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Breast cancer literacy and health beliefs related to breast cancer screening among American Indian women

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Abstract

The purpose of this article is to examine the health beliefs and literacy about breast cancer and their relationship with breast cancer screening among American Indian (AI) women. Using the Health Belief Model (HBM) and hierarchical logistic regression with data from a sample of 286 AI female adults residing in the Northern Plains, we found that greater awareness of breast cancer screening was linked to breast cancer screening practices. However, perceived barriers, one of the HBM constructs, prevented such screening practices. This study suggested that culturally relevant HBM factors should be targeted when developing culturally sensitive breast cancer prevention efforts.

Keywords

American Indian women; breast cancer literacy; breast cancer screening; health beliefs

Introduction

Early detection of breast cancer is essential to treatment and survival of patients (Wu & Ronis, 2009) as breast cancer remains the second highest cause of cancer death and the most frequently diagnosed cancer in the United States (American Cancer Society, 2016). Despite a decrease in breast cancer deaths by 36% from 1989 to 2012 among the general U.S. population (American Cancer Society, 2016), American Indian (AI) women—particularly those residing in the Northern Plains (e.g., Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, and Wyoming)—have not

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benefited from this same decline, largely due to disproportionately low screening rates experienced by the population (Roen, Roubidoux, Joe, Russell,&Soliman, 2013; Roubidoux, 2012; White, Richardson, Li, Ekwueme, & Kaur, 2014). In fact, a study examining the cancer screening patterns from 1997 to 2006 found no significant improvement in screening rates for Northern Plains AIs (Watanabe-Galloway et al., 2011). Thus, breast cancer screening disparities experienced by AI women are highly salient for social work researchers and practitioners focusing on health equity and health disparities. Given AIs residing in the Northern Plains experience some of the most severe breast cancer screening disparities, the purpose of this article is to examine the health beliefs and literacy about breast cancer and breast cancer screening of AI women residing in the Northern Plains, predicting the receipt of clinical breast exams (CBEs) and/or mammographies.

Breast cancer disparities among AI women

Experiencing some of the lowest screening rates in comparison with non-AI women, breast cancer mortality represents the second highest cause of death among AI women (Filippi et al., 2013; Ndikum-Moffor, Braiuca, Daley, Gajewski, & Engelman, 2013; Roen et al., 2013; Roubidoux, 2012; Wingo et al., 2008). Related to low screening rates, when AI women are diagnosed with breast cancer, they tend to be diagnosed at later stages of the disease and experience a higher risk of mortality (Filippi et al., 2013; Li, Malone, & Daling, 2003; Roen et al., 2013; Roubidoux, 2012; Wingo et al., 2008). Although certain risks for breast cancer are not modifiable (e.g., older age, family history of breast or ovarian cancer, genetic factors, type II diabetes, and certain reproductive and bodily factors), late stage diagnosis undermines women's ability to change modifiable risk factors for breast cancer (e.g., weight gain, smoking, lack of exercise, and alcohol use (see American Cancer Society, 2016). Other research reports that breast cancer tends to be diagnosed at younger ages and later stages for American Indian and Alaska Native (AI/AN) women (Harper et al., 2009; Roubidoux, 2012; White et al., 2014). Reasons for AI late-stage diagnosis may include low breast cancer screening rates, less education, poverty, less access to health care, as well as cultural and institutional factors (Filippi et al., 2013;Wingo et al., 2008). Finally, AI women experience some of the lowest five-year breast cancer survival rates (Filippi et al., 2013; Ndikum-Moffor et al., 2013).

Unfortunately, the cancer information for AI/AN is incomplete, and more accurate information reflecting the true cancer burden on these populations is needed (American Cancer Society, 2016; Roubidoux, 2012). Cancer incidence rates vary greatly across the distinct tribal and geographic contexts (Espey et al., 2007; Kaur, Burhansstipanov, & Krebs, 2013; Roen et al., 2013; Roubidoux, 2012). For example, within the Northern Plains region, the breast cancer rate is 115.9 (per 100,000), whereas the rate in the Southwest has been reported as low as 50.8 (Kaur et al., 2013). When AI and Alaska Natives are grouped together, some studies have found that breast cancer rates of 80.5 per 100,000 in comparison with 127.3 per 100,000 among Whites (Kaur et al., 2013). Other studies report the breast cancer incidence rate for AI/ANs being 91.9 per 100,000 in comparison with a breast cancer rate of 128.1 among non-Hispanic Whites (NHW) (American Cancer Society, 2016).

When steps to reduce misclassification have been taken, breast cancer incidence rates varied across regions, with some of the highest rates being identified for the Northern and Southern Plains AIs (Wingo et al., 2008). Thus, calculating statistics for the total AI populations leads to erroneous conclusions about the AI cancer burden (Kaur et al., 2013). Given the Northern Plains is the focal region of the current study, the focus now turns to this area.

AI breast cancer disparities in the northern plains

Research reports that AI women residing in the Northern Plains tend to experience higher incidence of breast cancer, lower rates of mammography screening, and higher rates of breast cancer death in comparison NHW residing in this area (Espey et al., 2007; Roen te al., 2013; Watanabe-Galloway et al., 2011). Moreover, Northern Plains AI women over 40 years of age were found to have significantly lower past two-year CBEs and mammograms than NHWs residing in the same region (Watanabe-Galloway et al., 2011). Other research reports Northern Plains AI women, ages 40–64, tend to experience late onset breast cancer diagnoses at a rate of 36.0% in comparison with 27.8% for NHWs residing in this same region (Wingo et al., 2008). Likewise, between the years of 1999 and 2004, NHWs in the Northern Plains experienced a −3.3 annual percentage decline in breast cancer incidence, whereas the AIs from this same region only experienced a −1.4 annual percentage decline (Wingo et al., 2008). Thus, AI women in the Northern Plains are particularly vulnerable to breast cancer and screening disparities, making this region of utmost interest.

The Health Belief Model

The Health Belief Model (HBM) is a widely used theory in breast cancer research (Glanz, Rimer, & Viswanath, 2008; Koh, Choi, & Cho, 2015). It has been used across mainstream and ethnic minority populations to examine beliefs about breast cancer screening behaviors, such as receipt of a CBE and a mammography (Koh et al., 2015; Wu & Ronis, 2009; Wu, West, Chen, & Hergert, 2006). The HBM assesses people’s perceptions about the relative benefits (e.g., breast cancer screening are effective preventative measures) to the barriers (e.g., it takes too much time, I don’t have transportation, and it is too costly to receive breast cancer screenings) of receiving preventive health services (Koh et al., 2015; Lee, Stange,& Ahluwalia, 2015; Wu & Ronis, 2009; Wu et al., 2006). Other salient beliefs about breast cancer may include susceptibility to the disease (e.g., having a family history of breast cancer) and severity (e.g., belief that breast cancer can be lethal), along with motivation (e.g., wanting to live a healthy lifestyle) and confidence in one’s ability to overcome perceived barriers are thought to influence whether someone is likely to engage in preventive health behaviors (Koh et al., 2015; Lee et al., 2015; Wu & Ronis, 2009; Wu et al., 2006). Among AIs, a study on perceived barriers to breast cancer screening were identified in a study of 255 AI women in Oklahoma, which found that barriers (i.e., long wait-times and complex referral processes) predicted the receipt of mammography in the past two years (Tolma, Stoner, Li, Kim, &Engelman, 2014). Perceived vulnerability to breast cancer, access to quality health care, affordable screenings, and the cultural appropriateness of health care providers were all factors that affected older AI women’s mammography use (James, Gold, St John-BlackBird, & Brown Trinidad, 2015).

The current study

Though some research has identified barriers reported among AI women, an absence of geographically specific knowledge of how breast cancer literacy and beliefs among Northern Plains AI women predict breast cancer screenings precludes addressing this pressing health disparity. To predict AI women residing in the Northern Plains' receipt of a CBE and mammography, we propose the following five hypotheses. AI women who:

1. Have greater awareness of CBEs or mammography will be significantly more likely to receive a CBE or mammography.
2. Have greater knowledge about breast cancer will be significantly more likely to receive a CBE or mammography.
3. Believe in the benefits of CBE and mammography will be significantly more likely to receive a CBE or mammography.
4. Perceive greater barriers to the receipt of CBE and mammography will be significantly less likely to receive a CBE or mammography.
5. Are motivated to live a healthy lifestyle will be significantly more likely to receive a CBE or mammography.

Methods

Research design and data collection

This study used a cross-sectional survey design with convenience sampling of AI women in South Dakota. This study employed a combination of purposive and snowball sampling techniques to recruit participants. After approval from the Institutional Review Board at the University of South Dakota, the lead author contacted several different off-reservation localities including two senior centers, five senior housings in Sioux Falls, two AI churches, and three powwows coordinators in Brookings, Sioux Falls, and Vermilion, South Dakota. In the process of recruiting participants, flyers were posted in the public areas – such as public board, lunch, and recreational rooms – of these 12 sites. A number of research informational presentations were conducted describing the purpose of the study, eligibility criteria, the types of questions to be asked, confidentiality, anonymity of participation, the duration of the interview, and the voluntary nature of participation. To avoid bias from selecting only active people as the study participants, snowball sampling was also employed. Participants from the original sampling (members of two senior centers, five senior housings, two AI churches, and three powwows) were asked to talk about the research project with others who might meet the eligibility requirements, even though they may be socially and geographically isolated. These individuals were given the phone number to contact the researcher if they desired to participate in the study.

CBE is recommended every three years for women ages 20 years and older yearly for women ages 40 years and older (American Cancer Society, 2017b). Therefore, inclusion criteria consisted of women who were an AI woman and be 18 years of age or older and reside in South Dakota at time of interview. Willing participants completed a self-administered survey sometime between September 2013 and March of 2014. While

questionnaires were designed to be self-administered, trained interviewers who were AI college students were available to assist anyone who needed assistance; five participants needed such assistance. Prior to each survey, eligible participants gave informed written consent. The questionnaire took approximately 30 minutes to complete; participants received honorarium of $10 for their time. A total of 289 AI women participated in the study. Three surveys were excluded due to missing data, resulting in a final sample of 286 AI female adults.

Measures

Dependent variables—There were two dependent variables: (1) receipt of a CBE in the participant's lifetime and (2) receipt of a mammogram at least once in the woman's lifetime. Participants were asked whether they had ever had a CBE or mammogram. Response options were *yes* = 1 or *no* = 0. "Life-time" was used as the time frame, rather than the "past two years" to identify which HBM constructs are actually correlated with AI women's receipt of CBE or mammogram at any point in their lives.

Independent variables

Breast cancer literacy factors: The factors of breast cancer literacy include awareness regarding (1) CBE or (2) mammogram as well as (3) knowledge of breast cancer. The following two questions were used to measure the awareness of CBE or mammogram: "Have you ever heard of clinical breast exam?" and "Have you ever heard of Mammogram screening?" Responses to both items were coded 1 for *yes* and 0 for *no*.

To measure the knowledge of breast cancer, we developed the instrument using 10 questions from the American Cancer Society breast cancer guidelines (American Cancer Society [ACS], 2017a, 2017b) and other studies (Grunfeld, Ramirez, Hunter, & Richards, 2002; Smith et al., 2003) with true or false statements. We chose five breast cancer screening guidelines (e.g., "Yearly mammograms are recommended starting at age 40 and continuing for as long as a woman is in good health" and "Breast self-exam (BSE) is an option for women starting in their 20s") and five possible risk factors (e.g., "Mutations of some kinds of genes can lead to breast cancers" and "Women whose close blood relatives have breast cancer have a higher risk for this disease") based on a review of the previous literatures (ACS, 2017a, 2017b; Grunfeld et al., 2002; Smith et al., 2003). Responses were coded 1 for *true* and 0 for *false*. Correct answers will have the scores ranging from 0 to 10. Higher scores indicate greater knowledge of breast cancer.

Health beliefs: This study employed the HBM constructs (Champion, 1993; Champion et al., 2008; Glanz et al., 2008; Koh et al., 2015; Rosenstock, Strecher, & Becker, 1988) to measure health beliefs. Previous studies have found significant correlations between perceived benefits and barriers, respectively, and mammography use (Champion, 1991; Champion et al., 2008; Fulton et al., 1991; Glanz et al., 2008; VanDyke & Shell, 2017; Vernon, Laville, & Jackson, 1990). In this study, we adapted only three subscales from six subscales based on literature review (Champion, 1991; Fulton et al., 1991; Glanz et al., 2008; VanDyke & Shell, 2017; Vernon et al., 1990). The questionnaire consisted of 17 items. All items offered five response choices ranging from "*strongly disagree* (scores 1 point)" to

"*strongly agree* (scores 5 points)". Higher scores indicated more perceived benefits and motivation towards breast cancer screening except for barriers to breast cancer screening. Benefits of breast cancer screening consisted of five items scored from 5 to 25 (e.g., "When I participated in cancer screening I feel good aboutmyself"), barriers of breast cancer consisted of five items scored from 5 to 25 (e.g., "I am afraid to have a cancer screening because I might find out something is wrong"), and health motivation consisted of seven items scored from 7 to 35 (e.g., "I search for new information to improve my health"). Susceptibility, seriousness, and confidence for breast cancer screening were not assessed in this study. Prior to data analysis, a reliability analysis was conducted on the HBM questions. The coefficients of reliability were (1) $a = .90$, (2) $a = .82$, and (3) $a = .86$ for those three subscales, respectively.

Control variables: Demographic characteristics including age, marital status, employment, and education were used as control variables. The variable "age" and "education" were continuous variables. Employment was a dichotomous variable (1 = *being employed* and 2 = *unemployed*). Marital status was a categorical variable (1 = *never married*, 2 = *married*, and 3 = *other*).

Data analysis

This study employed descriptive statistics to understand demographic characteristics, chi-square/*t*-test to indicate age differences for the breast cancer factors, and a correlation matrix to know relationships among all variables using IBM SPSS Statistics version 21 (George & Mallery, 2013). Also, this study used hierarchical logistic regression to identify determinants of receipt of a CBE or mammogram, which are dichotomous dependent variables. There were two models based upon two dependent variables. The dependent variables of models 1 and 2 were the receipt of a CBE and the receipt of a mammogram. Each model followed specific three steps. In step 1, demographic variables (age, marital status, employment, and education) were entered as control variables. Variables of breast cancer literacy (awareness of CBE or mammogram and knowledge of breast cancer) were entered in Step 2. In model 1, we used the awareness of CBE, and in model 2, we used the awareness of mammogram. Then, variables of HBM constructs (benefits, barriers, and motivation) were entered in step 3. No multicollinearity problems were observed since the tolerance scores were greater than .70 in all independent variables (Mertler & Vannatta, 2010). Also, this study has less than 1% missing data and normal distributions were identified in main study variables of our sample.

Results

Demographic characteristics

Table 1 presents the demographic characteristics of 286 AI women. Participants ranged in age from 18 to 89 with a mean of 44.55 years; 31.1% were married, and only about 20% has less than high school diploma/General Educational Development. Among the participants, 37.2% earned less than $1,000 monthly and 51.8% were employed.

Regarding awareness, 92% of participants heard about the CBE and 94% heard about mammogram. The mean score of breast cancer literacy was 7.52 (±*SD* = 2.0), ranging from 0 to 10, indicating that respondents selected about 75% of correct answers. For HBM benefits, mean score was 17.9 (±*SD* = 3.9), ranging from 5 to 25, which states that the participants moderately agreed about the benefits of cancer screening detecting cancer early and decreasing mortality from cancer. For HBM barriers, mean score was 12.8 (±*SD* = 5.0), ranging from 5 to 25, indicating that the participants did not agree or disagree about the barriers of cancer screening such as taking too much time or painful. The mean score of HBM motivation was 24.9 (±*SD* = 5.7), ranging from 7 to 35, which states that the participants moderately agreed that maintaining good health and eating well-balanced meals are important. Also 75% of participants reported receiving a clinical breast cancer exam, and about 66% of participants reported receiving of a mammogram. In addition, this study used chi-square and *t*-test to understand age differences for the breast cancer factors. Their results indicated that the receipts of clinical breast cancer exam ($x^2 = 14.18$, $p \leq .001$) and mammogram ($x^2 = 33.85$, $p \leq .001$) were significantly different if they were over 50 years old or not. However, there were no age differences for the knowledge of breast cancer and awareness of clinical breast cancer exam and mammogram.

Bivariate correlations among all variables

Table 2 shows correlations among all variables. Receipt of a CBE was significantly correlated to receipt of a mammogram ($r = .62$, $p \leq .001$), age ($r = .42$, $p \leq .001$), married ($r = .12$, $p \leq .05$), awareness of CBE ($r = .41$, $p \leq .001$), awareness of mammogram ($r = .32$, $p \leq .001$), HBM benefits ($r = .22$, $p \leq .001$), HBM barriers ($r = -.20$, $p \leq .001$), and HBM motivation ($r = .16$, $p \leq .01$). Receipt of a mammogram was significantly associated with age ($r = .50$, $p \leq .001$), awareness of CBE ($r = .24$, $p \leq .001$), awareness of mammogram ($r = .28$, $p \leq .001$), HBM benefits ($r = .16$, $p \leq .01$), HBM barriers ($r = -.19$, $p \leq .01$), and HBM motivation ($r = .13$, $p \leq .05$).

Determinants of breast cancer screening

Tables 3 and 4 show the results of the hierarchical logistic regression. By using the odds ratios, the roles of independent variables on receipt of a CBE and receipt of a mammogram were explained.

Table 3 presents determinants of receipt of a CBE in the model 1. The Hosmer and Lemeshow test indicated the good fit of the model since the *p*-values in step 1 ($\chi^2 = 5.87$), step 2 ($\chi^2 = 8.41$), and step 3 ($\chi^2 = 7.23$) were greater than the established cut-off (.05) (Hosmer, Lemeshow, & Sturdivant, 2013). In all steps, age and other (divorced, separated, etc.) in marital status (vs. never married) were significant determinants of receipt of a CBE. In step 3, participants with older age were over one time higher than those with younger age to receive a CBE ($\beta = .07$, $p \leq .001$). Married participants or other (divorced, separated, etc.) in marital status were over three times higher than never married people to receive a CBE ($\beta = 1.20$, $p \leq .05$; $\beta = 1.11$, $p \leq .05$). Participants who heard about the CBE were over 18 times higher than those who have not heard about the exam to receive a CBE ($\beta = 2.93$, $p \leq .001$). HBM barrier was a negatively significant determinant to receive a CBE among AI women ($\beta = -.10$, $p \leq .05$).

Table 4 shows determinants of receipt of a mammogram in the model 2. The Hosmer and Lemeshow test revealed the good fit of the model because the *p*-values in step 1 ($\chi^2 = 5.48$), step 2 ($\chi^2 = 8.12$), and step 3 ($\chi^2 = 3.90$) were greater than the established cut-off. In all steps, age and other (divorced, separated, etc.) in marital status (vs. never married) were significant determinants of receipt of a mammogram. In step 3, participants with older age were over one time higher than those with younger age to receive a mammogram ($\beta = .08$, $p \leq .001$). Others (divorced, separated, etc.) in marital status were about two and half times higher than never married people to receive a mammogram ($\beta = .91$, $p \leq .05$). Participants who heard about the mammogram were over 25 times higher than those who have not heard about the mammogram to receive a mammogram ($\beta = 3.25$, $p \leq .01$). HBM barriers was a negatively significant determinant to receive a mammogram among AI women ($\beta = -.08$, $p \leq .05$).

Discussion and Implications

Before connecting results to hypotheses, it is first noteworthy that the vast majority of women were aware of CBE (91.5%) and mammograms (94.3%) were fairly knowledgeable about breast cancer, and most received a CBE (75.0%) and mammogram (66.2%). Although awareness rates were not available in extant research, other research comparing the breast cancer screening rates of AIANs in the Northern Plains in comparison with NHWs indicated that the past two-year proportion of respondents receiving a screening for CBE was 74.5% for AIANs from 2003 to 2006 in comparison with 79.3% among NHWs (Watanabe-Galloway et al., 2011). Likewise, 69.7% of AIANs in the Northern Plains had received a mammogram, whereas 76.0% of NHWs received a mammogram (Watanabe-Galloway et al., 2011). Both of these rates for AIANs were significantly lower than for NHWs, and AIAN CBE and mammogram screening rates did not significantly improve over the period of the study (Watanabe-Galloway et al., 2011). Although the percentages of screening for this study were slightly lower than those indicated by Watanabe-Galloway et al. (2011), they were very similar, and represent what appears to be the reported disparities in screening rate indicated by existing research. Regarding hypotheses, results fully support the first hypothesis, with AI women having greater awareness of CBEs being approximately 19 and 26 times more likely to receive a CBE and mammography, respectively. These findings indicate the importance of raising awareness about the need for CBEs and mammography. Relatedly, Filippi et al.'s (2013) qualitative study with 48 AI women indicated a lack of information about mammograms, such as why they are important, what the process is, and current screening guidelines in AI community (Filippi et al., 2013). This information is important to address in community awareness programmes. Likewise, studies have found that talking about breast health and breast cancer was not normative for participants across multiple AI contexts (Filippi et al., 2013; Ndikum-Moffor et al., 2013). Thus, identifying appropriate and culturally sensitive ways to raise awareness is a focal need for future research and social work practice in breast cancer prevention. Gotay et al. (2000) described such a culturally appropriate intervention where Native Hawaiian lay health educators facilitated groups that relayed health information in the culturally congruent "talk story" tradition. Such an intervention could be tailored to be culturally specific to AI tribes, integrating the HBM as part of its core tenets.

Regarding the second hypothesis, having greater knowledge about breast cancer in itself did not significantly predict CBE and/or mammography. It may be that most AI women have a general knowledge of breast cancer, which has been supported by other AI research. For example, Filippi et al.'s (2013) study found that most AI women had a general understanding of breast cancer risk factors and the sources of information came from friends, family, and cancer information materials. Likewise, hypothesis 3 was not fully supported, indicating the belief in the benefits of CBE and mammography did not significantly predict whether AI women received a CBE and/or mammography. Yet, a significant bi-variate correlation was found between belief in the benefits with both the receipt of CBE and mammograms.

Hypothesis 4, however, was fully supported, indicating that perceived barriers were significantly associated with both lower CBE and mammograms. For this study barriers for cancer screening included fearing finding out something is wrong, not understanding what will be done in screening, feeling embarrassed by screening, thinking screening will take too much time, and thinking screening will be too painful. Other research also found only barriers of the HBM, along with breast cancer literacy to predict the receipt of mammography (Wu & Ronis, 2009). AI research identified barriers to mammography including cost, competing demands, no health insurance, lack of transportation, distance to screening, and fear of identifying cancer (Filippi et al., 2013). Likewise, these Midwestern AI women identified the primary barriers of cost, time constraints, transportation, and perceived discrimination for breast cancer screening (Ndikum-Moffor et al., 2013). This research indicates a clear need to address such barriers, and such strategies could greatly improve likelihood of breast cancer screenings. Finally, hypothesis 5, motivation, did not significantly predict either breast screening outcome, although the correlations was significant in bi-variate calculations. Thus, although motivation may be a factor, it was not found to be a strong determinant of breast cancer screening among this sample. Older age was a determinant of CBE and mammogram (as age increased, so did likelihood of receiving a CBE and mammogram), which is commensurate with other research (American Cancer Society, 2016). Finally, being divorced or widowed increased likelihood of receiving a CBE and mammogram, which contrasts extant research that indicates being married tends to be associated with a higher likelihood of lifetime CBE (Lee et al., 2015). It may be that people who are divorced are more likely to be older in age than those who are married, mediating the relationship, rather than divorce itself being directly related to receipt of CBE or mammogram.

Culturally specific prevention strategies are needed to make prevention efforts and intervention efforts relevant and effective. Kaur et al. (2013) provide a comprehensive list of 26 such recommendation to overcome AI cancer disparities, the most salient including (a) focusing on prevention; (b) early detection and access to quality health care; (c) adapting cancer screening programmes to reflect local needs; (d) obtaining accurate local tribal data and replacing national data sources with regional ones where available; and (e) creating/modifying/and implementing culturally appropriate breast health early detection programmes and policies, among AIs. Clearly, much social work research and practice is needed to address AI breast cancer screening rates, with many promising prevention pathways identified for future work.

Limitations

This study has several limitations. The sampling approach was a convenience sample, and distinct to the geographic location. Also, data on tribal membership was not collected. Women who participated could differ systematically from those who chose not to participate; therefore, we cannot assume this sample to be broadly representative. Studies with more representative samples of AI women generally (and also across different tribes and rural/urban contexts), as well as comparison samples (e.g., NHW and other ethnic minorities) will provide a fuller picture of breast cancer screening. Additionally, findings only can be generalized to populations with similar characteristics. The use of women's self-report in CBE and mammography screening was not validated and the validity of these measures among AI women was not available. Future research should include measures to verify women's reports on screening practices with medical record review. Also, the responses may be subject to social desirability or desirability response bias, in which participants answer in a manner viewed favorably by others or the researcher. Finally, as a result of the cross-sectional design, causal relationships between factors and screening behaviors cannot be determined. Thus, future study is necessary to establish cause-and-effect relationship by conducting a longitudinal study.

Conclusion

In closing, the results of this study indicate that increasing awareness and addressing barriers may be among the most promising areas to address in improving AI breast cancer screening rates. Community education and awareness campaigns as well as medical practitioners and social workers providing proper education in health care settings are some of the ways to increase AI awareness about breast cancer and breast cancer screening practices. General information about breast cancer did not necessarily translate to AI women feeling personally compelled to engage in breast cancer screening practices. Thus, more nuanced and context-specific information may be more valuable. Barriers to CBE and mammograms were significant predictors of screening, indicating that health care practitioners can address the specific barriers indicated in this study, such as fearing finding out something is wrong, not understanding what will be done in screening, feeling embarrassed by screening, thinking screening will take too much time, and thinking screening will be too painful. Psychoeducational programmes can incorporate and address these fears and misperceptions to increase the accessibility of culturally congruent breast cancer screening practices for AI women.

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References

American Cancer Society. Cancer facts & figures 2016. Atlanta, GA: Author; 2016.

American Cancer Society. American cancer society recommendations for the early detection of breast cancer. 2017a. Retrieved from https://www.cancer.org/cancer/breast-cancer/screening-tests-and-early-detection/american-cancer-society-recommendations-for-the-early-detection-of-breast-cancer.html

American Cancer Society. History of ACS recommendations for the early detection of cancer in people without symptoms. 2017b. Retrieved from https://www.cancer.org/healthy/find-cancer-early/cancer-screening-guidelines/chronological-history-of-acs-recommendations.html

Champion VL. The relationship of selected variables to breast cancer detection behaviors in women 35 and older. Oncology Nursing Forum. 1991; 18(4):733–739. [PubMed: 2067962]

Champion VL. Instrument refinement for breast cancer screening behaviors. Nursing Research. 1993; 42(3):139–143. [PubMed: 8506161]

Champion VL, Monahan PO, Springston JK, Russell K, Zollinger TW, Saywell RM, Maraj M. Measuring mammography and breast cancer beliefs in African American women. Journal of Health Psychology. 2008; 13(6):827–837. [PubMed: 18697896]

Espey DK, Wu X, Swan J, Wiggins C, Jim MA, Ward E, Miller BA. Annual report to the nation on the status of cancer, 1975–2004, featuring cancer in American Indians and Alaska Natives. Cancer. 2007; 110(10):2119–2152. [PubMed: 17939129]

Filippi MK, Ndikum-Moffor F, Braiuca SL, Goodman T, Hammer TL, James AS, Daley CM. Breast cancer screening perceptions among American Indian women under age 40. Journal of Cancer Education. 2013; 28(3):535–540. [PubMed: 23813490]

Fulton JP, Buechner JS, Scott HD, DeBuono BA, Feldman JP, Smith RA, Kovenock D. A study guided by the health belief model of the predictors of breast cancer screening of women ages 40 and older. Public Health Reports. 1991; 106(4):410–420. [PubMed: 1908592]

George, D., Mallery, P. IBM SPSS statistics 21 step by step: A simple guide and reference. New York, NY: Pearson; 2013.

Glanz, K.Rimer, BK., Viswanath, K., editors. Health behavior and health education: Theory, research, and practice. San Francisco, CA: John Wiley & Sons; 2008.

Gotay CC, Banner RO, Matsunaga DS, Hedlund N, Enos R, Issell BF, DeCambra HO. Impact of a culturally appropriate intervention on breast and cervical screening among native Hawaiian women. Preventive Medicine. 2000; 31(5):529–537. [PubMed: 11071833]

Grunfeld EA, Ramirez AJ, Hunter MS, Richards MA. Women's knowledge and beliefs regarding breast cancer. British Journal of Cancer. 2002; 86(9):1373–1378. [PubMed: 11986766]

Harper S, Lynch J, Meersman SC, Breen N, Davis WW, Reichman MC. Trends in area-socioeconomic and race-ethnic disparities in breast cancer incidence, stage at diagnosis, screening, mortality, and survival among women ages 50 years and over (1987–2005). Cancer Epidemiology, Biomarkers & Prevention: A Publication of the American Association for Cancer Research, Cosponsored by the American Society of Preventive Oncology. 2009; 18(1):121–131. DOI: 10.1158/1055-9965.EPI-08-0679

Hosmer, DW., Jr, Lemeshow, S., Sturdivant, RX. Applied logistic regression. John Hoboken, NJ: Wiley & Sons; 2013.

James RD, Gold DE, St John-BlackBird A, Brown Trinidad S. Factors that influence mammography use among older American Indian and Alaska native women. Journal of Transcultural Nursing. 2015; 26(2):137–145. DOI: 10.1177/1043659614523994 [PubMed: 24626283]

Kaur, JS., Burhansstipanov, L., Krebs, LU. Understanding the true burden of cancer in American Indian and Alaska native communities. In: Jackson, OT., Evans, KA., editors. Health disparities. Hauppauge, NY: Nova Science Publishers; 2013. p. 39-76.

Koh E, Choi G, Cho JY. Effectiveness of an ongoing, community-based breast cancer prevention program for Korean American women. Health & Social Work. 2015; 41(1):51–59. DOI: 10.1093/hsw/hlv086

Lee HY, Stange MJ, Ahluwalia JS. Breast cancer screening behaviors among Korean American immigrant women: Findings from the health belief model. Journal of Transcultural Nursing:

Official Journal of the Transcultural Nursing Society/Transcultural Nursing Society. 2015; 26(5): 450–457. DOI: 10.1177/1043659614526457

Li CI, Malone KE, Daling JR. Differences in breast cancer stage, treatment, and survival by race and ethnicity. Archives of Internal Medicine. 2003; 163(1):49–56. [PubMed: 12523916]

Mertler, CA., Vannatta, RA. Advanced and multivariate statistical methods. 4. Los Angeles, CA: Pyrecek; 2010.

Ndikum-Moffor FM, Braiuca S, Daley CM, Gajewski BJ, Engelman KK. Assessment of mammography experiences and satisfaction among American Indian/Alaska native women. Women's Health Issues. 2013; 23(6):e395–e402. [PubMed: 24183414]

Roen EL, Roubidoux MA, Joe AI, Russell TR, Soliman AS. Adherence to screening mammography among American Indian women of the northern plains. Breast Cancer Research and Treatment. 2013; 139(3):897–905. [PubMed: 23749344]

Rosenstock IM, Strecher VJ, Becker MH. Social learning theory and the health belief model. Health Education Quarterly. 1988; 15(2):175–183. [PubMed: 3378902]

Roubidoux MA. Breast cancer and screening in American Indian and Alaska native women. Journal of Cancer Education. 2012; 27(1):66–72.

Smith RA, Saslow D, Sawyer KA, Burke W, Costanza ME, Evans WP, Sener S. American cancer society guidelines for breast cancer screening: Update 2003. CA: A Cancer Journal for Clinicians. 2003; 53(3):141–169. [PubMed: 12809408]

Tolma EL, Stoner JA, Li J, Kim Y, Engelman KK. Predictors of regular mammography use among American Indian women in Oklahoma: A cross-sectional study. BMC Women's Health. 2014; 14(1)doi: 10.1186/1472-6874-14-101

VanDyke SD, Shell MD. Health beliefs and breast cancer screening in rural appalachia: An evaluation of the health belief model. Journal of Rural Health. 2017; 33(4):350–360. [PubMed: 27545099]

Vernon SW, Laville EA, Jackson GL. Participation in breast screening programs: A review. Social Science & Medicine. 1990; 30(10):1107–1118. [PubMed: 2194294]

Watanabe-Galloway S, Flom N, Xu L, Duran T, Sioux R, Frerichs L, Jaiyeola AO. Cancer-related disparities and opportunities for intervention in Northern plains American Indian communities. Public Health Reports. 2011; 126(3):318–329. [PubMed: 21553659]

White A, Richardson LC, Li C, Ekwueme DU, Kaur JS. Breast cancer mortality among American Indian and Alaska native women, 1990–2009. American Journal of Public Health. 2014; 104(S3):S432–S438. [PubMed: 24754658]

Wingo PA, King J, Swan J, Coughlin SS, Kaur JS, Erb-Alvarez JA, Arambula Solomon TG. Breast cancer incidence among American Indian and Alaska native women: US, 1999–2004. Cancer. 2008; 113(S5):1191–1202. [PubMed: 18720389]

Wu T, Ronis D. Correlates of recent and regular mammography screening among Asian-American women. Journal of Advanced Nursing. 2009; 65(11):2434–2446. [PubMed: 19761457]

Wu T, West B, Chen Y, Hergert C. Health beliefs and practices related to breast cancer screening in Filipino, Chinese and Asian-Indian women. Cancer Detection and Prevention. 2006; 30(1):58–66. [PubMed: 16458452]

Table 1

Descriptive characteristics of study participants (N = 286).

			% or *Mean*
Sociodemographics			
Age	Ranged from 18 to 89 (SD = 15.09)	*Mean*	44.6
Marital status	Married		31.1
	Never married		35.7
	Others		33.2
Education	Lower than high school diploma/GED		20.2
	High school diploma/GED		57.8
	Bachelor degree or greater than bachelor degree		23.0
Monthly income	Less than $1,000		37.2
	$1,001 to $2,000		26.2
	$2,001 to $3,000		21.5
	Over $3,001		15.1
Being employed	Yes		51.8
	No		48.2
Breast cancer literacy			
Awareness of clinical breast exam	Yes		91.5
	No		8.5
Awareness of Mammogram	Yes		94.3
	No		5.7
Knowledge of breast cancer	Ranged from 0 to 10 (SD = 2.0)	*Mean*	7.5
HBM constructs			
HBM benefits	Ranged from 5 to 25 (SD = 3.9)	*Mean*	17.9
HBM barriers	Ranged from 5 to 25 (SD = 5.0)	*Mean*	12.8
HBM motivation	Ranged from 7 to 35 (SD = 5.7)	*Mean*	24.9
Receipt of breast cancer screening			
Receipt of clinical breast exam	Yes		75.0
	No		25.0
Receipt of Mammogram	Yes		66.2
	No		33.8

Table 2

Correlations among variables ($N = 286$).

	1	2	3	4	5	6	7	8	9	10	11
1. Receipt of a clinical breast exam											
2. Receipt of a mammogram	.62***										
3. Age	.42***	.50***									
4. Married	.12*	.09	.18***								
5. Being employed	.06	.05	−.06	.11*							
6. Education	.06	−.06	.01	.11*	.34***						
7. Awareness of clinical breast exam	.41***	.24***	.16**	−.05	.04	.11					
8. Awareness of mammogram	.32***	.28***	.08	.03	.07	.10	.69***				
9. Knowledge of breast cancer	.12	.03	−.07	.05	.19**	.13*	.14*	.18**			
10. HBM benefits	.22***	.16**	.12*	.03	.02	.00	.17**	.13*	.07		
11. HBM barriers	−.20***	−.19**	−.06	−.03	−.71***	−.18***	−.07	−.08	−.01	.00	
12. HBM motivation	.16**	.13*	.14**	.06	.01	.06	.21***	.23***	.08	.54***	.02

*$p \leq .05$,

**$p \leq .01$,

***$p \leq .001$.

Table 3

Model 1: hierarchical logistic regression model of receipt of clinical breast exam ($N = 286$).

	Clinical breast exam					
	Step 1		Step 2		Step 3	
	β^a (SE^b)	OR^c (95%CI)	β^a (SE^b)	OR^c (95%CI)	β^a (SE^b)	OR^c (95%CI)
Sociodemographics						
Age	.07 (.01)***	1.07 (1.04–1.10)	.08 (.02)***	1.08 (1.05–1.11)	.07 (.02)***	1.07 (1.04–1.11)
Marital status (vs. never married)						
Married	.75 (.42)	2.13 (.93–4.84)	1.07 (.50)*	2.92 (1.10–7.73)	1.20 (.51)*	3.31 (1.22–9.00)
Other (divorced, separated, etc.)	1.31 (.47)**	3.71 (1.48–9.28)	1.09 (.51)*	2.97 (1.09–8.12)	1.11 (.53)*	3.04 (1.08–8.59)
Being employed	.11 (.36)	1.12 (.55–2.28)	.09 (.41)	1.10 (.49–2.45)	.03 (.43)	1.03 (.44–2.41)
Education	.10 (.07)	1.10 (.97–1.25)	.02 (.07)	1.02 (.89–1.18)	.01 (.08)	1.01 (.87–1.18)
Breast cancer literacy						
Awareness of clinical breast exam			3.02 (.70)***	20.54 (5.30–81.08)	2.93 (.73)***	18.74 (4.49–78.26)
Knowledge of breast cancer			.18 (.11)	1.20 (.97–1.48)	.18 (.11)	1.20 (.97–1.49)
HBM constructs						
Benefits					.09 (.06)	1.10 (.98–1.23)
Barriers					−.10 (.04)*	.91 (.84–.98)
Motivation					−.00 (.04)	1.00 (.92–1.09)
Model chi-square (d.f. = 10)	63.55***		94.53***		104.58***	
Hosmer and Lemeshow Test chi-square	5.87		8.41		7.23	

*$p \leq .05$,

**$p \leq .01$,

***$p \leq .001$.

[a]Unstandardized beta coefficients.

[b]Standard errors.

[c]Odds ratios.

Table 4

Model 2: Hierarchical logistic regression model of receipt of mammogram (N = 286).

	Mammogram					
	Step 1		Step 2		Step 3	
	β^a (SE^b)	OR^c (95%CI)	β^a (SE^b)	OR^c (95%CI)	β^a (SE^b)	OR^c (95%CI)
Sociodemographics						
Age	.08 (.01)***	1.09 (1.06–1.12)	.09 (.01)***	1.09 (1.06–1.12)	.08 (.01)***	1.09 (1.06–1.12)
Marital status (vs. never married)						
Married	.22 (.39)	1.24 (.58–2.67)	.28 (.41)	1.32 (.59–2.96)	.33 (.42)	1.40 (.64–3.18)
Other (divorced, separated, etc.)	.87 (.41)*	2.38 (1.06–5.34)	.86 (.44)*	2.37 (1.00–5.63)	.91 (.45)*	2.48 (1.03–5.99)
Being employed	.59 (.36)	1.81 (.90–3.64)	.66 (.38)	1.94 (.92–4.11)	.61 (.39)	1.85 (.86–3.95)
Education	−.07 (.06)	.94 (.83–1.06)	−.12 (.07)	.89 (.78–1.01)	−.14 (.07)*	.87 (.76–1.00)
Breast cancer literacy						
Awareness of mammogram			3.26 (1.00)***	26.07 (3.65–186.15)	3.25 (1.03)**	25.78 (3.43–194.09)
Knowledge of breast cancer			.05 (.10)	1.05 (.87–1.27)	.06 (.10)	1.06 (.88–1.29)
HBM constructs						
Benefits					.04 (.05)	1.04 (.94–1.15)
Barriers					−.08 (.04)*	.92 (.86–.99)
Motivation					−.01 (.03)	.99 (.92–1.06)
Model chi-square (d.f. = 10)	81.15***		98.09***		104.60***	
Hosmer and Lemeshow Test chi-square	5.48		8.12		3.90	

*$p \leq .05$,

**$p \leq .01$,

***$p \leq .001$.

[a]Unstandardized beta coefficients.

[b]Standard errors.

[c]Odds ratios.