Factors Associated with Breast Cancer Screening in Asian Indian Women in Metro-Detroit

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Abstract

Few studies have examined social factors related to breast cancer screening in Asian Indian women in the Midwestern US. This cross-sectional, community-based survey utilized constructs of the Health Belief Model to examine factors associated with breast cancer screening among Asian Indian women in metropolitan Detroit, Michigan. Of the 160 participants, 63.8% reported receiving both a clinical breast exam and mammogram within the past 2 years. Women were more likely to screen for breast cancer if they had a college education, lived in the US for more years, perceived that breast cancer screening is useful in detecting breast cancer early, agreed that mammography was important, and received a recommendation by a healthcare provider to get a mammogram. These findings highlight the need for further research on regional differences in breast cancer screening knowledge, behaviors and predictors among Asian Pacific Islanders subgroups such as Asian Indian women who recently immigrated to the US.

Keywords

Asian Indian; Asian Pacific Islander; Breast cancer; Cancer screening; Health belief model

Introduction

Asian and Pacific Islanders (APIs) are one of the fastest growing racial/ethnic groups in the US [1, 2] and breast cancer is the leading cancer among women of many API subgroups [3]. Although breast cancer incidence and mortality among API women are less than many other racial/ethnic groups [4], immigrating to the US and adopting a western lifestyle are associated with an increased incidence of breast cancer for APIs [5–8]. Asian Indians compose the third largest API population, accounting for 16% of the total API population [9]. Asian Indian is a term used by the US Census Bureau to describe Americans who trace their heritage to India and to distinguish people from India from American Indians or Native Americans. Among Asian Indian women, breast cancer is the leading cancer in both

incidence and mortality [5], and Asian Indian women living in the US have a higher breast cancer incidence than Asian Indian women in India [10, 11].

Breast cancer screening is a means to detect breast cancer early and reduce related mortality [11]. The American Medical Association (AMA), the American Cancer Society (ACS), the American College of Obstetricians and Gynecologists (ACOG) and the US Preventive Services Task Force (USPSTF) recommend mammography for women aged 40 plus annually or biennially [12–14], and all but the USPSTF recommend clinical breast exams (CBE) no less than once every 2 years for women 40 and over [14]. Despite the importance of screening in detecting breast cancer, API women have the lowest rates of mammography nationally [15, 16] and do not meet the *Healthy People* 2010 objective of a mammography screening rate of 70% among women aged 40 plus in the past 2 years [17]. In 2003, 58% of API women compared to 63% of American Indian/Alaska Native women, 65% of Hispanic women, 70% of black women and 70% of white women reported receiving a mammography in the past 2 years [15].

Across ethnic groups, common barriers to mammography screening among women include: having limited time and access to care (e.g., money, health insurance, and transportation); lacking a usual source of care; receiving little or no encouragement or recommendation to participate in screening by physicians or family; perceiving that mammograms are inconvenient, uncomfortable, or dangerous; and believing that breast cancer is not a serious illness [18]. Among Asian American women, lower educational attainment, limited English proficiency, shorter length of residence in the US, karmic beliefs about cancer (belief that cancer is a consequence of past misdeeds), and racial, ethnic, and cultural discordance with providers have been associated with low adherence to screening guidelines [18, 19]. Among Asian Indian women, modesty has been identified as a barrier to breast cancer screening [20]. Modesty may influence a woman's willingness to touch her own body, have a practitioner perform a breast examination, or discuss screening with family or health care providers [20]. This is similar to the finding among non-API women that emotional variables (e.g., repression, cancer worry, and embarrassment) were barriers to breast cancer screening [21].

In addition to this range of factors associated with lower rates of screening, some factors have been found to be associated with increased screening among Asian Americans. Recommendation by a healthcare provider was found to be associated with higher mammography rates among Chinese, Filipino and Korean women [22], and receiving a physician's recommendation to have a mammogram has been shown to be an important predictor of screening even after controlling for patient characteristics [21, 23]. The importance of receiving a physician's recommendation for breast cancer screening is consistent with findings from a qualitative study suggesting that physicians are trusted sources of information in the South Asian population [24]. In the same study, provider characteristics influenced South Asian women's willingness to be screened for breast cancer; however, no clear preference for specific provider characteristics emerged. Some women stated that they would only consent to a breast examination by a female physician; other women were hesitant to have a practitioner that shared the same cultural background; and still others were concerned only with the practitioner's competence and sensitivity [24].

In a review of studies of breast cancer risk among Asian American women, we found that there have been few studies on South Asian or Asian Indian women's breast cancer screening behaviors. Of the studies reviewed, the majority have been conducted in New York and California [9, 22, 25–27]. In these studies, mammography rates within the past 2 years were 56% and 61.3%, respectively [9, 25]. One study conducted in the Midwest on Muslim women's breast cancer screening perceptions, knowledge and behaviors included 49 API participants (49% of the sample) [28]. This study found that only 46.7% of all participants received a CBE in the past 2 years and 44% received a mammogram in the past 2 years. Significant barriers to screening were perceived lack of money, lack of physician recommendation to screen, fear of being diagnosed with breast cancer and preference for a female practitioner. Another study conducted in the Midwest included a sample of 38 Asian Indian women [26]. This study found that fewer than half of the participants (48%), received a CBE in the last year and 70% received a mammogram in the last 2 years. Analyses of these data, however, did not include correlations between barriers and screening practices or the role of recommendation by healthcare providers to mammography attainment. These limited data suggest that there may be regional differences in screening rates among Asian Indian women. There are few published studies on factors affecting breast cancer screening behaviors of Asian Indian women in the Midwest, specifically, the receipt of CBEs and mammograms at recommended intervals for these women.

In this study, we seek to identify and explore factors that are associated with the self-reported breast cancer screening attitudes and practices of Asian Indian women in a large Midwestern metropolitan area, Detroit, Michigan, that has a high concentration of Asian Indians [29] and Asian Indian medical providers [30]. Breast cancer screening studies for API populations have used different screening guidelines, ranging from ever receipt of a mammogram and CBE to annual or biennial mammogram and CBE [9, 25, 26]. Based on national screening guidelines (AMA, ACS, ACOG, USPSTF), we measured screening adherence per participant as their reported compliance with both a mammogram within the past 2 years and a CBE within the past 2 years. We did not apply separate criteria for participants at higher risk of breast cancer due to the complexity involved in determining their risk status. For example, a woman aged 40 or older who had a family history of breast cancer and had a mammogram and a CBE within the past 2 years would be considered adherent to screening guidelines.

In our review of the scientific literature, emotional factors and cognitive variables congruent with aspects of the Health Belief Model (HBM) were critical factors associated with breast cancer screening. The Health Belief Model has been used in breast cancer screening research in many populations [26, 28, 31], and it explains the adoption of health behaviors by measuring the relative values of perceived threats, perceived benefits, perceived barriers, cues to action and antecedent variables [32]. We will utilize the following selected constructs from the Health Belief Model to predict breast cancer screening: antecedent variables (demographic and healthcare characteristics), perceived barriers (obstacles to engaging in the health behavior), perceived benefits (positive outcomes of a health behavior), and a cue to action (stimulus to engage in a health behavior). This paper seeks to examine the following aspects of Midwestern, Asian Indian women's breast cancer screening behavior:

1. To identify antecedent variables that are associated with screening adherence;

2. To test which barriers to breast cancer screening are correlated with non-compliance to screening guidelines;

3. To test which benefits are correlated with screening adherence

4. To test whether a recommendation from a healthcare professional (a cue to action) to have a mammogram is associated with screening adherence; and

5. To identify a combination of variables (antecedent variables, barriers, etc.) that best predict screening adherence.

Methods

Setting and Study Design

Asian Indians are the largest Asian subgroup in Michigan, due to a 70% increase between 1990 and 2000 [33]. Metropolitan Detroit has a population of over 4.4 million people, and Asian Indians account for over 55,000 people or almost 40% of the Asian population in this region of the state [29, 33]. In this tri-county area—Macomb, Oakland and Wayne—Asian Indians are a significant proportion of the population. According to the Michigan Department of Community Health Survey of Physicians (2007), 17% of active physicians in the state of Michigan are APIs [30] of which many are Asian Indian. This makes it relatively easy for Asian Indian women to receive care from an Asian Indian physician.

A cross-sectional, quantitative survey was administered to 205 Asian Indian women between May 2007 and September 2007 to examine factors associated with breast cancer screening in metro-Detroit (Macomb, Oakland and Wayne Counties). Nine sites were utilized to reach women 35 and older who identify as Asian Indian and to sample recent immigrants. The locations included five places of worship, including two that hosted health fairs (representing 44% of participants), two community-wide events (33%), one event held for women (17%), and one religious-community health fair at a hospital (6%). The sample yielded a population that was heterogeneous with regard to religious affiliation, insurance status, and age. Tote bags that included materials about breast cancer screening guidelines and resources were provided to participants as incentives. Approximately 20% of women approached declined to participate.

Questionnaires were administered orally by four trained female, Asian Indian interviewers in English or in the participant's preferred language. However, due to time constraints or preference, some participants either read the questions or marked responses themselves. The study materials were translated into Hindi by an individual fluent in Hindi and English, pre-tested with members of the target population and revised accordingly. The survey and consent forms were primarily administered in English and Hindi, though some were also administered in Gujarati, Punjabi, and Urdu. In order to prevent exclusion of women based on language, women whose native languages were Tamil and Telugu participated in the study by having female family members translate questions for them. The language of administration was not systematically recorded, but an estimated 35 women (17.1%) were

administered the survey in a language other than English. Based on this estimate, the language of administration did not yield statistically significant differences.

Questionnaire

Self-reported screening practices and demographic questions were adapted from the Behavioral Risk Factor Surveillance System (2006) and from a questionnaire designed for Muslim women, including Asian Indian women, in California to suit the target population [Galal, personal communication, 34, 35]. We removed questions from the original survey instrument that were specific to Islamic faith. We kept questions that addressed cultural factors including modesty and indicators of barriers and benefits to screening. A number of questions related to social support and family history were created by the first author. The questionnaire included 63 items and was pre-tested with women belonging to the population of interest. The aim of the pre-test was to enhance question comprehension and minimize respondent burden taking into consideration time to complete the questionnaire and participant discomfort.

The questionnaire measured self-reported mammography, clinical breast exam (CBE) and breast self exam (BSE), future plans to get a CBE and mammogram, knowledge of screening guidelines, perceived barriers, perceived benefits, perceived susceptibility, a cue to action, cultural beliefs, family history of cancer and breast cancer, perceived relationship between family history and cancer risk, social support and demographic information. The study was approved by the University of Michigan Institutional Review Board Health Sciences.

Sample Description

Women who (1) self-identified as Asian Indian (2) were 35 years of age or older and (3) did not or had not ever had breast cancer were invited to complete the study questionnaire. Most participants were between the ages of 40–59, grew up in India and identified as Hindu. Almost all participants (86.2%) had earned more than a high school education and more than half were employed. The mean number of years lived in the US was 18. Most women reported not having any difficulty in meeting monthly payments for their bills (Table 1).

Adherence to screening was defined as: reported receipt of both a mammogram within the past 2 years and a CBE within the past 2 years. Although women aged 35–39 were recruited to participate, we excluded them from the analyses since they are not recommended to screen by any national screening guidelines (AMA, ACS, ACOG, US-PSTF). We originally sought to understand the future screening practices of younger women in addition to the current and future screening practices of women 40 and older. However, inclusion of women under 40 in this data analyses might have resulted in misrepresentation of screening practices and factors associated with screening. Participants whose ages were missing were also excluded. Of the original 205 women, data from 160 participants were included in the analyses.

Data Analysis

Data were analyzed using the SPSS 15.0 software package with *P*-value <0.05 as the threshold of significance.

Chi-squared analyses were used to test whether there were significant associations between screening guideline adherence and (1) antecedent variables, (2) perceived barriers, (3) perceived benefits and (4) cues to action. Antecedent variables included age, educational attainment, employment status, religious affiliation, marital status, self-rated health status, access to healthcare and years lived in the US. A *t*-test analysis was conducted to determine the significance of the difference in the mean years lived in the US in relation to adherence. The *t*-test was used because data on years lived in the US was recorded as a continuous variable. Perceived barriers were grouped into three categories: barriers to breast self exam and clinical breast exam (discomfort touching own breasts and preference for a female doctor performing breast examination), barriers to mammography (mammogram perceived as embarrassing, perception that mammograms are useful only when there are breast problems, cost, fear of a mammogram and pain associated with a mammogram) and barriers to healthcare access (transportation and language). Perceived benefits of breast cancer screening were assessed using two measures: usefulness of breast cancer screening and importance of getting a mammogram. The cue to action assessed was recommendation of mammography by a healthcare practitioner.

Binary logistic regression was used to determine which variables best predicted adherence to screening guidelines. Based on the chi-square analyses, all variables significantly associated with mammography and CBE in the last 2 years were included in the initial model except pain associated with a mammogram because there was little variance in the data which was excluded. A backwards likelihood ratio analysis was performed to create a parsimonious model predicting breast cancer screening guideline adherence. The following variables were included: educational attainment, employment status, marital status, years lived in the US, family physician, insurance status, language, transportation, perception that mammograms are useful only when there are breast problems, usefulness of breast cancer screening, importance of getting a mammogram and recommendation by a healthcare professional.

Results

Table 2 illustrates the breast cancer screening practices of the 160 participants included in the data analyses. One hundred and two (63.8%) participants reported receiving both a mammogram and CBE in the last 2 years. A larger percentage of participants (71.2%) reported ever having a mammogram and ever having a CBE. There is a 7.4% difference in measuring participant adherence when comparing screening rates in the last 2 years versus ever having screened.

Table 3 shows the association between screening adherence and antecedent variables (i.e., demographic and healthcare characteristics). Demographic characteristics significantly associated with reporting receiving both a mammogram and CBE in the last 2 years were: higher educational attainment, being either self-employed or employed for wages, being married and having lived in the US for more years on average (24 years versus 10.7 years).

Both healthcare characteristics examined (having a family physician and being insured) were also significant.

Table 4 illustrates the association between screening adherence and barriers, benefits, and the cue to action. Response categories were collapsed into a dichotomous variable, combining strongly and somewhat agree into agree and somewhat and strongly disagree into disagree. In terms of barriers to breast cancer screening, perceptions that a mammogram is painful and that breast cancer screening is useful only when there are breast problems were significantly negatively associated with screening adherence. Barriers that influenced access to healthcare such as lack of transportation and language barriers were significantly negatively associated with adherence. Perceived usefulness of breast cancer screening in detecting breast cancer early and the relative importance of mammography were benefits that were significantly positively associated with adherence. Recommendation of mammography by a healthcare professional, the cue to action, was significantly positively associated with adherence.

In the logistic regression analysis, only individuals with complete data were included (n = 147). All the variables significantly associated with screening in the bivariate analyses were used in the initial model. According to the final model, select antecedent variables, both benefits that were tested and the cue to action positively predicted self-reported mammography and CBE in the last 2 years for Asian Indian women 40 and older. Women with higher levels of educational attainment and that have lived in the US for more years are more likely to adhere to screening guidelines. Women that perceive that breast cancer screening is useful in detecting breast cancer early and give a high relative importance to mammography are more likely to screen. Lastly women that receive a recommendation from their provider to obtain a mammogram are more likely to screen. This model was able to correctly predict whether or not a woman adheres to screening guidelines 81.6% of the time. Those women with higher educational attainment, more years lived in the US, increased perception of benefits and recommendation to screen for breast cancer from a practitioner were more likely to screen (Table 5).

Additionally, in the logistic regression model, years lived in the US was significant. The odds of breast cancer screening adherence increased by a factor of 1.044 for every additional year lived in the US. Education and recommendation of mammography were significant, and the odds of adherence increased by a factor of 6.66, with completion of graduate or professional school compared to completion of elementary to high school. The odds of breast cancer screening adherence increased by a factor of 0.16 if participants reported receiving a recommendation to get a mammography by a healthcare professional.

Discussion

This study contributes to a limited body of research on Asian Indian women's breast cancer screening attitudes and practices focusing on women who reside in the Midwest. Uniquely, we explore the knowledge and attitudes associated with breast cancer screening in relation to screening practices based on national guidelines that include both a mammogram and CBE within the last 2 years among a sample of an API subgroup. While a relatively small sample,

our population of 160 Asian Indian women in metro-Detroit is one of the largest community-based Midwestern samples to date in published literature to examine breast cancer screening knowledge and attitudes that influence screening practices.

In this sample, over 60% (63.8%) of women adhered to CBE and mammography screening guidelines. These rates of adherence to professional guidelines were consistent with those of other studies conducted in the US of Asian Indian women [9, 25, 26]. Other studies in this population base their results on screening adherence criteria that are less stringent, i.e., ever having a mammogram and ever having a CBE. Our results show that the two analyses produce similar results: there was a 7.4% difference between adherence criteria based on ever screening (having both a mammogram and a CBE) versus screening within the past 2 years. However, we recommend using both mammogram and CBE within the past 2 years as adherence criteria based on the national guidelines. In this population we found that the results were similar, however, this might not be true in other API subgroups.

Overall the women in this study were highly educated, insured, employed, and financially secure. Our logistic regression model shows that benefits when combined with specific antecedent variables (i.e., education, years lived in the US and recommendation by a physician) were the best predictors of screening. Therefore women from our sample did not face many of the barriers that women with different demographic characteristics face, such as recent immigrants. As has been found in other populations, our study participants who lived in the US for a shorter period of time were less likely than those who lived in the US for longer to adhere to screening guidelines [36–38]. We recommend that future studies purposefully sample for women who do not adhere to screening guidelines to better understand the variables and characteristics associated with their behavior, for example, recency of immigration).

Our study sample's CBE attainment rate in the last 2 years (68.1%) was higher than those found in Chinese, Filipina, and Korean women [22, 35, 39] and other studies of Asian Indian women [25, 26]. Similarly, the mammography rate of our study population (68.1%) was higher than the average for APIs overall [16] and samples of Chinese, Filipina and Korean women [22, 38, 40, 41], yet still slightly below the *Healthy People* 2010 objective of 70% [17].

One explanation for the relatively high screening rates in this sample was that participants did not experience common barriers to breast cancer screening. Previous studies have identified modesty as a barrier for breast cancer in Asian Indian samples [9, 26]. However, we did not find that modesty was a barrier to breast cancer screening; i.e., participants did not state a gender preference for their provider in the context of CBE nor did they find a mammogram embarrassing. In order to better understand the conflicting results, further exploration of modesty as a barrier is necessary. We also recommend exploring the relationship between modesty and educational attainment, length of time in the US, and family history. The literature suggests that high provider-patient cultural concordance is associated with mammography screening compliance in other API subgroups [18, 27, 42]. Cultural concordance in the Asian Indian population should be explored further. Qualitative

methods that are designed to provide a comprehensive understanding of these factors may be beneficial to the literature [43].

Our finding that a healthcare provider's recommendation for a mammogram was an important predictor of screening is consistent with previous studies [18, 44, 45] as well as *Healthy People* 2010s objective to increase the percentage of primary care providers who counsel patients about mammograms to 85% [17]. Since the literature indicates that healthcare providers, especially physicians, are considered a trusted source of health information in this population [24] which our study results confirm, educating providers on the importance of recommending breast cancer screening, particularly mammograms, should be a focus of health education.

Limitations

We used a convenience sampling method in participant recruitment because of the challenges of reaching this population; however, this sampling approach may have lead to systematic bias. Women who are more highly educated, for example, may be more likely to both participate in survey research and adhere to breast cancer screening guidelines [25]. Furthermore, a high proportion of study participants reported having a family history of cancer (27.5%) and a family history of breast cancer (8.8%). These data are higher than statewide rates of family history of cancer among Asian Americans (1.7%) [45]. Since family history of breast cancer is a risk factor for the disease [39, 46], our study population's adherence rates may be influenced by the high rate of participants with a family history. Although sites were chosen to promote diversity across a number of dimensions (e.g., socioeconomic position, religious affiliation and immigration), our sample of mostly married, highly educated women primarily from India is not representative of Asian Indian women in Michigan and similarly may not be for the Midwest or the US [47, 48]. However, the fact that these women still did not screen at levels recommended by Healthy People 2010 highlights the complexity of factors that influence screening and suggest that more research is needed on this population. Perceived susceptibility to breast cancer based on age, racial/ ethnic identity and family history and perceived severity of breast cancer may be considered in future research. Additionally social support in seeking preventive healthcare, and exploration of other barriers and benefits would be beneficial.

The use of self-reported data in face-to-face interviews may have resulted in further bias in our results. Self-reported data is subject to recall bias, and the recall time frame in this study may have resulted in inaccurate responses. Also, face-to-face interviews may have elicited socially desirable responses; for example, participants might have over reported their screening adherence because screening was clearly being discussed as a positive behavior. Moreover, because these data were collected through multiple methods there might have been inconsistency in questioning or recording responses.

Finally, although we included a measure of income in the questionnaire, the response categories were designed to be non-intrusive because they were administered face-to-face in a public setting. However, as a result, the measure provided data of limited accuracy to analyze meaningfully. This is a limitation because we were unable to compare our results to

other research that has examined the influence of income on breast cancer screening [9, 22, 26].

Conclusions

Our study of the breast cancer screening behaviors of a sample of Asian Indian women in metro-Detroit highlights the need for more research on regional and subpopulation differences in breast cancer knowledge, predictors, and screening. Future research should examine the effects of cultural and gender concordance between Asian Indian women and their healthcare providers on breast cancer screening. Future research should also examine subgroups of women who did not follow breast cancer screening recommendations, such as recent immigrants. Finally, comparisons of the characteristics of Asian Indian women who adhered to screening guidelines versus those who did not will also be beneficial.

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Table 1

Demographic characteristics of sample

		n (%)
Age	35–39	42 (20.8)
	40–49	56 (27.7)
	50–59	60 (29.7)
	>60	44 (21.8)
	Total	202 (100)
Educational attainment	Elementary– completed high school	28 (13.8)
	College[a]	93 (45.8)
	Graduate/ professional school	82 (40.4)
	Total	203 (100)
Employment status	Employed[b]	113 (55.4)
	Homemaker	71 (34.8)
	Unemployed	20 (9.8)
	Total	204 (100)
Marital status	Married	187 (92.1)
	Not married	16 (7.9)
	Total	203 (100)
Religious affiliation[c]	Hinduism	127 (62.9)
	Islam	33 (16.3)
	Sikhism	34 (16.8)
	Other	8 (4.0)
	Total	202 (100)
Place where participants grew up	India	184 (90.2)
	US	10 (4.9)
	Other	10 (4.9)
	Total	204 (100)
Income Measure—"how difficult is it for you or your family to meet the monthly payments on your or your family's bills?"	Extremely or very difficult	10 (5.0)
	Somewhat or slightly difficult	42 (20.8)
	Not difficult at all	150 (74.3)
	Total	202 (~ 100)
Years lived in the US	Mean years	18.02

[a]College includes completed college or technical/vocational school

[b]Employed includes those who are employed for wages and self-employed

[c]Other includes women who identify their religious affiliation with Jainism, Christianity or other

Table 2

Breast cancer screening rates

		n (%)
General screening practices	Ever had a CBE	121 (75.6)
	Ever had a mammogram	124 (77.5)
	Ever had both a CBE and mammogram	114 (71.2)
Study screening adherence criteria	Had last CBE within the past 2 years	109 (68.1)
	Had last mammogram within the past 2 years	109 (68.1)
	Total adherence to screening guidelines (Had both a CBE and mammogram within the past 2 years)	102 (63.8)

Table 3

Select antecedent variables by breast cancer screening adherence

		Adhere (%)	Do not adhere (%)	*P*-value
Demographic characteristics				
Age	40–49	35 (62.5)	21 (37.5)	0.374
	50–59	42 (70)	18 (30)	
	>60	25 (56.8)	19 (43.2)	
	Total	102 (63.8)	58 (36.3)	
Educational attainment	Elementary-completed high school	6 (26.1)	17 (73.9)	<0.001
	College	48 (65.8)	25 (34.2)	
	Graduate or professional school	48 (77.4)	14 (22.6)	
	Total	102 (64.6)	56 (35.4)	
Employment status	Employed	60 (73.2)	22 (26.8)	0.004
	Homemaker	27 (47.4)	30 (52.6)	
	Unemployed	15 (75)	5 (25)	
	Total	102 (64.2)	57 (35.8)	
Marital status	Married	98 (67.1)	48 (32.9)	0.003
	Not married	3 (25)	9 (75)	
	Total	101 (58.1)	57 (41.9)	
Religious affiliation	Hinduism	64 (63.4)	37 (36.6)	0.782
	Islam	17 (68)	8 (32)	
	Sikhism	14 (58.3)	10 (41.7)	
	Total	95 (63.3)	55 (36.7)	
Self-rated health status	Excellent	34 (64.2)	19 (35.8)	0.951
	Good	50 (63.3)	29 (36.7)	
	Fair/Poor	18 (66.7)	9 (33.3)	
	Total	102 (64.2)	57 (35.8)	
Years lived in the US	Average (SD)	24 (11.3)	10.7 (11.5)	0.023
	N	101	58	
Healthcare characteristics				
Family physician	Yes	97 (72.4)	37 (27.6)	<0.001
	No	5 (20.8)	19 (79.2)	
	Total	102 (64.6)	56 (35.4)	
Insurance status	Yes	96 (76.2)	30 (23.8)	<0.001
	No	6 (20.7)	23 (79.3)	
	Total	102 (65.8)	53 (34.2)	

Table 4

Barriers, benefits and cue to action by breast cancer screening adherence

Clinical breast exam barrier		Adhere (%)	Do not adhere (%)	*P*-value
I would be more comfortable having a female doctor or health practitioner perform a clinical breast exam than a male doctor or health practitioner.	Agree	75 (67.6)	36 (32.4)	0.131
	Disagree	27 (55.1)	22 (44.9)	
	Total	102 (36.3)	58 (63.8)	
Mammography screening barriers				
I think a mammogram is embarrassing.	Agree	14 (51.9)	13 (48.1)	0.158
	Disagree	88 (66.2)	45 (33.8)	
	Total	102 (36.3)	58 (63.8)	
I think a mammogram is painful.	Agree	58 (76.3)	18 (23.7)	<0.001
	Disagree	44 (62.9)	26 (37.1)	
	Don't know	0	13 (100)	
	Total	102 (64.2)	57 (35.8)	
I am afraid to have a mammogram.	Agree	8 (44.4)	10 (55.6)	0.064
	Disagree	94 (66.7)	47 (33.3)	
	Total	102 (64.2)	57 (35.8)	
I am concerned about the cost of a mammogram.	Agree	31 (59.6)	21 (40.4)	0.450
	Disagree	71 (65.7)	37 (34.3)	
	Total	102 (63.8)	58 (36.3)	
I think that women only need to have a mammogram when they have breast problems.	Agree	10 (33.3)	20 (66.7)	<0.001
	Disagree	91 (70.5)	38 (29.5)	
	Total	102 (63.8)	58 (36.3)	
Access to healthcare barriers				
Transportation is a problem for me in seeking breast health services.	Agree	7 (36.8)	12 (63.2)	0.009
	Disagree	95 (67.4)	46 (32.6)	
	Total	102 (63.8)	58 (36.3)	
Language is a problem for me in seeking breast health services.	Agree	8 (34.8)	15 (65.2)	0.001
	Disagree	94 (69.1)	42 (30.9)	
	Total	102 (58.3)	57 (41.7)	
Breast cancer screening benefits				
I think breast cancer screening is useful at detecting breast cancer early.	Agree	99 (67.8)	47 (32.3)	0.003
	Disagree	3 (25)	9 (75)	
	Total	102 (64.6)	56 (35.4)	
Getting a mammogram is important to me compared to other things going on in my life.	Agree	96 (70.6)	40 (29.4)	<0.001
	Disagree	6 (26.1)	17 (73.9)	
	Total	102 (58.3)	57 (41.7)	
Cue to action				
A health professional has recommended that I have a mammogram.	Agree	92 (80)	23 (20)	<0.001
	Disagree	10 (22.2)	35 (77.8)	
	Total	102 (63.8)	58 (36.3)	

Table 5

Predictors of breast cancer screening adherence

		OR (CI)	*P*-value
Educational attainment	Elementary-completed high school	0.62	0.024
	College	2.57 (0.65-10.2)	0.176
	Graduate or professional school	6.66[**] (1.61–27.6)	0.009
Years lived in the US		1.04[*] (1.00–1.09)	0.036
I think breast cancer screening is useful at detecting breast cancer early.	Agree	0.62	0.066
	Disagree	0.17 (0.03–1.12)	
Getting a mammogram is important compared to other things going on in my life.	Agree	0.62	0.056
	Disagree	0.29 (0.08–1.03)	
A health professional has recommended that I have a mammogram	Agree	0.62	<0.001
	Disagree	0.16[**] (0.06-0.44)	

[*] Significance at *P*-value < 0.05

[**] Significance at *P*-value < 0.01