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## Are There Regional Differences in Triple Negative Breast Cancer among Non-Hispanic Black Women?

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### Abstract

**Background:** Non-Hispanic black women (NHB) are diagnosed with triple negative breast cancer (TNBC) more often than other ethnic or racial groups in the United States (US). This study describes regional differences in TNBC incidence among NHB women in the US from 2011 to 2015.

**Methods:** We analyzed data from the United States Cancer Statistics (USCS) that includes incidence data from the Centers for Disease Control and Prevention's National Program of Cancer Registries (NPCR) and the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) programs.

**Results:** Compared to the incidence rate for NHB women in the South, rates were significantly lower in the Northeast (22.6 per 100,000), higher in the Midwest (25.5 per 100,000) and similar in the West. These regional differences might be explained by genetic admixture among people with different geographic ancestral origins.

**Conclusions:** Results from this study highlight the need to extend etiological research and evidence-based cancer prevention and control efforts to women at high risk of this disease in order to decrease cancer disparities.

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## Keywords

Triple negative breast cancer; Non-Hispanic black women; Cancer biomarkers; Estrogen receptors; Progesterone receptors; HER2Neu

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## INTRODUCTION

Non-Hispanic black (NHB) women are more likely to be diagnosed with triple negative breast cancer (TNBC) than other US ethnic or racial groups.<sup>1</sup> TNBC, which is negative for estrogen receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor 2 (HER2), has a less favorable prognosis and fewer treatment options.<sup>2</sup> We know of no previous studies that examined differences in TNBC incidence for a single racial or ethnic group by geographic region. This study described regional differences in TNBC among NHB women in the US.

## METHODS

We analyzed data from the United States Cancer Statistics (USCS) which includes data from the National Program of Cancer Registries (NPCR) and the Surveillance, Epidemiology, and End Results (SEER) programs.<sup>3</sup> Breast cancer biomarkers ER, PR and HER2 status have been routinely collected by registries since 2010. We examined TNBC incidence for women diagnosed with a primary invasive breast cancer from 2011 to 2015 (<https://seer.cancer.gov/siterecode/>). We calculated age-adjusted incidence rates per 100,000 NHB women and incidence rate ratios by US Census region and division.<sup>4</sup> The South region and the South Atlantic division were chosen as reference groups because these areas have the largest population of NHB women.  $P < .05$  was considered statistically significant. Analyses were conducted using SEER\*STAT version 8.2.1 (<https://seer.cancer.gov/seerstat/>).

## RESULTS

Approximately 26,000 NHB women were diagnosed with TNBC from 2011 to 2015. Compared to the incidence rate for NHB women in the South (24.9 per 100,000), incidence rates were significantly lower in the Northeast (22.6 per 100,000; RR = 0.91; CI 0.88–0.94) and West (22.5 per 100,000; RR = 0.91; CI 0.86–0.95) (Table 1). Compared to the incidence rate for NHB women in the South Atlantic division (25.0 per 100,000), rates were significantly lower in the Middle Atlantic division (22.7 per 100,000; RR = 0.91; CI 0.87–0.94), New England division (22.0 per 100,000; RR = 0.88; CI 0.80–0.96), West South Central division (23.6 per 100,000; RR = 0.94; CI 0.90–0.98), Mountain division (19.7 per 100,000; RR = 0.79 CI 0.71–0.88) and Pacific division (23.3 per 100,000; RR = 0.93 CI 0.89–0.98). Compared to the incidence rate for NHB women in the South Atlantic division, rates were higher in the Midwest divisions (25.6 per 100,000; RR = 1.02; CI 0.98–1.06 and 25.1 per 100,000; RR = 1.00; CI 0.93–1.10) and the East South Central Division (26.1 per 100,000; RR = 1.04; CI 1.00–1.09) (Table 2). Rate differences between divisions were small for all regions, but largest in the West. Furthermore, compared to the incidence rate for NHB women between the ages of 35–49 diagnosed with TNBC in the South, rates were significantly lower in the Northeast (26.7 per 100,000; RR = 0.85; CI 0.79–0.91) and West

(23.7 per 100,000; RR = 0.75; CI 0.68–0.83) and slightly lower in the Midwest (29.6 per 100,000; RR = 0.94; CI 0.88–1.0).

## DISCUSSION

We found regional differences in TNBC incidence among NHB women in the United States during 2011–2015, with the lowest rates in the West region and the highest rates in the Midwest region. Our results reveal that there is also regional variation in age at diagnosis as some age groups had incidence rates of TNBC that were significantly lower in the Northeast and West. There may be several reasons we observe regional differences. Regional differences may be partially explained by genetic admixture among people living in these locations based on different geographic ancestral origins.<sup>5</sup> A study examining the genetic history of 5269 women who self-identified as African American found that women residing in other region had less African ancestry compared to women in the South.<sup>5</sup> Another study of 1484 African American women reported that women diagnosed with ER + PR+ (versus ER–PR–) cancer were more likely to have higher proportions of European genetic ancestry.<sup>6</sup> We noted that NHB women living in areas previously reported to have greater African ancestry had higher incidence rates of TNBC, which may point to genetic admixture as one contributing factor. Additionally, there is great regional variation in lifestyle and behavioral factors such as age at first birth, number of births and breastfeeding that could also be considered likely contributors.<sup>7,8</sup> Although NHB women were the focus of our study, we examined other racial groups as well (data not shown). We found that Hispanic women had half the incidence of TNBC as NHB women, while other racial groups had lower incidence rates of TNBC compared to NHB women. Our results can serve as the foundation for more in depth investigations considering these factors.

This study has several limitations. First, we do not know the genetic make-up of NHB women in our study. We can only hypothesize that differences in geographic genetic admixture might explain our findings. Secondly, we were unable to account for other factors reported to impact breast cancer incidence including social and economic status, physical environment, unhealthy behaviors, population mobility and obesity. One study examining obesity prevalence in whites and non-Hispanic blacks by Census division found that the New England, Mountain, Pacific and Middle Atlantic had lower obesity prevalence than other divisions.<sup>9</sup> We found that these same divisions have lower TNBC rates among NHB women. In addition, the underlying familial genetic risk factors for developing TNBC are unknown as well. Women who have TNBC are more likely to have *BRCA1/2* mutations.<sup>10</sup> Women found to have TNBC should be referred for investigation of familial genetic risk as well as their families.<sup>11</sup> To our knowledge, this is the first paper focusing on regional differences in TNBC among NHB women. Our analysis provides a more complete picture of the distribution of TNBC among NHB women in the US. Results from our study highlight the need to extend etiological research and evidence-based cancer prevention and control efforts in order to understand and develop opportunities to decrease breast cancer disparities. Deeper understanding of regional and racial-ethnic differences in TNBC incidence may ultimately reduce the burden of TNBC.

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## Abbreviations:

<b>ER</b>	Estrogen receptor
<b>HER2</b>	Human epidermal receptor 2
<b>NPCR</b>	National Program of Cancer Registries
<b>NHB</b>	Non-Hispanic black
<b>PR</b>	Progesterone receptor
<b>TNBC</b>	Triple negative breast cancer
<b>SEER</b>	Surveillance, Epidemiology, and End Results
<b>US</b>	United States

## REFERENCES

1. Agurs -Collins T, Dunn B, Browne D, Johnson K, & Lubet R (2010). Epidemiology of health disparities in relation to the biology of estrogen-receptor-negative breast cancer. *Semin Oncol*, 37, 384–401. [PubMed: 20816508]
2. Centers for Disease Control and Prevention. (2012). Vital signs: racial disparities in breast cancer severity – United States, 2005–2009. *MMWR Morb Mortal Wkly Rep*, 61(45), 922–926. [PubMed: 23151952]
3. US Cancer Statistics Working Group. (2016). United States Cancer Statistics: 1999–2013 Incidence and Mortality Web-Based Report. Atlanta, GA: Centers for Disease Control and Prevention and National Cancer Institute, US Dept of Health and Human Services. <http://www.cdc.gov/uscs>. Accessed February 23, 2017.
4. US Census Bureau. Census regions and divisions of the United States. [https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us\\_regdiv.pdf](https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf). Accessed November 30, 2016.
5. Bryc K, Durand E, Macpherson M, Reich D, & Mountain J (2015). The genetic ancestry of African Americans, Latinos, and European Americans across the United States. *Am J Hum Genet*, 96(1), 37–53. [PubMed: 25529636]
6. Fejerman L, Haiman C, Reich D, et al. (2009). An admixture scan in 1,484 African American women with breast cancer. *Cancer Epidemiol Biomarkers Prev*, 18(11), 3110–3117. [PubMed: 19843668]
7. Willett WC, Tamimi R, Hankinson SE, Hazra A, Eliassen AH, & Colditz GA (2014). Chapter 18: nongenetic factors in the causation of breast cancer. In Harris JR, Lippman ME, Morrow M, & Osborne CK (Eds.), *Diseases of the Breast* (5th ed.). Lippincott Williams & Wilkins.
8. Palmer JR, Viscidi E, Troester MA, et al. (2014). Parity, lactation, and breast cancer subtypes in African American women: results from the AMBER Consortium. *J Natl Cancer Inst*, 106(10), dju237.
9. Le A, Judd S, Allison D, et al. (2014). The geographic distribution of obesity in the US and the portential regional differences in misreporting obesity. *Obesity*, 22(1), 300–306. [PubMed: 23512879]

10. National Cancer Institute. (2016). Genetics of breast and gynecologic cancers (PDQ®) - health professional version. [http://www.cancer.gov/types/breast/hp/breast-ovarian-genetics-pdq#section/\\_88](http://www.cancer.gov/types/breast/hp/breast-ovarian-genetics-pdq#section/_88).
11. Pal T, Bonner D, Cragun D, et al. (2015). A high frequency of BRCA mutations in young black women with breast cancer residing in Florida. *Cancer*, 121, 4173–4180. [PubMed: 26287763]

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Incidence rates and rate ratios among Non-Hispanic black women with TNBC by Census Region and Division, 2011–2015.

**Table 1.**

Region	Count	Rate	Lower CI	Upper CI	Rate ratio	Ratio lower CI	Ratio upper CI
South <sup>a</sup>	15,193	24.9	24.5	25.3			
Northeast	4104	22.6	21.9	23.3	0.91 <sup>b</sup>	0.88	0.94
Midwest	4681	25.5	24.8	26.3	1.02	0.99	1.06
West	2044	22.5	21.6	23.6	0.91 <sup>b</sup>	0.86	0.95
Division	Count	Rate	Lower CI	Upper CI	Rate ratio	Ratio lower CI	Ratio upper CI
South	South Atlantic <sup>a</sup>	9295	25.0	24.5	25.6		
	East South Central	2682	26.1	25.1	27.1	1.04	1.00
	West South Central	3216	23.6	22.8	24.4	0.94 <sup>b</sup>	0.90
Northeast	New England	519	22.0	20.1	24.0	0.88 <sup>b</sup>	0.80
	Middle Atlantic	3585	22.7	21.9	23.4	0.91 <sup>b</sup>	0.87
Midwest	East North Central	3885	25.6	24.8	26.4	1.02	0.98
	West North Central	796	25.1	23.3	26.9	1.00	0.93
West	Mountain	363	19.7	17.7	21.9	0.79 <sup>b</sup>	0.71
	Pacific	1681	23.3	22.1	24.4	0.93 <sup>b</sup>	0.88

CI, confidence interval.

<sup>a</sup>Reference group for rate ratios.

<sup>b</sup> $P < .05$ .

SEER\*Stat Database: NPCR and SEER Incidence – Analytic file - 1998–2015.

Age of diagnosis among Non-Hispanic black women with TNBC by Census Region, 2011–2015.

Table 2.

Age	Region	Count	Rate	Lower CI	Upper CI	Rate ratio	Ratio lower CI	Ratio upper CI
<35	South <sup>a</sup>	540	1.8	1.6	1.9			
	Northeast	113	1.4	1.1	1.6	0.77 <sup>b</sup>	0.62	0.95
	Midwest	162	1.8	1.5	2.1	1.0	0.83	1.19
	West	77	1.6	1.3	2.1	0.93	0.72	1.18
35–49	South <sup>a</sup>	3914	31.5	30.5	32.5			
	Northeast	968	26.7	25.1	28.5	0.85 <sup>b</sup>	0.79	0.91
	Midwest	1076	29.6	27.9	31.5	0.94	0.88	1.0
	West	431	23.7	21.5	26.1	0.75 <sup>b</sup>	0.68	0.83
50–59	South <sup>a</sup>	4793	59.5	57.8	61.2			
	Northeast	1155	49.5	46.7	52.4	0.83 <sup>b</sup>	0.78	0.89
	Midwest	1410	58.9	55.9	62.1	0.99	0.93	1.05
	West	606	50.2	46.3	54.4	0.84 <sup>b</sup>	0.77	0.92
60–69	South <sup>a</sup>	3595	67.6	65.4	69.9			
	Northeast	1009	64.7	60.8	68.9	0.96	0.89	1.03
	Midwest	1150	71.8	67.7	76.1	1.06	0.99	1.14
	West	497	63.3	57.8	69.1	0.94	0.85	1.03
70+	South <sup>a</sup>	2351	55.1	52.9	57.4			
	Northeast	859	58.7	54.9	62.8	1.07	0.98	1.15
	Midwest	883	63.9	59.8	68.3	1.16 <sup>b</sup>	1.07	1.25
	West	433	64.8	58.8	71.2	1.18 <sup>b</sup>	1.06	1.30

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CI, confidence interval.

<sup>a</sup>Reference group for rate ratios.

<sup>b</sup> $P < .05$ .

SEER\*Stat Database: NPCR and SEER Incidence – Analytic file - 1998–2015.