Cancer in Oklahoma Data Brief Series:

Female Breast Cancer in Oklahoma

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Introduction

In the United States (US), 1 in 8 women will be diagnosed with breast cancer.[1] Breast cancer is the most commonly diagnosed cancer and second most common cause of cancer death among women in the US and in Oklahoma.[2,3] Breast cancer is a highly treatable and survivable cancer with 66.2% surviving at least five years.[4] Recent trends in the world and the US show either an increase or a flattening of female breast incident female breast cancer rates.[5] Breast cancer in women can be detected at an early, treatable stage using mammography, an evidence-based cancer screening test. The United States Preventive Services Task Force (USPSTF) recommends biennial screening with mammography for women age 50-74.[6] The Grade B recommendation states "there is high certainty that the net benefit is moderate or there is moderate certainty that the net benefit is moderate to substantial."[6] The goal of this data brief is to describe breast cancer incidence, mortality, and screening rates among women in Oklahoma. This brief concludes with a discussion of the significance of findings on clinical practice and public health policy.

Methods

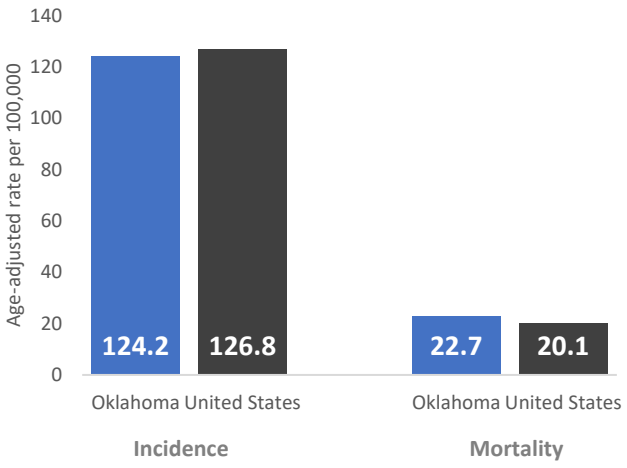
Data for cancer incidence were obtained from the Oklahoma Central Cancer Registry (OCCR), the Centers for Disease Control's (CDC) National Program of Cancer Registries (NPCR), and the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) program. Cancer mortality data were obtained from Oklahoma Vital Statistics and the CDC's National Vital Statistics System (NVSS). Information about breast cancer screening was obtained from the Behavioral Risk Factor Surveillance System (BRFSS). For this study, Hispanic persons were classified as being Hispanic regardless of race. Those who identified as White, Black or African American, American Indian or Alaska Native, and Asian or Pacific Islander were not of Hispanic ethnicity. All data sources used in this brief were publicly available.

To ensure the stability of estimates and confidentiality, rates were suppressed if fewer than 16 counts were reported in a specific category, and all rates were age adjusted to the 2000 US standard population. Breast cancer cases used in analyses were classified using the International Classification of Disease for Oncology system (ICD0-03 C50.0-50.9) and the sample was limited to women. Cases were limited to invasive incident cancers. Temporal patterns were assessed using Average Annual Percent Change (AAPC) in rates with 95% confidence interval (CI) determination by Joinpoint regression analysis.[7] BRFSS estimates were suppressed for stability if the unweighted sample size was less than 50. Unknown values were excluded, and resulting percentages were weighted averages estimated from the sample and population sizes. All incidence and mortality rates are reported per 100,000 population. Staging for this data brief used the SEER summary stage.[8]

Results

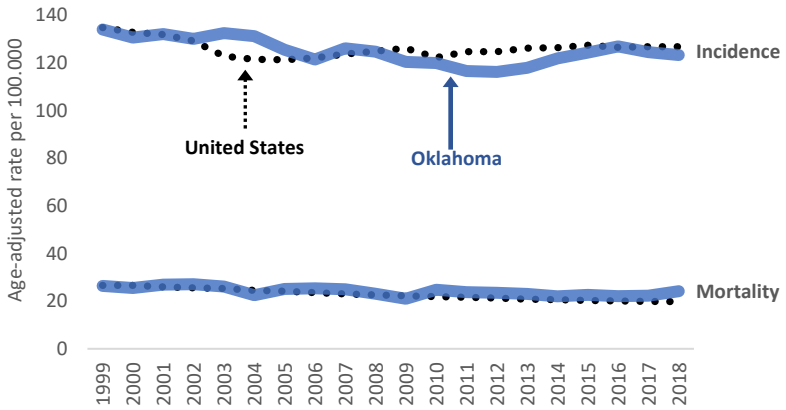
Overall, 1,246,304 invasive female breast cancers were diagnosed between 2014 and 2018 in the US. Of these cancers, 14,475 invasive female breast cancers were diagnosed in Oklahoma (1.2% of all US cases). In other words, there are nearly 3,000 women in Oklahoma diagnosed with invasive breast cancer each year. While 90% of American women diagnosed with breast cancer from 2011-2017 survived at least five years, 208,686 women succumbed to this disease, and 2,757 of those women were in Oklahoma (1.3% of all deaths). The 2014-2018 age-adjusted female breast cancer incidence rate in the US was 126.8 (95% CI:126.6,127.0) per 100,000 compared to 124.2 (95% CI:122.1,126.3) per 100,000 for Oklahoma (**Figure 1**). During that same time, the female age-adjusted breast cancer mortality rate was 20.1 (95% CI: 20.0,20.2) per 100,000 compared to 22.7 (95% CI:21.8,23.6) per 100,000 for Oklahoma.

Figure 1: Female breast cancer incidence and mortality by year Oklahoma and the US, 2014-2018



Source: SEER and CDC (NPCR and NVSS)

Figure 2: Female breast cancer incidence and mortality by year in Oklahoma and the US, 1999-2018

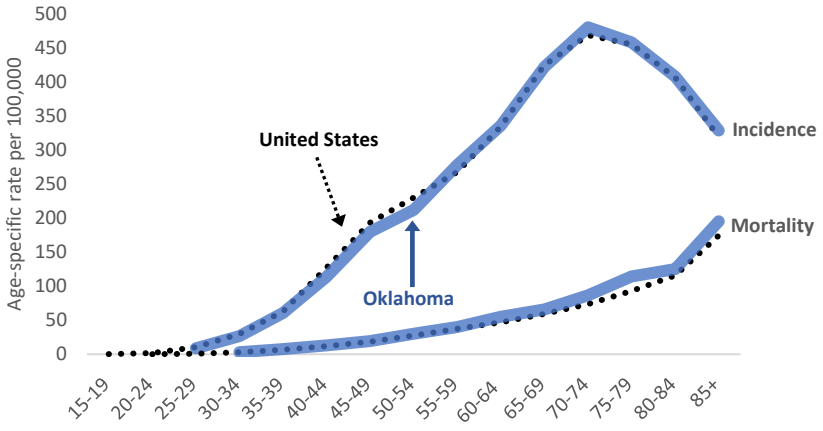


Source: SEER and CDC (NPCR and NVSS)

Figure 2 shows the trend in age-adjusted incidence rates and mortality rates per 100,000 women for Oklahoma and the US. There has not been a great deal of change in either incidence or mortality for the last 20 years. In Oklahoma, there has been a slight decrease in incidence from 1999 (134.0 per 100,000) to its lowest point in 2012 (116.2 per 100,000); however, there has been a slight increase from 2012 to 2018 at 123.3 per 100,000. There has been virtually no change in mortality from 1999 (26.4 per 100,000) to 2018 (24.2 per 100.000).

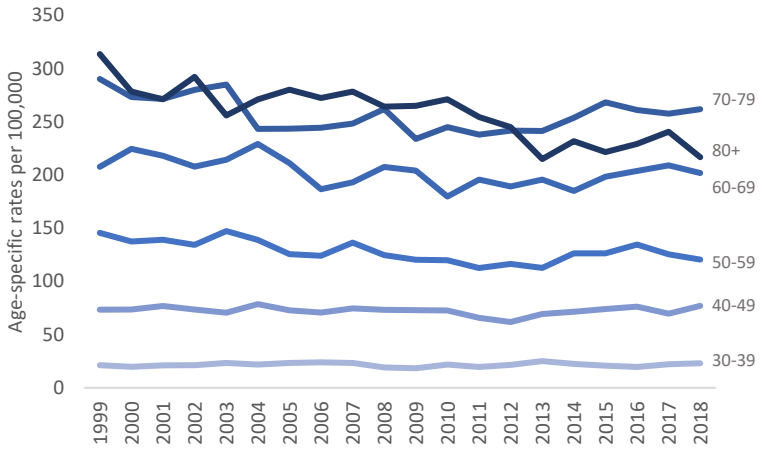
Figure 3 shows female breast cancer incidence and mortality by age for women in Oklahoma and the US. Female breast cancer incidence rises dramatically until the 70-74 age group, and then drops. Female breast cancer mortality steadily increases until the age 80-84 age group at which time the mortality rate begins to increase more steeply.

Figure 3: Female breast cancer incidence and mortality by age in Oklahoma and the US, 1999-2018



Source: SEER and CDC (NPCR and NVSS)

Figure 4. Female breast cancer incidence by age group and year in Oklahoma, 1999-2018

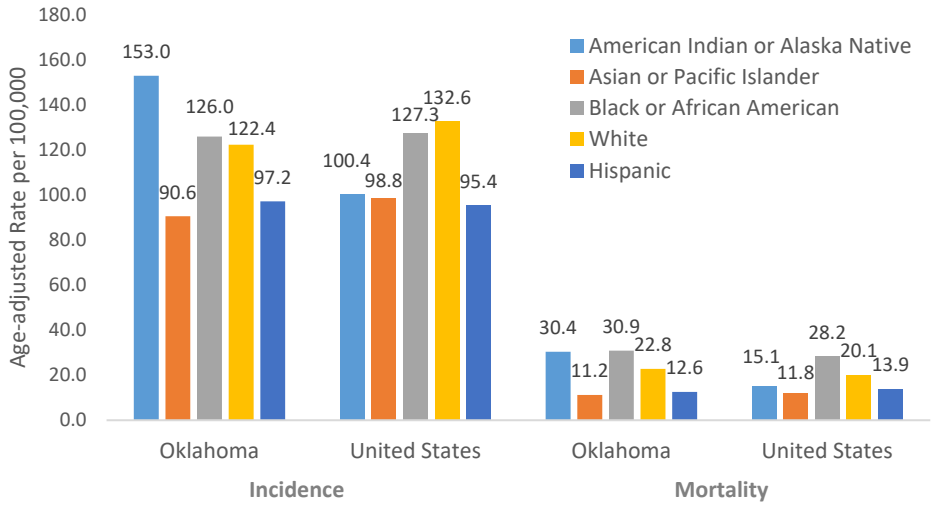


Source: OCCR and Oklahoma Vital Statistics

Figure 4 shows female breast cancer incidence by ten-year age groups for women in Oklahoma. These data show that women aged 80 and older (AAPC -1.50 p-value <.001), 60-69 (AAPC-0.5 p-value 0.025), and 50-59 (AAPC=-0.9 p-value 0.002) showed a statistically significant decline in incidence. However, women aged 40-49 (AAPC -0.2 p-value 0.361) and women aged 30-39 (AAPC 0.1; p-value 0.797) did not show a significant trend in incidence over this timeframe.

Figure 5 shows the age-adjusted incidence and mortality rates for female breast cancer (per 100,000 women) for Oklahoma and the US by race and ethnicity.

Figure 5: Age-adjusted female breast cancer incidence and mortality by race and ethnicity in Oklahoma and the US, 2014-2018

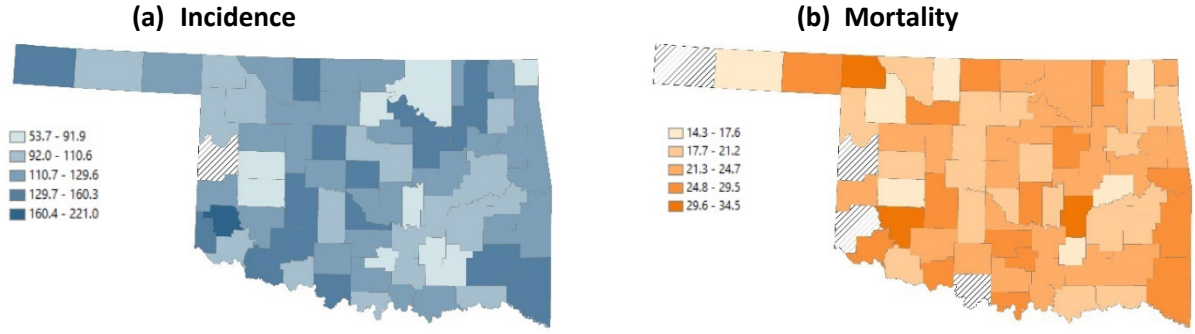


Source: SEER and CDC (NPCR and NVSS)

Compared to their US counterparts of the same race or ethnicity, American Indian or Alaska Native women (153.0 OK vs. 100.1 US) and Hispanic women (97.2 vs.95.4) in Oklahoma experienced higher incidence rates, while Asian or Pacific Islander women (90.6 vs. 98.8) and Black or African American women (126.0 vs. 127.3) and White women (122.4 vs. 132.6) experienced lower incidence rates (**Figure 5**). Compared to their US counterparts of the same race or ethnicity, American Indian or Alaska Native women (21.9 OK vs 15.2 US), Black or African American women (30.9 vs 28.2), and White women (22.8 vs 20.1) in Oklahoma experienced higher mortality rates, while Asian or Pacific Islander women (11.2 vs. 11.8) and Hispanic women (12.6,13.9) experienced lower rates. Among all major racial or ethnic groups in Oklahoma, American Indian and Alaska Native women had the highest age-adjusted incidence rate. In Oklahoma Black or African American women had the highest age-adjusted mortality rate (28.2 per 100,000).

Figure 6 shows maps of the female breast cancer (a) incidence and (b) mortality rates by county in Oklahoma. While there are no spatial clusters of incident female breast cancer (Moran's I p-value=0.107), slight rural and urban differences exist. Women residing in rural (non-metropolitan) counties were significantly less likely to be diagnosed with female breast cancer (59.9 per 100,000) than their counterparts residing in metropolitan counties (69.9 per 100,000). In addition, women living in rural counties were slightly less likely to die from female breast cancer, 11.9 per 100,000 vs. 12.6 per 100,000, respectively (data not shown, see **Appendix 1** for more detailed counts and rates by county).

Figure 6: Overall age-adjusted female breast cancer incidence and mortality rate by county Oklahoma, 2014-2018



Source: OCCR and Oklahoma Vital Statistics

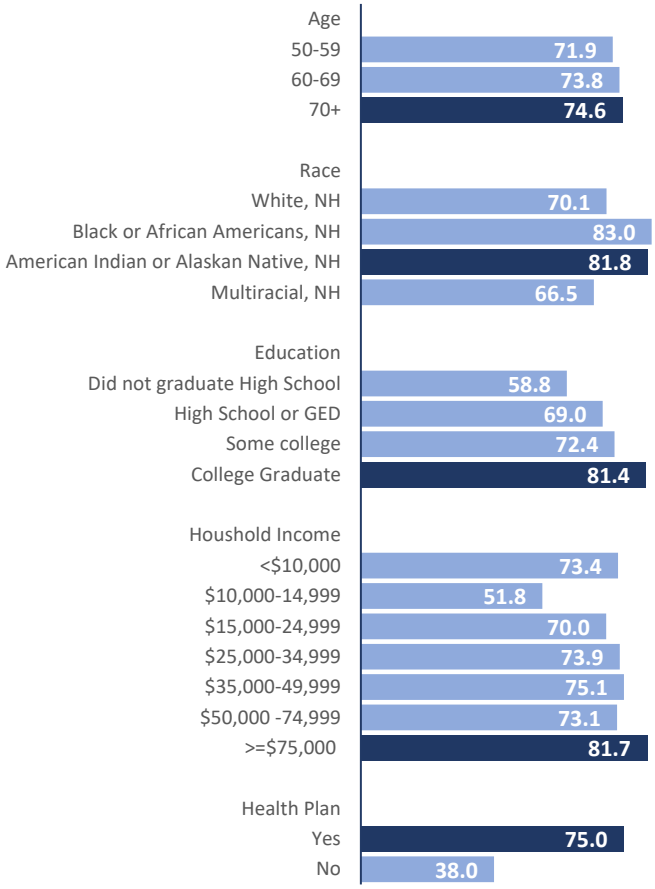
From 2017 to 2018, compared to national rates, women in Oklahoma were more likely to be diagnosed at a distant (6.9% OK, 5.8% US), regional (27.4%, 26.3%), or unknown stage (5.4%, 2.3%). Conversely, women in Oklahoma were less likely than women in the US to be diagnosed at the local stage (60.4%, 65.5%) (data not shown). In looking at stage of diagnoses by race and ethnicity, Black or African American women in Oklahoma were the most likely of any racial or ethnic group to be diagnosed with distant stage cancer (10%). Health care coverage shows extensive difference in diagnosis at distant stage depending on the source of coverage (**Table 1**). Oklahoma women with private health insurance had the lowest percentage of cancers diagnosed at a distant stage (5.8%). Women without health insurance coverage had a 3.6 times higher percentage (21.8%) of being diagnosed at distant stage (Table 1). Women with Medicaid coverage had the next highest percentage of distant stage diagnosis (11.9%). During the 2014 to 2018 interval, no women with either Military or Veteran's Administration coverage were diagnosed at a distant stage.

Table 1: Percent of female breast cancer cases by stage and payer source at diagnosis in Oklahoma, 2014-2018

Payer source at diagnosis	Localized	Regional	Distant	Unknown
Private insurance	60.9%	31.2%	5.8%	2.2%
Medicaid	49.4%	35.9%	11.9%	2.8%
Medicare	65.8%	24.0%	7.2%	3.1%
Military/VA	73.7%	26.3%	0.0%	0.0%
Indian/Public health service	65.6%	26.5%	7.9%	0.0%
Not insured	37.8%	34.7%	21.8%	5.7%

Source: OCCR

Figure 7: Percentage of Oklahoma women aged 50-75 who have had a mammogram in the past two years, 2020



Source: Oklahoma Behavioral Risk Factor Surveillance System (BRFSS)

Figure 7 shows the percentages of women aged 50 to 75 years in Oklahoma in 2020 who had had a mammogram in the past two years by sociodemographic characteristics. Overall, among Oklahomans aged 50-75, 71.9% had received a mammogram in the past two years compared to 78.3% among women in the US (data not shown). The rate in Oklahoma is less than the rate in 2000 at 74.3% (data not

shown). Black or African American women had the highest

(83.0%) proportion of women who had received a mammogram followed closely by American Indian or Alaska Native women (81.8%). White women (70.1%) and multiracial women (66.9%) were the least likely to have received a mammogram (Figure 6). As educational attainment increased so did the proportion of women who had a mammogram: 58.8% for respondents who did not graduate high school, 69.0% of for respondents who graduated high school, 72.4% for respondents who had some college, and 81.4% of respondent who graduated college. As income increased, the likelihood of mammography also increased, except for women with a household income of less than $10,000. Women whose household income was less than $10,000 had a higher proportion receiving a mammogram in the past two year (73.4%) than those with household incomes between $10,000 to 14,999 (51.8%) and $15,000 to $24,999 (70.0%). Finally, there was a large difference in the percentage of women who had received a mammogram based on health care coverage in which the percentage was 75.0% for women with coverage and 38.0% for women without it.

Conclusions and Implications for Practice and Policy

The breast cancer incidence rates for the overall Oklahoma and the US populations have improved only marginally over the past 20 years, and the mortality rate for the Oklahoma general population of women remain slightly higher than for the US. Major disparities in incidence for those identifying as American Indian or Alaska Native in Oklahoma, and mortality for American Indian or Alaska Native and Black or African American women in the state persist. Persons from several high-risk socioeconomic and racial or ethnic minority groups are less likely to undergo mammography and more likely to be diagnosed at a later and less treatable stage. Recommendations that could be used to reduce the disproportionate burden breast cancer places on high-risk populations of women in Oklahoma are discussed below.

Efforts to increase breast cancer screening are needed for several groups of women, including those who lack health insurance coverage, have lower educational attainment, or have income levels that may be too high for subsidized screening programs, but too low to be able to obtain health insurance coverage. For the latter, women whose household income was less than $10,000 had a higher proportion receiving a mammogram in the past two year (73.4%). Programs to increase health insurance coverage would enable more women to be screened. Although it is too soon to know, Oklahoma's recent expansion of Medicaid through the Affordable Care Act should help increase breast cancer screening rates in these groups. Also, fully funding federal programs to increase screening, such as the Breast and Cervical Cancer Early Detection Program (BCCEDP), would enable more low-income and uninsured women to be screened, as would increasing support provided by charitable organizations, such as Komen and the American Cancer Society.

Second, removing barriers to breast cancer screening and follow-up diagnostic services could increase screening rates in high-need populations. This could be accomplished by issuing standing orders for breast cancer screening so that women can get screened without the need to see a primary care provider and by providing screening via mobile mammography, especially in geographic locations in which standing mammography facilities may be located far from patients' homes. Increasing the number of facilities in Oklahoma recognized as mammographic centers of excellence would improve the quality of screening services.

Third, women with any of the cardinal breast cancer symptoms, including breast swelling of all or part of the breast, skin irritation or dimpling, breast or nipple pain, nipple retraction, redness, scaliness, or thickening of the nipple or breast skin, or nipple discharge, should receive prompt evaluation even if they have had a timely screening mammogram. At best, mammography reduces breast cancer mortality by 25%,[9] so even when rates of screening are high, mortality rates may remain high. This is especially true for women from groups with high mortality rates. For example, Black or African American women in Oklahoma have relatively high breast cancer screening rates, but they also have high breast cancer

mortality rates. Until screening modalities improve, prompt diagnosis and treatment at the time when symptoms occur may be one of the best ways to reduce mortality.

Fourth, there is a need to ensure that all Oklahoma women diagnosed with breast cancer have access to the newest, most effective treatments. This can be accomplished by providing funds to help patients address the financial challenges of treatment and funds to help defray the costs of traveling for care, including transportation and lodging costs.[10,11]

Finally, the lack of major improvement in breast cancer mortality over the past two decades signifies the need to develop more effective screening tests and more effective therapies. Newer but still experimental imaging modalities may prove superior to mammography. In 2019, the US Preventive Services Task Force (USPTF) issued a recommendation to screen women for hereditary cancer if they have a personal or family history of breast, ovarian, tubal, or peritoneal cancer or an ancestry associated with breast cancer susceptibility 1 and 2 (BRCA1/2)[12]. However, uptake of this guideline remains low. Moreover, recent advances in therapy, including immunotherapy, for breast cancer hold great promise in improving survival. As women who participate in clinical trials tend to have the best outcomes, efforts to enroll more women in trials to evaluate new breast cancer treatments are needed. Taken together, these and additional actions would enable Oklahoma to reduce the unacceptably high burden of breast cancer in the state.

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For more information, please contact: Community Outreach and Engagement, Stephenson Cancer Center, OU Health. Email: SCC-surveillance@ouhsc.edu

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