

## Regional variation in access to oncologic care and racial disparities among cervical cancer patients

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**Objective:** Disparities among black women with cervical cancer in the United States are well known; however, the etiology is not fully understood. Access to oncologic care and adequate insurance coverage likely affect these racial disparities. The aim of this study was to describe factors affecting the ability to receive oncologic care in cervical cancer as a function of race and geographic region of the U.S.

**Methods:** A retrospective cohort study was performed using the National Cancer Database (NCDB) among women with stage I-IVA cervical cancer from 2004-2014. To identify factors associated with the receipt of optimal treatment, multivariate logistic regression was used, including an interaction term to determine the relationship between race and region. To evaluate overall survival, a Cox multivariate proportional hazards model was performed, including a similar interaction term. Publicly available data from the National Cancer Institute, the Society of Gynecologic Oncology, and the United States Census were utilized to compile data regarding availability of cancer centers, gynecologic oncologists, and insurance status by region.

**Results:** A total of 55,659 women with cervical cancer were identified, of whom 9,153 were black (16.4%). Fewer black women presented with stage I disease (37.8% versus 47.8%,  $p < 0.001$ ) and fewer had private insurance (33.7% versus 47.7%) compared to non-black women. Twice as many black women had incomes less than \$38,00 as compared to white women (20.6% versus 48.5%,  $p < 0.001$ ), and almost twice as many did not graduate high school (24.1% versus 38.3%,  $p < 0.001$ ). On multivariate analysis, black women in the South (aOR 0.77, 95% CI 0.70-0.84,  $p < 0.001$ ) and Midwest (aOR 0.82, 95% CI 0.72-0.94,  $p = 0.003$ ) were less likely to receive optimal treatment compared to non-black women in these regions while controlling for confounding factors ( $p$ -interaction=0.034). On survival analysis, black women in the South (aHR 1.13, 95% CI 1.06-1.19,  $p < 0.001$ ) and West (aHR 1.34, 95% CI 1.14-1.66,  $p = 0.001$ ) had worse mortality compared to non-black women in those regions ( $p$ -interaction=0.027). In the analysis of population-level data, the South had the highest proportion of black residents (19.4%), the lowest percentage of privately insured residents (61.7%), and the highest percentage of uninsured residents (17.4%) of any other region. The South, Midwest, and West have proportionally fewer NCI-designated cancer centers and fewer gynecologic oncologists compared to the Northeast (Table 1).

**Conclusions:** Black women living in the South of the United States are at particular risk of both inadequate treatment and worse overall survival for cervical cancer after controlling for confounding factors. Population-level data suggests that women in the South may be underinsured and lack access to cancer centers and gynecologic oncologists compared to women in the Northeast.

**Table 1.** Race, insurance, and access to oncologic care by region using population-level data.

<b>Region</b>	<b>Black N* (%)</b>	<b>Private insurance N* (%)</b>	<b>Public insurance N* (%)</b>	<b>Uninsured/ Unknown insurance N*(%)</b>	<b>NCI cancer centers<sup>§</sup> (average per # of states in region)</b>	<b>Gynecologic Oncologists per population<sup>†</sup> (n:1,000,000)</b>
<b>Northeast</b>	6682 (11.9%)	38241 (69.3%)	18067 (32.7%)	5484 (9.9%)	14 (1.6)	4.1
<b>South</b>	23201 (19.4%)	71707 (61.7%)	36996 (31.8%)	20189 (17.4%)	21 (1.2)	2.6
<b>Midwest</b>	7021 (10.4%)	46477 (69.8%)	20708 (31.1%)	7553 (11.3%)	14 (1.2)	2.2
<b>West</b>	3475 (4.6%)	45968 (62.8%)	22399 (30.6%)	11954 (16.3%)	13 (1.2)	2.0

N\*- number reported in thousands. Data derived from the United States Census Bureau.

<https://www.census.gov/library/publications/2017/demo/p60-260.html>

§ Data derived from the National Cancer Institute. <https://www.cancer.gov/research/infrastructure/cancer-centers/find>

† Data derived from the Society of Gynecologic Oncology full member roster reported in 2014. Number of providers per 1,000,000 people in the population