Utilization of Screening Mammography Among Middle-Aged and Older Women

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Abstract

Aims: This study examines patterns of screening mammogram use, investigating the relationship of screening with demographic, health status, and healthcare factors.

Methods: Data from 1242 women aged ≥ 41 were obtained from a random sample of mailed surveys to community households in an eight-county region in Central Texas in 2010. The dependent variable was the timing of the participants' most recent screening mammography (in the past 12 months, between 1 and 2 years, or > 2 years). Predictor variables included demographic, health status, and healthcare access factors. Multinomial logistic regression identified variables associated with screening mammography practices.

Results: The majority of women reported having at least one mammogram during their lifetime (93.0%) and having a mammography within the past 2 years (76.2%). Participants who reported not having a routine checkup in the past 12 months (odds ratio [OR] 0.12, $p < 0.001$), having a lapse of insurance in the past 3 years (OR 2.95, $p < 0.05$), and living in a health provider shortage area (OR 1.42, $p < 0.05$) were less likely to be screened within the past 2 years.

Conclusions: Routine healthcare plays a major role in preventive screening, which indicates screening mammography practices can be enhanced by improving participation in routine checkups with medical providers, continuity of insurance coverage, and women's access to healthcare. Interventions to encourage screening mammography may be particularly needed for women who have experienced a lapse in insurance or have not had a checkup in the past year.

Introduction

EVIDENCE SHOWS THAT BREAST CANCER SCREENING by mammography reduces mortality.^{1,2} Breast cancers detected early with screening mammography are less likely to metastasize to lymph nodes and more likely to be treated with breast conservation without chemotherapy.³ Despite the known benefits of annual or biannual screening mammography beginning at age 40 or 50,⁴ approximately 25%–50% of American women report not having a mammogram in the past 2 years.^{4,5} High variation in average rates of screening mammography adherence can be attributed to the lack of consensus about the efficacy of screening for women aged 40–49, variation in availability of screening facilities, and other factors that may disproportionately impact those residing in communities with fewer healthcare resources.⁶ Elting et al.⁷ documented that mammography facilities were available in only 49% of Texas counties. The likelihood of screening mammography in the previous 2 years was lowest

for women living in counties without mammography facilities and those not adjacent to a county with a mammography facility.

Although interventions that use tailored messaging have shown promise for increasing rates of screening mammography, they are not effective for all groups of women.^{8,9} Effective tailoring remains a challenge in part because of the assortment of factors associated with the likelihood of adhering to screening guidelines, including demographic factors, relationships with providers, perceived health, health literacy, and access to facilities.¹⁰ Lower adherence to screening mammography guidelines has been documented among populations of low incomes, less education, younger and older ages, within rural or inner city communities, and of Hispanic and Asian ethnicity.^{11–15} The primary reason given by women for not having a mammogram is lack of a physician's recommendation.^{10,16–18} Other important barriers include lack of a usual healthcare source, inadequate health insurance coverage, and recent immigration.^{12,19,20} The

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likelihood of having screening mammography increases as the patient increases the number of physicians seen, number of appointments kept, and years of clinic attendance.^{11,21–24}

Longer durations of patient-physician relationships and better communication between patients and physicians may improve knowledge and trust, which may result in an increased likelihood of adhering to screening mammography guidelines, along with other preventive services.²⁵ However, the patient-physician relationship cannot be the sole target of interventions because many women, especially those in more rural areas, experience limited healthcare access, do not identify with a primary healthcare provider, or are affected by limited physician time in primary care settings.^{15,26–29}

Although general barriers to screening mammography have been identified, less is known about the relationships of perceived health, healthcare access, and use of primary care services with screening mammography at different times among diverse populations within various settings. In addition, relatively little is known about screening mammography use by women in their 40s, which is an important topic to investigate given questions about the effectiveness of screening for women in their 40s at average risk for breast cancer.^{4,30–32} The primary purposes of this exploratory study were to (1) examine the screening mammography practices of middle-aged and older women residing in an eight-county area in Central Texas and (2) identify the personal demographics, perceived health status, and healthcare access factors associated with the time in which participants reported their most recent mammogram (i.e., having a mammogram in the past 12 months, having a mammogram between the past 1 and 2 years, and having a mammogram longer than the past 2 years).

At the time of this study, the American Cancer Society (ACS) recommended that women should receive annual screening mammography beginning at age 40 as long as they were in good health.⁴ The U.S. Preventive Services Task Force (USPSTF) previously recommended that women receive screening mammography every 1–2 years beginning at age 40³³; however, in November 2009, the USPSTF issued new recommendations calling for individualized decisions about screening mammography for women aged 40–49 and biennially from age 50 to 74.³⁰ For the purpose of this study, we looked at mammography in the past 12 months (ACS recommendation), in the past 1–2 years (new USPSTF recommendation), and >2 years ago (not adherent to either ACS or USPSTF recommendations).

Materials and Methods

Participants and procedures

Data were collected in 2010 as part of a regional eight-county health assessment of the Brazos Valley in Central Texas. The survey was conducted by the Center for Community Health Development at Texas A&M Health Science Center and was intended to assist local communities in identifying and prioritizing health problems. Results of this regularly occurring survey are used by the Brazos Valley Health Partnership as part of their planning for community health action. The assessment used random-digit dialing to obtain a population-based sample of the noninstitutionalized civilian population. Sampling was stratified by county to ensure adequate representation of counties in the region.

Further randomization within each household was achieved using the next-birthday method³⁴; that is, when the telephone was answered, investigators asked to speak with the adult resident of the household who had the birthday that would next occur. That adult resident was then informed of the survey purpose and recruited to participate in the assessment. Of those reached by phone, 51.9% agreed to participate and received a paper survey by mail. Two reminder postcards were sent at 2-week intervals after mail-out of the survey packet. The protocol called for a modest incentive (\$2.00 for filling out the questionnaire). Of those who were sent surveys, 62.1% ($n=3946$ men and women) returned completed surveys (overall response rate 32.2%). Institutional Review Board approval was obtained at Texas A&M University.

A total of 2232 women aged 41–49 years and ≥ 51 years completed the assessment. Only the 1242 women with complete data on all variables were retained in the analytic sample for this study. Compared to respondents excluded for omitted or incomplete data, the study sample respondents were similar in race/ethnicity and self-reported chronic conditions status but significantly younger (chi-square=21.09, $p<0.001$), more educated ($t=-4.67$, $p<0.001$), and less likely to reside in a health provider shortage area (HPSA) (chi-square=190.98, $p<0.001$).

Instrument

Participants were surveyed using a mailed community assessment instrument that asked questions about the respondent's health, lifestyle behaviors, healthcare access, neighborhood factors, and personal characteristics. The instrument included Likert-type scales, checklists, and closed-ended and open-ended response formats. Participants took approximately 45 minutes to complete the questionnaire.

Data and measures

Dependent variable. Screening mammography receipt was the dependent variable in this study: participants' most recent self-reported screening mammography (having a mammogram in the past 12 months, having a mammogram between the past 1 and 2 years, and having a mammogram >2 years ago).

Health status variables. The participants' self-reported number of chronic conditions was measured with a composite score of nine conditions, including hypertension, congestive heart failure, high cholesterol, angina, diabetes, emphysema, arthritis, Parkinson's disease, and a disease of the liver. Women who self-reported having cancer were omitted from the analytic sample. Current general health was assessed with the single-item self-rated health measure rated from poor to excellent.³⁵ Respondents rated depressive symptoms experienced in the past 2 weeks using the nine-item Patient Health Questionnaire (PHQ-9). Frequency of symptoms described in each item was rated on a 4-point scale from not at all to nearly every day. Using the validated clinical classifications, this variable was coded into the following four categories: no depression, mild depression, moderate depression, and moderately severe to severe depression.³⁶

Healthcare access variables. Variables used in this study to identify participant's healthcare-related behavior were

routine checkup by a medical provider in the previous 12 months (categorized as yes or no; defined as part of preventive care that was not for a specific illness), lapse in insurance in the previous 3 years (categorized as yes or no), and residing in an HPSA according to the 2009 classifications of the U.S. Department of Health and Human Services' Health Resources and Services Administration (categorized as yes or no).³⁷

Personal demographics. Respondent demographic characteristics included age (41–49 years, 51–64 years, 65–74 years, ≥75 years), years of education (continuous variable ranging from 1 to 17+ years of schooling), and race/ethnicity (self-identified as non-Hispanic white, African American, and Hispanic).

We classified age in several categories so we could compare screening mammography practices by age, based on the specific recommendation guidelines posed by the ACS and USPSTF. Women who were on the lower cutoff for these recommendations were excluded from the study because it is plausible that these participants may not comply with recommendations immediately after their most recent birthday. Specifically, participants aged 40 and aged 50 were omitted from these analyses to eliminate potential bias associated with being of a transitional age for the screening recommendations (recommendations specifically for individuals aged 40–49 and 50–74 may take approximately a year to be implemented).

Data analysis

All statistical analyses for this study were performed using SPSS (version 17). Frequencies were calculated for all major study variables that were initially examined in relationship to the respondent's most recent screening mammography and routine medical provider checkup status. Pearson's chi-square tests were performed to assess the independence between categorized characteristics and goodness-of-fit for frequency distributions. *t* test statistics and one-way analyses of variance (ANOVA) (*f* statistics) were used to identify mean differences between groups for continuous variables. Multinomial logistic regression was used to identify personal demographics, health status indicators, and access to healthcare associated with the probability of participants' most recent screening mammography (mammogram in the past 12 months served as the referent category).

Results

Sample

Sample characteristics of study participants are presented in Table 1. Of the 1242 study participants, 22.5% (*n* = 279) were between the ages of 41 and 49 years, 42.8% (*n* = 532) were between the ages of 51 and 64 years, 19.8% (*n* = 246) were between the ages of 65 and 74 years, and 14.9% (185) were ≥75 years. On

TABLE 1. SAMPLE CHARACTERISTICS BY MOST RECENT SCREENING MAMMOGRAPHY

	Past 12 months (<i>n</i> = 755)	Between 1 and 2 years (<i>n</i> = 191)	Longer than 2 years (<i>n</i> = 296)	Total (<i>n</i> = 1242)	Chi- square/ <i>f</i>	<i>p</i>
Age, years					31.46	0.036
41–49	163 (21.6%)	47 (24.6%)	69 (23.3%)	279 (22.5%)		
51–64	333 (44.1%)	72 (37.7%)	127 (42.9%)	532 (42.8%)		
65–74	163 (21.6%)	39 (20.4%)	44 (14.9%)	246 (19.8%)		
75+	96 (12.7%)	33 (17.3%)	56 (18.9%)	185 (14.9%)		
Years of education ^a	13.50 (±2.46)	13.38 (±2.80)	12.78 (±0.88)	13.31 (±2.55)	8.69	0.000
Race/ethnicity					5.00	0.287
Non-Hispanic white	613 (81.2%)	163 (85.3%)	246 (83.1%)	1022 (82.3%)		
African American	93 (12.3%)	16 (8.4%)	26 (8.8%)	135 (10.9%)		
Hispanic	49 (6.5%)	12 (6.3%)	24 (8.1%)	85 (6.8%)		
Number of chronic conditions ^a	1.79 (±1.34)	1.84 (±1.53)	1.48 (±0.09)	1.78 (±1.40)	0.59	0.552
Health provider shortage area					16.16	0.000
Do not reside in shortage area	473 (62.6%)	97 (50.8%)	152 (51.4%)	722 (58.1%)		
Reside in shortage area	282 (37.4%)	94 (49.2%)	144 (48.6%)	520 (41.9%)		
General health status					17.95	0.022
Poor	24 (3.2%)	11 (5.8%)	20 (6.8%)	55 (4.4%)		
Fair	106 (14.0%)	26 (13.6%)	54 (18.2%)	186 (15.0%)		
Good	264 (35.0%)	62 (32.5%)	113 (38.2%)	439 (35.3%)		
Very good	274 (36.3%)	72 (37.7%)	79 (26.7%)	425 (34.2%)		
Excellent	87 (11.5%)	20 (10.5%)	30 (10.1%)	137 (11.0%)		
Depression scale					16.94	0.009
None	527 (69.8%)	133 (69.6%)	174 (58.8%)	834 (67.1%)		
Mild	145 (19.2%)	32 (16.8%)	72 (24.3%)	249 (20.0%)		
Moderate	43 (5.7%)	10 (5.2%)	29 (9.8%)	82 (6.6%)		
Moderately severe to severe	40 (5.3%)	16 (8.4%)	21 (7.1%)	77 (6.2%)		
Routine checkup in past 12 months					186.20	0.000
No	73 (9.7%)	65 (34.0%)	138 (46.6%)	276 (22.2%)		
Yes	682 (90.3%)	126 (66.0%)	158 (53.4%)	966 (77.8%)		
Insurance lapse in past 3 years					56.59	0.000
No	685 (90.7%)	168 (88.0%)	216 (73.0%)	1069 (86.1%)		
Yes	70 (9.3%)	23 (12.0%)	80 (27.0%)	173 (13.9%)		

^aMean standard deviation [SD], *f* statistic, and *p* value reported for continuous variables.

average, the women had 13.3 years of education (± 2.6 ; more than 1 year of education beyond high school) and self-reported 1.8 chronic conditions (± 1.4 , ranging from 0 to 7 conditions). The majority self-identified as non-Hispanic white (82.3%) and residing in a non-HPSA (58.1%). Approximately 78% of participants reported having a routine checkup by a medical provider in the past 12 months, and 86.1% reported no insurance lapse in the past 3 years. The majority of women had had at least one prior mammogram (93.0%), and 60.8% reported undergoing screening mammogram in the past 12 months.

A significantly larger proportion of those who reported having a mammogram in the past 12 months resided in a non-HPSA (chi-square = 16.16, $p < 0.001$) and had a routine medical checkup in the past 12 months (chi-square = 186.20, $p < 0.001$) compared to their counterparts who reported having a mammogram longer than in the past 1 year. Significant differences were also observed by screening mammography practices for years of education ($f = 8.69$, $p < 0.001$), depression (chi-square = 16.94, $p < 0.01$), and general health (chi-square = 17.95, $p < 0.05$).

Given the importance of healthcare access as a major correlate of preventive screening, we compared women who reported having a routine checkup by a medical provider in the past 12 months to those who reported no checkup in the past 12 months. A significantly larger proportion of women

who reported not having a routine checkup in the past 12 months were younger (chi-square = 22.10, $p < 0.001$), resided in an HPSA (chi-square = 5.82, $p < 0.05$), reported an insurance lapse in the past 3 years (chi-square = 31.68, $p < 0.001$), and reported less recent screening mammography (chi-square = 194.60, $p < 0.001$). On average, women who had a checkup in the past 12 months reported having more chronic conditions ($t = -6.52$, $p < 0.001$) (Table 2).

Factors explaining screening mammography

Table 3 displays the results of the multinomial logistic regression analysis that examined the likelihood of having a screening mammography over different time periods (having a mammogram in the past 12 months served as the referent group). The first model compared those who had a screening mammography between the previous 1 and 2 years to those who had a screening in the previous 12 months. Participants who resided in an HPSA were significantly more likely to report having a screening mammography between 1 and 2 years ago compared to their counterparts who did not reside in an HPSA (odds ratio [OR] 1.52, confidence interval [CI] 1.09-2.13, $p < 0.05$). Participants who reported having a routine checkup in the past 12 months were significantly less likely to report having a screening mammography between 1

TABLE 2. SAMPLE CHARACTERISTICS BY ROUTINE CHECKUP IN PAST 12 MONTHS

	No (n=276)	Yes (n=966)	Total (n=1242)	Chi-square/t	p
Age, years				22.10	0.000
41-49	87 (31.5%)	192 (19.9%)	279 (22.5%)		
51-64	119 (43.1%)	413 (42.8%)	532 (42.8%)		
65-74	38 (13.8%)	208 (21.5%)	246 (19.8%)		
75+	32 (11.6%)	153 (15.8%)	185 (14.9%)		
Years of education ^a	13.17 (± 2.36)	13.35 (± 2.61)	13.31 (± 2.55)	1.11	0.269
Race/ethnicity				1.92	0.384
Non-Hispanic white	223 (80.8%)	799 (82.7%)	1022 (82.3%)		
African American	29 (10.5%)	106 (11.0%)	135 (10.9%)		
Hispanic	24 (8.7%)	61 (6.3%)	85 (6.8%)		
Number of chronic conditions ^a	1.30 (± 1.38)	1.91 (± 1.38)	1.78 (± 1.40)	-6.52	0.000
Health provider shortage area				5.82	0.016
Do not reside in shortage area	143 (51.8%)	579 (59.9%)	722 (58.1%)		
Reside in shortage area	133 (48.2%)	387 (40.1%)	520 (41.9%)		
General health status				9.54	0.049
Poor	12 (4.3%)	43 (4.5%)	55 (4.4%)		
Fair	32 (11.6%)	154 (15.9%)	186 (15.0%)		
Good	94 (34.1%)	345 (35.7%)	439 (35.3%)		
Very good	95 (34.4%)	330 (34.2%)	425 (34.2%)		
Excellent	43 (15.6%)	94 (9.7%)	137 (11.0%)		
Depression scale				0.08	0.994
None	184 (66.7%)	650 (67.3%)	834 (67.1%)		
Mild	57 (20.7%)	192 (19.9%)	249 (20.0%)		
Moderate	18 (6.5%)	64 (6.6%)	82 (6.6%)		
Moderately severe to severe	17 (6.2%)	60 (6.2%)	77 (6.2%)		
Insurance lapse in past 3 years				31.68	0.000
No	209 (75.7%)	860 (89.0%)	1069 (86.1%)		
Yes	67 (24.3%)	106 (11.0%)	173 (13.9%)		
Most recent screening mammography				194.60	0.000
Never	50 (18.1%)	37 (3.8%)	87 (7.0%)		
Between 2 and 5 years	88 (31.9%)	121 (12.5%)	209 (16.8%)		
Between 1 and 2 years	65 (23.6%)	126 (13.0%)	191 (15.4%)		
Past 12 months	73 (26.4%)	682 (70.6%)	755 (60.8%)		

^aMean (SD), *t* statistic, and *p* value reported for continuous variables.

TABLE 3. FACTORS EXPLAINING SCREENING MAMMOGRAPHY PRACTICES

	<i>Between 1 and 2 years</i>						<i>Longer than 2 years</i>					
	–	SE	p	OR	95% CI		–	SE	p	OR	95% CI	
Age 75+ years	0.32	0.30	0.293	1.38	0.76	2.49	0.95	0.28	0.001	2.59	1.50	4.48
Age 65–74 years	–0.10	0.28	0.735	0.91	0.53	1.57	0.06	0.27	0.837	1.06	0.62	1.80
Age 51–64 years	–0.24	0.23	0.296	0.79	0.50	1.23	0.19	0.21	0.368	1.21	0.80	1.83
Age 41–49 years	1.00	–	–	–	–	–	1.00	–	–	–	–	–
Years of education	0.01	0.04	0.815	1.01	0.94	1.09	–0.07	0.03	0.048	0.94	0.88	1.00
Hispanic	–0.09	0.36	0.810	0.92	0.45	1.86	–0.18	0.31	0.569	0.84	0.46	1.53
African American	–0.50	0.31	0.099	0.61	0.33	1.10	–0.76	0.27	0.005	0.47	0.27	0.80
Non-Hispanic white	1.00	–	–	–	–	–	1.00	–	–	–	–	–
Number of chronic conditions	0.09	0.08	0.220	1.10	0.95	1.27	–0.08	0.07	0.231	0.92	0.80	1.06
Health provider shortage area, yes	0.42	0.17	0.014	1.52	1.09	2.13	0.35	0.16	0.025	1.42	1.05	1.94
Health provider Shortage area, no	1.00	–	–	–	–	–	1.00	–	–	–	–	–
General health status poor	0.55	0.54	0.311	1.73	0.60	4.96	0.79	0.48	0.099	2.21	0.86	5.68
General health status fair	0.09	0.41	0.821	1.10	0.49	2.43	0.43	0.36	0.230	1.54	0.76	3.12
General health status good	0.12	0.32	0.702	1.13	0.60	2.12	0.35	0.29	0.228	1.42	0.80	2.51
General health status very good	0.23	0.30	0.437	1.26	0.70	2.27	–0.07	0.28	0.805	0.93	0.54	1.62
General health status excellent	1.00	–	–	–	–	–	1.00	–	–	–	–	–
Depression scale, moderately severe to severe	0.39	0.38	0.298	1.48	0.71	3.09	0.19	0.35	0.592	1.21	0.60	2.42
Depression scale, moderate	–0.04	0.39	0.921	0.96	0.45	2.08	0.61	0.31	0.049	1.84	1.00	3.38
Depression scale, mild	–0.16	0.23	0.501	0.85	0.54	1.35	0.38	0.20	0.056	1.46	0.99	2.15
Depression scale, none	1.00	–	–	–	–	–	1.00	–	–	–	–	–
Routine checkup in past 12 months, yes	–1.64	0.21	0.000	0.19	0.13	0.29	–2.10	0.18	0.000	0.12	0.09	0.18
Routine checkup in past 12 months, no	1.00	–	–	–	–	–	1.00	–	–	–	–	–
Insurance lapse in past 3 years, yes	0.22	0.28	0.443	1.24	0.72	2.15	1.08	0.22	0.000	2.95	1.93	4.51
Insurance lapse in past 3 years, no	1.00	–	–	–	–	–	1.00	–	–	–	–	–

Referent category: Mammogram in the past 12 months.

CI, confidence interval; OR, odds ratio; SE, standard error.

and 2 years ago compared to their counterparts who did not have routine physician visit in the past 12 months (OR=0.19, CI 0.13–0.29, $p<0.001$).

The second model compared those who had a screening mammography longer than the past 2 years to those who had a screening in the previous 12 months. Participants aged ≥ 75 years were more likely to report screening mammography beyond the past 2 years compared to their counterparts between the ages of 41 and 49 years (OR 2.59, CI 1.50–4.48, $p<0.001$). For every additional year of reported education, participants were significantly less likely to report screening mammography beyond the past 2 years (OR 0.94, CI 0.88–1.00, $p<0.05$). Participants who resided in an HPSA (OR 1.42, CI 1.05–1.94, $p<0.05$) reported moderate depression (OR 1.84, CI 1.00–3.38, $p<0.05$) and reported having an insurance lapse in the past 3 years (OR 2.95, CI 1.93–4.51, $p<0.05$) were significantly more likely to report screening mammography beyond the past 2 years compared to their respective counterparts. Conversely, those who self-identified as African American (OR 0.47, CI 0.27–0.80, $p<0.001$) and reported having a routine physician visit in the past 12 months (OR 0.12, CI 0.09–0.18, $p<0.001$) were less likely to report having a screening mammography beyond the past 2 years compared to their counterparts, respectively.

Discussion

Findings from this study indicate that the vast majority of women surveyed (93%) had undergone mammography at

least once during their lives. Across age groups, 62.4% of respondents reported having a mammogram in the past 12 months, which is consistent with ACS guidelines; 76.2% of respondents reported having a mammogram in the past 2 years, which represents adherence to the new USPSTF screening guidelines.^{30,33} Seventy-five percent of women aged 41–49, 76% of women aged 51–64, 82% of women aged 65–74, and 70% of women aged ≥ 75 reported having a screening mammography within the previous 2 years. Not unforeseen, compliance rates for meeting the ACS guidelines for annual screening were lower than the rates for meeting the USPSTF guidelines, as 2 years is more time to obtain a mammogram.

As indicated in the bivariate analyses by screening mammography (Table 1), women with better health status were more likely to be screened, which is not surprising given that ACS guidelines recommend screening for “those in good health”⁴ and the USPSTF guidelines also indicate the importance of healthcare providers’ recommendations to reflect provider-patient decisions based on individual situations.³⁰ Walter et al.³⁸ specifically recommend making efforts to better target women for routine screening mammography to avoid unnecessary screening among women with limited life expectancies and those for whom screening risks outweigh the benefits. Despite the overall high rates of reported screening mammography within 2 years, variations in screening practices emerged among subpopulations.

Unlike other reports of disparities in screening mammography rates,⁵ we found no evidence supporting that racial/ethnic minority groups received screening mammography at

lower rates than their non-Hispanic white counterparts. Whereas marked racial/ethnic disparities in breast cancer screening were noted historically,³⁹ our findings are consistent with other studies that report African Americans may actually have higher screening rates than their non-Hispanic white counterparts^{40,41} and that differences in screening rates are minimized for members of health maintenance organization (HMO).⁴² As seen in other studies,⁴³ depressive symptomatology has been associated with the underuse of medical screenings, including mammograms, and poor adherence to treatment regimens and a subsequently poorer overall health status. Our findings illustrate the need for further studies to better examine the influence of depressive symptoms on screening mammography using various measures of depression with different clinical cutoff points.

In the current study, only two variables were observed as factors explaining differences between screening mammography practices thought to be consistent with recommendations associated with either the ACS or USPSTF guidelines.^{4,30,33} Differences between these screening time frames were associated with residing in an HPSA and having a routine checkup by a medical provider outside of the past 12 months. This finding emphasizes the importance of women's residential context as a possible influence on their screening mammography practices. Those who reported less recent screenings were more likely to reside in an HPSA, which was also associated with having a routine checkup with a medical provider outside of the past 12 months. These findings support the need for ongoing efforts to strengthen and develop the healthcare infrastructures in communities considered to be underserved and outside of major urban cities. For example, as indicated by Legler et al.,⁴⁴ the use of mobile mammogram vans may help increase screening rates in HPSAs.

The data support the important role of healthcare providers in encouraging screening mammography, a finding that is consistent with studies of adherence to other preventive service recommendations.^{45–47} Providers are playing a key role in referring women to mammogram screening. It is also important that women become more active consumers of recommended guidelines and request mammograms from their healthcare providers. Patient navigators attached to healthcare organizations or part of community organizations can play a critical role in educating women about the importance of routine screening and help refer them to accessible and affordable places for receiving such diagnostic care.^{48,49}

Nearly 10% of women who reported having a mammogram in the past year also reported not having a routine medical provider checkup in the past 12 months. This finding suggests that some women underwent screening mammography without a primary care visit for other preventive services. This proactive subpopulation is important to study because their behavior indicates motivation to use preventive services and screening, despite their not having sought comprehensive primary care services to address all relevant preventive service recommendations. The ramifications of completing screening mammography in the absence of other primary care services are largely unknown. The fact that these women sought screening mammography is encouraging because it indicates that opportunities exist for health professionals to encourage women to obtain additional preventive services at the time of mammography. In the long run, however, the lack of screening consensus between ACS and

USPSTF guidelines³³ may adversely influence screening rates because of the increased potential for women in their 40s and 50s to misunderstand the details about screening recommendations. Clear messages about the need for and timing of screening mammograms are warranted for both women and their healthcare providers in order to have maximal influence on practice behaviors.

Limitations

This study is subject to the limitations that affect survey research. Although consent was obtained by telephone, surveys were mailed, and individual respondents cannot be verified. This study used self-reported data, which may inherently introduce recall and reporting biases. Although there is a potential concern that self-reported mammograms may be either underreported or overreported, the congruence between self-reports and chart reviews is fairly high, with recall accuracy better for shorter time frames and among better educated women.⁵⁰ Additionally, our overall 2-year screening rates of 76.2% are consistent with those reported in the Behavioral Risk Factor Surveillance System for the same public health administrative region (Texas Public Health Administration Region 7 screening mammography rates were 78.9% compared to the statewide and national averages of 72.6% and 76.8%, respectively).⁵¹

The survey was lengthy, which potentially contributed to a reduced response rate or made completion particularly difficult for persons with limited education or inadequate literacy or those in poor health. Although the response rate of 32.2% for the 2010 survey was comparable to that of other community surveys,⁵² those responding tended to be female, non-Hispanic white, and educated to a greater extent than in countywide statistics, potentially limiting overall generalization of findings to the general female population. Our sample population is similar to the 2008 intercensal population estimates, which show that women ≥ 40 in this seven-county region are 73.6% Anglo, 13.9% black, and 10.6% Hispanic.⁵³ When compared to women omitted from the study sample for incomplete data, those included in the study were significantly less likely to reside in an HPSA, thus potentially biasing the sample toward having more recent screening mammography. In addition, the survey was cross-sectional, and findings do not address change in patterns of screening mammography as women age.

Conclusions

This study provides a unique perspective about screening mammography for women of various ages living in Central Texas and gives a glimpse into what may be seen with the introduction of new guidelines recommending more individualized approaches and biennial screening. Traditional sociodemographic characteristics were not as strongly associated with being screened as those variables representing healthcare access (not having a routine checkup, having a lapse in insurance, and residing in an HPSA). The relationship of screening to depressive symptomatology may represent another opportunity for healthcare providers to recognize their patients' mental health concerns and view mental health as a significant predictor in obtaining recommended preventive health services. Knowing factors associated with screening mammography practices is beneficial to identifying points

of intervention for better targeting women who can benefit from mammography.

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Disclosure Statement

The authors have no conflicts of interest to report.

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