OKLAHOMA
State Department
of Health

CANCER BURDEN IN THE STATE OF OKLAHOMA - 2017

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Overview

Introduction

Cancer continues to be the second leading cause of death in Oklahoma, behind heart disease.[1] In 2018, cancer accounted for 21% of all deaths.[2] About 22,000 Oklahomans are diagnosed with cancer, and over 8,000 die from these diseases each year. Oklahoma has a unique racial and ethnic population comprised of almost four million individuals. There are considerable variations in cancer incidence and mortality between racial/ethnic groups. The reasons for these differences in both incidence and mortality rates are complex and vary for different cancer sites. Contributory factors include variations in cancer screening rates, prevalence of risk factors (modifiable and non-modifiable), and access to health insurance and health care services. Many cancers can be prevented. Nearly half of cancer deaths can be linked to modifiable risk factors, such as diet, physical activity, excess body mass, and tobacco use.[3] Regular screening can result in early detection of many cancers, when treatment is more likely to be successful.

Purpose

Cancer burden is defined as cancer diagnoses and the deaths, disabilities, and suffering caused by cancer. This report provides an in-depth analysis of the burden of cancer in Oklahoma. It analyzes five major cancer sites (breast, cervical, colorectal, lung and bronchus, and prostate) by race/ethnicity, age group, sex, geographic location, and stage at diagnosis. This report was written to assist health professionals, researchers, clinicians, students, and staff of cancer control organizations, community groups, and others who are working to reduce the burden of cancer throughout Oklahoma.

Understanding the cancer burden in Oklahoma is vital for a variety of reasons, including: to report cancer trends in the state; to educate the public; to provide information for planning and evaluation of cancer prevention and control activities throughout the state; and to demonstrate the importance of collecting population-based surveillance data.

Data Definitions and Sources

Data in this report represent the most updated data available for Oklahoma cancer incidence (through 2017), cancer mortality (through 2018), and national cancer incidence and mortality (through 2017).

Definitions

- *Age-adjusted rate*: A rate statistically modified to eliminate the effect of different age distributions in different populations.
- *Age-specific rate*: A rate limited to a particular age group.
- *Age adjustment*: A method used to make comparisons across groups over time. This method that calculates the weighted average of the rates within each age group and uses a standardized population to calculate the rate. This method reduces the confounding effect of age when comparing rates across different populations.
- *Cancer incidence:* The number of new cancer cases occurring in a population during a specified period of time, often expressed as a rate per 100,000 population.
- *Cancer mortality*: The number of cancer deaths occurring in a population during a specified period of time, often expressed as a rate per 100,000 population.
- *In situ*: Carcinoma in situ, also called in situ cancer, refers to a group of abnormal cells that have not spread from the location where they first formed. In general, it is the earliest form of cancer and is considered stage 0.
- *Rate:* The number of events (diseases or deaths) that occur during a specified time period.
- *Stage at diagnosis:* The proportion of cases diagnosed at a specified stage compared with all cases diagnosed during that time period.

Sources

The Oklahoma Central Cancer Registry (OCCR) and the Center for Health Statistics (CHS) at the Oklahoma State Department of Health (OSDH) collect data to measure a wide variety of population characteristics, including the incidence and mortality of cancer as well as behaviors related to the risk of developing cancer.

The OCCR collects and maintains cancer incidence data. The CHS collects and maintains the following:

- *Cancer mortality data:* Deaths of residents within the state of Oklahoma.
- *Hospital discharge data:* Reported discharges from inpatient and outpatient hospitals, and free-standing ambulatory surgery centers. This data is used to evaluate costs associated with cancer.
- *Behavioral Risk Factor Surveillance System (BRFSS):* A state-based telephone survey that collects data on the health behaviors of Oklahomans, which have been shown to be a major contributor to disease, injury, and premature death.

The United States Census Bureau collects and maintains census data on population, housing, and economic indicators and annual estimates are provided by the American Community Survey. The United States Cancer Statistics collates cancer registry data from the Centers for Disease Control and Prevention (CDC) National Program of Cancer Registries (NPCR) and the National Cancer Institute's (NCI) Surveillance, Epidemiology, and End Results (SEER) Program, as well as mortality data from CDC's National Center for Health Statistics. The statistics provide information on newly diagnosed cancer cases and cancer deaths for the whole U.S. population.

Suppression of Case Counts and Rates

Any case counts that are ten or less are suppressed to ensure confidentiality. Cancer rates made up of these small case counts are also not reported.

Data Notes

Unless otherwise indicated, all incidence rates are expressed as cases per 100,000 population and mortality rates are expressed as deaths per 100,000 population. All rates are expressed as age-adjusted or age-specific rates. A 95% confidence interval may be displayed as error bars on some graphs, which indicate a range of values that one can be 95% certain contains the true mean of a population.

Cancer Risk Factors and Screening Behaviors in Oklahoma

According to the American Cancer Society's Cancer Facts & Figures 2020, today cancer accounts for about 1 in every 6 deaths worldwide, and by 2040, the global burden is expected to reach 27.5 million new cancer cases and 16.2 million cancer deaths.[4] In 2021 in the United States, there will be an estimated 1.9 million new cancer cases and over 608,000 cancer deaths. In Oklahoma in 2021, there will be an estimated 22,800 new cancer cases and over 8,600 new deaths. From 2013-2017, the average annual incidence rate in was 449.4 cases per 100,000 Oklahomans. From 2014-2018, the average annual mortality rate was 179.4 deaths per 100,000 Oklahomans.[5]

Race and Ethnicity

Oklahoma has a unique racial and ethnic population of almost four million individuals. According to the U.S. Census and the 2019 American Community Survey, Oklahomans self-reported race is: 72.4% White, 8.0% American Indian or Alaska Native (AIAN), 7.3% Black or African American, 2.3% Asian, 2.3% some other race, and 0.1% Native Hawaiian and Other Pacific Islander. Two or more races were reported by 7.6% of the population. There is considerable variation in cancer incidence and mortality between racial/ethnic groups.

Racial Misclassification in Cancer Data

Accurately classifying race and ethnicity is imperative to accurately describing the burden of disease in a population and to identifying or describing existing disparities. Unfortunately, in Oklahoma, there is a long history of racial misclassification, particularly among the American Indian population. According to the CDC, "More American Indian and Alaska Native patients are misclassified as another race in cancer registry records than patients in other racial groups. Studies have found that this racial misclassification contributes to underestimates of cancer incidence and death rates among the American Indian/Alaska Native (AIAN) population. Accurate determination of disease burden is a critical first step toward identifying health disparities."[6]

One recognized method that can improve the accuracy of cancer burden estimates among the AIAN population is linkage with Indian Health Service (IHS) administrative records. The IHS provides medical services to AIAN who are enrolled members of federally recognized tribes. These individuals are included in IHS records if they have ever received services at an IHS facility. To address AIAN misclassification in cancer registry data, the OCCR annually links the cancer registry data to the IHS administrative records database. This linkage helps provide a more comprehensive and accurate picture of the cancer burden in this population, helping to reduce the underreporting of cancer incidence and mortality in this population.

Ethnicity

In Oklahoma, the largest ethnic group is Hispanic. Those individuals who are of Hispanic ethnicity will fall into one of the racial groups as well. The large majority of individuals with Hispanic ethnicity are also classified as White, however they may be of any race(s). In Oklahoma, among all races, 11.1% of individuals reported being of Hispanic or Latino ethnicity according to the U.S. Census and the 2019 American Community Survey.

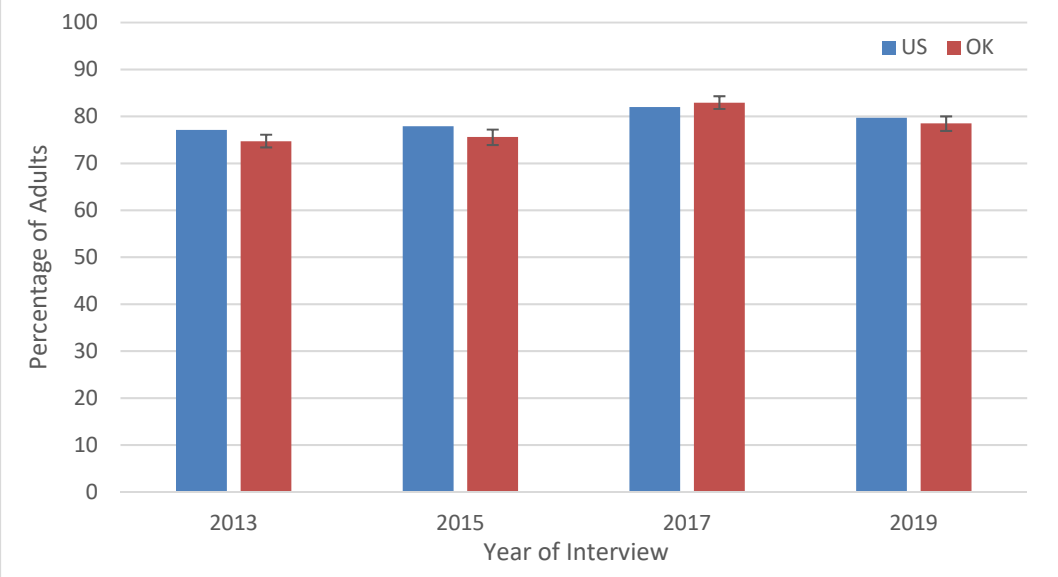
Behavioral Risk Factors

Diet, physical activity, alcohol consumption and tobacco use are some of the most-studied known risk factors for cancer.[7,8] Decreasing unhealthy behaviors and increasing healthy behaviors can impact cancer rates over time. Data from the Behavioral Risk Factor Surveillance System (BRFSS) is used to track self-reported behaviors among Oklahomans. Prevalence of various cancer-related behavioral risk factors from 2012 to 2019, with error bars showing 95% confidence intervals, are displayed in the figures below. If the U.S. prevalence is beyond the Oklahoma 95% confidence interval that implies statistically significant difference.

Diet

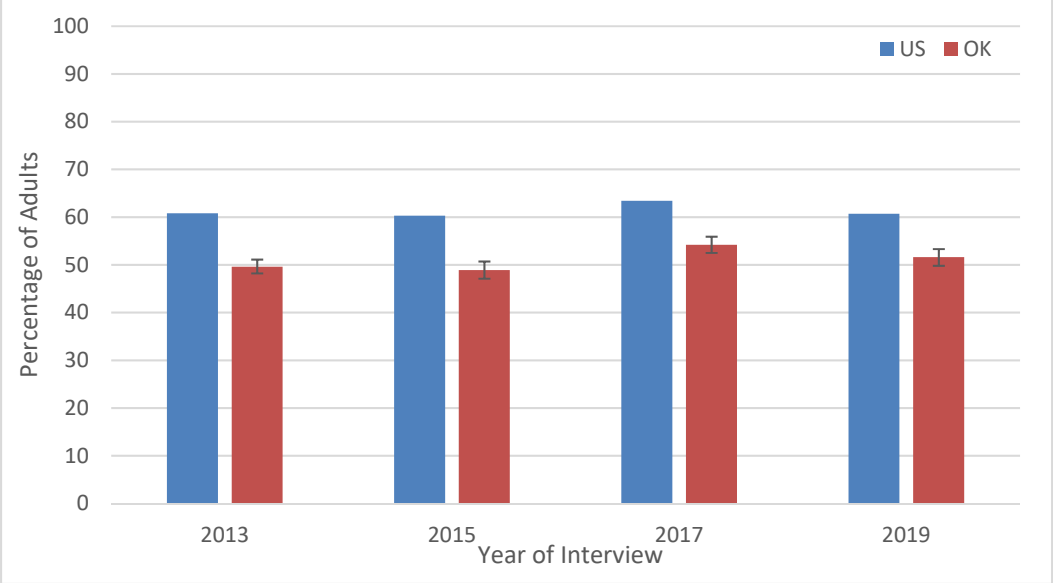
Low fruit and vegetable intake was one of the leading risk factors for death from cancer worldwide.[7] Those diets with an emphasis on a variety of fruits and vegetables, whole grains, legumes, and fish or poultry and fewer red and processed meats are associated with lower risk.[9,10] In 2019, 79.7% of adults in the U.S. consumed vegetables one or more times per day. In Oklahoma, 78.5% of adults consuming vegetables one or more times per day (Figure 1). The percentages were lower overall for consumption of fruits. In Oklahoma, 51.6% of adults consumed fruit more than once per day while in the U.S., the percentage was higher at 60.7% of adults consuming fruit one or more times per day (Figure 2).

Figure 1: Percentage of Adults Reporting Consuming Vegetables One or More Times per Day, 2013-2019



Data Source: Behavioral Risk Factor Surveillance System (BRFSS). 2020.

Figure 2: Percentage of Adults Reporting Consuming Fruits One or More Times per Day, 2013-2019



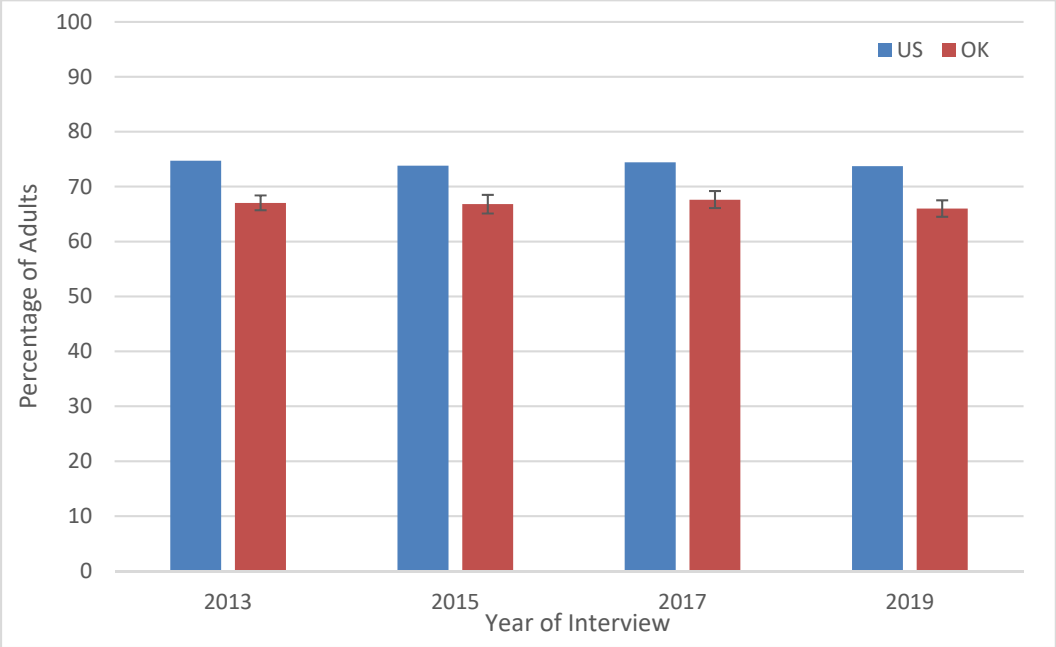
Data Source: Behavioral Risk Factor Surveillance System (BRFSS). 2020.

Physical Activity

According to American Cancer Society researchers, at least 42% of newly diagnosed cancers in the U.S. – about 750,000 cases in 2020 – are potentially avoidable, including the 18% caused by a combination of excess body weight, alcohol consumption, poor nutrition, and physical inactivity.[4] The latest recommendations for adults call for 150-300 minutes of moderate intensity or 75-150 minutes of vigorous intensity activity each week, or a combination of these activities.[11] For children and adolescents aged 2 to 19, the recommendation is at least 60 minutes of moderate or vigorous intensity activity each day. Moderate activities are those that make you breathe as hard as you would during a brisk walk. This includes things like walking, biking, or even housework and gardening. Vigorous activities make you use large muscle groups and make your heartbeat faster, make you breathe faster and deeper, and also make you sweat.

When adults were asked about physical activity, the responses followed a similar pattern as consumption of fruits and vegetables, with Oklahomans reporting lower levels of physical activity than their U.S. counterparts (Figure 3). In the 2019 BRFSS, when asked if they had participated in any physical activities in the past month, 66.0% of Oklahoman adults reported that they had, compared with 73.7% of adults in the U.S.

Figure 3: Percentage of Adults Reporting Participating in Any Physical Activity in the Past Month, 2013-2019

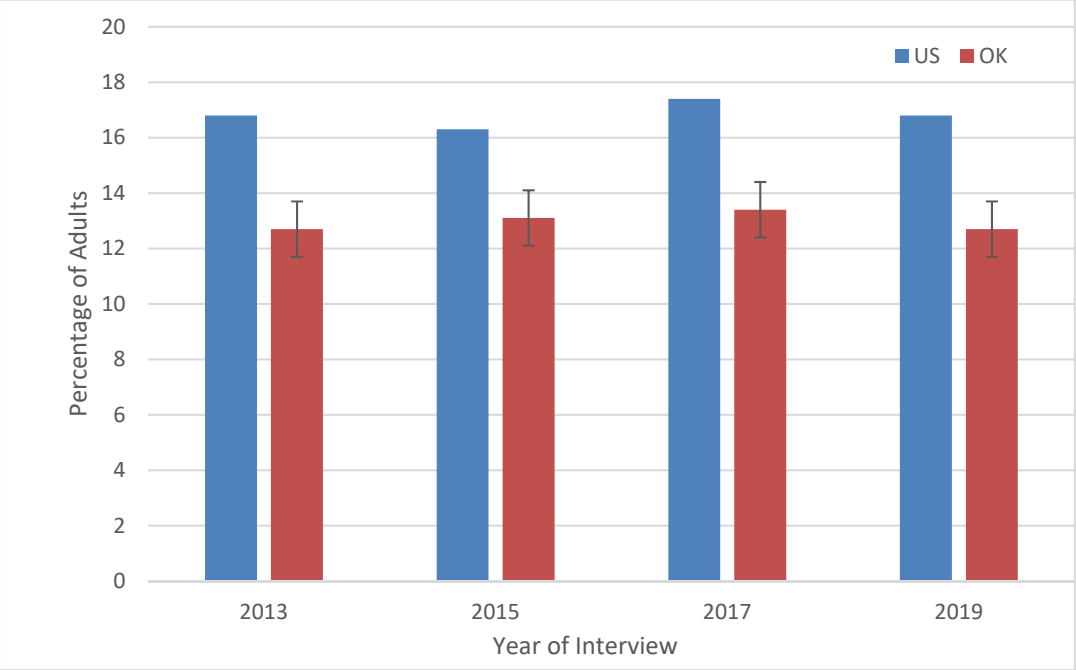


Data Source: Behavioral Risk Factor Surveillance System (BRFSS). 2020.

Alcohol Consumption

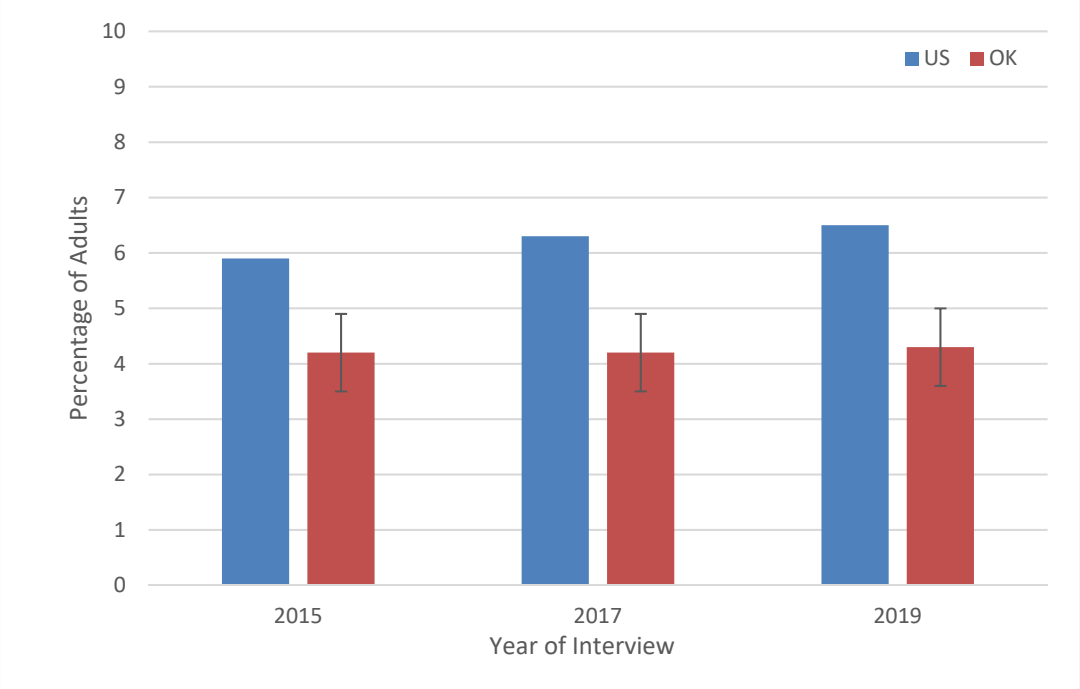
According to American Cancer Society, there are convincing evidence that drinking alcohol increased the risk of cancers of the mouth, esophagus, breast, and colorectum (latter in men). [7] However there were probable evidence that drinking alcohol increased risk of liver and colorectal cancer (latter in women). Throughout both the U.S. and Oklahoma, from 2013 through 2019, adults who reported binge drinking within past month has decreased (Figure 4). In 2019, the percentage of Oklahoman adults who reported heavy drinking (adult men having more than 14 drinks per week and adult women having more than 7 drinks per week) was 4.3% which was significantly lower than the U.S. at 6.5% (Figure 5).

Figure 4: Percentage of Adults Reporting Binge Drinking (males having five or more drinks on one occasion, females having four or more drinks on one occasion) in the Past Month, 2013-2019



Data Source: Behavioral Risk Factor Surveillance System (BRFSS). 2020.

Figure 5: Percentage of Adults Reporting Heavy Drinking (males having more than 14 drinks per week, females having more than 7 drinks per week) in the Past Month, 2015-2019

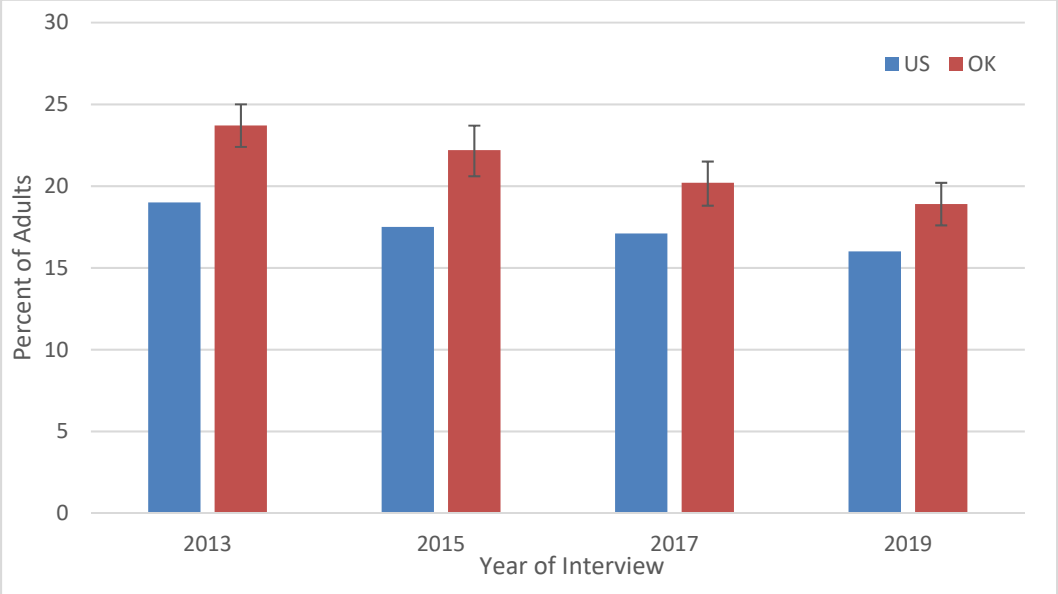


Data Source: Behavioral Risk Factor Surveillance System (BRFSS). 2020.

Tobacco Use

Tobacco use is another important behavioral risk factor for development of cancer. According to a recent study by the American Cancer Society, at least 19% of newly diagnosed cancers in the U.S. are caused by smoking.[4] Throughout both the U.S. and Oklahoma, from 2013 through 2019, adults who are current smokers has decreased (Figure 6). While the percentage of Oklahoman adults who are current smokers is still higher than adults in the U.S., it has decreased from 23.7% in 2013 to 18.9% in 2019.

Figure 6: Percentage of Adults Reporting Smoking Tobacco Every Day, 2013-2019



Data Source: Behavioral Risk Factor Surveillance System (BRFSS). 2020.

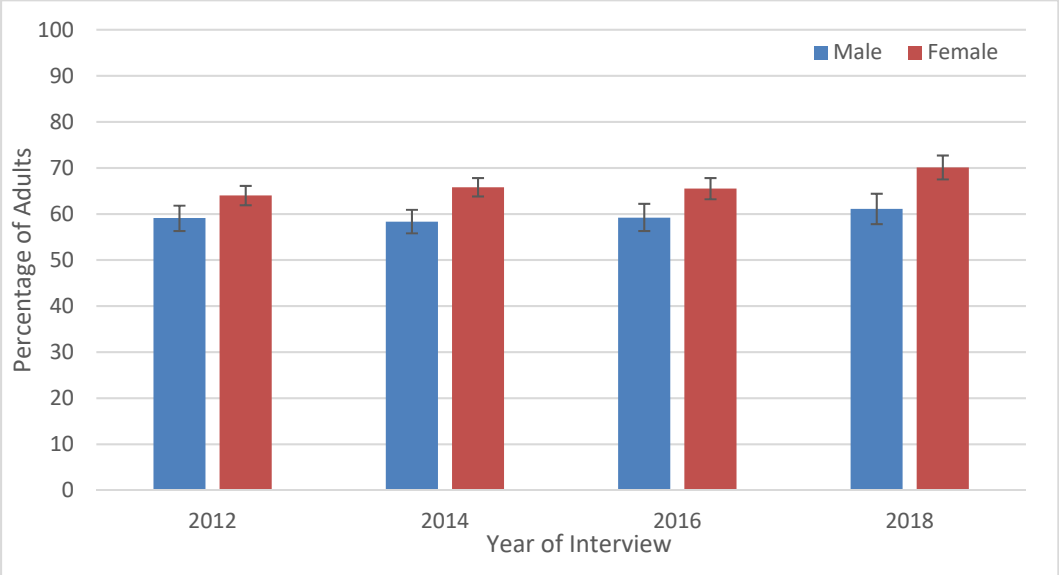
Cancer Screening

There are some types of cancer that have screening tests available. The BRFSS collects data on self-reported screenings for several of these, including colorectal, prostate, breast, and cervical cancers.

Sigmoidoscopies or Colonoscopies (Colorectal Cancer)

Over the past few years, the percentage of adults 50 years and older who reported having ever received a sigmoidoscopy or colonoscopy has remained fairly stable. In 2018, more females (70.1%) than males (61.1%) reported receiving screening (Figure 7).

Figure 7: Percentage of Adults 50+ Years Reporting Ever Having Received a Sigmoidoscopy or Colonoscopy, 2012-2018

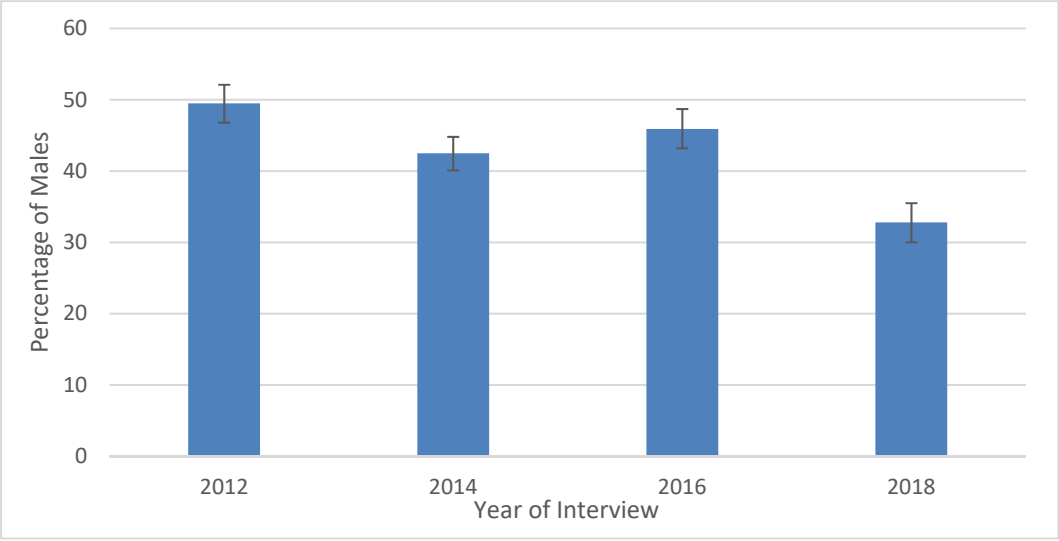


Data Source: Behavioral Risk Factor Surveillance System (BRFSS). 2020.

PSA test (Prostate Cancer)

Among males 40 years and older, there is a screening test available for prostate cancer known as the Prostate Specific Antigen (PSA) test. While there is some controversy regarding the accuracy of this test, it is currently the test recommended by the American Cancer Society for males 40 and older to receive regularly, to assess risk for prostate cancer.[12,13] In 2018, 32.8% of the male population in Oklahoma 40 years or older reported receiving a PSA in the past two years (Figure 8).

Figure 8: Percentage of Males 40+ Years Reporting Received a PSA Test in the Past Two Years, 2012-2018

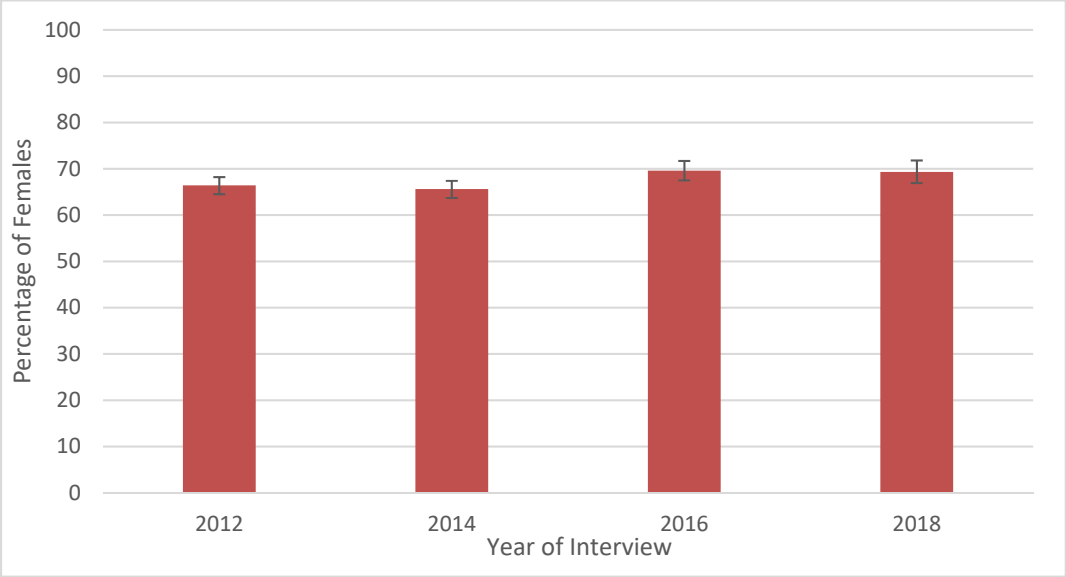


Data Source: Behavioral Risk Factor Surveillance System (BRFSS). 2020.

Mammogram (Breast Cancer)

Among females 40 years and older, it is recommended by the American Cancer Society to receive a mammogram annually to screen for breast cancer.[14,15] Among higher risk populations, the age and frequency will differ based on a physician's recommendation. The BRFSS asks females 40 years and older if they have received a mammogram in the past two years. The proportion of the female population 40 years and older who reported receiving a mammogram in the past two years has remained stable in recent years. In 2012, 66.4% of females reported having been screened, compared with 65.6% in 2014, 69.6% in 2016, and 69.3% in 2018 (Figure 9).

Figure 9: Percentage of Females 40+ Years Reporting Received a Mammogram in the Past Two Years, 2012-2018

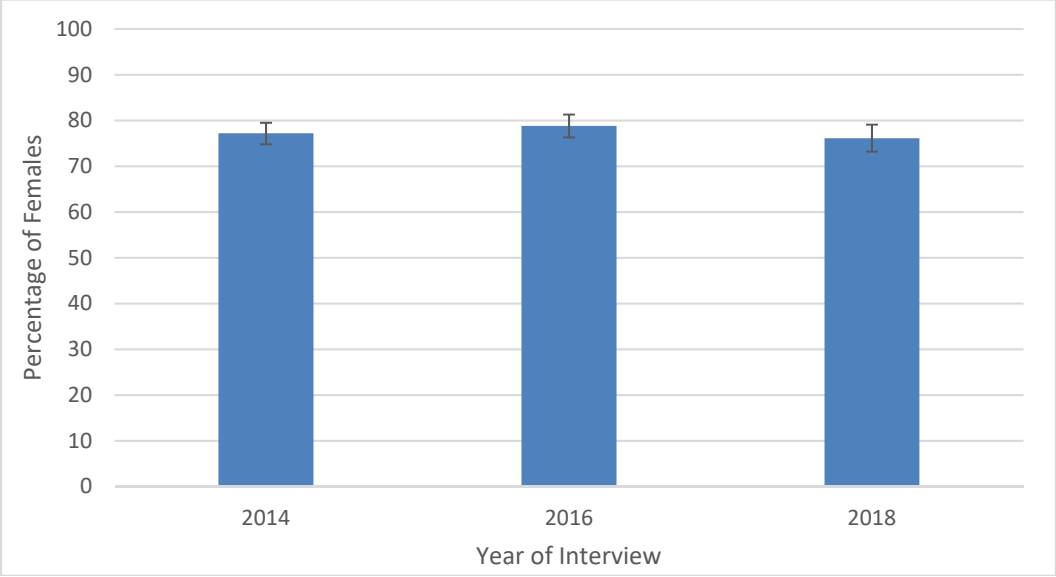


Data Source: Behavioral Risk Factor Surveillance System (BRFSS). 2020.

Pap Test (Cervical Cancer)

A Papanicolaou test (pap test) is one of the available tests recommended by the American Cancer Society for females to screen for abnormal cells in their cervix.[16] This test can not only detect cancer but is also a form of treatment since abnormal cells may actually be removed during the test. Positive results for a pap test can result in additional treatments and more frequent screenings and ultimately prevent the development of cervical cancer. The BRFSS asks females aged 21 to 65 if they have received a pap test in the past three years. The proportion of the population that has reported receiving this screening test is among the highest of all cancer screening tests and has remained stable over time. The percentage of females in Oklahoma aged 21 to 65 who reported having received this test in the past three years was 77.2% in 2014, 78.8% in 2016, and 76.1% in 2018 (Figure 10). The human papillomavirus (HPV) test is another available screening test for cervical infection by high-risk types of HPV that are more likely to cause pre-cancers and cancers of the cervix. The test can be done by itself or at the same time as the Pap test (called a co-test) (with the same swab or a second swab), to determine your risk of developing cervical cancer. [17] Currently there is no BRFSS data on percentage of females reporting they've received HPV testing.

Figure 10: Percentage of Females 21-65 Years Reporting Received a Pap Test in the Past Three Years, 2014-2018



Data Source: Behavioral Risk Factor Surveillance System (BRFSS). 2020.

Female Breast Cancer

Breast cancer is not one disease; rather it is several diseases that behave differently.

Breast cancers are the most common cancers among females in Oklahoma.
More than 1 in 4 cancers diagnosed among women in the state are breast cancers.
The average age at diagnosis between 2013 and 2017 was 63 years.

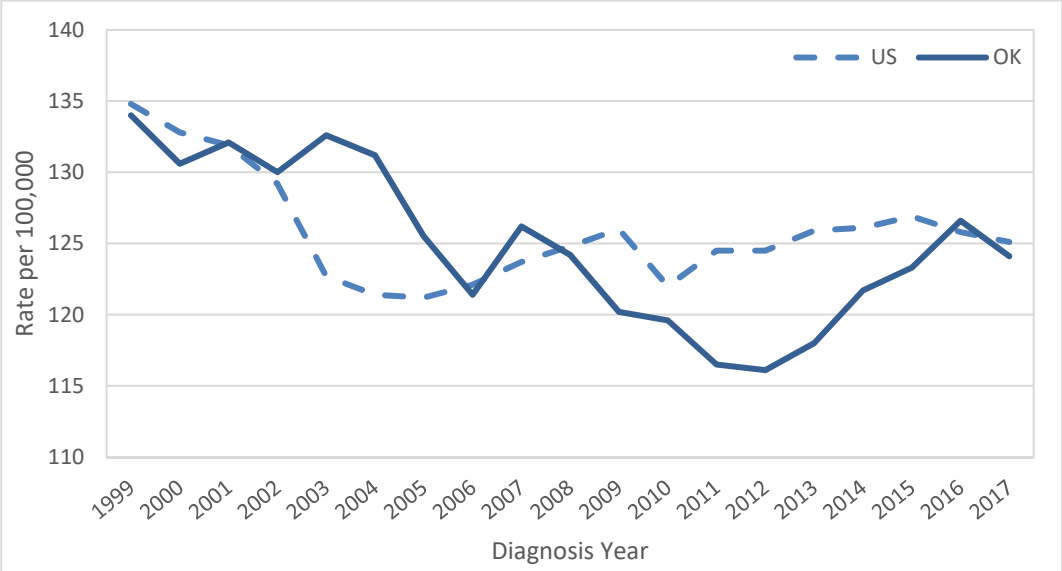
Oklahoma compared to the United States

Incidence

In 2017, 3,413 women were diagnosed with breast cancer in Oklahoma, an age-adjusted rate of 143.8 cases per 100,000 women. Of these, 460 were *in situ*. The remaining 2,953 cases (124.1 cases per 100,000 women) made up 27% of all cancers diagnosed among women that year.

In 2017, the incidence of female breast cancer in Oklahoma was just under that of the U.S. (125.1 cases per 100,000 women). Ninety-six percent of cases in both the U.S. and Oklahoma were diagnosed among females aged 40 and older. From 1999-2017, female breast cancer incidence in Oklahoma has decreased 8%, comparable to a 7.8% decrease across the nation (Figure 11).

Figure 11: Age-Adjusted Female Breast Cancer Incidence Rates in OK and the U.S., 1999-2017



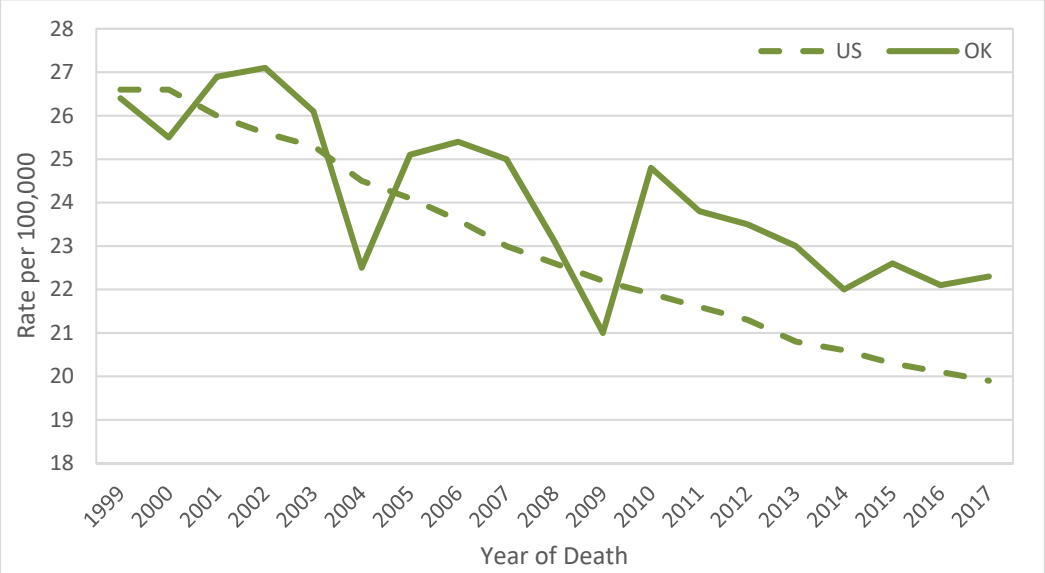
Data Sources: Oklahoma Central Cancer Registry (OCCR). December 2019 submission.
United States Cancer Statistics (USCS). Released June 2020.

Mortality

In 2017, 556 women died from breast cancer in Oklahoma, a rate of 22.4 deaths per 100,000 women. This made up 15% of all cancer deaths among women that year. Breast cancer was the second leading cause of cancer deaths in women in 2017.[17] In 2018, that number rose to 610 deaths (24.3 deaths per 100,000 women).

Mortality from breast cancer has been declining in both the United States and Oklahoma since 1999 (Figure 12). In 2017, the mortality rate from female breast cancer in Oklahoma was comparable to that of the U.S. (19.9 deaths per 100,000 women). From 1999 to 2017, there was a 25% decline in deaths from breast cancer in the U.S. compared to a 16% decline in Oklahoma. Due to the smaller number of total deaths in Oklahoma, the rate is less stable and therefore shows more variation over time. However, since 2010, female mortality rates due to breast cancer have remained approximately 10% higher than those of the U.S.

Figure 12: Age-Adjusted Female Breast Cancer Mortality Rates in Oklahoma and the U.S., 1999-2017



Data Sources: OCCR. December 2019 submission.
USCS. Released June 2020.

Who Gets Breast Cancer in Oklahoma?

Female breast cancer impacts women of all races and ethnicities and across all age groups. However, the rate at which women are diagnosed with and die from breast cancer varies between these groups.

Race/Ethnicity

Incidence

As seen in Table 1, from 2013-2017, age-adjusted incidence rates among white women were lower than that of both American Indian/Alaskan Native (AIAN) and black women. While the number of cases

among white women is the highest compared to these other groups, the general population of this groups is also higher.

Table 1: Female Breast Cancer Case Count and Age-Adjusted Incidence Rates by Race and Ethnicity, 2013-2017

Race/Ethnicity	Number of Cases	Age Adjusted Incidence Rate (per 100,000 women)
AIAN	1,583	185.4
Black	1,025	142.6
White	12,779	137.9
Hispanic*	583	119.8

***This is not a mutually exclusive grouping**

Data Source: OCCR. December 2019 submission.

From 1997 to 2017, breast cancer increased among AIAN and black women, 14% and 5% respectively, while decreasing 4% among white women during the same time period (Figure 13). However, in the last ten years, rates have decreased across all groups: 21% decrease among black women and 5% decrease among both white and AIAN women.

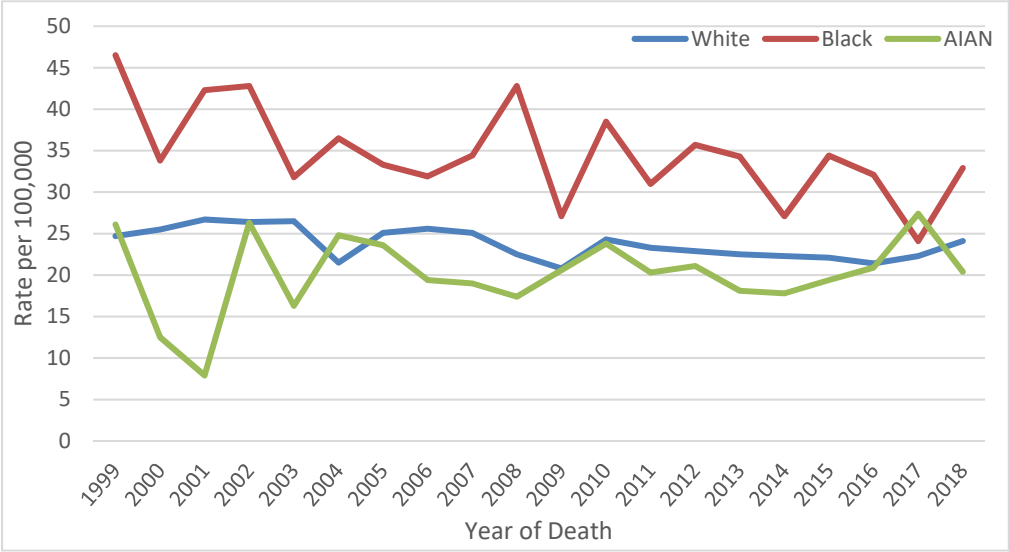
Figure 13: Age-Adjusted Female Breast Cancer Incidence Rates by Race, 1997-2017

Data Source: OCCR. December 2019 submission.

Mortality

Black women had the highest mortality rate from breast cancer in 2018 (32.9 deaths per 100,000 women), followed by white (24.1 deaths) and AIAN (20.4 deaths) women. Mortality rates among all groups have declined since 1999 (29% decrease for black women; 22% decrease for AIAN women; 2% decrease for white women) (Figure 14).

Figure 14: Age-Adjusted Female Breast Cancer Mortality Rates by Race, 1999-2018



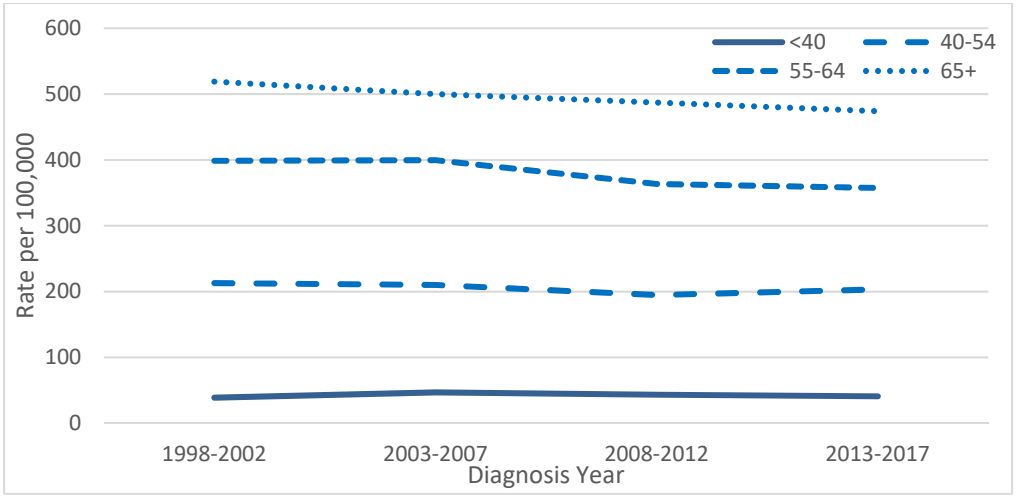
Data Source: OCCR. December 2019 submission.

Age Group

Incidence

From 1998-2017, the incidence of female breast cancer in Oklahoma has declined among the older age groups (Figure 15). There has been a 5%, 10%, and 9% decline in breast cancer incidence among females 40-54 years, 55-64 years, and 65+ years, respectively. The incidence among females <40 years has increased by 5% in the same time period.

Figure 15: 5-year Age-Specific Female Breast Cancer Incidence Rates by Age Cohort, 1998-2017

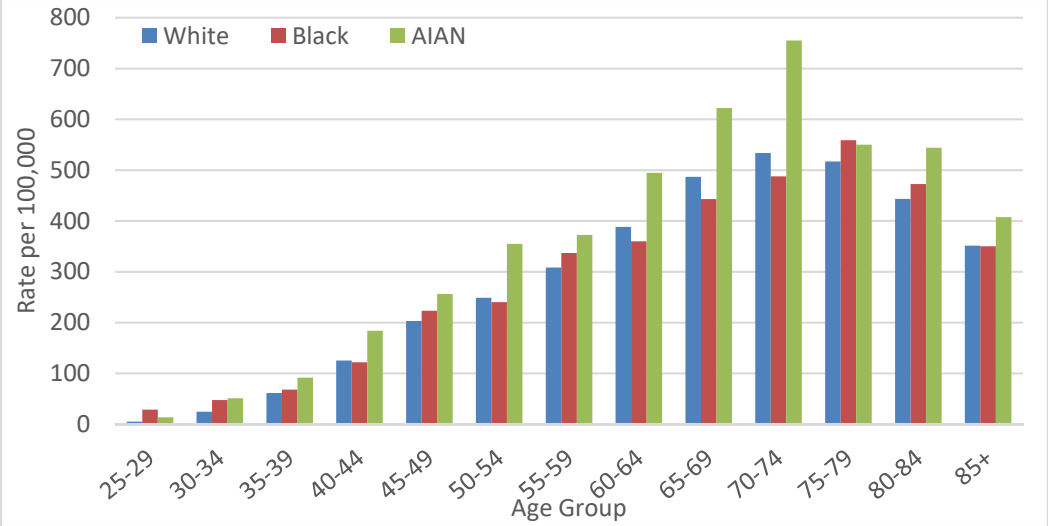


Data Source: OCCR. December 2019 submission.

Broken down further by race, breast cancer incidence peaked at slightly different age groups between these groups during the past five years (Figure 16). AIAN women had the highest 5-year rate of 755.0 cases per 100,000 women among those aged 70-74 years. The highest 5-year rate among white women

occurred in this same age group, with 533.6 cases per 100,000 women. Incidence rates peaked at slightly older ages among black women (74-79 years) at 559.0 cases per 100,000 women.

Figure 16: Age-Specific Female Breast Cancer Incidence Rates by Race and Age Group, 2013-2017

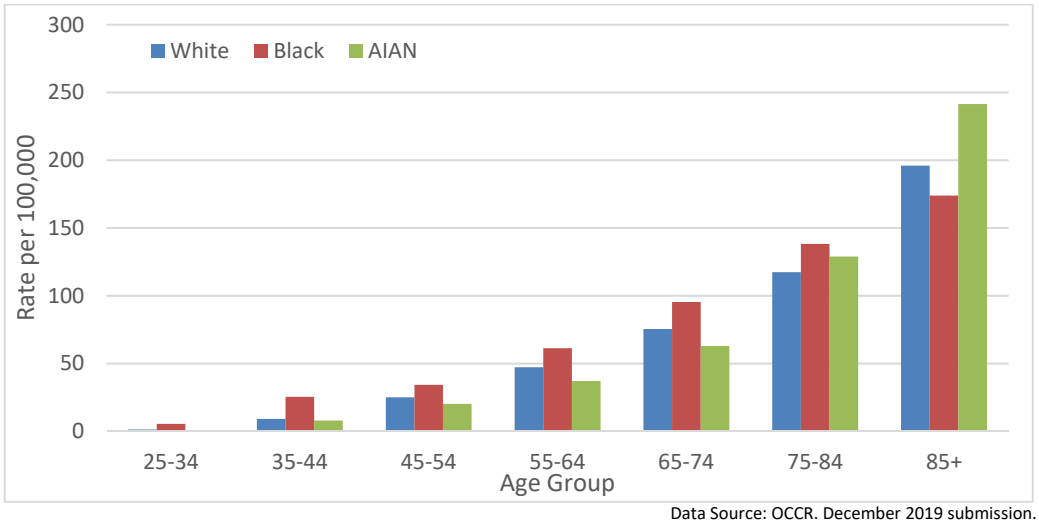


Data Source: OCCR. December 2019 submission.

Mortality

Black women experience higher female breast cancer mortality, compared to white and AIAN, in all age groups until age 75+ (Figure 17).

Figure 17: Age-Specific Female Breast Cancer Mortality Rates by Race and Age Group, 2014-2018



Data Source: OCCR. December 2019 submission.

Sex

Incidence

Breast cancer does occur in both males and females; however, most cases occur among females. From 2013-2017, there were a total of 16,535 reported breast cancer cases among women (14,144 excluding

in situ), while there were 131 reported cases among males (124 excluding *in situ*) during those five years, an age-adjusted incidence rate of 1.3 cases per 100,000 men.

Mortality

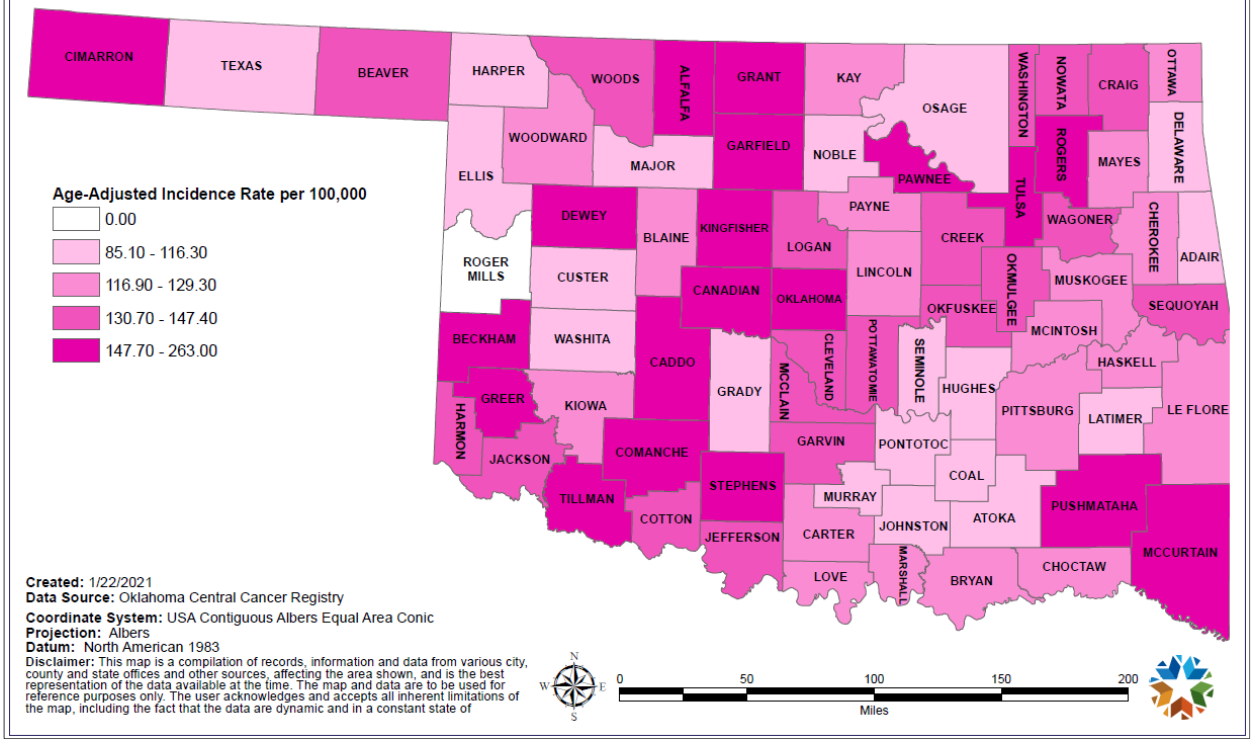
From 2014-2018, there were 2,756 deaths among females (22.7 deaths per 100,000 women) compared with 28 deaths among males (0.3 deaths per 100,000 men).

Location

Incidence

The overall breast cancer incidence in Oklahoma from 2013-2017 was 143.8 cases per 100,000 women. From 2013-2017, 24 counties in Oklahoma had a higher incidence rate compared to that of the state (Map 1). Greer (263.0 cases per 100,000 women), Tillman (185.9), Alfalfa (184.4), Pushmataha (176.0), and Grant (171.3) counties had the highest incidence rates of breast cancer for women during this time.

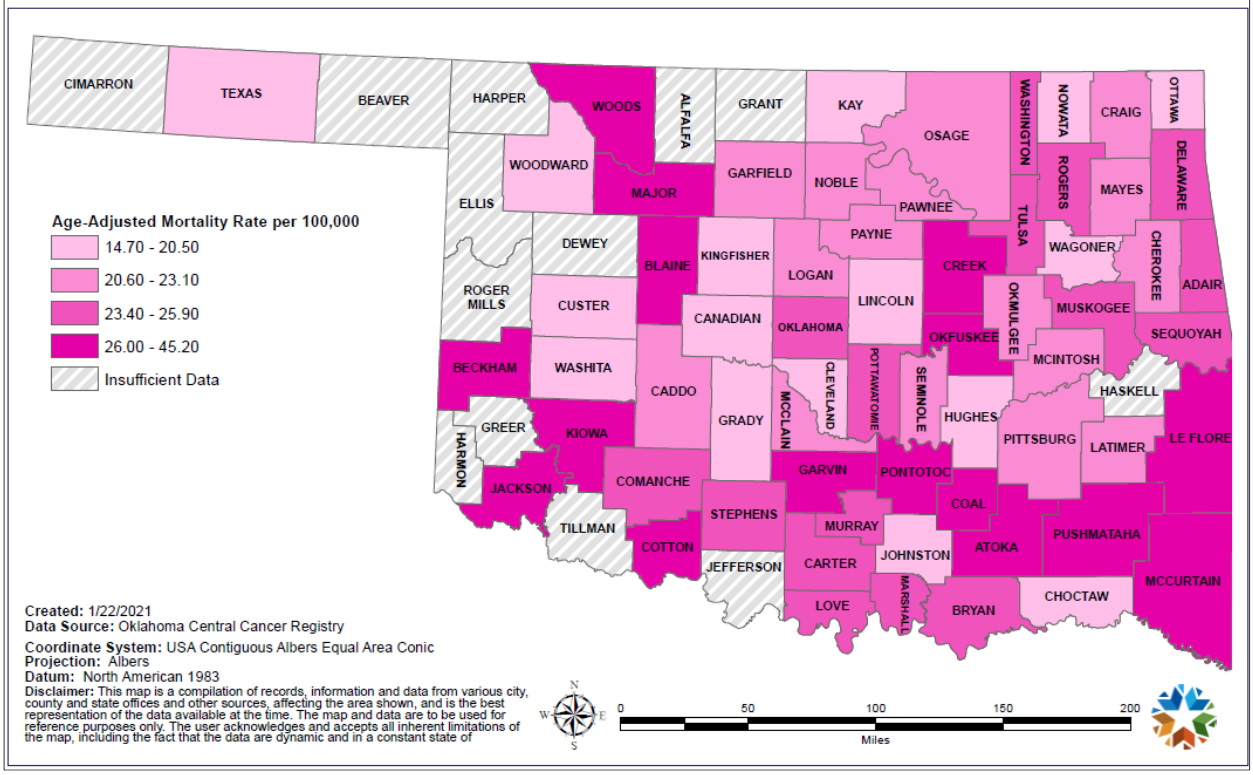
Map 1: Female Breast Cancer Incidence Rates in Oklahoma by County, 2013-2017



Mortality

The overall breast cancer mortality in Oklahoma from 2014-2018 was 22.7 cases per 100,000 women. From 2014-2018, 35 counties in Oklahoma had a higher mortality rate compared to that of the state (Map 2). Major (45.2 deaths per 100,000 women), Kiowa (40.9), Atoka (34.7), Cotton (31.9), and McCurtain (31.7) had the highest rates of death from breast cancer for women during this time.

Map 2: Female Breast Cancer Mortality Rates in Oklahoma by County, 2014-2018

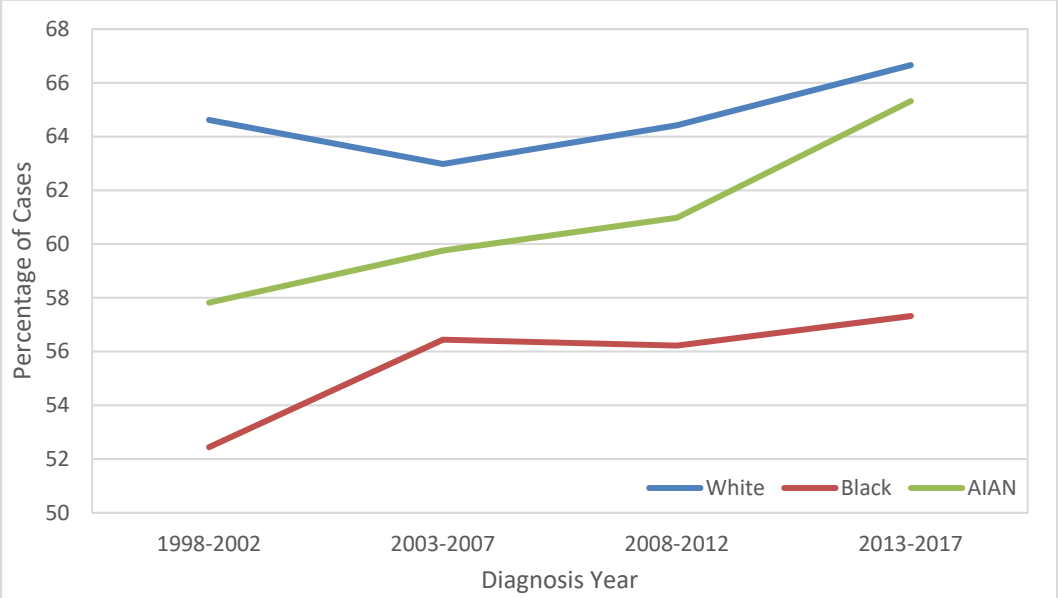


Stage at Diagnosis

Breast cancer can be detected *in situ* or at local stages, "early stage", which increases chances of survival. In 2017, over two-thirds (68 percent) of breast cancers in Oklahoman women were diagnosed at an early stage. Looking at stage at diagnosis over time is one way to assess the effectiveness of screening and early intervention efforts in the population. From 1998-2017, there has been shift from late stage to early stage diagnoses of breast cancer in Oklahoma.

Across all races, the proportion of cases diagnosed at early stages has increased over time (Figure 18). However, disparities exist in stage at diagnosis by race, with white females having the largest proportion of cases diagnosed at early stages (66.7%), followed by AIAN (65.3%) and finally black females (57.3%).

Figure 18: 5-Year Proportion of Female Breast Cancer Cases Diagnosed at Early Stage by Race, 1998-2017



Data Source: OCCR. December 2019 submission.

Cervical Cancer

Cervical cancer is 93% preventable through screening and vaccination.[17]

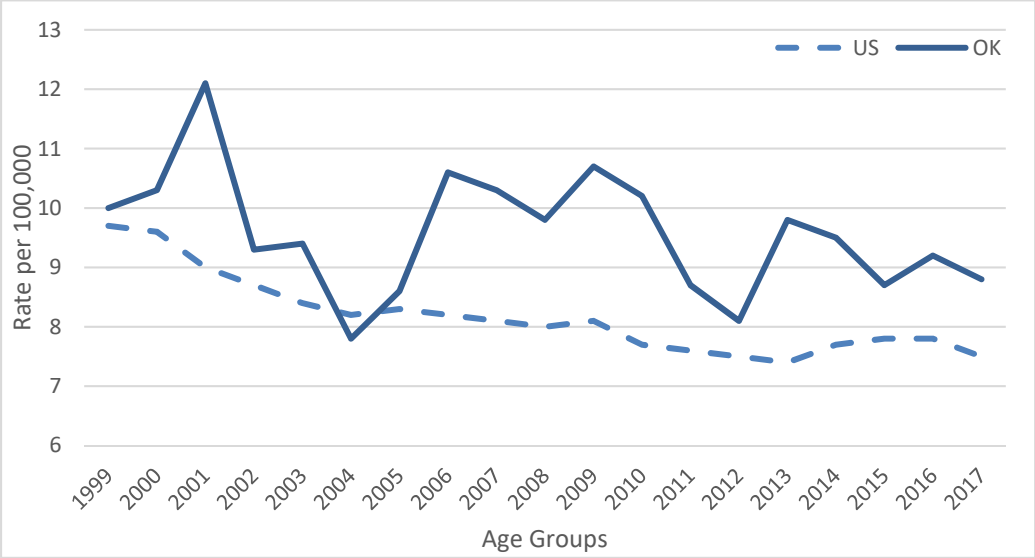
Cervical cancer is the 10th leading cause of cancer deaths among females in Oklahoma.
1 in 64 cancers diagnosed among females in Oklahoma is cervical cancer.
The average age at diagnosis between 2013 and 2017 was 49 years.

Oklahoma compared to the United States

Incidence

In 2017, there were 171 cervix uteri cancers diagnosed in Oklahoman women, an age-adjusted incidence rate of 8.8 cases per 100,000 women. By comparison, in 2017 the national incidence rate was 7.5 cases per 100,000 women. From 1999-2017, cervical cancer incidence in Oklahoma has decreased just 12% compared with 23% nationally (Figure 19).

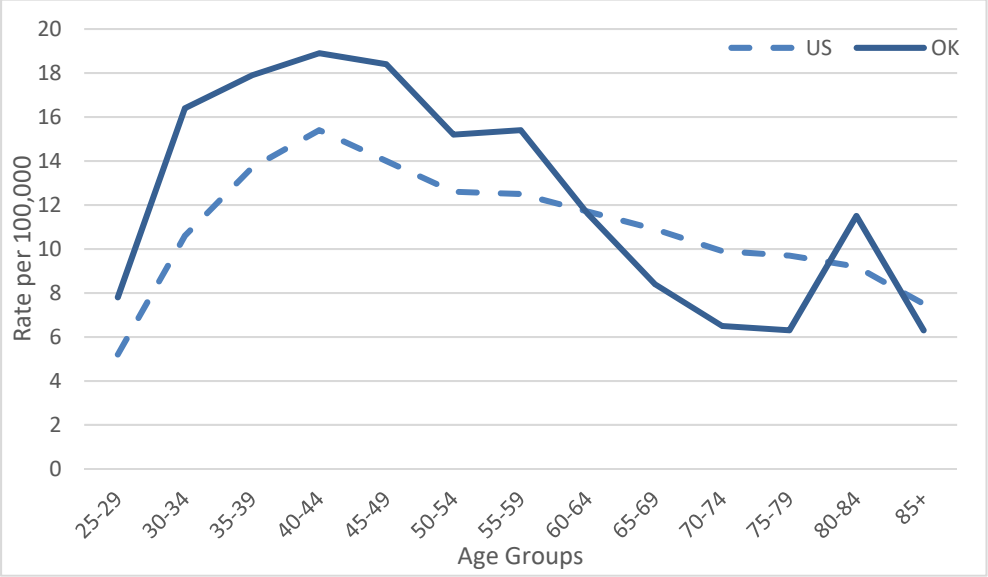
Figure 19. Age-Adjusted Cervical Cancer Incidence Rates in OK and the U.S., 1999-2017



Data Sources: OCCR. December 2019 submission.
USCS. Released June 2020.

From 2013-2017, just two thirds (66.5%) of cervical cancer cases in Oklahoma were diagnosed among women under 55 years of age, while 70% of cases nationally are diagnosed in women under 55 years (Figure 20).

Figure 20. Age-Specific Cervical Cancer Incidence Rates by Age Group in OK and the U.S., 2013-2017



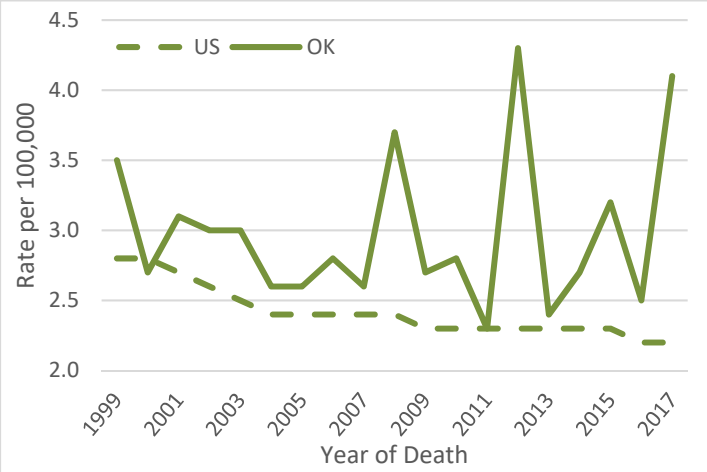
Data Sources: OCCR. December 2019 submission.
USCS. Released June 2020.

Mortality

In 2017, 86 women died from cervical cancer, an age-adjusted incidence rate of 4.1 deaths per 100,000 women (Figure 21). This is the highest rate since 2012 and the highest number of deaths in any recorded year. These deaths made up 2.27% of all cancer deaths among women in 2017. Cervical cancer is the tenth leading cause of cancer deaths among Oklahoman women.[18] In 2018, deaths dropped to 76 (3.5 deaths per 100,000 women) in Oklahoma.

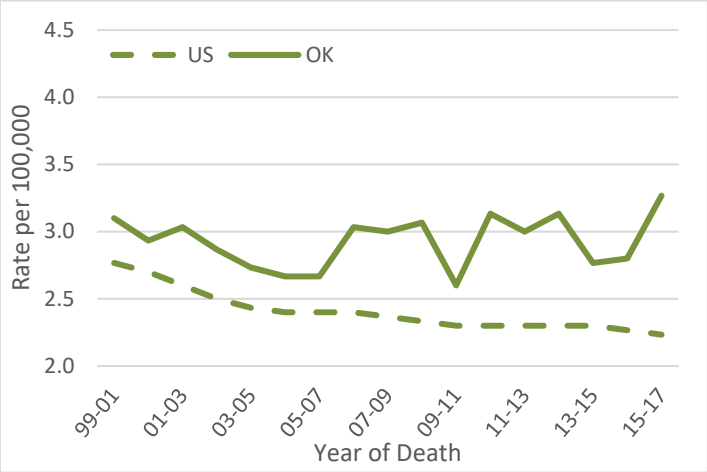
While mortality rates from cervical cancer have declined nationally (21%) from 1999-2017, Oklahoma has seen a 17% increase. However, small annual case numbers contribute to an unstable rate. Viewing the data by 3-year rolling average (Figure 22) portrays the general trend of cervical cancer mortality and helps overcome the instability illustrated by the annual rate. In this case, the rates are still diverging, with a decreasing national trend (20%) and an increasing state trend (5%).

Figure 21. Age-Adjusted Cervical Cancer Mortality Rates in OK and the U.S., 1999-2017



Data Sources: OCCR. December 2019 submission.
USCS. Released June 2020.

Figure 22. 3-Year Rolling Averages of Age-Adjusted Cervical Cancer Mortality Rates in OK and the U.S., 1999-2017



Data Sources: OCCR. December 2019 submission.
USCS. Released June 2020.

Who Gets Cervical Cancer in Oklahoma?

Cervical cancer impacts women of all races and ethnicities and across all age groups. However, the rate at which women are diagnosed with and die from cervical cancer varies between these groups.

Race/Ethnicity

Incidence

As seen in Table 2, from 2013-2017, age-adjusted cervical cancer incidence rates among AIAN women were higher than that of both white and black women. While the number of cases among all other races is the lowest, the rate is the highest, in proportion to the total population of each groups.

Table 2: Cervical Cancer Case Count and Age-Adjusted Incidence Rates by Race and Ethnicity, 2013-2017

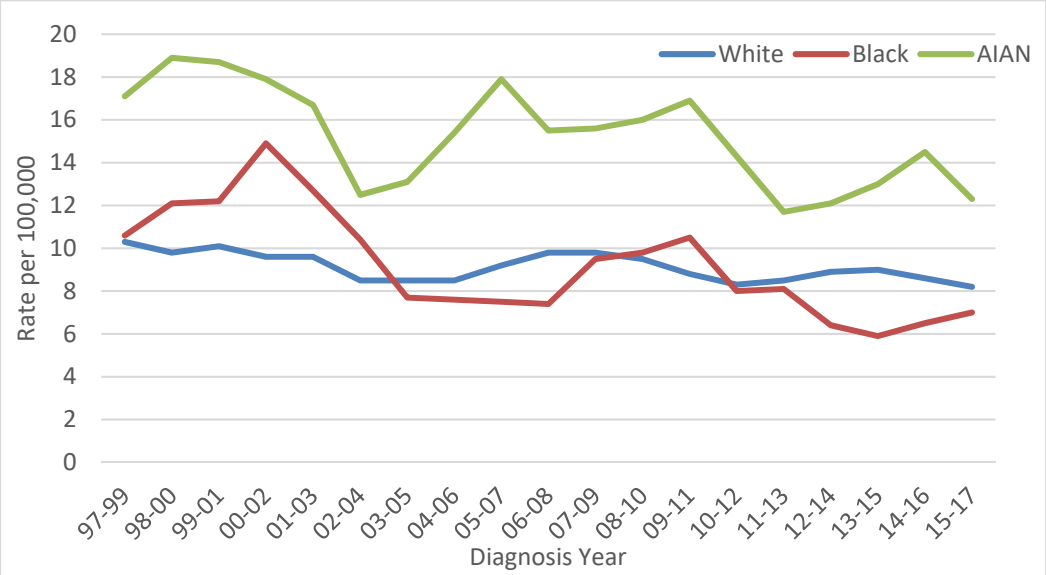
Race/Ethnicity	Number of Cases	Age Adjusted Incidence Rate (per 100,000 women)
AIAN	123	13.7
Black	46	6.5
White	664	8.7
Other Races	44	19.4
Hispanic*	79	12.0

***This is not a mutually exclusive grouping**

Data Source: OCCR. December 2019 submission.

From 1997 to 2017, incidence of cervical cancer has decreased among white, black and AIAN women, 25%, 19% and 50% respectively (Figure 23).

Figure 23: 3-year Rolling Average of Age-Adjusted Cervical Cancer Incidence Rates by Race, 1997-2017

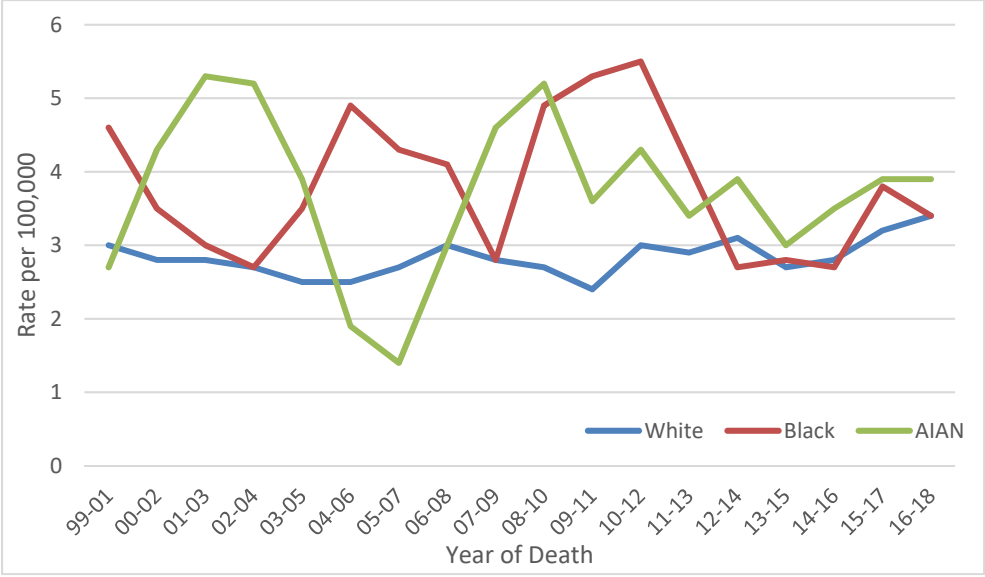


Data Source: OCCR. December 2019 submission.

Mortality

In 2017, AIAN women had the highest age-adjusted mortality rates from cervical cancer (4.8 deaths per 100,000 women), followed by black (4.3) and white women (4.1). These mortality rates have not improved significantly since 1999 (Figure 24). Additionally, mortality rates across all racial groups are greater than corresponding nationwide rates (Table 3). In 2018, mortality rates dropped among both AIAN (3.9 deaths per 100,000 women) and white (3.6 deaths) women. To maintain confidentiality, mortality rates for black women are not reported.

Figure 24. 3-Year Rolling Average of Age-Adjusted Cervical Cancer Mortality Rates by Race 1999-2018



Data Source: OCCR. December 2019 submission.

Table 3. Cervical Cancer Age-Adjusted Mortality Rates by Race in OK and the U.S., 2017

Race/Ethnicity	United States (deaths per 100,000 women)	Oklahoma (deaths per 100,000 women)
AIAN	1.5	4.8
Black	3.4	4.3
White	2.1	4.1

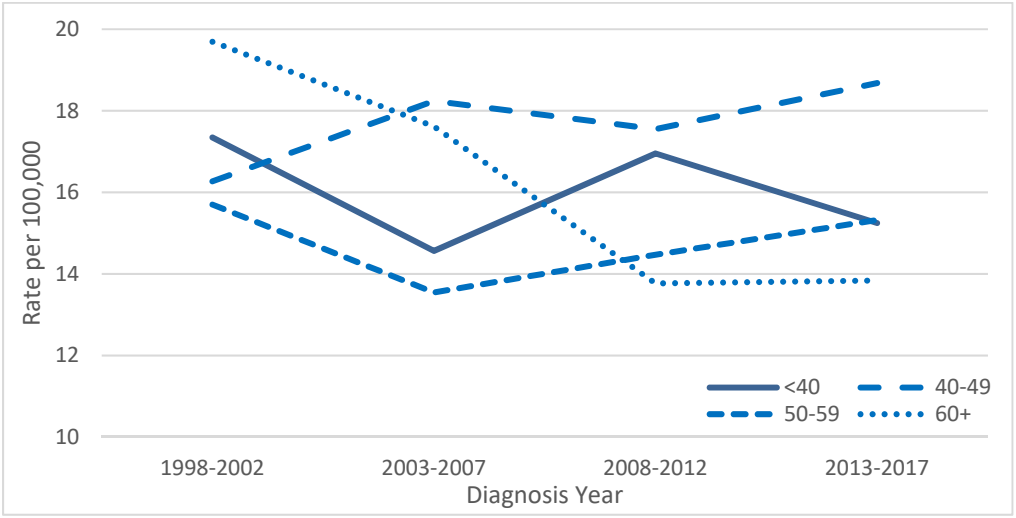
Data Sources: OCCR. December 2019 submission.
USCS. Released June 2020.

Age Group

Incidence

From 1998-2017, women aged 40-49 years have seen a 15% increase in 5-year incidence rates of cervical cancer, with a most recent 5-year (2013-2017) incidence rate of 18.7 cases per 100,000 women (Figure 25). In contrast, the incidence of cervical cancer has declined among all other age cohorts: women aged 60 and older saw a 30% decrease; women aged <40 years saw a 12% decrease; and women 50-59 years saw a 2.4% decrease.

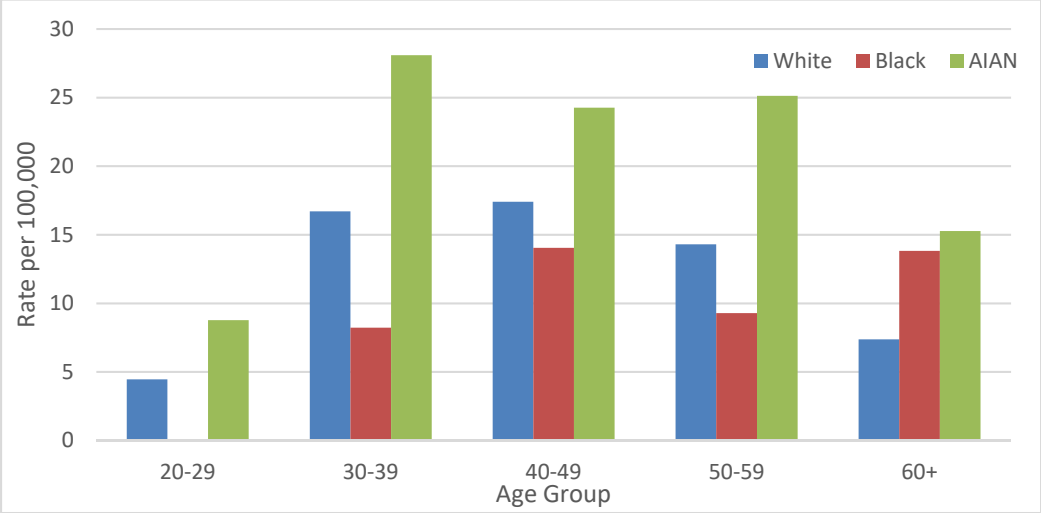
Figure 25. 5-Year Age-Specific Cervical Cancer Incidence Rates by Age Cohort, 1998-2017



Data Source: OCCR. December 2019 submission.

Broken down further by race, clear disparities among age groups exist, with AIAN women experiencing peak cervical cancer incidence (28.1 cases per 100,000 women) at a younger age group (30-39 years) compared with white (17.4 cases per 100,000 women) and black (14.0 cases per 100,000) women (40-49 years) (Figure 26).

Figure 26. Age-Specific Cervical Cancer Incidence Rates by Race and Age Group, 2013-2017

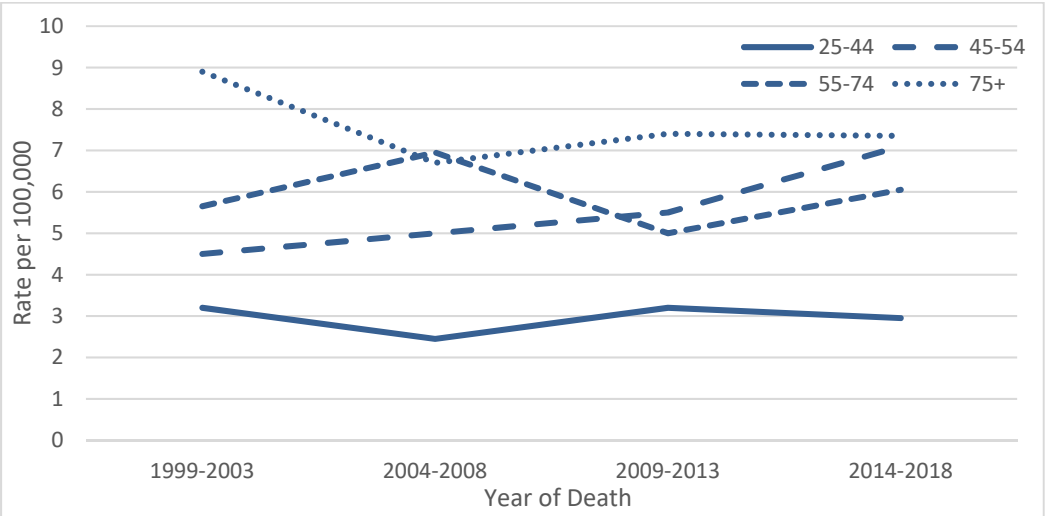


Data Source: OCCR. December 2019 submission.

Mortality

From 1999-2018, 5-year cervical cancer mortality rates have decreased or stayed the same across most age groups, except for women aged 45-54 years, who experienced a 58% increase in cervical cancer mortality during the past 20 years (Figure 27).

Figure 27. 5-Year Age-Specific Cervical Cancer Mortality Rates by Age Group, 1999-2018



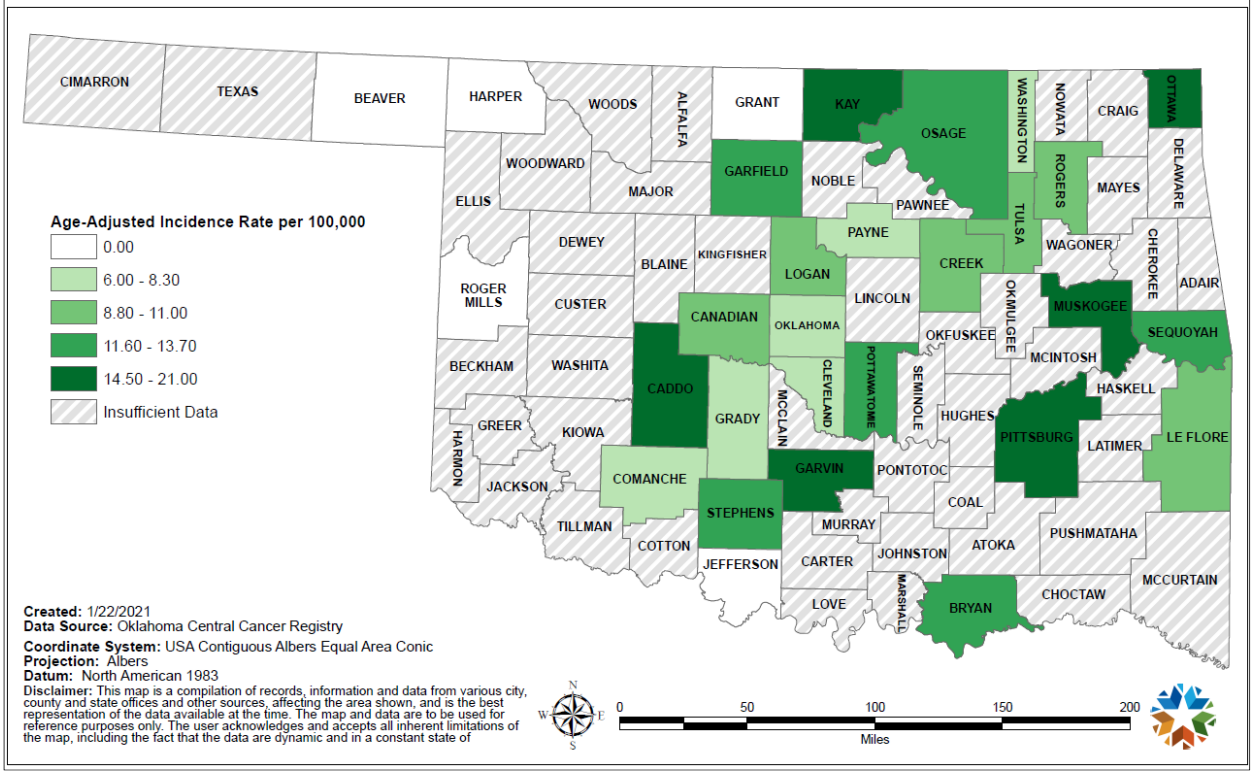
Data Source: OCCR. December 2019 submission.

Location

Incidence

From 2013-2017, the incidence of cervical cancer was 9.2 cases per 100,000 women in Oklahoma. Out of the 24 counties with a non-suppressed incidence, 15 counties in Oklahoma had a higher incidence rate compared to that of the state (Map 3). Garvin (21.0), Caddo (17.9), Pittsburg (16.7), Kay (16.7), and Muskogee (14.9) counties had the highest incidence rates of cervical cancer over the past five years.

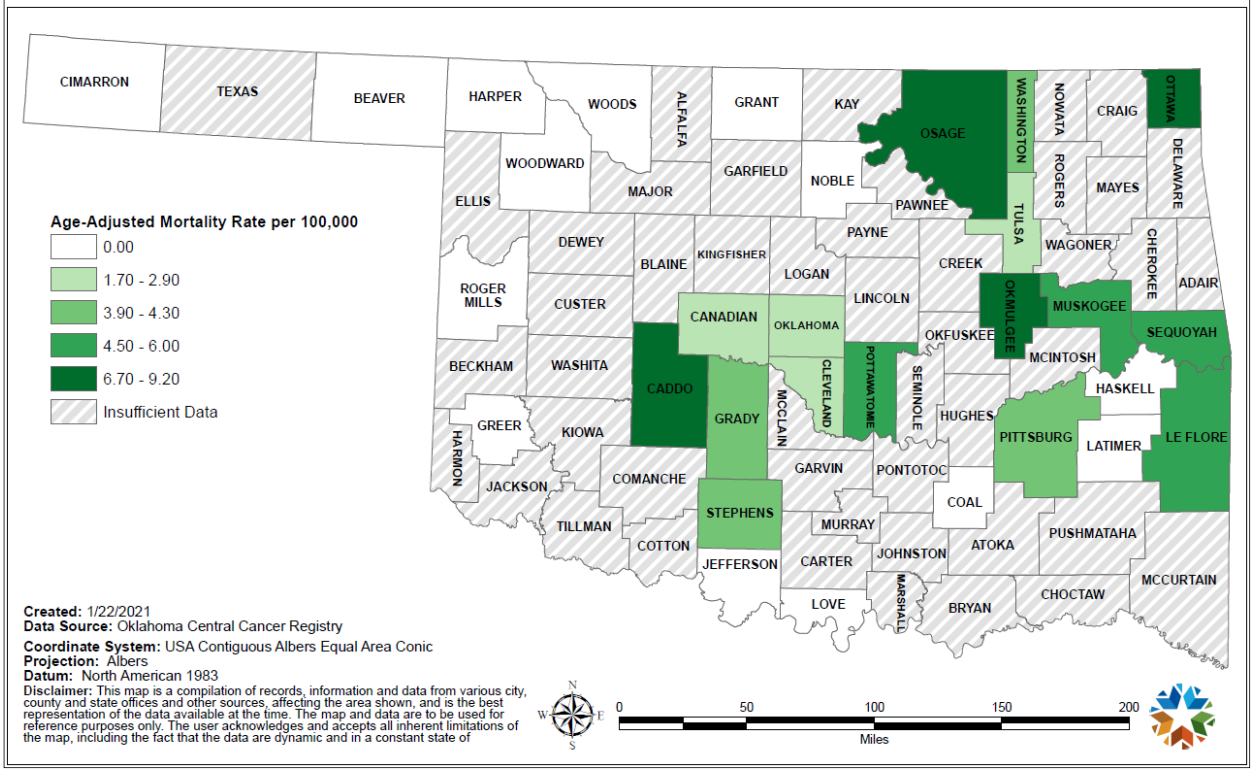
Map 3. Cervical Cancer Incidence Rates in Oklahoma by County, 2013-2017



Mortality

From 2014-2018, cervical cancer mortality was 3.2 deaths per 100,000 women in Oklahoma. Out of the 16 counties with a non-suppressed mortality, 12 counties had a higher mortality rate compared to that of the state (Map 4). Ottawa (9.2 deaths per 100,000 women), Caddo (8.7), Osage (7.9), Okmulgee (6.7), and Leflore (6.0) counties had the highest mortality rates of cervical cancer over the past five years.

Map 4. Cervical Cancer Mortality Rates in Oklahoma by County, 2014-2018



Stage at Diagnosis

Through regular screening, cervical cancer can be detected *in situ* and treated at this early, non-invasive, pre-symptomatic stage. Preventing invasive disease through screening significantly increases chance of survival. Looking at stage at diagnosis over time is one way to assess the effectiveness of screening in the population. However, *in situ* cases are not reportable to the central cancer registry. From 2013-2017, 39% of cervical cancers in Oklahoma were diagnosed at the local stage (confined to the primary site), 38% at the regional stage (spread to regional lymph nodes), 11% at the distant stage (cancer has metastasized), and 12% unknown (unstaged).

Colorectal Cancer

Colorectal cancer is the 4th most frequently diagnosed cancer and 4th leading cause of cancer deaths among Oklahomans.

1 in 12 cancers diagnosed among Oklahomans is colorectal cancer.
The average age at diagnosis between 2013 and 2017 was 66 years.

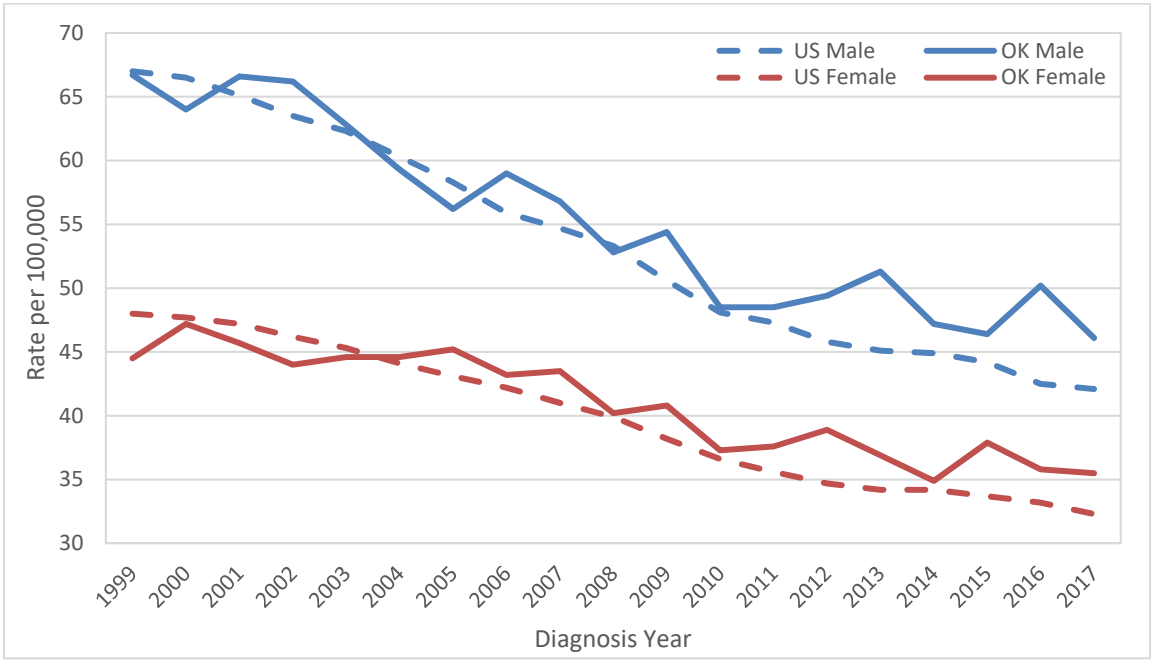
Oklahoma compared to the United States

Incidence

In 2017, 1,828 Oklahomans were diagnosed with colorectal cancer (CRC), an age-adjusted incidence rate of 40.0 cases per 100,000 population, which was higher than the national rate of 37.0 cases per 100,000. Both in Oklahoma and nationwide, 53% of CRC diagnoses were in men (OK: 46.1 cases per 100,000 men; U.S.: 42.1 cases per 100,000 men). The incidence rate for Oklahoman women was 35.5 cases per 100,000 women compared with 32.3 cases per 100,000 women nationwide.

From 1999-2017, CRC incidence rates decreased 25% in Oklahoma, compared with 34% nationwide. In Oklahoma, male rates decreased 31% compared with 37% nationally, while female rates decreased 20% in the state, compared with 33% nationwide (Figure 28).

Figure 28. Age-Adjusted Colorectal Cancer Incidence Rates by Sex in OK and the U.S., 1999-2017



Data Sources: OCCR. December 2019 submission.
USCS. Released June 2020.

Eighty-nine percent of CRC cases in both the U.S. and Oklahoma were diagnosed among individuals aged 50 and older in 2017, which is the recommended age to begin screening. However, CRC incidence rates have been increasing among Americans less than 49 years since 1995 (Siegel, et al., 2020), indicating a need for increased screening at earlier ages.

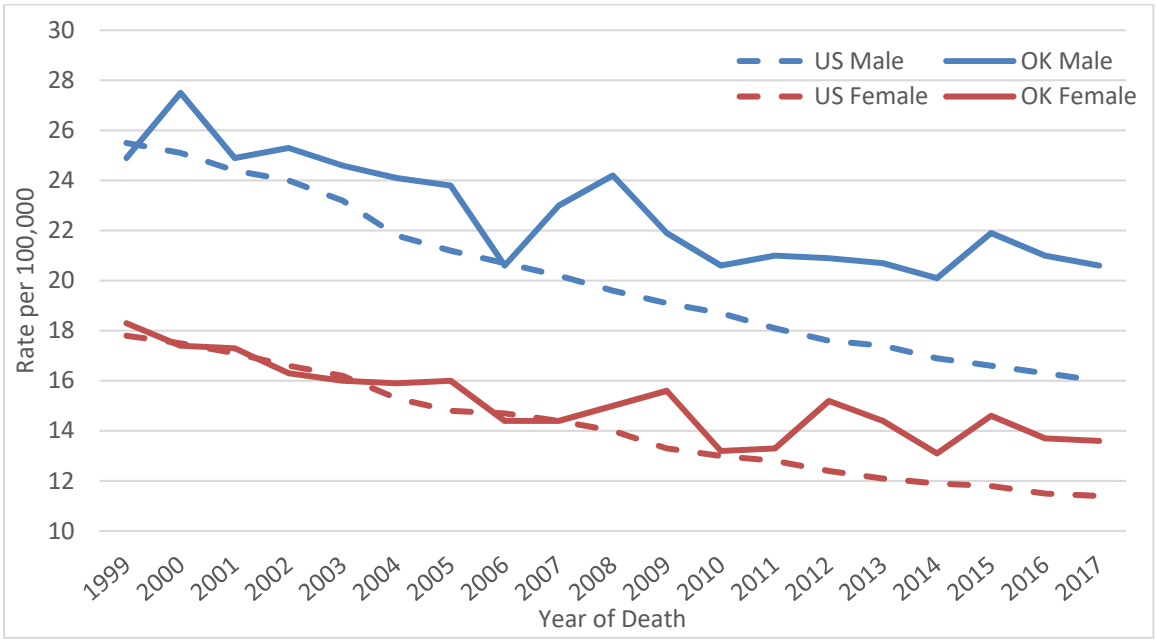
Mortality

In 2017, 766 Oklahomans died from CRC, an age-adjusted mortality rate of 16.7 deaths per 100,000 population, which was higher than the national rate of 13.5 deaths per 100,000. In Oklahoma, 55% of CRC deaths occurred in men (424 cases, 20.7 deaths per 100,000 men), compared with 53% nationwide (16.0 deaths per 100,000 men). The CRC mortality rate among women in Oklahoma was 13.7 deaths per 100,000 women, compared with 11.4 deaths per 100,000 women nationwide that year.

In 2018, CRC mortality rates decreased for both males (399 deaths; 18.9 deaths per 100,000 men) and females (334 deaths; 13.2 deaths per 100,000 women) in Oklahoma.

In 2017, CRC was the fourth leading cause of cancer death among Oklahomans: second leading cause among men and third leading cause among women.[17] Since 1999, mortality from colorectal cancer has been declining in the state and nationwide (Figure 29). However, the nationwide mortality rate is decreasing faster than that of Oklahoma. Since 1999, nationwide, men have experienced a 37% decline in CRC mortality compared with just a 17% decline in Oklahoma. Nationwide, women experienced a 36% decline in CRC mortality, compared with a 26% decline for Oklahoman women in the same time.

Figure 29. Age-Adjusted Colorectal Cancer Mortality Rates by Sex in OK and the U.S., 1999-2017



Data Sources: OCCR. December 2019 submission.
USCS. Released June 2020.

Who Gets Colorectal Cancer in Oklahoma?

Race/Ethnicity

Incidence

Table 4 illustrates that 2013-2017 age-adjusted colorectal cancer incidence rates among AIAN men (78.2 cases per 100,000 men) and AIAN women (58.3 cases per 100,000 women) were higher than that of both of their white and black counterparts.

Table 4: Colorectal Cancer Case Count and Age-Adjusted Incidence Rates by Sex, Race and Ethnicity, 2013-2017

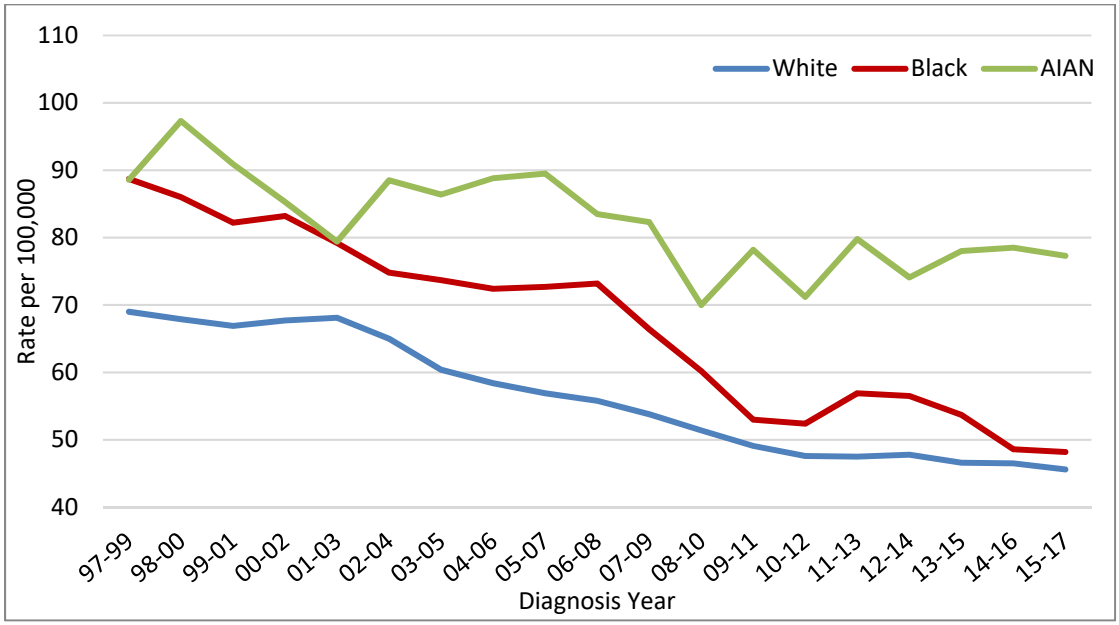
Sex	Race/Ethnicity	Number of Cases	Age Adjusted Incidence Rate (per 100,000 population)
Male	AIAN	543	78.2
	Black	302	50.9
	White	3854	46.3
	Other Races	69	49.3
	Hispanic*	163	37.3
Female	AIAN	479	58.3
	Black	269	38.2
	White	3378	34.8
	Other Races	67	37.4
	Hispanic*	130	30.7

***This is not a mutually exclusive grouping**

Data Source: OCCR. December 2019 submission.

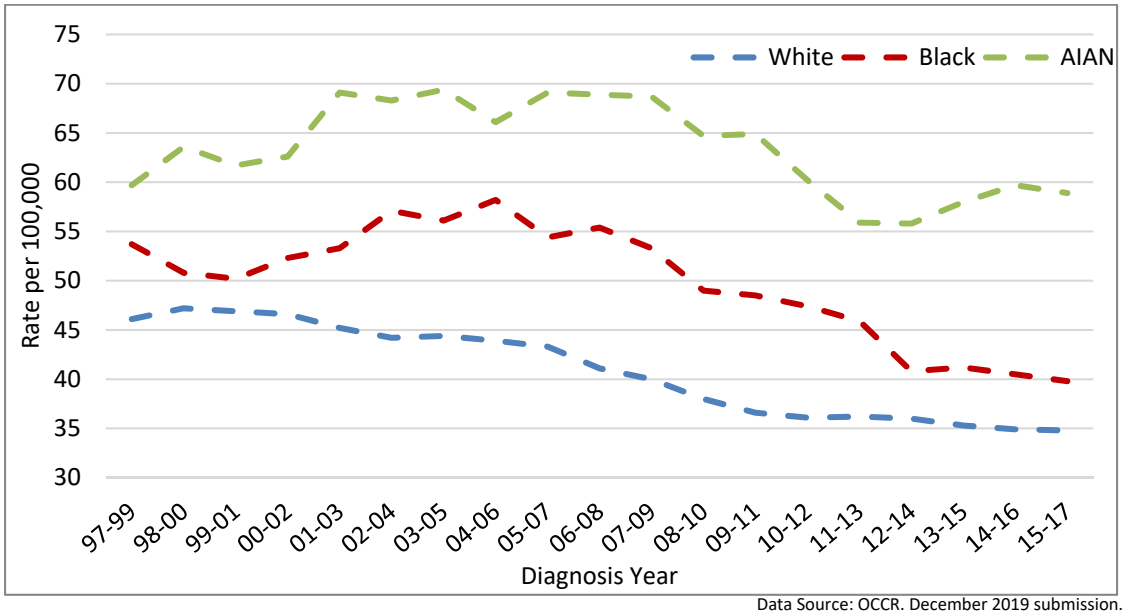
From 1997 to 2017, incidence of colorectal cancer has decreased among both male and females in all racial groups (Figure 30a and Figure 30b). Black males and females had the largest decrease (54% and 43%, respectively), followed by white males (34%), AIAN females (27%), white females (24%), and finally AIAN males (15%).

Figure 30a. 3-Year Rolling Averages of Age-Adjusted Male Colorectal Cancer Incidence Rates by Race, 1997-2017



Data Source: OCCR. December 2019 submission.

Figure 30b. 3-Year Rolling Averages of Age-Adjusted Female Colorectal Cancer Incidence Rates by Race, 1997-2017

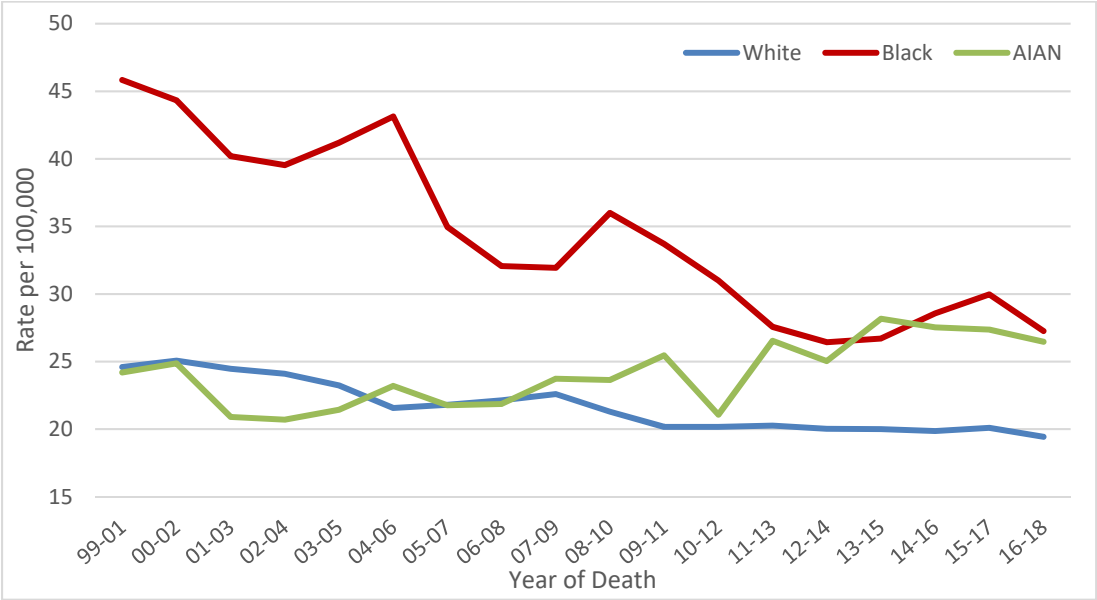


Data Source: OCCR. December 2019 submission.

Mortality

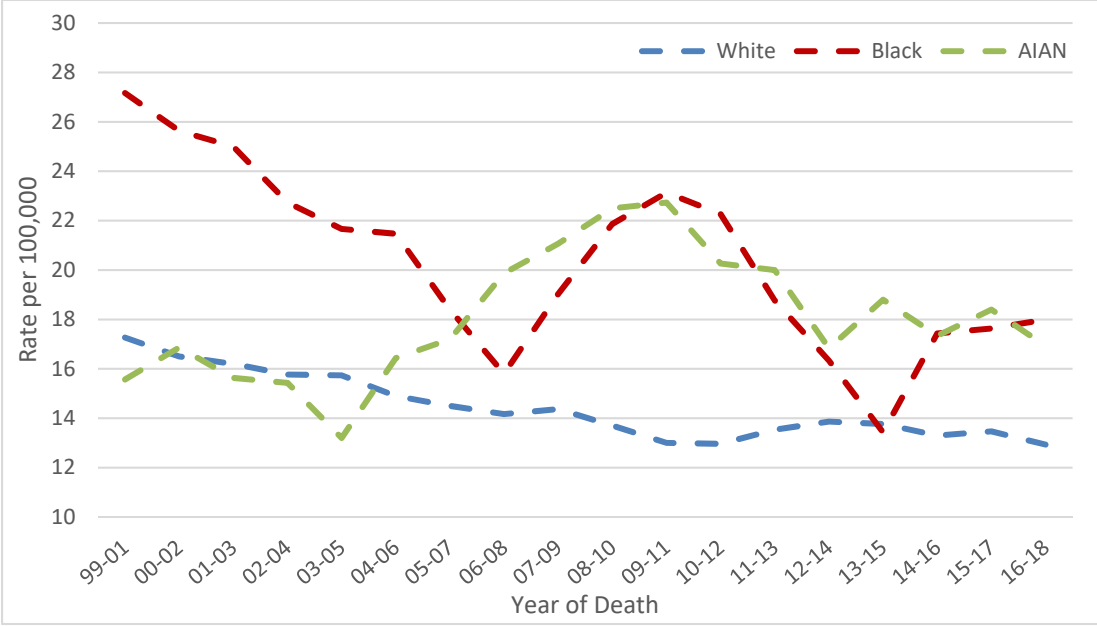
In 2018, among males, AIAN had the highest age-adjusted CRC mortality rate (22.8 deaths per 100,000 men), followed by black (21.2 deaths) and white (18.8 deaths) men. Among females, both AIAN and black had the highest age-adjusted mortality rate (17.1 deaths per 100,000 women), followed by white (12.5 deaths) women. These mortality rates have not improved significantly since 1999 (Figure 31a and Figure 31b). Additionally, only black female CRC mortality rate increased from 2017, while all other groups' mortality rates decreased.

Figure 31a. 3-Year Rolling Averages of Age-Adjusted Male Colorectal Cancer Mortality Rates by Race, 1997-2018



Data Source: OCCR. December 2019 submission.

Figure 31b. 3-Year Rolling Averages of Age-Adjusted Female Colorectal Cancer Mortality Rates by Race, 1997-2018



Data Source: OCCR. December 2019 submission.

Five-year mortality rates across all racial groups for both males and females in Oklahoma are greater than corresponding nationwide rates (Table 5).

Table 5. Colorectal Cancer Age-Adjusted Mortality Rates by Sex and Race in OK and the U.S., 2013-2017

Sex	Race/Ethnicity	United States (deaths per 100,000 population)	Oklahoma (deaths per 100,000 population)
Male	AIAN	13.5	28.4
	Black	23.2	28.1
	White	16.2	20.3
Female	AIAN	9.1	18.1
	Black	15.2	15.7
	White	11.5	13.8

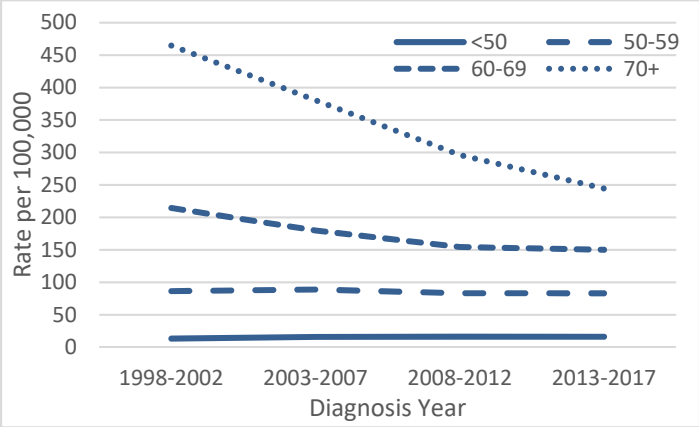
Data Sources: OCCR. December 2019 submission.
USCS. Released June 2020.

Age Group

Incidence

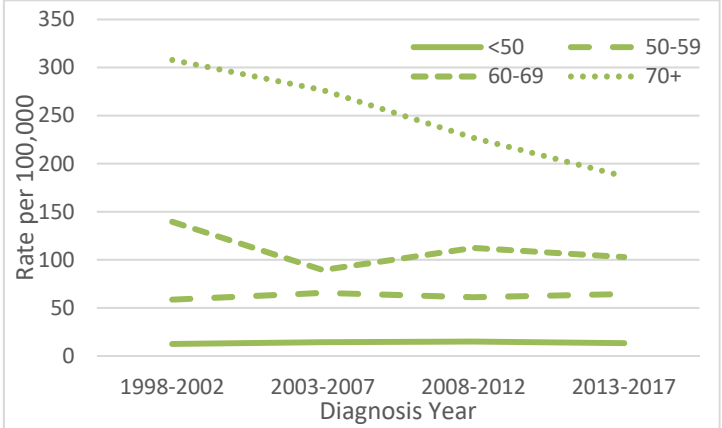
From 1998-2017, both males and females aged 70 years and older had the greatest decreases in 5-year incidence rates of CRC (47% and 39%, respectively) (Figures 32a and 32b). Males aged 60-69 years experienced a 30% decrease, and females of the same age group experienced a 26% decrease. However, the younger cohorts of both males and females saw increases in CRC 5-year incidence rates since 1998: females aged 50-59 years had a 10% increase; females aged 50 years and younger experienced a 6.5% increase; and most shockingly, males aged 50 and younger experienced a 21% increase. This increase among males under 50 is especially noteworthy given that the current recommendations for CRC screening is for individuals aged 50 and older.

Figure 32a. 5-Year Age-Specific Male Colorectal Cancer Incidence Rates by Age Group, 1998-2017



Data Source: OCCR. December 2019 submission.

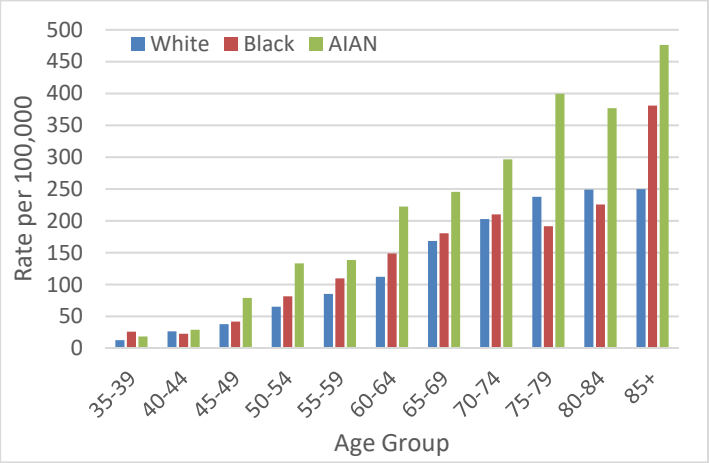
Figure 32b. 5-Year Age-Specific Female Colorectal Cancer Incidence Rates by Age Group, 1998-2017



Data Source: OCCR. December 2019 submission.

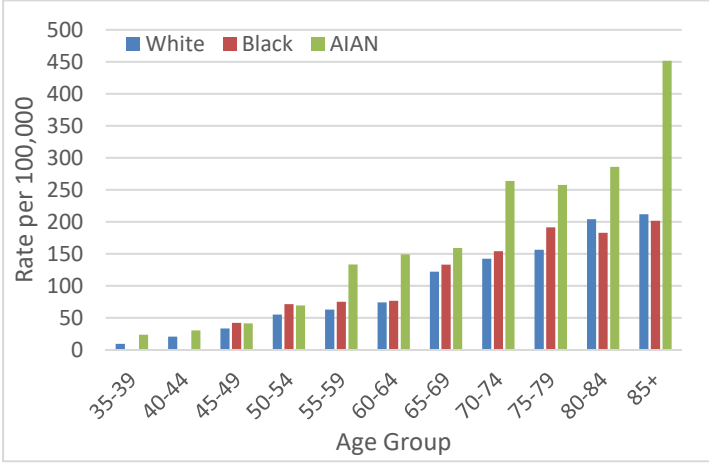
Broken down further by race, clear disparities exist across all age groups, with AIAN men and women experiencing the greatest disease burden compared with their white and AIAN counterparts (Figure 33a and Figure 33b).

Figure 33a. Age-Specific Male Colorectal Cancer Incidence Rates by Race and Age Group, 2013-2017



Data Source: OCCR. December 2019 submission.

Figure 33b. Age-Specific Female Colorectal Cancer Incidence Rates by Race and Age Group, 2013-2017

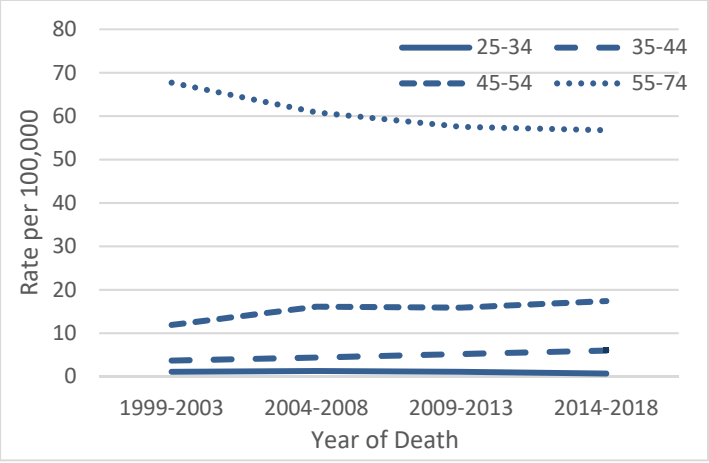


Data Source: OCCR. December 2019 submission.

Mortality

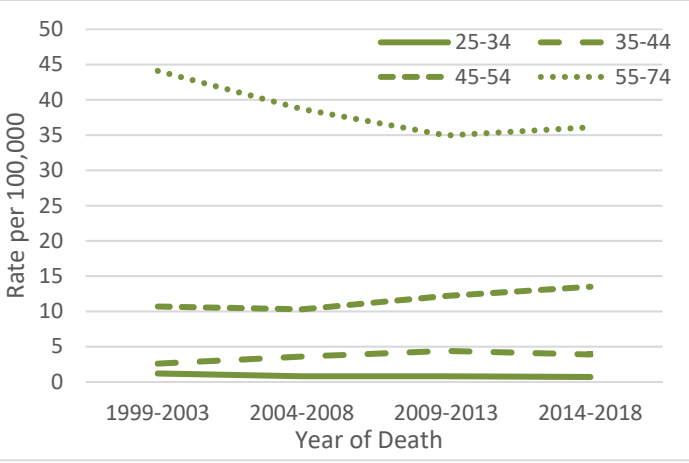
From 1999-2018, 5-year CRC mortality rates decreased among each age group, except 35-44 and 45-54 years for both men (62% increase and 46% increase, respectively) and women (50% increase and 26% increase, respectively). This is especially concerning considering the current CRC screening recommendations highlighted above. For clarity, Figures 34a and 34b illustrate mortality rates for Oklahomans under age 75 years.

Figure 34a. 5-Year Age-Specific Male Colorectal Cancer Mortality Rates by Age Group Younger than 75, 1999-2018



Data Source: OCCR. December 2019 submission.

Figure 34b. 5-Year Age-Specific Female Colorectal Cancer Mortality Rates by Age Group Younger than 75, 1999-2018



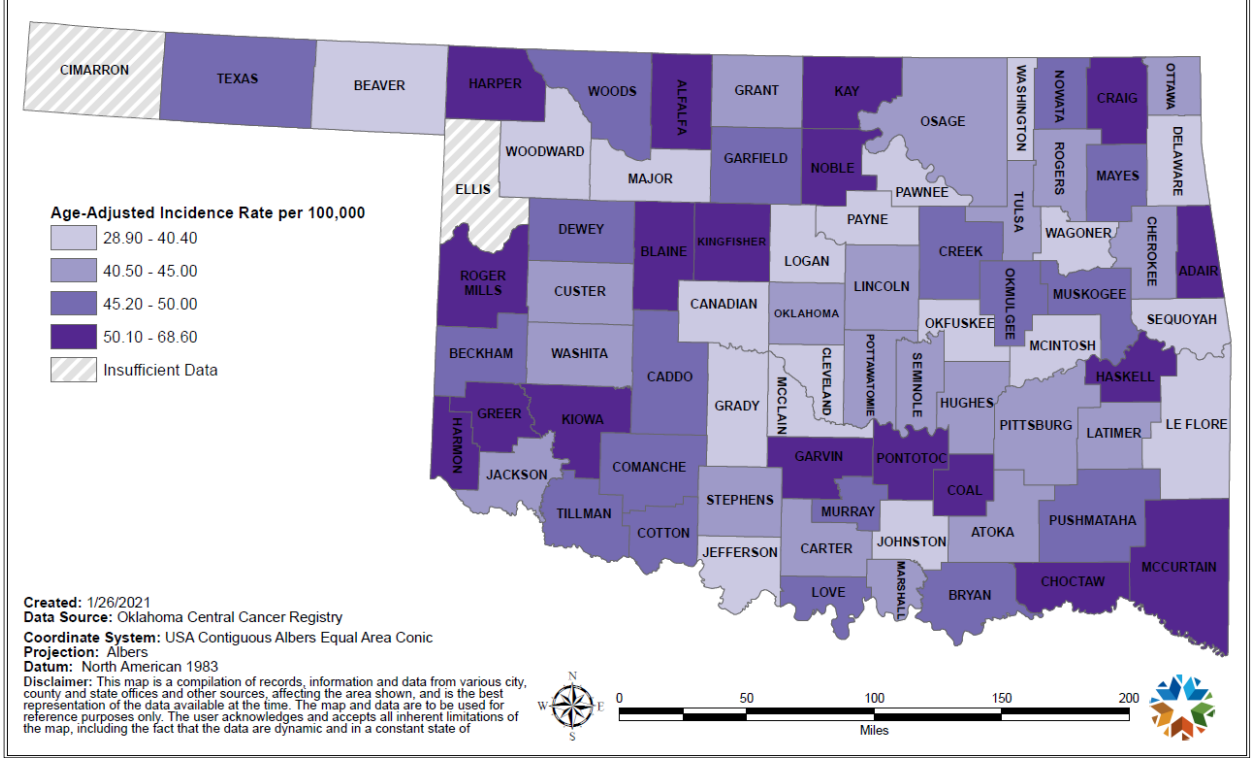
Data Source: OCCR. December 2019 submission.

Location

Incidence

The overall CRC incidence in Oklahoma from 2013-2017 was 42.7 cases per 100,000 population (49.4 cases per 100,000 men and 37.0 cases per 100,000 women). From 2013-2017, 45 counties had a higher incidence rate compared to that of the state (Map 5). Kiowa (68.6 cases per 100,000 population), Coal (28), Greer (64.1), Kingfisher (59.5), and Garvin (57.3) counties had the highest 5-year incidence rates of CRC in Oklahoma.

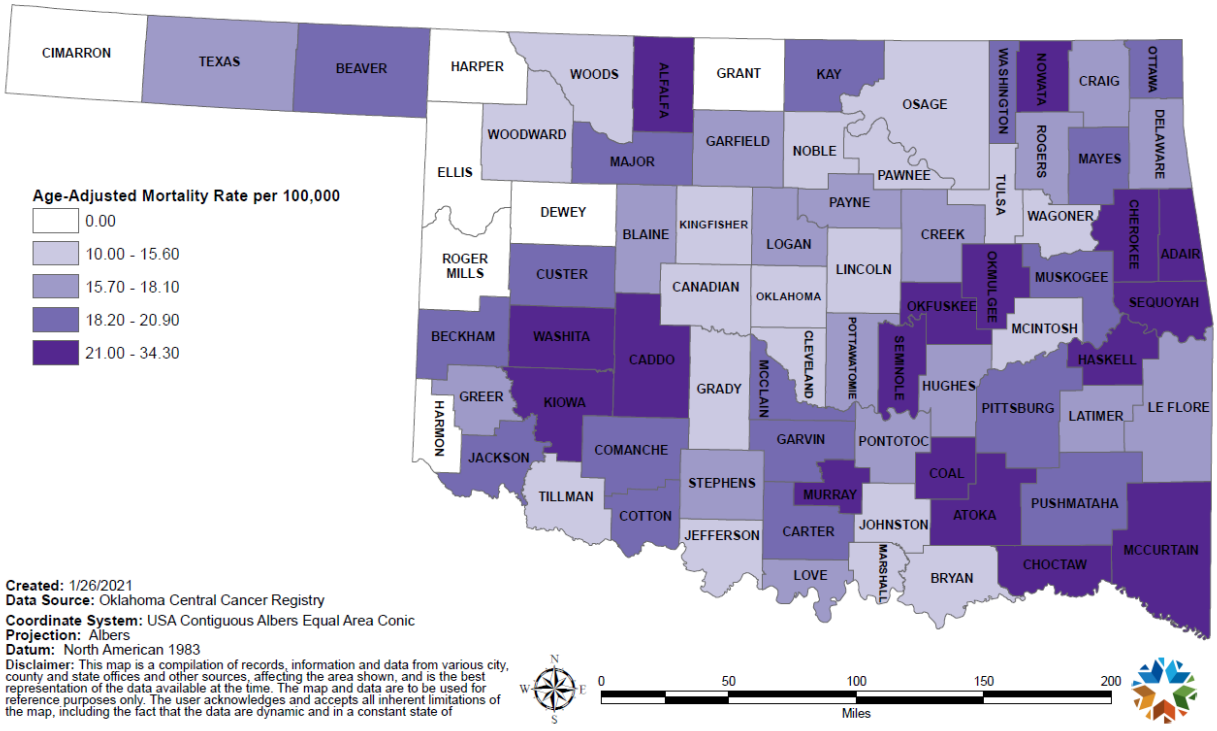
Map 5. Colorectal Cancer Incidence Rates in Oklahoma by County, 2013-2017



Mortality

From 2014-2018, CRC mortality was 16.7 deaths per 100,000 population (20.5 deaths per 100,000 men and 13.7 deaths per 100,000 women) in Oklahoma. From 2014-2018, 44 counties had a higher mortality rate compared to that of the state (Map 6). Kiowa (34.3 deaths per 100,000 population), Choctaw (30.5), Nowata (28.1), McCurtain (26.9), and Atoka (26.1) counties had the highest mortality rates of CRC in Oklahoma.

Map 6. Colorectal Cancer Mortality Rates in Oklahoma by County, 2014-2018

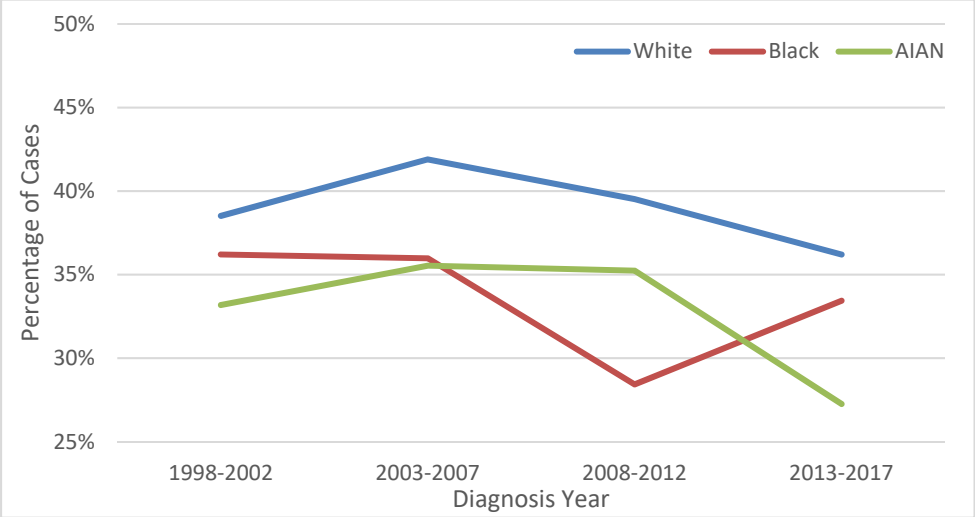


Stage at Diagnosis

Colorectal cancer can be detected early through screening. If polyps are removed during a colonoscopy, cancer development can be prevented entirely. Colorectal cancer detected at *in situ* or local stages increases chance of survival. Looking at stage at diagnosis over the years is one way to assess the effectiveness of screening and early intervention in the population.

From 1998-2017, there has not been the shift to early-stage CRC diagnoses, as is seen in other cancers. Overall, CRC incidence remains higher at later stages across race and gender groups. Among males, all racial groups saw a minimal decrease in percent of early-stage diagnosis: white males had the highest proportion diagnosed at early stage, followed by black and AIAN males (Figure 35a). Unfortunately, among AIAN males, the proportion of cases diagnosed at early stages has declined in more recent years to less than a third of cases.

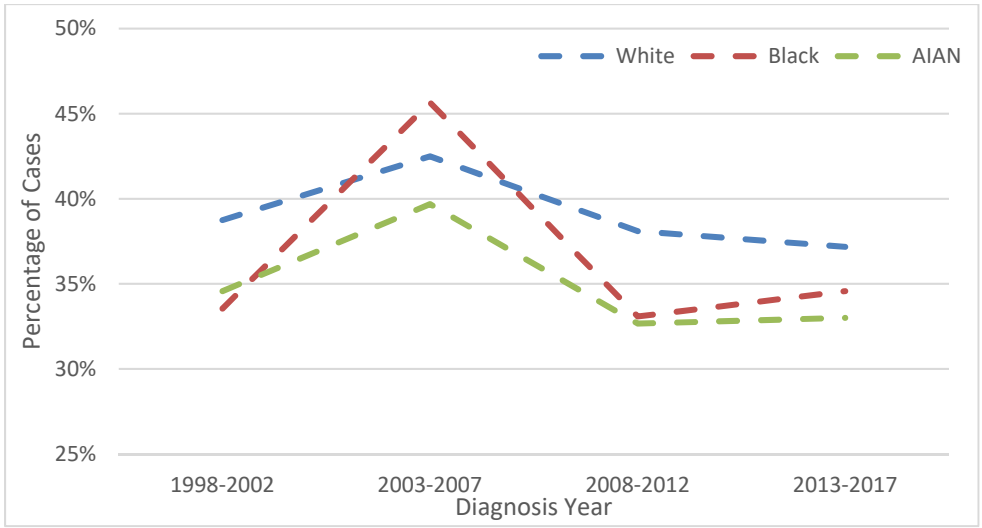
Figure 35a. 5-Year Proportion of Male Colorectal Cancer Cases Diagnosed at Early Stage by Race, 1998-2017



Data Source: OCCR. December 2019 submission.

White and AIAN females saw a minimal decrease, while black women saw a slight increase in proportion of early-stage CRC diagnosis (Figure 35b).

Figure 35b. Proportion of Female Colorectal Cancer Incidence Diagnosed at Early Stage by Race, 1998-2017



Data Source: OCCR. December 2019 submission.

Lung and Bronchus Cancer

Lung and bronchus cancers are the most frequently diagnosed cancers and the leading cause of cancer death among Oklahomans.
1 in 7.5 cancers diagnosed among Oklahomans is lung or bronchus cancer.
The average age at diagnosis between 2013 and 2017 was 69 years.

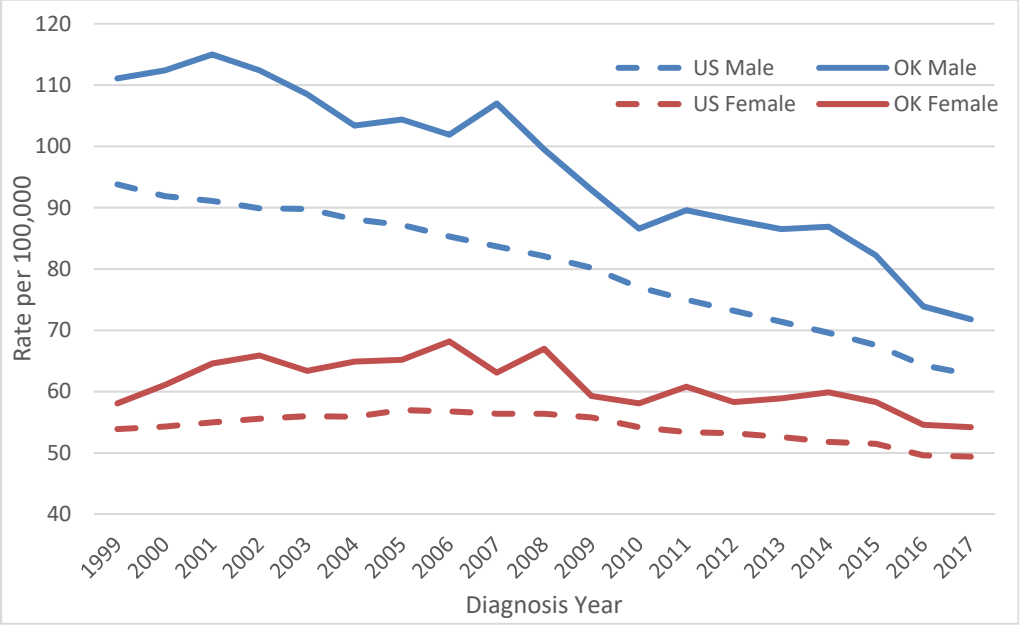
Oklahoma compared to the United States

Incidence

In 2017, 2,972 Oklahomans were diagnosed with lung and bronchus cancers, an age adjusted rate of 62.1 cases per 100,000 population, which was higher than the national rate of 55.2 cases per 100,000 population. In Oklahoma, lung and bronchus cancers are the second most diagnosed cancer for men, behind prostate cancer, with 46.7% of cases in the state diagnosed in men, an incidence rate of 72.0 cases per 100,000 men. This is compared with 51.4% nationwide, an incidence rate of 62.8 cases per 100,000 males. Lung and bronchus cancers are also the second most frequently diagnosed cancer among women in Oklahoma, behind breast cancer. The incidence rate for Oklahoman women in 2017 was 54.3 cases per 100,000 women compared with 49.4 cases per 100,000 women nationwide.

From 1999-2017, lung and bronchus cancer incidence rates decreased 23.0% in Oklahoma compared with 21.8% nationwide. In Oklahoma, male rates decreased 35.4% compared with 33.0% nationally, while female rates decreased 6.7% in the state, compared with 8.3% nationwide (Figure 36).

Figure 36. Age-Adjusted Lung and Bronchus Cancer Incidence Rates by Sex in OK and the U.S., 1999-2017



Data Sources: OCCR. December 2019 submission.
USCS. Released June 2020.

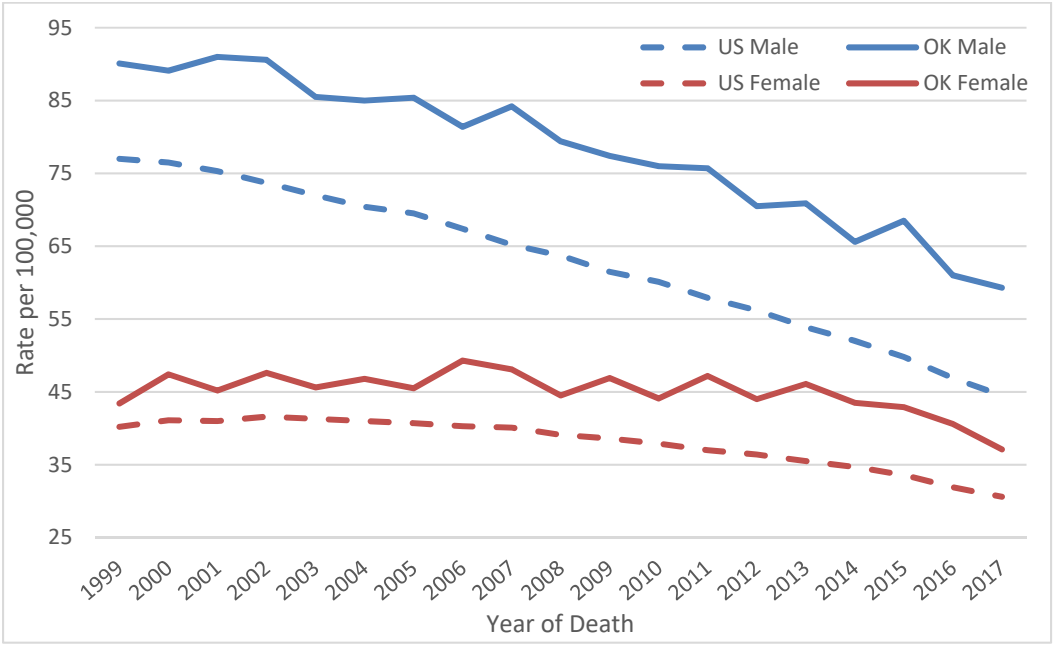
Mortality

Lung and bronchus cancers are the leading cause of cancer death among Oklahomans. In 2017, 2,211 Oklahomans died from lung and bronchus cancers, an age-adjusted mortality rate of 46.8 deaths per 100,000 population, which was higher than the national mortality rate of 36.7 deaths per 100,000 population. In Oklahoma, 57% of lung and bronchus cancer deaths occurred in men (1,267 deaths, 59.3 deaths per 100 000 men), compared to 54% nationwide (44.5 deaths per 100,000 men). In 2017, the lung and bronchus cancer mortality rate among Oklahoman women was 37.2 deaths per 100,000 women (944 deaths), compared with 30.6 deaths per 100,000 women nationwide.

In 2018, lung and bronchus mortality rates decreased for males (1,253 deaths; 57.1 deaths per 100,000 men) but increased for females (1,021 deaths; 38.7 deaths per 100,000 women) in Oklahoma.

Since 1999, mortality from lung and bronchus cancers has been declining in the state and nationwide (Figure 37). However, the nationwide mortality rate is decreasing faster than it is in Oklahoma. Since 1999, nationwide, men have experienced a 42% decline in lung and bronchus cancer mortality rates, compared with a 34% decline in Oklahoma. Nationwide, women experienced a 24% decline, compared with a 15% decline for Oklahoman women.

Figure 37. Age-Adjusted Lung and Bronchus Cancer Mortality Rates by Sex in OK and the U.S., 1999-2017



Data Sources: OCCR. December 2019 submission.
USCS. Released June 2020.

Who Gets Lung and Bronchus Cancers in Oklahoma?

Race/Ethnicity

Incidence

Table 6 illustrates that 2013-2017 age-adjusted lung and bronchus cancers incidence rates among AIAN men (115.2 cases per 100,000 men) and AIAN women (80.4 cases per 100,000 women) were higher than that of both of their white and black counterparts.

Table 6: Lung and Bronchus Cancers Case Count and Age-Adjusted Incidence Rates by Sex, Race and Ethnicity, 2013-2017

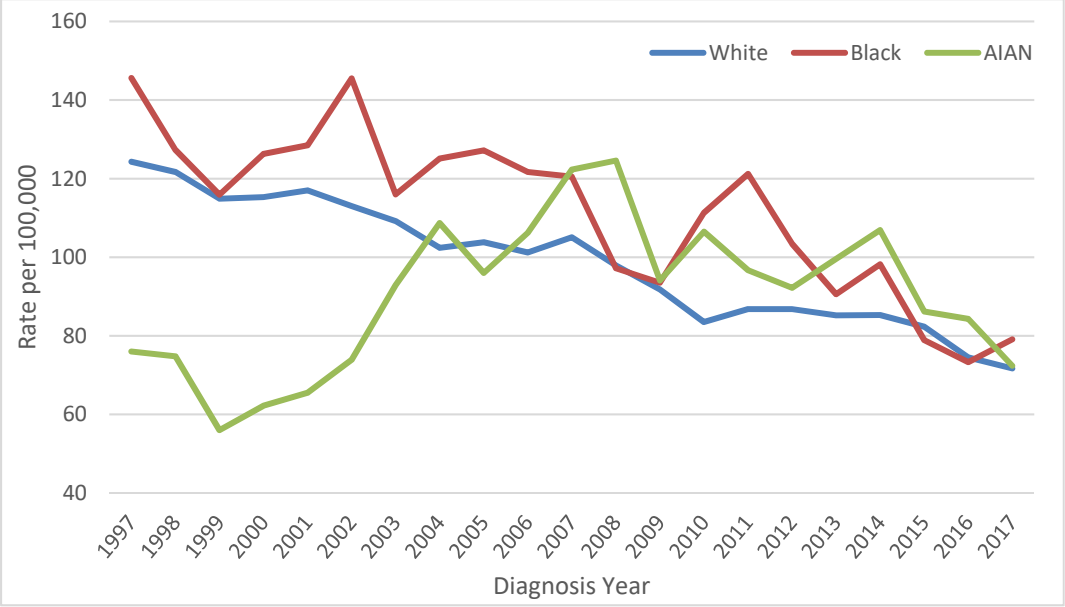
Sex	Race/Ethnicity	Number of Cases	Age Adjusted Incidence Rate (per 100,000 population)
Male	AIAN	782	115.2
	Black	459	80.5
	White	7,083	78.0
	Other Races	98	78.7
	Hispanic*	118	38.2
Female	AIAN	687	80.4
	Black	359	50.2
	White	5,940	56.0
	Other Races	87	48.0
	Hispanic*	122	35.3

***This is not a mutually exclusive grouping**

Data Source: OCCR. December 2019 submission.

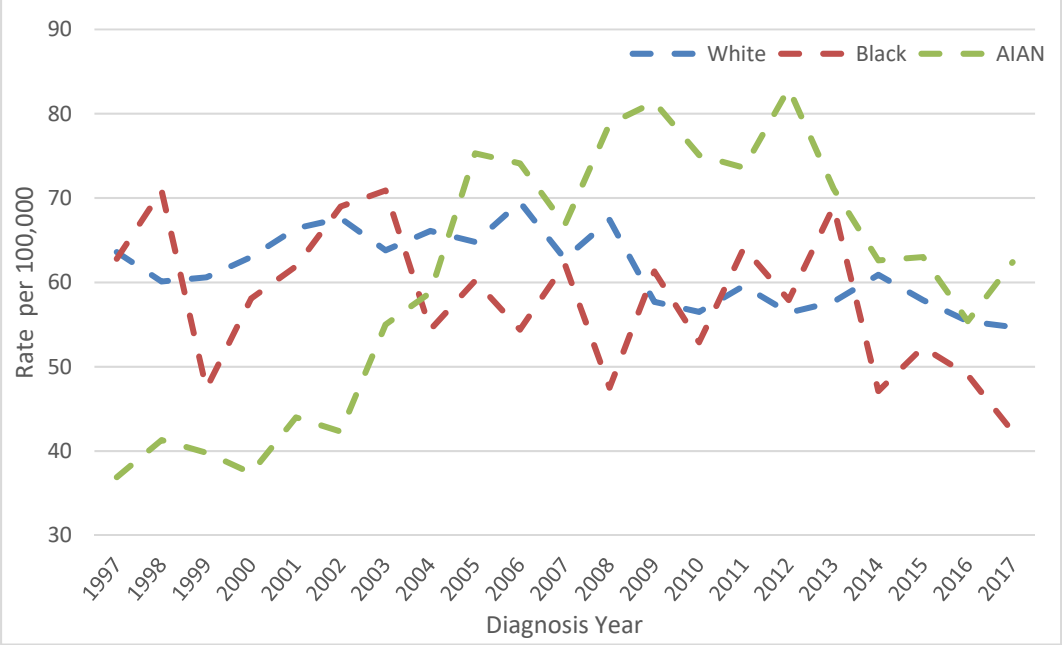
From 1997 to 2017, incidence of lung and bronchus cancers have decreased among both male and females in all racial groups, except AIAN women (Figure 38a and Figure 38b). Since 1997, black males had the largest decrease (46%), followed by white (42%) and AIAN males (4.7%). Black females had the largest decrease (33%), followed by white (14%) females. Unfortunately, since 1997 AIAN women have had a 69% increase in lung and bronchus cancer incidence. However, since peak incidence rates in 2012, lung and bronchus cancers in AIAN women has decreased 25%.

Figure 38a. Age-Adjusted Male Lung and Bronchus Incidence Rates by Race, 1997-2017



Data Source: OCCR. December 2019 submission.

Figure 38b. Age-Adjusted Female Lung and Bronchus Incidence Rates by Race, 1997-2017



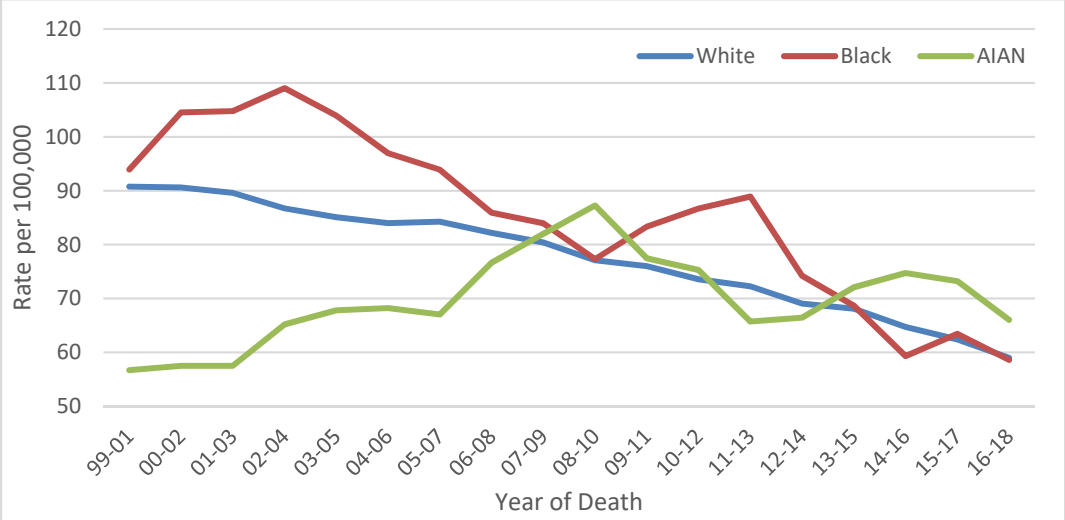
Data Source: OCCR. December 2019 submission.

Mortality

In 2018, among males, AIAN had the highest age-adjusted lung and bronchus mortality rate (66.0 deaths per 100,000 men), followed by white (57.0 deaths) and black (54.7 deaths) men. Among females, white had the highest age-adjusted mortality rate (40.1 deaths per 100,000 women), followed by AIAN (36.2 deaths) and AIAN (26.7 deaths) women. Mortality rates have decreased since 1999 among white and black men (37% and 39%, respectively) and women (7.6% and 38.6%, respectively) (Figure 39a and Figure 39b). However, morality rates for AIAN have increased since 1999 for both men (15%) and women (16%). Lung and bronchus mortality rates for AIAN men reached a high in 2008 and have

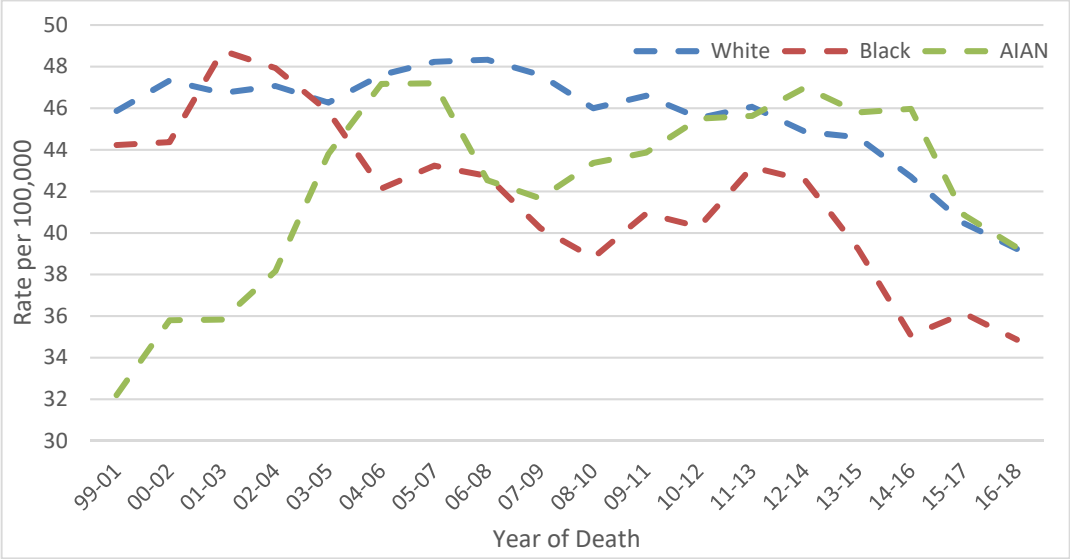
declined 32% since then. For AIAN women, mortality rates peaked in 2005 and have declined 51% since that year.

Figure 39a. 3-Year Rolling Averages of Age-Adjusted Male Lung and Bronchus Mortality Rates by Race, 1999-2018



Data Source: OCCR. December 2019 submission.

Figure 39b. 3-Year Rolling Averages of Age-Adjusted Female Lung and Bronchus Mortality Rates by Race, 1999-2018



Data Source: OCCR. December 2019 submission.

Additionally, lung and bronchus mortality rates across all racial groups in both male and female are far greater than corresponding nationwide rates (Table 7).

Table 7. Lung and Bronchus Cancer Age-Adjusted Mortality Rates by Sex and Race in OK and the U.S., 2013-2017

Sex	Race/Ethnicity	United States (deaths per 100,000 population)	Oklahoma (deaths per 100,000 population)
Male	AIAN	32.0	68.8
	Black	58.8	66.4
	White	49.4	65.1
Female	AIAN	21.9	43.1
	Black	31.1	39.5
	White	34.5	42.2

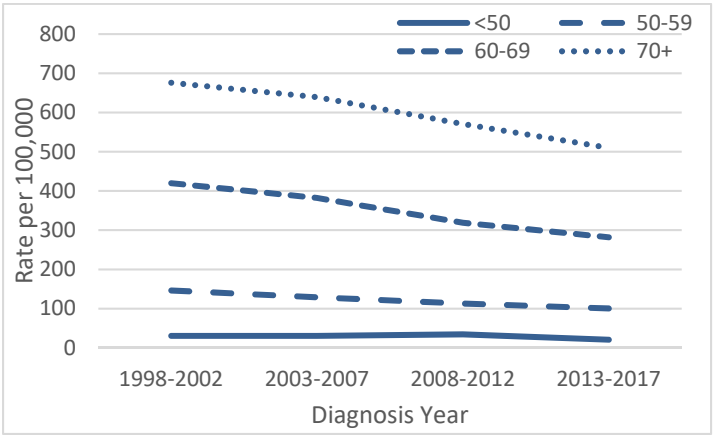
Data Sources: OCCR. December 2019 submission.
USCS. Released June 2020.

Age Group

Incidence

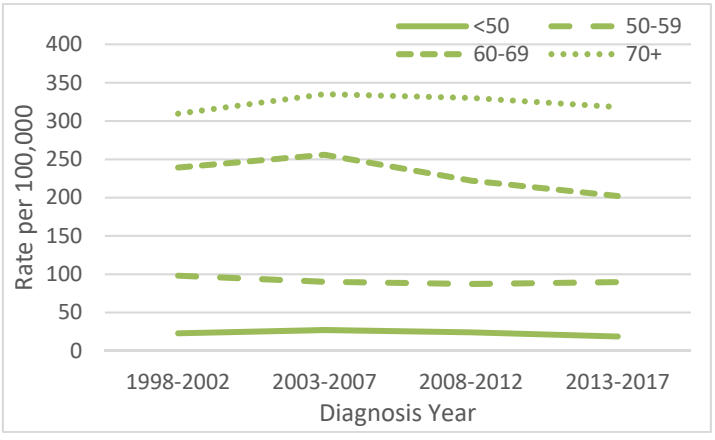
From 1998-2017, men across all age groups experienced a significant decrease in 5-year lung and bronchus incidence rates. Men aged 60-69 years had the greatest decrease (33%), followed by those aged 50 years and younger (32%), 50-59 years (31%), and 70 years and older (25%) (Figure 40a). Women also experienced decreases in 5-year incidence rates at all age groups, except 70 years and older. Women aged 50 and younger had the greatest decrease (18%), followed by those aged 60-69 years (16%), and 50-59 years (9%) (Figure 40b). Incidence rates among women aged 70 and older increased 2.8% during this time period.

Figure 40a. 5-Year Age-Specific Male Lung and Bronchus Incidence Rates by Age Group, 1998-2017



Data Source: OCCR. December 2019 submission.

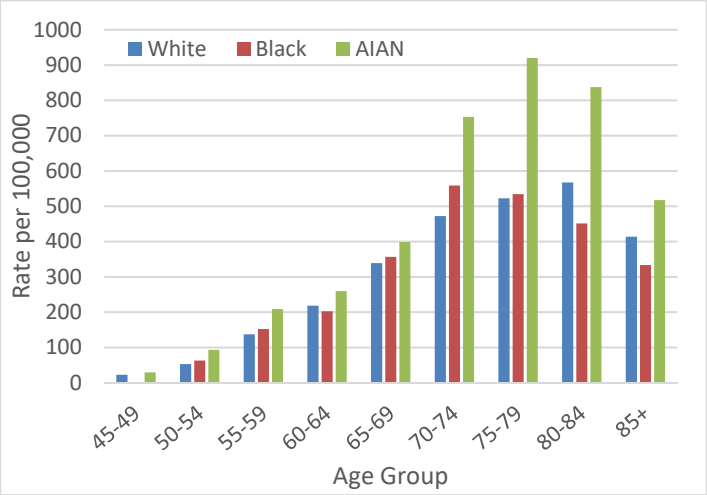
Figure 40b. 5-Year Age-Specific Female Lung and Bronchus Incidence Rates by Age Group, 1998-2017



Data Source: OCCR. December 2019 submission.

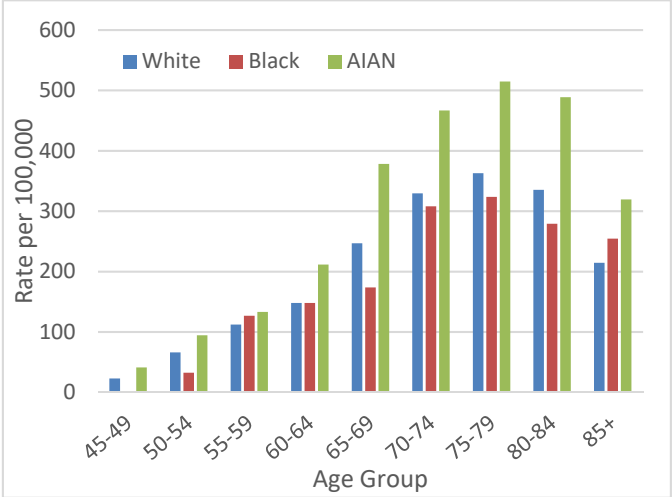
Broken down further by race, clear disparities exist across all age groups, with AIAN men and women experiencing the greatest disease burden compared with their white and AIAN counterparts (Figure 41a and Figure 41b).

Figure 41a. Age-Specific Male Lung and Bronchus Incidence Rates by Race and Age Group, 2013-2017



Data Source: OCCR. December 2019 submission.

Figure 41b. Age-Specific Female Lung and Bronchus Incidence Rates by Race and Age Group, 2013-2017

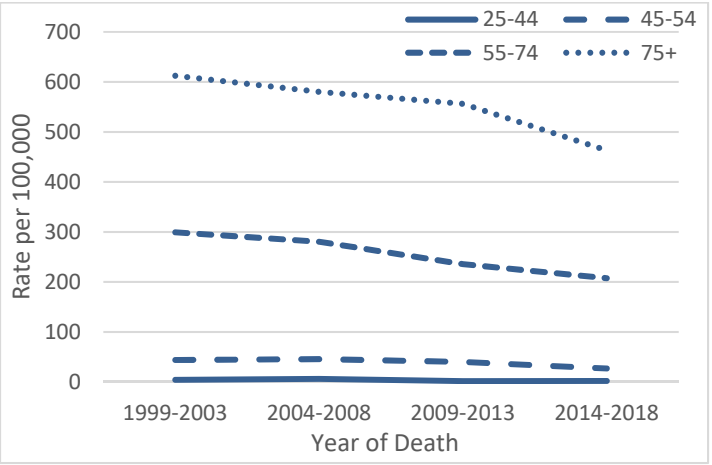


Data Source: OCCR. December 2019 submission.

Mortality

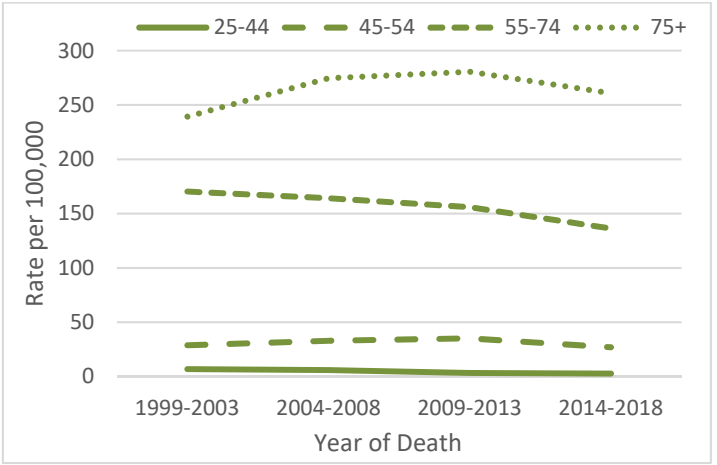
From 1999-2018, 5-year lung and bronchus cancer mortality rates decreased for all age groups for men (Figure 42a). Men aged 25-44 years saw the greatest decrease (57%), followed by 45-55 years (39%), 55-74 years (31%), and 75 years and older (24%). During this time, mortality rates decreased among women for each age group, except those aged 75 years and older, which saw a 9% increase in mortality (Figure 42b). Women aged 25-44 years saw the greatest decrease (59%), followed by those aged 55-74 years (20%) and 45-54 years (6%).

Figure 42a. 5-Year Age-Specific Male Lung and Bronchus Mortality Rates by Age Group, 1999-2018



Data Source: OCCR. December 2019 submission.

Figure 42b. 5-Year Age-Specific Female Lung and Bronchus Mortality Rates by Age Group, 1999-2018



Data Source: OCCR. December 2019 submission.

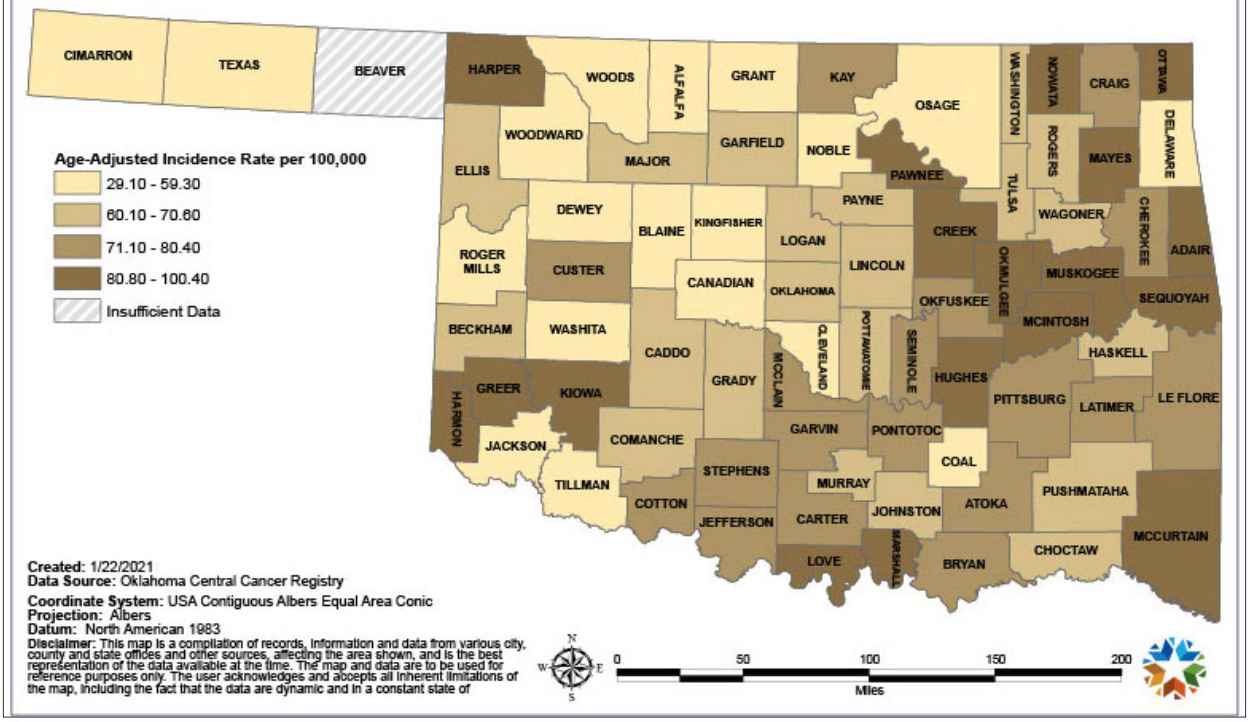
Location

Incidence

The overall lung and bronchus cancer incidence rate in Oklahoma from 2013-2017 was 67.4 cases per 100,000 population (80.5 cases per 100,000 men and 57.1 cases per 100,000 women). From 2013-2017,

out of the 73 counties with a non-suppressed incidence rate, 42 counties (58%) had a higher incidence rate compared to that of the state (Map 7). Greer (100.3 cases per 100,000 population), Hughes (97.4), Muskogee (95.6), Harmon (89.6), and Kiowa (86.6) counties had the highest 5-year incidence rates of lung and bronchus cancers in Oklahoma.

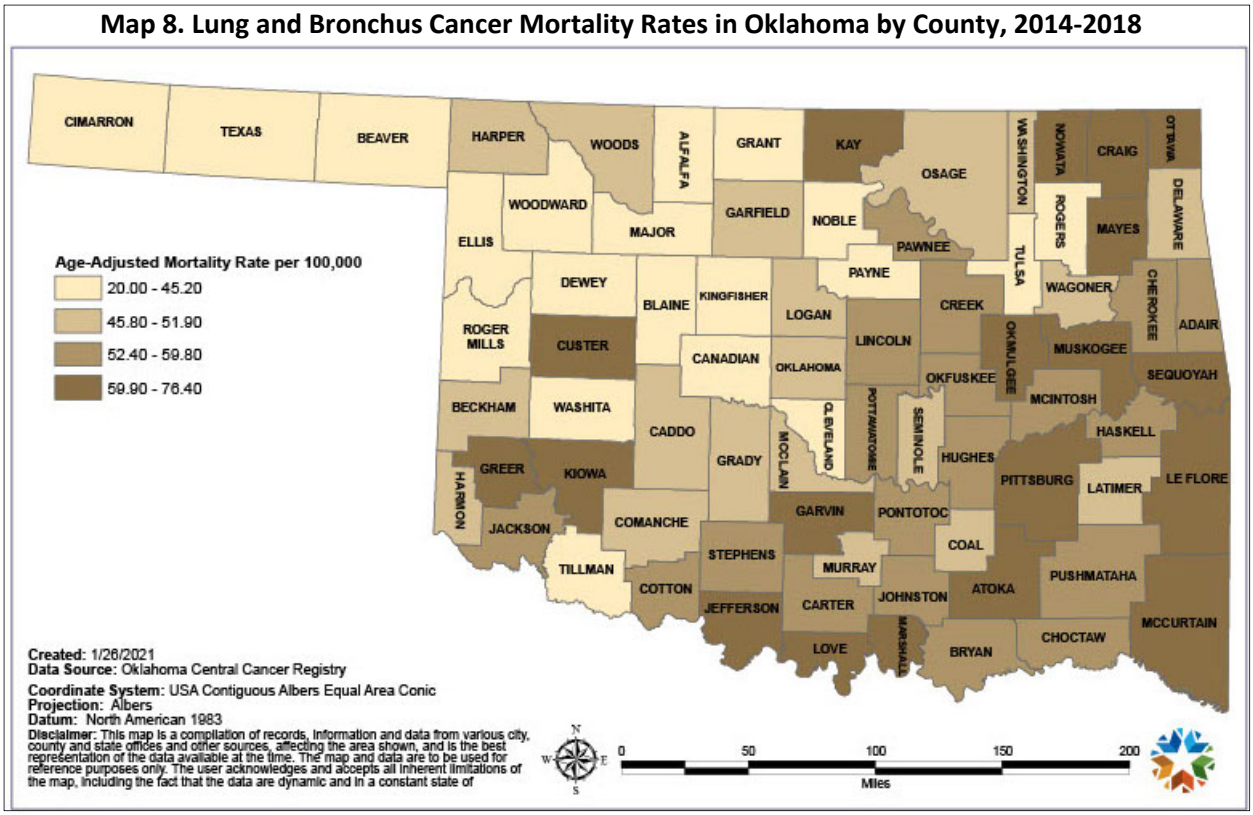
Map 7. Lung and Bronchus Cancer Incidence Rates in Oklahoma by County, 2013-2017



Mortality

From 2014-2018, the lung and bronchus cancer mortality rate was 49.9 deaths per 100,000 population (61.9 deaths per 100,000 men and 40.5 deaths per 100,000 women) in Oklahoma. Out of the 77 counties in Oklahoma, 44 counties (57%) had a higher mortality rate compared to that of the state (Map 8). Nowata (76.4 deaths per 100,000 population), Love (73.3), Ottawa (69.9), Kiowa (68.0), and Pittsburg (67.8) counties had the highest mortality rates of lung and bronchus cancer in Oklahoma.

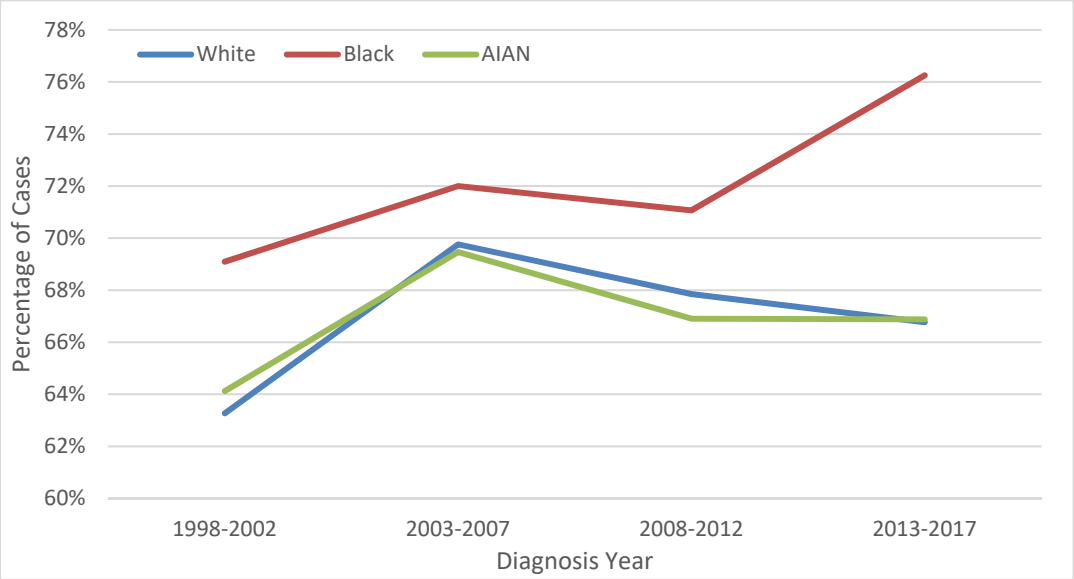
Map 8. Lung and Bronchus Cancer Mortality Rates in Oklahoma by County, 2014-2018



Stage at Diagnosis

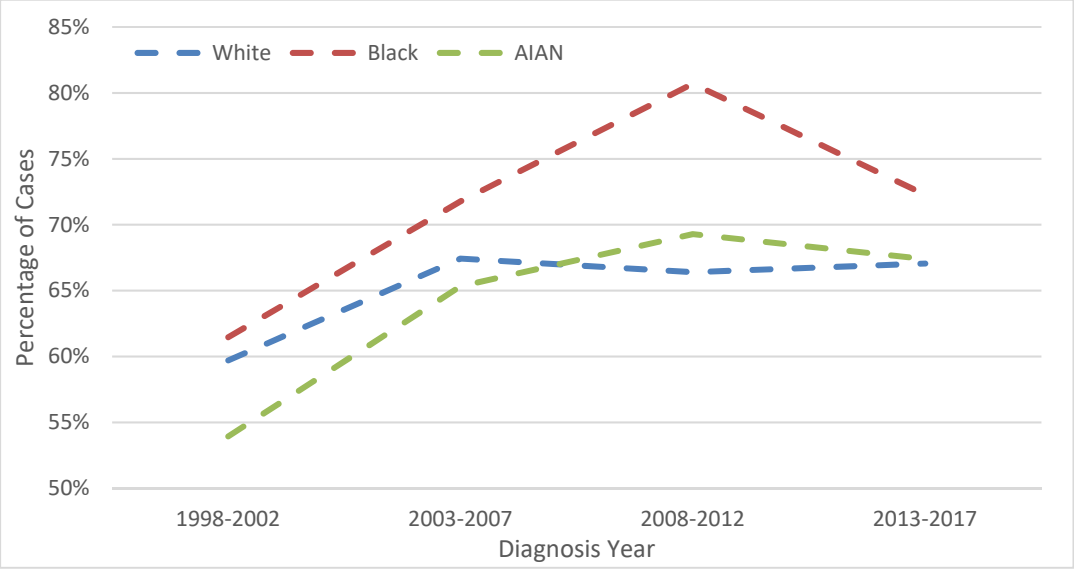
From 1998-2017, there has been no significant improvement in the stage at which lung and bronchus cancers are diagnosed. In fact, there has been a slight increase in late-stage diagnoses across all race groups for men and women in Oklahoma (Figure 43a and Figure 43b). However, since 2008, percent of late-stage diagnoses have slightly decreased for all race groups except black males and white females, where percentage of late stage diagnoses have continued to rise.

Figure 43a. 5-Year Proportion of Male Lung and Bronchus Cancer Cases Diagnosed at Late Stage by Race, 1998-2017



Data Source: OCCR. December 2019 submission.

Figure 43b. 5-Year Proportion of Female Lung and Bronchus Cancer Cases Diagnosed at Late Stage by Race, 1998-2017



Data Source: OCCR. December 2019 submission.

Prostate Cancer

Prostate cancer is the most frequently diagnosed cancer and the 2nd leading cause of cancer death among males in Oklahoma.
1 in 5 cancers diagnosed among males in Oklahoma is prostate cancer.
The average age at diagnosis between 2013 and 2017 was 67 years.

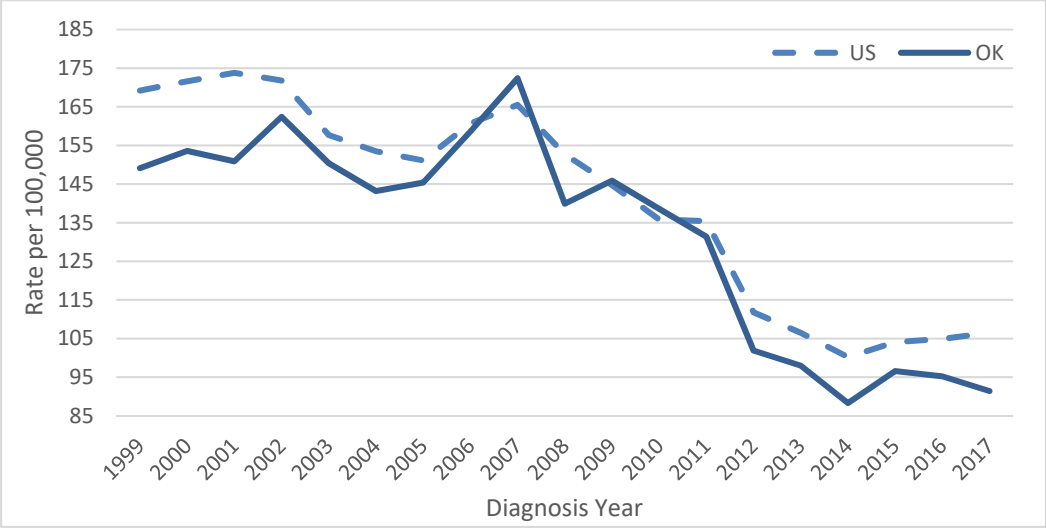
Oklahoma compared to the United States

Incidence

In 2017, 2,097 men were diagnosed with prostate cancer in Oklahoma, an age-adjusted rate of 91.4 cases per 100,000 men, making up 20% of all cancers diagnosed among men that year.

In 2017, the incidence of prostate cancer in Oklahoma remained below that of the U.S. (106.5 cases per 100,000 men), as it has been since 2011. More than 1 in 5 cases of prostate cancer (21%) are diagnosed before the age of 60. From 1999-2017, prostate cancer incidence in Oklahoma has decreased 39% compared to 37% nationwide (Figure 44).

Figure 44. Age-Adjusted Prostate Cancer Incidence Rates in OK and the U.S., 1999-2017



Data Sources: OCCR. December 2019 submission.
USCS. Released June 2020.

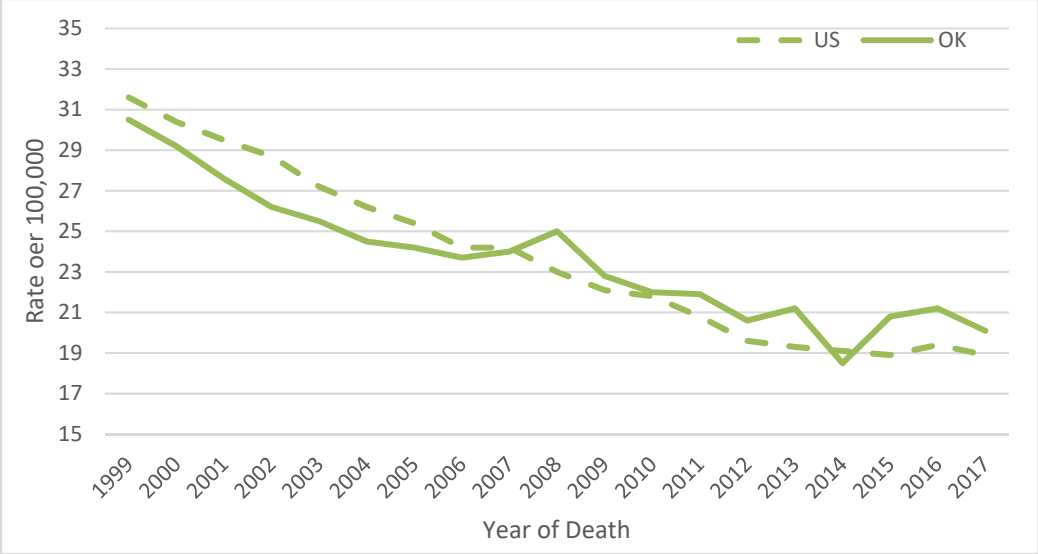
Mortality

In 2017, 388 men died from prostate cancer in Oklahoma, a rate of 20.1 deaths per 100,000 men. This made up 8.8% of all cancer deaths among men that year. Prostate cancer was the second leading cause of cancer deaths among men in 2017.[18]

There was no significant change in prostate mortality rates in 2018 in Oklahoma (396 deaths; 20.0 deaths per 100,000 men).

Mortality from prostate cancer has been declining in both the United States and Oklahoma since 1999 (Figure 45). In 2017, the mortality rate from prostate cancer in Oklahoma was slightly above that of the U.S. (18.9 deaths per 100,000 men). From 1999 to 2017, there was a 40% decline in deaths from prostate cancer nationwide compared to a 34% decline in Oklahoma.

Figure 45. Age-Adjusted Prostate Cancer Mortality Rates in OK and the U.S., 1999-2017



Data Sources: OCCR. December 2019 submission.
USCS. Released June 2020.

Who Gets Prostate Cancer in Oklahoma?

Race/Ethnicity

Incidence

As seen in Table 8, from 2013-2017, age-adjusted prostate cancer incidence rates among black men (162.0 cases per 100,000 men) were higher that of both AIAN (106.9 cases) and white (85.1 cases) men.

Table 8: Prostate Cancer Case Count and Age-Adjusted Incidence Rates by Race and Ethnicity, 2013-2017

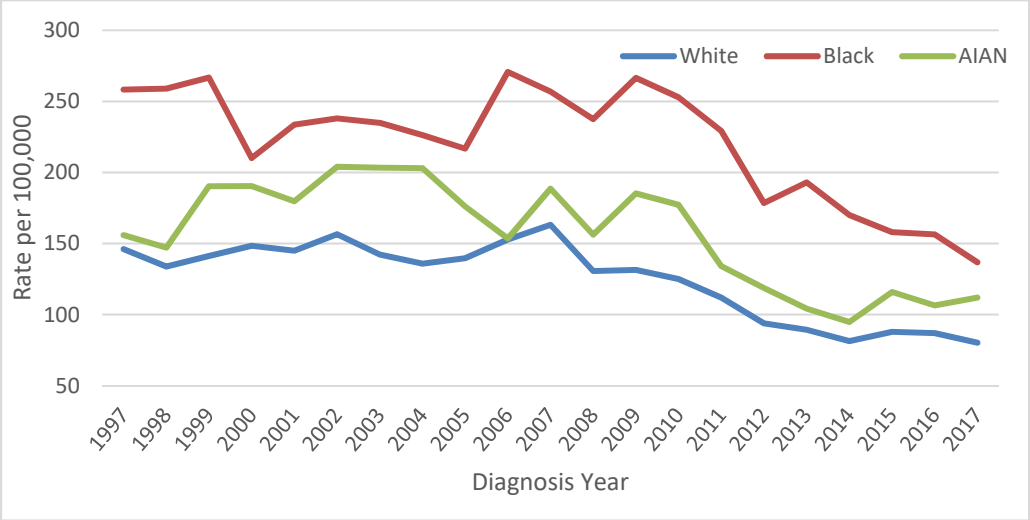
Race/Ethnicity	Number of Cases	Age Adjusted Incidence Rate (per 100,000 men)
AIAN	792	106.9
Black	1,036	162.0
White	8,080	85.1
Hispanic*	220	61.7

***This is not a mutually exclusive grouping**

Data Source: OCCR. December 2019 submission.

From 1997 to 2017, prostate cancer incidence decreased across all racial groups. Black males had the largest decrease (47%) yet continue to have higher rates compared to their white and AIAN counterparts. White males' rates decreased 45% and AIAN males' rates decreased 28% during the same time (Figure 46).

Figure 46. Age-Adjusted Prostate Cancer Incidence Rates by Race, 1997-2017

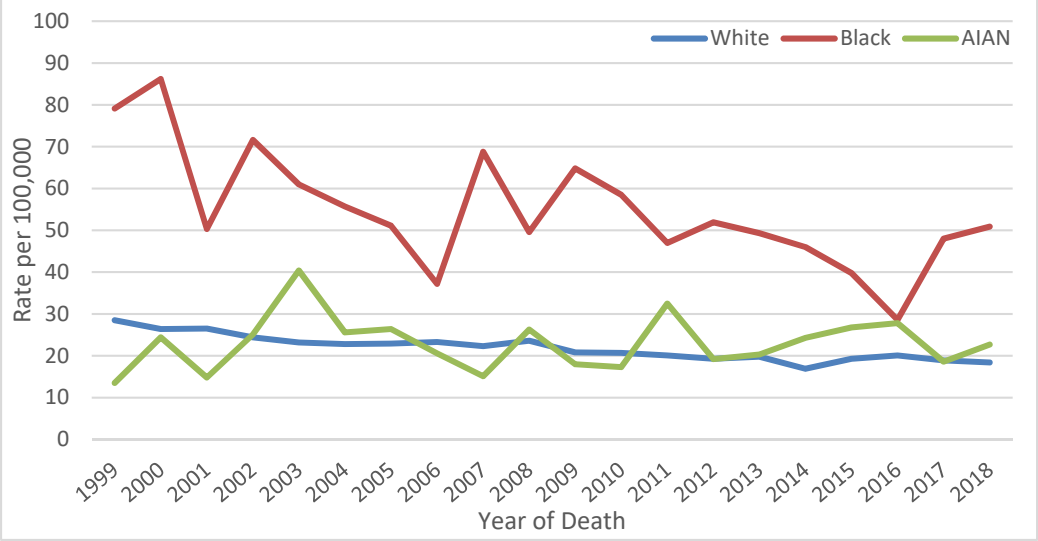


Data Source: OCCR. December 2019 submission.

Mortality

Following a similar trend to incidence rates, prostate cancer mortality rates are highest among black men (50.9 deaths per 100,000 men), compared with AIAN (22.7 deaths) and white (18.4 deaths) men in 2018. Since 1999, mortality rates have decreased the most for AIAN men (68% decrease), followed by black (36%) and white (35%) men (Figure 47).

Figure 47. Age-Adjusted Prostate Cancer Mortality Rates by Race, 1999-2018



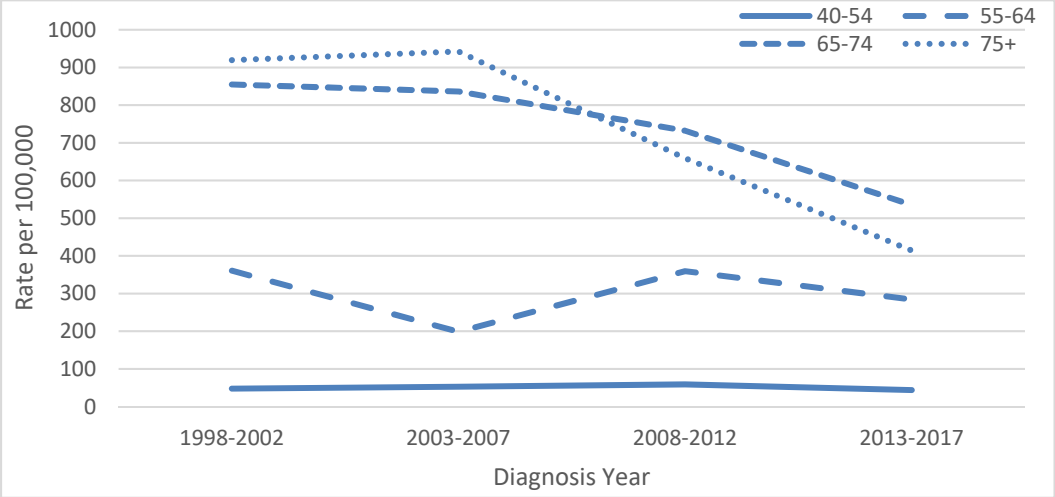
Data Source: OCCR. December 2019 submission.

Age Group

Incidence

From 1998-2017, the incidence of prostate cancer in Oklahoma has declined across all age-groups (Figure 48). Males over the age of 75 years experienced the greatest decrease (55%), followed by those aged 65-74 years (37%), 55-64 years (21%), and 40-54 years (8%).

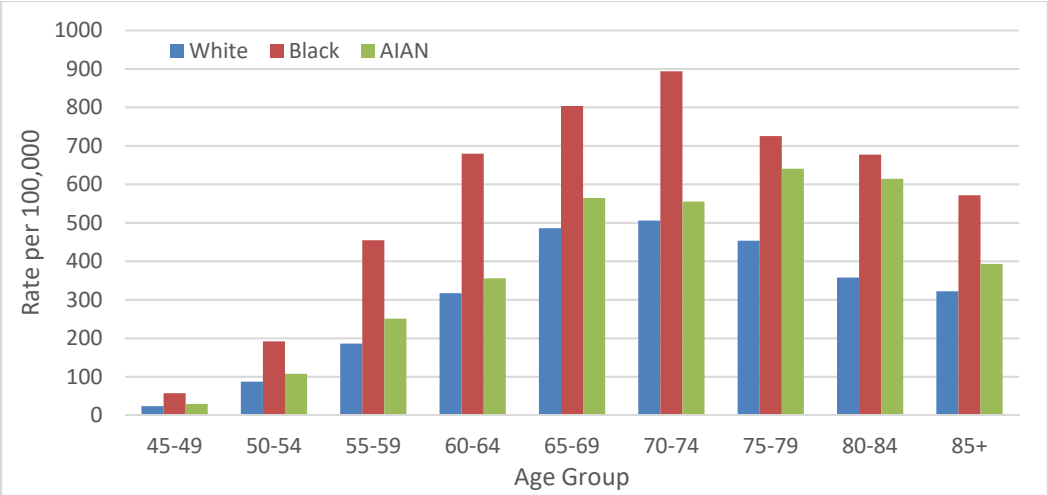
Figure 48. 5-Year Age-Specific Prostate Cancer Incidence Rates by Age Group, 1998-2017



Data Source: OCCR. December 2019 submission.

Broken down further by race, clear disparities exist across all age groups, with black men experiencing the greatest disease burden compared with their white and AIAN counterparts (Figure 49).

Figure 49. Age-Specific Prostate Cancer Incidence Rates by Race and Age Group, 2013-2017

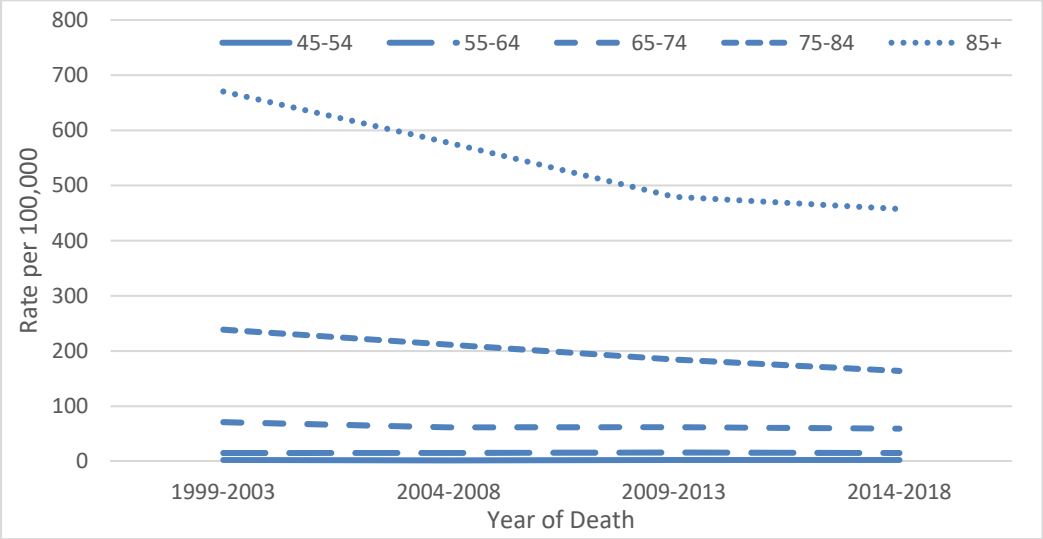


Data Source: OCCR. December 2019 submission.

Mortality

From 1998-2018, 5-year prostate cancer mortality rates decreased for all age groups over 65 years. Mortality rates for men aged 45-54 years and 55-64 years remained the same (Figure 50). Mortality rates for men aged 85 years and older decreased 32%, followed by those aged 75-84 years (31%) and 65-74 years (17%).

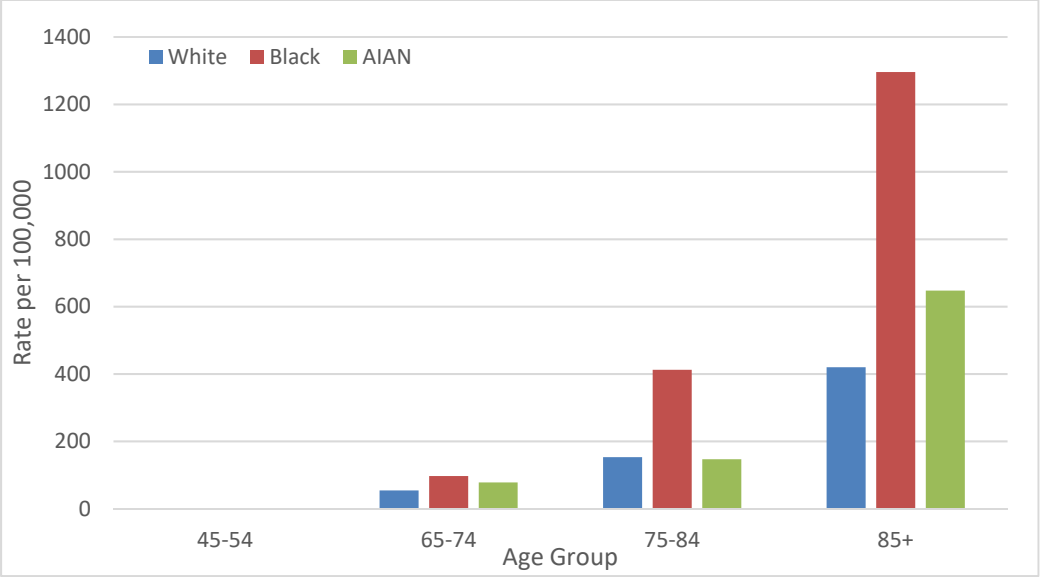
Figure 50. 5-Year Age-Specific Prostate Cancer Mortality Rates by Age Group, 1999-2018



Data Source: OCCR. December 2019 submission.

Distinct disparities in prostate cancer mortality exist when examined by race. Similar to incidence trends, in 2018 black males experienced the greatest mortality from prostate cancer across all age groups. At the oldest age group, mortality rates among black men (1,296 deaths per 100,000 men) were twice the rate of AIAN men (648 deaths) and three times the rate of white men (420 deaths) (Figure 51).

Figure 51. Age-Specific Prostate Cancer Mortality Rates by Race and Age Group, 2018



Data Source: OCCR. December 2019 submission.

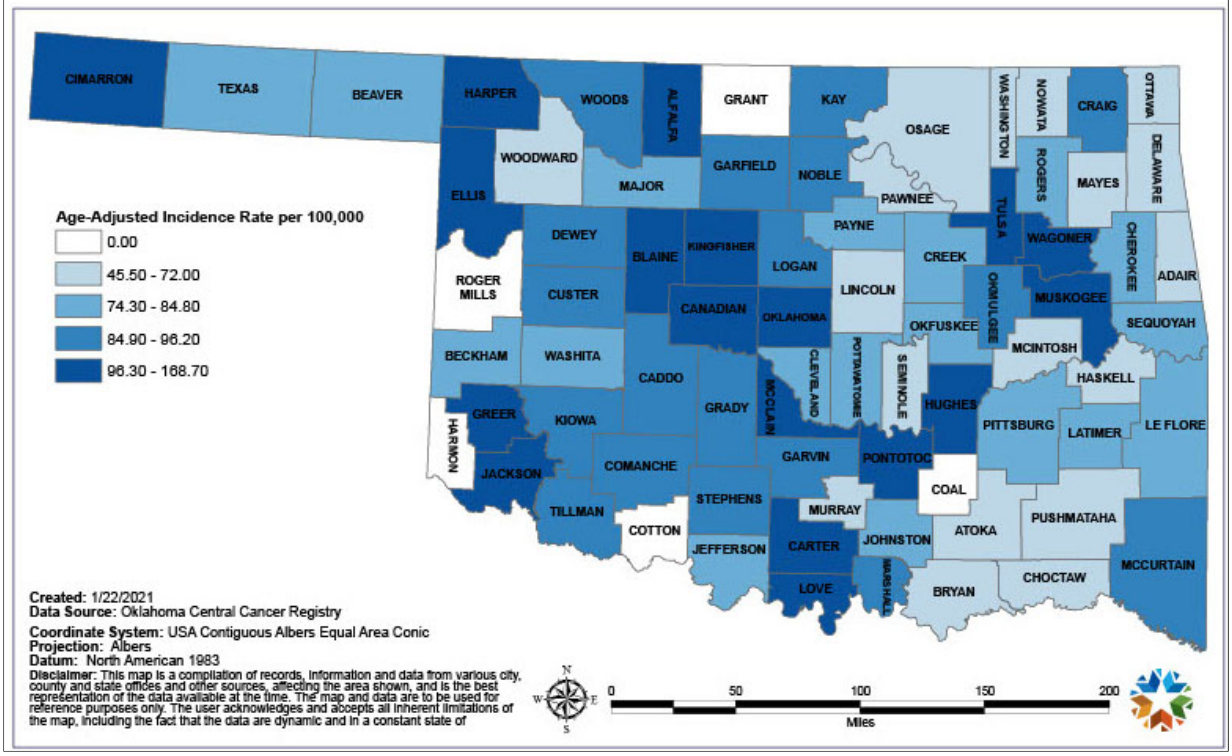
Location

Incidence

The overall prostate cancer incidence in Oklahoma from 2013-2017 was 93.9 per 100,000 men. From 2013-2017, 31 counties (44%) in Oklahoma had a higher incidence rate compared to that of the state (out of the 70 counties with non-suppressed data) (Map 9). Harper (173.0 cases per 100,000 men),

Jackson (136.2), Greer (136.1), Oklahoma (120.9), and Kingfisher (109.6) counties had the highest incidence rates of prostate cancer for men during this time.

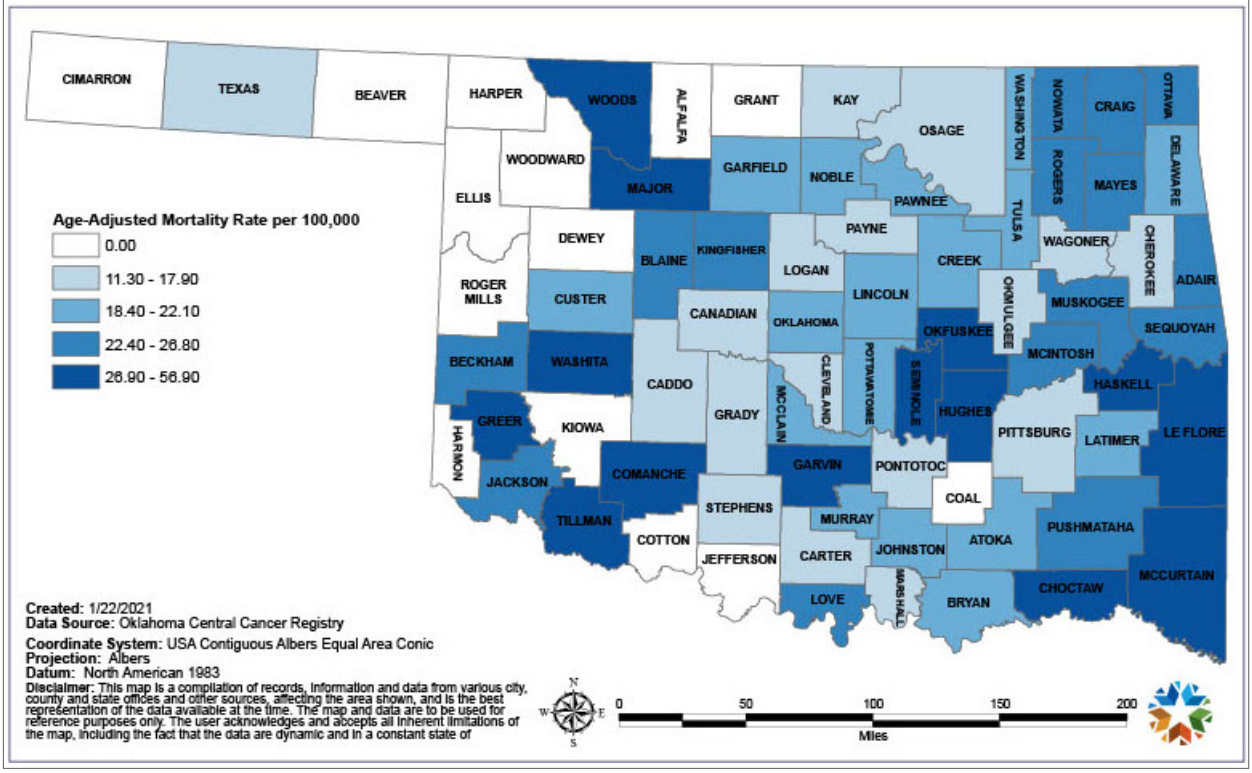
Map 9. Prostate Cancer Incidence Rates in Oklahoma by County, 2013-2017



Mortality

From 2013-2017, the prostate cancer mortality rate was 20.3 deaths per 100,000 men in Oklahoma. Out of the 63 counties with a non-suppressed mortality rate, 36 counties (60%) had a higher mortality rate compared to that of the state (Map 10). Okfuskee (56.9 deaths per 100,000 population), Greer (45.6), Choctaw (33.6), Woods (33.2), and Washita (32.1) counties had the highest mortality rates of prostate cancer in Oklahoma.

Map 10. Prostate Cancer Mortality Rates in Oklahoma by County, 2014-2018

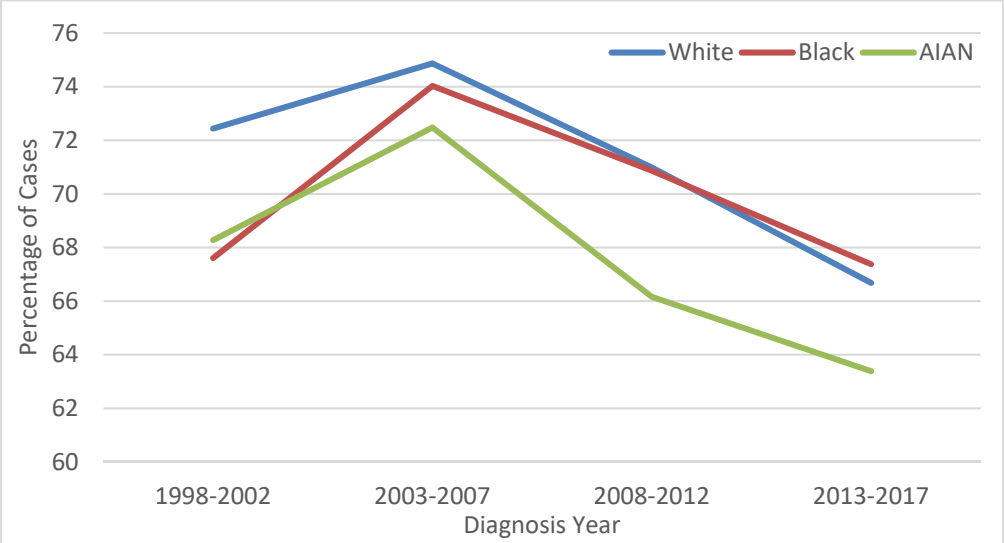


Stage at Diagnosis

Prostate cancer is one of the few types of cancer that can be detected early. Detection at *in situ* or local stages increases the chance of survival. Looking at stage at diagnosis over the years is one way to assess the effectiveness of screening and early intervention in the population. However, this is less effective with prostate cancer as a large proportion of the cases have an unknown stage at diagnosis, resulting in less accurate assessment of how effective screening is.

Even so, the decreasing trend of early-stage diagnosis from 1998-2017 is concerning (Figure 52). Disparities exist between racial groups, with AIAN men experiencing a greater decrease in proportion of cases diagnosed at early stage compared with their white and black counterparts.

Figure 52. 5-Year Proportion of Prostate Cancer Cases Diagnosed at Early Stage by Race, 1998-2017



Data Source: OCCR. December 2019 submission.

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Acknowledgements

We gratefully acknowledge the contribution of the cancer registrars and reporters across the state of Oklahoma, and the dedicated staff of the Oklahoma Central Cancer Registry, without whom this report would not be possible. Special acknowledgement is extended to the tribal nations of Oklahoma for their contributions to improving the quality and completeness of Oklahoma cancer data.

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SUGGESTED CITATION:

Feld AJ, Yeung DC, Smith N & Espinoza RE. (2021) Cancer Burden in the State of Oklahoma - 2017. Oklahoma State Department of Health, Center for Health Statistics: Oklahoma City, OK.

This publication is supported by the Centers for Disease Control and Prevention of the U.S. Department of Health and Human Services (HHS) as part of a financial assistance award totaling $710,000 with 100 percent funded by CDC/HHS. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement, by CDC/HHS, or the U.S. Government.

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