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Master of Public Health Research Project

**Evaluation of the Program Delivery of Every
Woman's Life in Virginia**

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Abstract

Introduction Among women, breast cancer is the most prevalent cancer and the second leading cause of cancer death. Although technology advances have improved survival rates for breast cancer overall, improvements have not been universally experienced by all socioeconomic and racial groups. Known determinants of breast cancer care disparities include socioeconomic status, race, age, and social support. As a part of the Breast and Cervical Cancer Mortality Prevention Act of 1990 and with the help of CDC funding, the Virginia Breast and Cervical Cancer Early Detection Program (BCCEDP) or Every Woman's Life (EWL) was created. EWL provides breast cancer screening to female VA residents between the ages of 18 and 64 who lack health insurance and fall at or below 200% of the Federal Poverty Level.

Objective The purpose of this study is to determine if delays in the diagnosis and treatment of breast cancer, within the VDH program EWL, differs based on sociodemographic characteristics and/ or regional location.

Methods From its inception to July 2008, 705 women received a breast cancer diagnosis through the EWL program. For these 705 cases prevalence and crude odds ratios were calculated for both diagnosis and treatment delays for all of the demographic variables along with 95% confidence intervals. Adjusted odds ratios were calculated for sociodemographic variables against screening to diagnosis delays and diagnosis to treatment disparities along with 95% confidence intervals.

Results According to the crude odds ratios more women who fall into the other category of race experienced diagnosis delays (OR=2.28 [1.11, 4.67]), but they were more likely to receive treatment in a timely manner (OR=0.29 [0.11, 0.79]). Women living alone were also more likely to experience diagnosis delays (OR=1.49 [1.10, 3.02]). Hispanic women were more likely to receive treatment in a more timely manner than non-Hispanic women (OR=0.21 [0.05, 0.81]). Also, women being treated in any other region than northern VA were more likely to experience treatment delays. However, according to the adjusted odds ratios, the only significant timing delay was the one experienced more often by women in the other race category.

Conclusion The research indicates known indicators of disparities within cancer care as socioeconomic status, race, ethnicity, age, and social support. The findings of this study indicate that the only significant indicator of disparity within the Every Women's Life program is race. Although, African-American women were just as likely to receive timely diagnosis and treatment as white women in the program, it was the combined groups of Asian, American Indian, and other women that were more likely to experience diagnosis, but not treatment, delays. The fact that no other significant indicators of disparities were found within EWL indicates a success of the program, as EWL is targeting those women that would have otherwise been missed by the system.

Introduction

Cancer is the second leading cause of death for women in the United States following coronary heart disease¹. The most common cancer affecting women is breast cancer. After lung cancer, breast cancer causes more death than any other cancer². In 2008, among females, there were an estimated 184,450 newly diagnosed cases and 40,480 deaths due to breast cancer in the United States³. Cancer care begins with risk assessment and primary prevention, followed by screening, detection, and diagnosis. Treatment, recurrence, surveillance, and end-of-life care are also very important facets of cancer care. Although technology advances have improved survival rates for breast cancer overall, improvements have not been universally experienced by all socioeconomic and racial groups. Timely access to all parts of the cancer care continuum needs to be improved in order to eliminate cancer care disparities⁴.

Insuring that all women receive early breast cancer screening is particularly important because cancer is most treatable at the early stages³. The American Cancer Society publishes early detection guidelines for breast cancer based on the current scientific research. These include a yearly mammogram starting at age 40. However, not everyone has health insurance; therefore, they are unable to afford a yearly mammogram. Detecting breast cancer at early stages leads to both decreased morbidity and mortality⁵.

Socioeconomic status has a well known association with health care disparities, and cancer is no exception; however, racism, exposure to stress,

acculturation, resources, geographic location, and medical care are all contributing factors¹. However, not all research agrees on the most influential determinant of health disparities, more specifically cancer care disparities; although, it has been proposed that disparities are more often based on income level than either education or race^{1,6,7}. Other research has identified determinants such as geographic location, as a key contributor to cancer care disparities^{8,9}. Jacobs found that rural patients have an increased probability of mastectomy⁸. Lund discussed the prevalence of disparities within urban cancer care settings⁹. However, Mobley discusses the probability that geographic location is not a determinant of cancer care disparities because the variations have been falsely interpreted because variations fluctuate more across a geographic region than within one¹⁰.

Past research has identified that black women were significantly more likely to receive a diagnosis of breast cancer at an advanced stage of the disease than were their white women peers^{11,12,13,14}. African American women also have lower breast cancer survival rates than white women; 5 year survival rates from 1981 to 1995 for white and African American women were 86% and 71%, respectively^{1,15}. Peek¹⁶ discussed the possibility that African-American women, who have the highest rates of breast cancer death, avoid screening for breast cancer. Possible reasons include a fear of the health care system, psychosocial issues, fatalism, denial and repression, a previous negative experience with the health care system, perceived discrimination, and poor health outcomes^{16,17}.

Other research has identified racial discrimination as an important factor; women with perceived discrimination were less likely to get cancer screening^{2,17}. Social support can be a factor in seeking cancer care because family members provide a network that helps one overcome fears¹⁸. Having social support can affect the quality of life of the women receiving cancer diagnoses and treatment. There is also evidence that age plays a factor in receiving timely breast cancer screening¹⁹. Although women over 65 represent around 44% of newly diagnosed breast cancer cases and 56% of breast cancer deaths, only around 66% of women over age 70 are being screened according to guidelines. When these women receive a breast cancer diagnosis, it is more likely to be at a later stage.

Nationally and locally, there has been an influx of programs developed to address this problem since 1990. In 1990, the Breast and Cervical Cancer Mortality Prevention Act was signed into law. Due to this law, the Centers for Disease Control and Prevention (CDC) was charged with the task of creating a national program to improve access to breast and cervical cancer screening²⁰. As a part of this national initiative, with the help of CDC funding, the Virginia Breast and Cervical Cancer Early Detection Program (BCCEDP) or Every Woman's Life (EWL) was created.

Every Woman's Life is dedicated to providing breast and cervical cancer screening to female Virginia residents, between the ages of 40 and 64, who might otherwise receive none and ultimately get passed over by the entire system. In 2006, EWL routine screening was restricted to women ages 45-64

but expanded to symptomatic women between the ages of 18 and 44 years. Eligibility criteria for EWL also includes Virginia residency, lack of health insurance, and an income at or below 200% of the Federal Poverty Level²¹. In order for Every Woman's Life to reach all the women who need its services throughout the state, there are dozens of screening sites throughout the state²².

The purpose of this study is to determine if delays in the diagnosis and treatment of breast cancer, within the VDH program EWL, differs based on sociodemographic characteristics and/ or regional location. Specifically the current study will:

- 1) Quantify the prevalence of screening to diagnosis and diagnosis to treatment delays among women in Virginia's EWL program
- 2) Identify sociodemographic and/or regional disparities in timely diagnosis and treatment following an abnormal screening result in these women.

Methods

Through the Breast and Cervical Cancer Mortality Prevention Act of 1990, the CDC has set up clinical guidelines which help to eliminate any cancer care disparities. The guidelines from CDC mandate that that at least 75% of the women receiving screening through programs such as EWL should have a diagnosis within 60 days of screening and for at least 80%, treatment should start at least 60 days after diagnosis. EWL is administered by the Virginia Department of Health (VDH); however, it is up to local health providers to carry out the screening. The goal is to eliminate any disparities that might exist at any time during the cancer care continuum.

An analysis was conducted on the data set collected by the Virginia Department of Health program Every Woman's Life between September 1997 and July 2008. Women who received free cancer screening from Every Woman's Life had to meet certain criteria. Women who were between the ages of 40 and 64, residents of Virginia, lacking insurance coverage, or unable to pay the deductible, at 200% or below the Federal Poverty Level have been covered by Every Woman's Life since the program's inception²¹. Beginning in July of 2006, Every Woman's Life screening for breast and cervical cancer became available to symptomatic women between the ages of 18 and 49.

This data set used in the current study included all women that were provided breast cancer screening through the program Every Woman's Life. Data collection for each member of the retrospective cohort began at enrollment

in the program and continued through either the initiation of treatment or a negative screening result. There were 40,845 screening mammograms performed between September 1997 and July 2008. This included 705 women with a breast cancer diagnosis. The information collected included date of birth, Every Woman's Life provider, residential county, race, ethnicity, primary language, household income, household occupancy, federal poverty level, breast cancer history, screening date, diagnosis date, treatment date, and final diagnosis.

Statistical Analyses

The outcomes of interest were the intervals from screening to diagnosis and diagnosis to treatment. These variables were calculated as number of days between the events. In preliminary analyses, it was found that within the EWL program, 87.4% of women diagnosed with breast cancer received their diagnosis before the CDC standard, 60 days, and 92.1% of them started treatment within 60 days from diagnosis as well. EWL successfully meets CDC minimum standards, but there might still be room for improvement. Diagnosis and treatment should occur as soon as possible, so the time interval of interest was narrowed to look for areas in need of improvement within EWL. In these analyses, screening to diagnosis and diagnosis to treatment delays were defined as any case where the time interval was greater than 30 days. Other variables of interest were race, income, age, and region of residence within Virginia, and final diagnosis.

SAS 9.1.3 was used for all of the statistical analyses. Prevalence of screening to diagnosis disparities and diagnosis to treatment disparities were calculated for each variable as an initial approach for determining what was associated with the disparities. A 95% confidence interval was calculated for each prevalence. The crude odds ratios were then calculated for each category as an estimate of risk. Crude odds ratios were calculated with given references and each variable was separate and independent of all other variables. 95% confidence intervals were calculated for the crude odds ratio.

To account for confounding, adjusted odds ratios were calculated for all the demographic variables against screening to diagnosis delays and diagnosis to treatment delays along with 95% confidence intervals. The adjustment accounted for Virginia region of residence, race, ethnicity, household income, household occupancy, final diagnosis, and age at screening.

Results

Table 1 illustrates the characteristics of interest for the study participants. The majority of the women diagnosed with breast cancer through Every Woman's Life were white (57.3%; black = 36.3%; Asian = 2.7%), non-Hispanic (95.3%), and over age 50 (65.5%; 40-50 = 31.8%; under 40 = 2.7%). The regional breakdown of the women was: Northern VA = 5.4%, Northwestern VA = 16%, Central VA = 7.2%, Eastern VA = 36.9%, and Southwestern VA = 31.8%. More than half of the women came from households making between \$5,000 and \$20,000 annually and lived at about 100% of the federal poverty limit. A little under half (46.2%) of the women live alone. Over 95% of the women have no history of a breast cancer diagnosis, and the final diagnosis for over 70% of the women was invasive breast cancer, as opposed to Ductal Carcinoma In Situ (DCIS) or Lobular Carcinoma In Situ (LCIS). Women were diagnosed at Stage II more often (32.1%; Stage I = 18.0%, Stage III = 16.3%, Stage IV = 6.4%).

In this analysis, the definition for a normal time interval between diagnosis after screening, and receiving treatment after diagnosis was 30 days. Of the women diagnosed with breast cancer, 60.4% of them received their diagnosis at least 30 days after screening, and 68.8% of them began treatment at least 30 days after diagnosis.

Prevalence

The prevalence of screening to diagnosis delays and diagnosis to treatment delays, stratified within each of the categories, is shown in Table 2.

The prevalence of diagnosis delays was highest in the Northern Virginia region among women living in households with incomes between \$1000 and \$5000 and no other occupants. Although delays in diagnosis were more prevalent for American Indian women and Hispanic women, there were too few of them for statistical significance. Women diagnosed with DCIS also experienced more diagnosis delays than women diagnosed with invasive breast cancer or LCIS. This is also true of women with Stage I tumors.

The prevalence of treatment delays was highest within the Northwestern region of Virginia and also for black women. Women from households of most income levels experienced approximately the same level of treatment delays, and women living alone and/or under the federal poverty limit did not experience a higher prevalence of treatment delays. The prevalence of treatment delays was highest among women below age 40 and those who had no history of breast cancer. There was a higher prevalence of treatment delays experienced by women receiving a final diagnosis of invasive breast cancer and/or have a stage II tumor.

Crude Odds Ratio

To estimate those at greatest risk for experiencing screening to diagnosis (see table 3) and diagnosis to treatment delays (see table 4), odds ratios were calculated within each category for both variables. Race did affect the likelihood of diagnosis delays, women falling into the other category were 128% more likely to experience a diagnosis delay than White women (OR=2.28 [1.11, 4.67]).

Women living alone experienced a 49% increase in the odds of a diagnosis delay than those living with others (OR=1.49 [1.10, 3.02]). Women receiving a final diagnosis of either invasive breast cancer (OR=0.37 [0.25, 0.54]) or LCIS (OR=0.24 [0.08, 0.77]) experienced significantly less diagnosis delays than women receiving a DCIS final diagnosis. Women with tumors at stage III (OR=0.39 [0.22, 0.67]) and stage IV (OR=0.28 [0.12, 0.62]) also had decreased odds of experiencing diagnosis delays.

Breast Cancer diagnosis to treatment delays were less likely to be experienced by both women in the other category of race when compared to White women (OR=0.29 [0.11, 0.79]) and women of Hispanic origin when compared to Non-Hispanic origin (OR=0.21 [0.05, 0.81]). As compared to the women treated in the Northern Virginia region, women from all other regions, including the Northwestern (OR=3.77 [1.42, 10.00]), Southwestern (OR=2.95 [1.15, 7.55]), Central (OR=3.85 [1.33, 11.14]), and Eastern (OR= 2.78[1.09, 7.08]) regions had an increased odds of experiencing treatment delays of greater than 30 days.

Adjusted Odds Ratio

The adjusted odds ratios for diagnosis delays can be found in table 5 and those for treatment delays can be found in table 6. The adjusted odds ratios were calculated to account for all the stratifications presented in the data set. When accounting for region, race, ethnicity, age, income, household occupancy,

final diagnosis, and treatment delays, there was one statistically significant disparity in diagnosis timing. Women of other races than White and Black who sought out screening through Every Woman's Life were more likely to experience diagnosis delays (Adjusted OR=2.52 [1.03, 6.17]). However, a diagnosis of either invasive breast cancer (Adjusted OR=0.40 [0.27, 0.59]) or LCIS (Adjusted OR=0.24 [0.07, 0.81]) were protective against diagnosis delays. However, there were no statistically significant treatment delays in the adjusted model.

Discussion & Conclusion

The purpose of this study was to determine if screening, diagnosis, and treatment of breast cancer, within the Virginia Department of Health program, Every Woman's Life, differs based on sociodemographic characteristics and/ or regional location. The findings of this study will help improve the delivery of the program Every Woman's Life. Now that certain risk factors are known for those diagnosis and treatment delays, the provider locations can target and improve delivery across all of the EWL patients.

In preliminary analyses, it was found that EWL successfully met CDC's 60 day diagnosis and treatment standard. Over 75% of all women who had abnormal screening results received a diagnosis within 60 days and over 80% of all women who received a diagnosis also received timely treatment. No detectable disparities existed using the 60 day cutoff within Every Woman's Life. Women were just as likely to receive a timely diagnosis and timely treatment regardless of sociodemographic characteristics, and geographic location.

In order to determine if any improvements could be made within the Every Woman's Life program, the analysis was changed to reflect a shorter "acceptable" interval between screening and diagnosis, and diagnosis and treatment. A few disparities were found when this analysis was performed. In the crude analyses it was found that women in the other race category were more likely than white women to experience diagnosis delays of greater than thirty days and women living alone were more likely to experience diagnosis

delays than women living with others. Also, women from northwestern Virginia, southwestern Virginia, and central Virginia were more likely than women from northern Virginia to experience treatment delays of greater than thirty days. This might be an indicator that EWL providers in northern Virginia have found a more effective, efficient, and timely way to deliver the program. Although the other regions are delivering the program effectively within the acceptable 60 day time limit, they might be able to learn from northern Virginia's success. In the adjusted model only women in the other race category experienced statistically significant diagnosis delays and there were no statistically significant treatment delays within the EWL program.

The findings of this study indicate that the only significant indicator of disparity within the Every Women's Life program is race. Although, African-American women were just as likely to receive timely diagnosis and treatment as white women in the program, it was the combined groups of Asian, American Indian, and other women that were more likely to experience diagnosis, but not treatment, delays. Previous studies have identified known indicators of disparities within cancer care as socioeconomic status, race, ethnicity, age, and social support^{6,7,11-19}; however, this study uses a unique sample of women. All the women included in this study were targeted because of their inability to afford breast cancer screening. Therefore, this selection bias influenced the outcome of the study because the women included might not represent their entire demographic. The fact that no other significant indicators of disparities were

found within EWL indicates a success of the program, as EWL is targeting those women that would have otherwise been missed by the system.

This retrospective cohort provides a unique look at several steps in the cancer care continuum, including breast cancer diagnosis, and treatment initiation. However, there were some limitations. First, women below age 40 were not eligible for EWL until 2006, so the data might look different if they had been included from the start. Second, the results of this study might be subject to differential surveillance bias. Because women younger than 40 must be symptomatic to receive the services offered by Every Woman's Life, they are less likely to be referred to the program and diagnosed at an early stage. Finally, the program is targeted to a very specific population within Virginians and therefore might not be generalizable to other states or other programs.

Greater statistical power and more generalizable results could come from an analysis of data from the entire country. Since Virginia's Every Woman's Life is only one of 63 programs nationwide that delivers this service with the aid of the Centers for Disease Control and Prevention, perhaps it would be possible to conduct a national evaluation. Another possible improvement would be to increase statewide awareness of the program so that more people could benefit from its services. If this were possible, the women reached by this program might start to more accurately reflect the state demographics, and findings could be more universally applicable. Every Women's Life is successfully helping women participating in the program receive both timely diagnosis of breast

cancer and treatment regardless sociodemographic characteristics. If they were to try and improve the program, they could make sure that the women in the other race category are diagnosed just as fast as white and African-American women. Also, the other regions of the state could learn from Northern Virginia's quick treatment timelines and deliver treatment quicker to their patients as well.

In order to eliminate health disparities, especially those experienced during cancer care such as screening access, diagnosis delays, and treatment delays, the approach must be broad. The entire public health perspective has to be addressed, and all determinants of health, such as: access, human behavior, environment, and genetics, need to be taken into account^{23,24}. This includes not only behaviors and access to care, but also, the physical and social environments, school age exposure to physical education, and restricting toxic substance exposure.

Tables

Table 1. Screening to Diagnosis & Diagnosis to Treatment Delays

Variable	Total		sx - dx		dx - tx	
	(N)	%	delay %	no delay %	delay %	no delay %
Region						
Northwestern	113	16.0	13.4	17.8	18.7	14.8
Northern	38	5.4	6.5	4.7	1.9	7.0
Southwestern	224	31.8	31.2	32.4	31.3	32.0
Central	51	7.2	7.6	7.0	8.4	6.8
Eastern	260	36.9	40.6	34.0	35.0	37.5
unknown	19	2.7	0.7	4.0	4.7	1.9
Race						
White	404	57.3	54.3	59.6	59.3	56.5
Black	256	36.3	37.0	35.4	38.3	35.5
Asian	19	2.7	4.0	1.9	1.9	2.9
American Indian	3	0.4	0.7	0.2	0.0	0.6
Other	11	1.6	2.2	1.2	0.0	2.3
Unknown	12	1.7	1.8	1.6	0.5	2.3
Ethnicity						
Hispanic origin	20	2.8	3.6	2.3	0.5	3.9
Non-Hispanic origin	672	95.3	94.9	95.5	97.7	94.2
Unknown	13	1.8	1.4	2.1	1.9	1.9
Household Income						
less than \$1,000	96	13.6	15.2	12.7	14.5	13.2
\$1,000 to \$5,000	48	6.8	8.3	5.9	4.2	8.0
\$5,000 to \$20,000	462	65.5	65.6	65.3	66.8	65.2
more than \$20,000	91	12.9	10.9	14.3	14.0	12.2
unknown	8	1.1	0.0	1.9	0.5	1.4
Household Occupancy						
Living Alone	326	46.2	52.5	42.0	48.6	45.6
Living with Others	378	53.6	47.5	57.7	51.4	54.2
unknown	1	0.1	0.0	0.2	0.0	0.2
Federal Poverty Level						
100% Federal Poverty	397	56.3	57.6	55.2	53.7	57.7
> 100% Federal Poverty	307	43.5	42.4	44.6	46.3	42.1

unknown	1	0.1	0.0	0.2	0.0	0.2
Breast Cancer History						
No History	676	95.9	94.9	96.5	96.7	95.5
Prior Diagnosis	29	4.1	5.1	3.5	3.3	4.5
Final Diagnosis						
DCIS - Stage 0	138	19.6	29.3	13.4	19.2	19.8
Invasive Breast Cancer	551	78.2	69.2	83.8	79.4	77.5
LCIS - Stage 0	16	2.3	1.4	2.8	1.4	2.7
Age						
Women below age 40	19	2.7	1.4	3.5	3.3	2.5
Women Ages 40-50	224	31.8	29.0	33.8	32.7	31.1
Women over Age 50	462	65.5	69.6	62.7	64.0	66.4
Screening to Diagnosis Interval						
< 30 Days	426	60.4	0.0	100.0	59.8	60.8
> 30 days	276	39.1	100.0	0.0	39.3	39.0
Unknown	3	0.4	0.0	0.0	0.9	0.2
Diagnosis to Treatment Interval						
< 30 Days	485	68.8	68.5	69.2	0.0	100.0
> 30 days	214	30.4	30.4	30.0	100.0	0.0
unknown	6	0.9	1.1	0.7	0.0	0.0
Tumor Stage						
AJCC Stage I	127	18.0	21.0	16.0	14.5	19.8
AJCC Stage II	226	32.1	31.2	32.9	36.9	30.1
AJCC Stage III	115	16.3	10.1	20.2	15.9	16.5
AJCC Stage IV	45	6.4	2.9	8.7	6.5	6.4
Summary Distant	4	0.6	0.0	0.9	0.5	0.6
Summary Local	1	0.1	0.4	0.0	0.0	0.2
Summary Regional	4	0.6	0.4	0.7	0.5	0.6
Unknown	12	1.7	1.8	1.4	2.3	0.8
Unstaged	14	2.0	1.4	2.3	2.3	1.9
Missing	157	22.3	30.8	16.9	20.6	23.1

Table 2. Prevalence of screening to diagnosis & diagnosis to treatment delays

Variable	Total (N)	s-d delay (N)	Prev (%)	95%CI		d-t delay (N)	Prev (%)	95%CI	
Region									
Northwestern	113	37	32.7	24.09	41.40	40	35.4	26.58	44.22
Northern	38	18	47.4	31.49	63.24	4	10.5	0.77	20.28
Southwestern	224	86	38.4	32.02	44.76	67	29.9	23.91	35.91
Central	51	21	41.2	27.67	54.68	18	35.3	22.18	48.41
Eastern	260	112	43.1	37.06	49.10	75	28.8	23.34	34.35
Race									
White	404	150	37.1	32.42	41.84	127	31.4	26.91	35.96
Black	256	102	39.8	33.85	45.84	82	32.0	26.32	37.75
Asian	19	11	57.9	35.69	80.10	4	21.1	2.72	39.38
American Indian	3	2	66.7	13.32	120.01	0	0.0	0.00	0.00
Other	11	6	54.5	25.12	83.97	0	0.0	0.00	0.00
Ethnicity									
Hispanic origin	20	10	50.0	28.09	71.91	1	5.0	-4.55	14.55
Non-Hispanic origin	672	262	39.0	35.30	42.68	209	31.1	27.60	34.60
Household Income									
less than \$1,000	96	42	43.8	33.83	53.67	31	32.3	22.94	41.65
\$1,000 to \$5,000	48	23	47.9	33.78	62.05	9	18.8	7.71	29.79
\$5,000 to \$20,000	462	181	39.2	34.73	43.63	143	31.0	26.74	35.17
more than \$20,000	91	30	33.0	23.31	42.63	30	33.0	23.31	42.63
Household Occupancy									
Living Alone	326	145	44.5	39.08	49.87	104	31.9	26.84	36.96
Living with Others	378	131	34.7	29.86	39.45	110	29.1	24.52	33.68
Federal Poverty Level									
100% Federal Poverty	397	159	40.1	35.23	44.87	115	29.0	24.51	33.43
> 100% Federal Poverty	307	117	38.1	32.68	43.54	99	32.2	27.02	37.48
Breast Cancer History									
No History	676	262	38.8	35.08	42.43	207	30.6	27.15	34.10
Prior Diagnosis	29	14	48.3	30.09	66.46	7	24.1	8.56	39.71
Final Diagnosis									
DCIS - Stage 0	138	81	58.7	50.48	66.91	41	29.7	22.09	37.33
Invasive Breast Cancer	551	191	34.7	30.69	38.64	170	30.9	27.00	34.71
LCIS - Stage 0	16	4	25.0	3.78	46.22	3	18.8	-0.38	37.88

Age

Women below age 40	19	4	21.1	2.72	39.38	7	36.8	15.15	58.53
Women Ages 40-50	224	80	35.7	29.44	41.99	70	31.3	25.18	37.32
Women above Age 50	462	192	41.6	37.06	46.05	137	29.7	25.49	33.82

Screening to Diagnosis Interval

< 30 Days	426	0	0.0	0.00	0.00	128	30.0	25.69	34.40
> 30 days	276	276	100.0	100.00	100.00	84	30.4	25.01	35.86

Diagnosis to Treatment Interval

< 30 Days	485	189	39.0	34.63	43.31	0	0.0	0.00	0.00
> 30 days	214	84	39.3	32.71	45.79	214	100.0	100.00	100.00

Tumor Stage

AJCC Stage I	127	58	45.7	37.01	54.33	31	24.4	16.94	31.88
AJCC Stage II	226	86	38.1	31.72	44.38	79	35.0	28.74	41.17
AJCC Stage III	115	28	24.3	16.50	32.19	34	29.6	21.22	37.91
AJCC Stage IV	45	8	17.8	6.61	28.95	14	31.1	17.58	44.64
Summary Distant	4	0	0.0	0.00	0.00	1	25.0	-17.44	67.44
Summary Local	1	1	100.0	100.00	100.00	0	0.0	0.00	0.00
Summary Regional	4	1	25.0	-17.44	67.44	1	25.0	-17.44	67.44
Unstaged	14	4	28.6	4.91	52.24	5	35.7	10.61	60.81

Table 3. Breast Cancer Screening to Diagnosis Delays Odds Ratios

Variable	s-d delay %	Total (N)	POR	95%CI	
Region					
Northwestern	32.7	113	1.00		
Northern	47.4	38	1.83	0.87	3.86
Southwestern	38.4	224	1.27	0.79	2.04
Central	41.2	51	1.43	0.72	2.82
Eastern	43.1	260	1.50	0.95	2.38
Race					
White	37.1	404	1.00		
Black	39.8	256	1.09	0.79	1.50
Other	57.6	33	2.28	1.11	4.67
Ethnicity					
Hispanic origin	50.0	20	1.57	0.65	3.83
Non-Hispanic origin	39.0	672	1.00		
Household Income					
less than \$1,000	43.8	96	1.57	0.87	2.84
\$1,000 to \$5,000	47.9	48	1.85	0.91	3.78
\$5,000 to \$20,000	39.2	462	1.28	0.80	2.06
more than \$20,000	33.0	91	1.00		
Household Occupancy					
Living Alone	44.5	326	1.49	1.10	3.02
Living with Others	34.7	378	1.00		
Federal Poverty Level					
100% Federal Poverty	40.1	397	1.06	0.78	1.44
> 100% Federal Poverty	38.1	307	1.00		
Breast Cancer History					
No History	38.8	676	1.00		
Prior Diagnosis	48.3	29	1.48	0.71	3.12
Final Diagnosis					
DCIS - Stage 0	58.7	138	1.00		
Invasive Breast Cancer	34.7	551	0.37	0.25	0.54
LCIS - Stage 0	25.0	16	0.24	0.08	0.77
Age					
Women below age 40	21.1	19	0.50	0.16	1.50
Women Ages 40-50	35.7	224	1.00		
Women above Age 50	41.6	462	1.26	0.90	1.74

Diagnosis to Treatment Interval					
< 30 Days	39.0	485	1.00		
> 30 days	39.3	214	0.99	0.72	1.38
Tumor Stage					
AJCC Stage I	45.7	127	1.00		
AJCC Stage II	38.1	226	0.75	0.48	1.16
AJCC Stage III	24.3	115	0.39	0.22	0.67
AJCC Stage IV	17.8	45	0.28	0.12	0.62
Summary Distant	0.0	4	0.06	0.00	1.81
Summary Local	100.0	1	>999.99	<0.01	>999.99
Summary Regional	25.0	4	0.41	0.04	3.92
Unstaged	28.6	14	0.49	0.15	1.63

Table 4. Breast Cancer Diagnosis to Treatment Delays Odds Ratios

Variable	d-t delay %	Total (N)	POR	95%CI	
Region					
Northwestern	35.4	113	3.77	1.42	10.00
Northern	10.5	38	1.00		
Southwestern	29.9	224	2.95	1.15	7.55
Central	35.3	51	3.85	1.33	11.14
Eastern	28.8	260	2.78	1.09	7.08
Race					
White	31.4	404	1.00		
Black	32.0	256	1.03	0.74	1.43
Other	12.5	32	0.29	0.11	0.79
Ethnicity					
Hispanic origin	5.0	20	0.21	0.05	0.81
Non-Hispanic origin	31.1	672	1.00		
Household Income					
less than \$1,000	32.3	96	1.01	0.55	1.85
\$1,000 to \$5,000	18.8	48	0.53	0.23	1.20
\$5,000 to \$20,000	31.0	462	0.96	0.59	1.55
more than \$20,000	33.0	91	1.00		
Household Occupancy					
Living Alone	31.9	326	1.18	0.85	1.62
Living with Others	29.1	378	1.00		
Federal Poverty Level					
100% Federal Poverty	29.0	397	0.88	0.64	1.22
> 100% Federal Poverty	32.2	307	1.00		
Breast Cancer History					
No History	30.6	676	1.00		
Prior Diagnosis	24.1	29	0.76	0.33	1.76
Final Diagnosis					
DCIS - Stage 0	29.7	138	1.00		
Invasive Breast Cancer	30.9	551	1.05	0.70	1.57
LCIS - Stage 0	18.8	16	0.59	0.17	2.04
Age					
Women below age 40	36.8	19	1.33	0.51	3.49
Women Ages 40-50	31.3	224	1.00		
Women above Age 50	29.7	462	0.95	0.67	1.34

Diagnosis to Treatment Interval					
< 30 Days	30.0	426	1.00		
> 30 days	30.4	276	1.01	0.73	1.39
Tumor Stage					
AJCC Stage I	24.4	127	1.00		
AJCC Stage II	35.0	226	1.60	0.99	2.58
AJCC Stage III	29.6	115	1.24	0.71	2.17
AJCC Stage IV	31.1	45	1.37	0.66	2.86
Summary Distant	25.0	4	1.03	0.11	9.66
Summary Local	0.0	1	0.19	<0.001	80.76
Summary Regional	25.0	4	1.03	0.11	9.66
Unstaged	35.7	14	1.67	0.53	5.30

Table 5. Adjusted Odds Ratio of Screening to Diagnosis Delays

Variable	Total (N)	s-d delay %	Adjusted		
			POR	95%CI	
Region					
Northwestern	37	32.7	1.00		
Northern	18	47.4	1.19	0.47	3.02
Southwestern	86	38.4	1.45	0.88	2.39
Central	21	41.2	1.58	0.75	3.30
Eastern	112	43.1	1.62	0.97	2.73
Race					
White	150	37.1	1.00		
Black	102	39.8	0.92	0.63	1.36
Other	19	57.6	2.52	1.03	6.17
Ethnicity					
Hispanic origin	10	50.0	1.36	0.44	4.19
Non-Hispanic origin	262	39.0	1.00		
Household Income					
less than \$1,000	42	43.8	1.01	0.49	2.08
\$1,000 to \$5,000	23	47.9	1.08	0.47	2.47
\$5,000 to \$20,000	181	39.2	0.92	0.53	1.60
more than \$20,000	30	33.0	1.00		
Household Occupancy					
Living Alone	145	44.5	1.35	0.93	1.97
Living with Others	131	34.7	1.00		
Final Diagnosis					
DCIS - Stage 0	81	58.7	1.00		
Invasive Breast Cancer	191	34.7	0.40	0.27	0.59
LCIS - Stage 0	4	25.0	0.24	0.07	0.81
Age					
Women below age 40	4	21.1	0.30	0.08	1.14
Women Ages 40-50	80	35.7	1.00		
Women above Age 50	192	41.6	1.34	0.94	1.92
Diagnosis to Treatment Interval					
< 30 Days	189	39.0	1.00		
> 30 days	84	39.3	1.11	0.78	1.58

Table 6. Adjusted Odds Ratio of Diagnosis to Treatment Delays

Variable	Total (N)	d-t delay %	Adjusted		
			POR	95%CI	
Region					
Northwestern	40	35.4	3.07	0.87	10.88
Northern	4	10.5	1.00		
Southwestern	67	29.9	2.39	0.69	8.33
Central	18	35.3	2.97	0.78	11.25
Eastern	75	28.8	2.08	0.60	7.18
Race					
White	127	31.4	1.00		
Black	82	32.0	1.03	0.69	1.55
Other	4	12.5	0.52	0.15	1.79
Ethnicity					
Hispanic origin	1	5.0	0.23	0.03	1.97
Non-Hispanic origin	209	31.1	1.00		
Household Income					
less than \$1,000	31	32.3	0.94	0.45	1.97
\$1,000 to \$5,000	9	18.8	0.43	0.17	1.09
\$5,000 to \$20,000	143	31.0	0.89	0.51	1.56
more than \$20,000	30	33.0	1.00		
Household Occupancy					
Living Alone	104	31.9	1.39	0.94	2.07
Living with Others	110	29.1	1.00		
Final Diagnosis					
DCIS - Stage 0	41	29.7	1.00		
Invasive Breast Cancer	170	30.9	0.93	0.60	1.43
LCIS - Stage 0	3	18.8	0.52	0.14	1.98
Age					
Women below age 40	7	36.8	2.28	0.76	6.82
Women Ages 40-50	70	31.3	1.00		
Women above Age 50	137	29.7	0.91	0.62	1.33
Diagnosis to Treatment Interval					
< 30 Days	128	30.0	1.00		
> 30 days	84	30.4	1.10	0.77	1.57

Works Cited

1. Williams DR. Racial/ethnic variations in women's health: the social embeddedness of health. *American Journal of Public Health*. 2002; 92(4):588-597.
2. Jemal A, Murray T, Ward E, et al. Cancer Statistics. *CA Cancer J Clin*. 2005; 55:10-30.
3. American Cancer Society. Cancer Facts and Figures 2008. Atlanta: American Cancer Society; 2008.
4. Zapka JG, Taplin SH, Solberg LI, Manos MM. A framework for improving the quality of cancer care: the case of breast cancer and cervical cancer screening. *Cancer Epidemiology*. 2003; 12:4-13.
5. Albert RH, Clark MM. Cancer screening in the older patient. *Am Fam Physician*. 2008; 78(12): 1369-74.
6. Kim J, Jang SN. Socioeconomic disparities in breast cancer screening among US women: trends from 2000 to 2005. *J Prev Med Public Health*. 2008; 41(3):186-194.
7. Byers TE, Wolf HJ, Bauer KR, et al. The impact of socioeconomic status on survival after cancer in the United States. *American Cancer Society*. 2007; Available at: www.interscience.wiley.com. Accessed September 2, 2008.
8. Jacobs LK, Kelley KA, Rosson GD, Detrani ME, Chang DC. Disparities in urban and rural mastectomy populations. *Annals of Surgical Oncology*. 2008.
9. Lund MJ, Butler EN, Bumpers HL, et al. High prevalence of triple-negative tumors in an urban cancer center. *American Cancer Society*. 2007; Available at: www.interscience.wiley.com. Accessed September 2, 2008.
10. Mobley LR, Kuo TM, Driscoll D, Clayton L, Anselin L. Heterogeneity in mammography use across the nation: separating evidence of disparities from the disproportionate effects of geography. *Int J of Health Geographics*. 2008; 7:132-150.
11. Levine RS, Kilbourne BE, Baltrus PA, et al. Black-white disparities in elderly breast cancer mortality before and after implementation of medicare benefits for screening mammography. *Journal of Healthcare for the Poor and Underserved*. 2008; 19: 103-134.
12. Brawley OW. Disaggregating the effects of race and poverty on breast cancer outcomes. *J Natl Cancer Inst*. 2002; 94(7):471-473.
13. Baquet CR, Mishra SI, Commiskey P, Ellison GL, DeShields M. Breast cancer epidemiology in blacks and whites: disparities in incidence, mortality, survival rates and histology. *Journal of the National Medical Association*. 2008; 100(5):480-488.
14. Jemal A, Clegg LX, Ward E, et al. Annual report to the nation on the status of cancer, 1975-2001, with a special feature regarding survival. *Cancer*. 2004; 101(1): 3-27.

15. Curtis E, Quale C, Haggstrom D, Smith-Bindman R. Racial and ethnic differences in breast cancer survival. *American Cancer Society*. 2007; Available at: www.interscience.wiley.com. Accessed September 2, 2008.
16. Peek ME, Sayad JV, Markwardt R. Fear, fatalism and breast cancer screening in low-income African-American women: the role of clinicians and the health care system. *J Gen Intern Med*. 2008; accepted July 2008.
17. Crawley LM, Ahn DK, Winkleby MA. Perceived medical discrimination and cancer screening behaviors of racial and ethnic minority adults. *Cancer Epidemiol Biomarkers Prev*. 2008; 17(8): 1937-1944.
18. Aziz NM, Rowland JH. Cancer Survivorship Research Among Ethnic Minority and Medically Underserved Groups. *Oncology Nursing Forum*. 2002; 29(5):789-801.
19. Bigby JA, Holmes MD. Disparities across the breast cancer continuum. *Cancer Causes and Control*. 2005; 16:35-44.
20. Breast and Cervical Cancer Mortality Prevention Act of 1990. Available at: <http://www.cdc.gov/cancer/NBCCEDP/legislation/law.htm>. Accessed February 20, 2009.
21. VBCCEDP: Who is eligible for services? Available at: <http://www.vahealth.org/breastcancer/service.htm>. Accessed October 30, 2008.
22. Virginia Breast and Cervical Cancer Early Detection Program. Available at: <http://www.vahealth.org/breastcancer/>. Accessed October 30, 2008.
23. Satcher DS, Higginbotham EJ. The public health approach to eliminating disparities in health. *American Journal of Public Health* 2008; 98:400-403.
24. Du XL, Fang S, Meyer TE. Impact of treatment and socioeconomic status on racial disparities in survival among older women with breast cancer. *Am J Clin Oncol*. 2008; 31:125-132.