Vital Signs: Racial Disparities in Breast Cancer Severity — United States, 2005–2009

Abstract

Background: Breast cancer death rates have been declining among U.S. women since 1990 because of early detection and advances in treatment; however, all racial groups have not benefited equally.

Methods: Breast cancer incidence, stage at diagnosis, and mortality rates for 2005–2009 for women in the United States and for each state were calculated using United States Cancer Statistics (USCS) data. Black to white mortality ratios and mortality to incidence ratios by race were calculated.

Results: Despite having lower incidence rates, black women had a 41% higher breast cancer death rate. More black women were diagnosed at regional or distant cancer stage compared with white women (45% versus 35%). For every 100 breast cancers diagnosed, black women had nine more deaths than white women (27 deaths per 100 breast cancers diagnosed among black women compared with 18 per 100 among white women).

Conclusions: Despite significant progress in breast cancer detection and treatment, black women experience higher death rates even though they have a lower incidence of breast cancer compared to white women.

Implications for Public Health Practice: Advances in screening and treatment have improved survival for U.S. women with breast cancer. However, black women experience inequities in breast cancer screening, follow-up, and treatment after diagnosis, leading to greater mortality. At the individual level, the maximal effectiveness of screening for breast cancer can only be achieved when all women have timely follow-up to breast cancer exams and state-of-the-art treatment. At the health system level, optimal health-care delivery may be strengthened through performance-based reimbursement, expanded use of information technology, and quality assurance reporting-protocols. Proven effective interventions such as patient navigation could be expanded for use in other settings.

Introduction

Breast cancer remains a significant public health challenge. It is the most commonly diagnosed cancer among US women. Although breast cancer deaths have declined over the last 2 decades, it remains the second leading cause of cancer deaths among women (*1*). It is estimated that approximately half of this decrease has resulted from advances in treatment and early detection (*2*). However, not all racial groups have benefited equally.

The continuum of breast cancer care begins with regular screening, and continues with timely follow-up and appropriate treatment (*3*). The maximum benefit of breast cancer screening will only be achieved if women of all racial groups receive not only optimal screening, but also timely follow-up and state-of-the-art treatment. Modeling studies have shown possible differences in mortality at each phase of this process (*4*).

This report summarizes disparities in breast cancer incidence and mortality between white and black women in the United States, using data from USCS for 2005–2009. USCS includes mortality data from the National Vital Statistics System (NVSS) and incidence data from the National Program of Cancer Registries (NPCR) and the Surveillance, Epidemiology, and End Results (SEER) program.

Methods

Data on new cases of invasive breast cancer diagnosed during 2005–2009 were obtained from population-based cancer

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registries affiliated with the NPCR and SEER programs, which combined cover all of the US population. Data from all states met the USCS data-quality criteria for 2005–2009.* SEER Summary Stage 2000[†] was used to characterize cancers as localized, regional, distant, or unknown stage using clinical and pathologic tumor characteristics such as tumor size, depth of invasion and extension to regional or distant tissues, involvement of regional lymph nodes, and distant metastases. Data on breast cancer deaths during 2005–2009 were based on death certificate information reported to state vital statistics offices and compiled into a national file through NVSS. Population estimates for the denominators of incidence and death rates were from the U.S. Census, as modified by SEER.[§] Annual breast cancer incidence and mortality rates per 100,000 women were age-adjusted by the direct method to the 2000 U.S. standard population (19 age groups), and corresponding 95% confidence intervals (CIs) were calculated.

To measure disparity in rates, the incidence and mortality rate ratios among black women to those among white women were calculated. The mortality to incidence ratio (MIR) was calculated by dividing the age-adjusted mortality rate by the age-adjusted incidence rate. The MIR represents the number of breast cancer deaths per 100 breast cancers diagnosed and is an indication of prognosis after diagnosis. To ensure stability of rates, statistics were not reported if the numerator had fewer than 16 observations.

Results

During 2005–2009, among women of all races, an average of 205,246 breast cancers were diagnosed each year; 173,970 were in white women, and 21,942 were in black women. Black women had a lower incidence rate (116.9 cases per 100,000) compared with white women (122.1) but a higher percentage of cancers diagnosed at regional or distant stage (45% versus 35%) (Table). In addition, black women had a 41% higher rate of breast cancer mortality during 2005–2009 than did white women (Figure 1).

Overall in the United States during 2005–2009, the MIR was 0.27 (27 deaths per 100 breast cancers) among black women and 0.18 (18 deaths per 100 breast cancers) among white women. Among the 40 states and District of Columbia with sufficient numbers of deaths for analysis, MIRs for black women showed more variability and were generally higher than those for white women. MIRs were similar among black and white women only in Delaware and Rhode Island (Figure 2).

Conclusions and Comments

Black women experience higher death rates even though they have a lower incidence of breast cancer compared to white women. The disparity in breast cancer death rates among black and white women has been described previously (4). Disparities exist at each phase in the complex breast cancer care trajectory, from screening and follow-up of abnormal findings to treatment initiation and completion (5). Although the causes and magnitude of these disparities are debated, possible solutions have been implemented to help reduce differences in care along the continuum (6).

Although similar rates of mammography use among white and black women have been described using national self-reported data, studies verifying self-report have shown that mammography use might actually be lower among black women (7). One study found that after accounting for overreporting, the prevalence of mammography use decreased from 77% to 65% among white women and from 78% to 59% among black women (7). Black women are more likely to have longer intervals between screening mammograms which might lead to an increase in diagnosis of cancer at a later stage (8). Regular and adequate breast cancer screening can result in detection of breast cancer at an earlier stage and therefore a better prognosis (8,9).

Timeliness of follow-up care after an abnormal screening test is a critical step to optimal outcomes. Extensive delay after an abnormal screening mammogram leads to larger cancers, more positive lymph nodes, and subsequently poorer outcomes (10). Initiation of treatment depends on a definitive diagnosis. Timeliness and adequacy of follow-up varies by socioeconomic, community, and health system characteristics (11). Even among women with similar insurance status, black women have longer intervals to diagnosis after an abnormal mammogram than white women (12,13). For example, 20% of black women had diagnostic intervals over 60 days compared to 12% of white women. (13).

Breast cancer prognosis varies considerably by subtypes. Breast cancer can be subtyped by the expression of the

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* CDC and the National Cancer Institute, in collaboration with the North American Association of Central Cancer Registries, maintain the USCS dataset, which contains the official federal statistics on cancer incidence. Cancer registries demonstrated that cancer incidence data were of high quality by meeting six USCS publication criteria: 1) case ascertainment is ≥90% complete, 2) ≤5% of cases are ascertained solely on the basis of a death certificate, 3) ≤3% of cases are missing information on sex, 4) ≤3% of cases are missing information on age, 5) ≤5% of cases are missing information on race, and 6) ≥97% of the registry's records passed a set of single-field and inter-field computerized edits that test the validity and logic of data components. Additional information available at http://www.cdc.gov/uscs and http://www.cdc.gov/cancer/npcr/uscs/technical_notes/criteria.htm.

[†] Additional information available at http://seer.cancer.gov/tools/ssm.

[§] Population estimates for the period 2005–2009 incorporate bridged single-race estimates that are derived from the original multiple race categories in the 2000 U.S. census. Adjustments to population data were made by the U.S. Census Bureau to account for the Gulf Coast population in Alabama, Mississippi, Louisiana, and Texas displaced by major population shifts resulting from hurricanes Katrina and Rita in 2005. Additional information available at http://seer.cancer.gov/popdata/index.html and http://www.census.gov/popest.

TABLE. Average annual number and rate of cases of invasive female breast cancer,* by cancer stage, black or white race, and age group — United States, 2005–2009

| Race/Age group (yrs)	Overall			Cancer stage[†] Localized[§]				Regional[§]				Distant[§]			
	No.	Rate	(95% CI)	No.	Rate	(95% CI)	%	No.	Rate	(95% CI)	%	No.	Rate	(95% CI)	%
All races	205,246	121.1	(120.8–121.3)	125,578	73.8	(73.6–74.0)	61	62,244	37.2	(37.1–37.4)	30	10,918	6.4	(6.3–6.4)	5
<40	9,941	13.1	(13.0–13.3)	4,636	6.1	(6.1–6.2)	47	4,394	5.8	(5.7–5.9)	44	622	0.8	(0.8–0.8)	6
40–49	34,452	150.8	(150.1–151.5)	19,333	84.5	(84.0–85.0)	56	12,727	55.8	(55.4–56.3)	37	1,547	6.8	(6.6–6.9)	4
50–59	48,779	241.7	(240.7–242.6)	29,052	143.8	(143.0–144.5)	60	15,895	79.0	(78.4–79.5)	33	2,628	13.0	(12.8–13.2)	5
60–69	48,777	369.5	(368.1–371.0)	31,298	237.4	(236.2–238.6)	64	13,623	102.9	(102.2–103.7)	28	2,559	19.3	(19.0–19.7)	5
70–79	37,449	413.9	(412.1–415.8)	24,989	276.2	(274.7–277.8)	67	9,334	103.2	(102.3–104.2)	25	1,961	21.7	(21.2–22.1)	5
≥80	25,849	365.4	(363.4–367.4)	16,270	230.8	(229.2–232.4)	63	6,270	88.6	(87.6–89.6)	24	1,601	22.5	(22.1–23.1)	6
White	173,970	122.1	(121.8–122.3)	108,595	75.7	(75.5–75.9)	62	51,376	36.8	(36.6–36.9)	30	8,711	6.0	(6.0–6.1)	5
<40	7,460	12.7	(12.5–12.8)	3,532	6.0	(5.9–6.1)	47	3,305	5.6	(5.5–5.7)	44	424	0.7	(0.7–0.7)	6
40–49	27,697	150.6	(149.8–151.4)	15,861	86.1	(85.5–86.7)	57	10,072	54.9	(54.4–55.4)	36	1,135	6.2	(6.0–6.3)	4
50–59	40,358	242.4	(241.4–243.5)	24,523	147.1	(146.3–147.9)	61	12,879	77.6	(77.0–78.2)	32	2,015	12.1	(11.8–12.3)	5
60–69	42,104	376.2	(374.6–377.8)	27,476	245.8	(244.5–247.1)	65	11,488	102.4	(101.5–103.2)	27	2,089	18.6	(18.3–19.0)	5
70–79	33,014	423.7	(421.7–425.8)	22,324	286.5	(284.9–288.2)	68	8,063	103.5	(102.5–104.5)	24	1,644	21.1	(20.6–21.5)	5
≥80	23,337	369.6	(367.5–371.8)	14,880	236.6	(234.9–238.3)	64	5,568	88.2	(87.1–89.2)	24	1,405	22.1	(21.6–22.7)	6
Black	21,942	116.9	(116.2–117.6)	11,373	61.0	(60.5–61.5)	52	8,034	42.3	(41.9–42.7)	37	1,801	9.6	(9.4–9.8)	8
<40	1,702	15.5	(15.2–15.9)	715	6.5	(6.3–6.8)	42	778	7.1	(6.9–7.3)	46	158	1.4	(1.3–1.5)	9
40–49	4,592	149.9	(147.9–151.8)	2,223	72.5	(71.2–73.9)	48	1,908	62.4	(61.1–63.6)	42	335	10.9	(10.4–11.4)	7
50–59	5,880	242.7	(240.0–245.5)	3,003	123.9	(121.9–125.9)	51	2,222	91.8	(90.1–93.5)	38	495	20.4	(19.6–21.3)	8
60–69	4,679	341.0	(336.6–345.4)	2,565	187.2	(184.0–190.5)	55	1,590	115.6	(113.1–118.2)	34	384	27.9	(26.7–29.2)	8
70–79	3,225	366.1	(360.5–371.8)	1,868	212.0	(207.7–216.4)	58	980	111.1	(108.1–114.3)	30	262	29.8	(28.2–31.5)	8
≥80	1,864	345.4	(338.4–352.5)	999	185.1	(180.0–190.3)	54	556	103.0	(99.2–106.9)	30	166	30.7	(28.7–32.9)	9

Abbreviation: CI = confidence interval.

Sources: CDC's National Program of Cancer Registries (NPCR) and the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) program.

* Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population (19 age groups, Census P25–1130); 95% confidence intervals were calculated. To use the most accurate staging information, this report excludes cases that were identified only by autopsy or death certificate.

[†] Percentages of stages do not sum to 100% because data for cases with unknown stages are not presented.

[§] A localized cancer is confined to the primary site, a regional cancer has spread directly beyond the primary site or to regional lymph nodes, and a distant cancer has spread to other organs.

FIGURE 1. Invasive female breast cancer incidence and mortality rates,* by race[†] — United States, 2005–2009
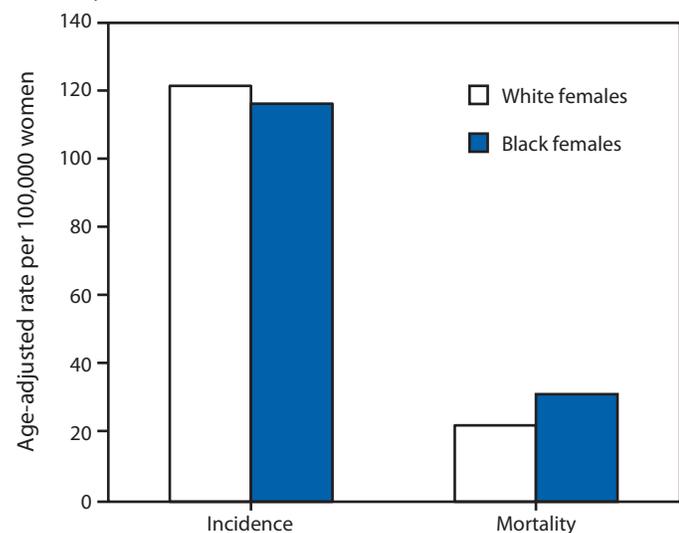
Source: CDC's National Program of Cancer Registries (NPCR), the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) program, and National Vital Statistics System mortality data (available at http://www.cdc.gov/nchs/deaths.htm).
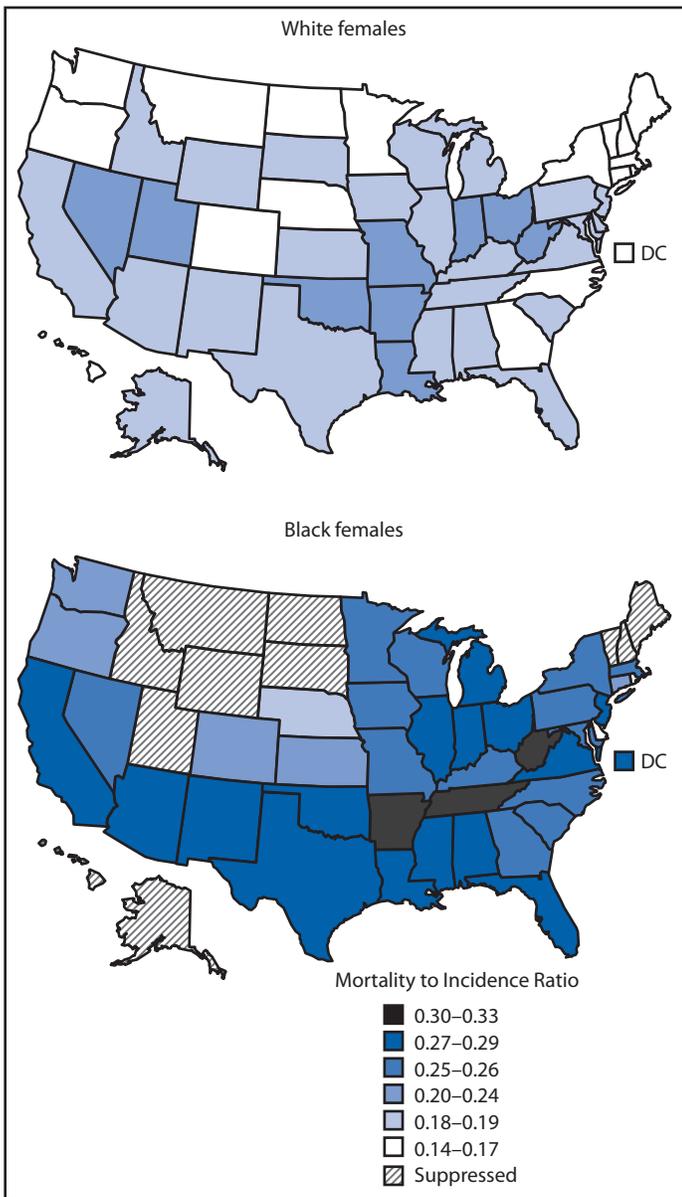
* Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population (19 age groups, Census P25–1130).

[†] The ratio of breast cancer incidence rates among black females compared with breast cancer incidence rates among white females was 0.96. The ratio of breast cancer mortality rates among black females compared with breast cancer mortality rates among white females was 1.41.

estrogen receptor (ER), progesterone receptor (PR) and human epidermal growth factor receptor 2 (HER2). Women who have ER+ and PR+ breast cancers have more treatment options and a more favorable prognosis than women with tumors lacking ER and PR expression or with triple-negative (ER-, PR-, HER2-) breast cancers (14). Compared with white women, black women more frequently are found to have tumor subtypes with a poorer prognosis, especially the triple negative subtype (14). Models show that differences in breast cancer characteristics contribute to differences in breast cancer mortality between black and white women (4). Further research is needed to determine the etiology of biologic characteristics of breast cancer in black women to design effective prevention and treatment strategies.

Advances in treatment of breast cancer are estimated to be responsible for a quarter of the recent decline in breast cancer deaths (2). However, several studies have reported that black women do not receive the same quality of treatment for breast cancer as white women (15). A recent modeling study showed that up to 19% of the mortality difference between black and white women could be eliminated if the same treatment was provided to both populations (4). Given equal response to chemotherapy, equal treatment of woman based on stage and tumor characteristics should lead to similar outcomes (16).

FIGURE 2. Breast cancer mortality to incidence ratios* among black and white females — United States, 2005–2009

White females

Black females

Mortality to Incidence Ratio

- ■ 0.30–0.33
- ■ 0.27–0.29
- ■ 0.25–0.26
- ■ 0.20–0.24
- ■ 0.18–0.19
- □ 0.14–0.17
- ▨ Suppressed

* The mortality to incidence ratio (MIR) was calculated as the age-adjusted mortality rate divided by the age-adjusted incidence rate. The MIR is a population-based measure of fatality/prognosis after diagnosis and can be used to compare groups with disparate incidence or mortality rates. The difference in MIRs can be used as an estimate of excess deaths. An MIR of 0.14 indicates that for every 100 breast cancer cases, 14 breast cancer deaths occurred. Overall, the MIR among black females was 0.27, compared with 0.18 among white females.

Beginning treatment in a timely way is also important. Fewer black women (69%) start treatment within 30 days compared with white women (82%) (*15*).

The findings in this report are subject to at least three limitations. First, cause of death was not verified in this study, but lack of verification was not likely to affect the results. A recent CDC study reported that >98% of breast cancer deaths were verified using linkage with the National Death Index (*17*). Second, the analyses based on race might be biased if race and ethnicity were misclassified; although reports have shown that misclassification is minimal for categorizing by white and black race.¶ Finally, postcensal populations for 2005–2009 were estimated by the U.S. Census Bureau; errors in these estimates might increase as time passes from the original recording of Census data, leading to underestimates or overestimates of incidence and mortality rates.

In the *Guide to Community Preventive Services,* evidence-based client-directed interventions include group education, one-on-one education, client reminders, reduction of structural barriers, and reduction of out-of-pocket expenses (*18*). Peer educators and patient navigators serving in underserved communities have a proven track record of assisting women with adherence to breast cancer screening recommendations and with assuring that women with abnormal screening test results obtain appropriate follow-up tests and treatment (*19*). Observational studies have shown that patient navigation in complex health systems leads to more complete, timely breast cancer care and earlier stage at diagnosis (*19*). Emerging evidence from randomized controlled trials supports this intervention in high risk populations (*6*).

Implementation of systematic approaches for tracking screening results and assurance that follow-up and treatment are provided within predetermined intervals have been critical to the success of the National Breast and Cervical Cancer Early Detection Program (NBCCEDP) (*13*). The program holds providers accountable for reporting performance data and achieving benchmarks for screening women, including time to diagnosis after an abnormal test result and time to treatment (*13*). A recent report using data from NBCCEDP found improvement in program performance measures, with higher percentages of women completing timely follow-up after abnormal screening test results and initiating treatment (*13*). The quality of breast cancer screening, follow-up, and treatment initiation among NBCCEDP providers improved through the widespread use of performance-based protocols designed to achieve predetermined program benchmarks (*13*). Expansion of health information technology through meaningful use of electronic health records is expected to improve quality, safety, and efficiency, leading to improved health outcomes.** Finally, centralized data systems such as population-based screening registries could be used to monitor and assure the quality of screening and timely diagnosis, and treatment of breast cancer (*20*).

The National Cancer Institute (NCI) sponsors the HMO Cancer Research Network, which provides a health system platform for

¶ Additional information available at http://www.cdc.gov/cancer/npcr/uscs/technical_notes/interpreting/race.htm.
** Additional information available at http://www.healthit.gov/policy-researchers-implementers/meaningful-use.

Key Points

- During 2005–2009, black women had lower breast cancer incidence rates but higher mortality rates compared with white women.
- Black women had nine more deaths than white women for every 100 breast cancers diagnosed in each group.
- Not all women receive the same follow-up of abnormal screening tests and treatment for breast cancer, leading to disparities in the frequency of breast cancer deaths.
- Patient navigation is a proven intervention in high-risk populations that could decrease inequities in access to timely follow-up and high-quality state-of-the-art treatment for breast cancer.
- For more information, see http://www.cdc.gov/vitalsigns.

conducting research on disparities in the delivery of screening and treatment and on interventions to improve access to and increase the effectiveness and efficiency of screening and treatment.[††] NCI recently funded a multisite program with the scientific goal of supporting research to better understand how to improve the screening process from recruitment, screening, and diagnosis to referral for treatment of breast, colon, and cervical cancer.[§§]

At the individual level, the maximal effectiveness of screening for breast cancer can only be achieved when all women have access to timely follow-up testing after abnormal breast cancer exams and state-of-the-art treatment. More research is needed to determine the best screening and treatment strategies for aggressive breast cancers. Optimal health-care delivery can be strengthened through performance-based reimbursement, expanded use of information technology, and quality assurance–reporting protocols. More work also is needed to develop, evaluate, and disseminate additional interventions to decrease inequities in follow-up after an abnormal mammogram and receipt of treatment (*6,10*).

[††] Additional information available at http://crn.cancer.gov.
[§§] Additional information available at http://appliedresearch.cancer.gov/networks/prospr.

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