



Literacy of Breast Cancer and Screening Guideline in an Immigrant Group: Importance of Health Accessibility

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Abstract

Little is known about predictors of breast cancer literacy among immigrant women. A cross-sectional survey investigated predisposing, enabling, and need factors of breast cancer literacy among 233 Korean American women living in a southeastern U.S. city. Breast cancer literacy was measured by questions that asked awareness of cancer screening methods and a 5-item questionnaire derived from the American Cancer Society's breast cancer screening guidelines and risk factors. Annual checkup was an enabling factor of awareness of Clinical Breast Exam (CBE) and mammogram, and also for breast cancer literacy covering the knowledge of breast cancer screening guidelines and risk factors. Health status was a need factor of CBE awareness. Marital status was a predisposing factor of mammogram awareness, and age and years of residence in the US were predisposing factors of breast cancer literacy. The findings of the study illuminate probable avenues of intervention to promote breast health knowledge for Korean American women.

Keywords Breast cancer literacy · Andersen's behavioral model · Annual checkup · Korean American women

Introduction

Breast cancer screening guidelines recommend annual mammograms every year for women age 45 to 54 and every 2 years for women 55 and older at an average risk of breast cancer [1]. Korean American (KA) women in the United States (U.S.) underutilize breast cancer screenings [2],

although breast cancer incidence rates rapidly increase as the duration of residency of KA women in the U.S. increases [3]. Breast cancer awareness and screening literacy were compelling predictors of breast cancer screening participation [4]. KA women seemed prone to have insufficient knowledge of breast cancer screening guidelines. For example, less than 20% of 123 KA respondents living in San Diego County, California, reported that they had adequate breast cancer knowledge [5]. A recent study also reported that the proportion of KA women who never received mammograms nor practiced self-breast exams was "similar to that of women who lacked knowledge of self-breast exams" (p. 171) [6]. A lack of breast cancer literacy was a barrier to receiving screenings in a timely manner [7].

Little is known about the individual or environmental determinants of breast cancer literacy. Studies have recently revealed that KA women's knowledge of breast cancer and screening procedures was associated with multiple socioeconomic and cultural factors including age, marital status, employment, educational attainment, health insurance, having a primary care physician, perceived health, and acculturation [6, 8–10]. However, none of these studies framed their inquiries based on a relevant theoretical framework.

To address such research gap, the purpose of the study is to examine the factors associated with breast cancer

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awareness and screening literacy based on Andersen's health utilization model. The findings of the study will help to develop culturally relevant interventions that encourage KA women to obtain breast health knowledge.

Theoretical Framework

This study defines breast cancer screening literacy as knowledge in breast cancer screening guidelines, not as the capacity to obtain, process, and understand health information and services needed to make health decisions [11]. Knowledge in breast cancer screening guidelines is associated with breast cancer screening behaviors among Korean American women [7]. The present study conceptualizes factors that explain breast cancer literacy based on Andersen's health utilization model [12]. The model helps understand the determinants of receiving breast cancer screening and/or utilizing health information [13]. A recent study also employed this model to understand predisposing, enabling and need factors related to cancer literacy [9]. Predisposing factors are general demographic and social characteristics that exist regardless of certain health conditions; enabling factors are impeding and facilitating methods of obtaining care; and need factors indicates functional and health problems that generates immediate causes of care [12]. The model assumes that each component might be considered a single contributor to predicting use or one factor could lead to another in causal ordering of the relationship for utilizing the care [12].

Predisposing factors refer to individual characteristics that may indirectly lead to breast cancer literacy and examples include age, marital status, and years of residence in the U.S. [6, 8]. According to a Korean American Health Survey (n=656), adult KA women younger than 40 years had less knowledge on self-breast exams compared to those who were 40–64 years old [6]. While about 60% of married women had knowledge of self-breast exams, only one-third of unmarried Korean women were equipped with such knowledge. Women who had spent more than 25% of their lifetime in Korea were less likely to have knowledge of self-breast exams [6].

Enabling factors have a direct influence on the possession of such literacy and they include having English proficiency and having a dependable source of care [14]. Having a primary care physician and speaking more fluent English were significant predictors of cancer literacy among KA immigrants living in the New York metropolitan area in the U.S. [8]. While annual checkup was a compelling enabler of breast cancer screenings [15], its association with breast cancer literacy has not yet been found. Annual checkup is an important venue for female patients asked about and/or screened for breast cancer. Thus, this study examines its association with breast cancer literacy.

Need factors affect one's perceived need for breast cancer literacy [12]. This study frames family cancer history and health status as need factors. Poor self-rated health status had a direct effect on cancer literacy, and it also mediated the relationship between self-rated health status and cancer screening behavior [9]. A higher percentage of women with familial breast cancer history perceived a high risk of the disease compared to women who perceived a moderate risk, and also indicated higher chances of getting breast cancer [16].

Methods

Participants

A total of 233 KA women living in a southeastern city in the U.S. completed a survey questionnaire during the summer of 2016. Participants aged 20 years or older and first generation of immigrants were included. A total of 25–30 KA women were recruited in each of the five age categories (e.g. 20s, 30s, 40s, 50s and 60s and above). The participants' ages ranged from 20 to 75 years old.

Data Collection

This study collected data through a cross sectional, self-administered survey. Survey was written in Korean and self-administered by most participants. However, social workers who are bilingual of Korean and English and hold a minimum of master's degree assisted senior participants older than 60 to complete the survey to ensure an understanding of the survey questions and vocabularies. Self-administered surveys took about 20–25 min and assisted self-administered surveys took about an hour. In order to minimize sampling bias, the study strategically diversified sampling sites, including Korean senior centers, churches, and/or language schools. All study procedures were bound by the approved IRB protocol from the authors' universities. Informed consent was obtained from all participants.

Measures

Dependent Variables

Awareness and literacy of breast cancer screenings are the dependent variables of this study. While awareness of breast cancer screening is considered a part of literacy, this study posits that awareness of breast cancer screening can stand as a separate variable by measuring if participants simply know about the cancer screening methods [17]. Participants were asked yes or no questions regarding whether they had ever heard of breast cancer screenings

involving CBE and mammograms. CBE is no longer recommended by American Cancer Society since October, 2015 due to false positive outcomes when it is used together with mammogram, and it should not be an alternative to mammography screening [18]. CBE may detect breast cancer if it is the only available screening test [19]. Literacy of breast cancer was measured by 5-items made from cancer screening guidelines [20] and breast cancer risk factors [21]. The items included “Breast self-exam is an option for women starting in their 20s”, “Women whose close blood relatives have breast cancer have a higher risk for this disease”, “Yearly mammograms are recommended starting at age 40 and continuing for as long as a woman is in good health”, “CBE is recommended about every 3 years for women in their 20s and 30s and every year for women 40 and over”, and “The risk of developing breast cancer increases as getting older”. Correct answers were added up, and the number of correct answers indicated breast cancer screening literacy.

Independent Variables

For predisposing factors of breast cancer screening awareness and literacy, age was coded in years and categorized into 20–29, 30–39, 40–49, 50–59, or 60 and over. Marital status was dichotomized as other or married/partnered, and years in the U.S. were categorized into less than 10, 11–30, or 31 and over. Enabling factors involved levels of English proficiency, which was measured by a 4-point Likert scale (not at all, not well, well, or very well) and dichotomized variables of annual checkup and having a primary physician (yes or no). As need factors, family cancer history variable was dichotomized (yes or no) and health status was measured by a 5-point Likert scale later categorized into very poor/poor, fair, or good/excellent.

Analysis

The study employed SPSS 24.0 and analyzed the descriptive statistics of the sociodemographic characteristics of the sample; the Chi-square test to explore sociodemographic characteristics associated with awareness of breast cancer screening; and the *t* test or ANOVA to examine sociodemographic characteristics associated with breast cancer literacy. The study also analyzed the frequency of the participants' awareness and literacy of breast cancer screenings; a binary logistic regression model regarding awareness of breast cancer screening; and a multiple linear regression model to estimate the effects of the significant predictors of breast cancer literacy. Models satisfied basic assumptions such as linearity, normality, homogeneity, and dependence.

Results

Sociodemographic Characteristics of the Sample

Mean age of the participants was 40.84 ($SD = 30.75$). About 67% of the participants were married or living with partners. About 39.5% had been in the U.S. fewer than 10 years, and 68.7% had earned at least a bachelor's degree. The participants had good (47.6%) English speaking proficiency. One fourth reported a monthly household income of \$1999 or less, 39.5% had a monthly income between \$2000 and \$5999, and 30% had a monthly income over \$6000. Less than a half (46.3%) of the participants received annual checkups, 63.8% had a primary physician, and 58.8% had family cancer history. About 40% of the respondents had good or excellent health, 52.6% had fair health, and 7.5% had very poor or poor health.

Table 1 shows that CBE awareness levels of the sample differed according to annual checkup participation ($\chi^2 = 8.062$, $p < 0.01$) and health status ($\chi^2 = 13.203$, $p < 0.01$). The level of mammogram awareness was different based on marital status ($\chi^2 = 9.398$, $p < 0.01$), years in the U.S. ($\chi^2 = 10.911$, $p < 0.01$), an annual checkup ($\chi^2 = 14.380$, $p < 0.001$). Levels of breast cancer literacy were consistent across sociodemographic characteristics.

Screening Awareness and Literacy

Those who heard of CBEs were 78.5%, and 89.7% had heard of mammograms. The mean score of breast cancer literacy was 4.17 ($SD = 1.03$) out of a total of 5. The majority of respondents correctly answered the following statements: “Breast self-exam (BSE) is an option for women starting in their 20s” (88.9%); “Women whose close blood relatives have breast cancer have a higher risk for this disease” (85.2%); “Yearly mammograms are recommended starting at age 40 and continuing for as long as a woman is in good health” (81.9%); and “CBE is recommended about every 3 years for women in their 20s and 30s and every year for women 40 and over” (81.1%). The correction rate regarding the question “The risk of developing breast cancer increases as getting older” was somewhat lower (76.5%).

Factors Predicting Awareness of Breast Cancer Screening

Table 2 shows that annual checkup ($OR = 2.603$, 95% $CI [1.045, 6.484]$) of enabling factors and health status ($OR = 2.331$, 95% $CI [1.283, 4.237]$) of need factors were significantly associated with CBE awareness. None of the predisposing factors were significant predictors of CBE

Table 1 Sociodemographic characteristics of the sample (n=233)

Characteristic	n (%)	CBE awareness		Mammogram awareness		Breast cancer and screening literacy		
		n (%)	χ^2	n (%)	χ^2	M	SD	t/F
Age								
20–29	44 (18.9)	31 (13.5)	5.433	37 (15.9)	4.843	4.30	0.80	0.711
30–39	51 (21.9)	38 (16.5)		45 (19.4)		4.10	1.17	
40–49	57 (24.5)	46 (20.0)		52 (22.4)		4.25	0.88	
50–59	25 (10.7)	21 (9.1)		25 (10.8)		4.28	1.14	
≥ 60	56 (24.0)	47 (20.4)		50 (21.6)		4.02	1.10	
Marital status								
Married	156 (67.0)	128 (82.05)	2.834	147 (94.23)	9.398**	4.23	0.99	1.108
Other	76 (32.6)	54 (71.05)		61 (80.26)		4.07	1.08	
Years in the USA								
0–10	92 (39.5)	27 (11.7)	3.583	30 (12.9)	10.911**	4.07	1.14	2.421
11–30	111 (47.6)	89 (38.7)		104 (44.8)		4.17	0.99	
≥ 31	30 (12.9)	67 (29.1)		75 (32.3)		4.53	0.63	
Education								
≥ Bachelor's degree	70 (30.0)	49 (70.00)	3.096	59 (84.29)	2.164	4.13	1.11	– 0.394
≥ Bachelor's degree	160 (68.7)	131 (81.88)		147 (91.88)		4.19	0.99	
English proficiency								
Very well	32 (13.7)	27 (84.38)	3.718	31 (96.88)	3.329	4.45	0.68	1.380
Well	79 (33.9)	63 (79.75)		69 (87.34)		4.06	1.15	
Not well	107 (45.9)	83 (77.57)		96 (89.72)		4.23	0.98	
Not at all	9 (3.9)	5 (55.56)		7 (77.78)		3.89	1.36	
Income								
≤ \$1999	60 (25.8)	44 (73.33)	4.144	50 (83.33)	4.444	4.07	1.01	1.285
\$2000–\$5999	92 (39.5)	68 (73.91)		82 (89.13)		4.14	1.12	
≥ \$6000	70 (30.0)	61 (87.14)		67 (95.71)		4.34	0.93	
Annual check-up								
Yes	107 (46.3)	92 (40.4)	8.062**	104 (45.2)	14.380***	4.30	0.85	1.791
No	124 (53.7)	89 (39.0)		103 (44.8)		4.07	1.14	
Having a primary physician								
Yes	148 (63.8)	121 (52.6)	1.892	137 (59.1)	2.818	4.18	0.96	– 0.203
No	84 (36.2)	62 (27.0)		72 (31.0)		4.20	1.07	
Family cancer history								
Yes	137 (58.8)	102 (44.3)	3.232	120 (51.7)	1.261	4.08	1.09	– 1.652
No	96 (41.2)	81 (35.2)		89 (38.4)		4.31	0.90	
Health status								
Good/excellent	91 (39.9)	78 (34.5)	13.203**	84 (36.8)	3.963	4.21	0.86	0.816
Fair	120 (52.6)	94 (41.6)		108 (47.4)		4.20	1.05	
Very poor/poor	17 (7.5)	8 (3.5)		13 (5.7)		3.88	1.36	

** $p < 0.01$, *** $p < 0.001$

awareness. The predictors as a set reliably distinguished between those who are aware of CBE and who are not ($\chi^2 = 27.613$, $df = 8$, $p < 0.01$), and Cox and Snell's R^2 indicated that 11.7% of the variation in the CBE awareness was explained by the logistic model.

Marital status (OR = 29.152, 95% CI [2.180, 389.772]) of predisposing factors and annual checkup (OR = 16.148,

95% CI [1.043, 250.131]) of enabling factors were significant predictors of mammogram awareness. None of the need factors were significant predictors. The model was reliable in distinguishing between those who were aware of Mammogram and who were not ($\chi^2 = 27.816$, $df = 8$,

Table 2 Binary logistic regression analysis on awareness of breast cancer and screening

Factors	Variables	CBE			Mammogram		
		SE	OR	95% CI	SE	OR	95% CI
Predisposing	Age ^a	0.178	1.386	[0.977, 1.965]	0.644	2.209	[0.625, 7.809]
	Marital status	0.388	1.520	[0.710, 3.254]	1.323	29.152*	[2.180, 389.772]
	Years in the USA	0.339	0.994	[0.511, 1.933]	0.794	1.681	[0.355, 7.968]
Enabling	English proficiency	0.452	2.117	[0.873, 5.134]	1.343	2.401	[0.173, 33.397]
	Annual checkup	0.466	2.603*	[1.045, 6.484]	1.398	16.148*	[1.043, 250.131]
	Having a primary physician	0.418	0.591	[0.260, 1.342]	1.080	0.326	[0.039, 2.710]
Need	Family cancer history	0.391	0.489	[0.227, 1.053]	1.360	0.076	[0.005, 1.094]
	Health status	0.305	2.331**	[1.283, 4.237]	0.746	0.768	[0.178, 3.313]
	Constant	0.870	0.271	2.168		5.739	
	<i>n</i>			233			138
	χ^2			27.613**			27.816***
	– 2 Log likelihood			195.765			43.323
	Pseudo <i>R</i> ²			0.117			0.187

Pseudo *R*² is Cox and Snell’s *R*²

SE standard error, *OR* odds ratio

p* < 0.05; *p* < 0.01, ****p* < 0.001

^aAge from 20 to 82 were applied as an independent variable of CBE awareness, and age from 40 to 82 were applied as an independent variable of Mammogram awareness, in accordance with American Cancer Society’s suggestion regarding the criteria age of each screening

Table 3 Multiple linear regression analysis on breast cancer and screening literacy (N = 233)

Factors	Variables	B	SE	β
Predisposing	Age	– 0.162	0.062	– 0.227*
	Marital status	0.067	0.149	0.031
	Years in the USA	0.302	0.125	0.201*
Enabling	English proficiency	– 0.266	0.159	– 0.132
	Annual check-up	0.423	0.170	0.209*
	Having a primary physician	– 0.299	0.169	– 0.142
Need	Family cancer history	– 0.218	0.136	– 0.106
	Health status	0.012	0.113	0.007
	(Constant)	4.481	0.327	
	<i>R</i> ²		0.082	
	ΔR^2		0.047	
	<i>F</i> (8, 212)		2.359*	

p* < 0.05; *p* < 0.01

p < 0.001), and Cox and Snell’s *R*² presented that 18.7% of the variation in the Mammogram awareness was explained by the logistic model.

Factors Predicting Breast Cancer Literacy

Table 3 presents age ($\beta = - 0.227$, *SE* = 0.062, *p* < 0.05) and years in the U.S. ($\beta = 0.201$, *SE* = 0.125, *p* < 0.05) among predisposing factors as having an association with breast cancer literacy. For enabling factors, annual checkup ($\beta = 0.209$, *SE* = 0.170, *p* < 0.05) was positively associated with the literacy. The model fit was verified [*F*(8, 212) = 2.359, *p* < 0.05], and results showed that the model accounted for 8.2% of breast cancer literacy variance.

Discussion

This study is one of few studies that have attempted to understand the factors associated with breast cancer awareness and literacy among KA women. Almost 80% of the participants had heard of CBEs, and 90% of them had heard of mammograms. Additionally, 76.5% to 88.9% of the respondents correctly answered knowledge questions on breast cancer screening guidelines and risk factors such as age and family cancer history. Such high awareness or literacy levels could be a new phenomenon among KA women. A study of 123 KA women conducted in San Diego County, California in 2001 found that only about 16% of the respondents had adequate knowledge of breast cancer [5]. A more recent study

published in 2016 found that the average knowledge level of breast cancer symptoms and screening methods among KA women ranged from 6.4 to 7.4 on a 10-point scale [22]. To understand the rising awareness/literacy levels as a trend, continued investigation is needed, particularly by the use of comparable measurement.

This study found that KA women who engage in annual checkups were more likely to hear of both mammograms and CBEs compared to those who did not engage in them. The annual checkup was a strong enabling factor of cancer screening practices among KA women [15]. Such a relationship appears to be consistent with breast cancer awareness. However, with the updated breast cancer screening that does not recommend CBE routinely, a sensitive shared-decision making of considering CBE initiated by physicians is needed as annual checkups appear to be a venue of influencing awareness of CBE. At the same time, physicians should emphasize the importance of mammogram and recommend women ages 50 or older to receive it regularly. KA women with partners were more likely to be aware of mammograms than were the women without partners. Women with partners may have more resources to access mammogram information based on social networks associated with the relationship. Participants' health status was only a need factor predicting CBE awareness. KA women with good health status were more likely to hear about CBE than those with unhealthy status. This result may need careful interpretation. Healthier KA women may routinely receive annual health checkups, including CBEs, which may encourage awareness.

Age influenced breast cancer literacy among KA women. Indeed, older women possessed poorer literacy than younger women in this study. The finding was surprising as young females usually tend to possess a lack of breast health literacy regarding family history and breast cancer screening methods as they have difficulties receiving information from their healthcare providers [23]. Among KA women, age displayed complex associations with health beliefs in a study conducted in a Midwest state [2]. Compared to those aged 40 to 64, those aged 65 and over were more likely to perceive breast cancer as a serious disease as well as recognize barriers to screening breast cancer; however, they were less likely to perceive that they are susceptible to breast cancer and that receiving a breast cancer screening would be beneficial [2]. Future studies need to investigate how age plays a role in determining KA women's accurate knowledge of breast cancer screenings and risk factors.

Length of residence in the U.S. was also a predisposing factor for KA women to possess breast cancer literacy but up until now there has been conflicting results regarding its association with breast cancer literacy in KA samples. Longer U.S. residence was associated with self-reported breast cancer screening practices among KA women [24], while other studies indicated no association [13, 25]. An

understanding of how KA women acquire breast cancer literacy while living in the U.S. will be beneficial in developing culturally competent prevention. One speculation is that the U.S. may have higher awareness of breast cancer, creating affluent educational opportunities, than their motherland.

Surprisingly, having a partner was not a predisposing factor of breast cancer literacy in this study. Commonly, living with a partner was positively associated with higher involvement in receiving mammograms [26]. However, one previous study noted that living with a partner was associated with having higher odds of unrealistic optimism regarding breast cancer susceptibility [27], indicating this may distort perception of risk.

The annual checkup was the only enabler of breast cancer screening literacy in this study. Having a primary physician had no association with degree of literacy. Health care providers, most often primary care physicians, are important sources of information regarding breast health prevention for 69% to 90% of respondents with differing race, age, family history, and education levels [28]. However, it appears that actual prevention practices such as annual checkups influence KA women to acquire relevant knowledge of screening guidelines and risk factors.

Several limitations affect interpretation of the study results. While this study represents diverse age groups of KA women living in the southeastern U.S. city, use of non-probability sampling limits the generalizability of the findings. Data collection through assisted self-administered surveys could potentially increase social desirability, leading to biased responses for higher awareness and/or literacy. Although current breast cancer literacy measures have strengths such as understanding knowledge of screening guidelines and the two strongest risk factors such as age and family history, the measures were not validated for construct, and reliability was weak.

This study also has implications for practices and policies. Community health care providers and policymakers in the southeastern area of the U.S. should consider annual checkups as a crucial means for promoting the awareness of breast cancer prevention methods as well as imparting knowledge of risk factors for breast cancer to KA women. Annual checkups can be promoted by interventions targeting key ethnic settings such as churches, community organizations, advocacy groups, and grocery markets. At the same time, promoting access to free health clinic services can be an important venue for effective interventions. Raising awareness of available free health clinic services in the region of our study among KA women along with community-based breast health education in the Korean language would be greatly beneficial.

The finding that age was negatively associated with literacy for breast cancer risk factors raises a crucial policy and practice concern for KA women living in the southeastern

area of the U.S. Older KA women had relatively lower knowledge of the risk factors and screening methods related to breast cancer than younger KA women [7]. Such a generational gap in terms of breast health literacy, especially as first generation KA women are aging, needs to be breached because older age is a major risk factor for breast cancer [20]. KA immigrants are older than other Asian American immigrant subgroups [29]. The study stresses the need for educational opportunities, particularly for older KA women. As marital support predicts KA women's preventive health behaviors [5], family support can be a strong predictor for older KA women whose lives may be dependent on younger generations in their families to receive transportation, emotional support, and information about health prevention. Family-based education that includes the target age group of KA women and their family members could be a culturally sensitive prevention approach to breast cancer awareness.

To conclude, the study addresses the unique experiences of KA women living in the southeastern area of the U.S. who possess relatively high awareness of CBEs and mammograms and high literacy of breast cancer risk factors compared to KA women living in other regions and/or from previous studies. The study illuminates annual checkups as an enabling factor for breast cancer awareness of CBEs and mammograms and the knowledge of risk factors. Further studies adopting a qualitative research design could uncover how annual checkups increase the awareness of breast cancer screenings and the literacy of the risk factors related to breast cancer. This study also underscores the importance of developing and implementing culturally sensitive interventions for older KA women to increase their breast health literacy as age is a risk factor.

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