Published in final edited form as:

Breast Cancer Res Treat. 2016 May ; 157(1): 193–200. doi:10.1007/s10549-016-3803-2.

Racial differences in receipt of adjuvant hormonal therapy among Medicaid enrollees in South Carolina diagnosed with breast cancer

Tisha M. Felder, PhD, MSW^{1,2}, D. Phuong Do, PhD³, Z. Kevin Lu, PhD⁴, Lincy S. Lal, PhD⁵, Sue P. Heiney, PhD, RN, FAAN⁶, and Charles L. Bennett, MD, PhD, MPP^{7,8,9,10}

¹Assistant Professor, College of Nursing, University of South Carolina, 1601 Greene Street, Room 620, Columbia, South Carolina 29208

²Core Faculty, Cancer Prevention and Control Program, Arnold School of Public Health, University of South Carolina, 915 Greene Street, Suite 200, Columbia, South Carolina 29208

³Associate Professor, Public Health Policy and Administration, Zilber School of Public Health, University of Wisconsin-Milwaukee, 1240 N. 10th Street, Milwaukee, Wisconsin 53201

⁴Assistant Professor, Clinical Pharmacy and Outcomes Sciences, South Carolina College of Pharmacy, University of South Carolina, 715 Sumter Street, Columbia, South Carolina 29208

⁵Instructor, Management, Policy & Community Health, University of Texas School of Public Health, University of Texas Health Science Center, 1200 Herman Pressler Drive, Houston, Texas 77030

⁶Research Professor, College of Nursing, University of South Carolina, 1601 Greene Street, Room 617, Columbia, South Carolina 29208

⁷Endowed Chair, SmartState Center for Medication Safety and Efficacy, University of South Carolina, 715 Sumter Street Columbia South Carolina 29208

⁸Professor, Clinical Pharmacy and Outcomes Sciences, South Carolina College of Pharmacy, University of South Carolina, 715 Sumter Street, Columbia, South Carolina 29208

⁹Hollings Cancer Center, Medical University of South Carolina, 86 Jonathan Lucas Street, Charleston, South Carolina 29425

¹⁰Arnold School of Public Health, University of South Carolina, 921 Assembly St, Columbia, South Carolina 29201

Abstract

Purpose—Several factors contribute to the pervasive Black-White disparity in breast cancer mortality in the U.S., such as tumor biology, access to care and treatments received including

Corresponding author: Tisha M. Felder, PhD, MSW, College of Nursing; and Cancer Prevention and Control Program, Arnold School of Public Health, University of South Carolina, 1601 Greene Street, Room 620, Columbia, SC 29208, Phone: 803-777-9830, Fax: 803-777-0550, feldert@mailbox.sc.edu.

Conflict of Interest: Dr. Lal received compensation and owns stock in Cardinal Health. All other authors declare that they have no conflicts of interest.

adjuvant hormonal therapy (AHT), which significantly improves survival for hormone-receptor positive breast cancers (HR+). We analyzed South Carolina Central Cancer Registry-Medicaid linked data to determine if, in an equal access health care system, racial differences in the receipt of AHT exist.

Methods—We evaluated 494 study-eligible, Black (n=255) and White women (n=269) who were under 65 years old and diagnosed with stages I–III, HR+ breast cancers between 2004 and 2007. Bivariate and multivariate analyses were conducted to assess receipt of 1 AHT prescriptions at any point in time following (ever-use) or within 12 months of (early-use) breast cancer diagnosis.

Results—Seventy-two percent of the participants were ever-users (70% Black, 74% White) and 68% were early-users (65% Black, 71% White) of AHT. Neither ever-use (adjusted OR (AOR)=0.75, 95% CI: 0.48–1.17) nor early-use (AOR=0.70, 95% CI: 0.46–1.06) of AHT differed by race. However, receipt of other breast cancer-specific treatments was independently associated with ever-use and early-use of AHT [ever-use: receipt of surgery (AOR= 2.15, 95% CI: 1.35–3.44); chemotherapy (AOR=1.97, 95% CI: 1.22–3.20); radiation (AOR=2.33, 95% CI: 1.50–3.63); early-use: receipt of surgery (AOR=2.03, 95% CI: 1.30–3.17); chemotherapy (AOR=1.90, 95% CI: 1.20–3.03); radiation (AOR=1.73, 95% CI: 1.14–2.63)].

Conclusions—No racial variations in use of AHT among women with HR+ breast cancers insured by Medicaid in South Carolina were identified, but overall rates of AHT use by these women is low. Strategies to improve overall use of AHT should include targeting breast cancer patients who do not receive adjuvant chemotherapy and/or radiation.

Keywords

Breast neoplasms; Medicaid; healthcare disparities; antineoplastic agents; hormonal; Practice guidelines

Introduction

While breast cancer survival rates have improved over time, the disparities in mortality rates between Black and White women with breast cancer have widened [1]. Black women are 41% more likely to die from breast cancer than White women, even though Black women are less likely to be diagnosed with the disease [2]. Compared to White women in South Carolina (SC), Black women's death rate from breast cancer is more than 60% higher [3]. Their risk of breast cancer death further increases if they are from socioeconomically disadvantaged (e.g., Medicaid-eligible) backgrounds [4].

A prior study of low-income women in a government-funded screening program in SC reported that Black and White women with newly diagnosed breast cancers presented at similar stages, but Black women were significantly more likely to be diagnosed with tumors of poor-prognosis phenotype [5]. While these findings suggest that biologic differences might account for the racial disparity in breast cancer mortality in SC, another key factor—differential use of treatments, such as adjuvant hormonal therapy (AHT) [6]—could be contributing to this racial divide.

Worldwide, the use of AHT has led to a significant reduction in breast cancer mortality for women with early stage, hormone-receptor positive breast cancers (HR+) [7]. Following the receipt of breast cancer surgery (lumpectomy or mastectomy), oncologists often recommend women with HR+, early stage breast cancers to receive a combination of adjuvant therapies, including chemotherapy, radiation and AHT. For AHT, clinical guidelines recommend tamoxifen, and/or aromatase inhibitor (AI) be taken daily for 5–10 years depending on menopausal status [8, 9]. As a measure of quality breast cancer care, guidelines further suggest that clinically-eligible women initiate AHT within 12 months of diagnosis [10]. This analysis investigates racial differences in the use of AHT among low-income women diagnosed with HR+ breast cancer who have equal access to medical and pharmaceutical care through SC Medicaid.

Materials and Methods

Data Sources

This study was approved by the Institutional Review Board of the University of South Carolina and SC Department of Health and Environmental Control. Data from the population-based, SC Central Cancer Registry (SCCCR) were used to identify all primary cases of breast cancers from 2004–2007 and linked to Medicaid enrollment/claims. The SCCCR has received either gold or silver certification for the completeness, accuracy and timeliness of its data since 1997. The SCCCR provided socio-demographic (e.g., race, marital status, age, county of residence) and cancer-specific information (e.g., stage, tumor grade, hormone receptor status) at the time of primary breast cancer diagnosis. Medicaid offered monthly records of all linked cancer beneficiaries' "fee-for-service" medical, hospital and pharmacy claims from 2003 to 2008. Medicaid files contained beneficiaries' diagnosis and procedure field codes by the International Classification of Disease, ninth Revision (ICD-9), and Current Procedural Terminology (CPT)/Healthcare Common Procedure Coding System (HCPCS) schema. Urban influence codes classifying patient county residence based on county population size, level of urbanization and access to larger communities were obtained from a publicly available data file from the U.S. Department of Agriculture [11].

Study eligibility

Figure 1 summarizes our study inclusion criteria. Women age 65 or older at diagnosis were excluded (n=220) because the administration of pharmacy benefits for Medicaid-Medicare "dual-eligibles" would have transferred from SC Medicaid to Medicare Part D in 2006 which overlapped our study period. Races other than Black or White were also excluded (n=10). The final analytic sample was n=494.

Study outcomes

We examined whether patients received AHT at any point in time following diagnosis (ever-use), as defined by those who had at one or more Medicaid pharmacy claims for any AHT agent during our study period. We also examined whether patients received AHT within 12 months of diagnosis (early-use) defined as having an initial Medicaid pharmacy claim for any type of AHT agent within 12 months of their breast cancer diagnosis. AHT was defined

as an AI or tamoxifen, as ascertained by generic drug name and therapeutic drug code in the Medicaid pharmacy files.

Independent variables

Our key variable of interest was race (Black vs. White). Other socio-demographics were marital status (married vs. not married), age (<45, 45–54, 55–64 years old), rurality of county of residence (small/large metropolitan, micropolitan, noncore/nonmetropolitan) and Medicaid eligibility status (disabled vs. not disabled). Cancer-specific clinical characteristics included year of diagnosis, stage, tumor grade and HR status. We categorized stages 1 and 2 as local, and stages 3, 4 or 5 as regional stage using the Surveillance Epidemiology and End Results summary stages [12]. We categorized tumor stage as I, II and III–IV or unknown/unavailable. Hormone receptor positive status consists of three potential classifications for estrogen (ER+ or ER–) and progesterone receptors (PR+ or PR–): ER+/PR+, ER+/PR–, ER–/PR+. Given the distribution of hormone status in our population, we dichotomized HR status: ER+/PR+ (77%) versus other combinations (ER+/PR– (19%), ER–/PR+ (4%)). We used ICD-9 and CPT/HCPCS codes within the Medicaid claims to identify additional breast cancer treatment specific factors: receipt (yes vs. no) of breast cancer surgery (lumpectomy or mastectomy), chemotherapy and radiation. We also used ICD-9 grouping methods to construct the Deyo-adapted Charlson comorbidity scores [13] (Procedural codes used in this study are available from the first author by request).

Data Analysis

We conducted descriptive statistics and bivariate analyses to estimate the association between ever-use and early-use to the independent variables. We then constructed two separate multivariate regression models to examine each of the outcomes in relation to race and other clinical and socio-demographic variables.

Results

A total of 225 (46%) Black and 269 (54%) White women were eligible for the study (Table 1). Most women were diagnosed with ER+/PR+ tumors (77%) and generally received some form of surgery (60%), chemotherapy (52%) or radiation (54%). Descriptive statistics by race indicated that Blacks versus Whites, were more likely to be diagnosed with grade III–IV or unknown tumors (58% vs 32%, $p<0.001$) and receive chemotherapy (62% vs 51%, $p=0.016$). Seventy-two percent of women were ever-users (70% Black, 74% White, $p=0.346$) and 68% were early-users (65% Black, 71% White, $p=0.146$) of AHT.

Ever-users

Table 2 presents model results for the receipt of AHT at any point in time following breast cancer diagnosis. In unadjusted models, no statistically significant difference was found between Blacks and Whites (OR= 0.83, 95% CI: 0.56–1.23). Women who received surgery (OR=2.79, 95% CI: 1.87–4.18), chemotherapy (OR=2.63, 95% CI: 1.76–3.93) or radiation (OR=2.98, 95% CI: 1.98–4.49) were significantly more likely to ever-use AHT. In the multivariate model, diagnosis of ER+/PR+ breast cancers (vs. other, AOR=1.09, 95% CI: 1.09–3.00) receipt of surgery (AOR=2.15, 95% CI: 1.35–3.44) chemotherapy (AOR=1.97,

CI: 1.22–3.20) or radiation (AOR=2.33, 95% CI: 1.50–3.63) were each independently associated with approximately twice the odds of ever-use compared to their respective reference group.

Early-users

With respect to early-use (Table 2), unadjusted models indicated that there was no statistically significant association between race and early-use of AHT ($p=0.147$). However, the odds of early-use of AHT were significantly higher for women who received surgery (OR=2.50, 95% CI: 1.70–3.68) chemotherapy (OR=2.19, 95% CI: 1.49–3.22) or radiation (OR=2.23, 95% CI: 1.52–3.29). Women diagnosed after 2006 (vs 2004) were less likely to use AHT within 12 months of diagnosis (2006: OR= 0.37, 95% CI: 0.19–0.87; 2007: OR=0.45, 95% CI: 0.21–0.97). Being diagnosed in 2006 (vs. 2004, $p=0.016$) and treatment-specific factors (receipt of surgery, $p=0.002$; chemotherapy, $p=0.007$; and radiation, $p=0.010$) remained statistically significant predictors in the multivariate model.

Discussion

We found that among low-income women in South Carolina who were diagnosed with HR+, early-stage breast cancers and insured by Medicaid, rates of ever-use and use of AHT within guideline recommendations (early-use) were similar for Black and White women. This finding is consistent with previous studies of Medicaid-enrolled breast cancer survivors in New York [14] and North Carolina [15], which also did not identify significant differences in AHT use by race after controlling for other factors. Comparatively, within more heterogeneous samples with respect to race/ethnicity, health insurance and socioeconomic backgrounds, studies report lower use of AHT among African Americans [16, 17], women living in high poverty areas [18] and those insured by Medicaid or uninsured patients [17]. Hershman et al. (2015) recently found that the combination of Black race (vs. White) and low net worth significantly reduced the odds of adhering to AHT [19]. Results from our study and the aforementioned work of others suggest that socioeconomic factors are a driving force to the differences in the use of AHT between Blacks and Whites.

While we did not find racial differences in the use of AHT, we did observe that nearly one-third of women in our study had no pharmacy claims for AHT indicating that they either did not fill their prescription or were not prescribed AHT. This is particularly troubling given that AHT improves survival and is covered by SC Medicaid. Others have documented low use of AHT in Medicaid populations ranging from 50–58% within in the first year [14, 20], compared to 85% in a privately insured population [21] and 72–92% in clinical trials [22]. It is suggested that low use of AHT among racial/ethnic and low socioeconomic populations (e.g., Medicaid-enrollees) are due, in part, to variations in barriers experienced by these subgroups, such as in patient-centered communication and access to community resources [23].

Of note, we did find that women who received breast surgery, chemotherapy or radiation treatments were twice as likely to be ever- and early-users of AHT compared to their counterparts. Oncologists base recommendations for chemotherapy and/or radiation on the specific characteristics of the patient's breast cancer (e.g. stage, tumor size, lymph node

status, etc.). Patients who receive these additional treatments will have more interactions with cancer care providers, thus, providing more opportunities for them to receive their AHT prescription, obtain information about AHT, and discuss potential issues or concerns about their AHT with their oncology providers. Patients who receive adequate information about AHT and understand why they need it, are more likely to take their AHT as prescribed [24].

Our study has limitations. First, SCCCR-Medicaid data does not include information on patient or provider attitudes and beliefs that play an important role in AHT use [25, 26]. Second, because Medicaid claims are collected for administrative versus research purposes, administrative changes in the SC Medicaid program may have led to some misclassification of our outcome. For instance, the finding that early-use of AHT decreased after 2006 may be due, in part, to changes in SC Medicaid following implementation of the state's Medicaid Breast and Cervical Treatment Program in 2005. Third, these changes could also account for the low rates of surgery in our study. Wheeler et al. (2014) found a similar concern, in that 22% of the Medicaid-enrolled breast cancer patients in North Carolina had no claims for surgery [20]. An alternative explanation for our low rates of surgery could be that some patients receiving surgery prior to Medicaid enrollment. Given that patients enroll in Medicaid pre/post cancer diagnosis for various reasons (e.g., loss of private insurance), treatment information from Medicaid files may be incomplete [27]. Fourth, for women who had no Medicaid pharmacy claims for AHT, we are unable to determine if they were never prescribed or received AHT from support services, such as pharmaceutical assistance programs. For example, AIs accounted for nearly 40% of all agents received by financially indigent cancer patients enrolled in pharmaceutical assistance programs at a large cancer care hospital [29]. Finally, this study included only Medicaid enrollees from SC, so generalizability beyond this setting and time period cannot be assumed.

While we reassuringly did not find evidence of racial variations in AHT in our Medicaid population, it was not because rates of AHT use for Black and White women were similarly high, but rather that these rates were similarly low. Among Medicaid-enrollees diagnosed with HR+ breast cancers, particular attention should be placed on exploring reasons why they may not receive or fill prescriptions for AHT, as well as, improving overall use of AHT. Targeted strategies to improve use of AHT are also particularly needed for those women who do not receive other adjuvant treatments, such as chemotherapy or radiation.

Acknowledgments

I would like to thank Dr. James Hardin for his gracious guidance and assistance with the data management for this project.

Funding: At the time of study, Dr. Felder funded by a Postdoctoral Fellowship in Health Outcomes Award from the PhRMA Foundation (2011–2013). Dr. Felder is currently funded by a Mentored Research Scientist Development Award to Promote Diversity from the National Cancer Institute of the National Institutes of Health (K01CA193667). Dr. Bennett is supported by the SmartState Program of South Carolina and an unrestricted grant from Doris Levkoff Meddin to the Center for Medication Safety and Efficacy.

References

1. Hunt BR, Whitman S, Hurlbert MS. Increasing Black: White disparities in breast cancer mortality in the 50 largest cities in the United States. *Cancer epidemiology*. 2014

2. American Cancer Society. Cancer Facts & Figures 2015. Atlanta: American Cancer Society; 2015. Available from: <http://www.cancer.org/acs/groups/content/@editorial/documents/document/acspc-044552.pdf> [cited August 3, 2015]
3. Hébert JR, Daguise VG, Hurley DM, Wilkerson RC, Mosley CM, Adams SA, et al. Mapping cancer mortality-to-incidence ratios to illustrate racial and sex disparities in a high-risk population. *Cancer*. 2009; 115(11):2539–2552. [PubMed: 19296515]
4. Vona-Davis L, Rose DP. The influence of socioeconomic disparities on breast cancer tumor biology and prognosis: a review. *Journal of Women's Health*. 2009; 18(6):883–893.
5. Cunningham JE, Walters CA, Hill EG, Ford ME, Barker-Elamin T, Bennett CL. Mind the gap: Racial differences in breast cancer incidence and biologic phenotype, but not stage, among low-income women participating in a government-funded screening program. *Breast Cancer Res Treat*. 2013; 137(2):589. [PubMed: 23239148]
6. van Ravesteyn NT, Schechter CB, Near AM, Heijnsdijk EA, Stoto MA, Draisma G, et al. Race-specific impact of natural history, mammography screening, and adjuvant treatment on breast cancer mortality rates in the United States. *Cancer Epidemiology Biomarkers & Prevention*. 2011; 20(1): 112–122.
7. Early Breast Cancer Clinical Trialists' Collaborative Group. Effects of chemotherapy and hormonal therapy for early breast cancer on recurrence and 15-year survival: an overview of the randomised trials. *Lancet*. 2005; 365:1687–1717. [PubMed: 15894097]
8. Burstein HJ, Prestrud AA, Seidenfeld J, Anderson H, Buchholz TA, Davidson NE, et al. American Society of Clinical Oncology clinical practice guideline: Update on adjuvant endocrine therapy for women with hormone receptor–positive breast cancer. *Journal of Clinical Oncology*. 2010; 28(23): 3784–3796. [PubMed: 20625130]
9. Winer EP, Hudis C, Burstein HJ, Wolff AC, Pritchard KI, Ingle JN, et al. American Society of Clinical Oncology technology assessment on the use of aromatase inhibitors as adjuvant therapy for postmenopausal women with hormone receptor–positive breast cancer: status report 2004. *Journal of clinical oncology*. 2005; 23(3):619–629. [PubMed: 15545664]
10. [cited 2015 August 3, 2015] National Quality Forum Endorsement Summary: Cancer Measures. 2012. Available from: https://www.qualityforum.org/News_And_Resources/Endorsement_Summaries/Cancer_Measures_Endorsement_Summary.aspx
11. United States Department of Agriculture, Economic Research Service. [cited August 3, 2015] Urban Influence Codes. 2003. Available from: <http://www.ers.usda.gov/data-products/urban-influence-codes.aspx>
12. Johnson, CH.; Adamo, M., editors. SEER Program Coding and Staging Manual 2007. National Cancer Institute, NIH Publication number 07-5581. Bethesda, MD: 2008. revision
13. Deyo RA, Cherkin DC, Ciol MA. Adapting a clinical comorbidity index for use with ICD-9-CM administrative databases. *Journal of clinical epidemiology*. 1992; 45(6):613–619. [PubMed: 1607900]
14. Yung RL, Hassett MJ, Chen K, Gesten FC, Roohan PJ, Boscoe FP, et al. Initiation of adjuvant hormone therapy by Medicaid insured women with nonmetastatic breast cancer. *Journal of the National Cancer Institute*. 2012; 104(14):1102–1105. [PubMed: 22773822]
15. Kimmick G, Anderson R, Camacho F, Bhosle M, Hwang W, Balkrishnan R. Adjuvant hormonal therapy use among insured, low-income women with breast cancer. *Journal of Clinical Oncology*. 2009; 27(21):3445–3451. [PubMed: 19451445]
16. Banerjee M, George J, Yee C, Hryniuk W, Schwartz K. Disentangling the effects of race on breast cancer treatment. *Cancer*. 2007; 110(10):2169–2177. [PubMed: 17924374]
17. Freedman RA, Virgo KS, He Y, Pavluck AL, Winer EP, Ward EM, et al. The association of race/ethnicity, insurance status, and socioeconomic factors with breast cancer care. *Cancer*. 2011; 117(1):180–189. [PubMed: 20939011]
18. Gorey KM, Luginaah IN, Holowaty EJ, Zou G, Hamm C, Balagurusamy MK. Mediation of the effects of living in extremely poor neighborhoods by health insurance: breast cancer care and survival in California, 1996 to 2011. *International Journal for Equity in Health*. 2013; 12:6. [PubMed: 23311824]

19. Hershman DL, Tsui J, Wright JD, Coromilas EJ, Tsai WY, Neugut AI. Household net worth, racial disparities, and hormonal therapy adherence among women with early-stage breast cancer. *Journal of Clinical Oncology*. 2015; 33(9):1053–1059. [PubMed: 25691670]
20. Wheeler S, Kohler R, Reeder-Hayes K, Goyal R, Lich K, Moore A, et al. Endocrine therapy initiation among Medicaid-insured breast cancer survivors with hormone receptor-positive tumors. *J Cancer Surviv*. 2014; 8(4):603–610. [PubMed: 24866922]
21. Livaudais JC, LaCroix A, Chlebowski RT, Li CI, Habel LA, Simon MS, et al. Racial/Ethnic Differences in Use and Duration of Adjuvant Hormonal Therapy for Breast Cancer in the Women's Health Initiative. *Cancer Epidemiology Biomarkers & Prevention*. 2013; 22(3):365–373.
22. Murphy CC, Bartholomew LK, Carpentier MY, Bluethmann SM, Vernon SW. Adherence to Adjuvant Hormonal Therapy among Breast Cancer Survivors in Clinical Practice: A Systematic Review. *Breast cancer research and treatment*. 2012; 134(2):459–478. [PubMed: 22689091]
23. Roberts, Megan C.; Wheeler, Stephanie B.; Reeder-Hayes, Katherine. Racial/Ethnic and Socioeconomic Disparities in Endocrine Therapy Adherence in Breast Cancer: A Systematic Review. *American Journal of Public Health*. 2015 Jul; 105(S3):e4–e15. [PubMed: 25905855]
24. Heisig SR, Shedden-Mora MC, Blanckenburg P, Schuricht F, Rief W, Albert US, et al. Informing women with breast cancer about endocrine therapy: effects on knowledge and adherence. *Psycho-Oncology*. 2015; 24(2):130–137. [PubMed: 24953538]
25. Liu Y, Malin JL, Diamant AL, Thind A, Maly RC. Adherence to adjuvant hormone therapy in low-income women with breast cancer: the role of provider–patient communication. *Breast Cancer Res Treat*. 2013; 137(3):829–836. [PubMed: 23263740]
26. Bickell NA, Weidmann J, Fei K, Lin JJ, Leventhal H. Underuse of breast cancer adjuvant treatment: patient knowledge, beliefs, and medical mistrust. *Journal of Clinical Oncology*. 2009; 27(31):5160–5167. [PubMed: 19770368]
27. Boscoe FP, Schrag D, Chen K, Roohan PJ, Schymura M. Building Capacity to Assess Cancer Care in the Medicaid Population in New York State. *Health services research*. 2011; 46(3):805–820. [PubMed: 21158856]
28. Nadpara PA, Madhavan SS. Linking Medicare, Medicaid, and Cancer Registry Data to Study the Burden of Cancers in West Virginia. *Medicare & Medicaid Research Review*. 2012; 2(4) mmrr. 002.04.a01.
29. Felder TM, Lal LS, Bennett CL, Hung F, Franzini L. Cancer patients' use of pharmaceutical patient assistance programs in the outpatient pharmacy at a large tertiary cancer center. *Community oncology*. 2011; 8(6):279. [PubMed: 22879815]

Figure 1.
Flow chart of study participant inclusion and exclusion criteria.

Table 1

Summary of participant characteristics

Characteristic	Total (n=494)	White N=269 (%)	Black N=225 (%)	P
Age at diagnosis, years (mean ± SD)	51.4 ± 8.78	51.7 ± 8.67	51.0 ± 8.90	0.346
Age categories at diagnosis, years				0.538
Under 45 years old	122 (24.7)	68 (25.3)	54 (24.0)	
45–54 years old	163 (33.0)	83 (30.9)	80 (35.6)	
55–64 years old	209 (42.3)	118 (43.9)	91 (40.4)	
Marital status at diagnosis				0.016
Not married/unknown	351 (71.1)	179 (66.5)	172 (76.4)	
Married	143 (29.0)	90 (33.5)	53 (23.6)	
Medicaid eligibility status				0.713
Not disabled	50 (10.1)	26 (9.7)	24 (10.7)	
Disabled	444 (89.9)	243 (90.3)	201 (89.3)	
County at diagnosis				0.124
Small/large metropolitan	359 (72.7)	201 (74.7)	158 (70.2)	
Micropolitan	90 (18.2)	50 (18.6)	40 (17.8)	
Non-core adjacent	45 (9.1)	18 (6.7)	27 (12.0)	
Year of diagnosis				0.329
2004	53 (10.7)	24 (8.9)	29 (12.9)	
2005	111 (22.5)	66 (24.5)	45 (20.0)	
2006	159 (32.2)	83 (30.9)	76 (33.8)	
2007	171 (34.6)	96 (35.7)	75 (33.3)	
Stage at diagnosis				0.245
Localized	260 (52.6)	148 (55.0)	112 (49.8)	
Regional	234 (47.4)	121 (45.0)	113 (50.2)	
Hormone receptor status				0.276
Other (ER+/PR–, ER–/PR+)	114 (23.0)	57 (21.2)	57 (25.3)	
ER+/PR+	380 (77.0)	212 (78.8)	168 (74.7)	
Tumor Grade				0.001
Grade I	91 (18.4)	56 (20.8)	35 (15.6)	
Grade II	210 (42.5)	128 (47.6)	82 (36.4)	
Grade III-IV/unknown	193 (39.1)	85 (31.6)	108 (48.0)	
Charlson co-morbidity score				0.657
0	436 (88.3)	239 (88.9)	197 (87.6)	
1 +	58 (11.7)	30 (11.2)	28 (12.4)	
Type of surgery				0.614
None/unknown	196 (39.7)	104 (38.7)	92 (40.9)	
Lumpectomy or Mastectomy	298 (60.3)	165 (61.3)	133 (59.1)	

Characteristic	Total (n=494)	White N=269 (%)	Black N=225 (%)	P
Receipt of Chemotherapy				0.016
No	218 (44.1)	132 (49.1)	86 (38.2)	
Yes	276 (55.9)	137 (50.9)	139 (61.8)	
Receipt of Radiation				0.337
No	229 (46.4)	130 (48.3)	99 (44.0)	
Yes	265 (53.6)	139 (51.7)	126 (56.0)	
Receipt of adjuvant hormonal therapy				
At any point in time following diagnosis (ever-use)	355 (71.9)	198 (73.6)	157 (69.9)	0.346
Within 12 months of diagnosis (early-use)	337 (68.2)	191 (71.1)	146 (68.9)	0.146

Bivariate and multivariate models for receipt of adjuvant hormonal therapy following breast cancer diagnosis from 2004 to 2007, (N=494)

Table 2

Characteristic	Receipt of AHT at any point in time following diagnosis (Ever-users: N=355 (72%))			Receipt of AHT within 12 months of diagnosis (Early-Users: N=337 (68%))		
	Unadjusted OR (95% CI)	P	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	P
Race						
White	REF	0.346	REF	REF	REF	0.091
Black	0.83 (0.56–1.23)		0.75 (0.48–1.17)	0.75 (0.52–1.10)	0.70 (0.46–1.06)	
Age at diagnosis, years						
Under 45 years old	REF		REF	REF	REF	
45–54 years old	0.96 (0.57–1.64)	0.885	1.00 (0.54–1.86)	1.21 (0.73–2.01)	1.19 (0.66–2.12)	0.565
55–64 years old	0.82 (0.50–1.36)	0.448	0.87 (0.48–1.59)	1.05 (0.65–1.69)	1.02 (0.58–1.79)	0.949
Marital status at diagnosis						
Not married/unknown	REF	0.35	REF	REF	REF	0.639
Married	1.23 (0.79–1.92)		1.15 (0.71–1.86)	1.17 (0.77–1.79)	1.12 (0.71–1.76)	
Medicaid eligibility status						
Not disabled	REF	0.332	REF	REF	REF	0.101
Disabled	1.36 (0.73–2.53)		1.32 (0.61–2.83)	1.8 (0.99–3.26)	1.82 (0.89–3.72)	
County at diagnosis						
Small/large metropolitan	REF		REF	REF	REF	
Metropolitan	1.08 (0.64–1.80)	0.783	1.09 (0.62–1.91)	0.99 (0.60–1.65)	1.00 (0.59–1.71)	0.993
Non-core adjacent	1.65 (0.77–3.55)	0.198	1.88 (0.81–4.34)	1.16 (0.59–2.29)	1.24 (0.59–2.60)	0.563
Year of diagnosis						
2004	REF		REF	REF	REF	
2005	0.69 (0.31–1.55)	0.368	0.59 (0.25–1.42)	0.6 (0.27–1.34)	0.51 (0.22–1.20)	0.122
2006	0.54 (0.25–1.16)	0.113	0.52 (0.23–1.19)	0.41 (0.19–0.87)	0.37 (0.16–0.83)	0.016
2007	0.52 (0.24–1.11)	0.090	0.63 (0.28–1.46)	0.45 (0.21–0.97)	0.52 (0.23–1.17)	0.113
Stage at diagnosis						
Localized	REF	0.049	REF	REF	REF	0.881
Regional	1.49 (1.00–2.22)		1.11 (0.70–1.76)	1.27 (0.87–1.86)	0.97 (0.63–1.50)	

Characteristic	Receipt of AHT at any point in time following diagnosis (Ever-users: N=355 (72%))				Receipt of AHT within 12 months of diagnosis (Early-Users: N=337 (68%))			
	Unadjusted OR (95% CI)	P	Adjusted OR (95% CI)	P	Unadjusted OR (95% CI)	P	Adjusted OR (95% CI)	P
Hormone receptor status								
Other (ER+/PR-, ER-/PR+)	REF	0.061	REF	0.022	REF	0.121	REF	0.062
ER+/PR+	1.53 (0.98–2.40)		1.81 (1.09–3.00)		1.41 (0.91–2.19)		1.59 (0.98–2.56)	
Tumor Grade								
Grade I	REF		REF		REF		REF	
Grade II	2.01 (1.18–3.43)	0.01	1.74 (0.97–3.14)	0.065	1.64 (0.97–2.75)	0.063	1.38 (0.78–2.42)	0.269
Grade III-IV/unknown	1.42 (0.84–2.41)	0.188	1.21 (0.67–2.23)	0.536	1.26 (0.75–2.11)	0.382	1.14 (0.63–2.06)	0.663
Charlson co-morbidity score								
0	REF	0.682	REF	0.947	REF	0.897	REF	0.636
1 +	1.14 (0.61–2.13)		0.98 (0.49–1.96)		1.04 (0.91–2.19)		0.85 (0.45–1.64)	
Type of surgery								
None/unknown	REF	<0.001	REF	0.001	REF	<0.001	REF	0.002
Lumpectomy or Mastectomy	2.79 (1.87–4.18)		2.15 (1.35–3.44)		2.50 (1.70–3.68)		2.03 (1.30–3.17)	
Receipt of Chemotherapy								
No	REF	<0.001	REF	0.006	REF	<0.001	REF	0.007
Yes	2.63 (1.76–3.93)		1.97 (1.22–3.20)		2.19 (1.49–3.22)		1.90 (1.20–3.03)	
Receipt of Radiation								
No	REF	<0.001	REF	<0.001	REF	<0.001	REF	0.010
Yes	2.98 (1.98–4.49)		2.33 (1.50–3.63)		2.23 (1.52–3.29)		1.73 (1.14–2.63)	