

## Method of Detection of Breast Cancer in Low-Income Women

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### Abstract

**Background:** Breast cancer is the most common malignancy among women, and its timely diagnosis and treatment are of paramount importance, especially for vulnerable groups, such as low-income and uninsured women. Recent literature confirms that the method of breast cancer detection may be an important prognostic factor, but there are no studies that examine the method of breast cancer detection in low-income populations. We sought to analyze the determinants of method of detection (medical vs. self) in a cohort of low-income women with breast cancer receiving care through California's Breast and Cervical Cancer Treatment Program.

**Methods:** This is a cross-sectional survey analysis of 921 low-income women interviewed within 6 months of definitive surgical treatment. The outcome analyzed was self vs. medical detection of breast cancer.

**Results:** The mean age of the women was 53 years, with nearly 88% reporting an income of <\$30,000 per year; 64% of women self-detected their breast cancer. Logistic regression analyses revealed that older women, Latinas, and women having any health insurance before diagnosis had lower odds of self-detecting their lesions.

**Conclusions:** Patient age, ethnicity, and regular source of care were associated with method of breast cancer detection in a low-income underserved population. The rate of self-detection in our population correlates with the literature, but we need to improve efforts to increase mammography screening to ensure early detection of disease in this vulnerable group.

### Introduction

THE NATIONAL CANCER INSTITUTE (NCI) estimates that approximately 182,460 women in the United States will be diagnosed with breast cancer in 2008.<sup>1</sup> Given this disease burden, timely diagnosis and treatment of breast cancer are of paramount importance, especially for vulnerable groups, such as the uninsured, who now constitute 16% of the U.S. population.<sup>2</sup> Low-income women without insurance have lower rates of mammography screening,<sup>3,4</sup> and they may experience additional burdens and barriers in receiving optimal diagnosis and treatment.<sup>5</sup> Furthermore, more socioeconomically disadvantaged regions of the country have a higher breast cancer mortality rate.<sup>6</sup>

The benefits of mammography are well known, and it is generally accepted that breast cancers detected by mam-

mography screening are of smaller size and have better histological features than tumors detected otherwise.<sup>7-10</sup> Recent literature confirms that the method of breast cancer detection may indeed be an important prognostic factor, even after adjusting for stage shift and lead time and length-time biases.<sup>11,12</sup> For example, Joensuu et al.<sup>11</sup> found that women whose cancers were detected by mammography had a better estimated 10-year disease-free survival than women whose cancers were detected otherwise. Analysis of data from three large breast cancer screening trials indicated that women with interval cancers had a 53% greater hazard of death from breast cancer than women with screen-detected cancers.<sup>12</sup>

There are very few studies, however, that have examined the method by which breast cancer is detected in low-income populations. Our study fills this gap in the literature by analyzing the determinants of method of detection (medical vs.

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self) in a cohort of low-income women with breast cancer receiving care through California's Breast and Cervical Cancer Treatment Program (BCCTP).

### Materials and Methods

We sought to identify the determinants of medical detection vs. self-detection of breast cancer in a cohort of low-income women in the California BCCTP. The method of detection was characterized as self if the lump was felt through a self-examination, the spouse/partner felt the lump, or if the woman perceived the breast to be abnormal or had an abnormal sensation or bleeding from the nipple. If the lesion was detected by a routine mammogram or if the doctor felt a lump, the method of detection was categorized as medical.

The BCCTP is a coverage option through Medicaid that was created as part of the federal government Breast and Cervical Cancer Prevention and Treatment Act of 2000. It was designed to provide immediate coverage for medical treatment for individuals diagnosed with breast and cervical cancer. In California, applicants must be a resident of the state and have an income that does not exceed 200% of the Federal Poverty Level (FPL) (based on annual income and family size). Benefits are provided through either the state-funded or federally funded arm of the program. In the federal program, the individual must be uninsured, a citizen or national of the United States or have satisfactory immigration status, and <age 65. The state program provides safety net coverage for individuals not eligible for the federal program. Eligibility in the state program includes individuals with undocumented immigration status, age  $\geq 65$ , or insured but with expected premiums, copays, or deductibles  $> \$750$  per year. The federal program provides full scope, no-cost Medi-Cal coverage for the duration of the cancer treatment and includes coverage for other medical conditions. The state program only covers breast cancer treatment for a maximum of 18 months. Women are enrolled through authorized providers in the Every Woman Counts (EWC) or the Family Planning and Access to Care and Treatment (FPACT) breast cancer screening and diagnostic programs for low-income women.

The EWC program provides breast and cervical screening services for underserved women in California and is funded by federal grants and state tobacco tax revenue. For breast screening, women must be California residents  $\geq 40$  years of age, have low income, and be uninsured or have high deductibles or copayments that prevent them from accessing these services.<sup>13</sup> The FPACT program aims to provide a package of family planning and reproductive health services (including screening mammography) to low-income residents. Women must be  $\geq 40$  years and have income  $< 200\%$  of the FPL to be eligible for screening mammography.<sup>14</sup>

A total of 1511 English-speaking and Spanish-speaking women aged  $\geq 18$  years who had been diagnosed with breast cancer between 2003 and 2005 and were enrolled in the California BCCTP were contacted for participation in the study. Of these, 921 agreed to participate, a 61% overall response rate. Participants were interviewed by phone within 6 months of their definitive surgical treatment. Compared with survey responders, nonresponders were older (52 vs. 50 years) and had a greater percentage of Asians (8.9% vs. 4.3%) and African Americans (8.1% vs. 5.6%) and a lesser percentage of Hispanics (45.6% vs. 55.9%). Exclusion criteria included a previ-

ous history of breast cancer, active treatment for another cancer, and cognitive impairment. We limited our analysis to women aged  $\geq 40$  years, as routine screening mammography is recommended only for this population.

### Variable specification

The dependent variable was based on participants' responses to the question: How did you first know something was wrong? The response categories were coded as self (if the woman reported she felt a lump through self-examination, her spouse/partner felt a lump, her breast appeared abnormal, she felt an abnormal sensation, or she experienced bleeding from the nipple) or medical (if the woman reported a routine mammogram or the doctor felt a lump). We decided to code these response categories together, as there were very few women who reported that the lump was felt by a doctor ( $n = 48$ , 5%).

Independent variables included age, marital status (married/partnered or single/divorced/widowed), education status (high school graduate or less, some college or more), and income ( $< \$10,000$  per year,  $\$10,000$ – $\$20,000$  per year,  $> \$20,000$  up to  $\$30,000$  per year, and  $> \$30,000$  per year).<sup>15–18</sup> Ethnicity was coded as white, African American, Latina, and other. Self-reported general health was based on the SF-36 and was categorized as poor, fair, good, very good, or excellent.<sup>19</sup> Whether participants had a regular source of care before

TABLE 1. DESCRIPTIVE CHARACTERISTICS OF SAMPLE ( $n = 794$ )

	n	%
Age, years		53 <sup>a</sup>
Marital status		
Married/partnered	363	46
Single/divorced/widowed	433	54
Ethnicity		
White	266	34
African American	46	6
Latina	407	51
Other	75	9
Education		
High school graduate or less	467	59
Some college or more	325	41
Income		
$< \$10,000$ /year	290	37
$\$10,001$ – $20,000$ /year	229	29
$\$20,001$ – $30,000$ /year	170	22
$> \$30,001$ /year	98	12
Self-reported general health		
Poor	38	5
Fair	221	28
Good	312	39
Very good	149	19
Excellent	73	9
Had regular source of care before diagnosis		
No	337	42
Yes	457	58
Had any health insurance before diagnosis		
No	722	91
Yes	68	9

<sup>a</sup>Mean of continuous variable.

diagnosis and any health insurance before diagnosis were binary variables (yes or no).<sup>20,21</sup>

### Data analysis

Data analysis was carried out using Stata/SE 10 (Stata Corporation, College Station, TX). Unadjusted bivariate relationships between the dependent and independent variables were examined. Logistic regression models were used to estimate the predictors of medical vs. self-detection of breast cancer; independent variables in the regression were age, marital status, ethnicity, education, income, self-reported general health, having a regular source of care, and having health insurance before diagnosis. The overall fit of the model to the data was assessed with the maximum log likelihood ratio chi-square statistic.

### Results

The mean age in our sample was 53 years (median 53 years), and the women were predominantly low income, with nearly 88% reporting an income of <\$30,000 per year. Slightly more than half were Latina (51%), and more than two thirds rated their health as good/very good/excellent. More than half (58%) reported they had a regular source of care before

their breast cancer diagnosis, but only 9% reported having any medical insurance at the time of their diagnosis (Table 1).

Approximately two thirds ( $n = 507$ , 64%) of women self-detected their breast cancer, with only 36% ( $n = 287$ ) of cancers being detected by routine mammography or a lump being felt by the physician. Unadjusted odds ratios revealed that older women, Latinas, those having a regular source of care before diagnosis, and those having any health insurance before diagnosis had lower odds of self-detecting their lesions. These unadjusted odds ratios were statistically significant at the  $p = 0.05$  level.

After adjusting for other covariates, logistic regression analyses confirmed that older women, Latinas, and women with a regular source of care had decreased odds of self-detecting their lesions, but health insurance was no longer a statistically significant predictor (Table 2).

### Discussion

In our sample, approximately two thirds of women self-detected their breast cancer; this is in the range reported in the literature. The American College of Surgeons national survey of breast cancer patients found that 73% of malignant tumors were found by the patients, 23% by physicians, and only 4% by mammography.<sup>22</sup> This study was conducted in the early

TABLE 2. UNADJUSTED AND ADJUSTED ODDS RATIOS OF DETERMINANTS OF MEDICAL VS. SELF-DETECTION OF BREAST CANCER ( $n = 780$ )

	Unadjusted		Adjusted <sup>a</sup>	
	Odds ratio	95% CI	Odds ratio	95% CI
Age	0.97	0.96-0.99	0.97	0.96-0.99
Marital status				
Married/partnered	1.00		1.00	
Single/divorced/widowed	0.95	0.71-1.27	0.97	0.68-1.38
Ethnicity				
White	1.00		1.00	
African American	0.89	0.46-1.73	0.90	0.45-1.78
Latina	0.72	0.52-0.99	0.65	0.44-0.97
Other	1.15 <sup>b</sup>	0.65-2.02	1.00	0.55-1.81
Education				
High school or less	1.00		1.00	
Some college or more	1.22	0.91-1.64	1.03	0.72-1.46
Income				
< \$10,000/year	1.00		1.00	
\$10,001-20,000/year	0.88	0.62-1.27	1.04	0.71-1.54
\$20,001-30,000/year	0.92	0.62-1.37	1.04	0.67-1.62
> \$30,001/year	1.02	0.63-1.65	1.09	0.63-1.86
Self-reported general health				
Poor	1.00		1.00	
Fair	0.78	0.37-1.64	1.03	0.48-2.25
Good	0.86	0.42-1.77	0.94	0.44-2.01
Very good	0.68	0.32-1.46	0.69	0.31-1.54
Excellent	0.94	0.41-2.19	0.99	0.41-2.39
Had regular source of care before diagnosis				
No	1.00		1.00	
Yes	0.41	0.30-0.56	0.41	0.30-0.57
Had any health insurance before diagnosis				
No	1.00		1.00	
Yes	0.57	0.35-0.94	0.65	0.38-1.10

<sup>a</sup>Odds ratios are adjusted for other covariates in the model—age, marital status, ethnicity, educational status, income, general health status, having a regular source of care before diagnosis, and having any health insurance before diagnosis.

<sup>b</sup>An odds ratio >1 indicates increased likelihood of self-detection.

1980s, when mammography screening was not widespread as it is today.

Using data from the metropolitan areas of Atlanta, Seattle, and five counties from central New Jersey, Coates et al.<sup>23</sup> ascertained that 71% of women self-detected their breast cancer. This study examined women <45 years old, an age group that is less likely to be receiving mammography screening. Data from the Wisconsin tumor registry revealed a smaller percentage (55%) of women self-detecting their lesions.<sup>24</sup> In contrast, analysis of a subset of 2003 NHIS data indicates that 59% of breast cancers diagnosed between 2001 and 2003 were detected by mammography.<sup>25</sup> Our analysis focuses on low-income women, which was not the predominant population studied in the aforementioned studies.

The strongest predictor of self-detection vs. medical detection was having a regular source of care. In our study, 42% of the women had no regular source of care. Women with a regular source of care had less than half the odds of self-detecting their breast cancer. Of the women without a regular source of care, 60% were single/divorced/widowed, 70% reported an annual income <\$20,000, and 94% did not have any health insurance when diagnosed with breast cancer. Latinas comprised a majority of this group (47%). Having a regular source of care has been shown to be an important determinant of receipt of screening mammography and other preventive healthcare services.<sup>26–30</sup> Our study confirms its importance in a low-income population.

Our finding that a significant number of low-income women self-detected their breast cancer and that a lack of a regular source of care was an important impediment is an important policy finding. Women can be referred to BCCTP only through eligible providers—those contracted by the state to provide breast and cervical cancer screening under the EWC or FPACT programs. Screening through routine mammography and regular medical checkups have the potential to identify breast cancer at a much earlier stage. Early diagnosis and treatment will increase the likelihood of decreasing mortality. The BCCTP provides much needed care for these low-income women who would otherwise be without healthcare coverage, but eligibility comes after the cancer is detected. An analysis of the National Breast Cancer and Cervical Cancer Early Detection Program showed that of the 4 million women eligible to receive a mammogram from this program in 2002–2003, only 13.2% did.<sup>31</sup> In addition, outreach for breast cancer screening varies based on available funding and is currently minimal because of budget cutbacks.

Our finding of increasing age being associated with lesser odds of self-detection is consonant with the literature.<sup>22–24</sup> The impact of age may reflect the fact that because of differences in breast density, mammography may be less efficacious in younger women.<sup>32,33</sup> However, further work is needed to understand our finding of why Latina women in our sample are less likely than white women to self-detect their cancers. Possible explanations for this could include cultural factors, such as fatalism; lack of awareness or knowledge about breast cancer, its signs, symptoms, and risk factors; or a focus on family/work to the extent of neglecting one's health.<sup>34–37</sup>

A few caveats pertaining to our analyses have to be kept in mind. Our results may not be generalizable to states that have a different racial and ethnic distribution in the population or have different eligibility criteria for screening programs. Women were interviewed 6 months after definitive diagnosis

had been made; thus, their responses on the survey may have been subject to recall bias. However, there is evidence to suggest that cancer patients report a high level of confidence in their memory, which could be partly due to the phenomenon of a flashbulb memory, wherein people tend to better remember traumatic or emotional events in their lives.<sup>38,39</sup> In addition, an analysis of women enrolled in a managed care plan reported that the overall agreement between self-reported information and medical record data was 88% for mammography and 87% for clinical breast examination.<sup>40</sup> Another limitation was our inability to control for such factors as tumor biology, which could have an impact on the method of detection.<sup>23,24</sup>

## Conclusion

Patient age and regular source of care were associated with method of breast cancer detection in a low-income underserved population. The fact that nearly two thirds of women in our sample self-detected their cancers suggests that we need to improve efforts to increase mammography screening to ensure early detection of disease in this vulnerable population group.

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## Disclosure Statement

The authors have no conflicts of interest to report.

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