Cancer in Oklahoma Data Brief Series:

Kidney Cancer in Oklahoma

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Introduction

In 2019, kidney and renal pelvis cancer (simplified to "kidney cancer" in this report) was the 9th most commonly diagnosed cancer in the United States (US) and the 6th most commonly diagnosed cancer in Oklahoma (OK). From 2015-2019, among all US states, Oklahoma had the highest age-adjusted incidence rate and the 6th highest age-adjusted mortality rate for kidney cancer.[1] Kidney cancer also has the 2nd highest incidence disparity between Oklahoma (all races) and the US (all races), and it is the 2nd most rapidly increasing cancer in incidence in Oklahoma.

Risk factors associated with kidney cancer include: smoking; excess body weight; high blood pressure, family history and genetic factors, misuse of acetaminophen, a pain medication, for prolonged periods of time, environmental exposures (e.g., trichloroethylene), and advanced kidney disease (especially among dialysis patients).[3] Signs and symptoms are often lacking in the early stages of kidney cancer.[3] Moreover, no screening test for kidney cancer currently exists. Despite the frequent absence of symptoms and lack of a screening test, kidney cancer has a relatively high survival rate compared to many types of cancers, with 76.5% of all individuals diagnosed surviving at least 5 years.[3]

Given the troubling disparities for kidney and renal pelvis cancer in Oklahoma compared to other states and the US, in-depth examination of incidence and mortality rates for this cancer is warranted. This data brief presents information on kidney cancer incidence and mortality in Oklahoma, and concludes with a discussion of the significance of findings on clinical practice and public health policy.

Methods

Data for kidney 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 NCI'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). All data sources used in this brief were publicly available.

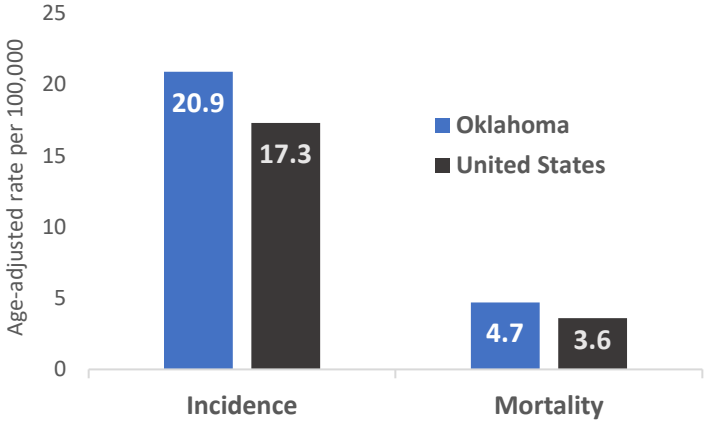
This data brief defines kidney cancer, using the ICD-10-CM code system, as the following cancer sites: (C64 and C65.9), which includes cancers of the kidney and cancers of the renal pelvis. To ensure the stability of estimates and confidentiality, CDC and SEER rates were suppressed if fewer than 16 counts were reported in a specific category and all rates were age-adjusted to the 2000 US standard population. For all analyses, unknown values were excluded and resulting percentages were weighted averages estimated from the sample and population sizes. All incidence and

mortality rates are per 100,000 population. Staging for this data brief used the SEER summary staging classification and excludes the unknown stage.

In this brief, Hispanic persons were categorized as being Hispanic regardless of race. All individuals in the sample were categorized into one of the following ethnic and racial groups: Hispanic, Non-Hispanic (NH) White, NH Black or African American, NH American Indian or Alaska Native (AI/AN), or NH Asian or Pacific Islander (Asian/PI). To improve accuracy, cancer incidence and mortality rates for the AI/AN population were Indian Health Service linked.

Results

Figure 1: Kidney cancer incidence and mortality in Oklahoma and the US, 2015-2019

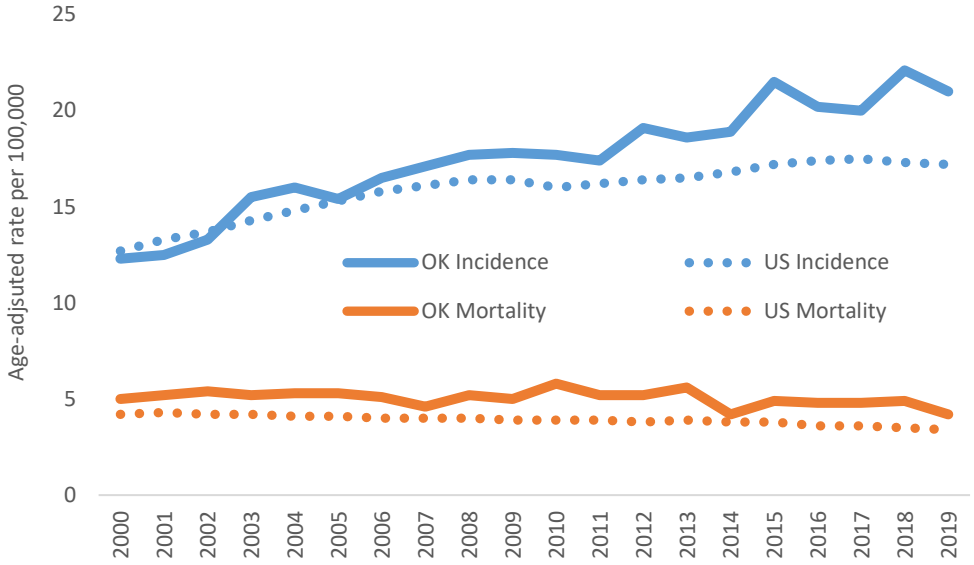


Source: SEER and CDC (NPCR and NVSS)

Overall, there were 331,015 cases of kidney cancer diagnosed between 2015 and 2019 in the US. Of these cancers, 4,763 (1.4%) cases were in Oklahoma. For mortality in the US, there were 70,404 kidney cancer deaths between 2015 and 2019. Of these cancer deaths, 1,101 (1.6%) deaths were in Oklahoma. From 2015-2019, the age-adjusted kidney cancer incidence rate in Oklahoma was higher than in the US with rates of 20.9 per 100,000 and 17.3 per 100,000 people respectively (**Figure 1**). During this time, the age-adjusted kidney cancer mortality rate for Oklahoma was 4.7 per 100,000 compared to 3.6 per 100,000 for the US.

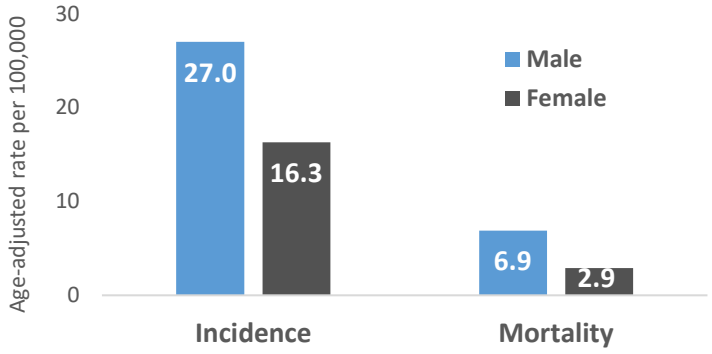
Figure 2 shows the yearly trends of kidney cancer incidence and mortality in the US and Oklahoma from 2000 to 2019. Incidence rates have increased over time for both Oklahoma and the US, while mortality rates for both have decreased. Since 2005, Oklahoma has had consistently higher incidence and mortality rates compared to the US, with the gap in incidence widening over time. Over the interval, the absolute change in kidney cancer incidence in Oklahoma was +71%, compared to +35% for the US. The absolute change in kidney cancer mortality for Oklahoma was -19%, compared to -24% for the US.

Figure 2: Kidney Cancer incidence and mortality by year in Oklahoma and the US, 2000-2019



Source: SEER and CDC (NPCR and NVSS)

Figure 3: Kidney cancer incidence and mortality by sex in Oklahoma, 2015-2019

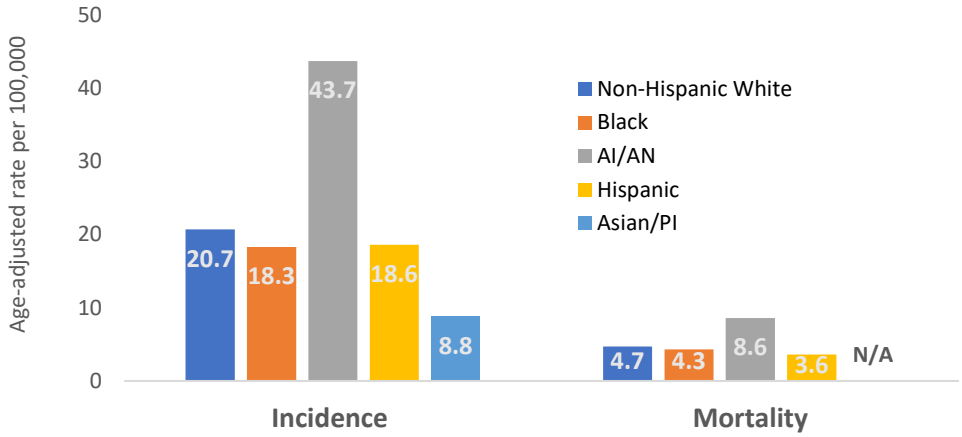


Source: OCCR and Oklahoma Vital Statistics

Figure 3 shows the age-adjusted incidence and mortality rates of kidney cancer by sex in Oklahoma from 2015-2019. Overall, both incidence and mortality rates are higher among men compared to women. The magnitude of the difference, however, is higher for mortality compared to incidence. Incidence rates are 1.7 times higher for males compared to females, whereas mortality rates are 2.4 times higher for males compared to females.

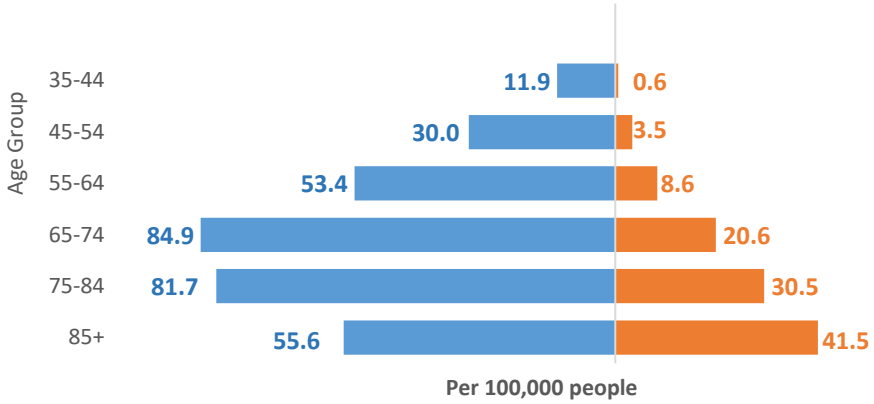
Figure 4 shows kidney cancer incidence and mortality by race and ethnicity in Oklahoma from 2015 to 2019. Among all major racial or ethnic groups in Oklahoma, the NH AI/AN population had the highest incidence and mortality rates. Although the Non-Hispanic White population had the second highest incidence and mortality rate, rates for the AI/AN population are much higher compared to the NHW population (2.1 times for incidence and 1.8 times for mortality).

Figure 4: Kidney cancer incidence and mortality by race/ethnicity in Oklahoma, 2015-2019



Source: OCCR and Oklahoma Vital Statistics

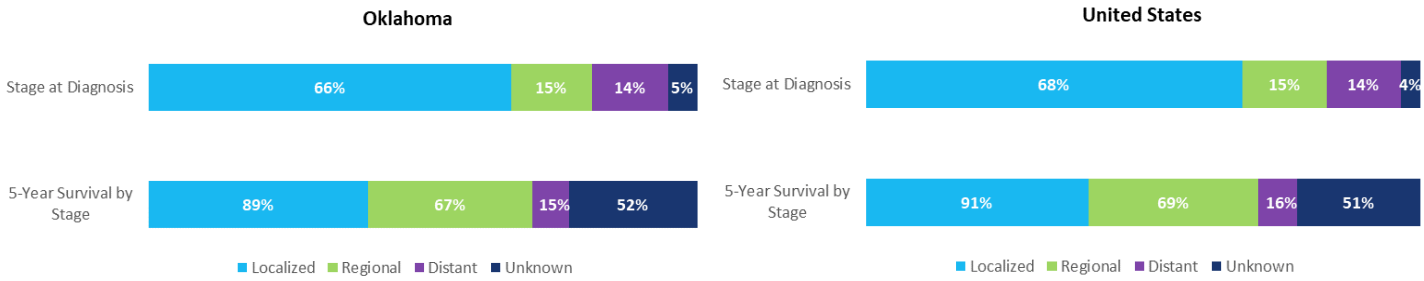
Figure 5: Kidney cancer age-adjusted incidence and mortality rates by age group, 2015-2019



Source: OCCR and Oklahoma Vital Statistics

Figure 5 shows kidney cancer incidence and mortality by 10-year age groups in Oklahoma from 2015 to 2019. The highest incidence rate is seen among those 65 to 74 years old. The highest mortality rate is seen among those 85 years and older. Mortality rates gradually increase as age increases, whereas incidence rates increase as age increases until the peak rate at 65-74 years, and then decline.

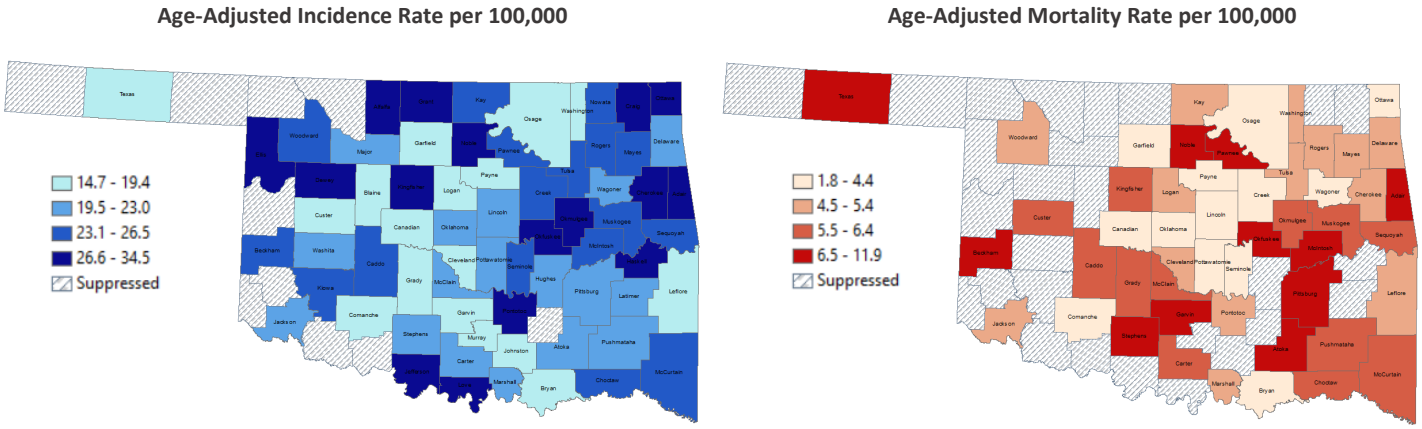
Figure 6: Kidney Cancer Stage at Diagnosis compared to 5-Year Relative Survival by Stage in Oklahoma and the US



Source: SEER and CDC (NPCR and NVSS)

Figure 6 shows the percent stage at diagnosis from 2015-2019 compared to the 5-year relative survival by stage from 2012-2018 for kidney cancer in Oklahoma and the US. The stage at diagnosis gives the percentage of cancers cases diagnosed at each stage, whereas the 5-year relative survival by stage provides the percentage of cancer cases surviving up to 5 years among those diagnosed at each stage. Most kidney cancers diagnosed each year in Oklahoma and the US are at the localized stage, notably, it is also the stage with the highest survival. Diagnosis at distant stage, which results in the lowest survival, is the least common stage at diagnosis in both Oklahoma and the US. Overall, the percent stage at diagnosis are similar for Oklahoma and the US at each stage, however Oklahoma has lower 5-year relative survival for each stage except for the unknown stage group.

Figure 7: Age-Adjusted Kidney Cancer Incidence and Mortality by County in Oklahoma, 2015-2019



Source: OCCR and Oklahoma Vital Statistics

Figure 7 shows age-adjusted kidney cancer incidence and mortality rates by county in Oklahoma. As seen in the maps above, incidence rates are highest in the northern half and especially in the northeastern quadrant of the state. Mortality rates are highest within the southeastern quadrant of Oklahoma. See **Appendix 1** for the underlying number of cancer cases, deaths and age-adjusted incidence and mortality rates for each county in Oklahoma.

Conclusions and Implications for Practice and Policy

Kidney cancer incidence rates for Oklahoma and the US have gradually increased over the past 20 years. However, this increase has been nearly twice as high in Oklahoma than in the US. In contrast, kidney cancer mortality rates for Oklahoma and US have improved slightly over the past 20 years, but mortality rates in Oklahoma have remained consistently higher than in the US during this interval. Findings from this brief form the foundation to the following recommendations to reduce the disproportionate burden of kidney cancer in Oklahoma.

Striking disparities in incidence and mortality rates among the AI/AN population exist, indicating the need to develop interventions to prevent kidney cancer, and improve kidney cancer detection and treatment in this group. Clearly, biological and epidemiological research is needed to better understand why rates are so high in the AI/AN population of Oklahoma. Similarly, men in Oklahoma face disproportionately high kidney cancer incidence and mortality rates, which points to the need to develop interventions to address kidney cancer in this group.

In order to reduce kidney cancer incidence in Oklahoma, interventions to reduce the impact of risk factors are needed. For example, cigarette smoking is a major risk factor for developing kidney cancer. While the prevalence of smoking in Oklahoma is declining, cigarette smoking remains problematic in Oklahoma, with some counties having a prevalence of about 30%.[4] Efforts to reduce cigarette smoking throughout the US, and particularly in Oklahoma, must be sustained. Excess body weight is another major risk factor for kidney cancer. Effective interventions and policies to prevent excess body weight, and decrease overweight and obesity when it occurs, should be implemented in Oklahoma and the US.

Because kidney cancer is highly survivable when diagnosed at an early stage of the disease, there is a need to develop kidney cancer screening. Emerging technologies, including multi-cancer detection (MCD) assays that evaluate cell-free DNA or other biological components, may be able to detect early-stage kidney cancer. However, it is not yet known whether screening for kidney cancer by MCD assay is effective, and if effective, whether it should be performed in the general population or in narrower cohorts of individuals who are at increased risk of developing kidney cancer.[5]

Finally, the lack of major improvements in kidney cancer mortality over the past two decades amplifies the need to develop more effective therapies. There is a need to ensure that all Oklahomans diagnosed with kidney cancer have access to the newest 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. Also, patients who participate in clinical trials tend to have the best outcomes. Efforts to help increase clinical trials awareness and increase participation in clinical trials, especially among members of high-risk groups, will ultimately improve kidney cancer outcomes.

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Data Sources:

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