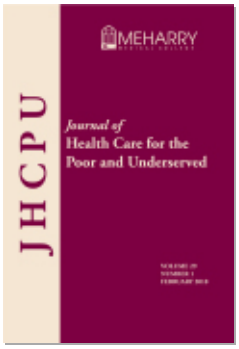
Time to Clinical Follow-up after Abnormal Mammogram among African American and Hispanic Women



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ORIGINAL PAPER

Time to Clinical Follow-up after Abnormal Mammogram among African American and Hispanic Women

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Abstract: **Background**. Time to clinical follow-up after an abnormal mammogram may be a significant factor contributing to breast cancer health disparities. **Objective**. Evaluate time to follow-up in a cross-sectional cohort of African American and Hispanic women who obtained mammogram screening at a county facility. **Methods**. Time to follow-up was assessed in days after an abnormal mammogram to subsequent clinical care in a cross-sectional study of 74 women. **Results**. The median number of days until clinical follow-up after an abnormal mammogram for women in the study was 30 days (Range: 0–357 days). There was a statistically significant difference in the time-to-biopsy among women who had incomplete mammograms and women who had comorbid conditions. **Conclusions**. This data indicates that county services provide clinical follow-up in compliance with recommended guidelines of 30 days. However, women with incomplete mammograms and comorbid conditions may be at a higher risk of experiencing delays in diagnosis and treatment.

Key words: Breast cancer, African American, Hispanic American, health care disparities, follow-up studies, abnormal mammogram.

Breast cancer is the second leading cause of cancer death among women in the United States.[1] Breast cancer survival among different ethnic and socioeconomic groups remains a significant cancer disparity. European American women, or non-Hispanic Whites, have higher incidence of breast cancer compared with other ethnic cohorts. However, African American women, or non-Hispanic Blacks, have significantly higher mortality, with up to 42% increased mortality compared with their European

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American counterparts.[2] Furthermore, Hispanic American women are approximately 20% more likely to die of breast cancer than European American women diagnosed at a similar age and stage.[3]

Many factors, both socioeconomic and biological, may contribute to these disparities in breast cancer mortality. Socioeconomic factors include inadequate access and knowledge for preventive screening as well as treatment.[4] Both African American and Hispanic American women are more likely to be diagnosed with advanced disease [2,5] and less likely to receive mastectomy than European American women.[6] Biological factors that contribute to disparities include reduced prevalence of hormone receptor (HR) positive tumors that respond better to treatment.[7,8]Triple-Negative Breast Cancer (TNBC) and HR negative breast cancer subtypes are more frequent among African American and Hispanic American women, which increases negative cancer outcomes in these groups.[2,5,9–12] Other biological factors that may put women at risk for reduced survival include high body mass index or obesity.[13–15]

Early detection and treatment provide the best chance for survival after breast cancer diagnosis. There is controversy regarding the utility of mammograms and age at which screening mammograms should be initiated. [16–18] The American Cancer Society, National Comprehensive Cancer Network (NCCN), and American Congress of Obstetricians and Gynecologists recommend annual mammogram screenings beginning at 40 years of age.[19–21] However, current US Preventative Task Force guidelines recommend biennial screening beginning at 50 years of age.[17] The recommended age to initiate screening mammograms is particularly crucial for African American and Hispanic American women since the age of breast cancer onset/diagnosis is more prevalent among younger women in these cohorts than in the general U.S. population.[22] Nationally, the age of diagnosis with breast cancer among women of European American descent is 61 years old,[22] whereas the age of diagnosis among women in South Los Angeles using county services was 51.97 years old for African American women and 48.69 for Hispanic American women. [15] Mammography screening initiated at age 40 can reduce the number of cases among African American and Hispanic women in South Los Angeles county diagnosed with later stage and distant metastasis, as well as maximizing years of life gained from screening[18]. It must also be mentioned, however, that younger women are also more likely to have higher breast density than older women,[23] which can result in inconclusive mammogram results, warranting further screening and additional time until biopsy is performed and diagnosis is received.

The Mammography Quality Assurance Act requires that the results of mammograms be provided to patients within 30 days. [24] In a study evaluating timeliness of follow-up at facilities across the Breast Cancer Surveillance Consortium, follow-up requiring additional imaging or biopsy/surgical consultation occurred within 30 days 90% and 81% of the time, respectively.[25]

Delays in receiving a diagnosis and follow-up to care may contribute to the later stage of diagnosis and reduced survival seen among African American and Hispanic women. Thus, the present study aims to assess the time to follow-up and time to diagnosis in a cohort of African American and Hispanic American women accessing health care at a county facility in a medically under resourced community of South Los Angeles. The study will also examine the effect of incomplete mammogram results

on the time to delay in biopsy/diagnosis, the association of breast density with receiving an incomplete result, and relationship between socioeconomic factors and time to follow-up after abnormal mammogram. There is limited information focused on breast health among African American and Hispanic American women and those younger than the national average age of 61. Hence, determining the timeframes by which this cohort of women receive follow-up after abnormal mammogram can inform health care providers and navigation programs to improve care for at-risk women and reduce breast cancer health disparities.

Methods

Population. The study cohort comprised women who obtained screening or cancer care at the Martin Luther King Jr. Multi-Service Ambulatory Care Center (MLK-MACC, formerly known as King-Drew Medical Center) between 1995 and 2007. The MLK-MACC is a county hospital in a medically under resourced community in South Los Angeles. Women in the study gave their consent to participate in an ongoing breast cancer study conducted in the Division of Cancer Research and Training at Charles R. Drew University of Medicine and Science (CDU) and MLK-MACC. The Institutional Review Board at CDU approved the study. Women were selected from the existing breast study database.

Inclusion criteria. The inclusion criteria were the following: (a) *self-identified race/ethnicity* of African American or Hispanic; (b) *incomplete or abnormal mammogram* defined as a Breast Imaging Reporting and Data System Score (BI-RADS) of 0, 4, or 5; (c) *clinical follow-up* defined as excisional biopsy, core biopsy, fine needle aspiration, or additional radiological imaging; (d) *diagnosis* of breast cancer, benign breast disease, or confirmed to have no breast disease or cancer; (e) *socioeconomic* data including education level, income, occupation, and insurance status, and clinical variables, such as carcinogen exposure, menopausal status, and family history of cancer; (f) *chronologically available follow-up data* documenting clinical procedures and results after abnormal mammogram. A total of 74 women met the criteria for the study, and follow-up histories were constructed using medical charts for abstraction.

Study variable definitions. The study reported on the participants' characteristics including age, self-identified ethnicity, final diagnosis, breast density, and time to follow-up in days after an abnormal mammogram. Women were considered to have a diagnosis of *cancer* if they had a breast mass that was a pathology-confirmed neoplasm. Women categorized as *non-cancer* included only women who were determined by mammogram or ultrasound evaluation to be cancer-free; or, who were determined by biopsy to have benign breast disease and no neoplastic/cancerous cells.

The American College of Radiology has developed the Breast Imaging Reporting and Data System (BI-RADS) in which categories for reporting mammographic findings are standardized with numbers 0–5.[26] A BI-RADS score of 1 and 2 are *Normal* and *Benign Findings*, respectively. BI-RADS score of 3 corresponds with *Probable Benign Findings* with initial short interval follow-up suggested.[26] Women who receive a BI-RADS score 4 or 5, corresponding to *Suspicious* and *Highly Suggestive of Malignancy*, respectively, should immediately receive a core or excisional biopsy for tissue diagnosis. Addition-

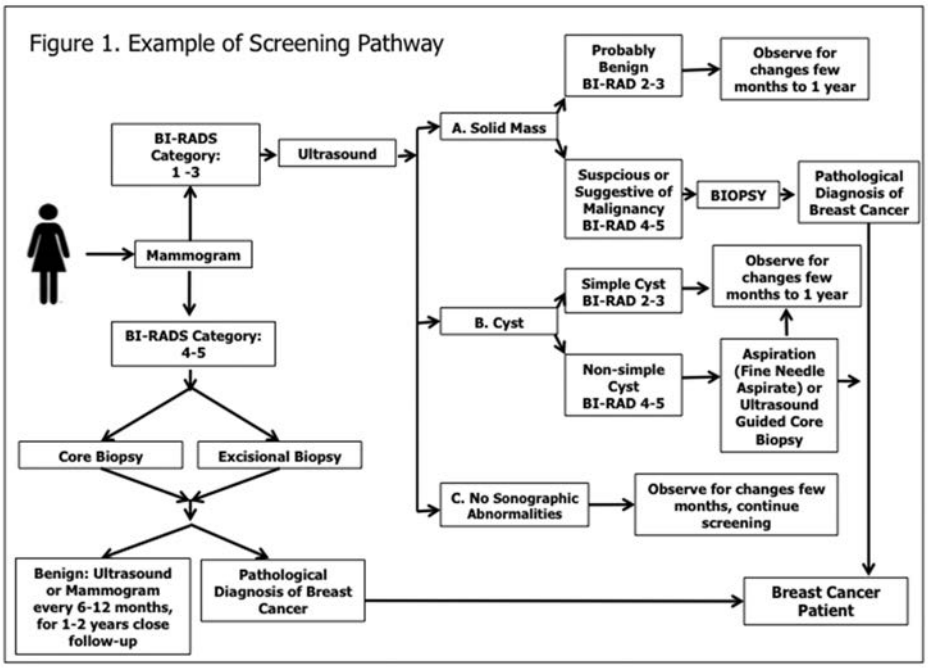

Figure 1. Example of Screening Pathway

ally, women who receive a BI-RADS score of 0, corresponding to an *Incomplete study,* require additional imaging studies or call back for additional views to complete this screening examination. (See the example screening pathway in Figure 1).

BI-RADS also describes breast density on a scale of D1-D4 with increasing breast density. BI-RADS breast density score of D1 is for *Fatty Breasts*, D2 is for *Fatty with Scattered Fibroglandular Densities*, D3 is *Heterogeneously Dense*, and D4 is *Extremely Dense*.

The following were assessed among women with an abnormal mammogram: (1) the average days to the next clinical follow-up, (2) the frequency of the next clinical follow-up being a biopsy, (3) the time to biopsy among women ultimately requiring a biopsy for diagnosis of cancer, (4) the frequency of women with a BI-RADS score of 0 being subsequently diagnosed with breast cancer, (5) the distribution of breast density in relation to BI-RADS score, and (6) the relation of socioeconomic status, family history, exposure to carcinogens, and comorbidities to days to follow-up.

Statistical analysis. The data for this study were analyzed with SPSS Software (IBM, New York, NY) versions 11.5–20.0. Statistical significance was assessed by analysis of variance (ANOVA). The 2-sided chi-square test was also used to assess the relationship between variables. Values with a $p < .05$ were considered statistically significant.

Results

The patient characteristics are reported in Table 1. A total of 74 patient histories were included and constructed, among which 30 women self-identified as African American

and 44 as Hispanic American. The average age of the cohort was 52.1 years old. Among the cohort, 70% of participants were peri/postmenopausal. Socioeconomic status (SES) variables were defined as education level, employment, annual income and insurance status. Among our cohort: 44% reported less than a high school education, 59.5% reported themselves to be unemployed and 88% to have a household income of less than $25,000. Over 69% of women were dependent on the Ability-to-Pay/Breast Program, a subsidized-free program, for financing their mammogram and breast evaluations.

The median number of days to 1st follow-up after incomplete or abnormal screening is provided in Table 2. Fifty-one women with abnormal mammograms had a BI-RADS score of 0 (Incomplete), 14 had a BI-RADS score of 4 (Suspicious Abnormality) and 6 had a BI-RADS score of 5 (Highly Suggestive of Malignancy). The median number of

Table 1.

DISTRIBUTION OF PARTICIPANT CHARACTERISTICS (N=74)

	N	%
Average Age	52.1+8.5 yrs	
Ethnicity		
African-American	30	38.5
Hispanic	44	56.4
Menopausal Status		
Premenopausal	21	28.4
Peri/Postmenopausal	53	71.6
Education		
< 12 Years	33	44.6
12–14 Years	33	44.6
14–16 Years	3	4.1
>16 Years	4	5.4
Employment		
Employed	29	39.2
Unemployed	44	59.5
Average Household Income		
< $25,000/year	65	87.8
$25,000–40,000/year	5	6.8
$40,000–60,000/year	0	0
>$60,000/year	1	1.4
Insurance (Prior to Diagnosis)		
ATP/Breast Program	51	68.9
HMO/PPO	8	10.8
MediCal/MediCare	9	12.2

Notes:
N= Number
ATP= Ability to Pay
HMO= Health Maintenance Organization
PPO= Preferred Provider Organization

Table 2.

DAYS UNTIL 1ST FOLLOW-UP AFTER INCOMPLETE OR ABNORMAL SCREENING[a]

BI-RADS Score	Description	N	Median	Min	Max
BIRADS = 0	Incomplete, Needs Further Imaging/Follow up	51	36	0	357
BIRADS = 4	Suspicious Abnormality, A Biopsy Should Be Considered	14	40	1	140
BIRADS = 5	Highly Suggestive of Malignancy, Appropriate Action is Recommended	6	8	0	48
	Total		30	0	357

Notes:
[a]ANOVA- p-value = 0.420
BIRADS= Breast Imaging Reporting and Data System Score
N= Number
Std. Dev= Standard Deviation
Min= Minimum
Max= Maximum

days to follow-up in this study was 30 days, with a range of 0–357 days. There was no statistically significant difference in median number of days to first clinical follow-up after incomplete or abnormal mammogram result, p=.420.

Time to biopsy varied significantly according to BI-RADS category (p<.001) as shown in Table 3. Among women with a BI-RADS score of 4, 86% received biopsy as their first clinical follow-up (FCF), and among women with BI-RADS score of 5, 83% received biopsy as their FCF. Only 29% of women with a BI-RADS score of 0 received biopsies as first clinical follow-up. The remaining 71% of women with BI-RADS scores of 0 had secondary imaging studies (Radiological Evaluation) as their FCF after incomplete mammogram. Among this subset, 50% of women had subsequent need for biopsy and only 21% had no further need for evaluation.

The median number of days until 1st biopsy follow-up is shown in Table 4. Among women who ultimately required tissue sampling (n = 61), biopsies following BI-RADS scores of 0 occurred at a median of 104 days, whereas the biopsies for BI-RADS scores of 4 occurred at a median of 40.5 days, and a median of 8 days for BI-RADS scores of 5. This difference in follow-up was statistically significant with p=.035 (Table 4).

A total of 48 women in this study received a BI-RADS score of 0. Table 5 provides the distribution of first clinical follow-up (FCF) within this cohort and ultimate diagnosis of breast cancer or non-cancer. Twenty-four (50%) of women with BI-RADS 0 were ultimately found to have no breast cancer, and 24 (50%) were found to have breast cancer. Among women who ultimately were found to have breast cancer, 46% received biopsy as their FCF after Incomplete mammogram result, and 54% required additional delay in receiving additional radiological evaluation prior to receiving confirmatory biopsy. The differences were statistically significant, with p<.001.

The breast density scores were also assessed among the cohort of women (Table

Table 3.

NUMBER OF WOMEN WITH INCOMPLETE OR ABNORMAL MAMMOGRAM WHO RECEIVED A BIOPSY[a]

BIRADS Score	Description	FCF was biopsy N (%)	FCF was Radiological with need for biopsy N (%)	FCF was Radiological with no need for biopsy N (%)	Total N
BIRADS = 0	Incomplete, Needs Further Imaging/Follow up	14 (29%)	24 (50%)	10 (21%)	48
BIRADS = 4	Suspicious Abnormality, A Biopsy Should Be Considered	12 (86%)	2 (15%)	0 (0%)	14
BIRADS = 5	Highly Suggestive of Malignancy, Appropriate Action is Recommended	5 (83%)	1 (17%)	0 (0%)	6

Notes:
[a]Chi-Square Test (2-sided) p-value < .001.
BIRADS= Breast Imaging Reporting and Data System Score
N= Number
FCF= First Clinical Follow-up

Table 4.

DAYS UNTIL 1ST BIOPSY FOLLOW UP[a]

BIRADS Score	Description	N	Median	Min	Max
0	Incomplete, Needs Further Imaging/Follow up	41	104	0	524
4	Suspicious Abnormality, A Biopsy Should Be Considered	14	41	1	140
5	Highly Suggestive of Malignancy, Appropriate Action is Recommended	6	8	0	52

Notes:
[a]ANOVA- p-value = .035.
BIRADS= Breast Imaging Reporting and Data System Score
N= Number
Std. Dev= Standard Deviation
Min= Minimum
Max= Maximum

6). Among the women who received a BI-RADS 0, 55% had BI-RADS Breast Density Score of 3 (Heterogeneously Dense) and 8% had BI-RADS Breast Density Score of 4 (Extremely Dense). There was no statistical significant difference in breast density scores between women who received BI-RADS scores of 0 and 4 or 5, p = .248. However, all women who had extremely dense breasts (D4) had incomplete mammograms (BI-RADS 0) although the sample size was small (n = 4).

Table 5.

WOMEN WITH (BIRADS=0) INCOMPLETE MAMMOGRAM WHO WERE DIAGNOSED WITH BREAST CANCER AFTER DELAY OF ADDITIONAL IMAGING PRIOR TO DIAGNOSTIC BIOPSY[a]

Diagnosis Description	FCF was biopsy N (%)	FCF was Radiological with need for biopsy N (%)	FCF was Radiological with no need for biopsy N (%)	Total N
Non-Cancer	3 (12%)	11 (46%)	10 (42%)	24
Cancer	11 (46%)	13 (54%)	0 (0.0%)	24

Notes:
[a]Chi-Square Test (2-sided) P-value < .001.
N= Number
FCF= First Clinical Follow-up

Table 6:

DISTRIBUTION OF BIRADS DIAGNOSTIC SCORE BY BIRADS BREAST DENSITY SCORE[a]

	BIRADS = D1 Fatty Breasts	BIRADS = D2 Fatty with Scattered Fibroglandular Densities	BIRADS = D3 Heterogeneously Dense	BIRADS = D4 Extremely Dense	Total
BIRADS = 0	5 (10%)	13 (27%)	27 (55%)	4 (8%)	49
BIRADS = 4 or 5	3 (16%)	6 (32%)	10 (53%)	0 (%)	19

Notes:
[a]Chi-Square Test (2-sided) p-value = .248.
BIRADS= Breast Imaging Reporting and Data System Score

The associations among multiple socioeconomic and risk variables were also assessed in relation to median number of days to follow-up. As shown in Table 7, there was no statistical significant difference in the median number of days to follow-up by education level, occupation, exposure to carcinogens, family history of cancer, and insurance status. However, the presence of a comorbidity or past known clinical problem such as diabetes or hypertension did have statistically significant differences in median number of days to follow-up (p=.049). Women with comorbidity or past known clinical problem had 48 median number of days to follow-up compared with women without comorbidity who had 25 median number of days until follow-up. All of the women with comorbidity or past known clinical problem, had diabetes and/or hypertension.

Table 7.

ASSOCIATION OF SOCIOECONOMIC FACTORS AND DAYS UNTIL 1ST FOLLOW-UP AFTER ABNORMAL MAMMOGRAM (N = 74)

Parameter	N	Median (days)	p-Value
Education (n=73)			
< 12 Years Education	33	30	0.664
>= 12 Years Education	40	35	
Occupation (n=73)			
Unemployed	44	22	0.714
Employed	29	53	
Exposure Carcinogen 5Years (n=58)			
No Carcinogen Exposure	54	26	0.624
Carcinogen Exposure	4	67	
Exposure Carcinogen 1Year (n=58)			
No Carcinogen Exposure	55	27	0.548
Carcinogen Exposure	3	22	
Family History of Cancer (n=73)			
No Family History of Cancer	43	36	0.266
Family History of Cancer	30	26	
Insurance Status (prior to DX) (n=68)			
ATP/Breast Program	51	30	0.589
HMO/PPO	8	63	
MediCare/MediCal	9	25	
Insurance Status (Current) (n=71)			
ATP/Breast Program	50	30	0.865
HMO/PPO	3	53	
MediCare/MediCal	18	35	
Past Known Clinical Problem (n=71)			
No Other Clinical Problem	38	25	0.049*
Yes Other Clinical Problem	33	48	

Notes:
*Statistically Significant
N= Number
SD= Standard Deviation
ATP= Ability to Pay
HMO= Health Maintenance Organization
PPO= Preferred Provider Organization
DX= Diagnosis

Discussion

Breast cancer is most commonly diagnosed in women aged 55–64 years old, with the median age of diagnosis at 61 years. Incidence and mortality typically increases with age.[27] This study describes a cohort of peri/postmenopausal African American and Hispanic women with an average age of 52.1 years, much younger than the national

average, who are low-income, educationally disadvantaged, and underinsured. We evaluated time to follow-up in this cohort of African American and Hispanic women who obtained mammogram screening at a county facility.

The overall median number of days to follow-up after abnormal mammogram in this cohort was 30 days, which adheres to the established guidelines for follow-up of abnormal mammogram results. However, there was a statistically significant association of the median number of days to follow-up with the presence of comorbidity or past known clinical disease. Data from our study indicate women with comorbid conditions or past known clinical disease had a longer median number of days to follow up than those who did not. Recent studies, such as that by Constantinou et al., report similar results of women with comorbidity (especially diabetes) who are less likely to adhere to breast and cervical cancer screening and follow-up guidelines than women without comorbidity.[28] A large study by Gurney et al. examining comorbidity in a wide variety of cancer types, similarly found that patients with comorbidity were not diagnosed earlier compared with women without comorbidity, but were rather more likely to be diagnosed later with distant metastasis.[29] Though it seems that women with chronic conditions would have frequent exposure to regular medical care, it is possible that these observations are due to patients with comorbidities prioritizing chronic conditions over preventative care. Alternatively, it is possible that participants who have no other clinical problem are more sensitive to abnormal clinical results and more actively seek follow-up compared with those with a chronic health problem. Nonetheless, data from our study clearly suggest that African American and Hispanic women in this cohort with comorbid conditions must be more engaged in preventive health care. Additional support and/or education programs may be required to overcome these barriers.

In addition, we found that the days to biopsy were significantly longer among African American and Hispanic women receiving a BI-RADS score of 0 (median of 104 days) compared with those who immediately received BI-RADS scores of 4 or 5 (median of 40 days and 8 days, respectively). This significant delay in time to biopsy was characterized by the need for additional imaging studies prior to biopsy. Additional imaging studies determined that 21% of women with BI-RADS score of 0 did not need biopsies. This suggests that the additional step of attaining additional imaging after incomplete mammogram can decrease morbidity associated with unnecessary biopsies. However, over 50% of women who did require biopsy after additional imaging were diagnosed with breast cancer. This underscores the fact that timeliness of secondary imaging is paramount, as these women only received a biopsy after the time delay associated with additional imaging. Additional imaging in women with BI-RADS score of 0 served to stratify patients requiring biopsy. The delay in receiving biopsy in African American and Hispanic women with incomplete mammograms could miss the time point for early detection of breast cancer and result in late diagnosis with advance stage breast cancer.

Furthermore, data indicate women with higher breast density (D3/D4) were more likely to have incomplete mammograms (BI-RADS 0). High breast density creates an unclear milieu that decreases the ability of the radiologist to determine the presence of a lesion.[30] Dense breasts are also associated with an increased risk of breast cancer.[31–34] Screening young women with mammography can present a challenge since

younger age is associated with higher breast density. As women age, the glandular tissue in the breast is replaced by fatty tissue, yielding less dense breasts, which can then be better screened by mammography.[35] Several states, including California, have implemented laws requiring patients to be notified if they have high breast density.[36] Patients may then be appropriately counseled by their physicians about the increased risk of breast cancer associated with increased mammographic density and the probability that breast lesions may be undetected. A study reporting on knowledge of breast density and awareness related to breast cancer risk found that both African American and non-Hispanic White women lacked awareness of the association between dense breasts and increased breast cancer risk.[37] All women, including those of vulnerable and underserved populations, should be made aware of this increased risk so that they understand the importance of timely follow-up and possibility of subsequent imaging in addition to mammography.

This study did not find any association between median number of days to follow-up and socioeconomic factors such as education, income, employment or insurance status. However, the overall cohort was low income, underinsured and educationally disadvantaged. Prior studies have determined timeliness of follow-up after abnormal mammography is delayed among minority and vulnerable populations who have low incomes and less education.[25,38–40] This led to the hypothesis that delays in time to follow-up after abnormal mammography is a factor in the decreased survival rates of underserved minority women,[41] similar to those in our cohort. Unfortunately, our study was unable to correlate time to follow-up with survival outcomes.

One limitation of this study is a low number of participants. It is difficult to draw conclusions or make generalizations based solely on this data; however, this study does suggest that longer time to follow-up is associated with the presence of comorbidity and incomplete mammograms (BI-RADS 0) . Additionally, incomplete mammograms may be associated with high breast density; and thus, higher breast density may be associated with delayed diagnosis of breast cancer. We suggest that the likelihood of completing the process from follow-up to diagnosis and subsequent care may be lessened by incomplete or inconclusive mammogram results, such as those resulting from highly dense breasts. Future studies are necessary to correlate time to follow-up with breast cancer outcomes as well as to expand the cohort to include more participants. It must be noted that this data precedes the Affordable Care Act and subsequent changes in access to care and the ability of underserved women to obtain mammograms and follow up care.

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