



# Does Offering Free Breast Cancer Screenings Make a Difference?—A Retrospective 3-Year-Review of a West Texas Free Breast Cancer Screening Program

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## Abstract

**Objectives:** We evaluated a single free breast cancer screening program for breast cancer rate per 1,000 mammograms and compared it to the national cancer rate. We aimed to determine compliance rate in previously noncompliant women, to determine recall rate, and to find the percentage of diagnostic imaging done as a first test on a previously unscreened population.

**Methods:** A retrospective chart review of 523 free breast cancer screenings was performed from 2010-2013. Baseline demographics, mammogram screenings, and breast cancer diagnoses were assessed. A p-value of <0.05 was considered statistically significant.

**Results:** Out of 523 screenings, 113 women had never received a previous mammogram. Screening breast cancer rate was found to be 2.4/1000. Breast cancer rate was found to be 92.6/1000 diagnostic mammograms. Breast cancer was detected in 11 women. Overall compliance rate was 21.9%. Of 523 mammograms included in our study, 20.7% were diagnostic on the first mammogram, while 79.3% were screening with a recall rate of 22.4%.

**Conclusions:** Free breast clinics help bridge the gap between health disparities and are an asset to the community. More funding and effort needs to be allocated towards increasing the number of free breast clinics nationwide.

## Introduction

According to Center for Disease Control and Prevention (CDC) statistics, breast cancer is the most common cancer in women, regardless of race or ethnicity, in the United States [1-3]. It is also the most common cause of death from cancer among Hispanic women and the second most common cause of death from cancer among white, African American (AA), Asian/Pacific Islander, and American Indian/Alaskan Native women [1]. Fortunately, with increased screening, detection methods, and improvements with innovation of breast cancer treatment, mortality has steadily decreased over the last decade in all races and ethnicities except for American Indian/Alaskan native women, for whom it has stayed constant [1]. The incidence of breast cancer has increased in young AA women by 0.5% per year while mortality rates have decreased [1]. This is likely attributed to increased screening for breast cancer in this population.

Health disparities are evident in the field of breast cancer [4-24]. A few of the reasons cited include location segregation, lack of knowledge about breast cancer and breast cancer prevention, mistrust of the healthcare system, fatalism, and cultural and religious reasons. The movement towards improvement in breast cancer prevention, detection, and treatment was addressed in the Healthy People 2010 and 2020 reports [25].

One of the goals listed in Healthy People 2020 is to completely eliminate health disparities related to breast cancer in the United States

and to increase the proportion of women who receive breast cancer screening based on the most recent guidelines. A step towards achieving these goals was made in the passing of the health care reform bill with the Patient Protection and Affordable Care Act (ACA) in 2010 which aims to improve insurance coverage and access to the healthcare system for every citizen of the United States [26]. However, a goal this immense is not likely to be achieved instantaneously and certain roadblocks are to be expected.

Our study evaluated a free breast cancer screening program established in Lubbock, Texas. We aimed to show that free breast cancer screening clinics are successful at helping to achieve goals listed in Healthy People 2020. We hypothesized that women are more likely to return for subsequent screening mammograms after receiving a free screening mammogram and education. We hoped to shed light on the effectiveness of free breast cancer screenings and thus improve support and funding for these programs.

## Methods

This retrospective review was approved by the Texas Tech University Health Sciences Center Institutional Review Board in Lubbock, Texas. Subjects were selected using a database collected by volunteering physicians during free breast cancer screenings paid for through a Cancer Prevention and Research Institute of Texas (CPRIT) grant, Susan G. Komen for the Cure grants, or private donations from September 2010 to February 2013. Inclusion criteria included women

over 40 years of age with no previous history of breast cancer. A total of 523 patients met inclusion criteria. Qualifying women were followed for a minimum of 14 months to see whether a repeat screening mammogram was obtained.

Screening mammogram was defined as a routine mammogram administered to detect breast cancer in women who have no apparent symptoms based on national screening guidelines. A diagnostic mammogram was defined as a mammogram that was obtained after suspicious results on a screening mammogram were found or after presentation of the patient with suspicious clinical signs such as a lump, breast pain, nipple discharge, thickening of the skin on breast tissue, or changes in the size or shape of breast. Compliance rate was defined as the number of all those studied who received a screening mammogram that subsequently returned within the following year to obtain an annual screening mammogram. Recall rate was defined as the number of screening mammograms that found an abnormality requiring further diagnostic imaging out of all screening mammograms obtained in the study. Cancer rate was defined as the number of cancers detected and confirmed in the study population per 1000 examinations.

Baseline demographics such as employment status, insurance funding, race, total household income, language spoken, highest level of education, and months since previous mammogram were assessed. Information was collected on number of breast cancers detected, stage of cancer, time since last mammogram screening, whether this was patient's first screening, and time to second screening.

If cancer was detected, we investigated whether National Comprehensive Cancer Network (NCCN) guidelines were followed. Microsoft Excel was used to perform statistical analyses on continuous data. R Environment for Statistical Computing and Graphics (v3.0.2) was used to perform statistical tests and correlation analysis. A p-value of <0.05 was considered statistically significant. Volunteering physicians performed free physical exams and patient education.

## Results

The mean age of women screened was 50.6, with a standard deviation (SD) of 6.9. Caucasian women comprised 41.5% of the population; Hispanic 41.1%, African-American 8.6%, and 8.8% were classified as other (Table 1).

Demographics of Study Population		
<b>Employed</b>		<b>N (%)</b>
No		113 (21.6)
Yes		187 (35.8)
No Reply		223 (42.6)
<b>Insurance Coverage</b>		
Private		48 (9.2)
Medicaid		9 (1.7)
Medicare		3 (0.6)
Blue Card		27 (5.2)

None	289 (55.3)
No Reply	147 (28.1)
<b>Race</b>	
Caucasian	217 (41.5)
Hispanic	215 (41.1)
African-American	45 (8.6)
Asian/Pacific Islander	5 (1.0)
Other	19 (3.6)
No Reply	22 (4.2)
<b>Total Household Income</b>	
Below 200% Poverty Line	224 (42.8)
Above 200% Poverty Line	60 (11.5)
No Reply	239 (45.7)
<b>Level of Highest Education</b>	
Some High School	40 (7.6)
High School Graduate	147 (28.1)
Vocational/ Some College	0 (0.0)
College Graduate	67 (12.8)
Graduate Degree	25 (4.8)
No Reply	244 (46.7)
<b>Primary Language</b>	
English	489 (93.5)
Spanish	22 (4.2)
English & Spanish	1 (0.2)
Other	2 (0.4)
No Reply	9 (1.7)

**Table 1:** Patient demographics of study population (N=523).

Breast cancer was detected in 11 patients, all of whom received appropriate treatment per NCCN guidelines. Of these 11 cancers detected, 5 (45.5%) were early <2A stage, while the other 6 (54.5%) were late >2B stage cancers (Table 2). Of 523 women in our study, 320 did not get yearly mammograms, although 76 had a follow-up mammogram in the next 14 months: a 24.0% compliance rate. Of the 113 (21.6%) women screened in our study who had never had a mammogram, 18 had a follow-up mammogram in the next 14 months: a 15.9% compliance rate. Another 11 (9.5%) returned for a subsequent mammogram outside the 12 ± 2 months recommended window. The compliance rate for all women with follow-up mammogram in the 12 ± 2 month window was 21.9%, with an overall follow-up rate of 25.6% (Tables 3 and 4).

Comparison of National Screening and Diagnostic Cancer Rates per 1000 Examinations						
	Number of screening mammogram examinations	Number of cancers detected	Cancer rate (per 1,000 examinations)	2004-2009 National Cancer rate (per 1,000 examinations)		
Total Screening Examinations	415	1	2.4	4.91		
Total Diagnostic Examinations	108	10	92.6	29.3		
Patient Demographics of those Detected to Have Breast Cancer (N=11)						
Patient Number	Age	Race	Total Household Income	Months Since Previous Mammogram	Stage at Diagnosis	Current Status (Time)
1	53	Caucasian	>200% PL	13	1	24 MDF
2	40	Hispanic	<200% PL	N/A	1A	33 MDF
3	64	AA	<200% PL	84	1A	28 MDF
4	46	Hispanic	<200% PL	18	1A	20 MDF
5	44	Caucasian	<200% PL	20	2A	26 MDF
6	62	Hispanic	<200% PL	N/A	2B	Deceased
7	50	AA	<200% PL	N/A	2B	9 MDF
8	43	Hispanic	<200% PL	48	3A	33 MDF
9	45	AA	<200% PL	N/A	3B	Deceased
10	53	Hispanic	>200% PL	N/A	4	28 MDF
11	49	Caucasian	<200% PL	N/A	4	36 MDF

**Table2:** Analysis of study population in those with detected breast cancer (N=523)

Compliance Rate, Recall Rate of Study Population			
	Overall (N=433)	No regular mammogram (N=320)	Never had a mammogram (N=113)
Received follow up mammogram	94	76	18
Compliance (%)	21.9	24	15.9
Cancers Detected	11	5	6
Recall Rate (%)	22.4	NA	NA
Mean Income and Cancers Detected in Those That Never Previously Received a Mammogram (N=284)			
		Income <200% PL (N=224)	Income >200% PL (N=60)
Mean age (SD)		50.9 (6.9)	50.01 (6.2)
No previous mammogram (%)		16.9	16.7
Cancers Detected		9	2
PL: Poverty Line; SD: Standard Deviation			

**Table 3:** Compliance rate and number of cancers detected between those that had no regular mammograms and those that had never received a mammogram (N=433).

Patient	Age	Race	Total Household Income	Months Since Previous Mammogram	Stage at Diagnosis	Current Status (Stage: Time)
1	53	Caucasian	>200% PL	13	1A	24 months DF
2	40	Hispanic	< 200% PL	NA	1A	33 months DF
3	64	AA	< 200% PL	84	1A	28 months DF
4	46	Hispanic	< 200% PL	18	1A	20 months DF
5	44	Caucasian		20	2A	26 months DF
6	62	Hispanic	< 200% PL	NA	2B	Deceased
7	50	AA	< 200% PL	NA	2B	4: 9 months
8	43	Hispanic	< 200% PL	48	3A	33 months DF
9	45	AA		NA	3B	Deceased
10	53	Hispanic	>200% PL	NA	4	4: 28 months
11	49	Caucasian	< 200% PL	NA	4	4: 36 months

AA: African American; PL: Poverty line; DF: Disease free; NA: Not available (i.e. no previous mammogram)

**Table 4:** Patient demographics, months since previous mammogram, stage at diagnosis and current status of the patient.

Of the 523 mammograms performed over the course of this study, 108 were diagnostic on initial presentation (20.7%). This percentage is considerably higher than the national percentage of 11.3% [27-30]. The breast cancer detection rate in our study population was 92.6 per 1000 diagnostic mammograms (Table 2). This is more than three times the national average rate of 29.3 per 1000 diagnostic mammograms [31-34]. The screening breast cancer rate in our study population was 2.4 per 1000 mammograms (Table 2). This is approximately half as much as the national screening breast cancer rate of 4.91 [30].

Among the 113 patients in our study who had never previously received a mammogram, 6 (5.31%) were diagnosed with breast cancer. A strong correlation was seen between lack of regular mammogram screenings and increased cancer detection rate (Correlation coefficient  $r = 0.59$ ,  $p < 0.002$ ). Ninety four of the 433 screening mammograms underwent a diagnostic mammogram after the initial screening mammogram, giving a recall rate of 22.4%.

Of the 523 study subjects, 284 disclosed financial information. Of these 284 women, only 60 (21.1%) had an income at or above the 200% poverty line (PL) of \$44,700 (Table 1). These 60 women had a mean age of 50.01 with SD 6.2. The remaining 224 women (78.9%) had household incomes below the 200% PL of \$44,700. These 224 women had a mean age of 50.9 with a SD 6.9. Of the 60 women with household incomes >200% PL, 10 (16.7%) never had a mammogram. Nine of the 11 cancers detected were in the group that disclosed their financial information. Of these nine cancers, 2 (22.2%) were detected in the group of women with household incomes >200% PL (Stage 1 and 4), and the remaining 7 (77.8%) were detected in the group of women with household incomes <200% PL (Stage 1A, 1A, 2B, 2B, 3B, and 4). If normalized to the number of women in each group, the cancer rates are 3.3% and 3.1% for the group with household incomes above and below the 200% PL, respectively. However, in terms of early vs. late stage cancers, the group with household incomes above the 200% PL had a 50/50 distribution, while the group with household incomes <200% PL had a 43/57 distribution in favor of late stage cancers. In

addition, 8 of the 11 cancers detected were in minority racial groups. Only 1 cancer out of the 11 detected, was detected on a screening mammogram. This patient was 46 years old, Hispanic, employed part time, uninsured, had her last mammogram 18 months ago, and diagnosed with stage 1A cancer (Table 2). All patients diagnosed with cancer during our study were treated appropriately according to disease stage with chemotherapy, surgery, radiation therapy, or a combination of these treatment modalities. Table 2 lists the demographic information of these 11 patients.”

## Discussion

In constructing our study, we aimed to determine compliance rate in previously noncompliant women, to determine the recall rate, and to find the percentage of diagnostic imaging done as a first test on a previously unscreened population. We also aimed to determine the screening and diagnostic breast cancer rate in our free clinics and compare it to the national statistics. In addition, we wanted to determine how many women had their very first mammogram at our free clinics.

The number of cancers detected in our study of 523 women that received screening and diagnostic mammograms was 11. Thus, our overall screening cancer rate was 2.4 per 1000 (Table 3). The national average cancer rate via screening mammography between 2004 and 2009 is 4.91 [30]. Thus, our cancer rate was half the national average. The number of cancers detected in our study via a diagnostic mammogram was 10. This gives us a diagnostic cancer rate of 92.6 per 1000 (Table 3). This is three times higher than the national average of 29.3 [34]. The low screening cancer rate in our population can most likely be explained by the fact that our study population is small. In addition, the high diagnostic rate is likely directly influenced by a lack of routine screenings. Multiple randomized trials on routine breast cancer screenings have shown that mammography breast cancer screening is effective at reducing morbidity and mortality in women and allows detection of breast cancer at an earlier stage by decreasing

the number of patients seeking a diagnostic mammogram subsequent to palpation of a mass in their breast [1,31-33].

Our study also showed that women with breast cancer who received an exam and mammogram at our free clinic were more likely to present at a later stage in the disease process. Of the 11 cancers detected in our patient population, 6 (54.5%) were found to be late (>2B) stage. From the 523 total mammograms that were included in our study, 108 (20.7%) were diagnostic on the first mammogram, while the remaining 415 (79.3%) were screening mammograms. This is because our population of women screened was not typical. Most of the women in our study were between the ages of 40-65 and lacked insurance funding and were also ineligible for Medicare or Medicaid.

Our single free breast cancer screening study also showed that the overall compliance rate of obtaining subsequent mammography screening was 21.9%. This is substantially lower than the overall national compliance rate, which has been cited to be somewhere between 50-70% [27-28]. Despite the much lower than average compliance rate, this is still an improvement as the women in our study population are those who were previously non-compliant. In addition, the results of this study are from the inception of a free breast cancer screening clinic. We anticipate that with time and greater funding, we will be able to increase the compliance rate closer to that of the national average.

In the United States, approximately 10% of women overall will be recalled from each mammography screening examination for further diagnostic testing (30). Recall rate is defined as the percentage of screening mammograms that found an abnormality requiring further diagnostic imaging. In our study, 94 women out of 415 underwent subsequent diagnostic mammograms after screening mammograms. Thus, our overall recall rate was 22.4%, more than double the national average (Table 3). This is likely due to the fact that the majority of the women in our population have not received routine screening mammograms prior to coming to our clinic that may have caught a suspicious finding sooner. In addition, some women were prompted to find our clinic after self-palpation of a mass, which is why the diagnostic as a first exam rate is high.

Of the 284 women that chose to report their income, most were below the 200% PL (78.9%). Based on our study, income levels <200% PL are more likely to utilize free breast cancer clinics and may be more likely to be diagnosed with late-stage breast cancer (Table 2). These findings support our claims that free breast screening clinics are an asset to the community and help in achieving the Healthy People 2020 goals of eliminating health disparities.

Thus, this study shows that free breast screening clinics may have a higher chance of detecting breast cancer via a diagnostic mammogram rather than a screening mammogram and diagnosing breast cancer that is in the later stage in the disease process compared to women who have access to preventative health care services.

With this study, we aimed to demonstrate that free breast cancer screenings are effective at detecting breast cancer, improving compliance in typically noncompliant women, and improve access to preventative healthcare to women who currently do not have access to mammography screening. Increase of free breast clinics nationwide can potentially lead to earlier detection of breast cancers, which will likely translate into decreased morbidity and mortality.

The ACA has already and will continue to increase insurance coverage for all United States citizens; however, these changes are not

immediate and may take years to implement. Free breast clinics are one way to provide healthcare access to women who may not have access to healthcare and allow them to get screening mammograms at the recommended age.

This study is limited in that it is a retrospective study. The data obtained were the results of a free breast clinic program that is still in early development (3 years). It can be speculated that more significant findings will be found with further development of the program, such as an increase in compliance rate and increased screening cancer detection rate that is more comparable to the general population of women screened.

## Conclusions

Our study found that our free breast cancer screening clinic program's cancer rate was 92.6 per 1000 diagnostic mammograms. The recall rate was 22.4%, both of which are considerably higher than the national average. We also found that our clinics were more likely to detect later stage breast cancers as compared to the national figures and have an income below the 200% PL. Overall, we hope to demonstrate with this study that free mammogram screening programs are an asset to the community and more effort and funding needs to be allocated toward establishing free clinics nationwide in an effort to eliminate health disparities.

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## Conflict of Interests

Dr. Candy Arentz is on the Speakers Bureau for Myriad Genetics. The other authors of this manuscript have no conflicting interests to declare.

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