

Mammography Rescreening Among Women of Diverse Ethnicities: Patient, Provider, and Health Care System Factors

Regina Otero-Sabogal, PhD
Desi Owens, MS, LCSW
Jesse Canchola, MS
Jacqueline M. Golding, PhD
Farzaneh Tabnak, PhD, MPH
Patrick Fox, PhD

Abstract: This study identified patient, provider, and health care system factors that influenced mammography rescreening among non-insured, racial/ethnic minority women. Data were collected using a stratified-clustered random sample survey of 1,050 women of five racial/ethnic groups (Latina, Chinese, Filipina, African American, and Caucasian) and 102 primary care clinical sites. Women received screening services through two no-cost screening programs in California. Chi-square tests were used to assess bivariate associations and multiple logistic regressions were used to compute adjusted odds ratios and 95% confidence intervals. Mammography rescreening was associated with living in the United States longer; having higher education levels, better health care access, a history of breast problems, and favorable perceptions of mammography; obtaining regular Pap screening and hormone replacement therapy; having had better communication with clinicians; and attending clinics that conducted in-reach activities. This study suggests that simply removing financial barriers is not enough to improve mammography rescreening among underserved women.

Key words: Mammography, cancer screening, women, low income, ethnic minority, access, attitudes.

Routine mammography screening is the best available method for detecting breast cancer in the early stages, and has a significant role in reducing mortality from the disease.¹ Although the rate of one-time mammography has increased over the past decade, the rate of repeat screenings has not, particularly among low-income minority populations, which have a disproportionately high number of breast cancer-related deaths.¹⁻⁶ Although mammography rescreening in vulnerable populations is a national priority,⁷ only limited information is available about factors

DR. OTERO-SABOGAL is an associate adjunct professor at the University of California, San Francisco, School of Nursing, Institute for Health and Aging. DR. FOX is Professor in Residence, DR. GOLDING is an adjunct professor, MS. OWENS is an analyst, MR. CANCHOLA is a senior statistician in the Center for AIDS Prevention Studies at the University of California, San Francisco, and DR. TABNAK is a research scientist at the California Department of Health Services, Cancer Detection Section.

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associated with mammography rescreening over time, especially among low-income, ethnically diverse populations.⁸ Moreover, very little research has examined the relationship between the needs of uninsured women and health care system factors that could improve mammography rescreening.^{9,10}

Cost and lack of insurance are repeatedly cited as primary deterrents to regular use of breast cancer screening and as reasons for differences in tumor stage at the time of detection.^{6,11-13} However, simply having access to free services is not enough to eliminate barriers to the regular use of mammography screening.¹⁴⁻¹⁶ In addition to cost and lack of insurance, this study explores individual, attitudinal, clinician, and health care system factors that may further explain regular participation in mammography screening among uninsured and underinsured minority women participating in a state-wide no-cost-to-the-patient mammography screening program.

Individual factors. Mammography rescreening rates are higher among non-Hispanic Caucasian,¹⁷ younger,^{4,18} more acculturated,¹⁶ and more educated women than their respective counterparts.¹⁸⁻²¹ Other factors associated with higher rates of rescreening are being relatively more knowledgeable about breast cancer;^{19,22} having a family history of breast cancer;^{18,23} routinely visiting a gynecologist;²⁴ having annual clinical breast examinations;^{19,24} reporting more primary care or more specialty visits³; being satisfied with a first mammogram;^{19,25} experiencing a first mammogram as less painful,^{25,26} less stressful, or less embarrassing;^{27,28} having a normal first mammogram;²⁹ and describing one's general health as good or excellent.³⁰

Moreover, perceptions of the benefits of and barriers to mammography are strongly associated with mammography screening.^{24,31-34} Thus, exploring unfavorable and favorable opinions (decisional balance) about mammography is necessary to fully understand the particular barriers and facilitators to mammography rescreening and to design interventions that address the needs of those underserved groups.

Clinician factors. Physicians' recommendations are the most important factor in motivating women to have initial and subsequent mammograms.^{29,35-38} Physicians' enthusiasm and style of communicating information about mammography screening can promote patients' returning for preventive care procedures.^{33,39-41} However, the clinician's influence is not always favorable because physicians communicate messages about mammography differently, depending on who the patient is. For example, physicians recommend mammography less frequently to patients who are older, have lower education levels, have lower household incomes, and have less insurance coverage.^{42,43} These factors are compounded in minority populations by communication problems: African Americans, Asian Americans, and Latinos are more likely than Caucasians to experience difficulty communicating with their physicians, to feel that they are treated with disrespect when receiving health care services, and to lack a regular doctor.⁴⁴ Satisfaction with health care providers' explanations of medical procedures and test results is also lower among Spanish-speaking Latinos than among either English-speaking Latinos or non-Latino Caucasians.⁴⁵ Satisfaction improves when there is language concordance between provider and patient.⁴⁶

System factors. Office system redesign in the provision of preventive and screening services is also associated with greater mammography compliance, greater

patient satisfaction, and better coordination and continuity in the delivery of mammography services.⁴⁷ Organizational changes such as use of a prevention team, tracking methods, patient education, and having a health educator call patients are the most consistently effective interventions for improving cancer screening.⁴⁸⁻⁵¹ Reminders, alerts, and prompting physicians have also been found to increase preventive care performance.⁵² Passive provider and patient education is not as effective as system change interventions.⁵³ The examination of site characteristics may help explain why removing cost barriers alone does not automatically ensure repeated mammography use.

Combined individual, clinician, and system factors. Studies have found differences in cancer screening by race and ethnicity. For example, African American and Caucasian women have higher rescreening rates than Asian and Latina women and women of other racial/ethnic backgrounds. In addition, higher family income level, shorter time since last mammogram, affiliation with a site with higher rescreening rates, continuity of care with a single primary care clinician, comprehensive service availability, and satisfaction with relationships established with the primary care provider also appear to be associated with mammography rescreening.^{54,55} In addition, participating in decision making with providers; being younger; having a recent Pap smear; reporting breast problems; and living in a region with more mammography facilities that have reminder systems, ample provider staffing, higher HMO market share, and higher charges for screening are also associated with rescreening.⁵

This study addresses the following question: Beyond cost issues, what are the individual, clinician, and system factors that facilitate or inhibit mammography rescreening among minority women 50 years of age and older? To our knowledge, this is one of the few studies that attempt to concurrently identify individual, clinician, and system factors associated with mammography rescreening among medically underserved women. The study participants received mammography services through two no-cost-to-the-woman screening programs, the Breast and Cervical Cancer Control Program (BCCCP) and the Breast Cancer Early Detection Program (BCEDP) in California. These two programs were renamed Cancer Detection Program: Every Woman Counts (CDP:EWC) in October, 2002. CDP:EWC provides breast cancer screening and diagnostic services to women aged 40 and over who are low-income, uninsured, or underinsured. It also provides cervical cancer screening and diagnostic services to women aged 25 and over who meet similar eligibility criteria.

Improving breast cancer screening among uninsured minority populations is a national priority according to the goals set forth by the U.S. Department of Health and Human Services in *Healthy People 2010*.^{7,56} Obtaining an understanding of these multiple factors will allow public health programs to better facilitate regular participation in mammography screening by low-income, minority women.

Methods

Sample. We collected data through a stratified-clustered random sample survey of all BCCCP and BCEDP clinic sites where women received clinical breast examinations (CBEs).

Eligible sites were identified using BCCCP and BCEDP claims data. We selected clinics that remained in either program through the 1999 calendar year; this yielded a total of 138 sites. The sites were stratified into two groups according to the number of program-funded CBEs conducted during 1996. This stratification was carried out to facilitate inquiry into whether clinic size, found to be relevant in abnormal mammogram follow-up rates, is also associated with screening rates.⁵⁷ Sites that had provided fewer than the median of 75 CBEs were counted as small; sites that had provided more than 75 CBEs were counted as large. Sites were called to obtain consent and confirm eligibility. Eligible sites were recruited sequentially from the randomized lists and a total of 108 sites (78%) consented to participate. Six of the 108 sites did not participate in the study because they could not provide enough clients or they withdrew consent, thus leaving a final sample of 102 sites (74%). Weights were constructed to reflect the unequal probability of selection of clinics within strata.

Women were eligible for the study if they were 50 years of age or older, had received normal CBE and mammography results, had never been diagnosed with breast cancer, and were not receiving short-term follow-up. Eligible patients were classified into the following six racial/ethnic groups based on self-report: Latina, Chinese/Cantonese, Filipina, Caucasian, African American, and other (including Native American, and Asian/Pacific Islander other than Chinese or Filipina). A total of 5,299 patients were selected from the six groups together, with additional recruitment of Chinese and Filipina women to ensure sufficient numbers for analysis. Letters were mailed to the selected women to inform them of the study and to obtain consent. Of the 5,299 women, 8.9% returned refusal postcards. An average of 10 women were recruited from each of the 102 participating sites. Although interviewers were instructed to call 10 women from each clinic until 10 interviews were completed at each site, a few clinics did not yield 10 interviews because the sample for those clinics was exhausted before the quota was met. Therefore, some sites had more interviews and some fewer, but the total sum of participants was 1,050. Each woman who had not responded was telephoned a minimum of nine times at varying times of the day and days of the week before recruitment attempts ceased. Excluding noncontacts due to achieving site-specific patient enrollment targets, the overall response rate was 73% of 1,438, resulting in a sample size of 1,050 women.

Measures. Bilingual, bicultural, professional interviewers conducted telephone surveys with women who consented to participate in the study. Women who were classified into the Other ethnic/racial group were interviewed in English. The 30-minute interview instrument was developed to measure the predictors of mammography rescreening and to assess women's experiences with breast cancer screening. Questions were developed through an extensive literature review and were adapted from previous studies⁵⁸ and focus group interviews. The interview instrument was translated into Spanish, Tagalog, Mandarin, and Cantonese by native speakers of each language and was back-translated into English. All back-translations were compared to ensure consistency. Interviewers, using a Computer Assisted Telephone Interview System, administered the questionnaire. The general survey response categories were yes/no (dichotomous) and scales were made up of three

points (good–neutral–bad). Pretesting indicated that these simplified response categories offered better construct validity for each answer and reduced the number of “do not know” responses in the population surveyed.

In addition to sociodemographic information, the questionnaire included items to obtain respondents’ acculturation level, length of time residing in the United States, national origin, language preference for the interview, access to health care, patient–clinician communication and language concordance, reasons for getting rescreened, and barriers and promoters to rescreening. *Acculturation*, the interactive process of adaptation, assimilation, and integration to the U.S. mainstream culture, has been shown to be a significant modifier of health behaviors including cancer screening.^{16,59–61} We measured acculturation using the Short Acculturation Scale.⁶² Because acculturation level and number of years in the United States were highly correlated (Spearman correlation $r = 0.73$) we included years living in the United States in our multivariable model.

The patient-level health correlates included whether the patient takes hormone pills, undergoes Pap tests following guidelines, and performs breast self-examinations, as well as information about any past cancer diagnosis other than breast cancer. Measures of access to health services, patient–physician communication, and decisional balance were converted into summative scales for analytical purposes.

Items addressing medical access were selected from The Group Health Association of America Patient Satisfaction Questionnaire⁶³ and from other surveys with similar populations. The summed items used to create the access to health care scale were the woman’s ability to see a doctor when needed; whether or not she had one source of health care;⁶⁴ and ratings for convenience, waiting time, paperwork, staff friendliness, and use of interpreters. Higher values indicate greater access to health care. The standardized Cronbach’s alpha coefficient was 0.30.

The summed items used to create the patient–clinician communication construct were clinicians’ use of interpreters, whether or not clinicians spoke patients’ languages, whether or not respondents brought friends or relatives to assist with interpreting, and whether or not clinicians explained procedures in an easy-to-understand way. Higher values indicate clearer communication between the patient and clinician. The standardized Cronbach’s alpha coefficient was 0.39.

The rationale for using a measure of decisional balance is based on previous findings showing that this construct of the Transtheoretical Model explains what facilitates or hinders a woman’s decision to have a mammogram.^{65–67} Decisional balance is a summary measure, derived as the sum of the difference between perceived facilitators (pros) and barriers (cons) to having mammograms. Our measure was adapted from Rakowski and associates⁶⁸ and new items were included after focus groups were conducted with the target population. The decisional balance scale was extensively pretested with all five racial/ethnic groups for cultural and linguistic appropriateness. It was not pretested with women from the Other ethnic/racial group.) To build the decisional balance scale, the items measuring cons were summed and included on one scale, and the pros were summed and included on another scale. Decisional balance was computed by subtraction of the con scale from the pro scale so that numbers above zero mean more pros than cons in general.

The scales were standardized to a mean of 50 and a standard deviation of 10. Participants answered yes or no to each item. This scale has a standardized Cronbach's alpha coefficient of 0.72. The decisional balance cons included concerns about paying for mammograms and for treatment, uncertainty about where to obtain a mammogram, concerns about x-rays, anticipating pain from mammography, not being concerned about breast cancer, being too busy, being afraid to discover breast cancer, and thinking that it is unnecessary at one's particular age. The decisional balance pros included feeling that it is important for women at one's age, making one feel at ease, having relatives with breast cancer, having the procedure as part of a check-up, clinician recommendation, and having insurance.

To measure the principal outcome, regular use of mammography screening, we used these questions: Did you have another mammogram after the one in 1996? When did you have the mammogram that followed the mammogram you had with the state's free program? and How many mammograms have you had in the last 5 years?

Regular use of mammography requires not only current adherence to guidelines, but regular use over an extended period of time. In this study, we defined regular mammography use as having had a subsequent mammogram 10–18 months following the 1996 index screen and having had three or more mammograms in the past 5 years. The questions used to define regular use of screening were derived from the National Cancer Institute Breast Cancer Screening Consortium Studies.⁶⁹

Site interviews. An in-person interview was conducted with a representative from each of the 102 randomly selected clinical sites that performed screening and diagnostic services as part of the programs. The site interview included measures of site and organizational factors, characteristics of the clinics' patient populations, access to screening services, education and outreach activities, rescreening practices, and relationships with the funding program.

The primary site coordinator, clinic manager, or clinic nurse was interviewed regarding site characteristics. Site interviews of approximately 1 hour in duration were conducted between January and September 1999.

Statistical methods. In the initial bivariate analyses, for correlates with more than two categories, the *p*-value associated with the Pearson chi-squared test was used with the appropriate complex survey adjustments to the chi-squared statistic. Following adjustments, the *p*-value associated with the Student's *t*-test was used for continuous predictors. Stepwise logistic regression models were run to identify substantive predictors of regular versus non-regular use of mammography screening.

We used both a theoretical as well as an empirical framework to determine which predictors would be entered into the model-building process. Initially, for the empirically determined predictors, the bivariate relationships between the outcome variable (mammography rescreening) and demographic and behavioral correlates were examined for statistical significance using the Pearson chi-square statistic (or the Fisher exact test when the correlate was dichotomous). The correlates were then entered into stepwise logistic regression procedures to identify the most parsimonious model while still achieving adequate fit, which was operationalized as probability greater than or equal to 0.10 using the Hosmer-Lemeshow goodness-of-fit test.

All final analyses were performed using the Stata statistical software (Stata, Inc.) survey procedures to adjust standard errors of parameters in the logistic regression

correctly by incorporating the complex aspects of the design (i.e., high- and low-density clinics [strata], the clinics themselves [clusters], and unequal probability of selection).^{70,71} In addition, for cross-tabulations, the Pearson chi-square statistic is used with the Rao-Scott correction^{72,73} to obtain an asymptotically valid chi-square under complex sample designs.

All hypothesized correlates (regardless of whether or not they had a significant bivariate relationship with the outcome variable) were analyzed using stepwise multivariable logistic regression. Each model was run first using a forward stepwise procedure, and then was repeated using a backward stepwise procedure; candidate models were identified for further analysis. In both procedures, the *p*-value for inclusion in the model was 0.10. Once the final models had been identified, the regressions were repeated to ensure that the correct parameter estimates and standard errors had been obtained to account for the changes in sample size due to listwise deletion of missing data.

In the analysis phase, a range of options was considered in dealing with missing data, depending on the nature of the missing information.⁷⁴ These options included various multiple imputation strategies, members of the random regression family of models,⁷⁵ and standard survey weighting schemes. However, most of the substantive variables considered did not have a substantial amount of missing data, so use of these missing data methodologies was not necessary. For those predictors that did, the missing data were due to question branching (i.e., skip patterns). Whenever possible, these variables were included in the model only when a sensitivity analysis produced the same model under the reduced sample (due to the missing data).

Results

Bivariate relationships. Tables 1 through 3 show the distributions of the subset of correlates evaluated in the model. Table 1 illustrates the bivariate associations of patient demographic characteristics with rescreening. High educational attainment was associated with higher proportions of rescreening, except for those women with 16 or more years of education. Latinas and women of Chinese descent were less likely than women in other racial/ethnic groups to be rescreened; similarly, women who were born in Mexico or Asia, as well as those interviewed in Spanish or Chinese, were less likely than women born elsewhere or who spoke other languages to be rescreened. Less acculturated women, and women who attended church more frequently were also less likely than more acculturated women and women who attended church less often to be rescreened. Seasonal workers, and, to a lesser extent, women who did not formally work outside the home, were less likely to be rescreened than other women.

Table 2 shows patients' health care access level, positive and negative attitudes regarding rescreening, and patient-clinician communication characteristics associated with rescreening. Only characteristics that were significantly associated with rescreening are shown.

Women who came back to be rescreened reported that it was easy to get health care when needed and most women had a usual source for health care, generally a neighborhood clinic. For slightly more than one third of the women (37.3%), the

Table 1.

**PATIENT DEMOGRAPHIC CHARACTERISTICS ASSOCIATED WITH
REGULAR PARTICIPATION IN MAMMOGRAPHY SCREENING
AMONG LOW-INCOME WOMEN IN CALIFORNIA, 1999**

	N	% of Women ^a	% of Women Rescreened	p-Value ^b
Age (y)	1,011			0.44
50-64		84.5	49.2	
65+		15.5	45.8	
Years of schooling (y)	1,012			0.000
No formal education		8.0	32.1	
1-8		40.0	42.2	
9-12		29.4	51.7	
13-15		14.7	63.7	
16+		7.8	60.8	
Race/ethnicity	1,023			0.002
Latina		51.4	43.4	
White (non-Hispanic)		26.0	60.1	
Chinese		7.3	38.7	
Filipina		7.7	53.2	
African American/black		5.1	55.7	
Other		2.5	46.3	
Birthplace	1,031			0.001
United States or Europe		35.3	56.7	
Mexico		34.7	41.5	
Philippines		7.5	55.2	
Asiac		7.2	38.7	
Other		15.3	48.8	
Marital status	1,029			0.046
Married		47.2	48.3	
Separated		7.8	38.8	
Never married		8.3	40.0	
Divorced		20.3	55.0	
Widowed		15.9	51.9	
Employment status	1,026			0.006
Working full time or part time		36.9	49.6	
Seasonal worker		4.6	34.1	
Unemployed/student		8.8	54.6	
Disabled/retired		22.9	55.8	
Full-time homemaker		26.8	42.6	

(continued)

Table 1. Continued.

	<i>N</i>	% of Women ^a	% of Women Rescreened	<i>p</i> -Value ^b
Annual household income	828			0.597
<\$5,000		17.5	49.0	
\$5,000–\$9,999		34.0	48.6	
\$10,000–\$19,999		33.8	52.1	
\$20,000–\$29,999		8.1	53.7	
\$30,000+		6.5	59.2	
Acculturation score	1,031			0.000
<12 (less acculturated)		61.9	43.1	
12+ (more acculturated)		38.2	58.0	
Religion	1,009			0.034
Attended church less than twice/month last year		36.6	53.4	
Attended church two or more times/month last year		63.5	46.2	
Health practices				
Takes hormone pills (HRT)	1,023	38.4	62.9	0.000
Had Pap tests following current guidelines	961	42.8	29.0	0.000
Years living in the United States	663			0.013
1–10		29.1	37.8	
11–20		27.9	43.2	
21–30		26.4	47.5	
31+		16.6	57.2	

^aSome numbers may not sum to 100% due to rounding error.

^bPearson chi-square test.

^cAsia includes China, Hong Kong, India, Korea, Taiwan, and Vietnam.

Abbreviation: HRT, hormone replacement therapy.

1996 index screening was their first mammogram (data not shown). The vast majority of women who came back to be rescreened had their index mammogram as part of an annual medical examination (85%). Women were also more likely to regularly participate in mammography screening if the doctor or nurse recommended it (79%) and if they had breast problems (12%). Good access to mammography services was typically reported and most women (89.4%) indicated that they had a mammogram around the time of the program-financed CBE.

Table 2.**CLINICAL ACCESS AND PATIENT ATTITUDES TOWARD REGULAR PARTICIPATION IN MAMMOGRAPHY SCREENING AMONG LOW-INCOME WOMEN IN CALIFORNIA, 1999**

	<i>N</i>	% of Women	% of Women Rescreened	<i>p</i> -Value ^a
Barriers to getting yearly mammogram (cons)				
Concerns about paying for mammogram	1,016	53.2	40.4	0.000
Concerns about paying for treatment if diagnosed with cancer	1,008	26.6	35.8	0.000
Not sure where to have mammogram	1,025	22.1	33.5	0.000
Concerns that x-rays might be harmful	990	18.5	34.4	0.000
Anticipating pain from mammography	1,024	7.4	30.2	0.001
Breast cancer is the last thing on their mind	1,002	13.2	35.6	0.003
Too busy	1,024	9.4	25.0	0.000
Afraid of discovering breast cancer	1,025	7.7	30.4	0.000
Think it is unnecessary at your age	1,012	6.5	30.3	0.000
Promoters to getting yearly mammogram (pros)				
Important for women your age	1,026	96.7	49.4	0.075
Makes you feel at ease about your health	1,029	97.8	49.4	0.015
Because you have relatives with breast cancer	1,025	40.4	44.7	0.030
It is part of your yearly check-up	1,026	93.4	50.4	0.001
Would get a mammogram if you had insurance	1,023	96.1	50.0	0.005
Reasons for getting initial screening mammogram				
History of breast problems	817	11.9	70.1	0.007
As part of annual examination	817	85.1	60.9	0.000
MD/RN recommended	817	79.1	59.1	0.024
	<i>N</i>	<i>Mean</i>	<i>SE</i>	<i>p</i> -value ^b
Decisional balance (pros-cons)	1,028			0.000
Regular participation in mammography		7.04	0.098	

(continued)

Table 2. Continued.

	N	Mean	SE	p=value ^b
Non-regular participation in mammography		6.13	0.133	
Access to health care	1,000			0.000
Regular participation in mammography		6.07	0.085	
Non-regular participation in mammography		4.84	0.130	
Physician-patient communication	1,031			0.000
Regular participation in mammography		6.61	0.035	
Non-regular participation in mammography		6.37	0.047	

^a Pearson chi-square test.
^b Student's *t*-test.

Although mammography was provided at no cost to patients, the most common barrier to getting yearly mammograms was concern about paying for the screening, which was reported by approximately half the women. About one fourth of women reported concerns about paying for treatment if cancer was diagnosed. Nearly one fifth of the women were not sure where to have a mammogram or had concerns that x-rays might be harmful. Fewer women (between 7% and 13%) anticipated pain when having a mammogram, felt that breast cancer was the last thing on their minds, were too busy, were afraid to discover breast cancer, or thought that mammography was unnecessary at their age.

More than 9 out of every 10 women who regularly participated in mammography screening reported that mammography was important for women their age, made them feel at ease about their health, or was part of their annual check-up. A similar number said they would get a mammogram if they had insurance. About one third of the women reported that having relatives with breast cancer would promote their use of mammography screening.

For about two thirds of women who regularly participated in mammography screening, no interpreter was used during the mammogram, and nearly one in five non-English-speakers reported that clinicians were bilingual. About 9 out of every 10 women reported that the clinician who performed the CBE told them to get a yearly mammogram, and explained the examination in a way that was easy to understand.

Over one half of women who engaged in rescreening were using estrogen replacement therapy (HRT). Nearly 9 out of every 10 women who regularly participated

Table 3.**SITE CHARACTERISTICS ASSOCIATED WITH REGULAR PARTICIPATION IN MAMMOGRAPHY SCREENING AMONG LOW-INCOME WOMEN IN CALIFORNIA, 1999**

	<i>N</i>	% of Sites	% of Women Rescreened	<i>p</i> -Value ^a
Site's organizational type	1,031			0.054
Public funded		18.8	54.1	
Not-for-profit hospital or clinic		56.0	49.8	
For-profit hospital or clinic		23.2	41.0	
Other		1.9	60.1	
Site provides cervical cancer screening	1,021	94.7	50.0	0.000
Site uses telephone education line	1,031	30.2	42.8	0.034
Site offers other screening services (access to health care)	1,031			0.089
One service		1.0	30.0	
Two services		3.1	34.3	
Three or more services		95.9	49.4	
Site's % reimbursement for all patients from Medi-Cal	973			0.006
95%		1.7	35.3	
75% to <95%		13.8	44.7	
50% to <75%		30.5	43.1	
25% to <50%		28.4	51.4	
<25%		25.5	58.7	
Site provides mammogram	1,031			
On-site		9.4	41.2	0.060
Another department on-site		8.0	36.1	0.028
An off-site location		51.0	51.7	0.073
	<i>N</i>	<i>Mean</i>	<i>SE</i>	<i>p</i> -value ^b
Site's % white/Caucasian patients	1,031			0.023
Regular participation in mammography screening		22.04	2.500	
Non-regular participation in mammography screening		18.65	2.181	

^aPearson chi-square test.^bStudent's *t*-test.

in mammography screening reported that they had performed breast self-examinations. Slightly fewer than half had received five Pap smears in the past 5 years.

Site characteristics. Table 3 shows associations between the 102 primary care site characteristics and rescreening. Only characteristics that were significant or nearly significantly associated with rescreening are shown at the two-sided 5% significance level.

About half of the sites were not-for-profit hospitals or clinics, with the remainder almost evenly divided among publicly funded sites and for-profit hospitals or clinics. Rescreening rates tended to be lower at for-profit hospitals or clinics than at other sites. The vast majority of sites (94.7%) where women received mammography rescreening offered cervical cancer screening services and had rescreening rates that almost doubled the rescreening rates of sites that did not offer this service. Sites where patients were referred elsewhere for mammography had higher rescreening rates than sites that provided mammography on site. In addition, sites that conducted in-reach activities had higher rescreening rates than sites that did not.

Table 4 shows the final multivariate model of patient and site characteristics associated with mammography rescreening. The Hosmer-Lemeshow goodness-of-fit test showed adequate fit ($p = 0.10$). Variables that were significantly associated with rescreening were included in the multivariate logistic regression model. Odds ratios (ORs) and 95% confidence interval (CI) were calculated.

Logistic regression yielded seven patient-level correlates and one clinic site-level correlate and an interaction with years of schooling (no formal education, 1–8, 9–12, 13–15, and 16 or more years) and decisional balance (continuous: pros minus cons; higher values mean more pros than cons). (In Table 4, 13–15 and 16 or more years of schooling are combined into one group labeled 13 or more years of schooling.) Because years of schooling completed and decisional balance were involved in an interaction, we interpreted decisional balance at each level of years of schooling completed and did not attempt to interpret the main effects of either of these variables.

We first looked at the patient-level correlates to the mammography rescreening outcome. Years of schooling completed interacted with the decisional balance scale (pros minus cons). Decisional balance was unrelated to adherence among women with no schooling and among women with 16 or more years of schooling (both ORs greater than 1). However, among women with 9–12 and 13–15 years of education, decisional balance was positively associated with mammography rescreening (OR = 1.25, $p = 0.018$ and OR = 1.54, $p = 0.04$). Rescreening rates among American-born women, women living in the United States for 11–20 years, and those living in the United States for 1–10 years were not significantly different (all ORs greater than 1; $p = 0.748$ and 0.644 , respectively). However, women living in the United States for 21–30 years were almost twice as likely to be rescreened as those living in the United States for 1–10 years (OR = 1.8, $p = 0.023$). The rescreening outcome for those living in the United States for 31 or more years was even more pronounced (OR = 2.44, $p = 0.006$). Women who took HRT were almost twice as likely to be rescreened as those who did not (OR = 1.9, $p = 0.00$). Women who underwent a Pap test following guidelines were almost four times as likely to be rescreened as women who did not (OR = 4.1, $p = 0.00$).

Table 4.**LOGISTIC REGRESSION MODEL OF REGULAR PARTICIPATION IN MAMMOGRAPHY SCREENING AMONG LOW-INCOME WOMEN IN CALIFORNIA, 1999**

Outcome: Mammography Rescreening 1=Regular, 0=Non-regular (ref)	Odds Ratio	95% CI for Odds Ratio		p-Value
		Lower	Upper	
Years living in United States				
1-10	Ref			
11-20	1.08	0.655	1.76	0.771
21-30	1.78	1.08	2.94	0.024*
31+	2.39	1.28	4.47	0.007**
US born	1.13	0.647	1.96	0.670
Take HRT				
No	Ref			
Yes	1.89	1.39	2.56	0.000***
Pap test following guidelines				
No	Ref			
Yes	4.02	2.85	5.66	0.000***
Site has conducted in-reach				
No	Ref			
Yes	1.57	1.12	2.22	0.01*
Site offers other screening services	1.34	1.24	1.45	0.000***
Doctor-patient communication	1.24	0.971	1.58	0.08†
Interaction*				
Decisional balance * Years of schooling				
No formal education	0.997	0.650	1.53	0.988
1-8	0.730	0.632	0.843	0.000***
9-12	0.909	0.754	1.10	0.312
13+	Ref			

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; † $p < 0.10$.

*Main effects for decisional balance and years of schooling are not shown since they are constituent components of an interaction.

Model Fit Diagnostic: Unadjusted Hosmer-Lemeshow Goodness-of-fit based on deciles of risk p -value = 0.43. In general, $p > 0.20$ (closer to 1.0) indicates good-fitting models.

Abbreviation: HRT, hormone replacement therapy.

The access to health care scale (higher values mean more screening services are provided) showed that as the number of services increased, the odds of women adhering increased by 34% (OR = 1.34, $p = 0.00$). The doctor-patient communication scale (higher values mean clearer communication) suggested that

clearer doctor-patient communication resulted in higher odds of rescreening (OR = 1.25, $p = 0.07$).

Discussion

This study demonstrates that simply removing financial barriers is not enough to influence the regular use of mammography screening. Even with access to a no-cost-to-the-woman program for breast health services, only 49% of the uninsured minority women in our sample regularly participated in mammography screening. Examining factors beyond program costs, we identified individual, clinician, and system influences on mammography rescreening among low-income, minority women receiving free breast health services.

We found that higher acculturation scores and more education, better access, favorable perceptions of mammography, better patient-clinician communication, and regular preventive health participation are strongly associated with mammography rescreening. In addition, women who receive screening services at clinics that conduct in-reach activities are more likely to participate in mammography screening regularly.

Acculturation positively influences breast cancer rescreening among low-income women who are immigrants.^{62,76-79} Indeed, as reported in other studies, we found that years living in the United States is a strong predictor of repeat mammography use.⁸⁰⁻⁸³ These results may indicate that more acculturated women have increased exposure to preventive messages and routine health practices, and perhaps have a better understanding of accessing and navigating the health care system than less acculturated women have. More acculturated women may also have values that are more consistent with using procedures like mammography to protect their health than less acculturated women have. In addition, we found that women who had more years of education were more likely to come back for mammography rescreening than women who had less education. This finding is related to previous studies that suggest that screening behaviors among more highly educated women may account, in part, for better health.^{15,18-20,38, 84-86} Interventions designed for immigrant women should provide access-related information that emphasizes the benefits of regular participation in mammography screening in a manner that is culturally and linguistically appropriate. Women with less formal education, including women who do not speak English, are more likely to report literacy problems in navigating the health care system and in understanding medical terminology,^{60,87} so this information must also be made accessible to individuals with lower literacy levels. Consistent with previous research,^{31,32,88} this study shows that women's perceptions of mammography influenced their decision to return for rescreening. Women who perceived more facilitators than barriers (i.e., positive decisional balance) were more likely to return for mammography screening.

Interestingly, education and decisional balance interacted with regular participation in mammography screening. Women with high school diplomas or college degrees tended to report more unfavorable perceptions about mammography use than women with less formal education. Perhaps, among low-income women, higher education is associated with increased knowledge of the difficulties involved

in obtaining mammograms and increased awareness of individual, clinician, and system barriers to mammography. Specific barriers reported in this study indicate that women thought that they would incur a cost for their mammogram, even though the California Department of Health Services widely advertises their free screening services. They also may believe that the mammograms will cost them money because they can incur bills for other health care services at the clinics where they receive mammograms. Additional barriers identified were concern about the cost of cancer treatment should this be necessary, fear of radiation, fear of discovering breast cancer, anticipation of pain from the mammography procedure, having a busy life, and having limited knowledge about mammography (e.g., thinking that mammography is unnecessary at their age). Like other studies,^{35,39} ours highlights a critical function that clinicians can provide of identifying, acknowledging, and addressing breast cancer concerns among groups at risk.

Our findings showed that a history of HRT, obtaining Pap smears on a regular basis, and having a history of breast problems were associated with mammography rescreening. It is likely that these factors are a proxy for preventive attitudes, access, and continuity of care. To obtain HRT, women must maintain a relationship with a clinician, which in turn facilitates access to other health care services, such as cancer screening. Hormone replacement therapy has been associated with an increased risk of breast cancer⁸⁹ and therefore women who receive HRT may be encouraged or may request to have mammograms on a regular basis. Thus, women who receive HRT may be more educated about screening than women who do not receive it.⁹⁰ Consistently with previous findings, women who regularly obtained Pap smears^{16,91} and had a history of breast problems¹⁶ were more likely to obtain mammography screening regularly. Hormone replacement therapy is a cause of uterine cancer when unopposed estrogen is used.⁹² Therefore, women using HRT may also perceive a need to obtain more Pap smears, or they may be encouraged to do so by their clinicians.

Our results indicate that clinics providing services to patients who have other forms of insurance such as Medicare and fee-for-service would be more likely to report higher screening rates. To explain this finding it is important to know that Medi-Cal pays for 33% of patients' clinic visits in California, and that more than half of Medi-Cal beneficiaries report that it is difficult to find a doctor nearby to treat them. In addition, according to the California HealthCare Foundation,⁹³ 44% of urban primary care physicians in California have no Medi-Cal patients as part of their practice. Because of difficulties with reimbursement, many providers refuse to accept Medi-Cal. These facts are consistent with previous work showing that women who had Medicaid coverage were significantly less likely to have a biennial mammogram than their counterparts.^{15,94,95} Furthermore, as reported by other studies,⁹⁶ our results indicate that the more preventive services are available at a clinical site, the higher the rescreening rates at that site are. Our data also suggest that structuring primary care services to facilitate the completion of several screenings in one visit would increase the likelihood of participation in mammography screening. Conversely, our data indicate that clinics where patients were referred off-site for mammography screening had higher rescreening rates than clinics that provided mammography screening on site. Perhaps many sites that offer services through the free state program do not have the resources to

accommodate all participants on site, and these outside mammography referrals serve as an extension of clinics' limited internal resources. This is further supported by the higher percentage of clinics in our sample that refer mammography services to an off-site provider. Our findings indicate that women's participation in breast health services is not necessarily interrupted by traveling to another location.

This study showed that women who received mammograms from clinics that conducted any type of breast cancer screening in-reach (such as physician and patient reminders, implementation of tracking systems, or patient education) were more inclined to have mammograms on a regular basis than women who received services at sites that did not conduct in-reach activities. This result coincides with previous system change reports indicating the importance of in-reach activities such as organizational changes⁴⁸ and provider and patient reminder systems^{97,98} in improving mammography rescreening rates.

Our results highlight the critical influence that providers have on patients' understanding and acceptance of mammography screening. As reported in other studies, doctor-patient communication and physician recommendation were significantly associated with mammography rescreening.⁹⁹⁻¹⁰² Language discordance between physicians and patients may be a barrier for clearer communication. Whereas most English-speaking women reported that clinicians explained the examination in a way that was easy to understand, among the Spanish, Cantonese, and Tagalog-speaking patients only one out of five indicated that the clinician spoke their language and more than one half said the clinician did not use an interpreter (data not shown). In other studies, Spanish-language preference has been negatively associated with Latinos' knowledge and use of preventive services.¹⁰³ These results confirm findings showing that Latino and Asian-American patients have more difficulty understanding information conveyed by doctors.⁴⁴ This is an area of crucial importance, especially in view of the fact that the last census reported that 17.9% of adults in the United States speak a language other than English and 11.1% are born outside of the United States.¹⁰⁴ Providers could best serve immigrants and non-English-speaking communities by providing culturally competent care that includes having interpreter services, hiring a multicultural staff, training staff to be culturally sensitive about patients' needs, and designing service delivery and educational materials to address the language and health literacy needs of patients.¹⁰⁵

One potential limitation of our study is that the results are based on self-reports, which may result in overestimates of mammography screening. Although other studies have found self-reports to be reasonably reliable, these conclusions should be viewed with some level of caution.^{106,107} It has been suggested that minority women overreport the use of screening mammography by one third.¹⁰⁷⁻¹¹¹ In addition, two of our scales, the medical access and provider-patient communication scales, require a more detailed examination of items for improved internal consistency.

Findings from this study suggest the importance of conducting clinic in-reach activities to promote ongoing rescreening. Low-income, minority women often attend mass screening programs inside fragmented health care systems, or are required to wait several months to receive a mammogram. Women would benefit from in-reach activities such as redesigning office systems with regular follow-up provided between screening appointments to ensure continuity of care. In addition,

multifaceted interventions with components directed at the screening needs of patients, clinicians, and system practices should be implemented. Specifically, clinic tracking and reminder systems, provider and patient education (e.g., on understanding the benefits of mammography screening), and the quality of patient-provider communication appear to enhance mammography rescreening in underserved populations receiving services in community health clinics. Developing and implementing a multilevel intervention approach is a critical step toward reducing ethnic and racial disparities in breast cancer screening utilization, which in turn, can lead to more timely diagnosis and treatment.

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Notes

1. American Cancer Society. Breast cancer facts & figures 2001–2002. Atlanta, GA: American Cancer Society, 2001.
2. Mickey RM, Durski J, Worden JK, et al. Breast cancer screening and associated factors for low-income African-American women. *Prev Med* 1995 Sep;24(5):467–76.
3. Bastani R, Kaplan CP, Maxwell AE, et al. Initial and repeat mammography screening in a low income multi-ethnic population in Los Angeles. *Cancer Epidemiol Biomarkers Prev* 1995 Mar;4(2):161–7.
Song L, Fletcher R. Breast cancer rescreening in low-income women. *Am J Prev Med* 1998 Aug;15(2):128–33.
Phillips KA, Kerlikowske K, Baker LC, et al. Factors associated with women's adherence to mammography screening guidelines. *Health Serv Res* 1998 Apr;33(1):29–53.
6. Otero-Sabogal R, Arnsberger P, Nussey B, et al. Factors associated with low-income Latinas adherence to breast cancer rescreening. *Women Cancer* 1999 Winter;1(5):35–41.
7. Hiatt RA. Behavioral research contributions and needs in cancer prevention and control: adherence to cancer screening advice. *Prev Med* 1997 Sep–Oct;26(5 Pt 2):S11–8.
8. Rakowski W, Rimer BK, Bryant SA. Integrating behavior and intention regarding mammography by respondents in the 1990 National Health Interview Survey of Health Promotion and Disease Prevention. *Public Health Rep* 1993 Sep–Oct;108(5):605–24.
9. Gann P, Melville SK, Luckmann R. Characteristics of primary care office systems as predictors of mammography utilization. *Ann Intern Med* 1993 Jun 1;118(11):893–8.
10. Thompson RS, Taplin SH, McAfee TA, et al. Primary and secondary prevention services in clinical practice. Twenty years' experience in development, implementation, and evaluation. *JAMA* 1995 Apr 12;273(14):1130–5.
Valdini A, Cargill LC. Access and barriers to mammography in New England community health centers. *J Fam Pract* 1997 Sep;45(3):243–9.
Wells BL, Horm JW. Stage at diagnosis in breast cancer: race and socioeconomic factors. *Am J Public Health* 1992 Oct;82(10):1383–5.
Chavez LR, Hubbell FA, Mishra SI, et al. The influence of fatalism on self-reported use of Papanicolaou smears. *Am J Prev Med* 1997 Nov–Dec;13(6):418–24.

14. Katz SJ, Hofer TP. Socioeconomic disparities in preventive care persist despite universal coverage. Breast and cervical cancer screening in Ontario and the United States. *JAMA* 1994 Aug 17;272(7):530-4.
15. Sabogal F, Merrill SS, Packer L. Mammography rescreening among older California women. *Health Care Financ Rev* 2001 Summer;22(4):63-75.
16. Otero-Sabogal R, Stewart S, Sabogal F, et al. Access and attitudinal factors related to breast and cervical cancer rescreening: why are Latinas still underscreened? *Health Educ Behav* 2003;30(3):337-59.
17. Breen N, Kessler LG, Brown ML. Breast cancer control among the underserved—an overview. *Breast Cancer Res Treat* 1996;40(1):105-15.
18. Hitchcock JL, Steckevecz MJ, Thompson WD. Screening mammography: factors associated with adherence to recommended age/frequency guidelines. *Womens Health* 1995 Fall;1(3):221-35.
19. Marshall G. A comparative study of re-attenders and non-re-attenders for second triennial National Breast Screening Programme appointments. *J Public Health Med* 1994 Mar;16(1):79-86.
20. Zapka JG, Stoddard A, Maul L, et al. Interval adherence to mammography screening guidelines. *Med Care* 1991 Aug;29(8):697-707.
21. Austin LT, Ahmad F, McNally MJ, et al. Breast and cervical cancer screening in Hispanic women: a literature review using the health belief model. *Womens Health Issues* 2002 May-Jun;12(3):122-8.
22. Miller AM, Champion VL. Mammography in older women: one-time and three-year adherence to guidelines. *Nurs Res* 1996 Jul-Aug;45(4):239-45.
23. Lerman C, Rimer B, Trock B, et al. Factors associated with repeat adherence to breast cancer screening. *Prev Med* 1990 May;19(3):279-90.
24. Taylor VM, Taplin SH, Urban N, et al. Repeat mammography use among women ages 50-75. *Cancer Epidemiol Biomarkers Prev* 1995 Jun;4(4):409-13.
25. Drossaert CH, Boer H, Seydel ER. Health education to improve repeat participation in the Dutch breast cancer screening programme: evaluation of a leaflet tailored to previous participants. *Patient Educ Couns* 1996 Jul;28(2):121-31.
26. Drossaert CH, Boer H, Seydel ER. Does mammographic screening and a negative result affect attitudes towards future breast screening? *J Med Screen* 2001;8(4):204-12.
27. Orton M, Fitzpatrick R, Fuller A, et al. Factors affecting women's response to an invitation to attend for a second breast cancer screening examination. *Br J Gen Pract* 1991 Aug;41(349):320-2.
28. Thompson B, Montano DE, Mahloch J, et al. Attitudes and beliefs toward mammography among women using an urban public hospital. *J Health Care Poor Underserved* 1997 May;8(2):186-201.
29. Johnson MM, Hislop TG, Kan L, et al. Compliance with the screening mammography program of British Columbia: will she return? *Can J Public Health* 1996 May-Jun;87(3):176-80.
30. Burack RC, Gurney JG, McDaniel AM. Health status and mammography use among older women. *J Gen Intern Med* 1998 Jun;13(6):366-72.
31. Rakowski W, Andersen MR, Stoddard AM, et al. Confirmatory analysis of opinions regarding the pros and cons of mammography. *Health Psychol* 1997 Sep;16(5):433-41.
32. Rimer BK, Conaway MR, Lyna PR, et al. Cancer screening practices among women in a community health center population. *Am J Prev Med* 1996 Sep-Oct;12(5):351-7.
33. Halabi S, Skinner CS, Samsa GP, et al. Factors associated with repeat mammography screening. *J Fam Pract* 2000 Dec;49(12):1104-12.

34. Crump SR, Mayberry RM, Taylor BD, et al. Factors related to noncompliance with screening mammogram appointments among low-income African-American women. *J Natl Med Assoc* 2000 May;92(5):237-46.
35. Mandelblatt JS, Yabroff KR. Breast and cervical cancer screening for older women: recommendations and challenges for the 21st century. *J Am Med Womens Assoc* 2000 Summer;55(4):210-5.
36. Howe HL. Repeat mammography among women over 50 years of age. *Am J Prev Med* 1992 May-Jun;8(3):182-5.
37. Rimer BK, Trock B, Engstrom PF, et al. Why do some women get regular mammograms? *Am J Prev Med* 1991 Mar-Apr;7(2):69-74.
38. Sobel J, Curtin A, Fell D. The Oregon Breast Cancer Detection and Awareness Project: the legacy of a mammogram screening campaign. *Health Values: Health Behavior, Education & Promotion* 1991;15(1):3-8.
39. Fox SA, Siu AL, Stein JA. The importance of physician communication on breast cancer screening of older women. *Arch Intern Med* 1994 Sep 26;154(18):2058-68.
40. Roberts RA, Birch NJ. A comparison of breast cancer secondary prevention activities and satisfaction with access and communication issues in women 50 and over. *Prev Med* 2001 Apr;32(4):348-58.
41. Pearlman DN, Rakowski W, Clark MA, et al. Why do women's attitudes toward mammography change over time? Implications for physician-patient communication. *Cancer Epidemiol Biomarkers Prev* 1997 Jun;6(6):451-7.
42. O'Malley MS, Earp JA, Hawley ST, et al. The association of race/ethnicity, socioeconomic status, and physician recommendation for mammography: who gets the message about breast cancer screening? *Am J Public Health* 2001 Jan;91(1):49-54.
43. Lane DS, Zapka J, Breen N, et al. A systems model of clinical preventive care: the case of breast cancer screening among older women. For the NCI Breast Cancer Screening Consortium. *Prev Med* 2000 Nov;31(5):481-93.
44. Collins K, Hughes D, et al. Diverse communities, common concerns: assessing health care quality for minority Americans. Findings from the Commonwealth Fund 2001 Health Care Quality Survey. New York, NY: The Commonwealth Fund, 2002.
45. Morales LS, Cunningham WE, Brown JA, et al. Are Latinos less satisfied with communication by health care providers? *J Gen Intern Med* 1999 Jul;14(7):409-17.
46. Carrasquillo O, Orav EJ, Brennan TA, et al. Impact of language barriers on patient satisfaction in an emergency department. *J Gen Intern Med* 1999 Feb;14(2):82-7.
47. Strom KL. Quality improvement interventions: what works? *J Healthc Qual* 2001 Sep-Oct;23(5):4-14; quiz 14, 24.
48. Rand Corporation, U.S. Department of Health & Human Services, Health Care Financing Administration. Evidence report and evidence-based recommendations; interventions that increase the utilization of Medicare-funded preventive services for persons age 65 and older. Santa Monica, CA: Southern California Evidence-Based Practice Center, 1999.
49. Manfredi C, Czaja R, Freels S, et al. Prescribe for health. Improving cancer screening in physician practices serving low-income and minority populations. *Arch Fam Med* 1998 Jul-Aug;7(4):329-37.
50. Atri J, Falshaw M, Gregg R, et al. Improving uptake of breast screening in multiethnic populations: a randomised controlled trial using practice reception staff to contact non-attenders. *BMJ* 1997 Nov 22;315(7119):1356-9.
51. Champion VL, Skinner CS, Menon U, et al. Comparisons of tailored mammography interventions at two months postintervention. *Ann Behav Med* 2002 Summer;24(3):211-8.

52. Balas EA, Weingarten S, Garb CT, et al. Improving preventive care by prompting physicians. *Arch Intern Med* 2000 Feb 14;160(3):301–8.
53. Rimer BK, Resch N, King E, et al. Multistrategy health education program to increase mammography use among women ages 65 and older. *Public Health Rep* 1992 Jul–Aug;107(4):369–80.
54. Evans JL, Nasca PC, Baptiste MS, et al. Factors associated with repeat mammography in a New York State public health screening program. *J Public Health Manag Pract* 1998 Sep;4(5):63–71.
55. O'Malley AS, Forrest CB, Mandelblatt J. Adherence of low-income women to cancer screening recommendations. *J Gen Intern Med* 2002 Feb;17(2):144–54.
56. National Cancer Institute. *Cancer Progress Report 2001*. Bethesda, MD: U.S. Department of Health & Human Services, Public Health Service, National Institutes of Health, National Cancer Institute, 2001.
57. Webber PA, Fox P, Zhang X, et al. An examination of differential follow-up rates in breast cancer screening. *J Community Health* 1996 Apr;21(2):123–32.
58. Perez-Stable EJ, Otero-Sabogal R, Sabogal F, et al. Pathways to early cancer detection for Latinas: en accion contra el cancer. *Health Educ Q* 1996;23(Suppl):S41–59.
59. Cuellar I, Arnold B, Gonzalez G. Cognitive referents of acculturation: Assessment of cultural constructs in Mexican Americans. *Journal of Community Psychology* 1995;23(4):339–56.
60. Peragallo NP, Fox PG, Alba ML. Breast care among Latino immigrant women in the U.S. *Health Care Women Int* 1998 Mar–Apr;19(2):165–72.
61. Castro FG, Coe K, Gutierrez S, et al. Designing health promotion programs for Latinos. In: Kato PM, Mann T, eds. *Handbook of diversity issues in health psychology*. New York: Plenum Press, 1996.
62. Marin G, Sabogal F, Marin BV, et al. Development of a short acculturation scale for Hispanics. *Hispanic J Behav Sci* 1987;9(2):183–205.
63. Group Health Association of America, Davies AR, Ware J. *The Group Health Association of America Patient Satisfaction Questionnaire. Measuring and managing health care quality*. New York, NY: Aspen Publishers Inc., 1992.
64. Bindman AB, Grumbach K, Osmond D, et al. Primary care and receipt of preventive services. *J Gen Intern Med* 1996 May;11(5):269–76.
65. Prochaska JO, Johnson S, Lee P. The transtheoretical model of behavior change. In: Shumaker SA, Schron EB, Ockene J, et al., eds. *The handbook of health behavior change*. 2nd ed. New York, NY, US: Springer Publishing Co. Inc., 1998.
66. Prochaska JO, Velicer WF, Rossi JS, et al. Stages of change and decisional balance for 12 problem behaviors. *Health Psychol* 1994 Jan;13(1):39–46.
67. Chamot E, Charvet AI, Perneger TV. Predicting stages of adoption of mammography screening in a general population. *Eur J Cancer* 2001 Oct;37(15):1869–77.
68. Rakowski W, Dube CE, Marcus BH, et al. Assessing elements of women's decisions about mammography. *Health Psychol* 1992;11(2):111–8.
69. Screening mammography: a missed clinical opportunity? Results of the NCI Breast Cancer Screening Consortium and National Health Interview Survey Studies. *JAMA* 1990 Jul 4;264(1):54–8.
70. Binder DA. On the variances of asymptotically normal estimators from complex surveys. *Int Stat Rev* 1983;51(3):279–92.
71. Kish I, Frankel MR. Inference from complex samples. *J R Stat Soc Ser B* 1974;36(1):1–37.
72. Rao JNK, Scott AJ. The analysis of categorical data from complex surveys: Chi-squared tests for goodness of fit and independence of two-way tables. *J Am Stat Assoc* 1981 Jun;76(374):221–30.

73. Rao JNK, Scott AJ. On chi-squared tests for multiway contingency tables with cell proportions estimated from survey data. *Ann Stat* 1984 Mar;12(1):46-60.
74. Little R, Rubin D. *Statistical analysis with missing data*. New York: Wiley, 1987.
75. Hedeker D, Gibbons R. Application of random-effects pattern-mixtures models for missing data in longitudinal studies. *Psychol Methods* 1997;2:64-78.
76. Tang TS, Solomon LJ, McCracken LM. Cultural barriers to mammography, clinical breast exam, and breast self-exam among Chinese-American women 60 and older. *Prev Med* 2000 Nov;31(5):575-83.
77. Hubbell FA, Mishra SI, Chavez LR, et al. The influence of knowledge and attitudes about breast cancer on mammography use among Latinas and Anglo women. *J Gen Intern Med* 1997 Aug;12(8):505-8.
78. O'Malley AS, Kerner J, Johnson AE, et al. Acculturation and breast cancer screening among Hispanic women in New York City. *Am J Public Health* 1999 Feb;89(2):219-27.
79. Peragallo NP, Fox PG, Alba ML. Acculturation and breast self-examination among immigrant Latina women in the USA. *Int Nurs Rev* 2000 Mar;47(1):38-45.
80. Solis JM, Marks G, Garcia M, et al. Acculturation, access to care, and use of preventive services by Hispanics: findings from HHANES 1982-84. *Am J Public Health* 1990 Dec;80 Suppl:11-9.
81. Facione NC. Breast cancer screening in relation to access to health services. *Oncol Nurs Forum* 1999 May;26(4):689-96.
82. Kaplan RM, Navarro AM, Castro FG, et al. Increased use of mammography among Hispanic women: baseline results from the NCI Cooperative Group on Cancer Prevention in Hispanic Communities. *Am J Prev Med* 1996 Nov-Dec;12(6):467-71.
83. Skaer TL, Robison LM, Sclar DA, et al. Cancer-screening determinants among Hispanic women using migrant health clinics. *J Health Care Poor Underserved* 1996 Nov;7(4):338-54.
84. Breast and cervical cancer screening among underserved women. Baseline survey results from six states. The National Cancer Institute Cancer Screening Consortium for Underserved Women. *Arch Fam Med* 1995 Jul;4(7):617-24.
85. Adler NE, Boyce T, Chesney MA, et al. Socioeconomic status and health. The challenge of the gradient. *Am Psychol* 1994 Jan;49(1):15-24.
86. Strzelczyk JJ, Dignan MB. Disparities in adherence to recommended followup on screening mammography: interaction of sociodemographic factors. *Ethn Dis* 2002 Winter;12(1):77-86.
87. Bobo JK, Dean D, Stovall C, et al. Factors that may discourage annual mammography among low-income women with access to free mammograms: a study using multi-ethnic, multiracial focus groups. *Psychol Rep* 1999 Oct;85(2):405-16.
88. Rawl SM, Champion VL, Menon U, et al. The impact of age and race on mammography practices. *Health Care Women Int* 2000 Nov-Dec;21(7):583-97.
89. Weiss LK, Burkman RT, Cushing-Haugen KL, et al. Hormone replacement therapy regimens and breast cancer risk(1). *Obstet Gynecol* 2002 Dec;100(6):1148-58.
90. Zhang P, Tao G, Anderson LA. Prevalence of and factors associated with hormone replacement therapy counseling: results from the 1994 National Health Interview Survey. *Am J Public Health* 1999 Oct;89(10):1575-7.
91. Mayer-Oakes SA, Atchison KA, Matthias RE, et al. Mammography use in older women with regular physicians: what are the predictors? *Am J Prev Med* 1996 Jan-Feb;12(1):44-50.
92. Grady D, Gebretsadik T, Kerlikowske K, et al. Hormone replacement therapy and endometrial cancer risk: a meta-analysis. *Obstet Gynecol* 1995 Feb;85(2):304-13.

93. Bindman AB, Huen W, Vrianizan K, et al. Physician participation in Medi-Cal, 1996–1998. Oakland, CA: Medi-Cal Policy Institute, California Healthcare Foundation, 2002.
94. Parker J, Gebretsadik T, Sabogal F, et al. Mammography screening among California Medicare beneficiaries: 1993–1994. *Am J Prev Med* 1998 Oct;15(3):198–205.
95. Potosky AL, Breen N, Graubard BI, et al. The association between health care coverage and the use of cancer screening tests. Results from the 1992 National Health Interview Survey. *Med Care* 1998 Mar;36(3):257–70.
96. Cummings DM, Whetstone L, Shende A, et al. Predictors of screening mammography: implications for office practice. *Arch Fam Med* 2000 Sep–Oct;9(9):870–5.
97. Walsh JM, McPhee SJ. A systems model of clinical preventive care: an analysis of factors influencing patient and physician. *Health Educ Q* 1992 Summer;19(2):157–75.
98. Mandelblatt JS, Yabroff KR. Effectiveness of interventions designed to increase mammography use: a meta-analysis of provider-targeted strategies. *Cancer Epidemiol Biomarkers Prev* 1999 Sep;8(9):759–67.
99. Fox SA, Roetzheim RG. Screening mammography and older Hispanic women. Current status and issues. *Cancer* 1994 Oct 1;74(7 Suppl):2028–33.
100. Roetzheim RG, Fox SA, Leake B. Physician-reported determinants of screening mammography in older women: the impact of physician and practice characteristics. *J Am Geriatr Soc* 1995 Dec;43(12):1398–402.
101. Fox SA, Roetzheim RG, Kington RS. Barriers to cancer prevention in the older person. *Clin Geriatr Med* 1997 Feb;13(1):79–95.
102. Burns RB, McCarthy EP, Freund KM, et al. Black women receive less mammography even with similar use of primary care. *Ann Intern Med* 1996 Aug;125(3):173–82.
103. Williams MV, Parker RM, Baker DW, et al. Inadequate functional health literacy among patients at two public hospitals. *JAMA* 1995 Dec 6;274(21):1677–82.
104. United States Census Bureau. U.S. Census Bureau state & county quickfacts. Washington, DC: United States Census Bureau, 2002.
105. National Forum for Health Care Quality Measurement and Reporting. The National Quality Forum: Improving healthcare quality for minority patients. Workshop proceedings. Washington, DC: National Forum for Health Care Quality Measurement and Reporting, 2002.
106. Etzi S, Lane DS, Grimson R. The use of mammography vans by low-income women: the accuracy of self-reports. *Am J Public Health* 1994 Jan;84(1):107–9.
107. Degnan D, Harris R, Ranney J, et al. Measuring the use of mammography: two methods compared. *Am J Public Health* 1992 Oct;82(10):1386–8.
108. Hiatt RA, Perez-Stable EJ, Quesenberry C Jr, et al. Agreement between self-reported early cancer detection practices and medical audits among Hispanic and non-Hispanic white health plan members in northern California. *Prev Med* 1995 May;24(3):278–85.
109. McGovern PG, Lurie N, Margolis KL, et al. Accuracy of self-report of mammography and Pap smear in a low-income urban population. *Am J Prev Med* 1998 Apr;14(3):201–8.
110. Suarez L, Goldman DA, Weiss NS. Validity of Pap smear and mammogram self-reports in a low-income Hispanic population. *Am J Prev Med* 1995 Mar–Apr;11(2):94–8.
111. McPhee SJ, Nguyen TT, Shema SJ, et al. Validation of recall of breast and cervical cancer screening by women in an ethnically diverse population. *Prev Med* 2002 Nov;35(5):463–73.