and household income ≥\$20,000 per year. New totals are shown in parentheses, due to missing data from 47 individuals for this question.

^b P values from chi-square tests (two-sided) for overall race effect followed by pairwise comparisons between races. A significance level of 0.05 was used for the overall race comparisons. Bonferroni adjustments created a significance level of 0.05/3 = 0.0167 for each pairwise comparison.

TABLE 2

Screening Rates at Baseline

Characteristic	% of patients				P value ^d
	African American (n = 295)	Native American (n = 371)	White (n = 226)	All (n = 892)	
Mammography					
Never	28	19	26	24	0.003 (African American vs. white 0.054; African American vs. Native American < 0.001)
Within last 3 yrs	60	59	54	58	
> 3 yrs ago	13	22	21	19	
Pap test					
Never	1	2	1	2	0.535
Within last 3 yrs	83	81	79	81	
> 3 yrs ago	16	16	20	17	
Clinical breast examination					
Never	6	9	8	8	0.589
Within last yr	50	51	48	50	
> 1 yr ago	44	40	45	43	

Pap: Papanicolaou.

^a P values from chi-square tests (two-sided) for overall race effect followed by pairwise comparisons between races. A significance level of 0.05 was used for the overall race comparisons. Bonferroni adjustments created a significance level of $0.05/3 = 0.0167$ for each pairwise comparison.

TABLE 3

Baseline Risk Factors for Breast Carcinoma

Characteristic	% of patients				P value ^b
	African American (n = 295)	Native American (n = 371)	White (n = 226)	All (n = 892)	
Ever treated for cancer (colon, ovarian, or breast)	1	2	4	2	0.086
Family history of breast carcinoma	16 (47/285)	21 (74/358)	27 (55/206)	21 (176/849)	0.023 (African American vs. white 0.006)
Early age at menarche (< 12 yrs) ^d	15 (40/264)	15 (51/336)	16 (31/190)	15 (122/790)	0.930
Nulliparity/late age at first birth	10	10	15	11	0.072
Smoker—current	26	32	32	30	0.154

^aNumbers in parentheses reflect new totals (due to missing responses or inapplicable data).

^bP values from chi-square tests (two-sided) for overall race effect followed by pairwise comparisons between races. A significance level of 0.05 was used for the overall race comparisons. Bonferroni adjustments created a significance level of $0.05/3 = 0.0167$ for each pairwise comparison.

TABLE 4

Modifiable Factors by Racial Group: Barriers

Barrier/characteristic	% of patients				P value ^c
	African American (n = 295)	Native American (n = 371)	White (n = 226)	All (n = 892)	
Too hard to find time	17	24	30	23	0.003 (African American vs. white < 0.001; African American vs. Native American 0.035)
Would rather not receive mammogram at different place ^a	28 (75/270)	29 (100/348)	24 (51/216)	27 (227/834)	0.466
Unaware of where to go to receive mammogram ^a	10 (30/287)	11 (38/360)	8 (17/220)	10 (85/867)	0.487
Physician did not encourage mammography	70	66	63	67	0.203
Ever had mammogram without physician ordering it? ^{a,b}	29 (63/214)	29 (87/300)	27 (46/168)	29 (196/682)	0.899
Ever asked physician to order mammogram?	15	13	10	13	0.322
Ever been encouraged by someone to receive a mammogram?	48	56	62	45	0.009 (African American vs. white 0.002)
No insurance	27	32	22	28	0.016 (Native American vs. white 0.005)
Never heard of BCCDP	87	90	91	89	0.381

BCCDP: Breast and Cervical Cancer Detection Program.

^aNumbers in parentheses reflect new totals due to missing data.^bOnly for those who reported having received a mammogram.^cP values from chi-square tests (two-sided) for overall race effect followed by pairwise comparisons between races. A significance level of 0.05 was used for the overall race comparisons. Bonferroni adjustments created significance levels of $0.05/3 = 0.0167$ for each pairwise comparison.

TABLE 5

Modifiable Factors, by Racial Group: Beliefs

Statement	% of patients who agreed				P value ^c
	African American (n = 295)	Native American (n = 371)	White (n = 226)	All (n = 892)	
Too embarrassing to receive a mammogram ^a	13 (37/287)	27 (99/364)	30 (66/219)	23 (202/370)	< 0.001 (African American vs. white < 0.001; African American vs. Native American < 0.001)
Radiation from mammogram can cause cancer ^a	16 (33/203)	19 (50/260)	15 (25/170)	17 (108/633)	0.444
Mammogram is painful ^a	33 (71/216)	39 (116/300)	40 (68/169)	37 (255/685)	0.262
I feel healthy—why bother receiving mammogram?	29	30	30	30	0.873
Self-rating of breast carcinoma risk: ^b					
Much lower or somewhat lower than average	36	28	34	32	0.057
Average	42	48	50	46	
Somewhat or much higher than average	22	24	16	21	
Amount of concern about developing breast carcinoma					< 0.001 (African American vs. Native 0.002; Native American vs. white 0.002)
Extreme	14	22	11	16	
Moderate	10	15	18	14	
Slight or not at all	76	63	72	70	

^aNumbers in parentheses reflect new totals due to missing data.^bDue to missing data for this question, the new totals were 280 African Americans, 346 Native Americans, and 211 whites, for a total of 837 responses.^cP values from chi-square tests (two-sided) for overall race effect followed by pairwise comparisons between races. A significance level of 0.05 was used for the overall race comparisons. Bonferroni adjustments created a significance level of 0.05/3 = 0.0167 for each pairwise comparison.

TABLE 6

Modifiable Factors, by Racial Group: Knowledge

Statement	% of patients who knew whether statement was true or false				P value ^d
	African American (n = 295)	Native American (n = 371)	White (n = 226)	All (n = 892)	
Women should begin receiving screening mammograms at age 40 yrs ^a	28	31	37	32	0.112
Women should never stop receiving mammograms ^b	66	76	77	73	0.007 (African American vs. white 0.009; African American vs. Native American 0.006)
Women should receive screening mammograms at least once yearly	72	74	71	73	0.612
A woman can self-detect breast carcinoma ^c	78	77	84	79	0.086 (Native American vs. white 0.030)
Black women are more likely to develop breast carcinoma ^c	39	43	39	41	0.393
The only good treatment for breast carcinoma is breast removal ^c	56	51	65	56	0.002 (African American vs. Native American 0.034; Native American vs. white < 0.001)
Women who have never had children are less likely to develop breast carcinoma ^c	63	56	65	61	0.043 (African American vs. Native American 0.048; Native American vs. white 0.029)
Older women are more likely to develop breast carcinoma than are younger women	54	56	51	54	0.530

^a Percentages represent women who responded that women should begin screening between ages 40 and 44 years.^b Women were asked to select an age at which they should stop receiving a mammogram or whether they should never stop.^c Percentages represent women who disagreed with this statement.^d P values from chi-square tests (two-sided) for overall race effect followed by pairwise comparisons between races. A significance level of 0.05 was used for the overall race comparisons. Bonferroni adjustments created a significance level of $0.05/3 = 0.0167$ for each pairwise comparison.