Cancer in Oklahoma Data Brief Series:

Kidney Cancer in Oklahoma – Update 2025

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Introduction

In 2022, 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 2018 to 2022, among all US states, Oklahoma had the 5th highest age-adjusted incidence rate, and from 2019 to 2023, the 4th highest age-adjusted mortality rate for kidney cancer.[1]

Risk factors associated with kidney cancer include: smoking; excess body weight; high blood pressure; family history and genetic factors; misuse of acetaminophen; occupational exposures (e.g., cadmium, asbestos, and petroleum byproducts); alcohol; chronic kidney disease; per- and polyfluoroalkyl substances (PFAS); chronic hepatitis C infection; sickle cell disease; chemotherapy; and kidney stones.[2] 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 77.8% of all individuals diagnosed surviving at least five years.[4]

Given the troubling disparities for kidney and renal pelvis cancer (from here on, kidney cancer), as well as the increasing rates in Oklahoma and the US, an 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, concluding with a discussion of the significance of the findings for clinical practice and public health policy.

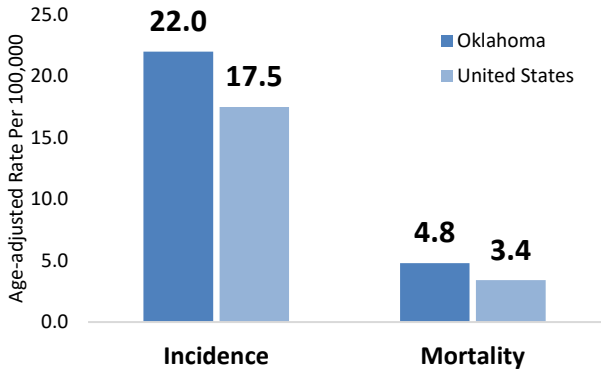
Methods

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-0-3 code system, as the following cancer sites: (C64.0 and C65.9), which include cancers of the kidney and cancers of the renal pelvis. To ensure stability of estimates and confidentiality, CDC and SEER rates were suppressed if fewer than 10 counts were reported in a specific category. All rates were age-adjusted to the 2000 US standard population. For all analyses, unknown values were excluded, and the resulting percentages were weighted averages estimated from the sample and population sizes, except for stage at diagnosis. All incidence and mortality rates are per 100,000 population. Staging for this data brief used the SEER summary staging classification.

In this brief, Hispanic persons were categorized as being Hispanic regardless of race. All individuals in the sample were classified 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 linked to the Indian Health Service. Temporal patterns were assessed using Average Annual Percent Change (AAPC) determination by Joinpoint regression analysis.[5]

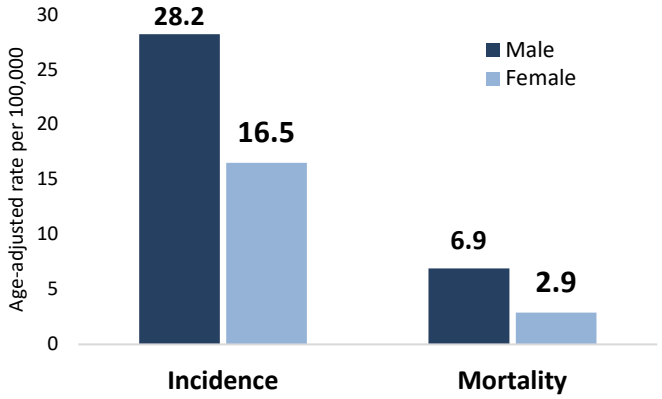
Figure 1: Kidney cancer incidence (2018-2022) and mortality (2019-2023) in Oklahoma and the United States



Source: CDC Cancer Data Visualization

Figure 2 shows the yearly trends of kidney cancer incidence and mortality in the US and Oklahoma from 1999 to 2023. 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. Oklahoma's incidence rate had a higher increase (AAPC 2.66, p-value < 0.001) compared to the US overall (AAPC 1.43, p-value < 0.001). Additionally, Oklahoma mortality was lower, but not significantly so (AAPC -0.31, p-value < 0.16), compared to the US overall (AAPC -0.98, p-value < 0.001).

Figure 3: Kidney cancer incidence (2018-2022) and mortality (2019-2023) by sex in Oklahoma



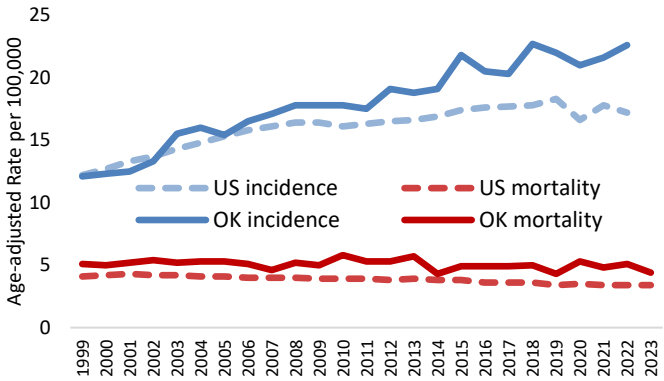
Source: CDC Cancer Data Visualization

Figure 3 shows the age-adjusted incidence and mortality rates of kidney cancer by sex in Oklahoma from 2018 to 2022. 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 than for females, whereas mortality rates are 2.4 times higher for males than for females.

Results

Overall, there were 352,960 cases of kidney cancer diagnosed between 2018 and 2022 in the US. Of these cancers, 5,044 cases (1.4%) were reported in Oklahoma. For mortality in the US, there were 71,890 kidney cancer deaths between 2019 and 2023. Of these cancer deaths, 1,148 (1.6%) were in Oklahoma. From 2018 to 2022, the age-adjusted kidney cancer incidence rate in Oklahoma was higher than in the US, with rates of 22.0 per 100,000 and 17.5 per 100,000 people, respectively (**Figure 1**). For 2019 to 2023, the age-adjusted kidney cancer mortality rate for Oklahoma was 4.8 per 100,000 compared to 3.4 per 100,000 for the US.

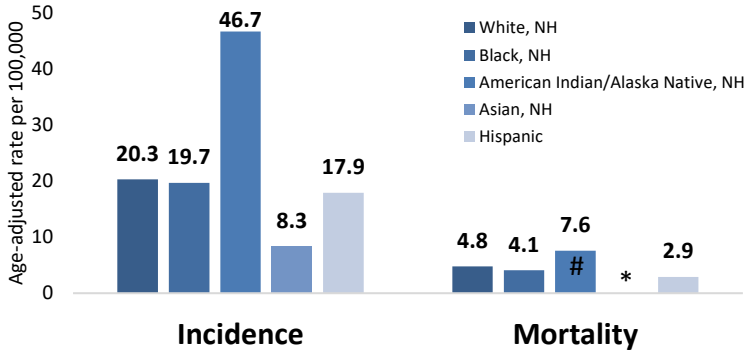
Figure 2: Age-adjusted kidney cancer incidence and mortality by year in Oklahoma and the US, 1999-2023



Source: CDC Wonder

Figure 4 shows kidney cancer incidence and mortality by race and ethnicity in Oklahoma from 2018 to 2022 and 2019 to 2023 respectively. Among all major racial or ethnic groups in Oklahoma, the NH AI/AN population had the highest incidence and mortality rates. Rates for the NH AI/AN population are much higher compared to the NH White population (2.1 times for incidence and 1.8 times for mortality).However, it is essential to note that the mortality rates for this group in Oklahoma are likely underestimated. Analyses that used data in prior years linking Indian Health Service data to the national death index showed even higher mortality for this group. However, the Indian Health Service-linked mortality data for the years presented here have not been released. We estimate a 29% increase when adjusting for misclassification in Oklahoma.[6]

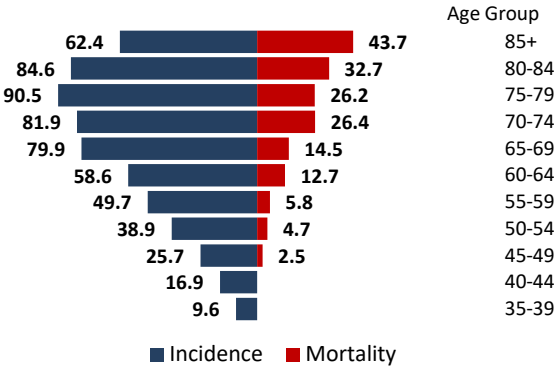
Figure 4: Kidney cancer incidence (2018-2022) and mortality (2019-2023) by race/ethnicity in Oklahoma



*Suppressed; # Estimates suggest a 29% high rate of AIAN mortality not accounted for in this chart

Source: CDC Cancer Data Visualization

Figure 5: Kidney cancer age-adjusted incidence (2018--2022) and mortality rates (2019-2023) by age group, Oklahoma



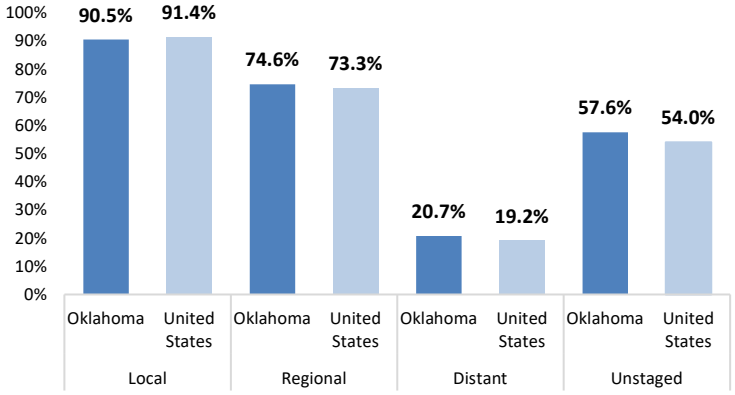
Source: CDC Wonder
Rate per 100,000

(data not shown). **Figure 6** shows the 5-year relative survival rate by stage, which indicates the percentage of cancer cases that survive for 5 years or more among those diagnosed at each stage. Most kidney cancers diagnosed each year in Oklahoma and the US were at the localized stage, which is also the stage with the highest survival. Diagnosis at the distant stage, which results in the lowest survival, is the least common stage at diagnosis in both Oklahoma and the US. Overall, the percentage of patients at each stage of diagnosis is similar for Oklahoma and the US.

Figure 5 shows kidney cancer incidence and mortality by 5-year age groups in Oklahoma from 2018 to 2022 and 2019 to 2023, respectively. The highest incidence rate is seen among those 75 to 79 years. The highest mortality rate was seen among the elderly, those 85 years and older. Mortality rates gradually increase with age, whereas incidence rates increase until reaching a peak between 75 to 79 years, and then decline.

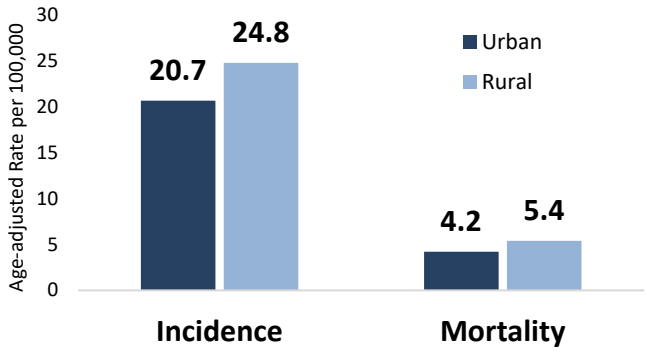
There were no differences between percentages by stage in Oklahoma and the United States from 2018 to 2022. At the local stage, 67% in Oklahoma and the United States; at the regional stage, 16% for both; at the distant stage, 14% in Oklahoma and 13% in the United States. And at Unstaged, both were at 3%

Figure 6: Kidney Cancer 5-Year Relative Survival by Stage in Oklahoma and the US 2018-2022



Source: CDC Cancer Data Visualization

Figure 7: Age-Adjusted Kidney Cancer Incidence (2018-2022) and Mortality (2019-2023) by Urban Rural Status, Oklahoma

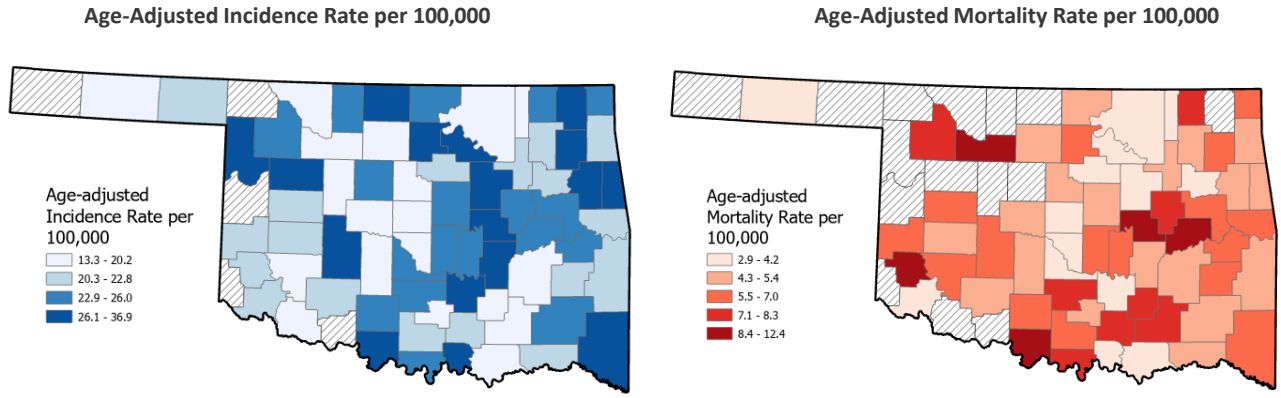


Source: OK2SHARE

Figure 7 shows the age-adjusted incidence and mortality rates by rural and urban status. When examining rural and urban differences, we observe that rural areas have higher rates of both incidence and mortality.

Figure 8 shows age-adjusted kidney cancer incidence and mortality rates by county in Oklahoma. As seen in the maps, incidence and mortality rates for the latest seven years are highest randomly throughout the state. See **Appendix 1** for the underlying number of cancer cases, deaths and age-adjusted incidence and mortality rates for

Figure 8: Age-Adjusted Kidney Cancer Incidence (2016-2022) and Mortality (2017-2023) by County in Oklahoma



Source: OK2SHARE

Conclusions and Implications for Practice and Policy

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

Striking disparities in incidence and mortality rates among males, NH AI/AN, and rural populations exist, indicating the need to develop interventions to prevent kidney cancer and improve kidney cancer detection and treatment in these groups. Clearly, research is needed to better understand why rates are so high in the NH AI/AN population of Oklahoma. Similarly, men in Oklahoma face disproportionately higher kidney cancer incidence and mortality rates, which points to the need to develop interventions to address kidney cancer in this group. Finally, the rural population has higher rates compared to urban areas, again requiring unique interventions.

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 over 25%.[7] 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 enable early detection of 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.

Finally, the lack of significant 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, as well as funds to defray the costs of traveling for care, including transportation and lodging expenses. Additionally, patients who participate in clinical trials tend to have the most favorable outcomes. Efforts to increase awareness of and participation in clinical trials, especially among high-risk groups, will ultimately improve kidney cancer outcomes.

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