Predisposing and Enabling Factors Associated with Mammography Use Among Hispanic and Non-Hispanic White Women Living in a Rural Area

Silvia Tejeda, PhD;[1] Beti Thompson, PhD;[2,3] Gloria D. Coronado, PhD;[2,4] Diane P. Martin, PhD;[3] and Patrick J. Heagerty, PhD[5]

ABSTRACT: ***Context:*** *Women who do not receive regular mammograms are more likely than others to have breast cancer diagnosed at an advanced stage.* ***Purpose:*** *To examine predisposing and enabling factors associated with mammography use among Hispanic and non-Hispanic White women.* ***Methods:*** *Baseline data were used from a larger study on cancer prevention in rural Washington state. In a sample of 20 communities, 537 women formed the sample for this study. The main outcomes were ever having had a mammogram and having had a mammogram within the past 2 years.* ***Findings:*** *Reporting ever having had a mammogram was inversely associated with lack of health insurance (OR = 0.37, 95% CI: 0.16-0.84), ages under 50 years (OR = 0.23, 95% CI: 0.12-0.45), high cost of exams (OR = 0.48, 95% CI: 0.27-0.87), and lack of mammography knowledge (OR = 0.16, 95% CI: 0.07-0.37), while increasing education levels were positively associated (OR = 1.72, 95% CI: 1.09-2.70). Reporting mammography use within the past 2 years was inversely associated with ages under 50 years (OR = 0.49, 95% CI: 0.27-0.88) and over 70 years (OR = 0.47, 95% CI: 0.24-0.94), lack of health insurance (OR = 0.23, 95% CI: 0.10-0.50), and high cost of exams (OR = 0.55, 95% CI: 0.35-0.87).* ***Conclusions:*** *Continued resources and programs for cancer screening are needed to improve mammography participation among women without health insurance or low levels of education.*

Breast cancer is the leading cause of cancer deaths among Hispanic women living in the United States. The incidence and mortality of breast cancer are lower among Hispanic women (92.6 and 16.3, respectively) compared to white women (130.8 and 25.4, respectively)[1]. Although the incidence is relatively low in Hispanic women, breast cancer is often diagnosed at an advanced stage.[2-4] Advanced stage of breast cancer at diagnosis has been attributed to less frequent mammography use,[5] socioeconomic factors,[3] and biological and genetic factors among Hispanic women.[2] Mammography use has increased for most women in the United States. Yet, rates are still lower among Hispanic women. The 2003 National Health Interview Survey (NHIS) reported 63.3% of Hispanic women have ever had a mammogram compared to 71.1% non-Hispanic white women.[6] Similarly, Hispanic women (66.1%) and specifically, Mexican women (63.4%) were less likely to report receiving a mammogram within the past 2 years compared to non-Hispanic white women (70.4%).[1]

Previous investigations on breast cancer screening among Hispanics have generally focused on predictors and barriers to screening. This study borrows theoretical constructs from the PRECEDE/PROCEED planning model to examine the association between mammography use and two constructs (predisposing and enabling factors) among Hispanic women and non-Hispanic white women living in rural Washington state. The constructs used in this study are from the

[1]Program for Cancer Control and Population Science, University of Illinois, Chicago, Ill.
[2]Cancer Prevention Program, Fred Hutchinson Cancer Research Center, Seattle, Wash.
[3]Department of Health Services, University of Washington, Seattle, Wash.
[4]Department of Epidemiology, University of Washington, Seattle, Wash.
[5]Department of Biostatistics, University of Washington, Seattle, Wash.

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PRECEDE part of the framework which includes predisposing, enabling, and reinforcing factors. Predisposing factors are those related to an individual's knowledge, attitudes, existing skills, and beliefs toward a behavior.[7] Studies report that women who lack knowledge of screening[8-10] and who have lower education or income levels[11,12] are less likely to report mammography use. Studies also report that Hispanic women have cultural beliefs that differ from non-Hispanic white women.[13,14] In a study comparing Hispanic women to white women from a prepaid health plan with similar socioeconomic status (SES), age, and perceived health, Hispanic women were more likely to have attitudes about cancer being God's punishment, believing cancer is a death sentence, and believing little could be done to prevent cancer.[15] These cultural beliefs and attitudes may influence mammography use patterns among Hispanic women,[16,17] though some studies have shown such beliefs and attitudes have a relatively weak influence on screening, once factors related to health care access and SES are taken into account.[8,10,18,19]

Enabling factors are resources such as health care access and services that can provide motivation for a health behavior to occur.[7] Among Hispanic women, research findings demonstrate that having health insurance,[10,11,19,20] and regular access to a doctor or clinic[9,20] are factors associated with mammography use.

Reinforcing factors are incentives for the behavior to reoccur; these include having social support, positive peer influence, or advice from significant others.[7] Various studies report that a provider's recommendation for a mammogram is the most influential factor.[21,22]

Little research on mammography use has been conducted among Hispanic women living in a rural area compared to urban areas. Skaer et al[23] found that among Hispanic women seeking medical care in a migrant clinic in rural Washington state, only 38% had reported ever receiving a mammogram and among those screened only 30% had received one in the past 2 years. Data from Washington state show that 68% of women from large or small towns report having been screened within the past 2 years compared to 75% of those living in larger urban areas.[24] In this study, we hypothesized that women who lacked enabling factors, lacked screening knowledge, had low education levels, or had negative attitudes toward cancer were less likely to report ever having had a mammogram or having had one in the previous 2 years. Furthermore, differences in mammography use may be influenced by race/ethnicity.

Methods

Data for this study come from the Community Randomized Trial of Hispanic Cancer Prevention. Detailed methods have been reported elsewhere.[25] They are briefly described as follows.

Setting and Study Population. The study took place in Yakima Valley of Washington state, a large agricultural community. The Hispanic population in the area is heavily involved in farm work. Twenty communities in this area participated in the study. Criteria for inclusion required that a community have at least 1 government facility located in the town (ie, fire station, post office, or school) and that it have at least 300 residents.

Subject Recruitment. Home addresses were obtained from a bulk mailing company and overlaid onto census maps. A random sample of households, over-sampling Hispanics, was selected to participate in an in-person survey. Hispanic households were identified by calculating the percentage of Hispanic residents within each census block using 1990 Census data. The census blocks were ordered into 3 groups, from the highest to the lowest percentage of Hispanic individuals living in the census blocks. About 160 households were drawn from each community, with 50% of the sampled households from the census blocks with the highest percentage of Hispanics, 33% of the sampled households from the census blocks with the second highest percentage of Hispanics, and 17% sampled from the lowest percentage of Hispanics. Within each household, an adult was recruited to participate. Criteria for the selection of participants included that the respondent be 18 years of age or older, had lived in the house for the past week, and was able to respond to the questions. If there was more than one eligible participant, the person selected was the one whose birthday was first, after December 31. Participants were interviewed in their preferred language, either English or Spanish.

Survey Instrument. An in-person, baseline survey was conducted from October 1998 to January 1999. It included 100 questions related to demographic characteristics, health care access, smoking behaviors, eating patterns, and cancer screening behaviors. Categories defined by Aday et al were used in constructing items to assess predisposing and enabling factors.[26,27] The survey was translated from English into Spanish by bilingual and bicultural research assistants and reviewed by the project's community advisory

board members to incorporate local terms and ensure cultural relevance. The survey and data collection methods were approved by the Institutional Review Board at the Fred Hutchinson Cancer Research Center.

Variables. The outcome variables in this study are ever having had a mammogram and having had a mammogram within the past 2 years. Before assessing date of last mammogram, a statement was made to women explaining the purpose of a mammogram and a diagram was presented showing a picture of a woman having a mammogram. Then, the participant was asked whether she ever had a mammogram and if so, when was her last mammogram, in months or years.

Independent variables included both predisposing and enabling factors. Predisposing factors included sociodemographic characteristics and an assessment of knowledge, attitudes, and personal risk factors. Age was measured in 3 groups (40-49, 50-69, and over 70 years) and education was also measured in 3 levels (8th grade or less, 9th to high school, and college or more). Women identifying themselves as Mexican, Chicana, or Mexican American were categorized as being of Mexican descent. Screening knowledge was determined by asking participants whether they could name a test to find breast cancer early, either mammogram or clinical breast exam. Predisposing attitudes were assessed with questions asking participants whether they agreed or disagreed with the following statements: "afraid of finding cancer," "afraid of finding another disease," "embarrassed of what friends and family might think," and "not liking being touched," as reasons for not having cancer screening exams. We hypothesized that women who do not obtain mammograms would be more likely to agree with these statements as they are potential barriers to screening, and women who do obtain mammograms would be more likely to disagree with statements. Attitude responses were in a 4 category Likert scale from "strongly disagree" to "strongly agree." For the purposes of analysis, we collapsed the "strongly disagree" and "disagree" categories into a single "disagree" category, and collapsed "strongly agree" and "agree" as a single "agree" category. Risk factors for breast cancer included questions about whether a participant ever had children, had a first child at or after age 30, or whether the participant's mother ever had breast cancer.

Enabling factors included health insurance status, having regular access to a doctor or clinic, and an assessment of barriers that may prevent women from seeking screening. Health insurance status was measured in 4 categories (none, Medicare, public, or private). Participants were asked whether cost of screening tests, availability of transportation or child care, ability to take time off from work, waiting time at clinic, or language barrier were reasons for not having had cancer screening exams. The responses for these questions were collapsed into 2 categories, "disagree" and "agree." These statements were not phrased as enabling factors, instead they were phrased as lack of enabling factors.

Analysis. Frequencies and chi-squared tests were used to assess differences by race/ethnicity for mammography use, predisposing factors (age, education, attitudes, knowledge about breast cancer screening, and breast cancer risk factors) and enabling factors (health insurance, regular access to a doctor or clinic, and logistical barriers). Collinearity between independent variables was assessed. Regular access to a doctor and health insurance status were correlated; therefore the variable, regular access to a doctor, was not included in multivariate analyses.

Logistic regression was used to estimate the adjusted odds ratio and 95% confidence interval for multivariate analyses, where community level effects were accounted for by treating the community variable as a random effect. To determine the association between predisposing and enabling factors with mammography use, we used multivariate models which included factors that were significant at $P < 0.05$ in bivariate analysis. Observations from women 41 years of age or younger were excluded from multivariate analyses for the outcome, having a mammogram in the previous 2 years, as women under this age may have not had a mammogram, appropriately. Interactions with race/ethnicity were examined to assess between-group variation in mammography use. Models were fitted with main effects for race/ethnicity, individual characteristic, and an interaction term. Analyses were performed using STATA 9.2 (StataCorp, College Station, Tex).

Results

A total of 1,795 participants completed the baseline interview which yielded a response rate of 83.1%.[25] For this analysis we excluded data from male participants (N = 766), women under age 40 (N = 459), Native American women (N = 24), and Asian or Pacific Islander women (N = 3).

We included 537 women, 28.3% Hispanic and 71.7% non-Hispanic white women, 40 years of age and over (Table 1). Fewer Hispanic women reported ever having had a mammography (70.0%) or having had a mammogram in the previous 2 years (66.0%) compared

Table 1. Comparison of Hispanic (N = 152) and Non-Hispanic White Women (N = 385) on Demographic Characteristics and Reasons for Not Obtaining Cancer Screening Tests[a]

Characteristics	Hispanic N (%)	Non-Hispanic White N (%)	*P*-Value[b]
Ever had a mammogram	105 (70.0)	320 (83.6)	<.01
Had a mammogram in previous 2 years	68 (66.0)	228 (71.9)	.25
Age (years)			<.01
40-49	66 (43.7)	100 (26.0)	
50-69	56 (37.1)	159 (41.4)	
≥70	29 (19.2)	126 (32.7)	
Education			<.01
8th grade or less	100 (66.2)	34 (8.9)	
9th grade to high school	35 (23.2)	208 (54.3)	
College or more	16 (10.6)	141 (36.8)	
Health Insurance			<.01
None	51 (33.6)	32 (8.4)	
Public	58 (38.2)	80 (21.1)	
Medicare	18 (11.8)	135 (35.5)	
Private	25 (16.5)	133 (35.0)	
Regular access to a clinic			<.01
No	40 (26.3)	205 (53.3)	
Yes	112 (73.7)	180 (46.8)	
Regular access to a doctor			<.01
No	39 (25.7)	44 (11.4)	
Yes	113 (74.3)	341 (88.6)	
Knowledge about mammogram	98 (71.1)	347 (93.5)	<.01

	Hispanic N (%)		Non-Hispanic White N (%)		
Reasons for Not Obtaining Cancer Screening Tests	Agree	Disagree	Agree	Disagree	
I'm afraid of finding cancer	35 (23.8)	112 (76.2)	95 (24.9)	286 (75.1)	.79
I'm afraid of finding other diseases	32 (21.6)	116 (78.4)	64 (17.0)	312 (83.0)	.22
I'm embarrassed of what friends and family might think	13 (8.8)	135 (91.2)	10 (2.6)	369 (97.4)	<.01
I don't like being touched	33 (22.5)	114 (77.6)	85 (22.8)	288 (77.2)	.93
Cost too much	68 (48.2)	73 (51.8)	167 (45.6)	199 (54.4)	.60
No transportation	39 (26.7)	107 (73.3)	50 (13.2)	330 (86.8)	<.01
Can't take time off from work	39 (27.5)	103 (72.5)	52 (13.9)	321 (86.1)	<.01
Waiting time at clinic	40 (28.0)	103 (72.0)	67 (18.0)	305 (82.0)	.01
Language barrier	20 (13.7)	126 (86.3)	23 (7.0)	307 (93.0)	.02
No child care	17 (14.8)	98 (85.2)	43 (14.7)	249 (85.3)	.99

[a]Percentages are based on non-missing values.
[b]*P*-values for chi-square tests assess differences between Hispanic and non-Hispanic white women.

to non-Hispanic white women (83.6% and 71.9%, respectively). Hispanic women were younger, less educated, and a greater percentage did not have any type of health insurance compared to non-Hispanic white women. A lower percentage of Hispanic women were able to name the mammogram or clinical breast exam as tests to find breast cancer early compared to non-Hispanic white women. Among Hispanic women, the majority identified themselves as being of Mexican descent (88.7%), completed the survey in Spanish (59.2%), and were born in Mexico (51.3%).

There were few differences by race/ethnicity for attitudinal statements. About the same percentage of Hispanic and non-Hispanic white women agreed with statements as reasons for not obtaining cancer screening exams: they were "afraid of finding cancer/other diseases," or "did not like being touched" (Table 1). The only difference was in one statement, where a significantly higher percentage of Hispanic women compared to non-Hispanic white women agreed that they were "embarrassed of what friends and family might think" as a reason for not obtaining cancer screening exams. In all of the statements regarding lack of enabling factors, a significantly greater percentage of Hispanic women compared to non-Hispanic white women agreed with the following

Table 2. Predisposing and Enabling Factors Associated with Mammography Use

		Ever Had a Mammogram Adjusted OR (95%CI)
Age (years)	40-49	0.23 (0.12-0.45)*
	50-69	1
	≥70	0.83 (0.30-2.33)
Race/ethnicity	Hispanic	1.33 (0.57-3.12)
	Non-Hispanic White	1
Education level	8th grade or less	0.51 (0.17-1.56)
	9th grade to high school	0.31 (0.15-0.65)*
	College or more	1
Trend test for education		1.72 (1.09-2.70)*
Health insurance	None	0.37 (0.16-0.84)*
	Public	1.54 (0.69-3.42)
	Medicare	1.21 (0.40-3.63)
	Private	1
Knowledge about mammogram	Incorrect	0.16 (0.07-0.37)*
	Correct	1
Screening tests cost too much	Agree	0.48 (0.27-0.87)*
	Disagree	1
Waiting time at clinic	Agree	1.32 (0.64-2.74)
	Disagree	1
		Had a mammogram in the past 2 years Adjusted OR (95%CI)
Age (years)	42-49	0.49 (0.27-0.88)*
	50-69	1
	≥70	0.47 (0.24-0.94)*
Health Insurance	None	0.23 (0.10-0.50)*
	Public	0.87 (0.46-1.67)
	Medicare	0.73 (0.33-1.59)
	Private	1
Screening tests cost too much	Agree	0.55 (0.35-0.87)*
	Disagree	1

*Statistically significant at $P < .05$.

statements as reasons for not obtaining cancer screening exams: they did not have transportation, could not take time off from work, had no child care, felt the wait at clinic was long, the clinic personnel did not speak Spanish, and thought cancer screening tests cost too much. A greater percentage of non-Hispanic white women reported risk factors for breast cancer. Among this group, 6.3% reported their mother had breast cancer, 8.8% reported never having had children, and 5.2% had their first child after age 30 compared to Hispanic women (3.3%, 4.6%, and 4.9%, respectively). No differences were found by race/ethnicity for risk factors based on chi-squared tests (results not shown).

In multivariate analysis, report of ever having had a mammogram was inversely associated with younger age (40-49 years), lack of health insurance, high cost of exams, and lack of knowledge about tests to find breast cancer early (Table 2). Increasing education levels were positively associated with report of ever having had a mammogram based on a trend test. Furthermore, there was evidence that the association between report of ever having had a mammogram and knowledge differed by race/ethnicity. Hispanic women who were not able to name the mammogram or clinical breast exam as exams to find breast cancer early were less likely to report ever having had a mammogram compared to non-Hispanic white women without knowledge of breast cancer screening (OR = 0.07, 95% CI: 0.02-0.21).

Report of having had a mammogram in the past 2 years was inversely associated with women ages under 50 years and over 70 years, lack of health insurance, and high cost of exams. There was no evidence that the association between having had a mammogram within

the previous 2 years with predisposing and enabling factors varied by race/ethnicity (data not shown).

Discussion

Constructs associated with the PRECEDE/PROCEED framework have been found to influence breast cancer screening and were hypothesized to be associated with mammography use in this study's rural population. Our findings suggest that predisposing factors, such as age, education, and knowledge may impact screening practices among women in a rural population, while race/ethnicity and attitudinal barriers have a marginal influence on mammography use. Additionally, our findings suggest that enabling factors such as health insurance and cost of exams may influence mammography use more than logistical barriers related to transportation, language, or child care.

In multivariate analysis, race/ethnicity was not significantly associated with mammography use, while other factors, such as health insurance status, education level, and age were associated. Other studies have found similar findings between race/ethnicity and mammography use, however.[11,20,28] When factors associated with SES are adjusted for, the effect of race/ethnicity attenuates. Even though, we found few differences by race/ethnicity previous studies have recommended the importance of using culturally relevant intervention approaches and tailored messages to different racial or ethnic groups.[29,30] One race difference found was that Hispanic women who were not able to name the mammogram or clinical breast exam as tests to find breast cancer early had a lower likelihood of screening use. In contrast, no association between ability to name exams for early detection of breast cancer and likelihood of screening use was found for non-Hispanic white women. Future interventions and community efforts need to teach women about breast cancer screening especially those who have never had a mammogram.

Some studies report that Hispanic women are more likely to have fatalistic beliefs and attitudes about breast cancer and screening.[15,16] However, some studies report no associations between attitudes and breast cancer screening behaviors among Hispanics.[8–10,18] In our study, Hispanic women were no more likely than non-Hispanic white women to have fatalistic attitudes about breast cancer and screening. Furthermore, we found no associations between mammography use and attitudes.

Hispanic women were significantly more likely than non-Hispanic white women to report barriers related to resource limitations such as lack of transportation, not being able to take time off from work, waiting time at clinic, and language barriers, though in multivariate analysis these factors were not significantly associated with mammography use, instead we found that lack of health insurance and cost played a more important role. The Yakima Valley is a relatively small place by rural standards with a highway adjacent to most of the 20 communities that participated in this study. It may be that services are relatively close for people to travel to a clinic or that women may get a ride from other family members, making transportation to a clinic less of a barrier. Another factor hypothesized to be inversely associated with screening use was inability to communicate due to a language barrier. Our findings showed no association between inability to communicate with health care providers and mammography use among Hispanic women. This may be due to the presence of services provided by the Yakima Valley Farmworkers' Clinic, an agency serving agricultural workers and the underserved by providing health care at a sliding scale with culturally appropriate services, such as Spanish-speaking health care professionals.

Our study found no significant associations between risk factors for breast cancer and mammography use. Similarly, a previous study assessing a different outcome (having a follow-up mammogram, after an abnormal one), found no associations between having a follow-up mammogram and age at first birth or nulliparity.[31] In contrast, a different study found that a greater percentage of women with routine mammography had a family history of breast cancer and a higher age at first live birth compared to women who did not receive routine mammography.[32] In our study, an assessment of risk factors were limited since we did not measure whether the relationship between risk factors and mammography use were due to women's knowledge about risk factors or whether women with these risk factors, were more likely to have a recommendation for screening from their health care provider.

Finally, age adjusted data from the NHIS show that 63% of Hispanic and 71% of non-Hispanic white women reported ever having a mammogram. In this study, self-reported screening percentages for Hispanics (70%) and non-Hispanic whites (83%) were higher than the national average. Differences between our sample and national data may be due to differences in sampling methods, use of age adjusted percentages in the national sample, potential over reporting of mammography use in our sample, or enhanced screening services in the study's area.

Our findings add information to the few studies among Hispanic women living in a rural setting.

Hispanic women in this study were mostly of Mexican descent. This is important, as studies have shown that Hispanic subgroups have different screening behaviors.[10] Finally, the study procedures involved in-person interviews, which may have increased participation rates and reduced selection bias.

Limitations to our study should be noted. The data were self-reported and may be biased toward reporting more favorable behaviors and subject to recall. Also, the constructs measured did not include a wide sample of factors that could be predisposing and enabling. Furthermore, the study's survey did not include questions regarding reinforcing factors, which have been found to be associated with screening use. For example, receipt of a mammography recommendation by a health care provider has been found to be an important determinant of mammography use in other studies.[21,22] Finally, this study may not be generalized to Hispanic and non-Hispanic white populations in Washington state or the United States.

In conclusion, predisposing and enabling factors are determinants of ever having had a mammogram or having had a mammogram in the past 2 years, among women living in a rural area. Local and national government programs that provide free or low cost services are needed to aid women without health insurance or those with low levels of education. Even though, breast cancer screening rates have widely increased for most women, teaching women about cancer screening is still needed in many community and clinic settings.

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