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Gebre-Egziabher Kiros

Ivette A. López

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Trends and Correlates of Breast Cancer Screening among Florida Women: Analysis of 2001 and 2008 BRFSS Data

**Alicestine Ashford, EdD, MPH, Gebre-Egziabher Kiros, PhD,
Ivette A. López, PhD, MPH**

ABSTRACT

This study examined trends and correlates of breast cancer screening among women aged ≥ 40 years old by race/ethnicity using the 2001 and 2008 Florida Behavioral Risk Factor Surveillance System (BRFSS). Breast cancer screening was measured using both mammography and clinical breast examination (CBE). The total sample size was 10,386, with 4,938 women in the 2001 BRFSS and 5,448 in 2008. Significant disparities in breast cancer screening by race/ethnicity were found both in 2001 and 2008, with Hispanics having the lowest screening participation, compared to non-Hispanic whites and non-Hispanic Blacks. In 2008, non-Hispanic Black women had the highest percentage of timely mammography, CBE, and both mammography and CBE combined than non-Hispanic white and Hispanic women. Not having health insurance was a strong predictor of non-screening across all racial/ethnic groups. Whereas age, being married, and having a college education or higher were negatively correlated with lack of timely breast cancer screening among non-Hispanic Whites, poor health status was positively associated with lack of timely screening. Among Hispanics, the variables of having some college education or college degree or higher were positively associated with lack of CBE and with mammography and CBE. Our findings suggest that both an expansion of health insurance coverage as well as the timely promotion of screening across education and racial/ethnic segments may be important for breast cancer prevention.

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Introduction

Breast cancer is the most commonly diagnosed cancer and the second leading cause of cancer deaths (next to lung cancer) among women in the United States (American Cancer Society, 2009; USPSTF, 2002, 2009). It is well documented that timely screening for breast cancer reduces the burden of breast cancer including the risk of untimely death (Strax & Martin, 1987; Kerlikowske, et al., 1995; USPSTF, 2002, 2009). Breast cancer incidence rates among women vary substantially across racial and ethnic groups (American Cancer Society, 2009; Ghafoor, Jemal, Ward, Cokkinides, Smith, & Thun, 2003). The average annual age-adjusted incidence rates per 100,000 women between 2002 and 2006 were 123.5, 113.0, and 90.0 among non-Hispanic white, non-Hispanic African Americans, and Hispanic/Latina women, respectively (American Cancer Society, 2009). Despite higher incidence rates, however, breast cancer death rates are lower among non-Hispanic white than non-Hispanic African American women. According to the latest statistics from the American Cancer Society (2009), breast cancer death rates among non-Hispanic white women during 2002-2006 is 23.9. In contrast, the

breast cancer death rate among non-Hispanic, African American women during the same period was 33.0. In addition, in 2006, death rates due to breast cancer were 38% higher among African American than white women (American Cancer Society, 2009). Furthermore, Horner and others (2009) document five-year cause-specific breast cancer survival rates based on patients diagnosed between 1999-2005 and 2006 were 88.3%, 77.3%, and 85.8% for non-Hispanic white, African American, and Hispanic/Latina women, respectively. These differences are attributed to both later stage at detection and poorer stage-specific survival (American Cancer Society, 2008, 2009).

Evidence of racial/ethnic disparities in breast cancer incidence and death is also observed in the state of Florida. The most recent statistics from the American Cancer Society (2009) show that in Florida, between 2002 and 2006, the average age-adjusted breast cancer incidence rate among non-Hispanic white women is 115.9. In contrast, the breast cancer incidence rate among non-Hispanic African American women is 99.5. However, the age-adjusted breast cancer mortality rate during the 2002-2006 is higher among non-Hispanic African

Florida Public Health Review, 2010; 7:17-25.
<http://health.usf.edu/publichealth/fphr/index.htm>

17

American women (30.0 per 100,000) than non-Hispanic white women (21.8 per 100,000).

This research examines recent breast cancer screening trends in Florida and documents racial/ethnic-specific correlates of breast cancer screening. Research that helps to monitor breast cancer screening behavior is crucial for targeting at-risk populations. There is some evidence that indicate certain groups of women are reverting to patterns of underutilizing mammography screening services. For example, using population based data from the Behavioral Risk Factor Surveillance System (BRFSS), Ryerson and colleagues (2007) found that rates of mammography screening declined among women ages ≥ 40 years between 2000 and 2005. Similarly, with data from the National Health Interview Survey (NHIS), (Breen et al. 2007) found that women aged 40-64 years who had public health insurance had significant declines in mammography use between 2000– 2005. One of the target goals of the *Healthy People 2010* document (USDHHS) is to increase breast cancer screening in all states and at the national level. Trend analysis of breast cancer screening prevalence in Florida by comparing 2001 and 2008 rates will reveal if there is any evidence that the trend it is reverting.

We investigated (1) racial/ethnic disparities in Florida breast cancer screening; (2) Florida trends in mammography and CBE use in 2001 and 2008 by race/ethnicity; and (3) factors associated with non-adherence to current breast cancer screening guidelines as recommended by the U.S. Preventive Services Task Force (USPSTF) for mammography and CBE use by race/ethnicity (USPSTF, 2002). For women ≥ 40 years, the USPSTF recommends screening mammography, with or without clinical breast examination (CBE), every 1-2 years (USPSTF, 2002). The most recent recommendation for breast cancer screening by the USPSTF is biennial mammography screening for women aged 50-74 years (USPSTF, 2009), but is against routine screening mammography in women aged 40-49 years. This study assesses whether minority women, women residing in rural areas, less educated women, and women without health insurance have a lower chance of receiving mammography and clinical breast examination on recommended time. This analysis used data from the 2001 and 2008 BRFSS to examine cancer screening practices among non-Hispanic white, non-Hispanic African American and Hispanic/Latina women in Florida.

Methods

Data Collection Methods

Secondary data were used in a cross-sectional research design. We used data from the 2001 and

Florida Public Health Review, 2010; 7:17-25.
<http://health.usf.edu/publichealth/fphr/index.htm>

2008 Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is an annual cross-sectional, population-based survey conducted by the Centers for Disease Control and Prevention (CDC) in collaboration with state health departments. The BRFSS uses a multistage cluster design to collect data annually on health-related behaviors and risk factors, clinical preventive practices, health care, and socio-demographic variables using a random-digit dialed telephone survey of the non-institutionalized U.S. adult population aged 18 years and older. A detailed description of the BRFSS, the survey methodology applied, data collected, questionnaire use and other information is available at <http://www.cdc.gov/brfss/index.htm>.

Research Questions and Hypotheses

The research questions were: Is there any substantial change in the prevalence of mammography and CBE utilization among Floridian women between 2001 and 2008? Are there racial/ethnic disparities in mammography and CBE use and if so, are the disparities narrowing? What are the correlates of non-adherence to mammography and CBE use among women in Florida? What are the common and unique factors that are correlated to mammography and CBE use non-adherence across the three racial/ethnic groups? What are the unique factors that are correlated to mammography and CBE use non-adherence by race/ethnicity? How can adherence to recommended breast cancer screening be improved? The study posited the following hypotheses:

- There is no difference in the prevalence of breast cancer screening use in Florida between 2001 and 2008;
- There is significant disparity in the receipt of timely mammogram and CBE by race/ethnicity in Florida;
- There is significant variation between receiving timely mammogram and CBE receipt and health insurance coverage across the three racial/ethnic groups in Florida;
- There is significant difference in receiving timely mammogram and CBE and women's education across the three racial/ethnic groups in Florida; and
- The risks of non-adherence to recommended timely breast cancer screening is higher among women who reside in rural areas, as compared to those women who reside in urban areas.

Participants

A total number of study participants from both the 2001 and 2008 Florida BRFSS was 10,484 women 40 years or older. The sample size from the 2001 BRFSS is 4,938 women (non-Hispanic

white=3,983, non-Hispanic African American=410, and Hispanic=545) and the 2008 BRFSS includes 5,448 women (non-Hispanic white=4,666, non-Hispanic African American=436, and Hispanic=346). We used the 2001 data because it was the first large survey designed to produce county-specific estimates in Florida and hence allowed us to run race/ethnicity-specific analysis. For comparison, we used the 2008 data because it the latest available data, and allowed us to examine recent trends in breast cancer screening. Both the 2001 and 2008 BRFSS data provide enough power and time interval to investigate changes in recent trends in breast cancer screening in Florida. This research was approved by Florida A&M University's institutional review board for the rights of human subjects in research. The study was exempt from full IRB review because it involved secondary data analysis on data which do not include personal identifiers.

Measures

Dependent variables: Three self-reported variables that are related to adherence to breast cancer screening were used as dependent variables. Non-adherence to breast cancer screening was defined as: (1) not receiving a mammogram within the preceding two years (0=no, 1=yes); (2) not having a CBE within the preceding two years (0=no, 1=yes); and (3) not receiving both a mammogram and a CBE within the preceding two years (0=no, 1=yes). These selected time intervals for breast cancer screening were based on the 2002 USPSTF recommended guidelines. The questions asked about mammography screening in the BRFSS are as follows: "A mammogram is an x-ray of each breast to look for breast cancer. Have you ever had a mammogram? (1) Yes, (2) No, (7) Don't know/not sure, (9) Refused." For respondents who answered yes, the next question was "How long has it been since you had your last mammogram? (1) Within the past year (anytime less than 12 months ago), (2) Within the past 2 years (≥ 1 year but < 2 years ago), (3) Within the past 3 years (≥ 2 years but < 3 years ago), (4) Within the past 5 years (≥ 3 years but < 5 years ago), (5) 5 or more years ago, (7) Don't know/not sure, (9) Refused." For CBE use, the questions were: "A clinical breast exam is when a doctor, nurse, or other health professional feels the breast for lumps. Have you ever had a clinical breast exam? (1) Yes, (2) No, (7) Don't know/not sure, (9) Refused." For women who answered yes to the previous question, the follow-up question was "How long has it been since your last breast exam? (1) Within the past year (anytime less than 12 months ago), (2) Within the past 2 years (≥ 1 year but < 2 years ago), (3) Within the past 3 years (≥ 2 years but < 3 years ago), (4) Within the past 5 years (≥ 3 years but < 5 years ago), (5) 5 or more

years ago, (7) Don't know/not sure, (9) Refused." A small number answered (7) and (9) and were excluded from the final analysis. Women who reported they have had screening within the past year (1) or within the past 2 years (2) were considered adherent (assigned a value of 0) and otherwise non-adherent (assigned a value of 1).

Independent variables: Demographic variables included race/ethnicity, age, marital status, educational attainment. Only non-Hispanic white, non-Hispanic African American, and Hispanic were included because their sample sizes allowed us to run race-specific analysis. Other independent variables included health status, health insurance coverage and BRFSS year. Finally, county rural-urban residence was identified using the county FIPS codes available on BRFSS by merging the county classification of the Economic Research Service of the U.S. Department of Agriculture.

Data Analyses

A Chi-squared analysis was conducted to assess associations between race/ethnicity and use of mammography and CBE. Logistic regression was applied to estimate the odds breast cancer screening non-adherence by age, marital status, educational level, health status, health insurance, year of BRFSS survey, and urban-rural residence. SURVEY procedures from Statistical Analysis System (SAS, Version 9.1.3) that takes into account the complex multistage sampling of the BRFSS was used in all analyses. The advantage of using both the 2001 and the 2008 surveys was that they provided independent estimates of the same sets of measures and relationships, and greater statistical power when pooled. First, we estimated our models separately for each of the two surveys and found no substantively important differences in underlying relationships. We thereby pooled the samples and included a dummy variable for survey year (0 for 2001 and 1 for 2008) in our multivariate models. Finally, we used Wald's χ^2 test to assess the goodness-of-fit of our logistic regression models.

Results

Figure 1 presents the percentage of women ≥ 40 years old who reported that they have never been screened for breast cancer using a mammogram and CBE in 2001 and 2008 by race/ethnicity. The χ^2 results show there was a significant difference in the proportion of women who have not been screened for breast cancer by race/ethnicity in both 2001 and 2008. Non-Hispanic white women were less likely never to have been screened for breast cancer using a mammogram than non-Hispanic African American and Hispanic/Latina women. Hispanics had the highest percentage of women that have never been

screened for breast cancer. There was no substantial change in the percentage of women who have never been screened for breast cancer among non-Hispanic white and non-Hispanic African American women between 2001 and 2008. However, the most alarming trend in mammography use is observed among Hispanic women, where the percentage of women who have never been screened increased markedly from 15% in 2001 to 23% in 2008. At the same time, the percentage of Hispanic women who have never been screened for breast cancer using CBE showed a 3.3% increase. In 2001, only 7.3% and 6.9% of non-Hispanic white women reported that they have never been screened for breast cancer using a mammogram and CBE, respectively, throughout their life. In contrast, 10% and 11.7% African American women and 15% and 23% of Hispanic women reported that they have never been screened using a mammogram and CBE, respectively.

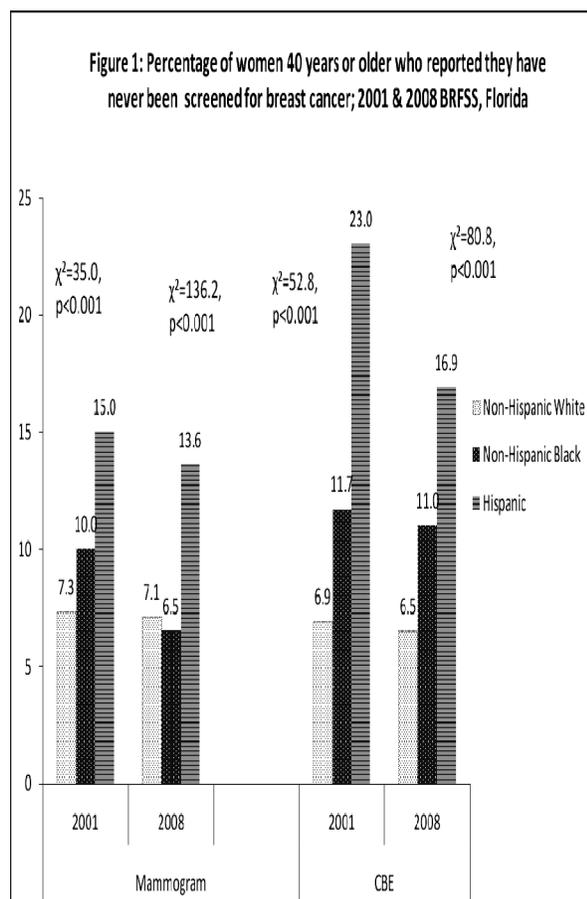


Table 1 shows the percentage of women who have received a mammogram and CBE in the preceding two years in 2001 and 2008 by race/ethnicity. The 2001 overall mammography and CBE screening prevalence rate for women 40 years

Florida Public Health Review, 2010; 7:17-25.
<http://health.usf.edu/publichealth/fphr/index.htm>

old and older in Florida was 78.0% and 76.1%, respectively. After seven years the mammography and CBE screening prevalence rates were 78.6% and 77.7%, respectively, showing only a 0.6% and 1.6% increase. The χ^2 statistics show significant difference in being adherent to receiving recommended cancer breast screening. Between 2001 and 2008, the overall likelihood of receiving a mammogram improved by only 0.6%, as the likelihood of receiving a CBE improved by 1.4%. Hispanic women have the lowest prevalence of both mammogram and CBE screening in 2001 and 2008. In 2001, non-Hispanic whites have a slight advantage over non-Hispanic African Americans in receiving up-to-date mammogram and CBE, but that advantage is reversed in 2008. Between 2001 and 2008, the percentage of non-Hispanic white women who were screened for breast cancer according to current guidelines for screening in mammography decreased by 1.3%, as CBE screening increased by 0.8%. At the same time, among non-Hispanic African American women, mammography and CBE screening increased by 6% and 4.6%, respectively. The increase among Hispanic women was 0.4% and 1.2% for screening in mammography and CBE, respectively. We also observed a very high congruence on the utilization of mammography and CBE. The percentage of women who reported use of both a mammogram and a CBE within the past two years was 77.7%. Furthermore, among all women who reported to have had mammography the past two years before the survey, 94.6% of them reported they had also obtained CBE. On the other hand, among all women who reported to have had CBE the past two years before the survey, 89.8% of them reported they had also obtained mammography with the preceding two years.

Table 2 displays the characteristics of the women 40 years old and older who participated in the 2001 and 2008 Florida BRFSS by survey year and by race/ethnicity. Non-Hispanic white respondents were more likely to be older, married, completed high school, and to report having health insurance, and were less likely to reside in urban counties than non-Hispanic African Americans and Hispanics. Non-Hispanic African American women were less likely to be married than non-Hispanic white and Hispanic women. Hispanic women respondents were more likely to report poor health status and reside in urban areas, but least likely to have health insurance. In addition, Hispanic respondents tended to be slightly younger than both non-Hispanic whites and non-Hispanic African Americans.

Table 3 presents odds ratios from logistic regression models estimating the odds of not receiving timely mammography, CBE, and both mammography and CBE combined breast cancer

screening by race/ethnicity. The overall model fit of the six logistic regression models as measured by Wald's χ^2 test showed good fitness. After adjusting for all the variables included in the logistic regression model, there was a strong negative association between having health insurance and failing to receive both mammography and CBE for breast cancer screening per current guidelines across the three racial/ethnic groups. Among non-Hispanic white women, failing to receive timely mammography is negatively associated with being 50 years old or older, married and having a college degree or more. Reporting a poor health status is modestly associated with failing to be up-to-date with mammography screening among non-Hispanic white women. In addition, among non-Hispanic white women, older age (≥ 65) and rural residence were positively correlated with non-adherence to CBE screening. As with mammography screening, while being married and having a college degree were also negatively associated with CBE screening non-adherence among non-Hispanic white women, poor health was positively associated. Moreover, age, marital status, and college degree were significantly negatively correlated with failure to receive both mammography and CBE screening combined among non-Hispanic white women. On the other hand, poor health status was positively correlated.

Among non-Hispanic African Americans, age was positively correlated with non-adherence to CBE screening although it was not correlated with mammography screening. Having some college education or college degree or higher was negatively associated with CBE screening among non-Hispanic African American women. There was a significant decline in the odds of failing to receive recommended mammography (OR=0.52), CBE (OR=0.58), and both mammography and CBE (OR=0.58) among non-Hispanic African American women in 2008 compared to 2001. That is, a significant decrease in the odds of non-adherence in breast screening was only observed among non-Hispanic African Americans. While age was negatively associated with non-adherence of mammography screening, it was positively associated with CBE screening among Hispanic women. In addition, among Hispanics, high school completion was negatively correlated with non-adherence to mammography screening and having a college degree was not significantly correlated with CBE screening non-adherence. Hispanic women who resided in rural counties in Florida had also lower odds of non-adherence to breast cancer screening.

Discussion

According to the Florida Bureau of Epidemiology, in 2006, 12,826 females were diagnosed with new breast cancer cases and 2,624 females died of breast cancer in the state (Florida Department of Health, 2009). The age-adjusted breast cancer incidence rate in 2006 was 108.7 per 100,000 females and the incidence rate was higher among white (109.6 per 100,000) than black females (90.6 per 100,000) by 21%. At the same time, however, breast cancer age-adjusted mortality rate was 34% higher among black (26.5 per 100,000) than white females (19.8%).

In 2001, our analyses show that the percentage of women reporting mammography use within the past two years was 79.0%, 77.1%, and 74.0% for non-Hispanic white, non-Hispanic African American, and Hispanic women, respectively. These estimates confirm the consistency of the phenomenon. In 2001, the range in prevalence of mammography use between the three racial/ethnic groups considered in this study was 5%. The range among racial/ethnic groups widened to 8.7% in 2008, where the percentage of women reporting mammography use within the past two years was 77.6%, 83.1%, and 74.4% for non-Hispanic white, non-Hispanic African American, and Hispanic women, respectively. Breast cancer survival was lower among minority women than non-Hispanic white women (Florida Department of Health, 2009). In Florida, Hispanic women were about twice more likely to never have been screened for breast cancer and were far less likely to be screened for breast cancer as per current guidelines than non-Hispanic white and non-Hispanic African Americans. In addition, Hispanic women were also significantly less likely to be screened for breast cancer than non-Hispanic white and non-Hispanic African Americans. Similar findings have been reported for Hispanic populations elsewhere in the United States (Fulton, Rakowski, & Jones, 1995).

In 2008, 78.6% of women reported having had a mammogram within the past two years. There was significant difference in the prevalence of mammography utilization: 77.6% non-Hispanic white, 81.1% non-Hispanic black, and 74.4% Hispanics. However, it should be noted that these rates are higher than the *Healthy People 2010* objective of a mammography screening rate of 70% among women aged 40 plus in the past two years. In 2001, the percentage of Hispanic women (15%) who never had mammography screening was more than twice the percentage of non-Hispanic whites (7.3%). The gap between non-Hispanic whites and Hispanics who never had a mammogram in Florida widened to

Table 1: Association of Race/Ethnicity and Breast Cancer Screening; BRFSS, Florida 2001 & 2008

Race/ethnicity	2001			2008		
	Mammogram	CBE	Both	Mammogram	CBE	Both
Non-Hispanic White	79.0	77.7	70.9	77.6	78.5	70.4
Non-Hispanic Black	77.1	76.5	66.7	83.1	81.1	75.1
Hispanic	74.0	69.6	62.3	74.4	70.8	64.9
Total	78.0	76.3	69.1	78.6	77.7	70.2
Chi-squared statistic	40.5***	147.3***	16.1**	68.34***	92.1***	11.1**

*** $p < .001$; ** $p < .01$; * $p < .05$

Source: 2001 and 2008 BRFSS, Florida

Note: The percentages are weighted.

Table 2: Percentage Distribution (Weighted) of the Study Subjects by Selected Characteristics by Race/Ethnicity, BRFSS, Florida, 2001 & 2008

Variable	2001			2008		
	Non-Hispanic White (n=3,983)	Non-Hispanic Black (n=410)	Hispanic (n=545)	Non-Hispanic White (n=4,666)	Non-Hispanic Black (n=436)	Hispanic (n=346)
Age						
40-49	24.1	35.6	38.7	23.5	34.6	36.7
50-64	34.5	38.1	34.9	35.3	42.2	36.1
65 & older	41.4	26.3	26.5	41.2	23.2	27.2
Marital status						
Unmarried	40.0	59.0	42.0	38.3	64.0	44.1
Married	60.0	41.0	57.8	61.7	36.0	55.9
Education						
< High school	7.1	19.8	24.2	5.3	20.6	22.1
Graduated high school	32.2	32.5	24.6	31.0	36.1	32.6
Some college or tech sch.	31.8	23.2	24.6	31.4	19.9	21.7
College graduate, more	28.8	24.5	26.6	32.3	23.4	23.6
Health status						
Good	82.4	70.6	66.8	82.4	73.5	65.8
Poor	17.6	29.4	33.2	17.6	26.5	34.2
Health Insurance						
No	9.0	13.8	24.1	7.6	17.9	27.1
Yes	91.0	86.2	75.9	92.4	82.1	72.9
County						
Urban	72.8	78.9	92.1	62.9	65.6	72.5
Rural	27.2	21.1	7.9	37.1	34.4	27.5

Source: 2001 and 2008 BRFSS, Florida

Table 3: Results from Logistic Regression Estimating the Odds of not Receiving Timely Breast Cancer Screening by Race/Ethnicity: 2001 & 2008 Florida BRFSS

	Non-Hispanic Whites			Non-Hispanic Black			Hispanics		
	Mam-mogram	CBE	Both	Mam-mogram	CBE	Both	Mam-mogram	CBE	Both
Age (vs. 40-49)									
50-64	0.45***	1.01	0.54***	0.86	4.34***	0.99	0.53***	2.74***	1.06
65 & older	0.40***	1.46	0.59***	0.68	3.83***	1.03	0.62*	2.72***	0.80
Marital status (vs. unmarried)									
Married	0.63***	0.78**	0.69***	0.82	1.68	1.21	0.95	0.80	0.92
Education (vs. < high school)									
Graduated high school	0.95	0.96	1.02	1.34	0.56	1.38	0.56**	1.55	1.18
Some college or technical school	0.81	0.90	0.93	0.59	0.28***	0.93	0.99	1.87	1.68
College graduate, more	0.59***	0.59***	0.65**	0.76	0.18***	0.71	0.78	1.57	1.53
Health status (vs. good)									
Poor	1.18*	1.37***	1.34***	1.20	0.55	1.17	1.16	0.81	1.28
Health Insurance (vs. No)									
Yes	0.23***	0.22***	0.25***	0.46***	0.58*	0.39***	0.27***	0.22***	0.30***
Year of Survey (vs. 2001)									
2008	1.07	0.96	1.08	0.52**	0.58*	0.55**	0.90	1.38	1.09
Rural county (vs. urban)									
	1.23*	1.30*	1.16	1.67*	2.03*	1.50	0.61	0.31	0.28*
Wald Chi-Square (df=10)	523.6***	315.1***	382.9***	46.5***	51.8***	39.3***	124.9***	62.0***	65.0***

*** p < .001; ** p < .01; * p < .05

three-fold in 2008. Whereas younger women from the three racial/ethnic groups had the greatest odds of not receiving a mammogram within the past two years, older women had the greatest odds of not receiving a CBE within the past two years.

For Florida, the overall likelihood of having received a timely mammogram improved by only 0.6%, but for non-Hispanic white women it declined by 1.3% and for non-Hispanic African American and Hispanic women it increased by 6% and 0.4%, respectively. According to the American Cancer Society estimates, in 2009 there will be 192,370 new breast cancer cases and 40,170 deaths (ACS, 2009). In Florida, the estimates are 12,650 new breast cancer cases and 2,730 deaths due to breast cancer. The breast cancer incidence rate is 116.7 per 100,000.

For breast cancer, it has been reported that there are remarkable differences between outcomes of localized vs. advanced diseases (American Cancer Society, 2009). Our analysis shows that about 76% of women ≥ 40 years old reported having a recent mammogram. The fact is that two-decades of screening have resulted in a significant increase in detection of early cancers. Yet, our results also show that a high percentage of Hispanic women were not screened.

In our analyses, having health insurance coverage emerged as the only predictor variable consistently associated with all screening practices among the three racial/ethnic groups. Women who reported having health insurance were more likely to receive the recommended breast cancer screening than those who reported not having insurance coverage. A lack of health insurance is also found to be associated with lower chances of survival among breast cancer patients (Halpern, 2007). The findings from our analysis provide important information on the trends and correlates of breast cancer screening practices among women in Florida by race/ethnicity from the 2001 and 2008 FL BRFSS. In addition, our study reports lower rates of screening among Hispanic women compared to non-Hispanic white and non-Hispanic African American women. Finally, our finding that Hispanic women with undergraduate or graduate education have higher odds of non-adherence to clinical breast examination than less educated women was unexpected. This suggests more research is needed on the barriers of Hispanic women; perhaps segmenting Latinas by education, including those with higher educational attainment in addition to the more often targeted lower income women.

In summary, non-adherence to breast cancer screening correlates negatively with having insurance coverage among all racial/ethnic groups. Furthermore, many women, particularly, Latino

women do not undergo routine mammography. Increased adherence to recommended mammography screening intervals, particularly among never-screened or frequently-screened women may allow for the discovery of tumors before they have progressed to an advanced stage and may result in decreased death rates.

Limitations

Our study has several limitations. One limitation of this study is a possible response bias due to the fact that the BRFSS is a telephone survey that excludes women living in households without telephones, and some of the randomly selected respondents refused to participate in the survey. Another limitation is that self-reported data about cancer screening behaviors may not be as reliable as data obtained from healthcare providers. Although reliability analyses of self-reported data collected from the BRFSS on breast cancer screening has been found to be adequate (Stein, Lederman, and Shea, 1993), other studies have documented that minority respondents may over report their screening practices (Vacek, Mickey, & Worden, 1997). An additional limitation is that because the BRFSS does not distinguish between cancer screening and diagnostic mammograms and CBEs, our results might overestimate true breast cancer screening prevalence rates. A final limitation is that younger respondents (women aged 40 and 41 years) had just entered the age eligibility for recommended breast cancer screening during the survey and might not have had enough time for screening and in our analysis would be categorized as non-adherent to screening recommendations. However, although these limitations may have introduced some error in delineating women's breast cancer screening practices, we believe the effects of these limitations on our findings were not large or biased to alter our results. Furthermore, our results are consistent with other studies that used other data sources.

Policy Implications

Our findings confirm the importance of health insurance access for recommended breast cancer screening and for expanding health care services. In addition, our results suggest the need of outreach programs specifically designed to address culturally-specific barriers targeting women residing in rural areas and Hispanic women at all levels of education. In addition, health promotion intervention strategies that focus on the health benefits of clinical breast examination for early detection of breast cancer focusing on older women is suggested. Furthermore, future research that monitors breast cancer screening in Florida is important for targeting at-risk groups

with cost effective interventions that improve prevention and early detection. Finally, future studies should include important factors such as distance to the cancer screening facility and other characteristics correlated with breast cancer screening in Florida.

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Alicestine Ashford (aliceshford@famuedu) is Assistant Professor of Health Policy and Management, Gebre-Egziabher Kiros (gekiros@famuedu) is Associate Professor of Epidemiology and Biostatistics, and Ivette A. López (ivette.lopez@famuedu) is Assistant Professor of Behavioral Science and Health Education, Florida A&M University Institute of Public Health, Tallahassee, FL. This paper was submitted to the *FPHR* on January 14, 2010, revised and resubmitted, and accepted for publication on March 25, 2010. Copyright 2010 by the *Florida Public Health Review*.