

# Burden of Cancer in Kansas

March 2021



# Burden of Cancer in Kansas

## **Kansas Department of Health and Environment**

Lee Norman, MD, Secretary

Ashley Goss, Deputy Secretary of Public Health

## **Bureau of Health Promotion**

Ryan Lester, MPH, Director

Ann Elifrits MS, LCP, LCAC, Program Director, Kansas Cancer Prevention and Control Program

Holly Frye, Kansas Cancer Program Manager

Philip Harris, MA, CHES® Communications Coordinator

## **Document Preparation and Review**

## **Bureau of Epidemiology and Public Health Informatics**

Ahmed Ismail, MB BCh, PhD, Senior Epidemiologist [Preparer]

Steven Corbett, PhD, Senior Chronic Disease Epidemiologist

Farah Ahmed, MPH, PhD, State Epidemiologist

## **Contact Information**

Office: (785) 296-1207 | Email: [kdhe.cancerkansas@ks.gov](mailto:kdhe.cancerkansas@ks.gov) | Web: [kscancerpartnership.org](http://kscancerpartnership.org) or [kdheks.gov/cancer/index](http://kdheks.gov/cancer/index)

Social Media: Facebook [@kscancerpartnership](#) | [@kdhenews](#)

Mail:

Kansas Cancer Program, Bureau of Health Promotion

Kansas Department of Health and Environment

1000 SW Jackson, Suite 230

Topeka, KS 66612

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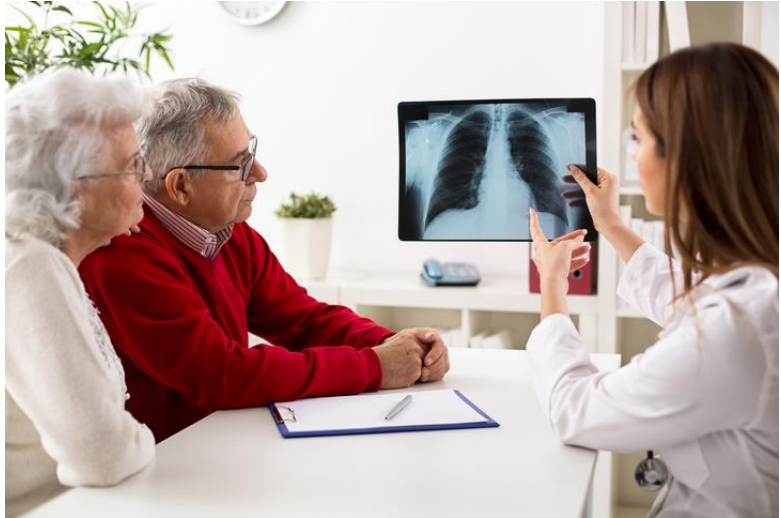
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## EXECUTIVE SUMMARY

More than 15,000 Kansans are diagnosed with cancer each year, and approximately 5,500 die from the disease. In fact, cancer is one of the leading causes of death in the state. This report describes the current status of cancer incidence and mortality in Kansas, as well as the prevalence of associated risk and protective factors among Kansans. The purpose of this report is to help guide cancer stakeholders at the state and local levels in their cancer prevention and control activities by identifying gaps and establishing baselines for planning objectives. Ongoing surveillance of



statewide data described in this report will continue to support stakeholders' need to monitor their progress and evaluate the impact of their work towards prevention and control of cancer in Kansas.

### Incidence

- From 2008 to 2017, the age-adjusted cancer incidence rates decreased significantly in Kansas and the U.S.
- In 2017, the age-adjusted cancer incidence rate in Kansas was 449.2 cases per 100,000 persons, and the rate was 437.8 cases per 100,000 persons in the U.S.
- In Kansas, the overall cancer incidence is significantly higher among males compared to females; non-Hispanics compared to Hispanics; and Kansans living in urban/semi-urban population density counties. However, this varies by cancer type.
- Cancer incidence rates increase dramatically with age, with the highest rate among Kansans aged 80-84 years old.
- The most commonly diagnosed invasive cancers in Kansas are prostate, lung and bronchus, and colorectal among men; and breast, lung and bronchus, and colorectal among women.
- The Kansas counties with the highest overall cancer incidence rates are Butler, Doniphan, Elk, Ellis, Franklin, Geary, Gove, Greeley, Greenwood, Harper, Lane, Lincoln, Logan, Ness, Osage, Ottawa, Russel, Saline, Shawnee, Wichita, and Wyandotte.

### Mortality

- From 2008 to 2018, the age-adjusted cancer mortality rates decreased significantly in Kansas and the U.S.
- In 2018, the age-adjusted cancer mortality rate was 153.9 deaths per 100,000 persons in Kansas; in 2017, the rate was 152.6 deaths per 100,000 persons in the U.S.
- In Kansas, the cancer mortality rates were significantly higher among males compared to females; African Americans compared to Whites; and Hispanics compared to non-Hispanics. However, this varies by cancer type.
- Cancer mortality rates increase dramatically with age, with the highest rate among Kansans aged 85 years and older.
- The leading causes of cancer death in Kansas are lung and bronchus, prostate, and colorectal among men; and lung, breast, and colorectal among women.

- The Kansas counties with the highest overall cancer mortality rates are Atchison, Bourbon, Chase, Cherokee, Clark, Cloud, Comanche, Crawford, Doniphan, Ellsworth, Franklin, Geary, Harper, Kingman, Lane, Logan, Ness, Osborne, Wilson, and Woodson.

## Lung Cancer

- In Kansas, lung cancer is the leading cause of cancer death, and the second most commonly diagnosed cancer overall.
- In Kansas, the age-adjusted lung cancer incidence (overall and late-stage) and mortality rates decreased significantly during the period 2008-2018.
- In 2017, the age-adjusted lung cancer overall incidence rate in Kansas was 52.3 cases per 100,000 persons, and the late-stage incidence rate in Kansas was 34.7 cases per 100,000 persons. In 2018, the age-adjusted lung cancer mortality rate in Kansas was 38.7 deaths per 100,000 persons.
- In Kansas, the age-adjusted lung cancer incidence (overall and late-stage) rates were significantly higher among males compared to females; African Americans compared to Whites; and non-Hispanics compared to Hispanics.
- In Kansas, the age-adjusted lung cancer mortality rates were significantly higher among males compared to females; and non-Hispanics compared to Hispanics.
- The Kansas counties with the highest lung cancer incidence rates are Anderson, Butler, Crawford, Franklin, Geary, Jewell, Labette, Lincoln, Neosho, Osage, Rush, and Wabaunsee. The Kansas counties with the highest lung cancer mortality rates are Anderson, Cherokee, Cloud, Crawford, Doniphan, Franklin, Geary, Greenwood, Marshall, Neosho, and Wilson.

## Colorectal Cancer

- In Kansas, colorectal cancer is the third leading cause of cancer death among males and females. It is also the third most commonly diagnosed cancer overall.
- In Kansas, the age-adjusted colorectal cancer incidence (overall and late-stage) and mortality rates decreased significantly during the period 2008-2018.
- In 2017, the age-adjusted colorectal cancer overall incidence rate was 38.7 cases per 100,000 persons and the late-stage incidence was 21.5 cases per 100,000 persons. In 2018, the age-adjusted colorectal cancer mortality rate was 14.5 deaths per 100,000 persons.
- In Kansas, the age-adjusted colorectal cancer incidence (overall and late-stage) rates are significantly higher among males compared to females; non-Hispanics compared to Hispanics, and among those living in rural counties compared to those living in urban counties during 2013-2017.
- In Kansas, the age-adjusted colorectal cancer mortality rates are significantly higher only among males compared to females during the period 2014-2018.
- The Kansas counties with the highest colorectal cancer incidence rates are Anderson, Bourbon, Doniphan, Grant, Gray, Harper, Mitchell, Rooks, Russell, Seward, and Thomas. The Kansas counties with the highest colorectal cancer mortality rates are Allen, Atchison, Bourbon, Cowley, Montgomery, and Neosho.

## Female Breast Cancer

- Among Kansas women, breast cancer is the most commonly diagnosed invasive cancer and the second leading cause of cancer death.
- The age-adjusted female breast cancer incidence (overall and late-stage) and mortality rates remained stable during the period 2008-2018.
- In 2017, the age-adjusted female breast cancer overall incidence rate in Kansas was 133.3 cases per 100,000 females, and the late-stage incidence rate was 39.6 cases per 100,000 females. In 2018, the age-adjusted female breast cancer mortality rate was 19.8 deaths per 100,000 Kansas females.



- In Kansas, the age-adjusted female breast cancer overall incidence rates were significantly higher among non-Hispanics compared to Hispanics, and among Kansas females living in urban counties compared to females living in rural counties during 2013-2017.
- In Kansas, the age-adjusted female breast cancer late-stage incidence rates were significantly higher among African American compared to White women, and among non-Hispanics compared to Hispanics during 2013-2017.
- In Kansas, the age-adjusted female breast cancer mortality rates were significantly higher only among African American compared to White women during 2014-2018.
- The Kansas counties with the highest female breast cancer incidence rates are Douglas, Ellis, Franklin, Greenwood, Johnson, Marion, Marshall, Ness, Norton, Osage, Ottawa, Rice, and Scott. The Kansas counties with the highest female breast cancer mortality rates are Franklin, Labette, and McPherson.

### Cervical Cancer

- In Kansas, the age-adjusted cervical cancer incidence (overall and late-stage) and mortality rates remained stable during the period 2008-2018.
- In 2017, the age-adjusted cervical cancer overall incidence rate was 7.0 cases per 100,000 Kansas females, and the late-stage incidence rate was 3.1 cases per 100,000 Kansas females. In 2018, the age-adjusted cervical cancer mortality rate was 2.1 deaths per 100,000 females in Kansas.
- The age-adjusted cervical cancer incidence (overall and late-stage) rates did not differ by race, ethnicity, or county population density.
- The age-adjusted cervical cancer mortality rates were significantly higher only among African American compared to White women.
- The cervical cancer incidence rates are only available only for Johnson, Sedgwick, Shawnee, and Wyandotte counties, and they are 4.7, 9.3, 7.0, and 12.2 cases per 100,000 women, respectively. The cervical cancer mortality rates are only available for Sedgwick and Wyandotte counties, and they are 2.6 and 5.3 cases per 100,000 women.

### Prostate Cancer

- In Kansas, prostate cancer is the most commonly diagnosed invasive cancer and the second leading cause of cancer death among men.
- The age-adjusted prostate cancer overall incidence decreased significantly during the period 2008-2017, while the late-stage incidence and mortality rates remained stable during the period 2008-2018.
- In 2017, the age-adjusted prostate cancer overall incidence rate was 116.4 cases per 100,000 males, and the late-stage incidence rate was 18.7 cases per 100,000 males. In 2018, the age-adjusted prostate mortality rate was 18.2 deaths per 100,000 males.
- In Kansas, prostate cancer incidence (overall and late-stage) and mortality rates were significantly higher among African Americans compared to Whites; and among non-Hispanics compared to Hispanics (only overall incidence) during the period 2013-2018.
- The Kansas counties with the highest prostate cancer incidence rates are Ellis, Franklin, Geary, Harper, Kearny, Lincoln, Lyon, Ness, Ottawa, Philips, Republic, Russel, Saline, and Stafford. The Kansas counties with the highest prostate cancer mortality rates are McPherson and Wyandotte.

### Melanoma

- In Kansas, the age-adjusted melanoma overall incidence rates increased significantly during the period 2008-2017 while the late-stage incidence and mortality rates remained stable during the period 2008-2018.

- In 2017, the age-adjusted melanoma overall incidence rate in Kansas was 28.6 cases per 100,000 persons, and the late-stage incidence rate was 3.4 cases per 100,000 persons. In 2018, the age-adjusted melanoma mortality rate was 2.4 deaths per 100,000 Kansans.
- During 2013-2017, the age-adjusted melanoma overall incidence rates were significantly higher among men compared to women, non-Hispanic compared to Hispanic Kansans, and among Kansans living in urban counties compared to Kansans living in rural counties.
- During 2013-2018, the age-adjusted melanoma late-stage incidence and mortality rates were significantly higher only among men compared to women in Kansas.
- The Kansas counties with the highest melanoma incidence rates are Butler, Franklin, Jackson, Johnson, Nemaha, and Sumner. The melanoma mortality rates are available only for Johnson, Sedgwick, and Shawnee counties, and they are 2.4, 2.5, and 2.5 cases per 100,000 persons, respectively.

### Cancer Incidence and Mortality among Kansas Children

- The most commonly diagnosed cancers among Kansas children less than 18 years during the period 2013-2017 were leukemia (20.5%), brain (17.5%), and thyroid (7.8%).
- The age-adjusted incidence rates for overall cancer among children less than 18 years during the period 2008-2017 were significantly higher than the rate during the period 1998-2002.
- The most recent data for Kansas shows a rate of 18.9 cases per 100,000 population (95% confidence interval: 17.5 to 20.3).
- Brain cancer (31.4%) and leukemia (24.5%) constitutes more than half of cancer-related deaths among Kansas children during the period 2014-2018
- The age-adjusted mortality rate for all cancers among children < 18 years old has not significantly changed between 1999 and 2018.
- The most recent data for Kansas shows a rate of 2.5 deaths per 100,000 population (95% confidence interval: 2.0 to 3.0).

### Cancer Screening Practices

- For the years 2017 and 2019 combined, 13.1 percent (95% CI: 9.6% to 16.6%) of high-risk Kansans for lung cancer have received the LDCT for lung cancer screening.
- In 2018, 67.3 percent of Kansas adults aged 50-75 years old had met the U.S. Preventive Services Task Force (USPSTF) recommendation for colorectal cancer screening. The percentages were lower among Hispanics, adults aged 50-64 years old, those who attained lower levels of education, those with lower annual household income, those who did not have health insurance, and those living in rural counties.
- In 2018, 64.6 percent of Kansas adults 50-75 years had a colonoscopy in the past 10 years.
- In 2018, 6.5 percent of Kansas adults 50-75 years had an FOBT in the past year.
- In 2018, 69.1 percent of Kansas women aged 40 years and older had a mammogram within the past two years. The percentages were significantly lower among women aged 40-49 years old, those with lower levels of education, those with lower annual household income, those without health insurance, those living with disability, and those without health insurance.
- In 2018, 86.5 percent of Kansas women aged 40 years and older have had a discussion with their health care provider about screening for breast cancer. The percentages were significantly lower among women who did not graduate from high school, those with lower annual household income, those without health insurance, and those living with disability.
- In 2018, 83.9 percent of Kansas women aged 21-65 years old met the USPSTF recommendation for cervical cancer screening. The percentages were lower among women aged 21 to 30 and 51-65 years

old, those who did not graduate from high school or attended some college, those with annual household income less than \$50,000, those living with disability, and those without health insurance.

- In 2018, 32.9 percent of Kansas men aged 40 years and older had a PSA test within the past two years. The percentages were significantly lower among men in younger age groups, race groups other than Whites, Hispanics, those with education level lower than a college degree, those with lower annual household income, and those without health insurance.

### **Cancer Risk and Protective Factors**

- In 2019, 16.2 percent of Kansas adults 18 years and older were current smokers. In 2017, 7.2 percent of Kansas high school students in grade 9-12 were current smokers.
- During 2018-2019, approximately 5.4 percent of Kansas adults 18 years and older used smokeless tobacco products. In 2017, approximately 5.3 percent of high school students in grades 9-12 currently used smokeless tobacco in Kansas.
- In 2019, 35.2 percent of Kansas adults 18 years and older were obese.
- In 2019, 50.4 percent of Kansas adults 18 years and older consumed fruits and vegetables 1 or more times per day.
- In 2019, 27.0 percent of Kansas adults 18 years and older met physical activity guidelines.
- In 2019, 28.1 percent of Kansas adolescents aged 13-17 years received the recommended (3 or more) doses of the HPV vaccine.
- In 2017, 24.0 percent of Kansas adults 18 years and older always or nearly always used sunscreen or sun-block when they stayed outside on a sunny day for more than an hour. The percentages were lower among males; adults aged 18 to 24, 25 to 34, or 65 years and older; African Americans; those with lower education levels; those whose annual household income was less than \$50,000, those who live without a disability, and those who live in rural counties.
- In 2017, 3.3 percent of Kansas adults 18 years and older used tanning or sunlamps within the past 12 months. The percentages were higher among females, adults younger than 65 years, those with lower education levels, those with annual household income \$50,000 or more, and those living without a disability.

### **Sharing Family History with Health Care providers and Genetic Counseling**

- In 2019, 92.6 percent of Kansas adults 18 years and older who actively collected family history of chronic diseases including cancer have shared their history with their healthcare providers. The percentages were lower among adults aged 18-24 years compared to those aged 65 years and older, and among adults without health insurance.
- In 2019, 12.9 percent of Kansas adults 18 years and older who have a family history of cancer have received genetic counseling for cancer. The percentages of Kansans who received genetic counseling were lower among males, adults aged 25-34 years, and adults living without a disability.

### **Cancer Survivorship**

- In 2019, 7.7 percent of Kansas adults 18 years and older reported they currently have cancer (excluding skin cancer).
- In 2019, the adjusted percentages of Kansans who self-reported fair/poor health, those living with disability, physically unhealthy for 14 days or more in the past month, and those with poor health interfered with usual activities for 14 days or more in the past month were significantly higher among adults with cancer as compared to those without cancer.
- During 2016-2018, the percentage of cancer survivors who received a summary of their treatment ranged from 41.3 percent (2017) to 48.7 percent (2016).

- During 2016-2018, the percentage of cancer survivors who received a survivorship care plan ranged from 70.0 percent (2017) to 77.1 percent (2016). The great majority of those who received a survivorship care plan (77.0%-79.6%) received it written down or printed on paper format.
- During 2016-2018, insurance paid for all or part of cancer treatment for most of Kansas cancer survivors (94.9%-97.1%) with their most recent diagnosis of cancer, and a small percentage of Kansas cancer survivors were denied insurance because of cancer (6.7%-8.3%).
- In 2018, only 2.5 percent of cancer survivors in Kansas were unable to obtain cancer screening due to cost, while about 11.0 percent were unable to obtain a recommended cancer screening testing due to cost, and about 9.0 percent of cancer survivors went in a financial hardship due to cancer, treatment, or late effects of treatment.
- The percentage of cancer survivors who participated in a clinical trial during their course of treatment ranged from 3.1 percent (2018) to 6.3 percent (2017).
- During 2016-2018, the percentages of cancer survivors who had pain caused by cancer or cancer treatment ranged from 8.1 percent (2016) to 10.0 percent (2018). The majority of those who had pain got their pain under control (72.3%-78.6%) with or without medication.

## INTRODUCTION



Cancer is the name given to a collection of related diseases. In all types of cancer, some of the body's cells begin to divide without control and spread into surrounding tissues. Cancer cells can also spread to other parts of the body through the blood and lymphatic systems. There are more than 100 different types of cancer, most of which are named for the organ or type of cell in which they start.<sup>1</sup> If the spread is not controlled, cancer can lead to severe complications and death. In the U.S., cancer is the second most common cause of death, accounting for nearly 1 in 4 deaths.<sup>2</sup> The burden of overall cancer incidence

and death in Kansas is highlighted in Chapters 1 and 2 of this report. The presentation included analysis of the cancer trend over the last 10 years of data, description of disparity by sex, race, ethnicity, and county population density, as well as the order of the most commonly diagnosed cancers and leading causes of cancer-related mortality.

Although anyone can develop cancer, the risk of being diagnosed with cancer increases with age because most cancers result from damage to genes that occurs over the course of one's lifetime, as opposed to inherited genetic mutations. Genetic damage may result from internal factors, such as hormones and immune conditions, or external factors, such as tobacco, viruses, chemicals, and radiation. Several types of cancer are largely preventable through avoidance of tobacco use, maintenance of a healthy weight, adequate physical activity, and healthful nutrition. Other cancers caused by viruses and ultraviolet radiation are also preventable through vaccination and skin protection, respectively. Cancer screening can also prevent certain cancers, such as colorectal and cervical cancer, through the detection and removal of precancerous cells before they turn into cancer. In addition, screening are beneficial because they can result in early diagnosis of cancer when they are most amenable to treatment. Chapters 3-8 of this report focus on incidence (overall and late-stage) and mortality of cancers that are largely preventable i.e., lung, colorectal, female breast, cervical, prostate, and melanoma. The trend in the annual incidence and mortality of the last 10 years of data of these types of cancer was presented. In addition, disparities in incidence and mortality were also identified in these chapters. Chapters 9 and 10 of this report describe the current prevalence of cancer screening practices, as well as the risk and protective behaviors, among Kansans. Chapter 11 provides information on sharing family history of cancer with healthcare providers and genetic counseling for patients who have a family history of cancer. The last chapter focuses on the quality of life for cancer survivorship.

This report serves as a companion piece to the 2022-2026 Kansas Cancer Prevention and Control Plan, a product of the Kansas Cancer Partnership whose goal is to reduce the burden and suffering of cancer and to enhance the lives of all Kansas cancer survivors and their families. The current Burden of Cancer in Kansas report was updated to help guide cancer stakeholders at the state and local levels in their cancer prevention and control activities by identifying gaps and establishing baselines for plan objectives. Ongoing surveillance of statewide data described in this report, including the Kansas Cancer Registry, Kansas Vital Statistics, and the Kansas Behavioral Risk Factor Surveillance System, will continue to support stakeholders' need to monitor progress and evaluate the impact of their work.

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<sup>1</sup> What is Cancer? 2020. National Cancer Institute. <http://www.cancer.gov/cancertopics/cancerlibrary/what-is-cancer>. Accessed September 6, 2020

<sup>2</sup> M. H. 2019. Deaths: Leading causes for 2017. Hyattsville, MD:National Center for Health Statistics.

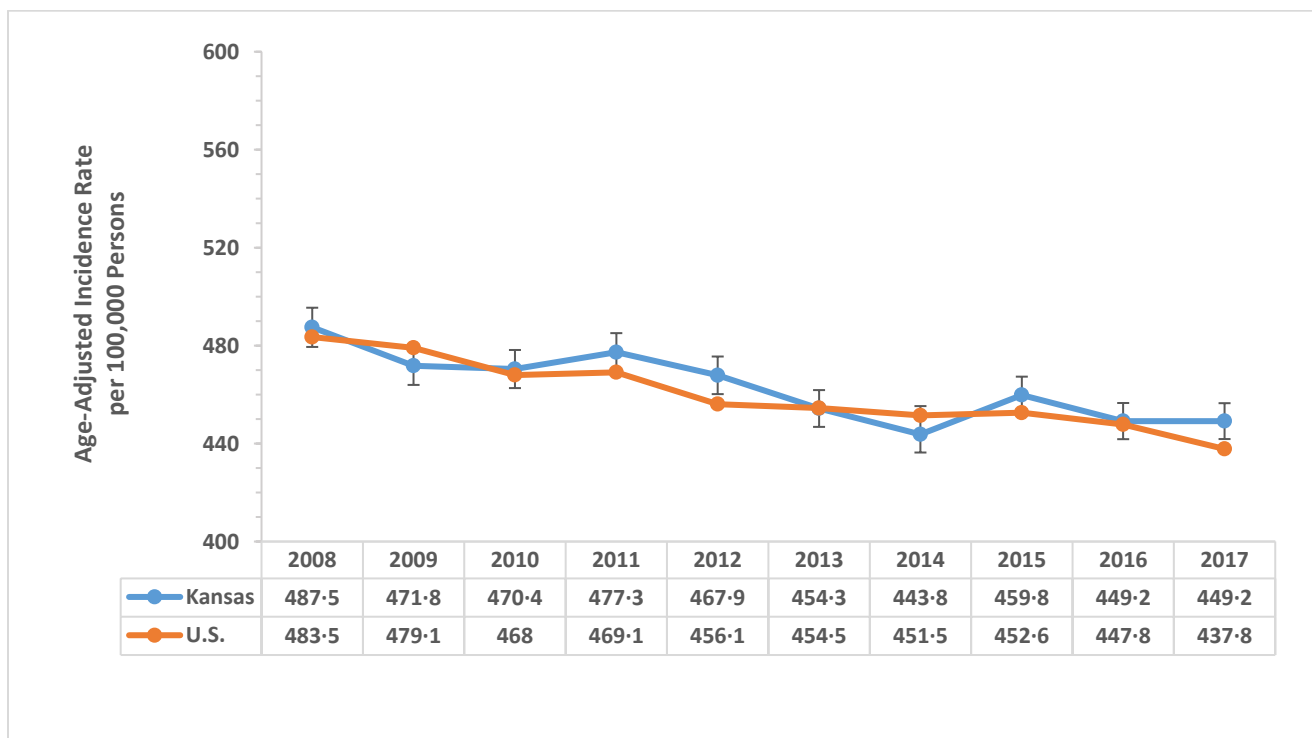
# CHAPTER 1: CANCER OVERALL INCIDENCE

## Cancer Overall Incidence

Each year, on average, about 15,000 invasive cancers are diagnosed among Kansas residents. In Kansas, the age-adjusted cancer overall incidence rates decreased significantly during the period 2008-2017 from 487.5 cases per 100,000 persons (95% Confidence Interval (CI): 479.5 to 495.5) in 2008 to 449.2 cases per 100,000 persons (95% CI: 441.8 to 456.5) in 2017 (Figure 1-1). Similarly, the age-adjusted cancer overall incidence rates decreased significantly in the U.S. from 483.5 cases per 100,000 persons (95% CI: 483.0 to 484.5) in 2008 to 437.8 cases per 100,000 persons (95% CI: 437.2 to 438.5) in 2017 (Figure 1-1). The average Annual Percent Change (APC) in the cancer overall incidence rates during that period was -0.9 in Kansas and -1.2 in the U.S.



**Figure 1-1. Age-adjusted cancer overall incidence rates, Kansas and the U.S. 2008-2017**



Source: 2008-2017 Kansas Cancer Registry. U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on 2019 submission data (1999-2017): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; [www.cdc.gov/cancer/dataviz](http://www.cdc.gov/cancer/dataviz), released in June 2020. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Cancer incidence was defined according to ICD-O-3 codes with a behavior code indicating invasive malignancy; includes in situ bladder cancer. The average Annual Percent Change (APC) in the annual rates was calculated using the Joinpoint software, see Technical Appendix for more details.

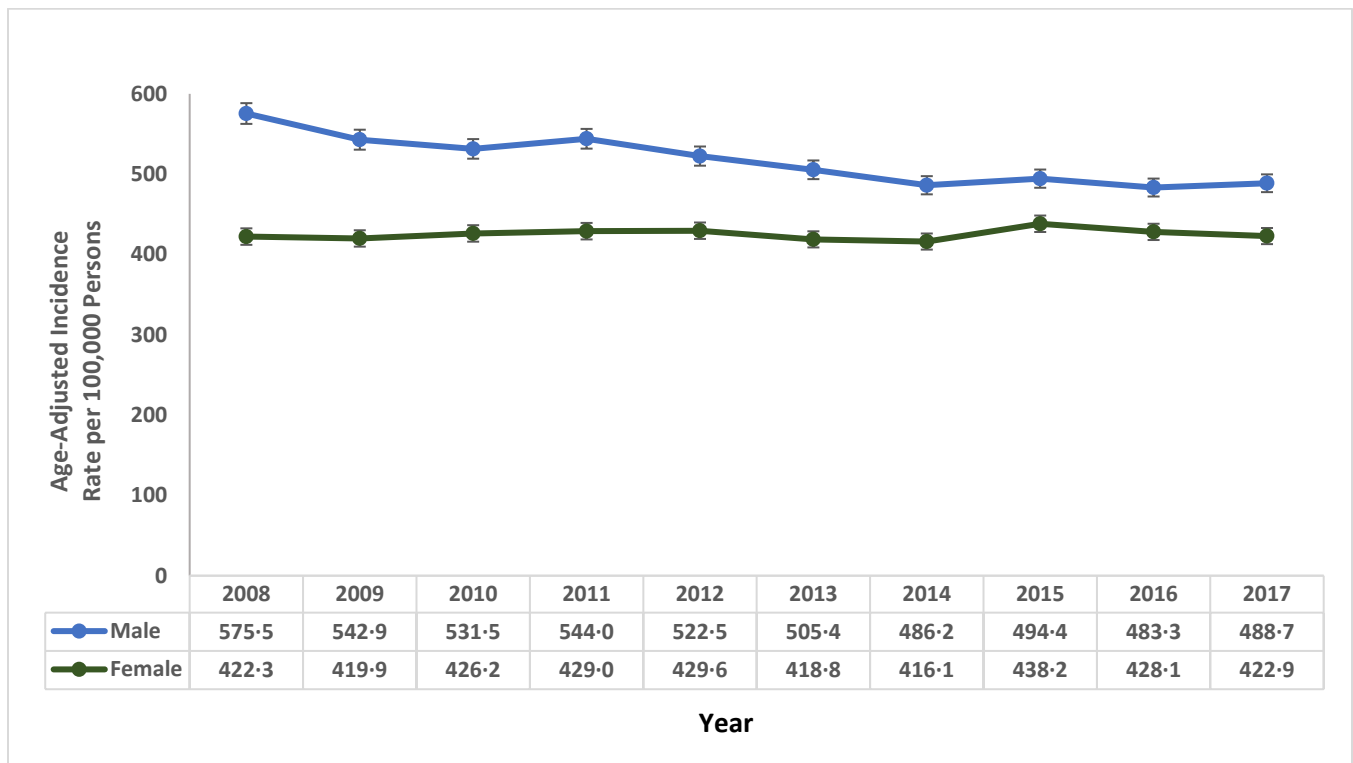
## Cancer Overall Incidence among Gender Groups

In Kansas, the age-adjusted cancer overall incidence rates were 15 percent to 35 percent higher for men than for women during the period 2008-2017 (Figure 1-2). The large difference in the overall incidence rates between Kansas males and females is similar to the difference at the national level.<sup>3</sup>

The age-adjusted cancer overall incidence rates among Kansas males decreased significantly from 575.5 cases per 100,000 persons (95% CI: 562.6 to 588.4) in 2008 to 488.7 cases per 100,000 persons (95% CI: 477.6 to 499.7) in 2017 (Figure 1-2). The average Annual Percent Change (APC) in the age-adjusted cancer overall incidence rates among Kansas males was -1.2 during the period 2008-2017.

The age-adjusted cancer overall incidence rates in Kansas females remained stable during the period 2008-2017, with a rate of 422.9 cases per 100,000 persons (95% CI: 412.9 to 432.9) in 2017 (Figure 1-2).

**Figure 1-2. Age-adjusted cancer overall incidence rates among gender groups, Kansas 2008-2017**



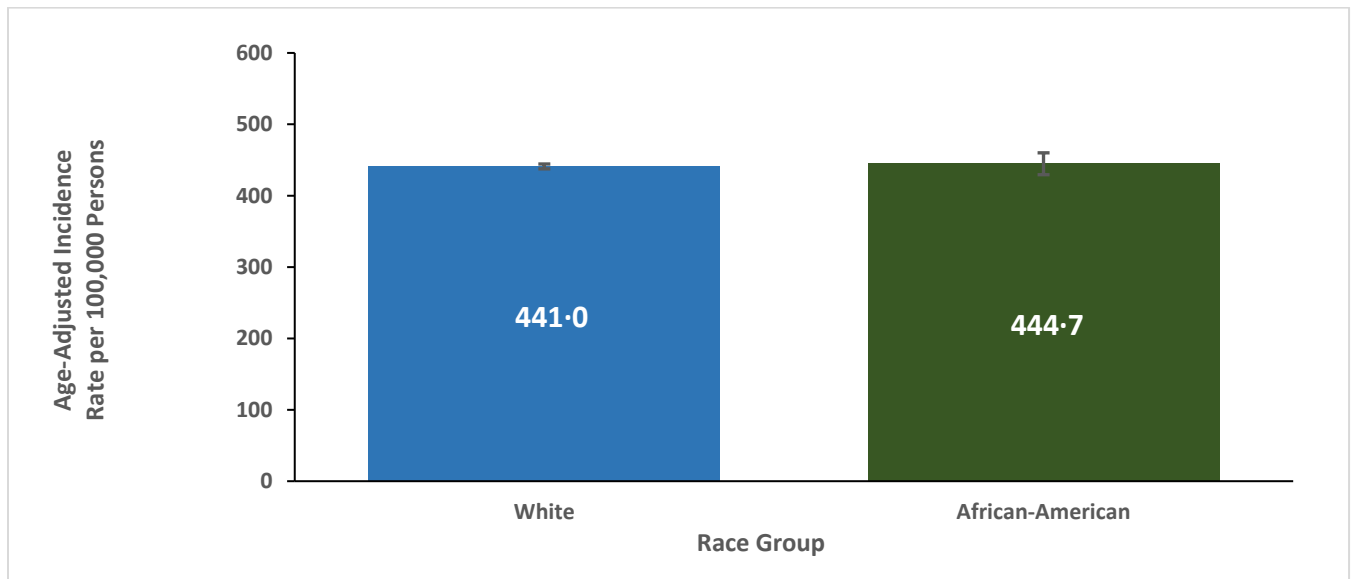
Source: 2008-2017 Kansas Cancer Registry. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Cancer incidence was defined according to ICD-O-3 codes with a behavior code indicating invasive malignancy; includes in situ bladder cancer. The average Annual Percent Change (APC) in the annual rates was calculated using the Joinpoint software; see Technical Appendix for more details on trend analysis.

<sup>3</sup> Ehemann C, Henley SJ, Ballard-Barbash R, Jacobs EJ, Schymura MJ, Noone AM, Pan L, Anderson RN, Fulton JE, Kohler BA, Jemal A, Ward E, Plescia M, Ries LAG, Edwards BK. Annual Report to the Nation on the Status of Cancer, 1975-2008, Featuring Cancers Associated with Excess Weight and Lack of Sufficient Physical Activity. Cancer. Epub 2012 Mar 28.

## Cancer Overall Incidence among Race Groups

The age-adjusted cancer overall incidence rates did not differ significantly between African American (444.7 cases per 100,000 persons; 95% CI: 429.4 to 460.0) and White Kansans (441.0 cases per 100,000 persons; 95% CI: 437.5 to 444.4) during the period 2013-2017 (Figure 1-3). Overall incidence rates for Kansans of other race categories are not shown because the number of cases were insufficient for computing statistically reliable rates for these race groups.

**Figure 1-3. Age-adjusted cancer overall incidence rates among race groups, Kansas 2013-2017**



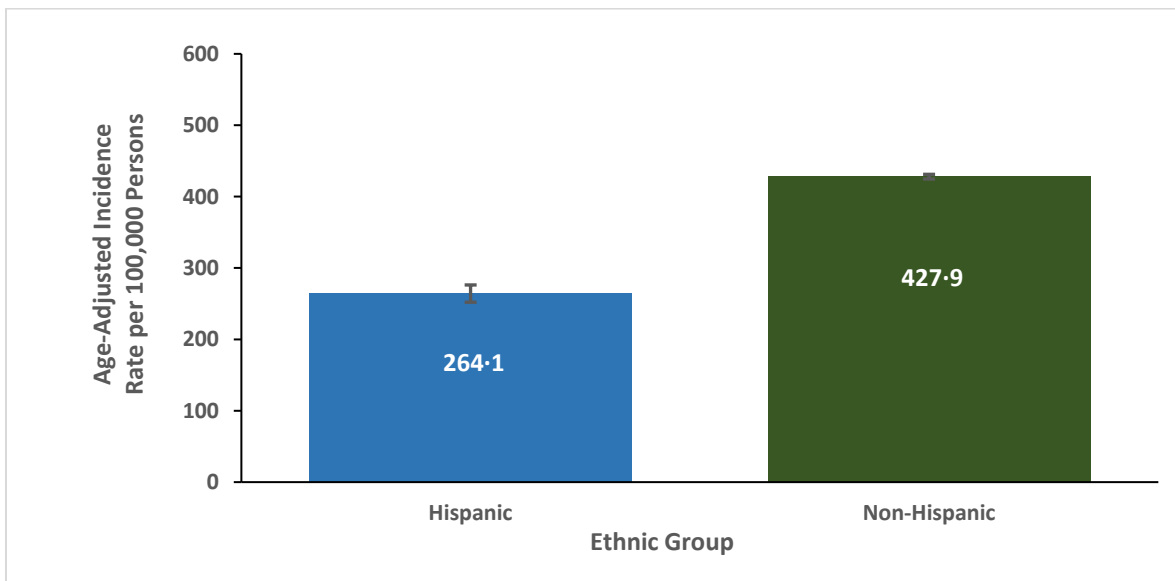
Source: 2013-2017 Kansas Cancer Registry. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Cancer incidence was defined according to ICD-O-3 codes with a behavior code indicating invasive malignancy; includes in situ bladder cancer.



## Cancer Overall Incidence among Ethnic Groups

In Kansas, the age-adjusted cancer overall incidence rates were significantly lower for Hispanics (264.1 cases per 100,000 persons; 95% CI: 252.0 to 276.2) as compared to non-Hispanics (427.9 cases per 100,000 persons; 95% CI: 424.6 to 431.3) during the period 2013-2017 (Figure 1-4).

**Figure 1-4. Age-adjusted cancer overall incidence rates among ethnic groups, Kansas 2013-2017**

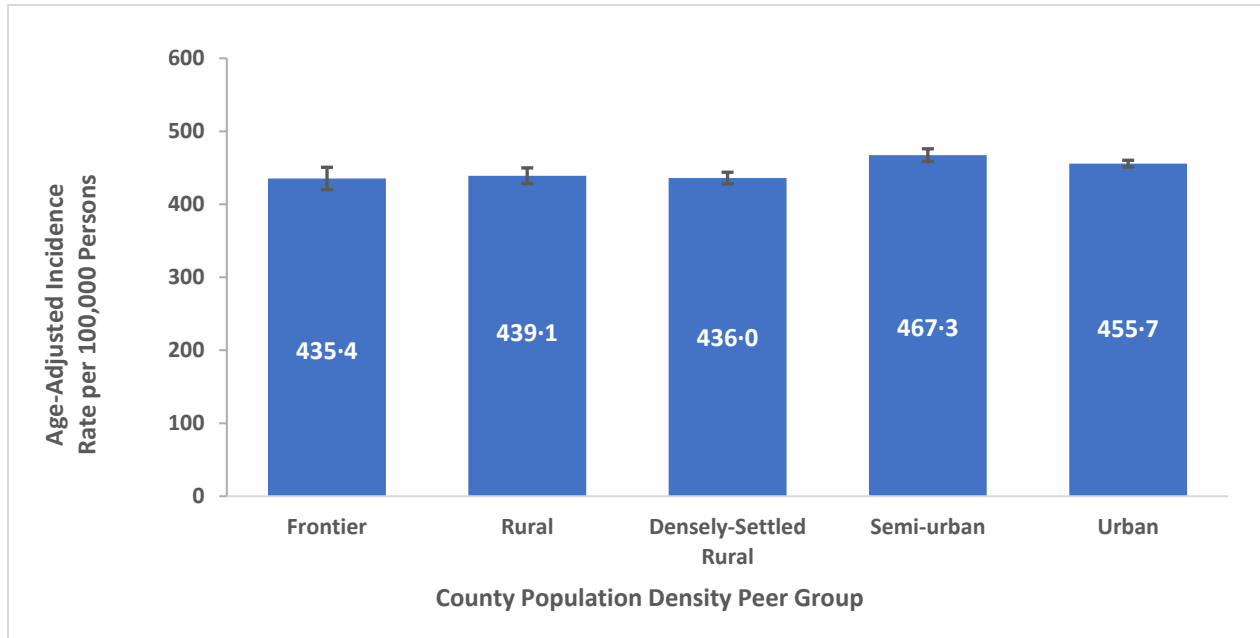


Source: 2013-2017 Kansas Cancer Registry. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Cancer incidence was defined according to ICD-O-3 codes with a behavior code indicating invasive malignancy; includes in situ bladder cancer. Hispanics were defined as persons of Mexican, Puerto Rican, Cuban, South or Central American, Other Spanish, Spanish not otherwise specified, or Dominican Republic ethnicity. Persons with Spanish surname only or unknown ethnicity were excluded.

## Cancer Overall Incidence among County Population Density Groups

The age-adjusted cancer overall incidence rates among Kansans living in semi-urban (466.9 cases per 100,000 persons; 95% CI: 458.2 to 475.5) and urban (455.7 cases per 100,000 persons; 95% CI: 451.1 to 460.3) population density counties were significantly higher than the rates in other county population density groups during the period 2013-2017 (Figure 1-5).

**Figure 1-5. Age-adjusted cancer overall incidence rates among county population density peer groups, Kansas 2013-2017**

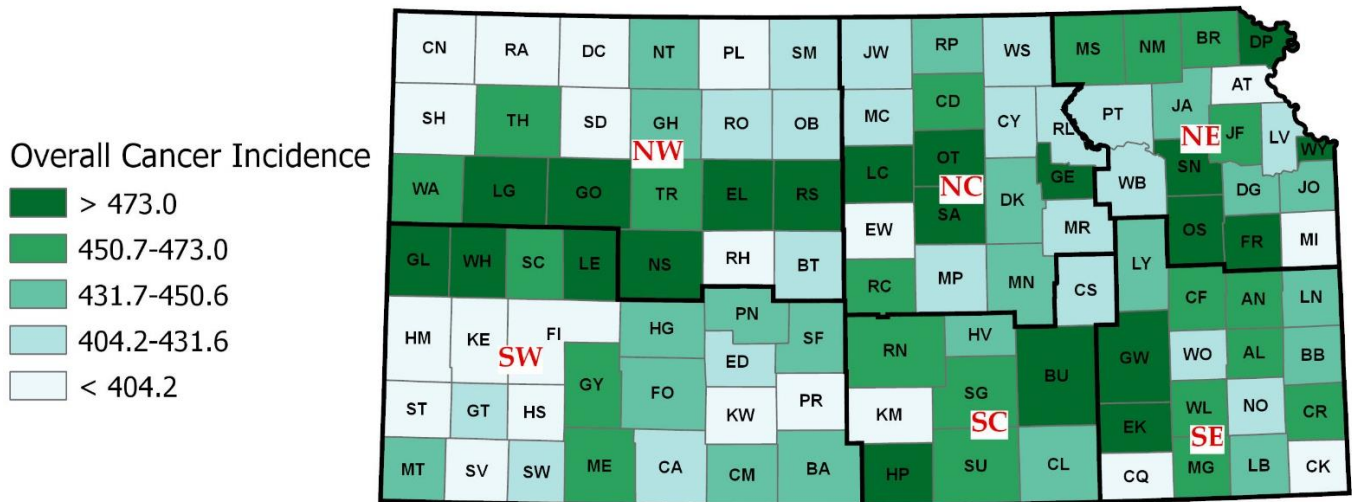


Source: 2013-2017 Kansas Cancer Registry. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. County population density peer groups are based on the population for each county in the 2000 population and are defined as follows: Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile). Vertical bars indicate 95% CIs. Cancer incidence was defined according to ICD-O-3 codes with a behavior code indicating invasive malignancy; includes in situ bladder cancer.

## Cancer Overall Incidence among Kansas Counties

The distribution of the age-adjusted overall cancer incidence rates by county in Kansas shows that the Butler, Doniphan, Elk, Ellis, Franklin, Geary, Gove, Greeley, Greenwood, Harper, Lane, Lincoln, Logan, Ness, Osage, Ottawa, Russel, Saline, Shawnee, Wichita, and Wyandotte counties represent the highest quantile (the highest 20% of Kansas counties) of the overall cancer incidence rates in Kansas (Figure 1-9).

**Figure 1-9. Age-adjusted cancer overall incidence rates by county, Kansas 2013-2017**

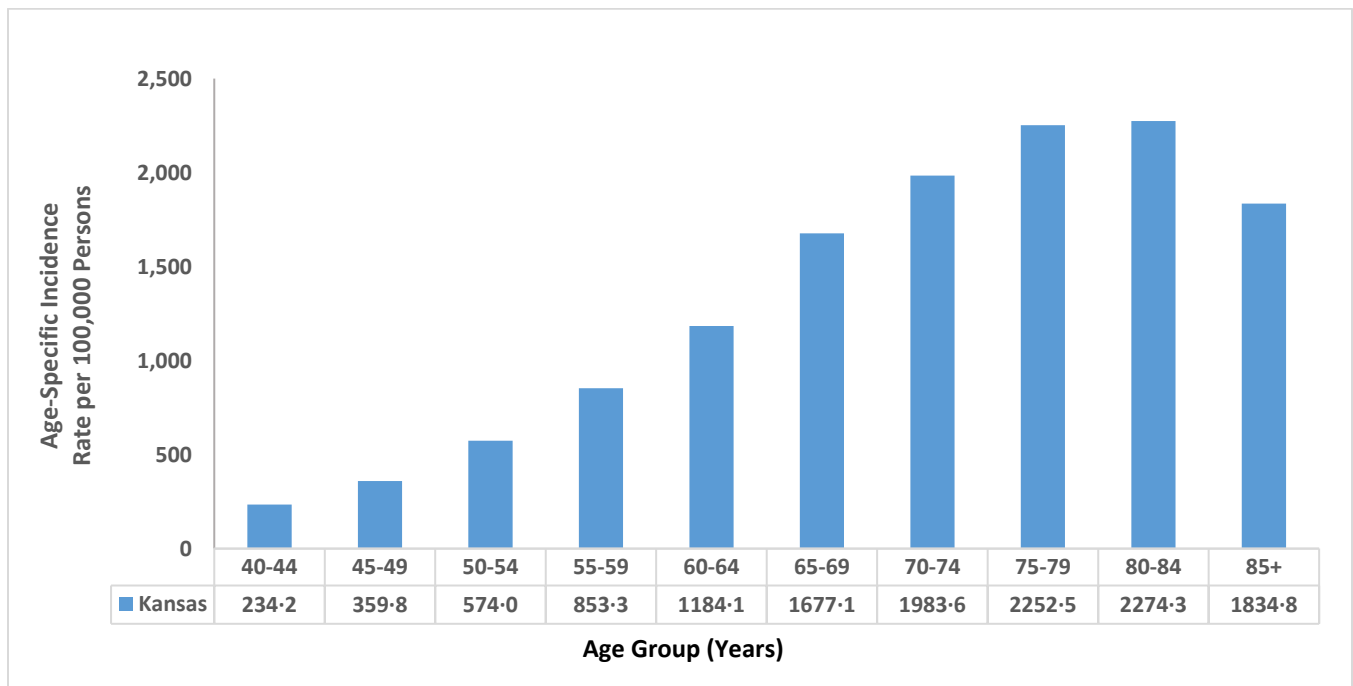


Source: 2013-2017 Kansas Cancer registry, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates are the number of cases per 100,000 persons and they were age-adjusted to the U.S. 2000 standard population using the direct method. The map also shows the boundaries of KDHE district offices.

## Cancer Overall Incidence among Age Groups

In Kansas, cancer overall incidence increased dramatically with age during the period 2013-2017 (Figure 1-6). Cancer incidence rates peaked among Kansans aged 80-84 years old (2274.3 cases per 100,000 persons; 95% CI: 2218.3 to 2331.4), and then decreased thereafter.

**Figure 1-6. Age-specific cancer incidence rates for Kansas residents 40 years and older, Kansas 2013-2017**

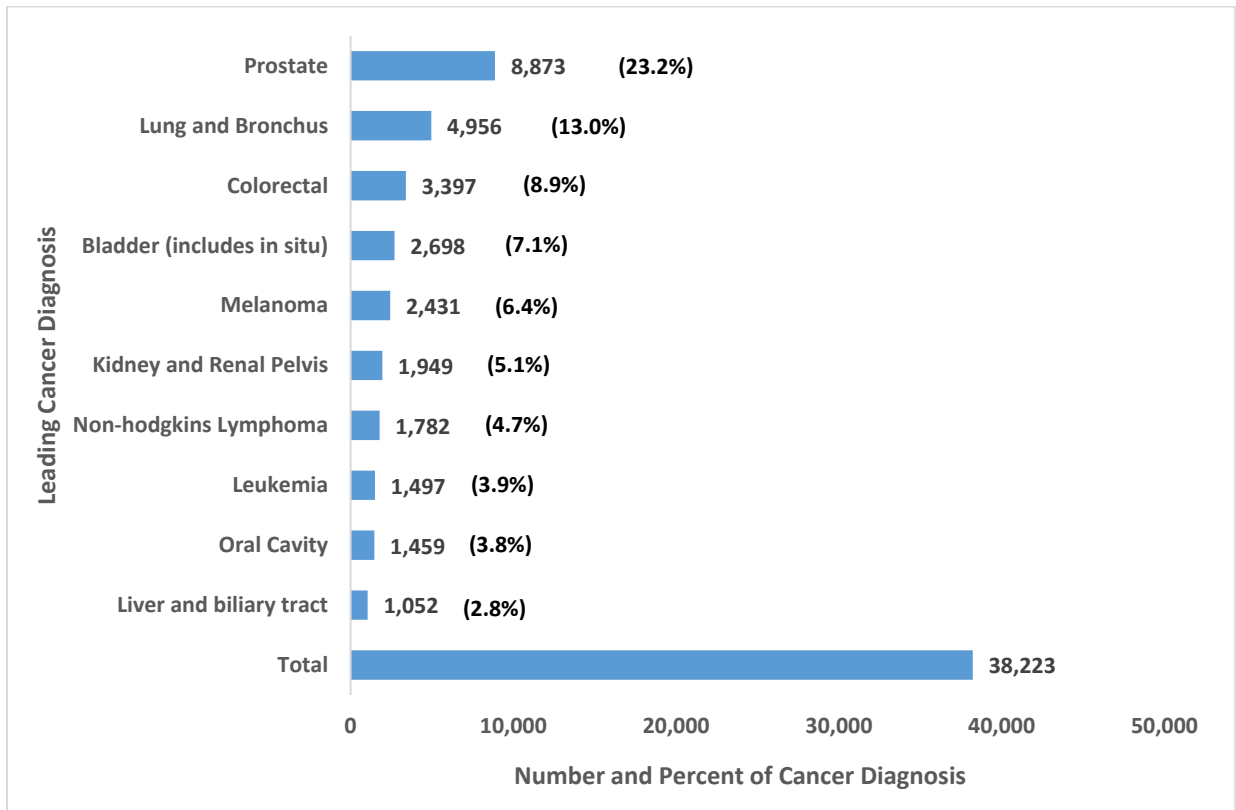


Source: 2013-2017 Kansas Cancer Registry. See Technical Appendix for details on how rates were calculated. Cancer incidence was defined according to ICD-O-3 codes with a behavior code indicating invasive malignancy; includes in situ bladder cancer.

## Most Commonly Diagnosed Cancers by Gender

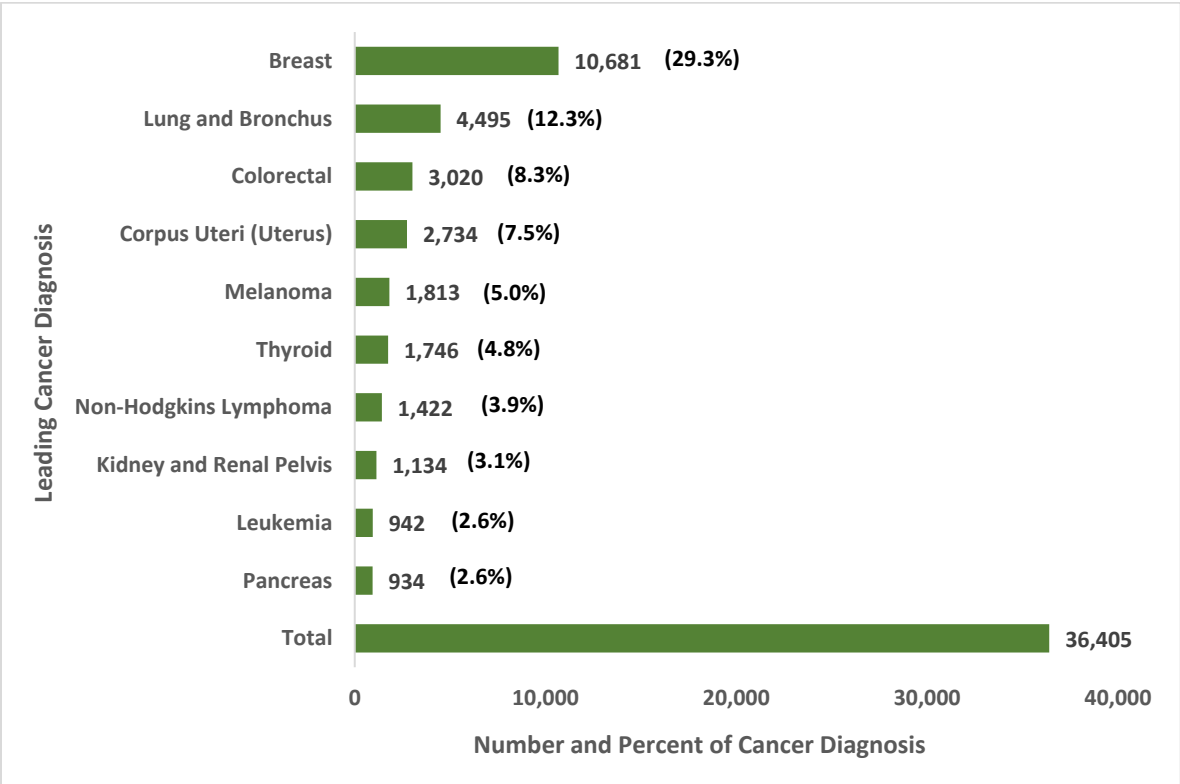
The most commonly diagnosed cancers among Kansas males during the period 2013-2017 were prostate (23.2%), lung and bronchus (13.0%), and colorectal (8.9%) cancer (Figure 1-7). Among Kansas females, the most commonly diagnosed cancers during this period were breast (29.3%), lung and bronchus (12.3%), and colorectal (8.3%) cancer (Figure 1-8).

**Figure 1-7. Top 10 cancer diagnoses among males, Kansas 2013-2017**



Source: 2013-2017 Kansas Cancer Registry. See Technical Appendix for details on how leading cancer diagnoses were defined.

**Figure 1-8. Top 10 cancer diagnoses among females, Kansas 2013-2017**



Source: 2013-2017 Kansas Cancer Registry. See Technical Appendix for details on how leading cancer diagnoses were defined.

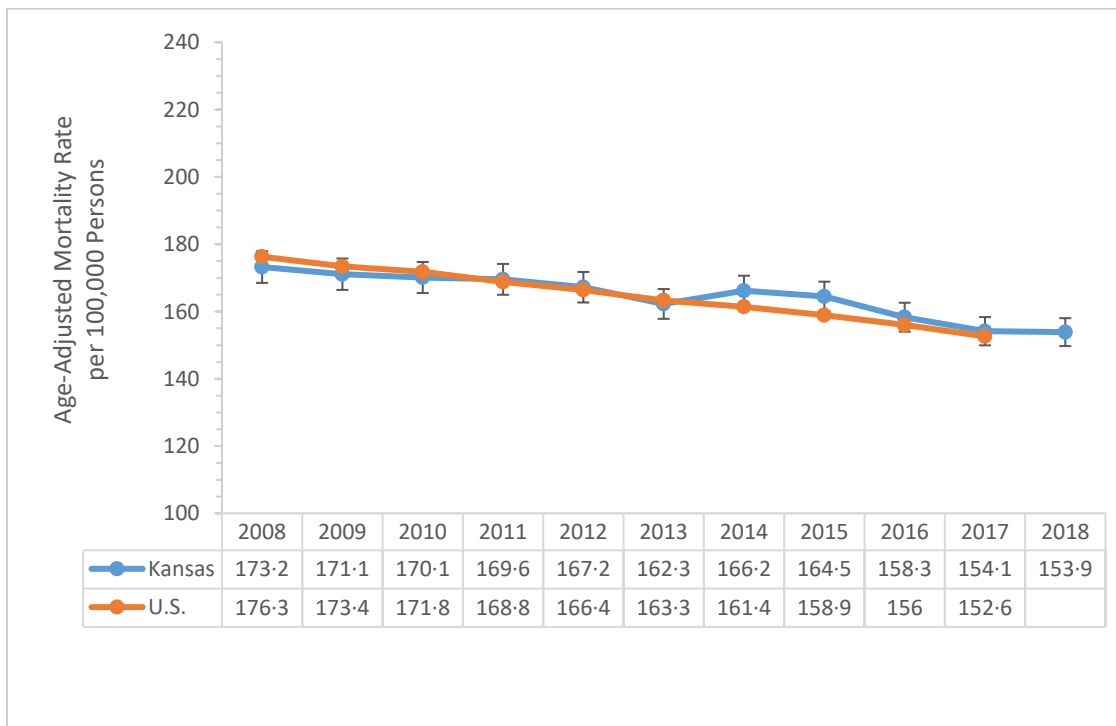
## CHAPTER 2: CANCER MORTALITY

### Cancer Mortality

More than 5,500 Kansans, on average, die from cancer each year. In Kansas, the age-adjusted cancer mortality rates decreased significantly during the period 2008-2018 from 173.2 deaths per 100,000 persons (95% Confidence Interval (CI): 168.5 to 177.9) in 2008 to 153.9 deaths per 100,000 persons (95% CI: 149.7 to 158.0) in 2018 (Figure 2-1). The age-adjusted cancer mortality rates also decreased significantly in the U.S. during the period 2008-2017 from 176.3 deaths per 100,000 persons in 2008 (95% CI: 175.9 to 176.8) to 152.6 deaths per 100,000 persons (95% CI: 152.2 to 153.0) in 2017 (Figure 2-1). The average Annual Percent Change (APC) in the cancer mortality rates during that period was -1.2 in Kansas and -1.6 in the U.S.



**Figure 2-1. Age-adjusted cancer mortality rates, Kansas and the U.S. 2008-2018**



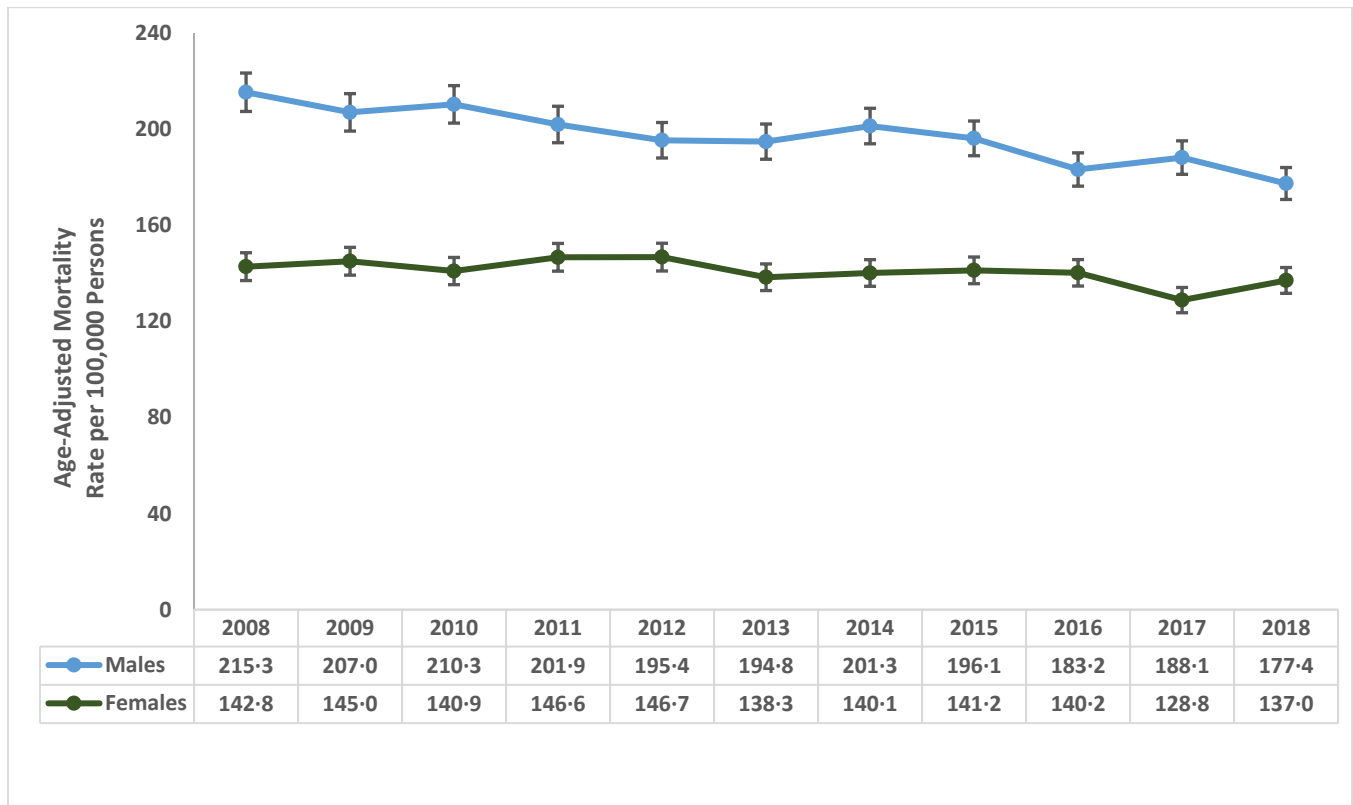
Source: 2008-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. U.S. U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on 2019 submission data (1999-2017): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; [www.cdc.gov/cancer/dataviz](http://www.cdc.gov/cancer/dataviz), released in June 2020. U.S. cancer mortality data for 2018 not available at the time the document was created. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Cancer mortality was defined as ICD-10 codes C00-C97. The average Annual Percent Change (APC) in the annual rates was calculated using the Joinpoint software; see Technical Appendix for more details on trend analysis.

## Cancer Mortality among Gender Groups

In Kansas, the age-adjusted cancer mortality rates were approximately 30 percent to 50 percent higher for men than for women throughout the period 2008-2018 (Figure 2-2). The age-adjusted cancer mortality rates among Kansas males decreased significantly from 215.3 deaths per 100,000 persons (95% CI: 207.3 to 223.3) in 2008 to 177.4 deaths per 100,000 persons (95% CI: 170.7 to 184.0) in 2017 (Figure 2-2). The average Annual Percent Change (APC) in the cancer mortality rates among Kansas males was -1.6 during the period 2008-2018.

Although the age-adjusted cancer mortality rates among Kansas females in 2008 (142.8 deaths per 100,000 persons; 95% CI: 137.0 to 148.5) and 2018 (137.0 deaths per 100,000 persons; 95% CI: 131.7 to 142.4) look similar, the trend analysis of the cancer mortality rates during the period 2008-2018 showed a significant APC of -0.7.

**Figure 2-2. Age-adjusted cancer mortality rates among gender groups, Kansas 2008-2018**



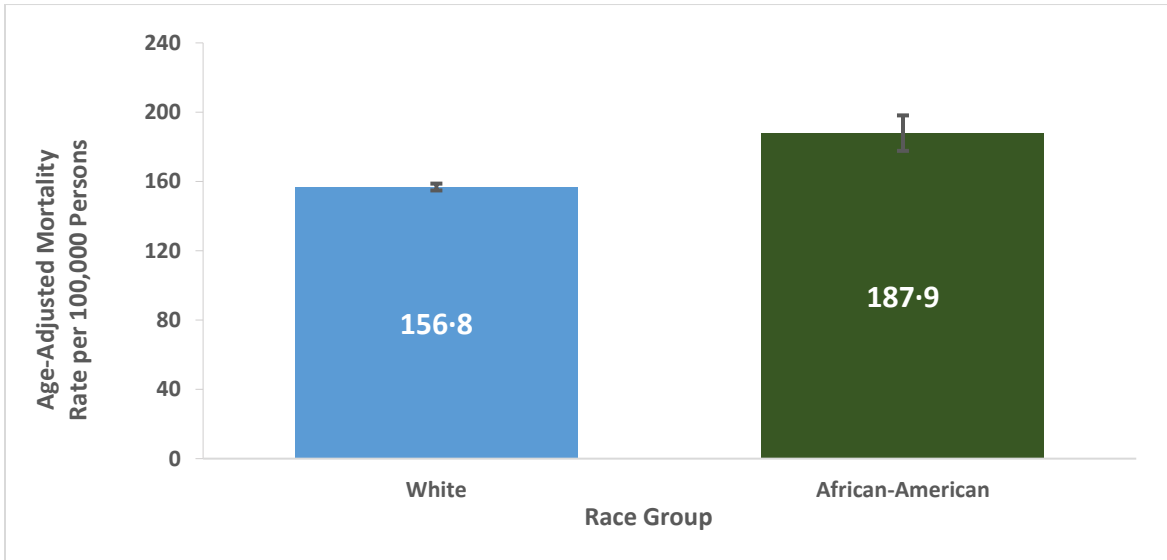
Source: 2008-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Cancer mortality was defined as ICD-10 codes C00-C97.



## Cancer Mortality among Race Groups

The age-adjusted cancer mortality rates were significantly higher for African American Kansans (187.9 deaths per 100,000 persons; 95% CI: 177.7 to 198.1) than for White Kansans (156.8 deaths per 100,000 persons; 95% CI: 154.8 to 158.8) during the period 2014-2018 (Figure 2-3).

**Figure 2-3. Age-adjusted cancer mortality rates among race groups, Kansas 2014-2018**

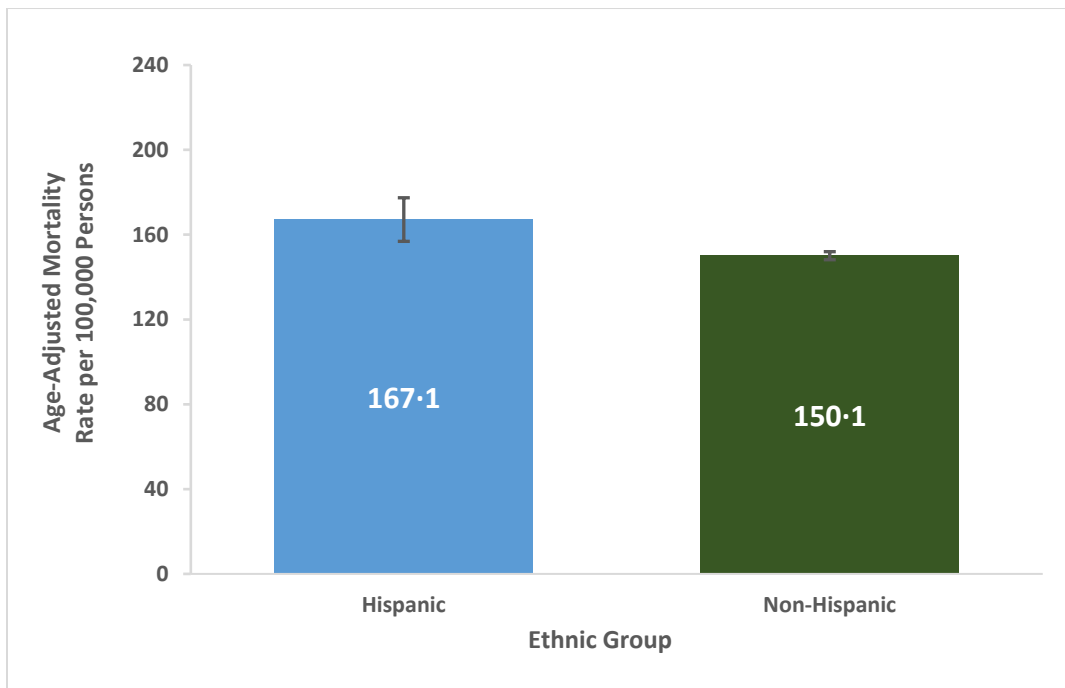


Source: 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Cancer mortality was defined as ICD-10 codes C00-C97.

## Cancer Mortality among Ethnic Groups

The age-adjusted cancer mortality rates were significantly higher for Hispanic Kansans (167.1 deaths per 100,000 persons; 95% CI: 156.9 to 177.4) than for non-Hispanic Kansans (150.1 deaths per 100,000 persons; 95% CI: 148.2 to 152.0) during the period 2014-2018 (Figure 2-4).

**Figure 2-4. Age-adjusted cancer mortality rates among ethnic groups, Kansas 2014-2018**

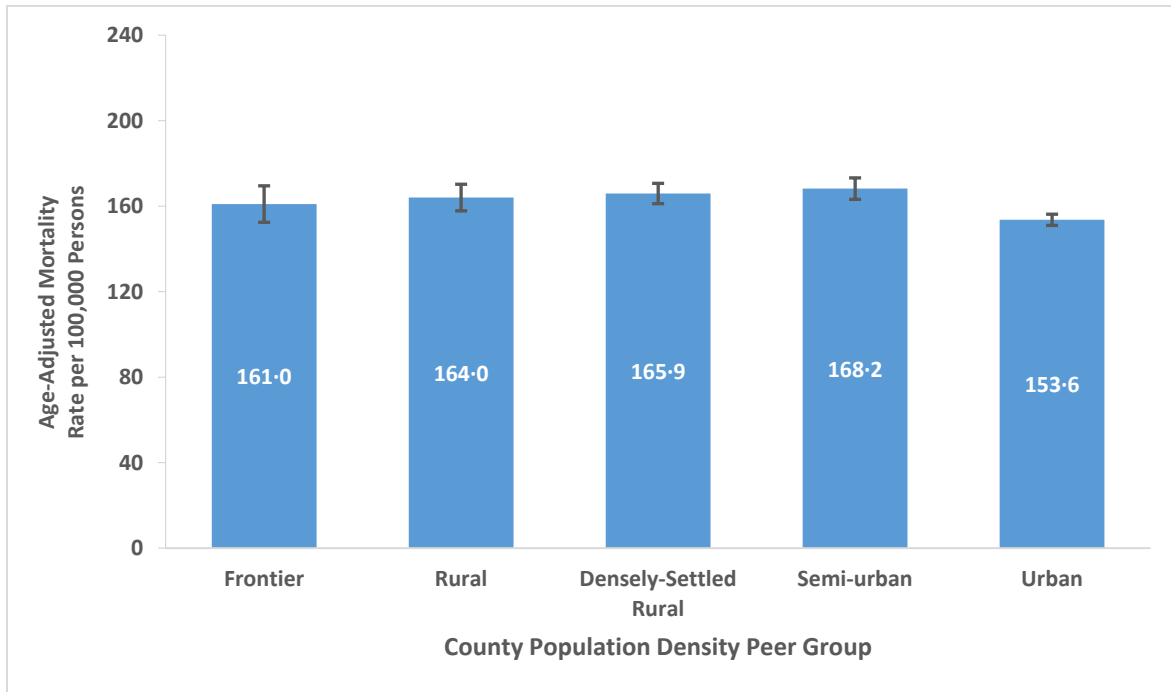


Source: 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Cancer mortality was defined as ICD-10 codes C00-C97. Hispanics were defined as persons of Mexican, Puerto Rican, Cuban, South or Central American, Other Spanish, Spanish not otherwise specified, or Dominican Republic ethnicity. Persons with Spanish surname only or unknown ethnicity were excluded.

## Cancer Mortality among County Population Density Groups

In Kansas, there were slight differences in age-adjusted cancer mortality rates among county population density groups during the period 2014-2018 (Figure 2-5). The age-adjusted cancer mortality rate in the urban counties (153.6 deaths per 100,000 persons; 95% CI: 151.0 to 156.2) was significantly lower than rates in the other county population density groups except the frontier county population density group.

**Figure 2-5. Age-adjusted cancer mortality rates among county population density peer groups, Kansas 2014-2018**

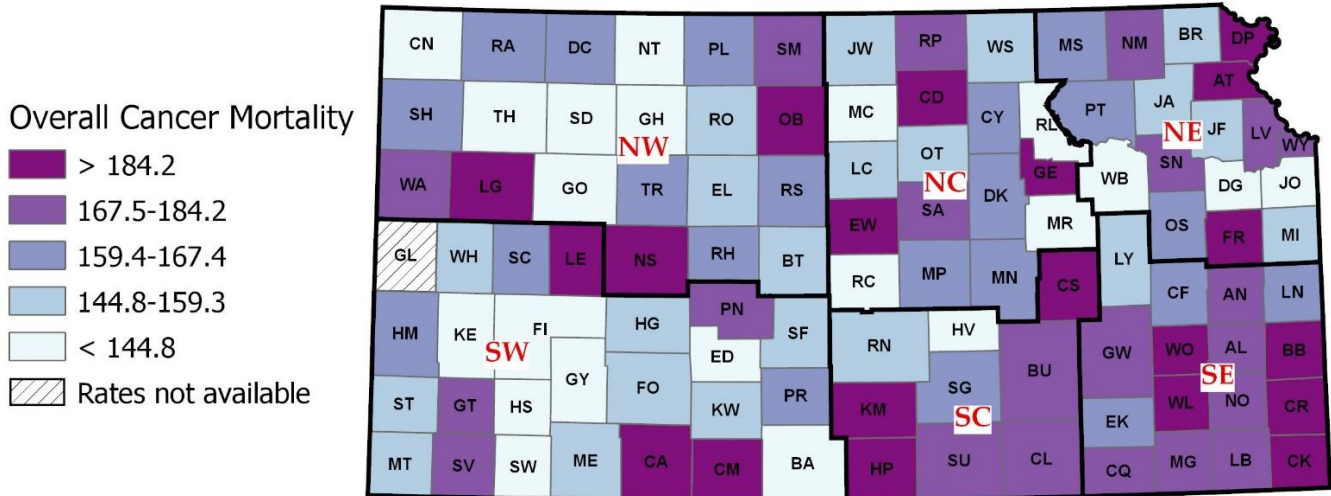


Source: 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. County population density peer groups are based on the population for each county in the 2000 population and are defined as follows: Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile). Vertical bars indicate 95% CIs. Cancer mortality was defined as ICD-10 codes C00-C97.

## Cancer Mortality among Kansas Counties

The distribution of the age-adjusted overall cancer mortality rates by county in Kansas shows that the Atchison, Bourbon, Chase, Cherokee, Clark, Cloud, Comanche, Crawford, Doniphan, Ellsworth, Franklin, Geary, Harper, Kingman, Lane, Logan, Ness, Osborne, Wilson, and Woodson counties constitute the highest quantile (the highest 20% of Kansas counties) of the overall cancer mortality rates in Kansas (Figure 2-9).

**Figure 2-9. Age-adjusted cancer overall mortality rates by county, Kansas 2014-2018**

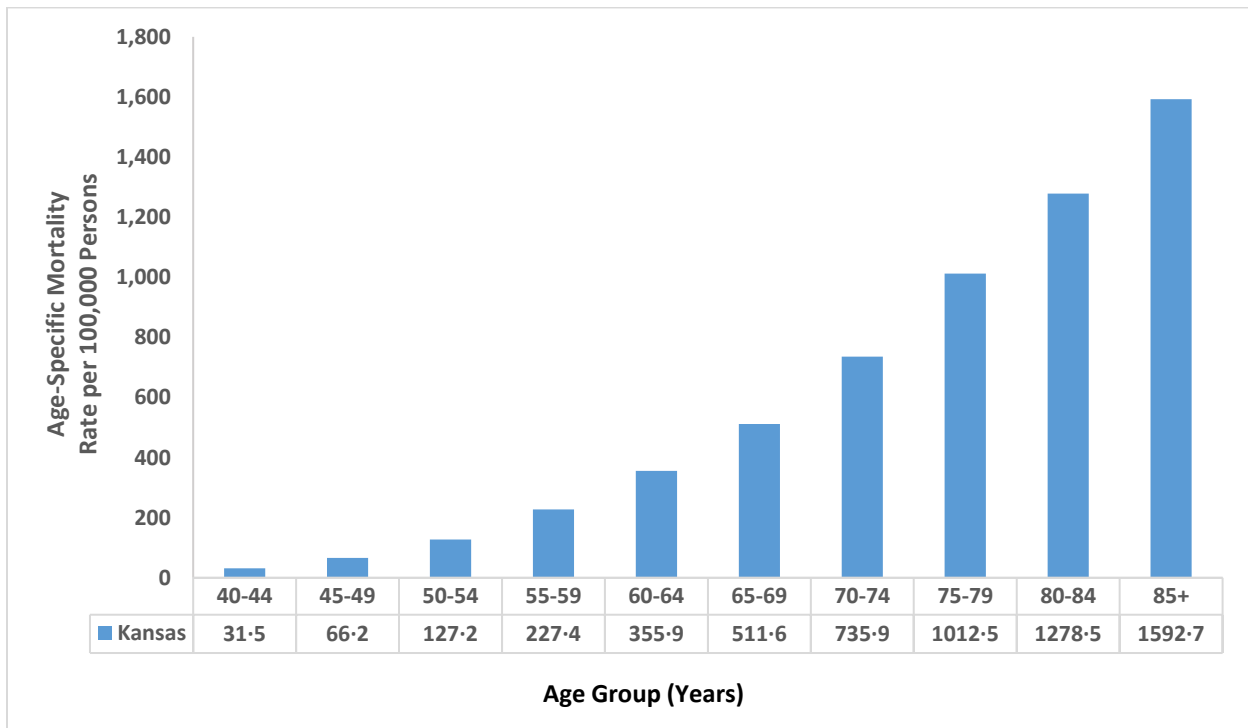


Source: 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates are the number of cases per 100,000 persons and they were age-adjusted to the U.S. 2000 standard population using the direct method. The map also shows the boundaries of KDHE district offices.

## Cancer Mortality among Age Groups

In Kansas, cancer mortality increased dramatically with age during the period of 2014-2018 (Figure 2-6). Cancer mortality rates were highest among Kansans aged 85 years and older (1592.7 cases per 100,000 persons; 95% CI: 1549.5 to 1636.8).

**Figure 2-6. Age-specific cancer mortality rates for Kansas residents 40 years and older, Kansas 2014-2018**

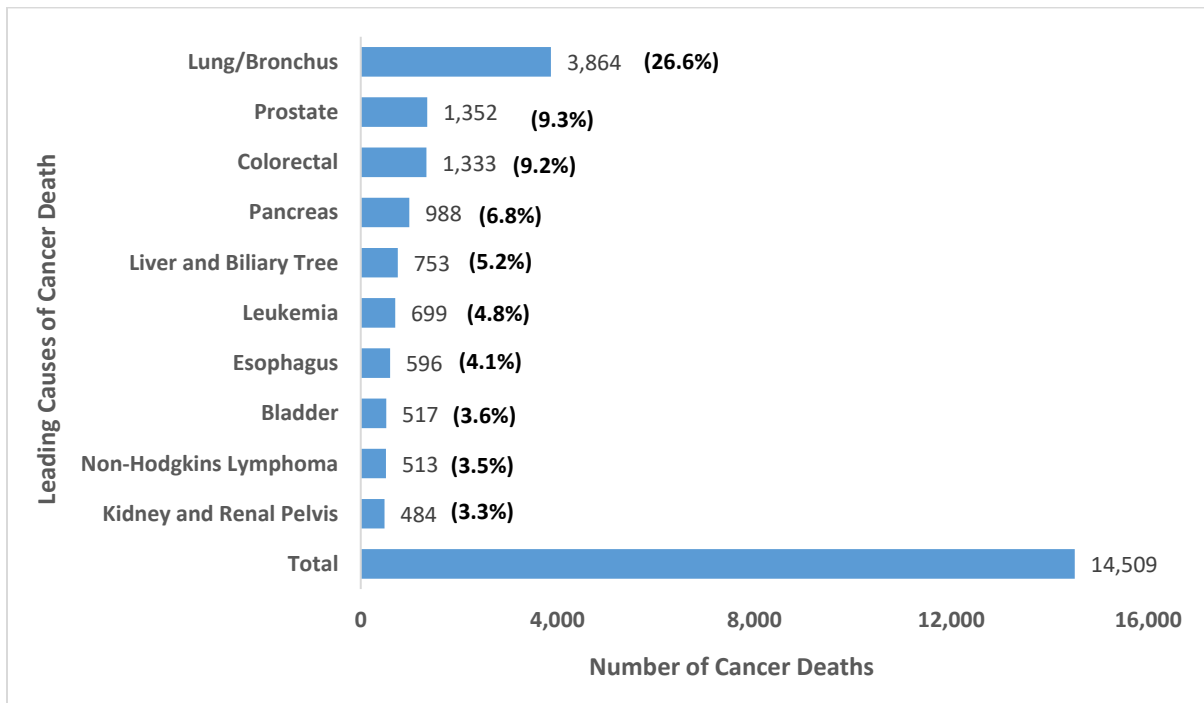


Source: 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. See Technical Appendix for details on how rates were calculated. Cancer mortality was defined as ICD-10 codes C00-C97.

## Leading Causes of Cancer-Related Death by Gender

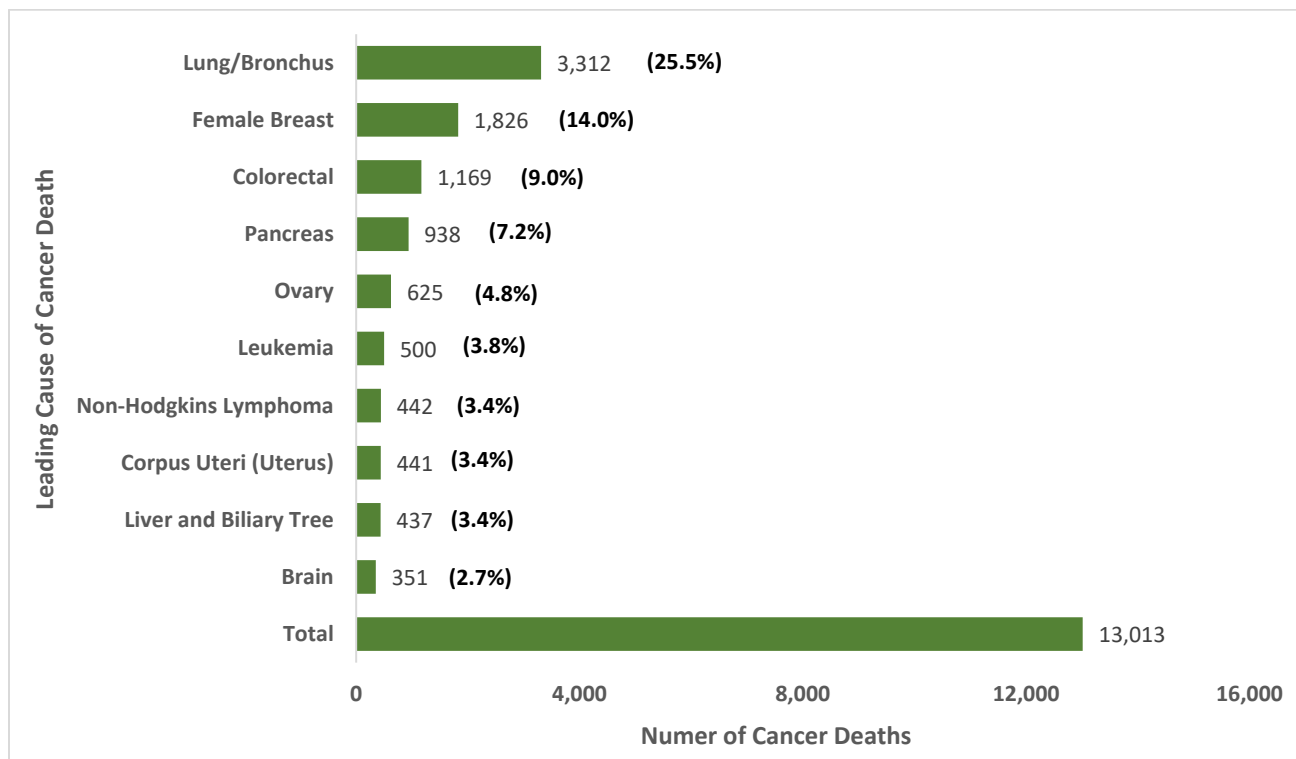
The most common causes of cancer-related death among Kansas males during the period 2014-2018 were lung and bronchus (26.6%), prostate (9.3%), and colorectal (9.2%) cancer (Figure 2-7). Among Kansas females, the leading causes of cancer-related death during this period were lung and bronchus (25.5%), breast (14.0%), and colorectal (9.0%) cancer (Figure 2-8).

**Figure 2-7. Top 10 causes of cancer death among males, Kansas 2014-2018**



Source: 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. See Technical Appendix for details on how leading causes of cancer death were defined.

**Figure 2-8. Top 10 causes of cancer death among females, Kansas 2014-2018**



Source: 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. See Technical Appendix for details on how leading causes of cancer death were defined.

## CHAPTER 3: PROFILES OF SELECTED CANCERS – LUNG AND BRONCHUS

Lung cancers are usually grouped into two main types, small cell and non-small cell, which grow and are treated differently. Non-small cell lung cancer is more common than small cell lung cancer.<sup>4</sup> Cigarette smoking is the number one preventable cause of lung cancer. The disease can also be caused by exposure to secondhand smoke, asbestos, or radon.<sup>5</sup> In Kansas, lung cancer is the leading cause of cancer death and the second most commonly diagnosed cancer overall.



### Lung Cancer Incidence and Mortality

On average, each year more than 1,900 lung cancers are diagnosed among Kansas residents, and more than 70% of them (about 1,350 cases) are diagnosed in late-stage. In addition, about 1,500 Kansans die from the disease annually. The age-adjusted lung cancer overall incidence rates in Kansas decreased significantly from 64.0 cases per 100,000 persons (95% Confidence Interval (CI): 61.1 to 66.9) to 52.3 cases per 100,000 persons (95% CI: 49.9 to 54.8) (Figure 3-1). The age-adjusted late-stage lung cancer incidence rates in Kansas decreased significantly from 44.2 cases per 100,000 persons (95% CI: 41.8 to 46.7) in 2008 to 34.7 cases per 100,000 persons (95% CI: 32.7 to 36.7) (Figure 3-1). The age-adjusted lung cancer mortality rates in Kansas decreased significantly from 51.8 deaths per 100,000 persons (95% CI: 49.2 to 54.4) in 2008 to 37.5 deaths per 100,000 persons (95% CI: 35.5 to 39.6) in 2017 (Figure 3-1). The average Annual Percent Change (APC) in the age-adjusted lung cancer overall incidence rates in Kansas during that period was -2.0, the APC of the late-stage incidence rates was -2.5, and the APC of the mortality rates was -3.1.

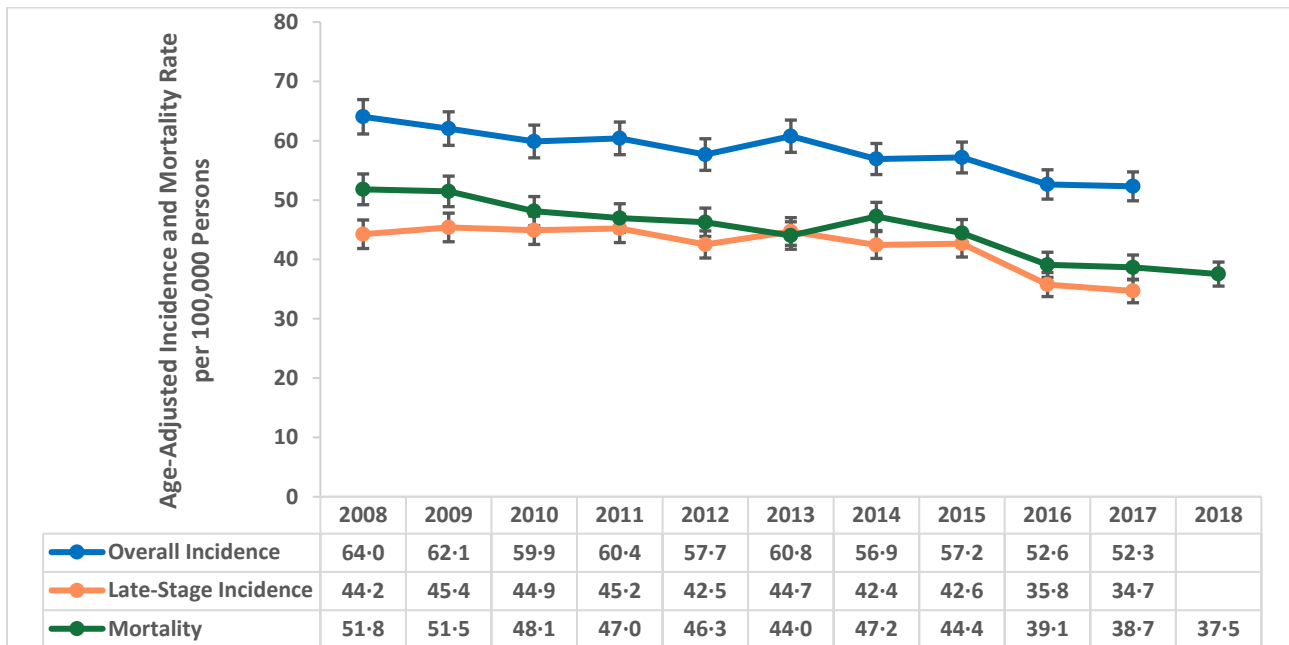
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<sup>4</sup> Johnson DH, Blot WJ, Carbone DP, et al. Cancer of the lung: non-small cell lung cancer and small cell lung cancer. In: Abeloff MD, Armitage JO, Niederhuber JE, Kastan MB, McKenna WG. *Clinical Oncology*. 4th ed. Philadelphia, Pa: Churchill Livingstone Elsevier; 2008.

<sup>5</sup> Alberg AJ, Ford FG, Samet JM. Epidemiology of lung cancer: ACCP evidence-based clinical practice guidelines (2<sup>nd</sup> edition). *Chest* 2007;132(3 Suppl):29S–55S.



**Figure 3-1. Age-adjusted lung cancer incidence and mortality rates, Kansas 2008-2017**



Source: 2008-2017 Kansas Cancer Registry. 2008-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Cancer incidence data for 2018 were not available at the time the document was created. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Lung cancer incidence was defined as ICD-O-3 codes, C340-C349 (excluding histology codes 9590-9989) with a behavior code indicating invasive malignancy. Lung cancer mortality was defined as ICD-10 code C34. The average Annual Percent Change (APC) in the annual rates was calculated using the Joinpoint software, see Technical Appendix for more details on trend analysis.

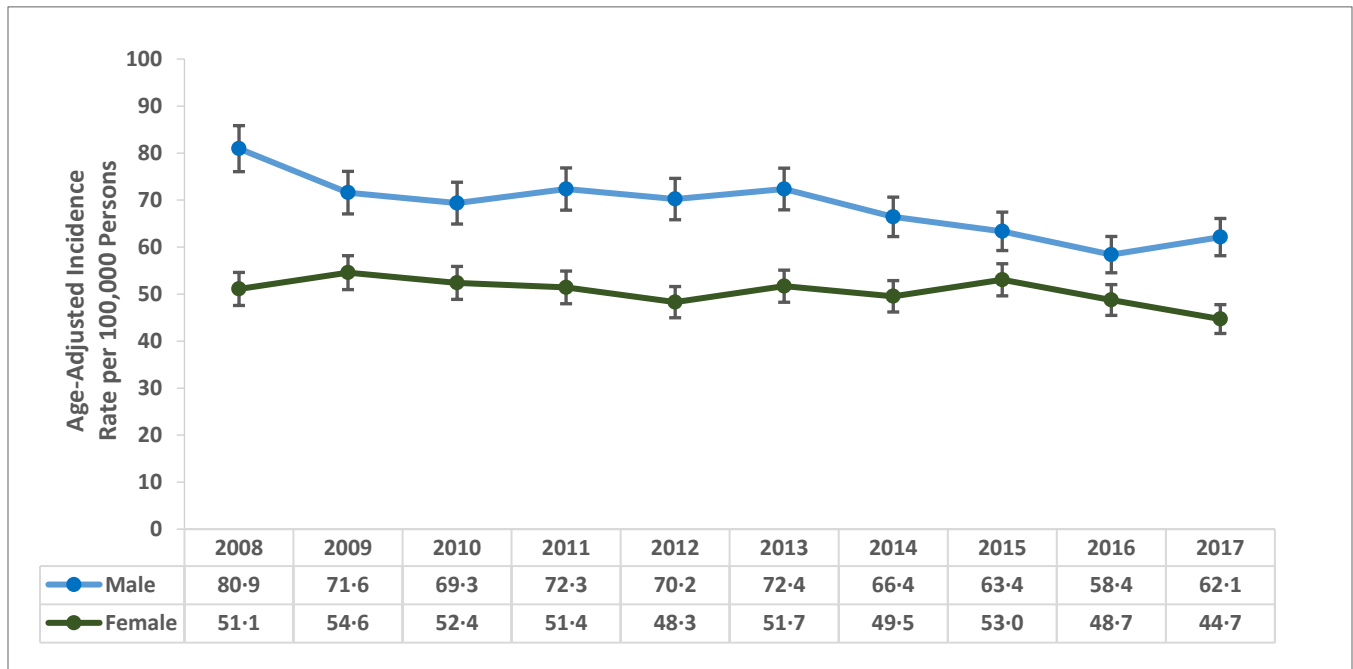
## Lung Cancer Overall Incidence among Gender Groups

The age-adjusted lung cancer overall incidence rates were significantly higher for males as compared to females during the period 2008-2017 (Figure 3-2).

The age-adjusted lung cancer overall incidence rates among Kansas males decreased significantly from 80.9 cases per 100,000 males (95% CI: 76.0 to 85.8) in 2008 to 62.1 cases per 100,000 males (95% CI: 58.2 to 66.1) in 2017 (Figure 3-2). The average Annual Percent Change (APC) of the lung cancer overall incidence rate among Kansas males was -2.7.

The age-adjusted lung cancer overall incidence rates among Kansas females remained stable during the period 2008-2017, and the rate was 44.7 cases per 100,000 females (95% CI: 41.6 to 47.8) in 2017 (Figure 3-2).

**Figure 3-2. Age-adjusted lung cancer overall incidence rates by gender and year, Kansas 2008-2017**



Source: 2008-2017 Kansas Cancer Registry. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Lung cancer incidence was defined as ICD-O-3 codes C340-C349 (excluding histology codes 9590-9989) with a behavior code indicating invasive malignancy. The average Annual Percent Change (APC) in the annual rates was calculated using the Joinpoint software; see Technical Appendix for more details on trend analysis.

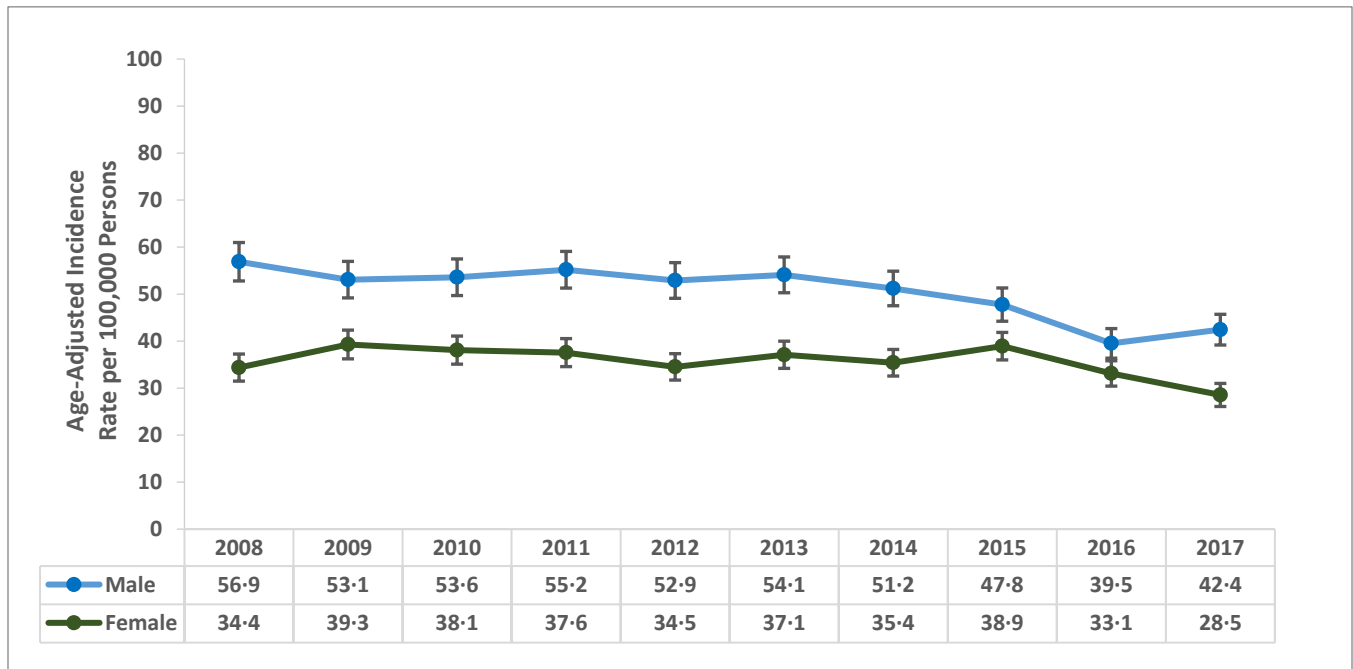
## Lung Cancer Late-Stage Incidence among Gender Groups

The age-adjusted lung cancer late-stage incidence rates were significantly higher for males as compared to females during the period 2008-2017 (Figure 3-3).

The age-adjusted lung cancer late-stage incidence rates decreased significantly from 56.9 cases per 100,000 males (95% CI: 52.8 to 61.0) in 2008 to 42.4 cases per 100,000 males (95% CI: 39.2 to 45.7) in 2017 (Figure 3-3). The average Annual Percent Change (APC) of the lung cancer late-stage incidence rate among Kansas males was -3.2 during the period 2008-2017.

The age-adjusted lung cancer late-stage incidence rates among Kansas females remained stable during the period 2008-2017, and the rate was 28.5 cases per 100,000 females (95% CI: 26.1 to 31.0) in 2017 (Figure 3-3).

**Figure 3-3. Age-adjusted late-stage lung cancer incidence rates by gender and year, Kansas 2008-2017**

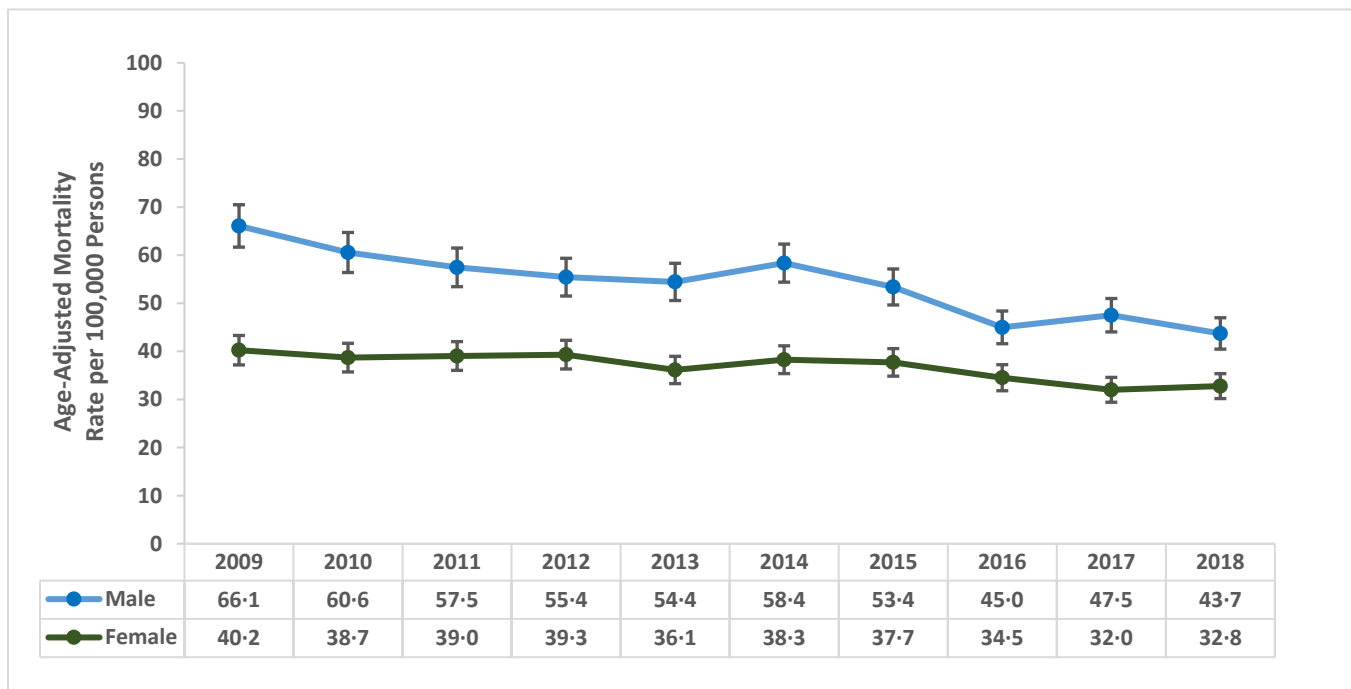


Source: 2008-2017 Kansas Cancer Registry. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Lung cancer incidence was defined as ICD-O-3 codes C340-C349 (excluding histology codes 9590-9989) with a behavior code indicating invasive malignancy. The average Annual Percent Change (APC) in the annual rates was calculated using the Joinpoint software; see Technical Appendix for more details on trend analysis.

## Lung Cancer Mortality among Gender Groups

The age-adjusted lung cancer mortality rates were significantly higher for males as compared to females during the period 2009-2018 (Figure 3-4). The lung cancer mortality rates among Kansas males decreased significantly from 66.1 deaths per 100,000 males (95% CI: 61.7 to 70.5) in 2009 to 43.7 deaths per 100,000 males (95% CI: 40.5 to 47.0) in 2018 (Figure 3-2). The lung cancer mortality rates among Kansas females decreased significantly from 40.2 deaths per 100,000 females (95% CI: 37.2 to 43.3) in 2009 to 32.8 deaths per 100,000 females (95% CI: 30.2 to 35.4) in 2018 (Figure 3-4). The average Annual Percent Change (APC) in the lung cancer mortality rates was -3.9 for males and -2.3 for females during the period 2009 to 2018.

**Figure 3-4. Age-adjusted lung cancer mortality rates among gender groups, Kansas 2009-2018**

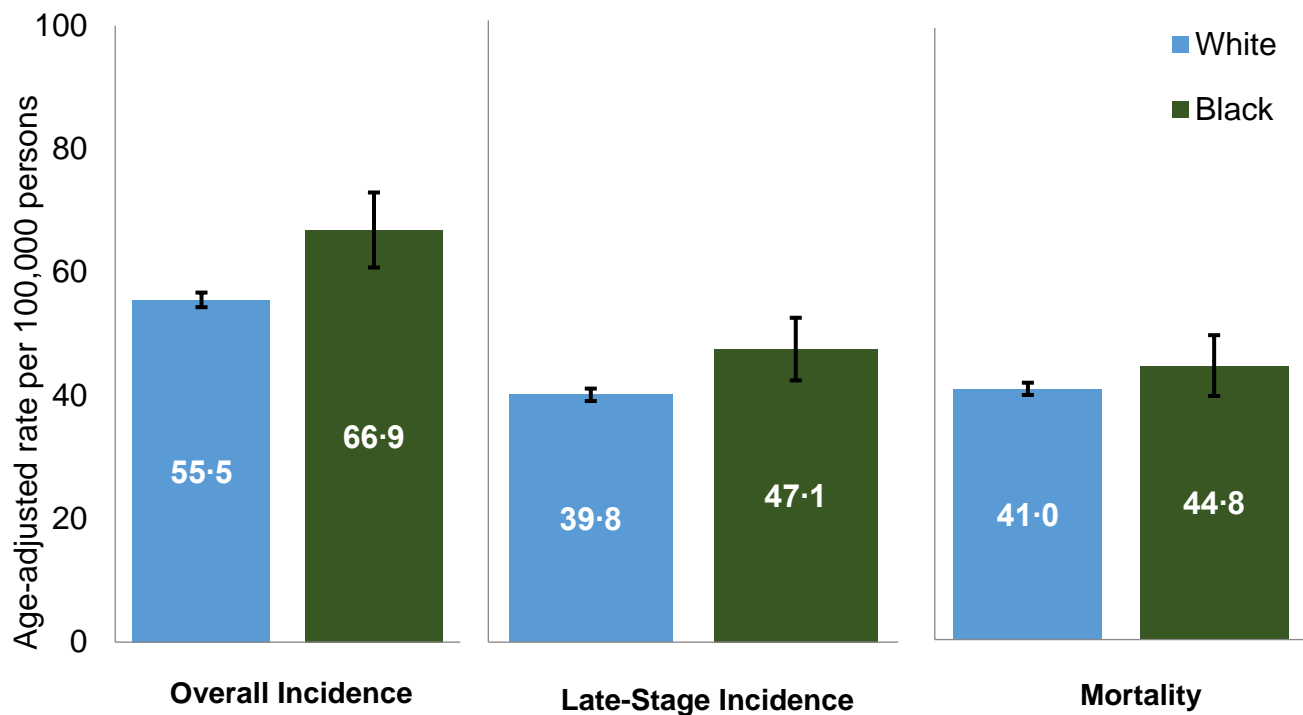


Source: 2009-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Lung cancer mortality was defined as ICD-10 code C34. The average Annual Percent Change (APC) in the annual rates was calculated using the Joinpoint software; see Technical Appendix for more details on trend analysis.

## Lung Cancer Incidence and Mortality among Race Groups

The age-adjusted lung cancer incidence rate was significantly higher for African American Kansans (66.9 cases per 100,000 persons; 95% CI: 60.8 to 72.9) than for White Kansans (55.5 cases per 100,000 persons; 95% CI: 54.3 to 56.7) during the period 2013-2017 (Figure 3-5). Similarly, the age-adjusted lung cancer late-stage incidence rate was significantly higher among African American Kansans (47.1 cases per 100,000 persons; 95% CI: 42.1 to 52.2) than for White Kansans (39.8 cases per 100,000 persons; 95% CI: 38.8 to 40.8) during the period 2013-2017 (Figure 3-5). However, the age-adjusted lung cancer mortality rate did not differ significantly between African American Kansans (44.4 deaths per 100,000 persons; 95% CI: 39.8 to 49.8) and White Kansans (41.0 deaths per 100,000 persons; 95% CI: 40.0 to 42.0) during the period 2014-2018 (Figure 3-5).

**Figure 3-5. Age-adjusted lung cancer incidence and mortality rates among race groups, Kansas 2013-2018**

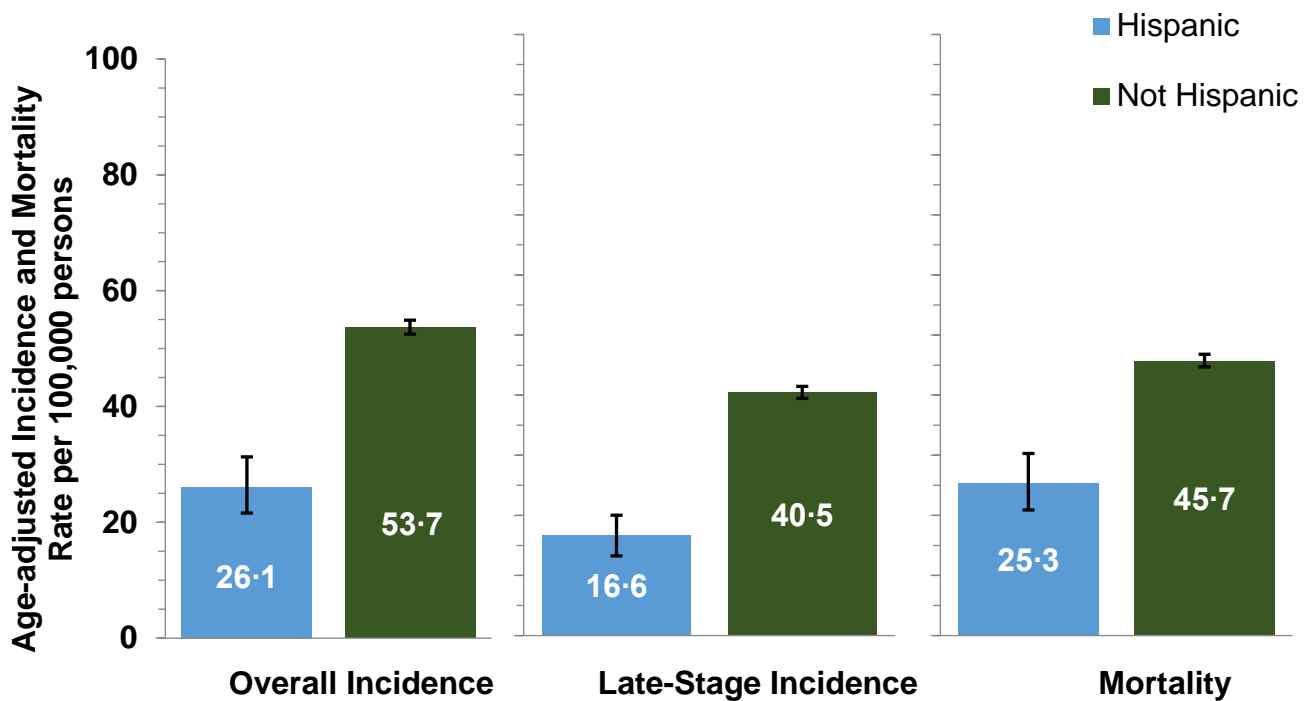


Source: 2013-2017 Kansas Cancer Registry. 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Lung cancer incidence was defined as ICD-O-3 codes C340-C349 (excluding histology codes 9590-9989) with a behavior code indicating invasive malignancy. Lung cancer mortality was defined as ICD-10 code C34.

## Lung Cancer Incidence and Mortality among Ethnic Groups

The age-adjusted lung cancer overall incidence rate was significantly lower for Hispanic Kansans (26.1 cases per 100,000 persons; 95% CI: 21.6 to 31.3) than for non-Hispanic Kansans (53.7 cases per 100,000 persons; 95% CI: 52.5 to 54.9) during the period 2013-2017 (Figure 3-6). Similarly, the lung cancer late-stage incidence rate was significantly lower for Hispanic Kansans (16.6 cases per 100,000 persons; 95% CI: 13.3 to 20.0) than for non-Hispanic Kansans (40.5 cases per 100,000 persons; 95% CI: 39.5 to 41.5) during the period 2013-2017 (Figure 3-6). Additionally, the lung cancer mortality rate was significantly lower for Hispanic Kansans (25.3 deaths per 100,000 persons; 95% CI: 20.9 to 30.3) than non-Hispanic Kansans (45.7 deaths per 100,000 persons; 95% CI: 44.7 to 46.8) during the period of 2014-2018 (Figure 3-6).

**Figure 3-6. Age-adjusted lung cancer incidence and mortality rates among ethnic groups, Kansas 2013-2018**

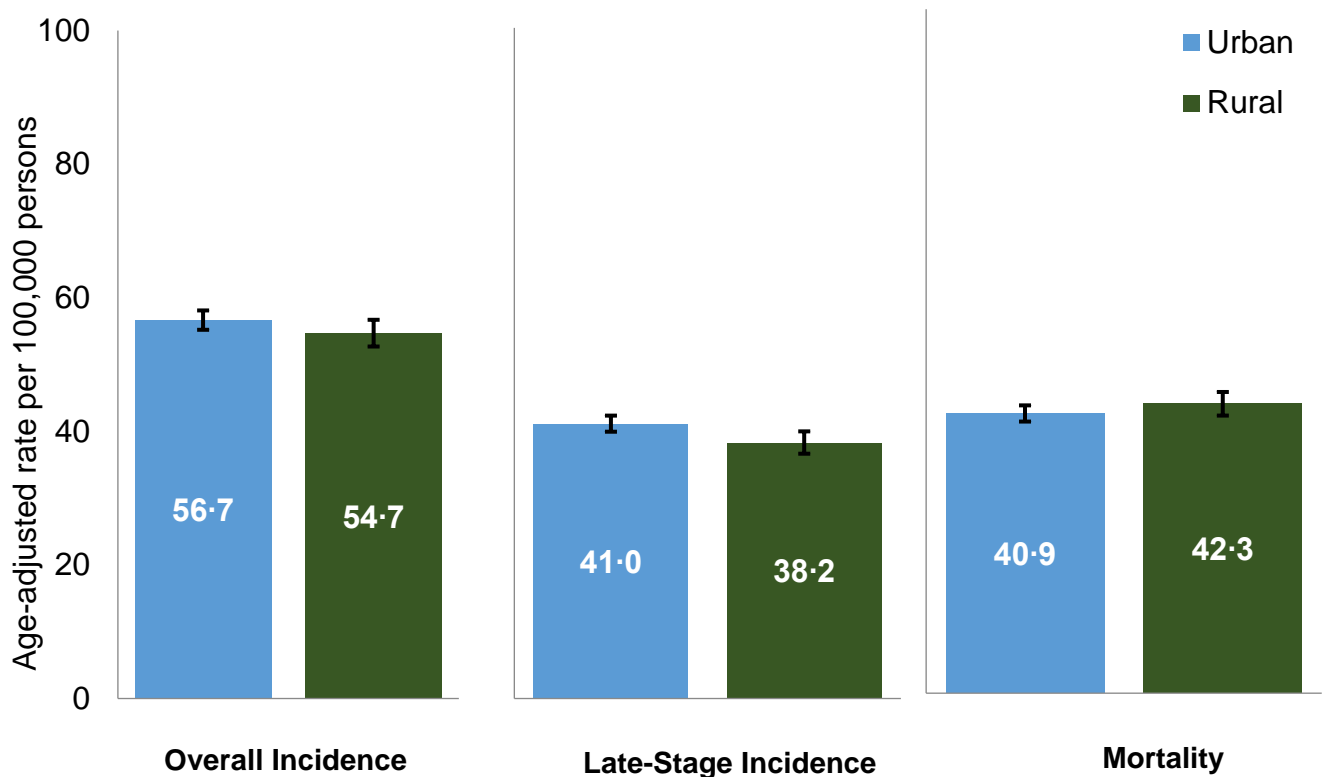


Source: 2013-2017 Kansas Cancer Registry. 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Lung cancer incidence was defined as ICD-O-3 codes C340-C349 (excluding histology codes 9590-9989) with a behavior code indicating invasive malignancy. Lung cancer mortality was defined as ICD-10 code C34. Hispanics were defined as persons of Mexican, Puerto Rican, Cuban, South or Central American, Other Spanish, Spanish not otherwise specified, or Dominican Republic ethnicity. Persons with Spanish surname only or unknown ethnicity were excluded.

## Lung Cancer Incidence and Mortality among County Population Density Groups

In Kansas, the age-adjusted lung and bronchus cancer overall incidence, late-stage incidence, and mortality rates did not differ significantly among Kansans by county population density during the period 2013-2018 (Figure 3-7).

**Figure 3-7. Age-adjusted lung cancer incidence and mortality rates among county population density peer groups, Kansas 2013-2018**

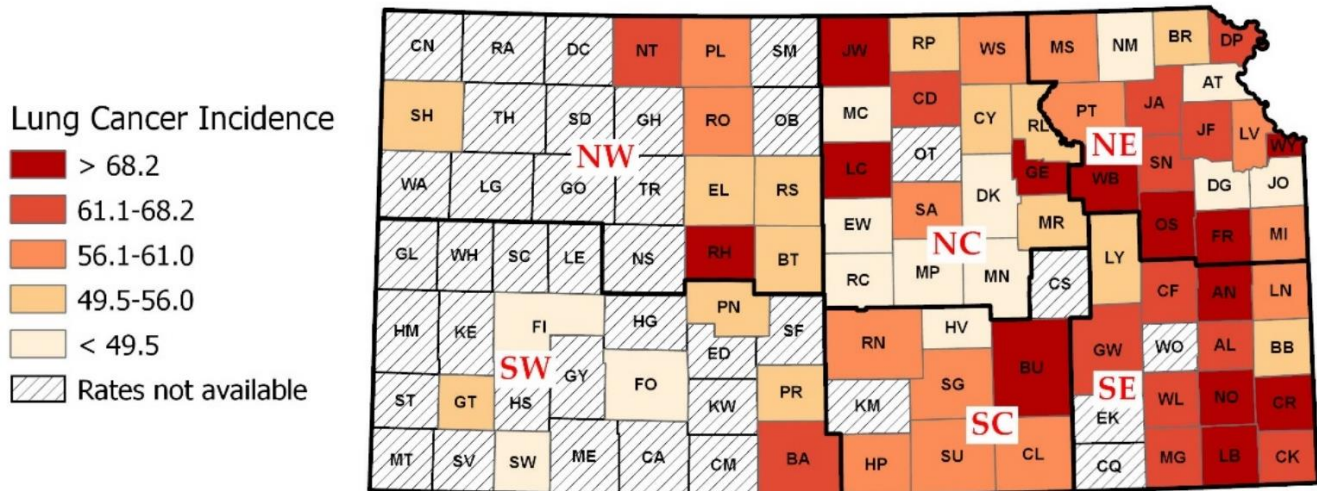


Source: 2013-2017 Kansas Cancer registry, 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. County population density peer groups are based on the population for each county in the 2000 population; the Rural counties included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while the Urban counties included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile). Vertical bars indicate 95% CIs. Cancer mortality was defined as ICD-10 codes C00-C97.

## Lung Cancer Incidence and Mortality among Kansas Counties

The distribution of the age-adjusted lung cancer incidence rates by county in Kansas shows that Anderson, Butler, Crawford, Franklin, Geary, Jewell, Labette, Lincoln, Neosho, Osage, Rush, and Wabaunsee counties represent the highest quantile (the highest 20% of Kansas counties) of the lung cancer incidence rates in Kansas (Figure 3-8).

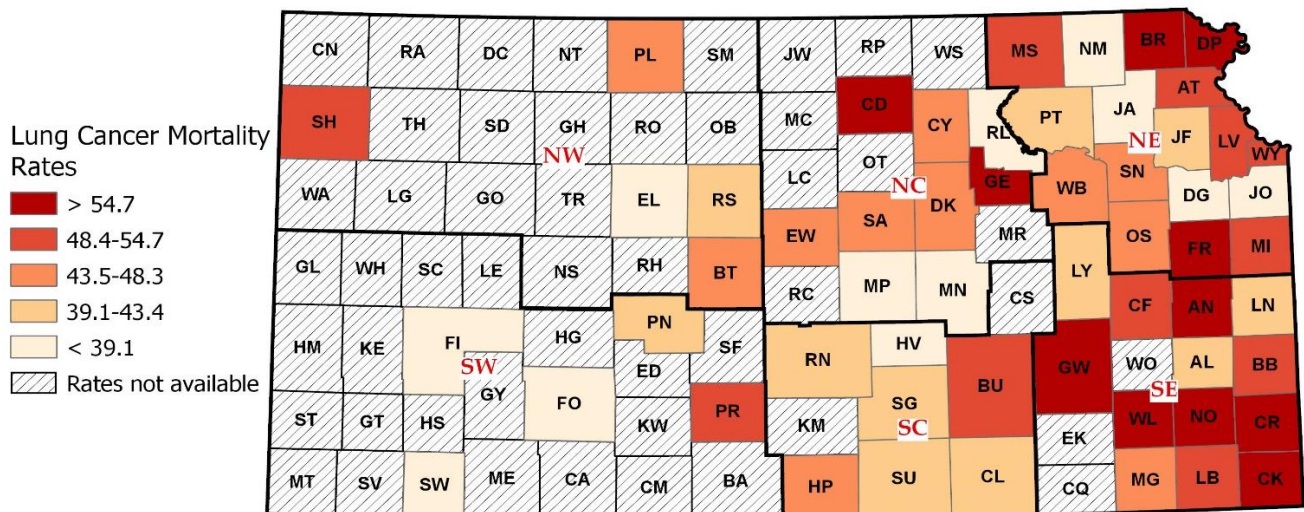
**Figure 3-8. Age-adjusted lung cancer incidence rates by county, Kansas 2013-2017**



Source: 2013-2017 Kansas Cancer registry, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates are the number of cases per 100,000 persons and they were age-adjusted to the U.S. 2000 standard population using the direct method. The map also shows the boundaries of KDHE district offices.

Regarding the distribution of the age-adjusted lung cancer mortality rates by county in Kansas, the Anderson, Cherokee, Cloud, Crawford, Doniphan, Franklin, Geary, Greenwood, Marshall, Neosho, and Wilson counties constitute the highest quantile (the highest 20% of Kansas counties) of the lung cancer mortality rates in Kansas (Figure 3-9)

**Figure 3-9. Age-adjusted lung cancer mortality rates by county, Kansas 2014-2018**



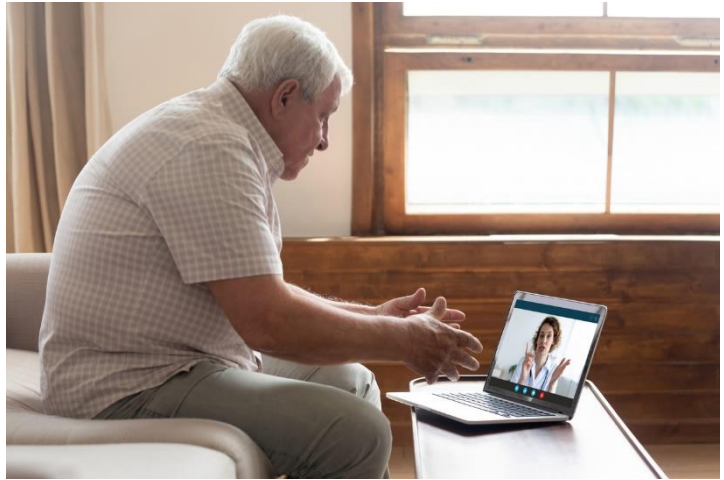
Source: 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates are the number of cases per 100,000 persons and they were age-adjusted to the U.S. 2000 standard population using the direct method. The map also shows the boundaries of KDHE district offices.



## CHAPTER 4: PROFILES OF SELECTED CANCERS – COLORECTAL

Colorectal cancer develops from precancerous polyps in the colon (large intestine) or rectum. The exact cause of most colorectal cancers is not yet known; however, research has shown that increased physical activity and maintaining a healthy weight can decrease the risk for colorectal cancer.<sup>6</sup> In Kansas, colorectal cancer is the third leading cause of cancer death among both males and females, as well as the third most commonly diagnosed cancer among both males and females.

### Colorectal Cancer Incidence and Mortality



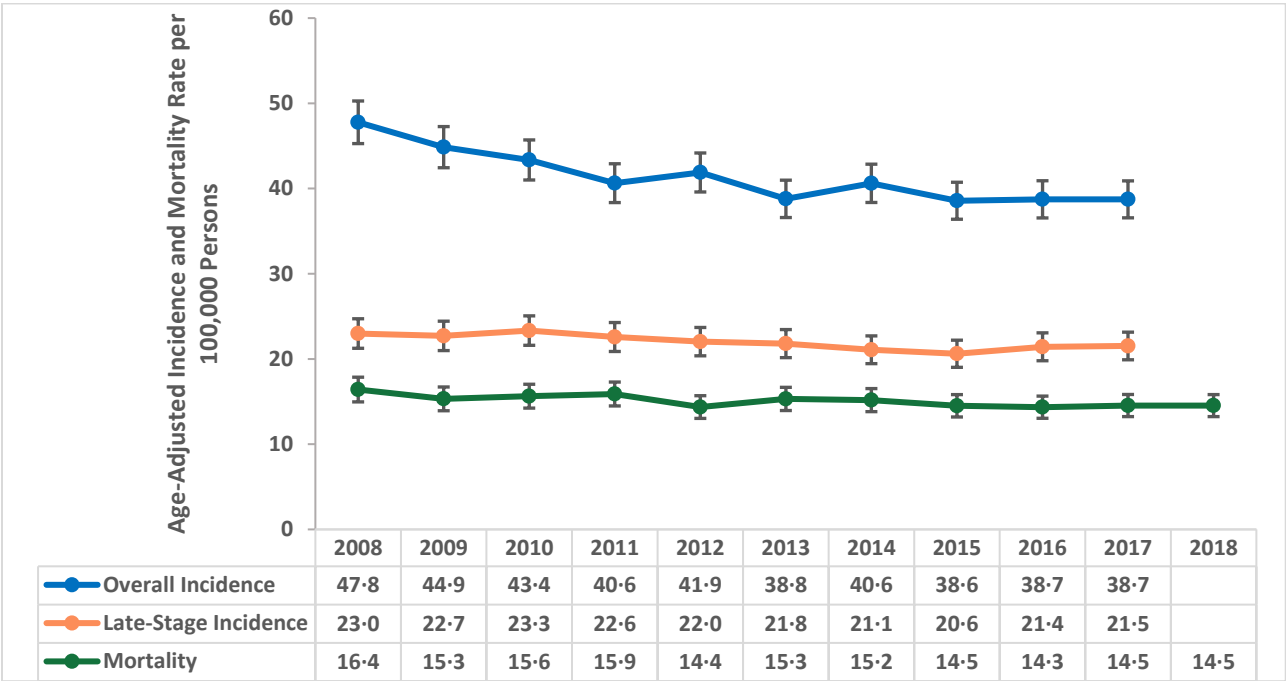
Each year, on average, nearly 1,300 colorectal cancers are diagnosed among Kansas residents, and more than half of them (700) are diagnosed in late-stage. In addition, more than 500 Kansans die from the disease annually. The age-adjusted colorectal cancer overall incidence decreased significantly from 47.8 cases per 100,000 persons (95% Confidence Interval (CI): 45.3 to 50.3) in 2008 to 38.7 cases per 100,000 persons (95% CI: 36.6 to 40.9) in 2017 (Figure 4-1). The average Annual Percent Change (APC) in the lung cancer overall incidence rates was -2.2 in Kansas during that period.

Although the age-adjusted colorectal cancer late-stage incidence rates in 2008 (23.0 cases per 100,000 persons; 95% CI: 21.3 to 24.7) and 2017 (21.5 cases per 100,000 persons; 95% CI: 19.9 to 23.1) look similar (Figure 4-1), the trend analysis of the rates resulted in a significant APC of -1.1 during that period. Similarly, the age-adjusted colorectal cancer mortality rate was 16.4 deaths per 100,000 persons (95% CI: 15.0 to 17.9) in 2008 and 14.5 deaths per 100,000 persons (95% CI: 13.2 to 15.8) in 2018 (Figure 4-1), with a significant APC of -1.1 during that period.

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<sup>6</sup> "Basic Information about Colorectal Cancer." Division of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention. [www.cdc.gov/cancer/colorectal/basic\\_info/index.htm](http://www.cdc.gov/cancer/colorectal/basic_info/index.htm). Accessed September 6, 2020

**Figure 4-1. Age-adjusted colorectal cancer incidence and mortality rates, Kansas 2008-2018**



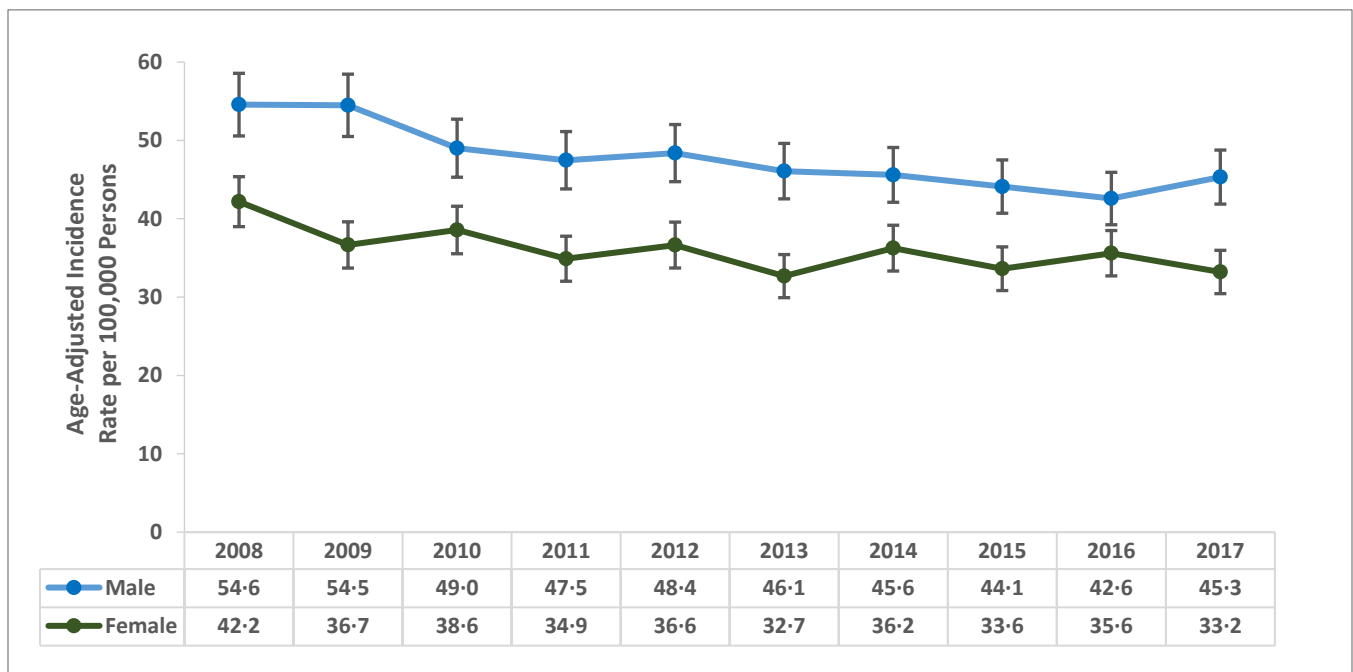
Source: 2008-2017 Kansas Cancer Registry. 2008-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Cancer incidence data for 2018 were not available at the time the document was created. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Colorectal cancer incidence was defined as ICD-O-3 codes C180-C189, C199, C209, or C260 (excluding histology codes 9590-9989) with a behavior code indicating invasive malignancy. Colorectal cancer mortality was defined as ICD-10 codes C18-C20 or C260. The average Annual Percent Change (APC) in the annual rates was calculated using the Joinpoint software, see Technical Appendix for more details on trend analysis.

## Colorectal Cancer Overall Incidence among Gender Groups

The age-adjusted colorectal cancer overall incidence rates were significantly higher for males as compared to females during the period 2008-2017 (Figure 4-2).

The age-adjusted colorectal cancer overall incidence rates decreased significantly for men from 54.6 cases per 100,000 males (95% CI: 50.6 to 58.6) in 2008 to 45.3 cases per 100,000 males (95% CI: 41.9 to 48.8) in 2017 (Figure 4-2). The age-adjusted colorectal cancer overall incidence rates also decreased significantly for women during the same period from 42.2 cases per 100,000 females (95% CI: 39.0 to 45.4) in 2008 to 33.2 cases per 100,000 females (95% CI: 30.4 to 36.0) in females (Figure 4-1). The average Annual Percent Change (APC) for colorectal cancer overall incidence rates were -2.5 for males and -1.9 for females.

**Figure 4-2. Age-adjusted colorectal cancer overall incidence rates by gender and year, Kansas 2008-2017**

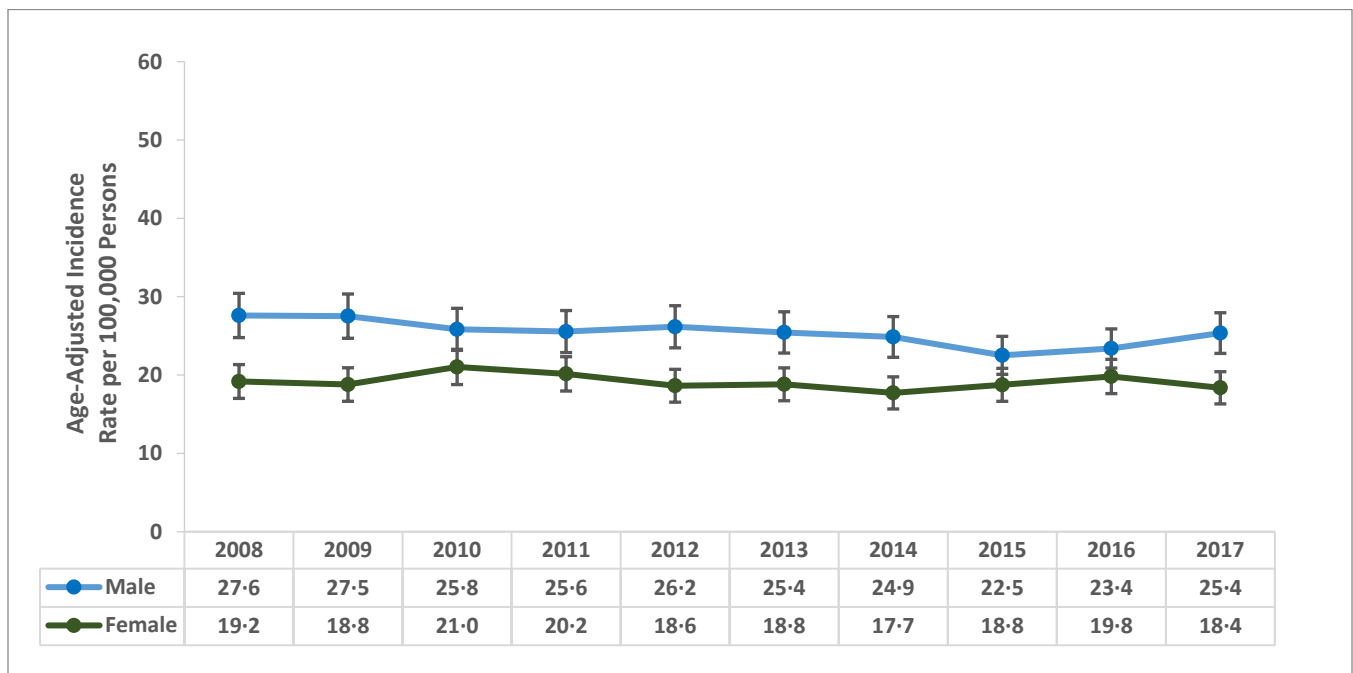


Source: 2008-2017 Kansas Cancer Registry. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Colorectal cancer incidence was defined as ICD-O-3 codes C180-C189, C199, C209, or C260 (excluding histology codes 9590-9989) with a behavior code indicating invasive malignancy. The average Annual Percent Change (APC) in the annual rates was calculated using the Joinpoint software, see Technical Appendix for more details on trend analysis.

## Colorectal Cancer Late-Stage Incidence among Gender Groups

The age-adjusted colorectal cancer late-stage incidence rates were significantly higher for males as compared to females in most of the years during the period 2008-2017 (Figure 4-3). Although the age-adjusted colorectal cancer late-stage incidence rates among Kansas males in 2008 (27.6 cases per 100,000 males; 95% CI: 24.8 to 30.4) and 2017 (25.4 cases per 100,000 males; 95% CI: 22.8 to 28.0) look similar (Figure 4-3), the average Annual Percent Change (APC) of the colorectal cancer late-stage incidence rate among Kansas males was -1.6 during 2008-2017. Conversely, the age-adjusted colorectal cancer late-stage incidence rates among Kansas females remained stable during the same period, with a rate of 18.4 cases per 100,000 females (95% CI: 16.3 to 20.4) in 2017 (Figure 4-3).

**Figure 4-3. Age-adjusted late-stage colorectal cancer incidence rates by gender and year, Kansas 2008-2017**

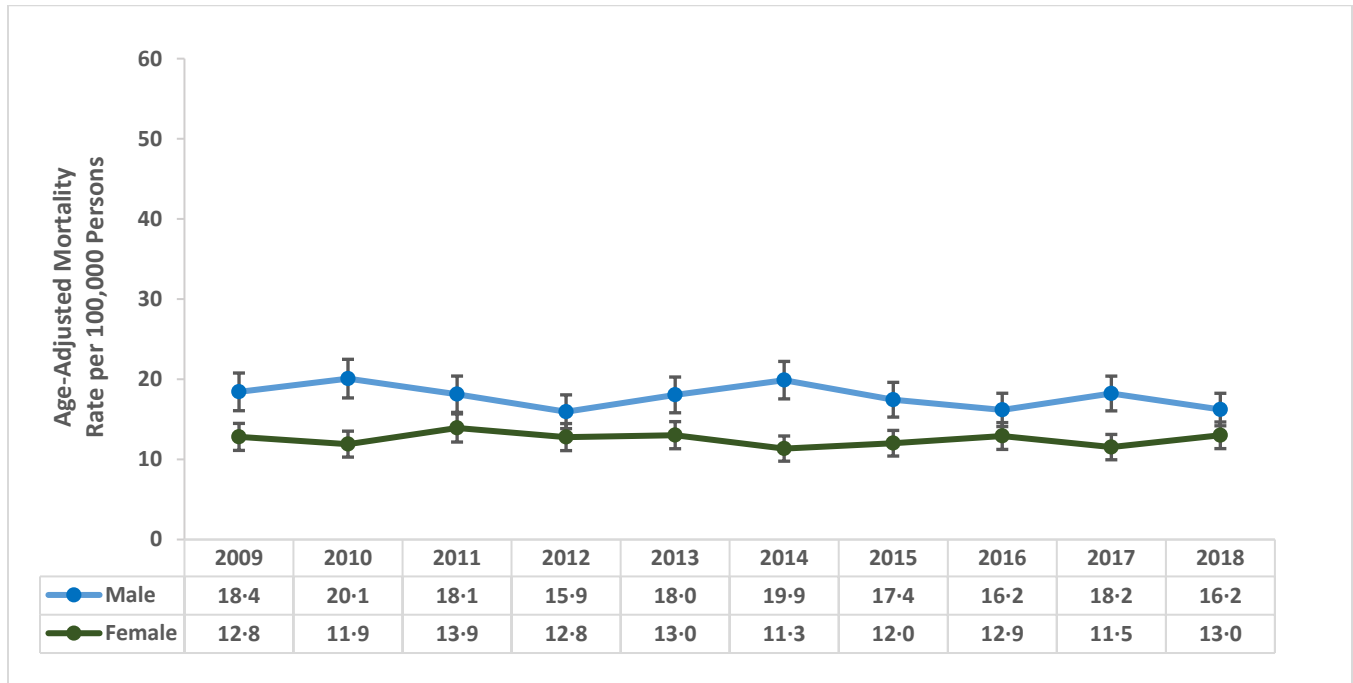


Source: 2008-2017 Kansas Cancer Registry. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Colorectal cancer incidence was defined as ICD-O-3 codes C180-C189, C199, C209, or C260 (excluding histology codes 9590-9989) with a behavior code indicating invasive malignancy. The average Annual Percent Change (APC) in the annual rates was calculated using the Joinpoint software, see Technical Appendix for more details on trend analysis.

## Colorectal Cancer Mortality among Gender Groups

The age-adjusted colorectal cancer mortality rates were significantly higher for males as compared to females during the period 2009-2018 (Figure 4-4). The age-adjusted colorectal cancer mortality rates did not change significantly for either males or females during the period from 2009 to 2018. In 2018, the age-adjusted colorectal mortality rate for males was 16.2 deaths per 100,000 males (95% CI: 14.2 to 18.2) and for females was 13.0 deaths per 100,000 females (95% CI: 11.3 to 14.7) (Figure 4-4).

**Figure 4-4. Age-adjusted colorectal cancer mortality rates among gender groups, Kansas 2009-2018**

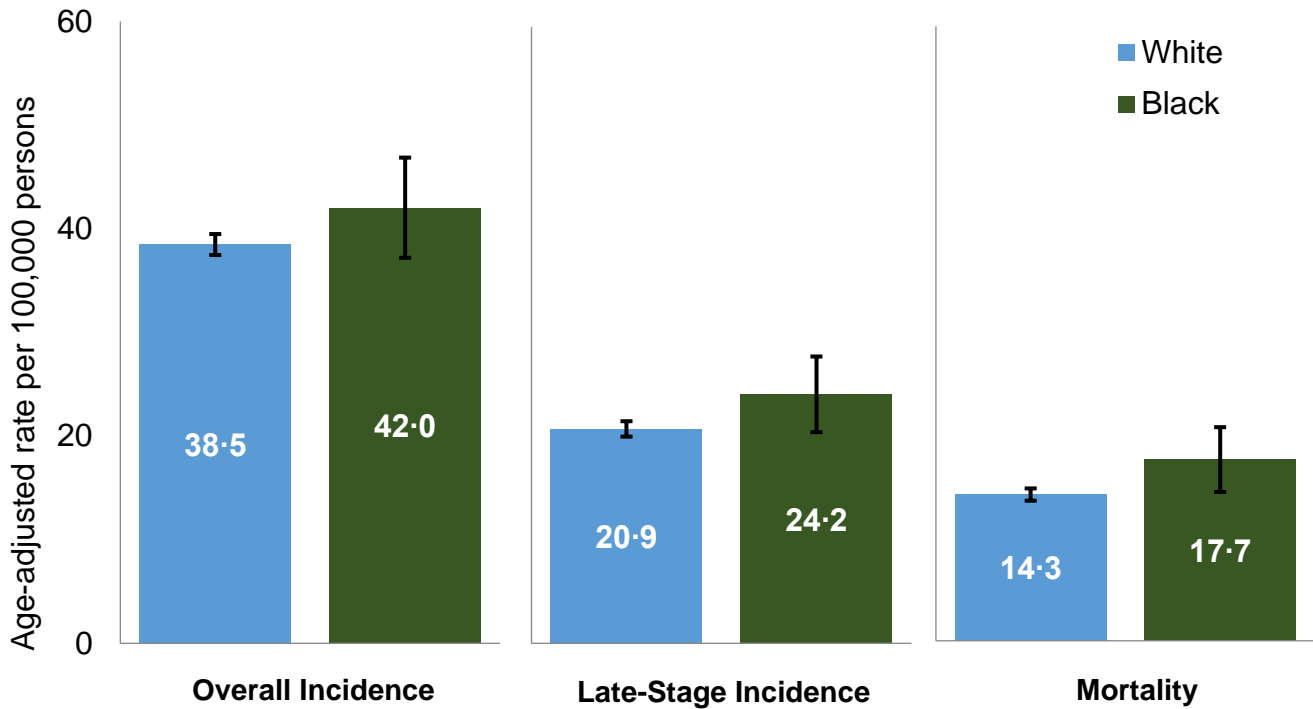


Source: 2009-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Colorectal cancer mortality was defined as ICD-10 codes C18-C20 or C260. The average Annual Percent Change (APC) in the annual rates was calculated using the Joinpoint software, see Technical Appendix for more details on trend analysis.

## Colorectal Cancer Incidence and Mortality among Race Groups

In Kansas, the age-adjusted colorectal cancer overall incidence, late-stage, and mortality rates did not differ significantly among Kansans by race during the period 2013-2018 (Figure 4-5).

**Figure 4-5. Age-adjusted colorectal cancer incidence and mortality rates among race groups, Kansas 2013-2018**

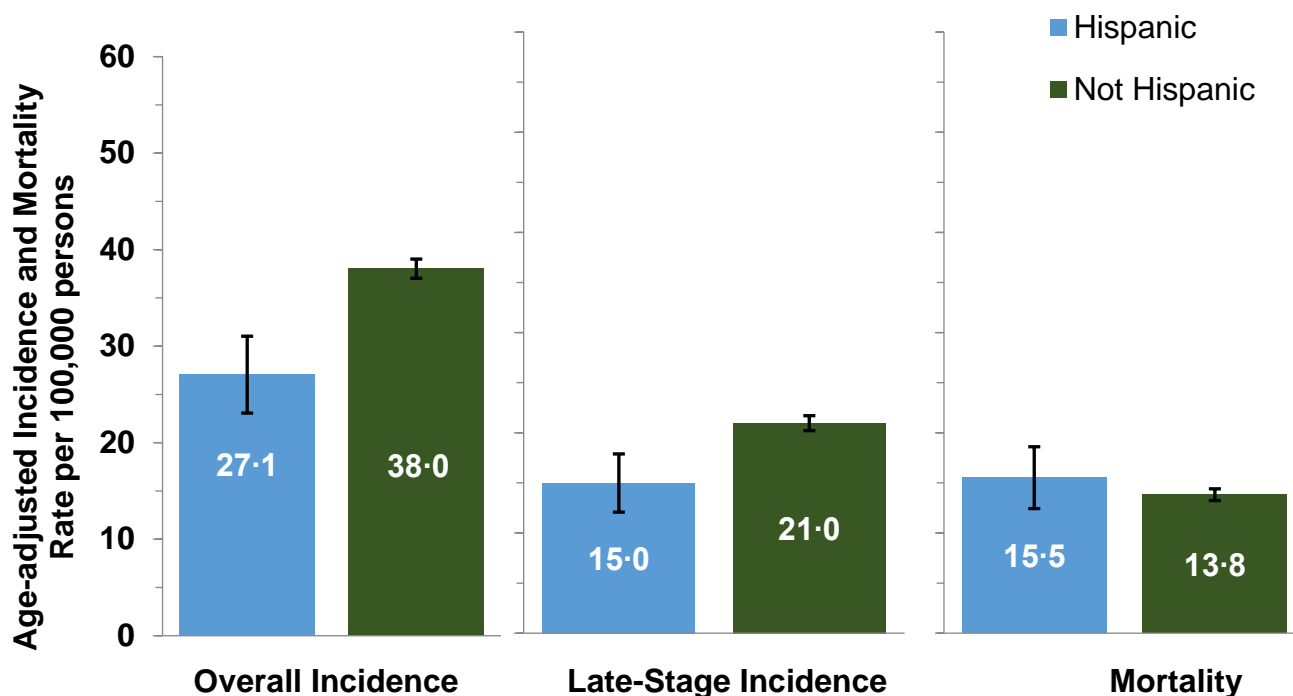


Source: 2013-2017 Kansas Cancer Registry. 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Colorectal cancer incidence was defined as ICD-O-3 codes C180-C189, C199, C209, or C260 (excluding histology codes 9590-9989) with a behavior code indicating invasive malignancy. Colorectal cancer mortality was defined as ICD-10 codes C18-C20 or C260, incidence rates for 2010-2014 were not available at the time the document was created.

## Colorectal Cancer Incidence and Mortality among Ethnic Groups

The age-adjusted colorectal cancer overall incidence rate was significantly lower for Hispanic Kansans (27.1 cases per 100,000 persons; 95% CI: 23.1 to 31.0) than for non-Hispanic Kansans (38.0 cases per 100,000 persons; 95% CI: 37.0 to 39.0) during the period 2013-2017 (Figure 4-6). In addition, the age-adjusted colorectal cancer late-stage incidence rate was significantly lower for Hispanic Kansans (15.0 cases per 100,000 persons; 95% CI: 12.1 to 17.9) than for non-Hispanic Kansans (21.0 cases per 100,000 persons; 95% CI: 20.2 to 21.7) during the period 2013-2017 (Figure 4-6). The age-adjusted colorectal cancer mortality rate did not differ significantly between Hispanic and non-Hispanic Kansans during the period 2014-2018 (Figure 4-6).

**Figure 4-6. Age-adjusted colorectal cancer incidence and mortality among ethnic groups, Kansas 2013-2018**

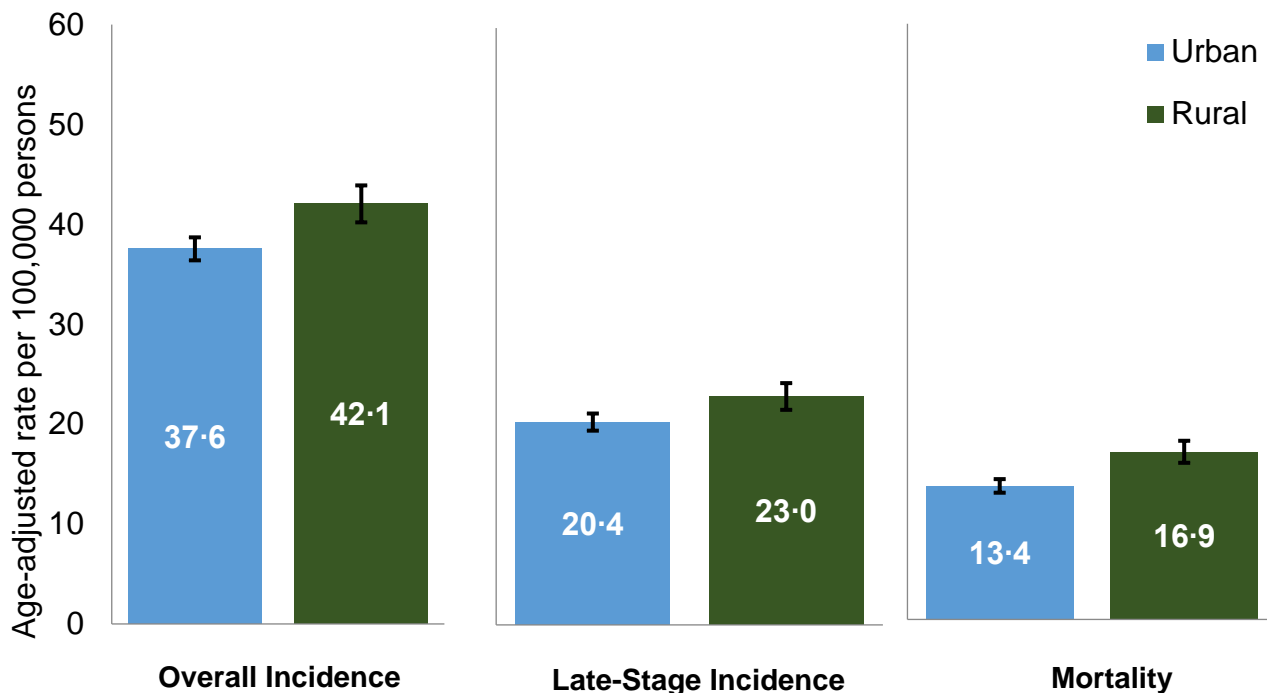


Source: 2013-2017 Kansas Cancer Registry. 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Colorectal cancer incidence was defined as ICD-O-3 codes C180-C189, C199, C209, or C260 (excluding histology codes 9590-9989) with a behavior code indicating invasive malignancy, incidence rates for 2010-2014 were not available at the time the document was created. Colorectal cancer mortality was defined as ICD-10 codes C18-C20 or C260. Hispanics were defined as persons of Mexican, Puerto Rican, Cuban, South or Central American, Other Spanish, Spanish not otherwise specified, or Dominican Republic ethnicity. Persons with Spanish surname only or unknown ethnicity were excluded.

## Colorectal Cancer Incidence and Mortality among County Population Density Groups

In Kansas, the age-adjusted colorectal cancer overall incidence rate was significantly higher for Kansans living in rural counties (42.1 cases per 100,000 persons; 95% CI: 40.2 to 43.9) than for Kansans living in urban counties (37.6 cases per 100,000 persons; 95% CI: 36.4 to 38.7) during the period 2013-2017 (Figure 4-7). In addition, the age-adjusted colorectal cancer late-stage incidence rate was significantly higher for Kansans living in rural counties (23.0 cases per 100,000 persons; 95% CI: 21.6 to 24.3) than for Kansans living in urban counties (20.4 cases per 100,000 persons; 95% CI: 19.5 to 21.2) during the period 2013-2017 (Figure 4-7). Furthermore, the age-adjusted colorectal cancer mortality rate was significantly higher for Kansans living in rural counties (16.9 cases per 100,000 persons; 95% CI: 15.8 to 18.0) than for Kansans living in urban counties (13.4 cases per 100,000 persons; 95% CI: 12.8 to 14.1) during the period 2013-2017 (Figure 4-7).

**Figure 4.7. Age-adjusted colorectal cancer incidence and mortality rates among county population density peer groups, Kansas 2013-2018**



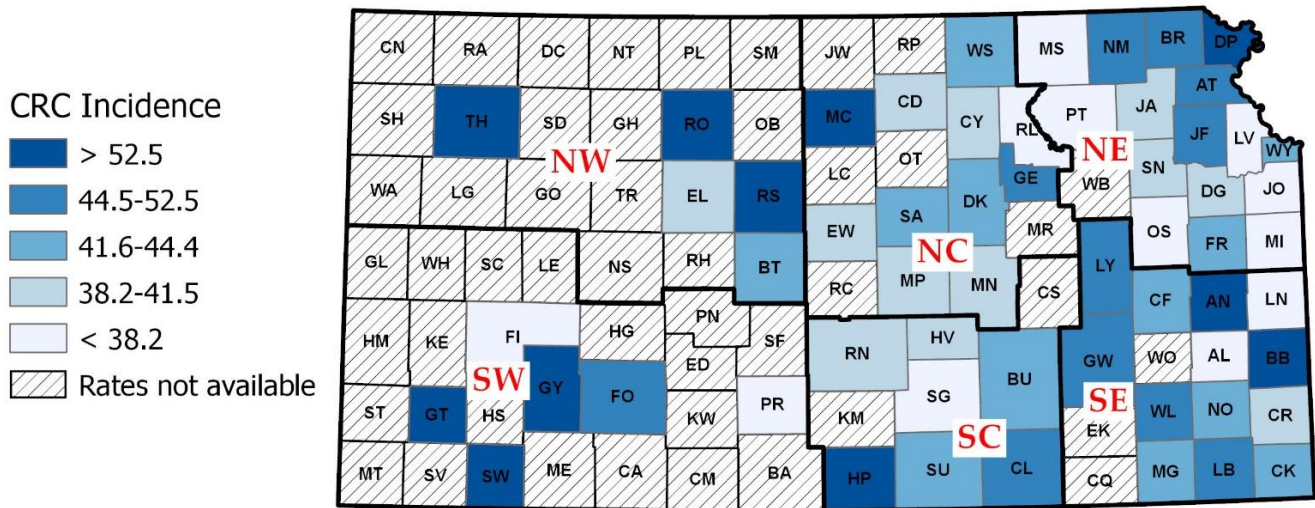
Source: 2013-2017 Kansas Cancer registry. 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. County population density peer groups are based on the population for each county in the 2000 population; the Rural counties included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while the Urban counties included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile). Vertical bars indicate 95% CIs. Cancer mortality was defined as ICD-10 codes C00-C97.



## Colorectal Cancer Incidence and Mortality among Kansas Counties

The distribution of the age-adjusted colorectal cancer incidence rates by county in Kansas shows that the Anderson, Bourbon, Doniphan, Grant, Gray, Harper, Mitchell, Rooks, Russell, Seward, and Thomas counties represents the highest quantile (the highest 20% of Kansas counties) of the colorectal cancer incidence rates in Kansas (Figure 4-8).

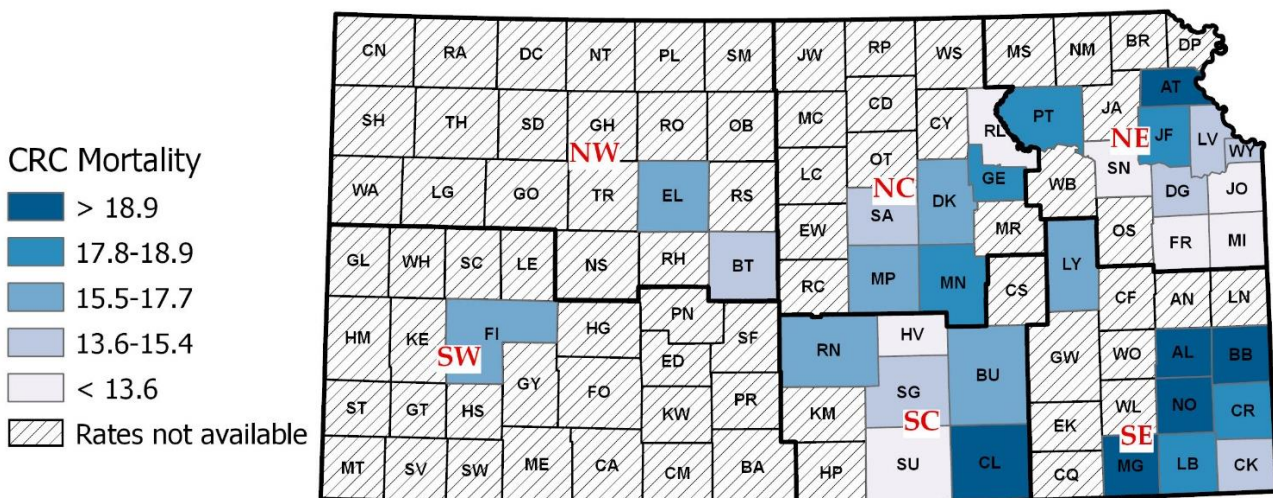
**Figure 4-8. Age-adjusted colorectal cancer incidence rates by county, Kansas 2013-2017**



Source: 2013-2017 Kansas Cancer registry, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates are the number of cases per 100,000 persons and they were age-adjusted to the U.S. 2000 standard population using the direct method. The map also shows the boundaries of KDHE district offices.

Regarding the distribution of the age-adjusted colorectal cancer mortality rates by county in Kansas, the Allen, Atchison, Bourbon, Cowley, Montgomery, and Neosho counties constitute the highest quantile (the highest 20% of Kansas counties) of the colorectal cancer mortality rates in Kansas (Figure 4-9).

**Figure 4-9. Age-adjusted colorectal cancer mortality rates by county, Kansas 2014-2018**



Source: 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates are the number of cases per 100,000 persons and they were age-adjusted to the U.S. 2000 standard population using the direct method. The map also shows the boundaries of KDHE district offices.

## CHAPTER 5: PROFILES OF SELECTED CANCERS – FEMALE BREAST

There are different kinds of breast cancer depending on which cells in the breast turn into cancer, such as the ducts which carry milk to the nipple (ductal carcinoma), or the glands which produce milk (lobular carcinoma). Although men can get breast cancer, it is not very common. For every 100 cases of breast cancer, less than one is in men.<sup>7</sup> Among Kansas women, breast cancer is the most commonly diagnosed cancer and the second leading cause of cancer death.

### Female Breast Cancer Incidence and Mortality

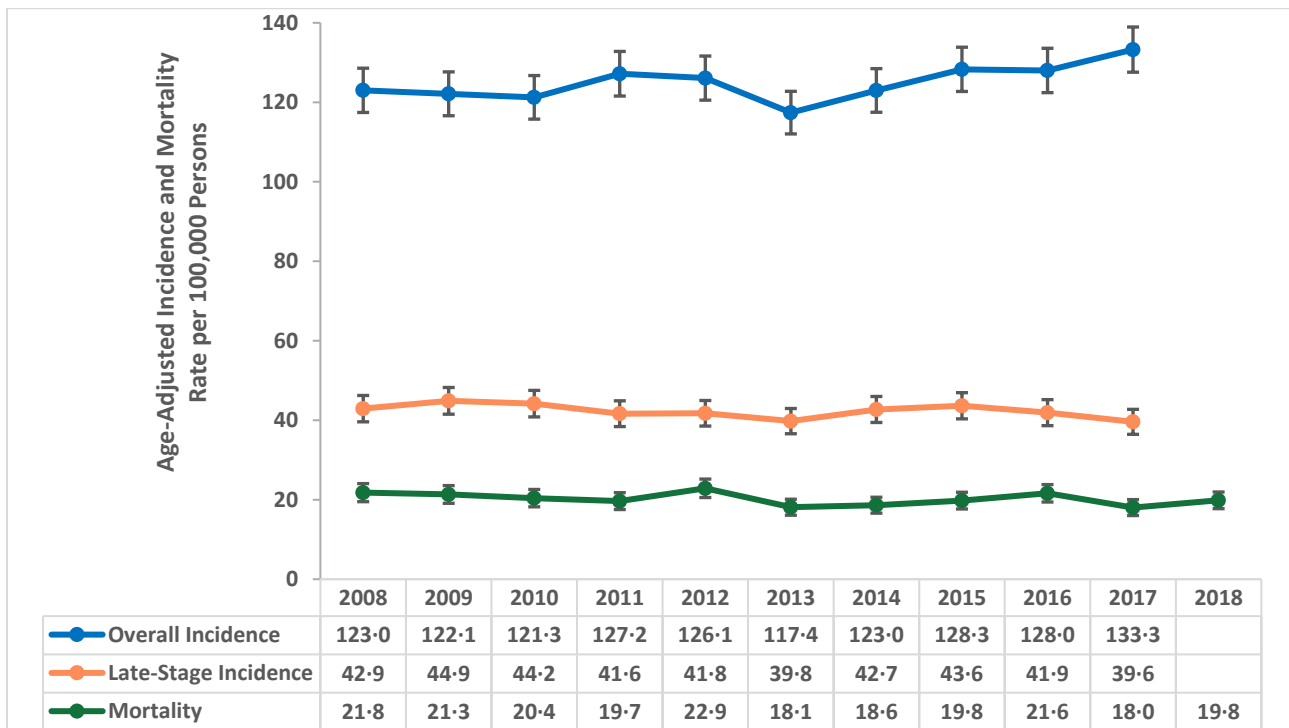


Each year, on average, 2,100 breast cancers are diagnosed among Kansas females, and about 600 of them are diagnosed in late-stage. In addition, approximately 360 Kansas females die of the disease annually. The age-adjusted female breast cancer overall incidence, late-stage incidence, and mortality rates remained stable during the period 2008-2018 (Figure 5-1). In 2017, the age-adjusted breast cancer overall incidence rate was 133.3 cases per 100,000 females (95% Confidence Interval (CI): 127.6 to 139.0), and the age-adjusted breast cancer late-stage incidence rate was 39.6 cases per 100,000 females (95% CI: 36.5 to 42.7) (Figure 5-1). In addition, the age-adjusted breast cancer mortality rate in 2018 was 19.8 deaths per 100,000 females (95% CI: 17.7 to 21.9) (Figure 5-1).

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<sup>7</sup> "Basic Information about Breast Cancer." Division of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention. [https://www.cdc.gov/cancer/breast/basic\\_info/index.htm#:~:text=Each%20year%20in%20the%20United,each%20year%20from%20breast%20cancer](https://www.cdc.gov/cancer/breast/basic_info/index.htm#:~:text=Each%20year%20in%20the%20United,each%20year%20from%20breast%20cancer). Accessed September 6, 2020

**Figure 5-1. Age-adjusted female breast cancer incidence and mortality rates, Kansas 2008-2018**

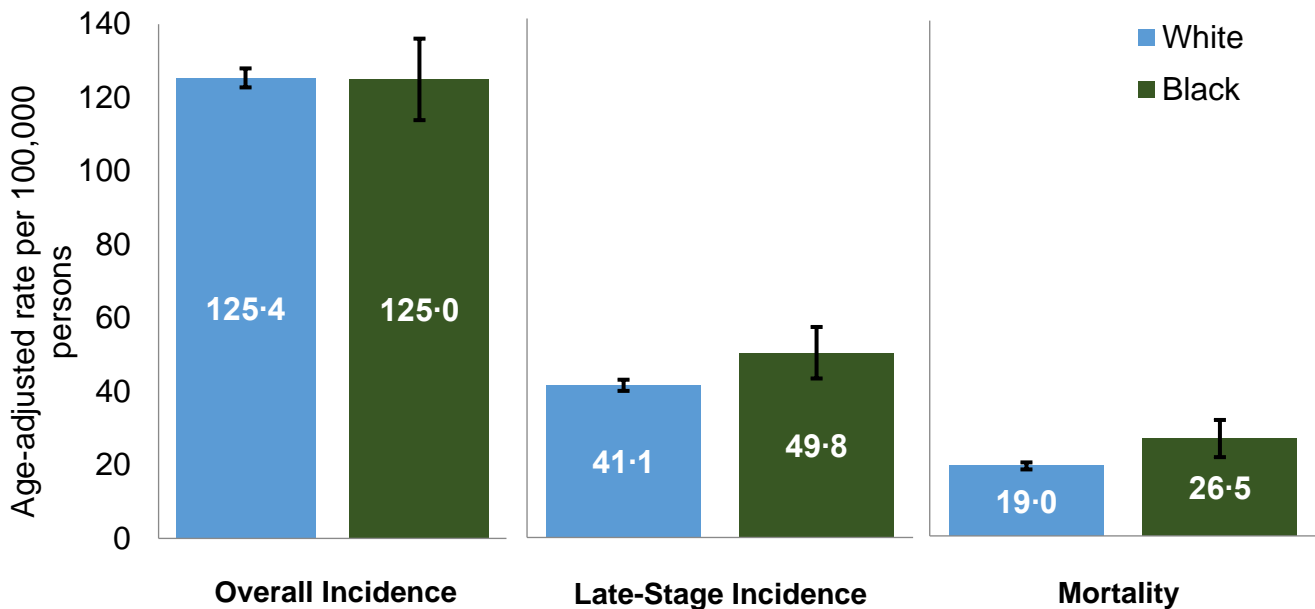


Source: 2008-2017 Kansas Cancer Registry. 2008-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Cancer incidence data for 2013 and 2014 were not available at the time the document was created. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Female breast cancer incidence was defined as ICD-O-3 codes C500-C509 (excluding histology codes 9590-9989) with a behavior code indicating invasive malignancy. Female breast cancer mortality was defined as ICD-10 code C50. The average Annual Percent Change (APC) in the annual rates was calculated using the Joinpoint, see Technical Appendix for more details on trend analysis.

## Female Breast Cancer Incidence and Mortality among Race Groups

In Kansas, the age-adjusted female breast cancer overall incidence rate did not differ significantly between White women (125.4 cases per 100,000 females; 95% CI: 122.8 to 128.0) and African American women (125.0 cases per 100,000 females; 95% CI: 113.9 to 136.1) during the period 2013-2017 (Figure 5-2). However, the age-adjusted female breast cancer late-stage incidence rate was significantly higher for African-American women (49.8 cases per 100,000 females; 95% CI: 42.9 to 56.8) than White women (41.1 cases per 100,000 females; 95% CI: 39.5 to 42.6) during the same period (Figure 5-2). Similarly, the age-adjusted female breast cancer mortality rate was significantly higher for African American Kansas women (26.5 deaths per 100,000 females; 95% CI: 21.4 to 31.5) compared with White Kansas women (19.0 deaths per 100,000 females; 95% CI: 18.1 to 20.0) during the period 2014-2018 (Figure 5-2).

**Figure 5-2. Age-adjusted female breast cancer incidence and mortality rates among race groups, Kansas 2013-2018**

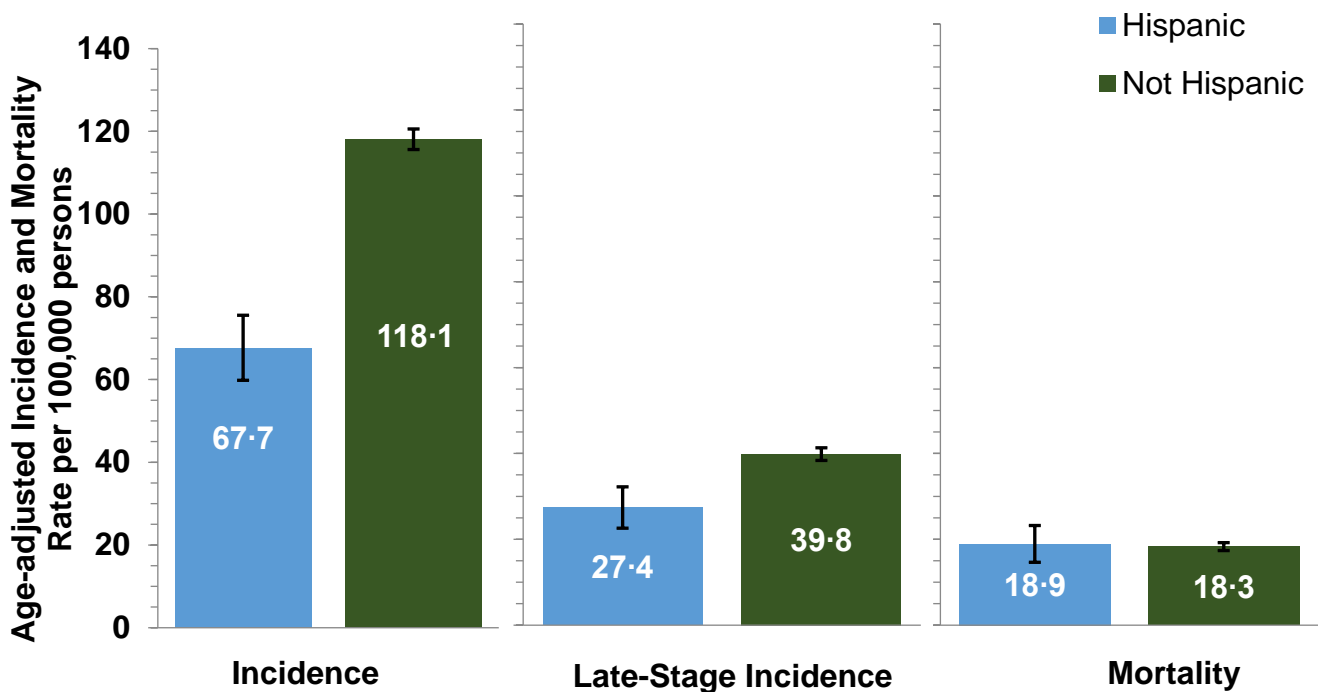


Source: 2013-2017 Kansas Cancer Registry. 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Female breast cancer incidence was defined as ICD-O-3 codes C500-C509 (excluding histology codes 9590-9989) with a behavior code indicating invasive malignancy. Female breast cancer mortality was defined as ICD-10 code C50.

## Female Breast Cancer Incidence and Mortality among Ethnic Groups

In Kansas, the age-adjusted female breast cancer overall incidence rate was significantly lower for Hispanic women (67.7 cases per 100,000 females; 95% CI: 59.8 to 75.5) than for non-Hispanic women (118.1 cases per 100,000 females; 95% CI: 115.6 to 120.6) during the period 2013-2017 (Figure 5-3). Similarly, age-adjusted female breast cancer late-stage incidence rates were significantly lower for Hispanic Kansas women (27.4 deaths per 100,000 females; 95% CI: 22.6 to 32.2) than for non-Hispanic Kansas women (39.8 deaths per 100,000 females; 95% CI: 38.4 to 41.3) during the period 2013-2017 (Figure 5-3). However, the breast cancer mortality rates did not differ significantly between Hispanic and non-Hispanic females in Kansas during the period 2014-2018 (Figure 5-3).

**Figure 5-3. Age-adjusted female breast cancer incidence and mortality among ethnic groups, Kansas 2013-2018**

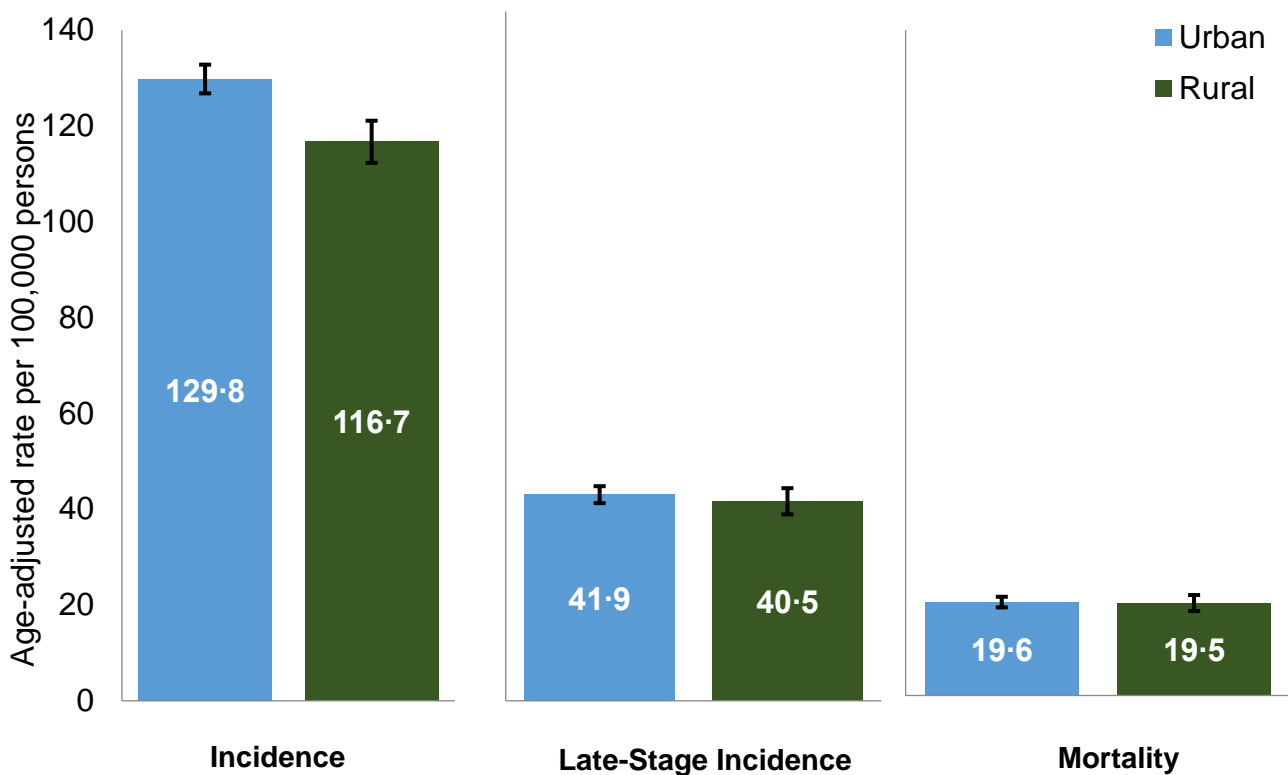


Source: 2013-2017 Kansas Cancer Registry. 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Female breast cancer incidence was defined as ICD-O-3 codes C500-C509 (excluding histology codes 9590-9989) with a behavior code indicating invasive malignancy. Female breast cancer mortality was defined as ICD-10 code C50. Hispanics were defined as persons of Mexican, Puerto Rican, Cuban, South or Central American, Other Spanish, Spanish not otherwise specified, or Dominican Republic ethnicity. Persons with Spanish surname only or unknown ethnicity were excluded.

## Female Breast Cancer Incidence and Mortality among County Population Density Groups

The age-adjusted breast cancer overall incidence rate was significantly higher for Kansas females living in urban counties (129.8 cases per 100,000 females; 95% CI: 126.8 to 132.8) than for Kansas females living in rural counties (116.7 cases per 100,000 females; 95% CI: 112.3 to 121.1) during the period 2013-2017 (Figure 5-4). However, the age-adjusted breast cancer late-stage incidence rate did not differ significantly between Kansas females living in urban counties (19.6 cases per 100,000 females; 95% CI: 18.5 to 20.8) and Kansas females living in rural counties (19.5 cases per 100,000 females; 95% CI: 17.8 to 21.1) during the period 2013-2017 (Figure 5-4). Similarly, the age-adjusted breast cancer mortality rate did not differ significantly between Kansas females living in urban counties (19.6 deaths per 100,000 females; 95% CI: 18.5 to 20.8) than for Kansas females living in rural counties (19.5 deaths per 100,000 persons; 95% CI: 17.8 to 21.1) during the period 2014-2018 (Figure 5-4).

**Figure 5-4. Age-adjusted female breast cancer incidence and mortality rates among county population density peer groups, Kansas 2013-2018**

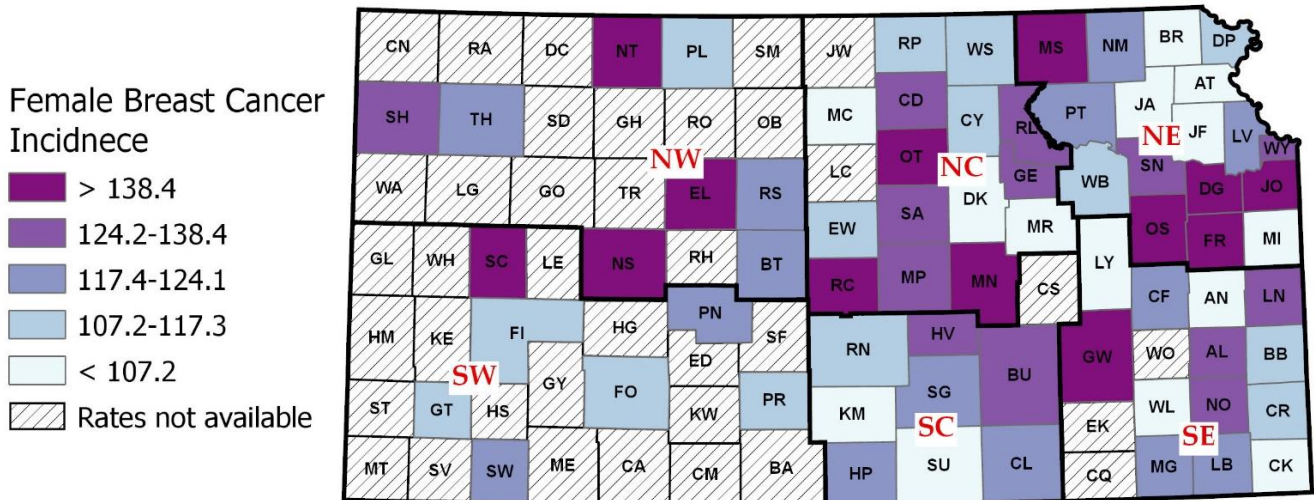


Source: 2013-2017 Kansas Cancer registry. 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. County population density peer groups are based on the population for each county in the 2000 population; the Rural counties included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while the Urban counties included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile). Vertical bars indicate 95% CIs. Cancer mortality was defined as ICD-10 codes C00-C97.

## Female Breast Cancer Incidence and Mortality among Kansas Counties

The distribution of the age-adjusted female breast cancer incidence rates by county in Kansas shows that the Douglas, Ellis, Franklin, Greenwood, Johnson, Marion, Marshall, Ness, Norton, Osage, Ottawa, Rice, and Scott counties represent the highest quantile (the highest 20% of Kansas counties) of the female breast cancer incidence rates in Kansas (Figure 5-5).

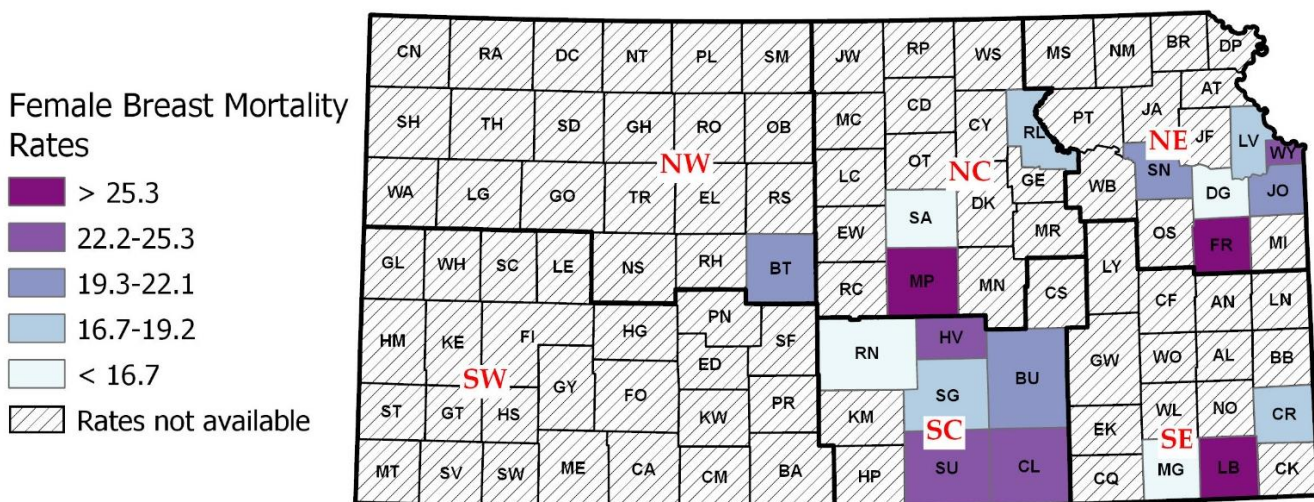
**Figure 5-5. Age-adjusted female breast cancer incidence rates by county, Kansas 2013-2017**



Source: 2013-2017 Kansas Cancer registry, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates are the number of cases per 100,000 persons and they were age-adjusted to the U.S. 2000 standard population using the direct method. The map also shows the boundaries of KDHE district offices.

Regarding the distribution of the age-adjusted female breast cancer mortality rates by county in Kansas, the Franklin, Labette, McPherson counties constitute the highest quantile (the highest 20% of Kansas counties) of the female breast cancer mortality rates in Kansas (Figure 5-6)

**Figure 5-6. Age-adjusted female breast cancer mortality rates by county, Kansas 2014-2018**



Source: 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates are the number of cases per 100,000 persons and they were age-adjusted to the U.S. 2000 standard population using the direct method. The map also shows the boundaries of KDHE district offices.

## CHAPTER 6: PROFILES OF SELECTED CANCERS – CERVICAL

The cervix is the lower, narrow end of the uterus. The human papillomavirus (HPV) is the main cause of cervical cancer. Cervical cancer is highly preventable due to the availability of the screening tests and vaccination against HPV infections.<sup>8</sup>

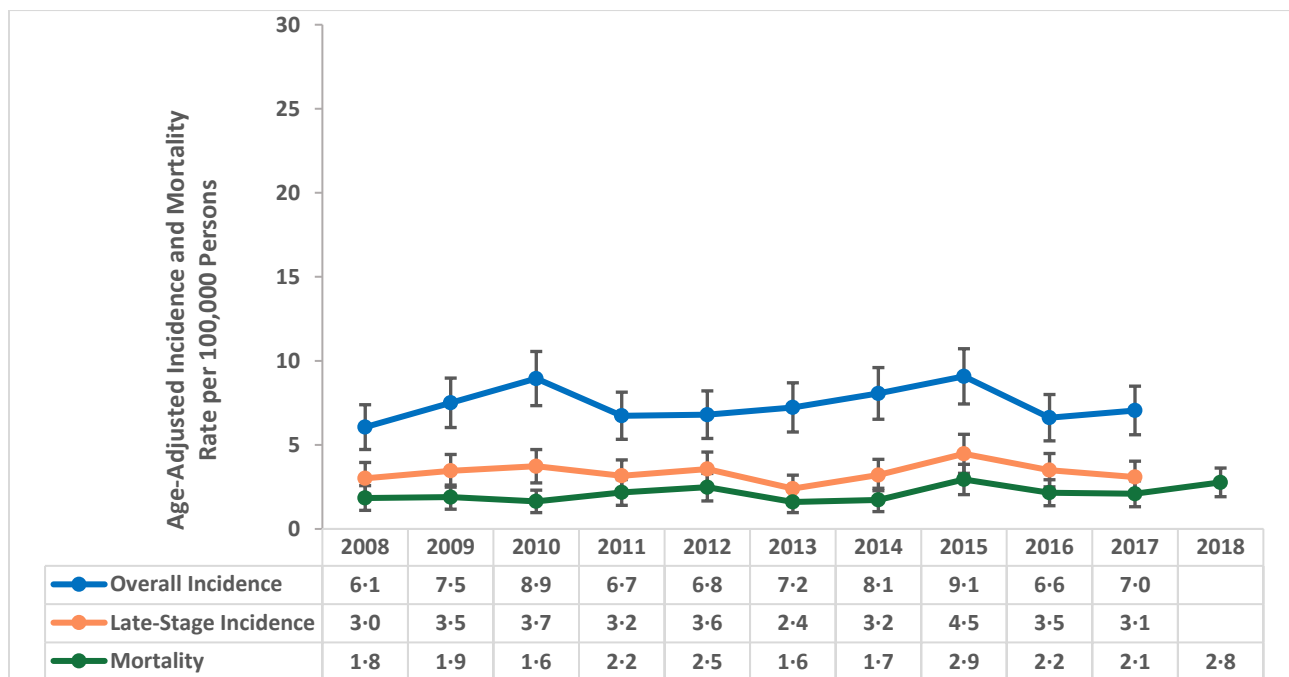
### Cervical Cancer Incidence and Mortality

On average, each year approximately 100 cervical cancers are diagnosed among Kansas females, and about half of them are diagnosed in late-stage. In addition, approximately 60 Kansas females die of the disease annually.



The age-adjusted cervical cancer overall incidence, late-stage incidence, and mortality rates remained stable during the period 2008-2018 (Figure 6-1). In 2017, the age-adjusted overall incidence rate was 7.0 cases per 100,000 females (95% Confidence Interval (CI): 5.6 to 8.5), and the age-adjusted late-stage incidence rate was 3.1 cases per 100,000 females (95% CI: 2.1 to 4.0) (Figure 6-1). In addition, the age-adjusted cervical cancer mortality rate in 2018 was 2.8 deaths per 100,000 females (95% CI: 1.9 to 3.6) (Figure 6-1).

**Figure 6-1. Age-adjusted cervical cancer incidence and mortality rates, Kansas 2008-2018**



Source: 2008-2017 Kansas Cancer Registry. 2008-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Cancer incidence data for 2013 and 2014 were not available at the time the document was created. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Cervical cancer incidence was defined as ICD-O-3 codes C530-C539 (excluding histology codes 9590-9989) with a behavior code indicating invasive malignancy. Cervical cancer mortality was defined as ICD-10 code C53. The average Annual Percent Change (APC) in the annual rates was calculated using the Joinpoint software; see Technical Appendix for more details on trend analysis.

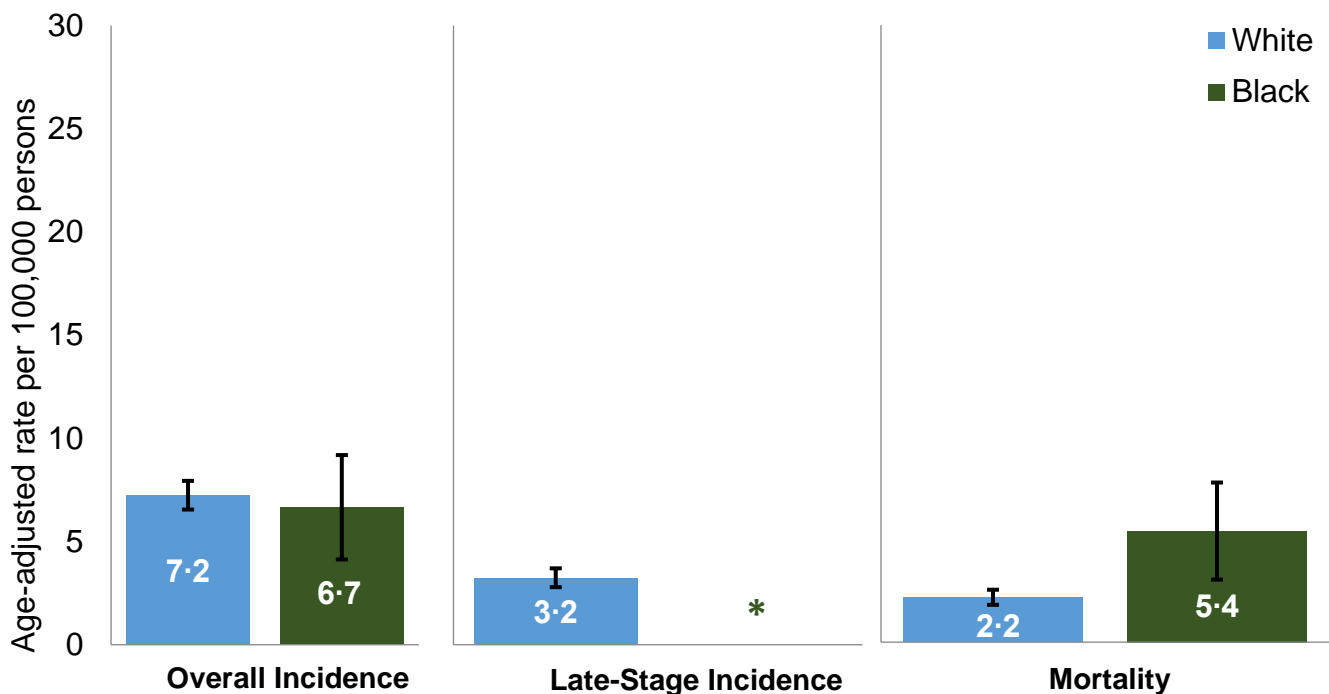
<sup>8</sup> "Cervical Cancer." Division of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention. [www.cdc.gov/cancer/cervical/index.htm](http://www.cdc.gov/cancer/cervical/index.htm). Accessed September 6, 2020



## Cervical Cancer Incidence and Mortality among Race Groups

In Kansas, the age-adjusted cervical cancer overall incidence rate did not differ significantly between White women (7.2 cases per 100,000 females; 95% CI: 6.6 to 7.9) and African American women (6.7 cases per 100,000 females; 95% CI: 4.1 to 9.2) during the period 2013-2017 (Figure 6-2). However, the age-adjusted cervical cancer mortality rate was significantly higher for African American Kansas women (5.4 deaths per 100,000 females; 95% CI: 3.0 to 7.8) compared with white Kansas women (2.2 deaths per 100,000 females; 95% CI: 1.8 to 2.6) during the period 2014-2018 (Figure 6-2). Due to the small number of late-stage cervical cancer cases among racial groups other than White during the most recent 5-year period, racial comparisons cannot be made.

**Figure 6-2. Age-adjusted cervical cancer incidence and mortality rates among race groups, Kansas 2013-2018**

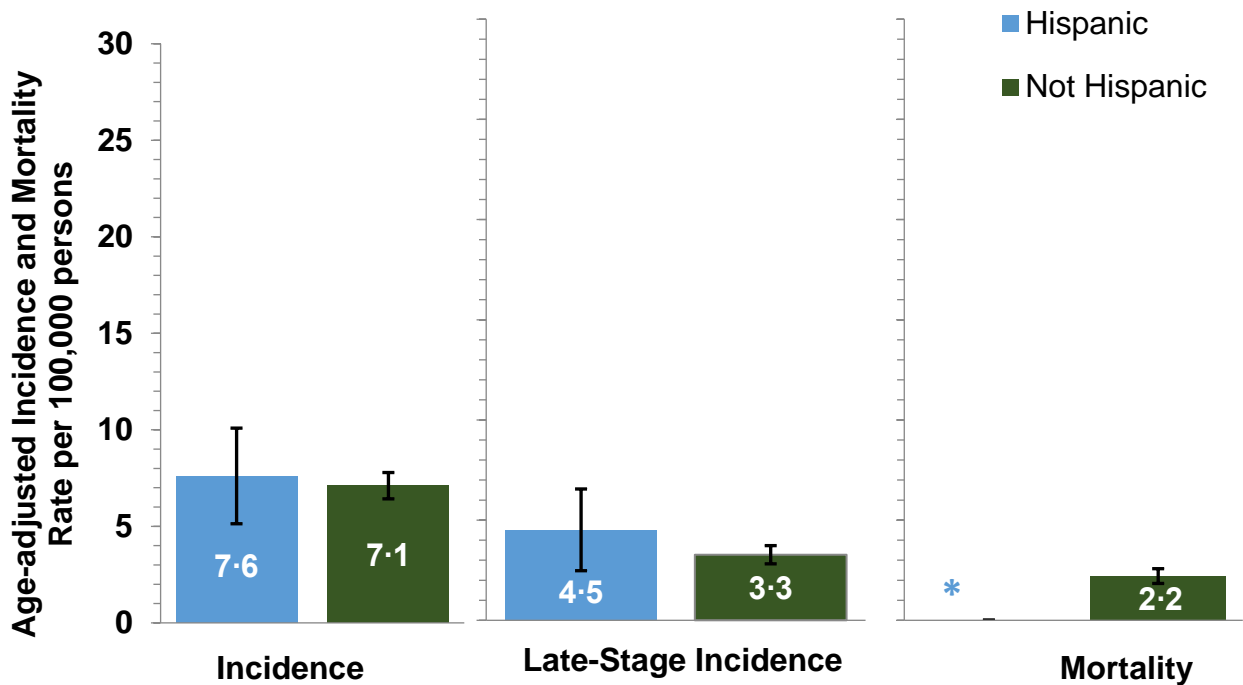


Source: 2013-2017 Kansas Cancer Registry. 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. \* denotes that the rate is not reported due to insufficient number of cases. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Cervical cancer incidence was defined as ICD-O-3 codes C530-C539 (excluding histology codes 9590-9989) with a behavior code indicating invasive malignancy. Cervical cancer mortality was defined as ICD-10 code C53.

## Cervical Cancer Incidence and Mortality among Ethnic Groups

In Kansas, the age-adjusted cervical cancer overall incidence rate did not differ significantly between Hispanic females (7.6 cases per 100,000 females; 95% CI: 5.1 to 10.1) and non-Hispanic females (7.6 cases per 100,000 females; 95% CI: 5.1 to 10.1) during the period 2013-2017 (Figure 6-3). Additionally, the age-adjusted cervical cancer late-stage incidence rate did not differ significantly between Hispanic females (4.5 cases per 100,000 females; 95% CI: 2.5 to 6.6) and to non-Hispanic females (3.3 cases per 100,000 females; 95% CI: 2.8 to 3.7) during the period 2013-2017 (Figure 6-3). The age-adjusted breast cancer mortality rate among non-Hispanic females was 2.2 cases per 100,000 females; 95% CI: 1.8 to 2.6) during the period 2014-2018 in Kansas (Figure 6-3). The mortality rate for Hispanic females in Kansas is not shown because the number of deaths was insufficient for computing a statistically reliable rate for this ethnic group.

**Figure 6-3. Age-adjusted cervical cancer incidence and mortality among ethnic groups, Kansas 2013-2018.**

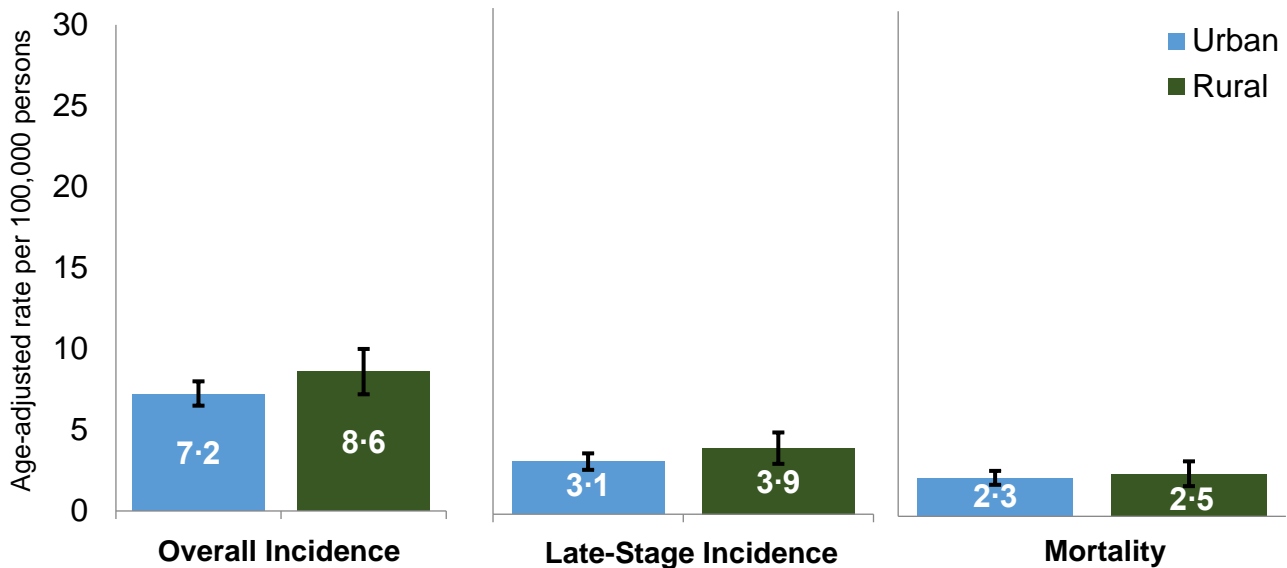


Source: 2013-2017 Kansas Cancer Registry. 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. \* denotes that the rate is not reported due to insufficient number of cases. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Cervical cancer incidence was defined as ICD-O-3 codes C530-C539 (excluding histology codes 9590-9989) with a behavior code indicating invasive malignancy. Cervical cancer mortality was defined as ICD-10 code C53. Hispanics were defined as persons of Mexican, Puerto Rican, Cuban, South or Central American, Other Spanish, Spanish not otherwise specified, or Dominican Republic ethnicity. Persons with Spanish surname only or unknown ethnicity were excluded.

## Cervical Cancer Incidence and Mortality among County Population Density Groups

The age-adjusted cervical cancer overall incidence rate did not differ significantly between Kansas females living in urban counties (7.2 cases per 100,000 persons; 95% CI: 6.5 to 8.0) and Kansas females living in rural counties (8.6 cases per 100,000 persons; 95% CI: 7.2 to 10.0) during the period 2013-2017 (Figure 6-4). Similarly, the age-adjusted cervical cancer late-stage incidence rate did not differ significantly between Kansas females living in urban counties (3.1 cases per 100,000 persons; 95% CI: 2.6 to 3.6) and Kansas females living in rural counties (3.9 cases per 100,000 persons; 95% CI: 3.0 to 4.8) during the period 2013-2017 (Figure 6-4). Additionally, the age-adjusted breast cancer mortality rate did not differ significantly between Kansas females living in urban counties (2.3 cases per 100,000 persons; 95% CI: 1.9 to 2.9) and Kansas females living in rural counties (2.5 cases per 100,000 persons; 95% CI: 1.8 to 3.3) during the period 2014-2018 (Figure 6-4).

**Figure 6-4. Age-adjusted cervical cancer incidence and mortality rates among county population density peer groups, Kansas 2013-2018**



Source: 2013-2017 Kansas Cancer registry. 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. County population density peer groups are based on the population for each county in the 2000 population; the Rural counties included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while the Urban counties included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile). Vertical bars indicate 95% CIs. Cancer mortality was defined as ICD-10 codes C00-C97.

## Cervical Cancer Incidence and Mortality among Kansas Counties

The age-adjusted cervical cancer incidence rates are only available for four counties: Johnson, Sedgwick, Shawnee, and Wyandotte. The rates were 4.7, 9.3, 7.0, and 12.2 cases per 100,000 women, respectively. The age-adjusted cervical cancer mortality rates are only available for two counties: Sedgwick and Wyandotte. The rates were 2.6 and 5.3 cases per 100,000 women.

Source: 2013-2017 Kansas Cancer Registry. 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates were age-adjusted to the U.S. 2000 standard population using the direct method.

## CHAPTER 7: PROFILES OF SELECTED CANCERS – PROSTATE

The prostate, a part of the male reproductive system, produces fluid that makes up a part of semen. Researchers do not yet agree on the factors that can influence a man's risk of developing prostate cancer, either positively or negatively.<sup>9</sup> In Kansas, prostate cancer is the most commonly diagnosed cancer the second leading cause of cancer death among men.

### Prostate Cancer Incidence and Mortality

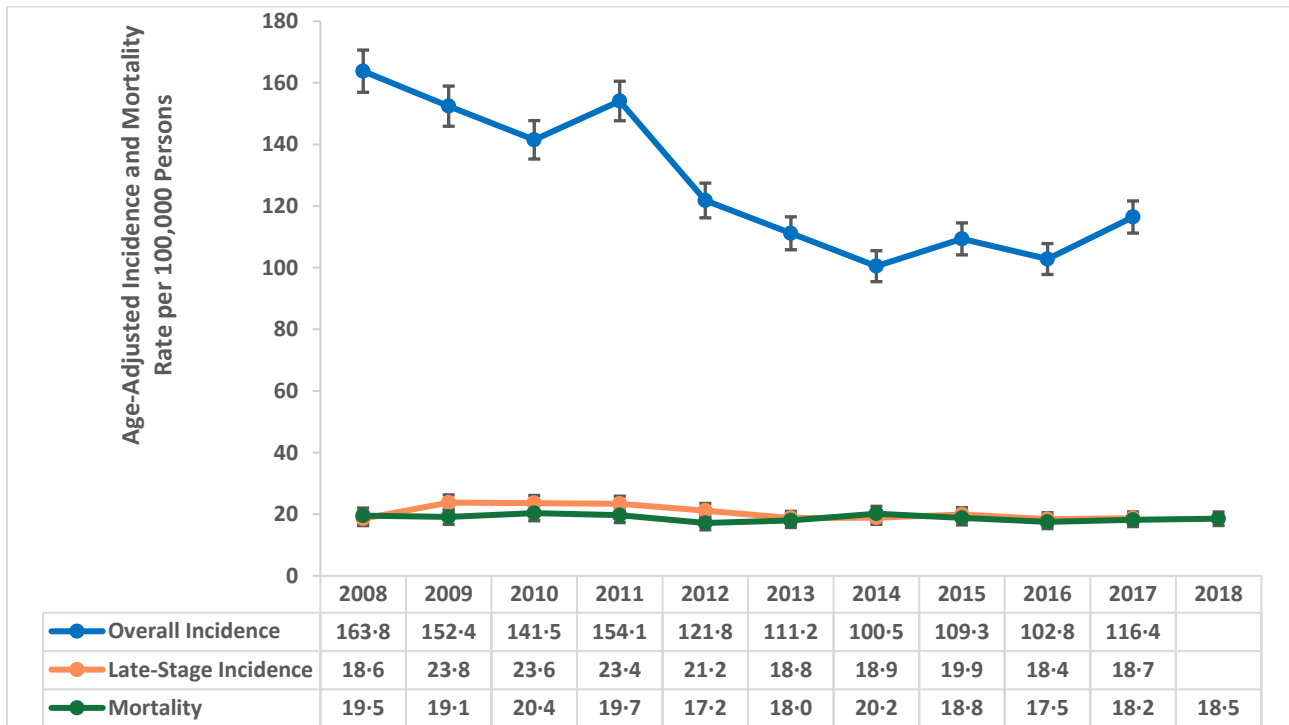
On average each year, more than 1,800 prostate cancers are diagnosed among Kansas males, and 300 of them are diagnosed in late-stage. In addition, approximately 250 men die from the disease annually. The age-adjusted prostate cancer overall incidence rates decreased significantly during the period 2008-2017 from 163.8 cases per 100,000 males (95% Confidence Interval (CI): 156.9 to 170.6) in 2008 to 116.4 cases per 100,000 males (95% CI: 111.2 to 121.6) in 2012 (Figure 7-1). The average Annual Percent Change (APC) in the prostate cancer overall incidence rate in Kansas was -5.0 during the period 2008-2017. The prostate cancer late-stage incidence and mortality rates remained stable during the period 2008-2018. In 2017, the age-adjusted prostate cancer late-stage incidence was 18.7 cases per 100,000 males (95% CI: 16.6 to 20.8); in 2018, the age-adjusted prostate cancer mortality rate was 18.5 deaths per 100,000 males (95% CI: 16.3 to 20.7) (Figure 7-1).



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<sup>9</sup> "Basic Information about Prostate Cancer." Division of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention. [https://www.cdc.gov/cancer/prostate/basic\\_info/index.htm](https://www.cdc.gov/cancer/prostate/basic_info/index.htm). Accessed September 6, 2020

**Figure 7-1. Age-adjusted prostate cancer incidence and mortality rates, Kansas 2008-2018**

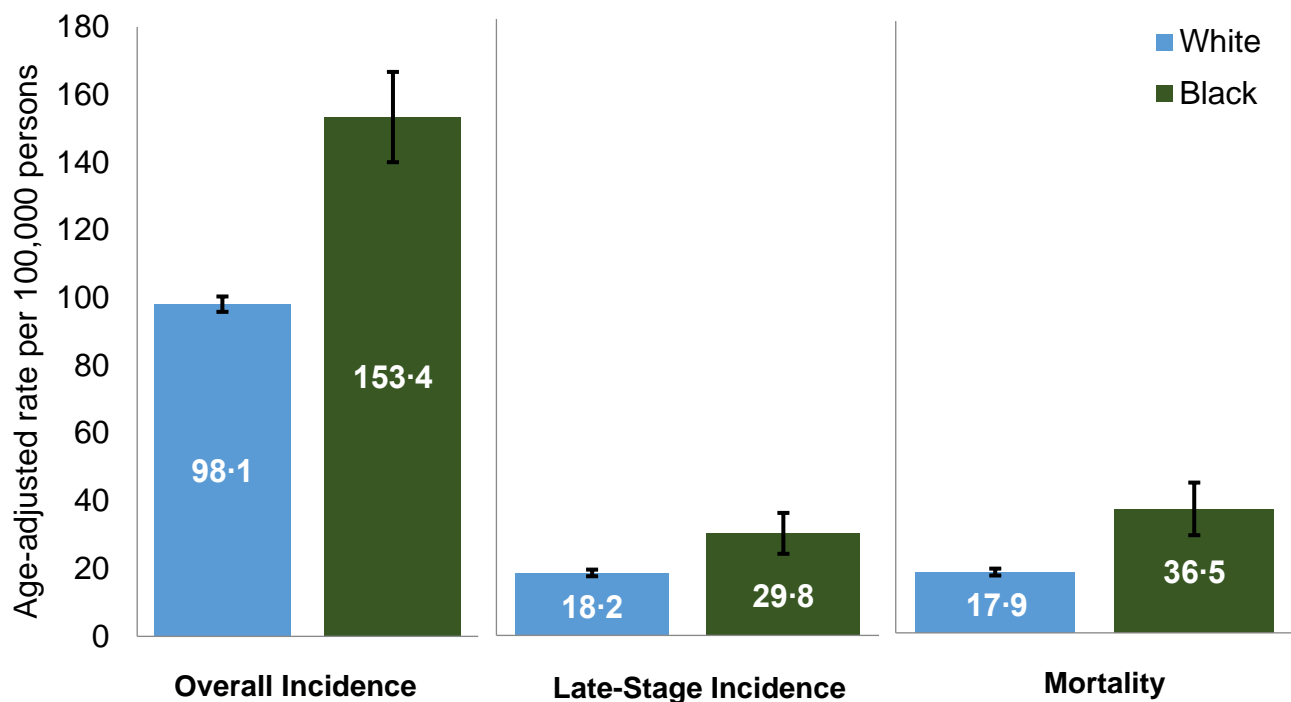


Source: 2008-2017 Kansas Cancer Registry. 2008-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Cancer incidence data for 2013 and 2014 were not available at the time the document was created. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Prostate cancer incidence was defined as ICD-O-3 code C619 (excluding histology codes 9590-9989) with a behavior code indicating invasive malignancy. Prostate cancer mortality was defined as ICD-10 code C61. The average Annual Percent Change (APC) in the annual rates was calculated using the Joinpoint software; see Technical Appendix for more details on trend analysis.

## Prostate Cancer Incidence and Mortality among Race Groups

In Kansas, the age-adjusted prostate cancer overall incidence rate was significantly higher for African American men (153.4 cases per 100,000 males; 95% CI: 140.1 to 166.7) than for White men (98.1 cases per 100,000 males; 95% CI: 95.9 to 100.4) during the period 2013-2017 (Figure 7-2). In addition, the age-adjusted prostate cancer late-stage incidence rate was significantly higher for African American men (29.8 cases per 100,000 males; 95% CI: 23.8 to 35.8) than for White men (18.2 cases per 100,000 males; 95% CI: 17.3 to 19.2) during the period 2013-2017 (Figure 7-2). Similarly, the age-adjusted prostate cancer mortality rate was significantly higher for African American Kansas men (36.5 deaths per 100,000 males; 95% CI: 28.7 to 44.2) than for White Kansas men (17.9 deaths per 100,000 males; 95% CI: 16.9 to 18.9) during the period 2014-2018 (Figure 7-2).

**Figure 7-2. Age-adjusted prostate cancer incidence and mortality rates among race groups, Kansas 2013-2018**

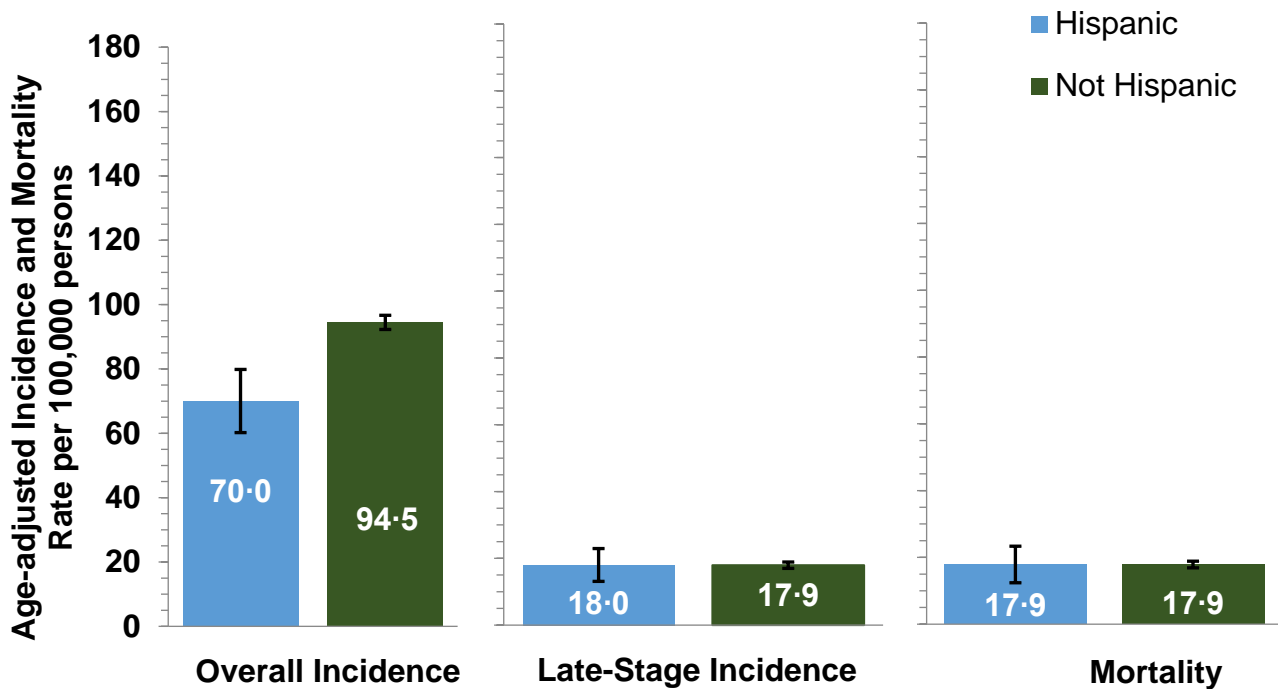


Source: 2013-2017 Kansas Cancer Registry. 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Prostate cancer incidence was defined as ICD-O-3 code C619 (excluding histology codes 9590-9989) with a behavior code indicating invasive malignancy. Prostate cancer mortality was defined as ICD-10 code C61.

## Prostate Cancer Incidence and Mortality among Ethnic Groups

In Kansas, the age-adjusted prostate cancer overall incidence rate was significantly lower for Hispanic men (70.0 cases per 100,000 males; 95% CI: 60.2 to 79.8) than for non-Hispanic men (94.5 cases per 100,000 males; 95% CI: 92.3 to 96.7) during the period 2013-2017 (Figure 7-3). However, the age-adjusted prostate cancer late-stage incidence rate did not differ between Hispanic men (18.0 cases per 100,000 males; 95% CI: 13.1 to 22.9) than for non-Hispanic men (17.9 cases per 100,000 males; 95% CI: 17.0 to 18.9) during the period 2013-2017 (Figure 7-3). Similarly, the age-adjusted prostate cancer mortality rate did not differ significantly between Hispanic Kansas men (17.9 deaths per 100,000 males; 95% CI: 12.4 to 23.4) as compared to non-Hispanic Kansas men (17.9 deaths per 100,000 males; 95% CI: 16.9 to 18.9) during the period 2014-2018 (Figure 7-3).

**Figure 7-3. Age-adjusted prostate cancer incidence and mortality among ethnic groups, Kansas 2013-2018**

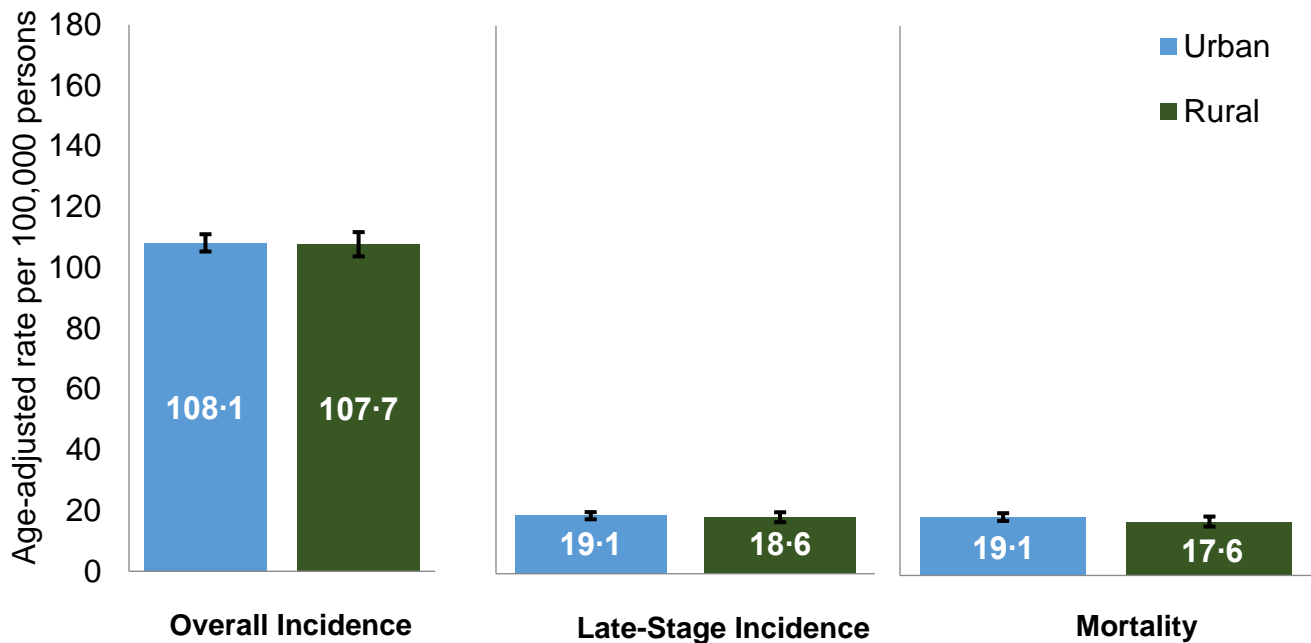


Source: 2013-2017 Kansas Cancer Registry. 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Prostate cancer incidence was defined as ICD-O-3 code C619 (excluding histology codes 9590-9989) with a behavior code indicating invasive malignancy. Prostate cancer mortality was defined as ICD-10 code C61. Hispanics were defined as persons of Mexican, Puerto Rican, Cuban, South or Central American, Other Spanish, Spanish not otherwise specified, or Dominican Republic ethnicity. Persons with Spanish surname only or unknown ethnicity were excluded.

## Prostate Cancer Incidence and Mortality among County Population Density Groups

The age-adjusted prostate cancer overall incidence rate did not differ significantly between Kansas males living in urban counties (108.1 cases per 100,000 persons; 95% CI: 105.3 to 111.0) and Kansas males living in rural counties (107.7 cases per 100,000 persons; 95% CI: 103.7 to 111.7) during the period 2013-2017 (Figure 7-4). Similarly, the age-adjusted prostate cancer late-stage incidence rate did not differ significantly between Kansas males living in urban counties (19.1 cases per 100,000 persons; 95% CI: 17.9 to 20.2) and Kansas males living in rural counties (18.6 cases per 100,000 persons; 95% CI: 16.9 to 20.2) during the period 2013-2017 (Figure 7-4). Additionally, the age-adjusted prostate cancer mortality rate did not differ significantly between Kansas males living in urban counties (19.1 deaths per 100,000 persons; 95% CI: 17.8 to 20.4) and Kansas males living in rural counties (17.6 deaths per 100,000 persons; 95% CI: 16.0 to 19.3) during the period 2014-2018 (Figure 7-4).

**Figure 7-4. Age-adjusted prostate cancer incidence and mortality rates among county population density groups, Kansas 2013-2018**



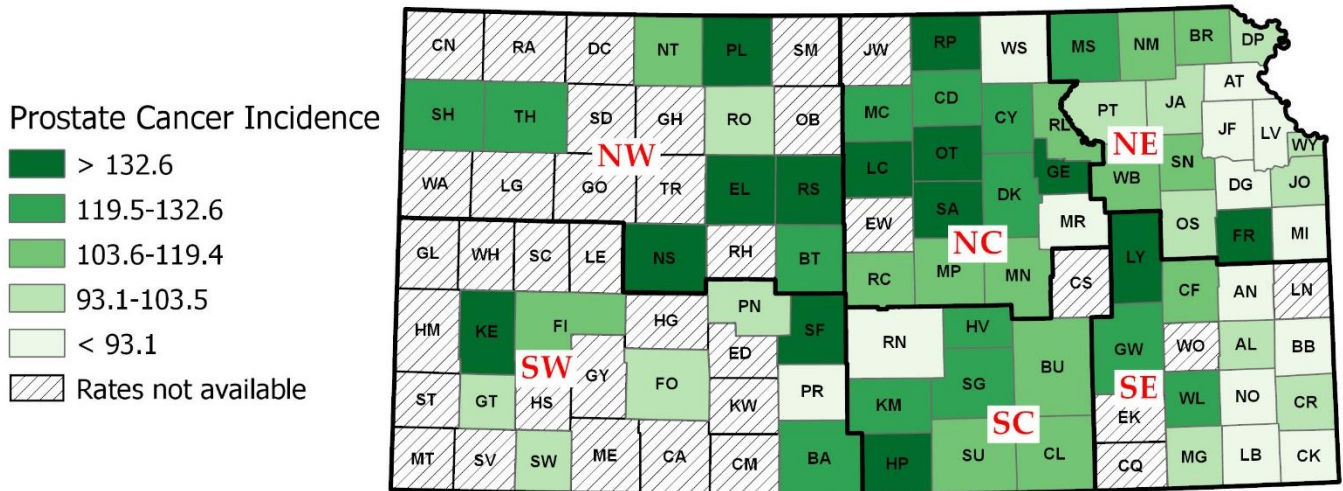
Source: 2013-2017 Kansas Cancer registry. 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. County population density peer groups are based on the population for each county in the 2000 population; the Rural counties included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while the Urban counties included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile). Vertical bars indicate 95% CIs. Cancer mortality was defined as ICD-10 codes C00-C97.



## Prostate Cancer Incidence and Mortality among Kansas Counties

The distribution of the age-adjusted prostate cancer incidence rates by county in Kansas shows that the Ellis, Franklin, Geary, Harper, Kearny, Lincoln, Lyon, Ness, Ottawa, Philips, Republic, Russel, Saline, and Stafford counties represent the highest quantile (the highest 20% of Kansas counties) of the prostate incidence rates in Kansas (Figure 7-5).

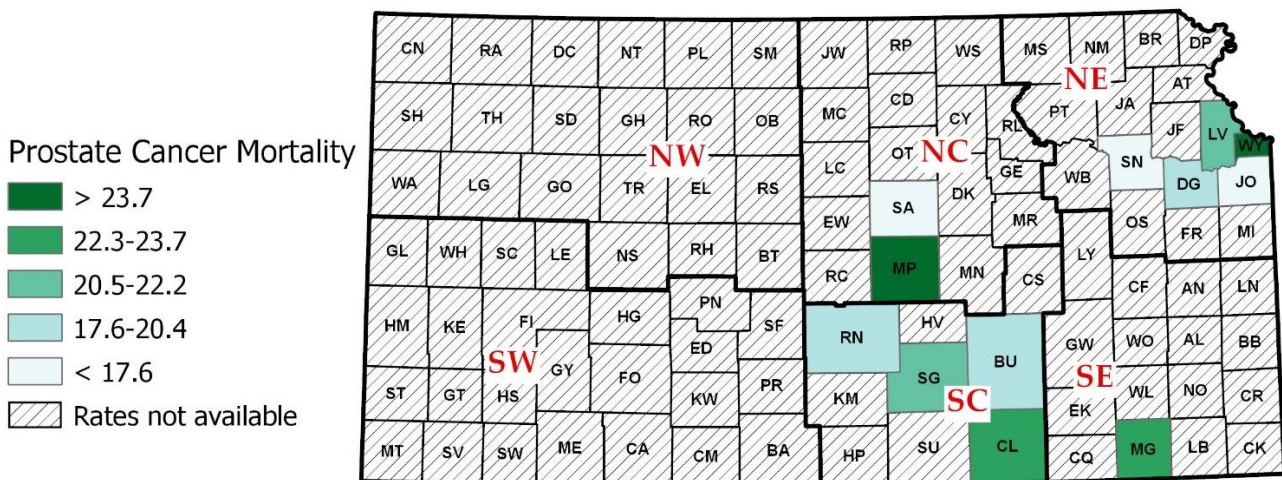
**Figure 7-5. Age-adjusted prostate cancer incidence rates by county, Kansas 2013-2017**



Source: 2013-2017 Kansas Cancer registry, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates are the number of cases per 100,000 persons and they were age-adjusted to the U.S. 2000 standard population using the direct method. The map also shows the boundaries of KDHE district offices.

Regarding the distribution of the age-adjusted prostate cancer mortality rates by county in Kansas, McPherson and Wyandotte counties constitute the highest quantile (the highest 20% of Kansas counties) of the prostate cancer mortality rates in Kansas (Figure 7-6)

**Figure 7-6. Age-adjusted prostate cancer mortality rates by county, Kansas 2014-2018**



Source: 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates are the number of cases per 100,000 persons and they were age-adjusted to the U.S. 2000 standard population using the direct method. The map also shows the boundaries of KDHE district offices.

## CHAPTER 8: PROFILES OF SELECTED CANCERS – MELANOMA OF THE SKIN



Skin cancer is the most common form of cancer in the United States. The two most common types of skin cancer—basal cell and squamous cell carcinomas—are highly curable. Melanoma, the third most common skin cancer, is almost always curable in its early stages, but it is much more likely than basal or squamous cell cancer to spread to other parts of the body if not diagnosed early.<sup>10</sup> About 65–90 percent of melanomas are caused by exposure to ultraviolet (UV) light.<sup>11</sup> UV rays are an invisible kind of radiation that comes from the sun and tanning beds, and can change skin cells.<sup>12</sup>

### Melanoma Incidence and Mortality

Each year, more than 700 melanomas are diagnosed in Kansas, among them about 100 cases were diagnosed in late-stage. In addition, about 90 Kansans die from the disease annually. In Kansas, the age-adjusted melanoma overall incidence rates increased significantly during the period 2008-2017 from 24.1 cases per 100,000 persons (95% Confidence Interval (CI): 22.3 to 25.9) in 2008 to 28.6 cases per 100,000 persons (95% CI: 26.7 to 30.5) in 2017 (Figure 8-1). The average Annual Percent Change (APC) in the lung cancer overall incidence rates in Kansas was +2.1 during the period 2008-2017.

Although the age-adjusted melanoma mortality rate between 2008 (3.0 deaths per 100,000 persons; 95% CI: 2.4 to 3.7) and 2018 (2.4 deaths per 100,000 persons; 95% CI: 1.9 to 2.9) looks similar (Figure 8-1), the APC in the melanoma mortality rates in Kansas was -2.6 during the period 2008-2018.

The age-adjusted melanoma late-stage incidence remained stable during the period 2008-2017 in Kansas, and the rate in 2018 was 3.4 cases per 100,000 persons (95% CI: 2.7 to 4.0) (Figure 8-1).

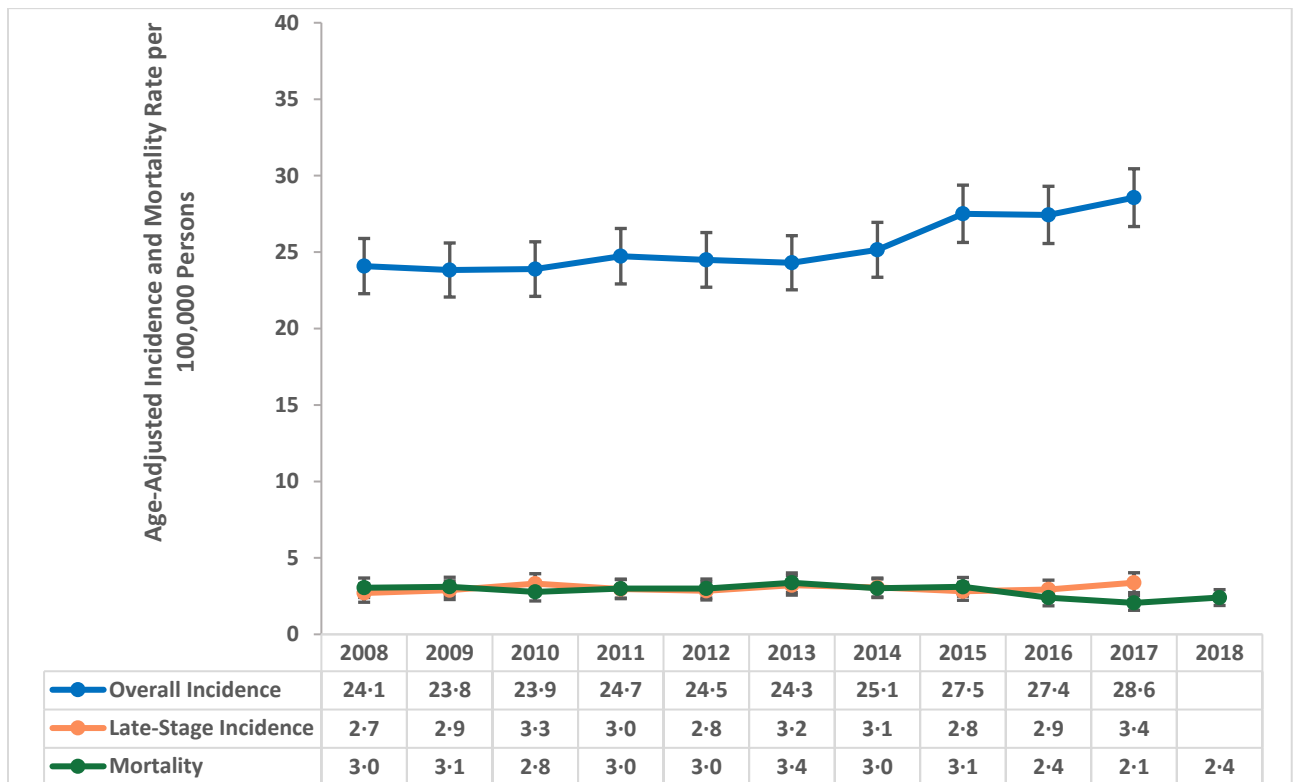
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<sup>10</sup> “Key Statistics for Melanoma Skin Cancer.” American Cancer Society. <https://www.cancer.org/cancer/melanoma-skin-cancer/about/key-statistics.html>. Accessed Sep 6, 2020

<sup>11</sup> Armstrong BK, Kricger A. How much melanoma is caused by sun exposure? *Melanoma Research* 1993;3(6):395–401.

<sup>12</sup> “Basic Information about Skin Cancer.” Division of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention. [www.cdc.gov/cancer/skin/basic\\_info/index.htm](http://www.cdc.gov/cancer/skin/basic_info/index.htm). Accessed Sep 6, 2020

**Figure 8-1. Age-adjusted melanoma incidence and mortality rates, Kansas 2008-2018**

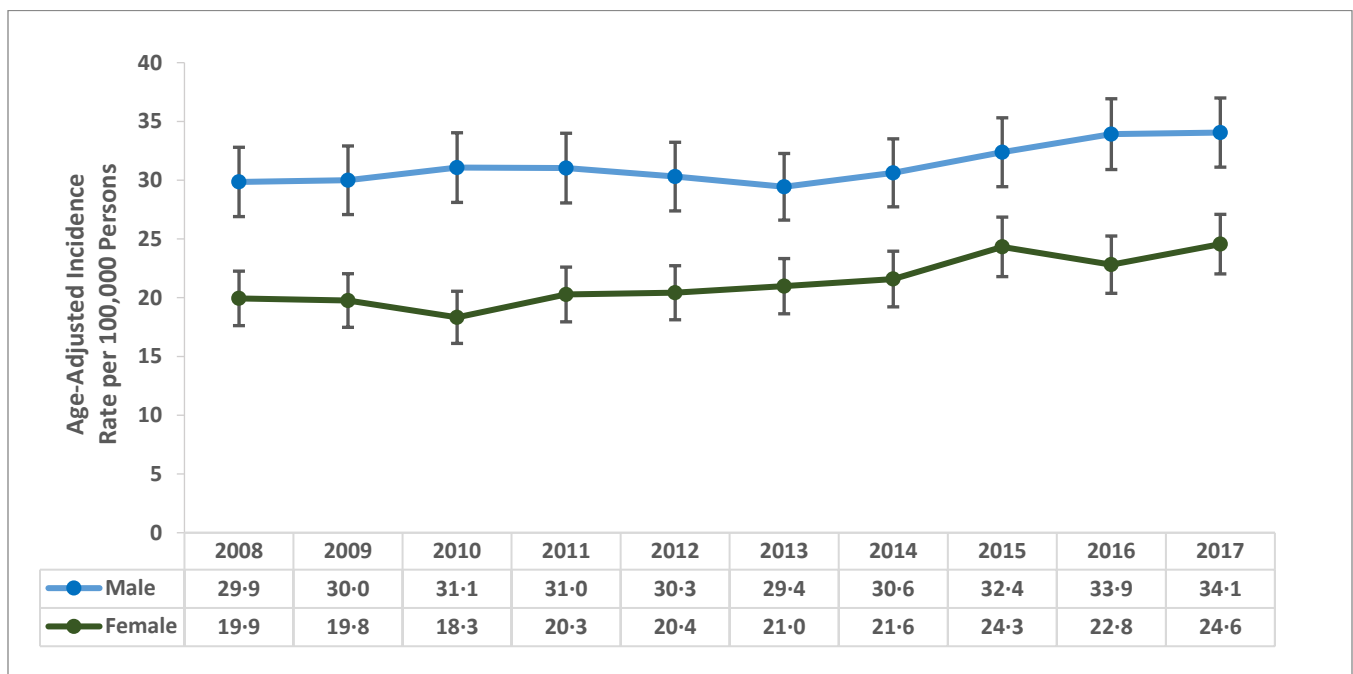


Source: 2008-2017 Kansas Cancer Registry. 2008-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Cancer incidence data for 2009 were not available at the time the document was created. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Melanoma incidence was defined as ICD-O-3 codes C440-449 and histology codes 8720-8780 with a behavior code indicating invasive malignancy. Melanoma mortality was defined as ICD-10 code C43. The average Annual Percent Change (APC) in the annual rates was calculated using the Joinpoint software, see Technical Appendix for more details on trend analysis.

## Melanoma overall Incidence among Gender Groups

The age-adjusted melanoma overall incidence rates were significantly higher for males as compared to females during the period 2008-2017 (Figure 8-2). The melanoma overall incidence rates increased significantly for males during the period 2008-2017 from 29.9 cases per 100,000 males (95% CI: 26.9 to 32.8) in 2008 to 34.1 cases per 100,000 males (95% CI: 31.1 to 37.0) in 2017 (Figure 8-2). The melanoma overall incidence rates increased significantly for females during the period 2008-2017 from 19.9 cases per 100,000 females (95% CI: 17.6 to 22.3) in 2008 to 24.6 cases per 100,000 males (95% CI: 22.0 to 27.1) in 2017 (Figure 8-2). The average Annual Percentage Change (APC) in the melanoma overall incidence rates among Kansas females (+2.8) was double the APC among males (+1.4).

**Figure 8-2. Age-adjusted melanoma overall incidence rates among gender groups, Kansas 2008-2017**

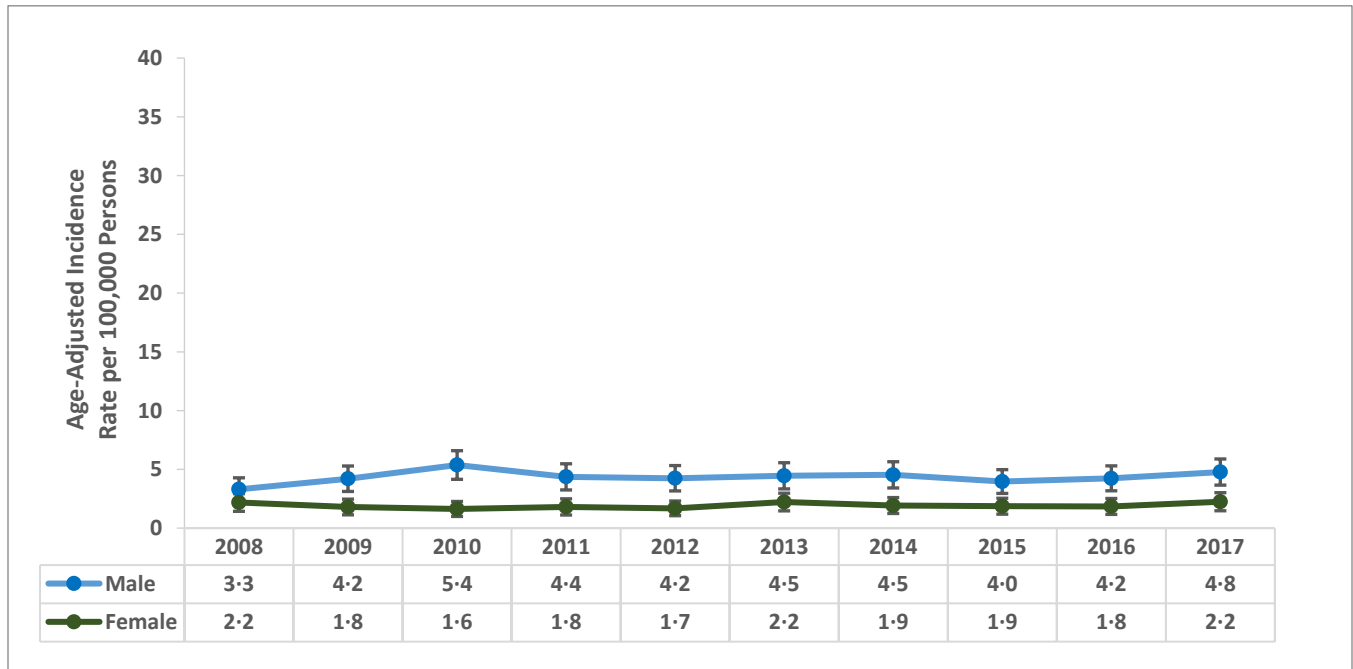


Source: 2008-2017 Kansas Cancer Registry. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Melanoma incidence was defined as ICD-O-3 codes C440-449 and histology codes 8720-8780 with a behavior code indicating invasive malignancy. Melanoma mortality was defined as ICD-10 code C43. The average Annual Percent Change (APC) in the annual rates was calculated using the Joinpoint software; see Technical Appendix for more details on trend analysis.

## Melanoma Late-Stage Incidence among Gender Groups

The age-adjusted melanoma late-stage incidence rates were significantly higher for males as compared to females during the period 2008-2017 (Figure 8-3). The melanoma late-stage incidence rates for both males and females remained stable during the period 2008-2017 in Kansas. In 2017, the melanoma late-stage incidence rate among Kansas males was 4.8 cases per 100,000 males (95% CI: 3.7 to 5.9), and 2.2 cases per 100,000 females (95% CI: 1.5 to 3.0) among Kansas females (Figure 8-3).

**Figure 8-3. Age-adjusted late-stage melanoma incidence rates among gender groups, Kansas 2008-2017**

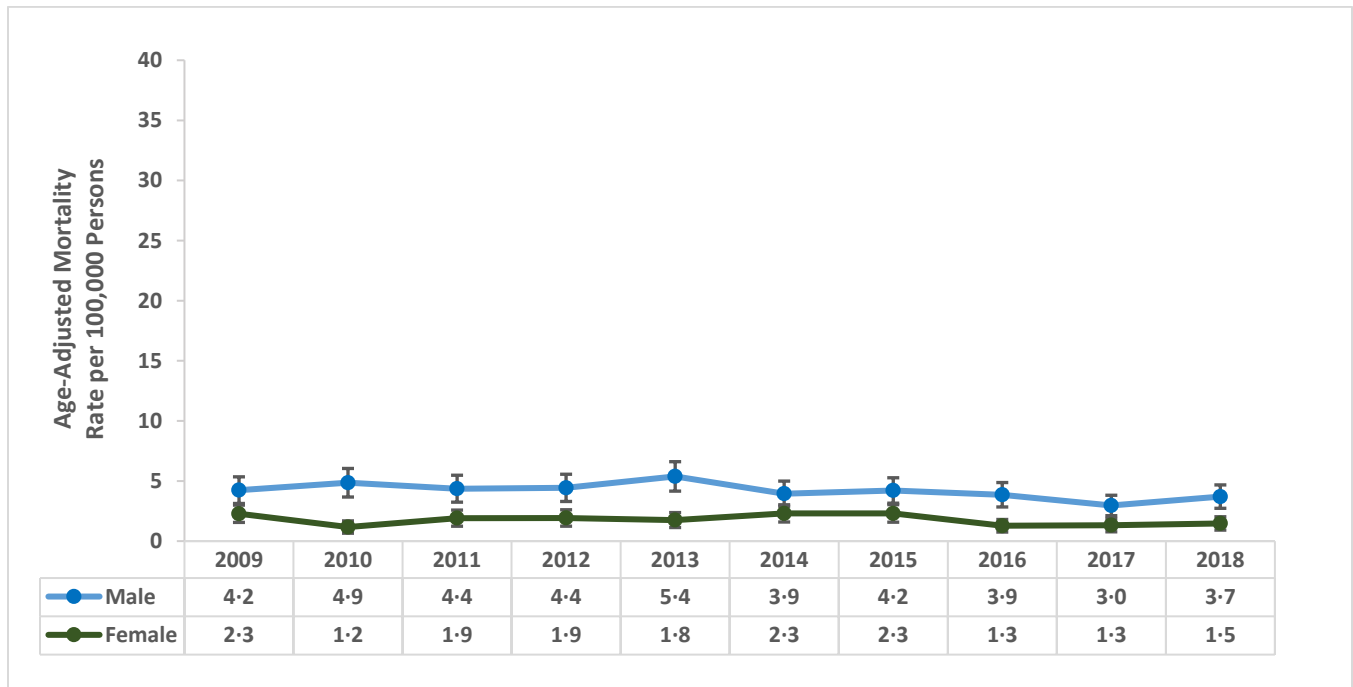


Source: 2008-2017 Kansas Cancer Registry. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Melanoma incidence was defined as ICD-O-3 codes C440-449 and histology codes 8720-8780 with a behavior code indicating invasive malignancy. Melanoma mortality was defined as ICD-10 code C43. The average Annual Percent Change (APC) in the annual rates was calculated using the Joinpoint software, see Technical Appendix for more details on trend analysis.

## Melanoma Mortality among Gender Groups

The age-adjusted melanoma mortality rates were significantly higher for males as compared to females during the period 2009-2018 (Figure 8-4). The melanoma mortality rates remained stable for both males and females from 2009 to 2018. In 2018, the melanoma mortality rate among Kansas males was 3.7 deaths per 100,000 males (95% CI: 2.7 to 4.7), and 1.5 deaths per 100,000 females (95% CI: 0.9 to 2.0) among Kansas females (Figure 8-4).

**Figure 8-4. Age-adjusted melanoma mortality rates among gender groups, Kansas 2009-2018**

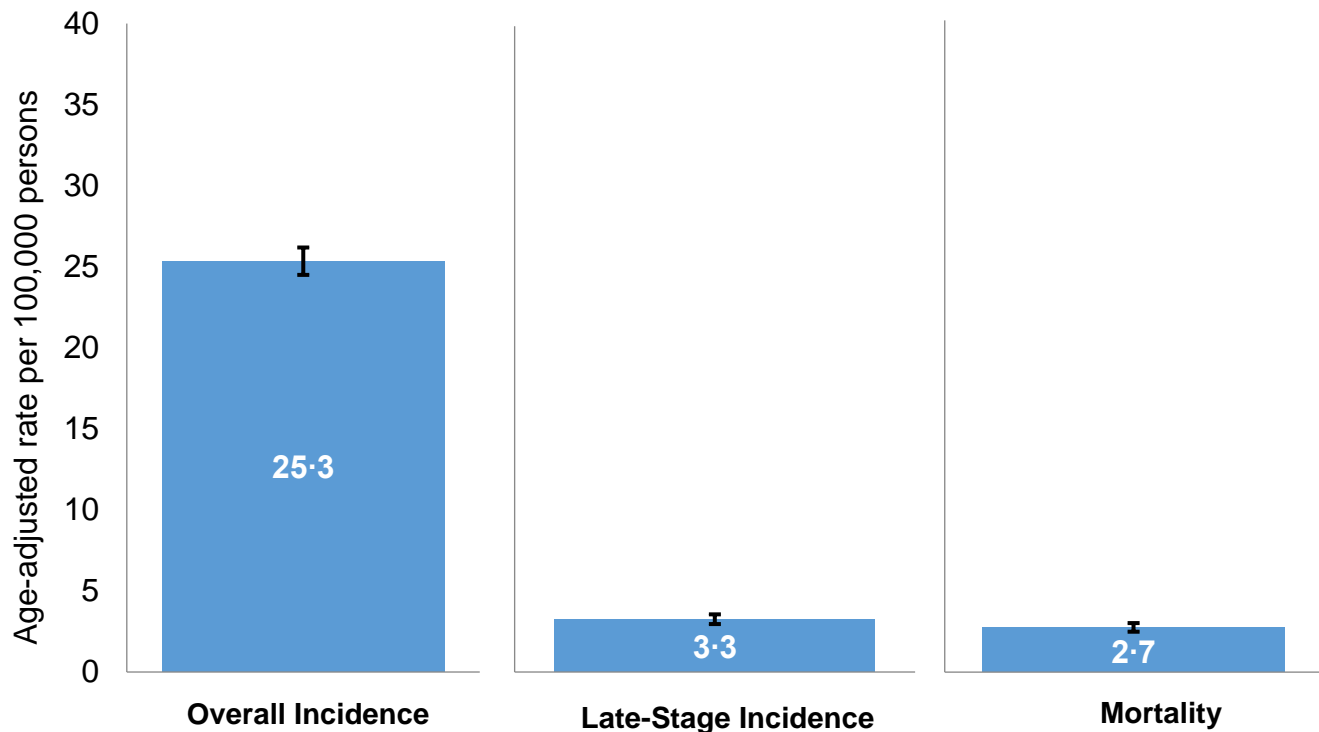


Source: 2009-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Melanoma mortality was defined as ICD-10 code C43. The average Annual Percent Change (APC) in the annual rates was calculated using the Joinpoint software, see Technical Appendix for more details on trend analysis.

## Melanoma Incidence and Mortality among Race Groups

The age-adjusted melanoma overall incidence rate for White Kansans during the period 2013-2017 was 25.3 cases per 100,000 persons; 95% CI: 24.5 to 26.2) (Figure 8-5). In addition, the age-adjusted late-stage melanoma incidence rate for White Kansans during the period 2013-2017 was 3.3 cases per 100,000 persons; 95% CI: 3.0 to 3.6) (Figure 8-5). Also, the age-adjusted melanoma mortality rate for White Kansans was 2.7 deaths per 100,000 persons; 95% CI: 2.5 to 3.0) during the period 2014-2018 (Figure 8-5). Data for African American and other racial group of Kansans are not shown because the number of cases was insufficient for computing a statistically reliable rate for these race groups.

**Figure 8-5. Age-adjusted melanoma incidence and mortality rates among Whites, Kansas 2013-2018**

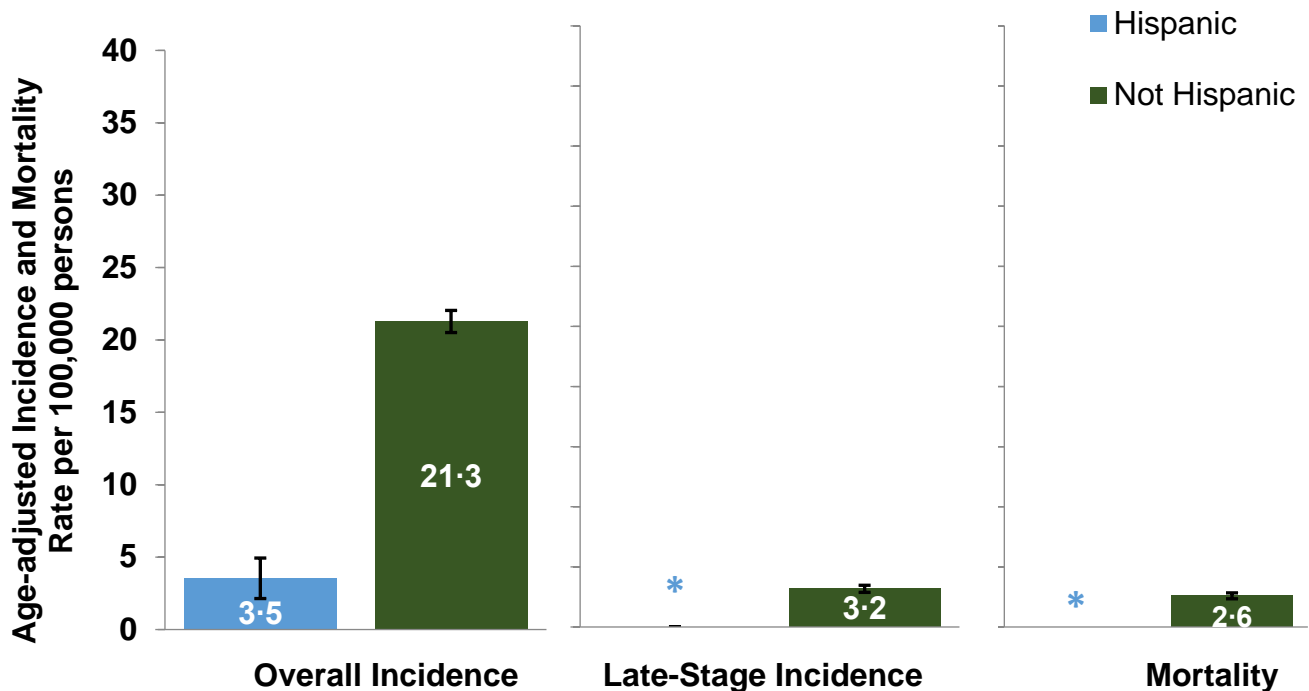


Source: 2013-2017 Kansas Cancer Registry. 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. The rate is not reported for African Americans due to insufficient number of cases. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Melanoma incidence was defined as ICD-O-3 codes C440-449 and histology codes 8720-8780 with a behavior code indicating invasive malignancy. Melanoma mortality was defined as ICD-10 code C43.

## Melanoma Incidence and Mortality among Ethnic Groups

The age-adjusted melanoma overall incidence rate for non-Hispanic Kansans (21.3 cases per 100,000 persons; 95% CI: 20.5 to 22.0) was significantly higher than that rate for Hispanic Kansans (3.5 cases per 100,000 persons; 95% CI: 2.1 to 4.9) during the period 2013-2017 (Figure 8-6). In addition, the age-adjusted melanoma late-stage incidence rate for non-Hispanic Kansans was 3.2 cases per 100,000 persons (95% CI: 2.9 to 3.5) during this period, while the age-adjusted melanoma mortality rate for non-Hispanic Kansans was 2.6 deaths per 100,000 persons (95% CI: 2.3 to 2.8) during this period (Figure 8-6). Data for Hispanic Kansans are not shown for late-stage incidence and mortality because the number of cases was insufficient for computing a statistically reliable rate for this ethnic group. Nationally, the age-adjusted melanoma incidence and mortality rates are about four times higher among non-Hispanics as compared to Hispanics.<sup>13</sup>

**Figure 8-6. Age-adjusted melanoma incidence and mortality rates among ethnic groups, Kansas 2013-2018**



Source: 2013-2017 Kansas Cancer Registry. 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. \* denotes that the rate is not reported due to insufficient number of cases. The rate is not reported for Hispanics due to insufficient number of cases. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. Vertical bars indicate 95% CIs. Melanoma incidence was defined as ICD-O-3 codes C440-449 and histology codes 8720-8780 with a behavior code indicating invasive malignancy. Melanoma mortality was defined as ICD-10 code C43. Hispanics were defined as persons of Mexican, Puerto Rican, Cuban, South or Central American, Other Spanish, Spanish not otherwise specified, or Dominican Republic ethnicity. Persons with Spanish surname only or unknown ethnicity were excluded.

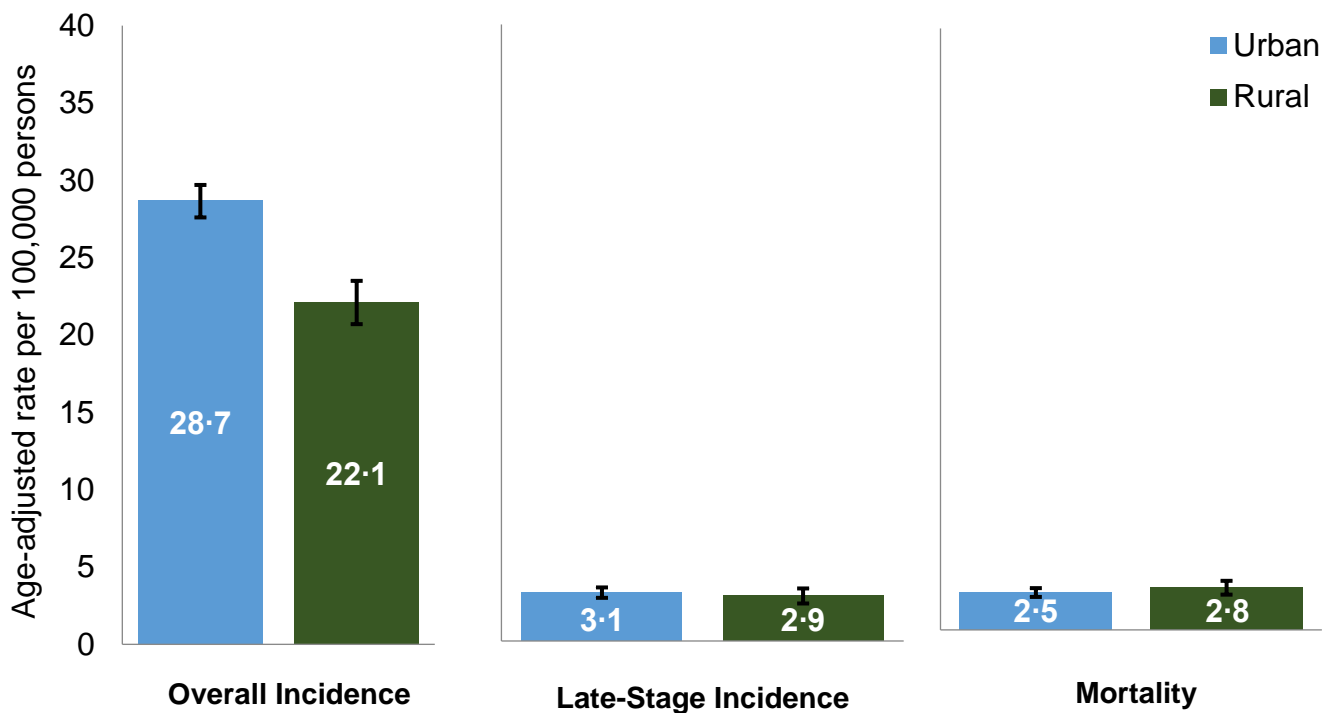
<sup>13</sup> Cancer Stat Facts: Melanoma of the Skin. Surveillance, Epidemiology, and End Results Program. <https://seer.cancer.gov/statfacts/html/melan.html>. Accessed September 6, 2020



## Melanoma Cancer Incidence and Mortality among County Population Density Peer Groups

In Kansas, the age-adjusted melanoma overall incidence rate was significantly higher for Kansans living in urban counties (28.7 cases per 100,000 persons; 95% CI: 27.6 to 29.7) than for Kansans living in rural counties (22.1 cases per 100,000 persons; 95% CI: 20.7 to 23.5) during the period 2013-2017 (Figure 8-7). There were no significant differences between Kansans living in urban or rural counties regarding the age-adjusted melanoma late-stage incidence (during the period 2013-2017) and mortality (during the period 2014-2018) rates (Figure 8-7).

**Figure 8-7. Age-adjusted melanoma incidence and mortality rates among county population density peer groups, Kansas 2013-2018**

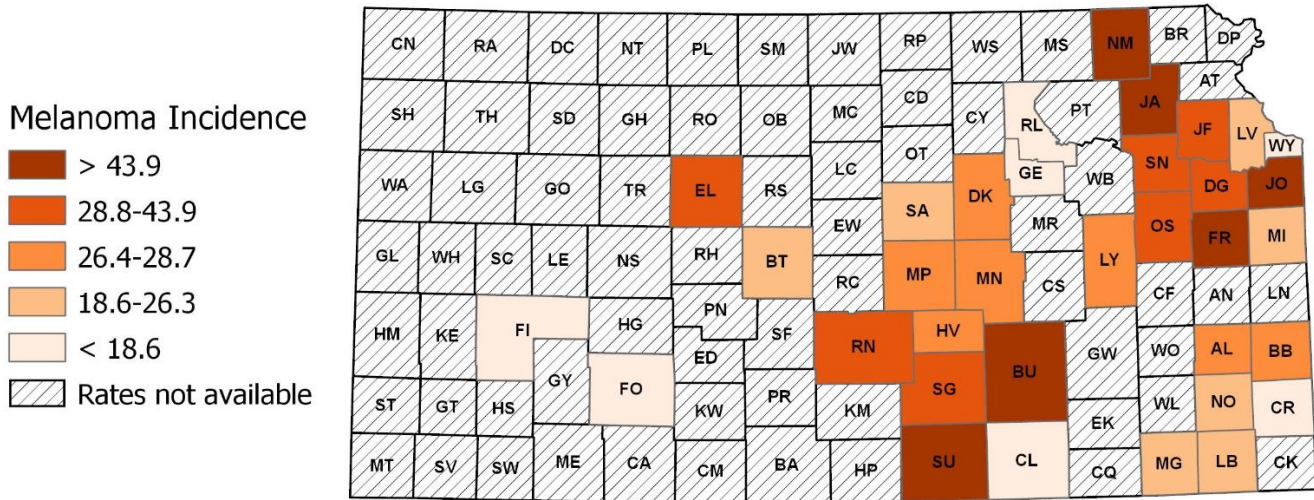


Source: 2013-2017 Kansas Cancer registry. 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates were age-adjusted to the U.S. 2000 standard population using the direct method. See Technical Appendix for details on how rates were calculated. County population density peer groups are based on the population for each county in the 2000 population; the Rural counties included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while the Urban counties included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile). Vertical bars indicate 95% CIs. Cancer mortality was defined as ICD-10 codes C00-C97.

## Melanoma Incidence and Mortality among Kansas Counties

The distribution of the age-adjusted melanoma incidence rates by county in Kansas shows that the Butler, Franklin, Jackson, Johnson, Nemaha, and Sumner counties represent the highest quantile (the highest 20% of Kansas counties) of the melanoma incidence rates in Kansas (Figure 8-8).

**Figure 8-8. Age-adjusted melanoma incidence rates among by county, Kansas 2013-2017**



Source: 2013-2017 Kansas Cancer registry, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates are the number of cases per 100,000 persons and they were age-adjusted to the U.S. 2000 standard population using the direct method. The map also shows the boundaries of KDHE district offices.

Regarding the distribution of the age-adjusted melanoma mortality rates by county in Kansas, the rates are available for three counties only: Johnson, Sedgwick, and Shawnee. The rates were 2.4, 2.5, and 2.5 cases per 100,000 persons, respectively.

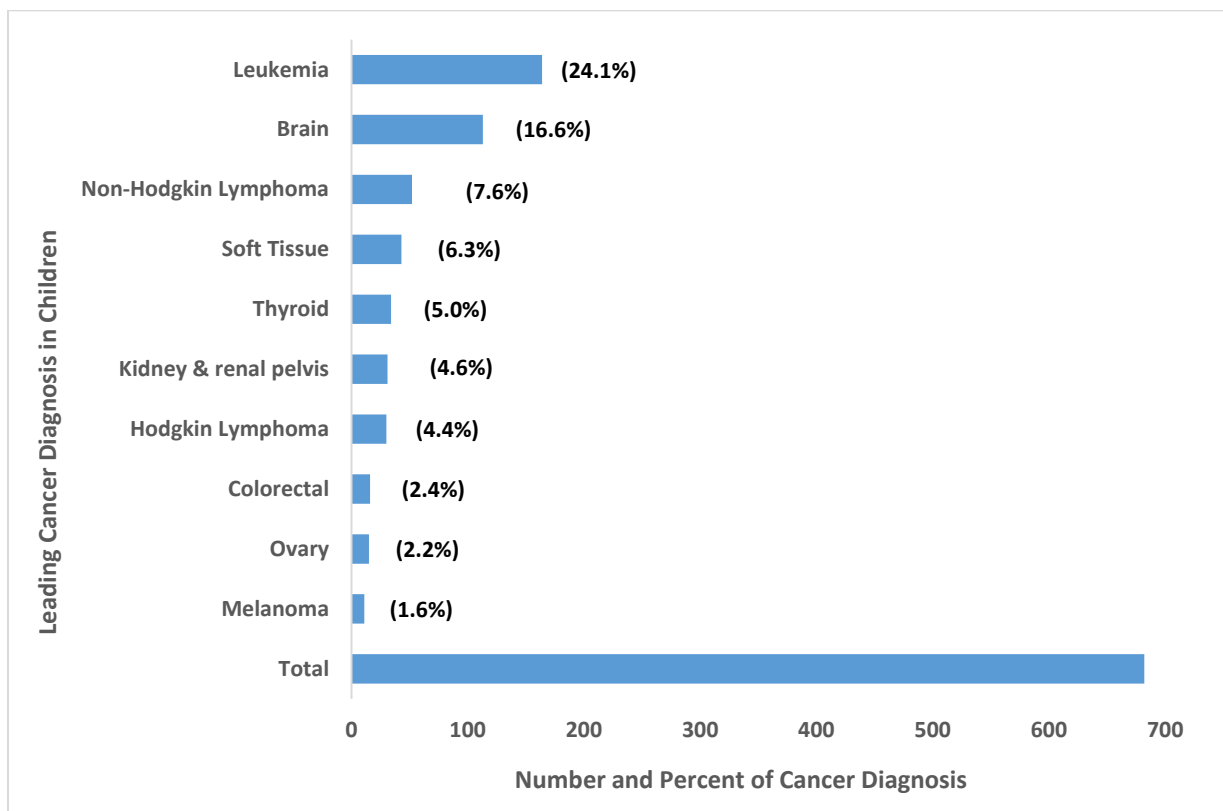
Source: 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. Rates are the number of cases per 100,000 persons and they were age-adjusted to the U.S. 2000 standard population using the direct method.

# Chapter 9: Overall Cancer Incidence and Mortality among Kansas Children

## Cancer incidence in Kansas children

Cancer types among children are different from those among adults. The more common adult cancers of the prostate, breast, lung, colorectum, uterus, and ovary all arise from cells that line cavities or glands. In contrast, childhood cancers are almost entirely leukemias, lymphomas, sarcomas, and cancers of the central nervous system, primarily neoplasms that arise from non-ectodermal tissue such as bone marrow, lymph glands, bone, and muscle.<sup>14</sup> The most commonly diagnosed cancers among Kansas children less than 18 years during the time period 2013-2017 were leukemia (24.1%), brain (16.6%), and thyroid (7.6%) cancer (Figure 9-1).

**Figure 9-1. Top 10 cancer diagnoses among children less than 18 years, Kansas 2013-2017**



Source: 2013-2017 Kansas Cancer Registry. See Technical Appendix for details on how leading cancer diagnoses were defined.

<sup>14</sup> ACS. 2000. Cancer facts and figures, 2000. Atlanta, GA:American Cancer Society.

The age-adjusted incidence rates for overall cancer among children less than 18 years during the period 2008-2017 were significantly higher than the rate during the period 1998-2002 (Table 9-1). The most recent data for Kansas shows a rate of 18.9 cases per 100,000 population (95% confidence interval (CI): 17.5 to 20.3). In the US, the most recent data (2013-2017) shows a rate of 18.9 cases per 100,000 population (95% CI: 18.8 to 19.0) among children 0-19 years.

**Table 9-1. Five-Year Trend in Age-adjusted Overall Cancer Incidence Rates among Children less than 18 years old, 1998-2017 Kansas**

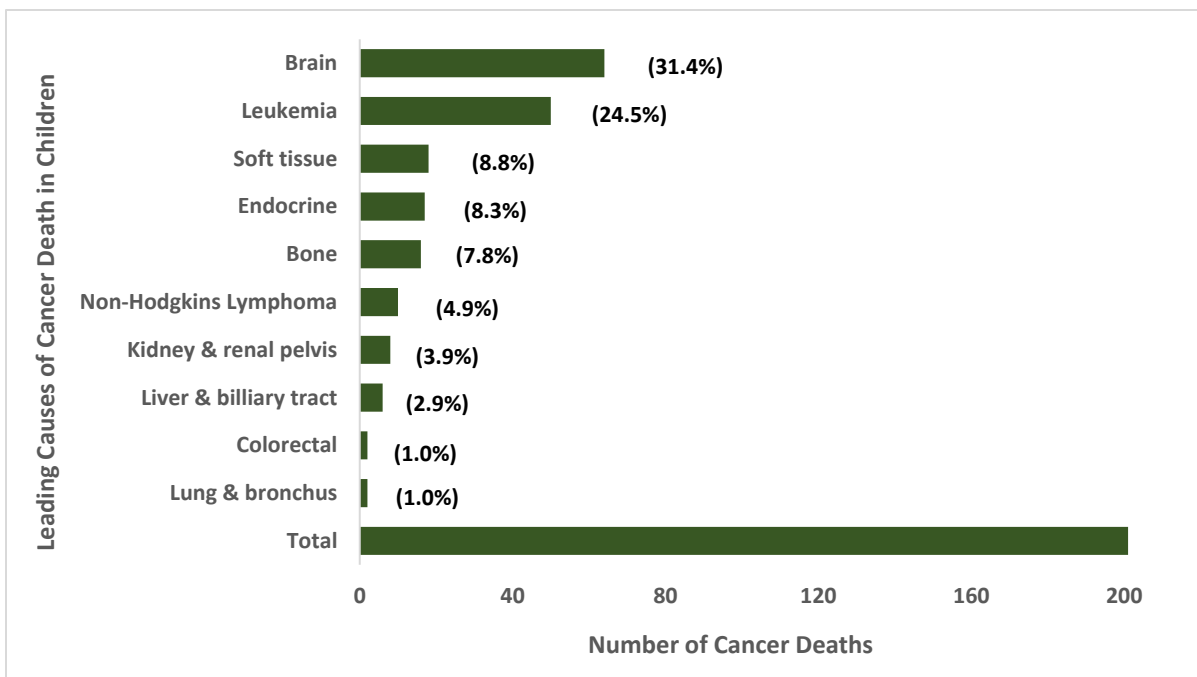
5-Year Interval	Age-adjusted Rate	Lower CL	Upper CL	Standard Error
1998-2002	14.9	13.7	16.2	0.6
2003-2007	16.4	15.1	17.8	0.7
2008-2012	17.8	16.5	19.2	0.7
2013-2017	18.9	17.5	20.3	0.7

Source: 2013-2017 Kansas Cancer Registry. See Technical Appendix for details on how leading cancer diagnoses were defined.

### Cancer deaths in Kansas children

Similar to cancer incidence among children, the leading causes of deaths due to cancer among children are different from adults. Although the leading causes of deaths due to cancer among adults are due to lung and bronchus, colorectal, female breast, and prostate cancers, the leading causes of deaths due to cancer among children are due to brain, leukemia, and Non-Hodgkin’s lymphoma.<sup>15</sup> Brain cancer (31.4%) and leukemia (24.5%) constitute more than half of cancer-related deaths among Kansas children during the period 2014-2018 (Figure 9-2).

**Figure 9-2. Top 10 causes of cancer death among children less than 18 years, Kansas 2014-2018**



Source: 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. See Technical Appendix for details on how leading causes of cancer death were defined.

<sup>15</sup> Siegel RL, Miller KD, Jemal A. 2018. Cancer statistics, 2018. CA Cancer J Clin 68:7-30.

The age-adjusted mortality rate for all cancers among children less than 18 years old has not significantly changed between 1999 and 2018 (Table 9-2). The most recent data for Kansas shows a rate of 2.5 deaths per 100,000 population (95% CI: 2.0 to 3.0). In the US, the most recent data (2013-2017) shows a rate of 2.3 deaths per 100,000 population (95% CI: 2.2 to 2.3) among children 0-19 years.

**Table 9-2. Five-Year Trend in Age-Adjusted Overall Cancer Mortality Rates among Children less than 18 years old, 1999-2018 Kansas**

5-Year Interval	Age-adjusted Rate	Lower CL	Upper CL	Standard Error
1999-2003	2.0	1.6	2.5	0.2
2004-2008	2.4	1.9	2.9	0.3
2009-2013	2.6	2.1	3.2	0.3
2014-2018	2.5	2.0	3.0	0.3

Source: 2014-2018 Kansas Vital Statistics, Bureau of Epidemiology and Public Health Informatics, KDHE. See Technical Appendix for details on how leading causes of cancer death were defined.

## CHAPTER 10: CANCER SCREENING PRACTICES



Cancer screening is the process of undergoing tests or examinations to detect disease in the absence of symptoms. If detected at an early stage, cancer can be treated more effectively, and in the case of cervical and colorectal cancer, prevented from occurring altogether. Recommended guidelines for cancer screening are becoming more individualized, depending on each person's family history, genetics, lifestyle behaviors, and other risk or protective factors. It is more important than ever that clinicians keep abreast of the most recent recommendations from professional

organizations and groups, so they are able to respond to patients' questions about cancer screening.

### National Cancer Screening Recommendations

#### **Lung**

In December 2013, the United States Preventive Services Task Force (USPSTF) recommended annual screening for lung cancer with low-dose computed tomography (LDCT) for asymptomatic persons aged 55 to 80 years who have a 30 pack or more per year smoking history and currently smoke or have quit within the past 15 years.<sup>16</sup> Currently, USPSTF is in the process of updating these guidelines. The American Cancer Society (ACS) has similar guidelines, but its age range is 55 to 74 years. In addition, the high-risk group should receive smoking cessation counseling if they are current smokers; be involved in informed/shared decision making about the benefits, limitation, and harms of screening with LDCT scans; and have access to a high volume, high quality lung cancer screening and treatment center.<sup>17</sup>

#### **Colorectal**

Several screening tests are used to detect polyps and colorectal cancer, including:

- High-sensitivity fecal occult blood test (FOBT), fecal immunochemical test (FIT), and Multitargeted stool DNA test (FIT-DNA) which detect blood in the stool;
- Flexible sigmoidoscopy, an examination by a physician using a short, thin, flexible light to check for polyps and cancer inside the rectum and lower third of the colon; and
- Colonoscopy, an examination by a physician using a longer, flexible, lighted tube to check for polyps or cancer inside the rectum and entire colon.
- Computed Tomography (CT) Colonography, also called a virtual colonoscopy, uses X-rays and computers to produce images of the entire colon, which are displayed on a computer screen for the doctor to analyze.

USPSTF recommends screening for colorectal cancer among adults age 50-75 years using FOBT or FIT annually, FIT-DNA annually or every three years, sigmoidoscopy every 5 years, CT colonography every 5 years, sigmoidoscopy every 10 years combined with annual FIT, or colonoscopy every 10

<sup>16</sup> Moyer VA, Force USPST. 2014. Screening for lung cancer: U.S. Preventive services task force recommendation statement. *Ann Intern Med* 160:330-338.

<sup>17</sup> Wender R, Fontham ET, Barrera E, Jr., Colditz GA, Church TR, Ettinger DS, et al. 2013. American cancer society lung cancer screening guidelines. *CA Cancer J Clin* 63:107-117.

years.<sup>18</sup> USPSTF also recommends that the decision for screening after age 75 should be made on an individual basis. ACS recommends regular screening for colorectal cancer to start at the age of 45. For people ages 76 through 85, the decision to be screened should be based on a person's preferences, life expectancy, overall health, and prior screening history, while people over 85 should no longer get colorectal cancer screening.<sup>19</sup>

## **Breast**

There are three main tests used to screen for breast cancer:

- Mammogram, an x-ray of the breast;
- Breast Magnetic Resonance Imaging (MRI), a breast MRI uses magnets and radio waves to take pictures of the breast.
- Clinical breast exam, an examination by a physician or nurse using their hands to feel a woman's breasts for lumps or other changes; and
- Breast self-exam (awareness), a self-examination where a woman uses her hands to feel her own breasts for lumps or other changes.

Mammograms are considered the best method for detecting breast cancer. The USPSTF recommends biennial (every two years) screening mammography for women aged 50 to 74 years, and for women 40-49 years, the decision to start screening should be an individual one.<sup>20</sup> ACS recommends that women should have the opportunity to begin annual screening between the ages of 40 and 44 years, women aged 45 to 54 years should be screened annually, and women 55 years and older should transition to biennial screening or have the opportunity to continue screening annually.<sup>21</sup>

## **Cervical**

There are two screening tests used to help prevent cervical cancer or detect it early:

- The Pap test (or Pap smear) looks for *precancers*, cell changes on the cervix that might become cervical cancer if they are not treated appropriately.
- The HPV test looks for the virus (human papillomavirus) that can cause these cell changes.

USPSTF recommends women aged 21-65 years receive a Pap test every three years or, for women aged 30 to 65 years, receive primary HPV test (an HPV test that is done by itself for screening) every five years, or HPV-Pap co-testing every five years.<sup>22</sup> ACS recommends that women aged 25 to 65 to receive primary HPV test every 5 years. If primary HPV testing is not available, screening may be done with either a co-test that combines an HPV test with a Pap test every 5 years or a Pap test alone every 3 years.<sup>23</sup>

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<sup>18</sup> Force USPST, Bibbins-Domingo K, Grossman DC, Curry SJ, Davidson KW, Epling JW, Jr., et al. 2016b. Screening for colorectal cancer: Us preventive services task force recommendation statement. *JAMA* 315:2564-2575.

<sup>19</sup> Smith RA, Andrews KS, Brooks D, Fedewa SA, Manassaram-Baptiste D, Saslow D, et al. 2018. Cancer screening in the united states, 2018: A review of current american cancer society guidelines and current issues in cancer screening. *CA Cancer J Clin* 68:297-316.

<sup>20</sup> Siu AL, Force USPST. 2016. Screening for breast cancer: U.S. Preventive services task force recommendation statement. *Ann Intern Med* 164:279-296.

<sup>21</sup> Oeffinger KC, Fontham ET, Etzioni R, Herzig A, Michaelson JS, Shih YC, et al. 2015. Breast cancer screening for women at average risk: 2015 guideline update from the american cancer society. *JAMA* 314:1599-1614.

<sup>22</sup> Force USPST, Curry SJ, Krist AH, Owens DK, Barry MJ, Caughey AB, et al. 2018a. Screening for cervical cancer: Us preventive services task force recommendation statement. *Ibid.* 320:674-686.

<sup>23</sup> Fontham ETH, Wolf AMD, Church TR, Etzioni R, Flowers CR, Herzig A, et al. 2020. Cervical cancer screening for individuals at average risk: 2020 guideline update from the american cancer society. *CA Cancer J Clin*.

## **Prostate**

There are two tests commonly used to screen for prostate cancer:

- Digital rectal exam (DRE), an examination by a doctor or nurse who estimates the size of the prostate and feels for any lumps or other abnormalities; and
- Prostate specific antigen test (PSA), a blood test that measures the level of PSA in the blood.

USPSTF recommends that for men ages 55 to 69, prostate cancer screening is up to the individual, and each man should discuss the potential benefits and harms of screening with his doctor. The USPSTF recommends against PSA-based screening for prostate cancer in men ages 70 and older.<sup>24</sup> ACS has similar recommendations,<sup>25</sup> but they recommend that the discussion about screening should take place at:

- Age 50 for men who are at average risk of prostate cancer and are expected to live at least 10 more years,
- Age 45 for men at high risk of developing prostate cancer, which includes African-Americans and men who have a first-degree relative (parent, offspring, siblings) diagnosed with prostate cancer at an early age, and
- Age 40 for men at even higher risk, those with more than one first-degree relative who had prostate cancer at an early age.

## **Melanoma**

The USPSTF has concluded there is not enough evidence to recommend skin cancer screening (total body examination by a doctor) for most people, but people with a history of skin cancer or those who are at higher risk should talk to their doctor.<sup>26</sup> The USPSTF recommends also that health care providers counsel young adults, adolescents, children, and parents of young children with fair skin about minimizing their UV exposure to lower their risk for skin cancer.<sup>27</sup> ACS does not have guidelines for skin cancer early detection.

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<sup>24</sup> Force USPST, Grossman DC, Curry SJ, Owens DK, Bibbins-Domingo K, Caughey AB, et al. 2018c. Screening for prostate cancer: Us preventive services task force recommendation statement. JAMA 319:1901-1913.

<sup>25</sup> Smith RA, Andrews KS, Brooks D, Fedewa SA, Manassaram-Baptiste D, Saslow D, et al. 2018. Cancer screening in the united states, 2018: A review of current american cancer society guidelines and current issues in cancer screening. CA Cancer J Clin 68:297-316.

<sup>26</sup> Force USPST, Bibbins-Domingo K, Grossman DC, Curry SJ, Davidson KW, Ebell M, et al. 2016a. Screening for skin cancer: Us preventive services task force recommendation statement. JAMA 316:429-435.

<sup>27</sup> Force USPST, Grossman DC, Curry SJ, Owens DK, Barry MJ, Caughey AB, et al. 2018b. Behavioral counseling to prevent skin cancer: Us preventive services task force recommendation statement. Ibid. 319:1134-1142.



## **Lung Cancer Screening: Receiving LDCT for lung cancer screening**

During 2017 and 2019, 13.1 percent (95% Confidence Interval (CI): 9.6% to 16.6%) of Kansans at high-risk for lung cancer (55 to 80 years who have a 30 pack or more per year smoking history and currently smoke or have quit within the past 15 years) <sup>28</sup> received the LDCT for lung cancer screening (Table 10-1).

The percentage of Kansas at high-risk for lung cancer who received LDCT for lung cancer screening did not differ significantly by gender, age group, education, county population density, or disability status. The only significant difference was that the percentage of Kansans at high-risk for lung cancer who received LDCT for lung cancer screening was higher among those whose annual household income was \$25,000 to less than \$35,000 (30.5%; 95% CI: 16.0% to 45.1%) compared to those whose annual household income was \$50,000 or more (8.5%; 95% CI: 3.4% to 13.6%).

Differences in lung cancer screening rate could not be examined by race, ethnicity, and insurance status due to having insufficient numbers needed to calculate the screening rates for some categories in these sociodemographic groupings.

## **Lung Cancer Screening: A health care professional recommended CT scan for lung cancer**

In 2017 and 2019, the high-risk group for lung cancer who did not receive CT for lung cancer early detection was asked if they have been recommended CT scan for lung cancer, but the rates are unstable to present either for the two years separately or combined.

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<sup>28</sup> Moyer VA, Force USPST. 2014. Screening for lung cancer: U.S. Preventive services task force recommendation statement. *Ann Intern Med* 160:330-338.

**Table 10-1. Percentage of lung cancer high-risk adults who had a CT scan for lung and bronchus cancer screening by selected characteristics, Kansas 2017 and 2019\***

Characteristic	Percentage of high-risk adults who had a CT scan for lung cancer screening by selected characteristics	95% Confidence Interval		
			to	
<b>Total</b>	13.1%	9.6%	to	16.6%
<b>Gender</b>				
Male	13.5%	8.8%	to	18.2%
Female	12.6%	7.3%	to	17.8%
<b>Age group</b>				
55-70	11.0%	6.6%	to	15.5%
71-80	16.7%	10.9%	to	22.5%
<b>Race</b>				
White	13.1%	9.4%	to	16.8%
African American**	-	-	-	-
Asian/Pacific Islander**	-	-	-	-
American Indian/Native Alaskan**	-	-	-	-
<b>Ethnicity</b>				
Hispanic	-	-	-	-
Non-Hispanic	13.5%	9.8%	to	17.1%
<b>Education</b>				
Less than high school**	-	-	-	-
High school graduate or GED	10.4%	6.1%	to	14.7%
Some college	15.8%	9.6%	to	22.0%
College graduate	11.0%	4.7%	to	17.3%
<b>Household Income</b>				
Less than \$15,000	-	-	-	-
\$15,000 to \$24,999	11.8%	4.8%	to	18.8%
\$25,000 to \$34,999	30.5%	16.0%	to	45.1%
\$35,000 to \$49,999	12.9%	5.2%	to	20.5%
\$50,000 or higher	8.5%	3.4%	to	13.6%
<b>Insurance Status</b>				
Insured	13.9%	10.1%	to	17.6%
Uninsured*	-	-	-	-
<b>County Population Density</b>				
Rural	10.9%	6.4%	to	15.4%
Urban	14.3%	9.5%	to	19.0%
<b>Disability Status</b>				
Living without a disability	12.1%	7.0%	to	17.2%
Living with a disability	14.5%	9.5%	to	19.4%

\* the high-risk group for lung cancer screening are those aged 55 to 80 years who have a 30 pack or more per year smoking history and currently smoke or have quit within the past 15 years

\*\*Prevalence estimate are unable to be presented due to insufficient counts.

Source: 2019 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. See Technical Appendix for details on how prevalence estimates were calculated. County population density peer groups are based on the population for each county in the 2000 population, where rural group included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while urban included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile)

## Colorectal Cancer Screening: Colonoscopy in the past 10 years

In 2018, 64.6 percent (95% Confidence Interval (CI): 63.1% to 66.2%) of Kansas adults 50-75 years had a colonoscopy in the past 10 years (Table 10-2).

The percentage of Kansans who had a colonoscopy in the last 10 years was significantly lower among Kansans aged 50 to 64 years (60.1%; 95% CI: 58.0% to 62.2%) compared to Kansans aged 65 years and older (73.3%; 95% CI: 71.6% to 75.9%).

The percentage of Kansans 50-75 years who had a colonoscopy in the past 10 years was significantly higher among White (65.7%; 95% CI: 64.1% to 67.3%) compared to other racial groups. The screening rate was also significantly lower among Hispanic (50.2%; 95% CI: 40.7% to 59.7%) compared to non-Hispanic (65.5%; 95% CI: 63.9% to 67.1%) Kansans.

In 2018, there was a trend of having a higher rate of colonoscopy in the past 10 years with increased level of education and more annual household income. The percentage of Kansans 50-75 years who had a colonoscopy in the past 10 years was significantly higher among college graduates (72.9%; 95% CI: 70.7% to 75.1%) compared to those with lower levels of education. In addition, the percentage of Kansans 50-75 years who had a colonoscopy in the past 10 years was significantly lower among those with less than high school (45.8%; 95% CI: 38.2% to 53.4%) compared to those with higher levels of education. Regarding annual household income, the percentage of Kansans 50-75 years who had a colonoscopy in the past 10 years was significantly lower among those whose annual household income was less than \$15,000 (49.1%; 95% CI: 44.3% to 54.0%) compared to those whose annual household income was \$25,000 or higher. In addition, the rate was significantly lower among those whose household income was less than \$25,000 compared to those whose household income was \$35,000 and higher. Furthermore, the rate was significantly lower among those whose household income was less than \$35,000 compared to those whose household income was \$50,000 or higher (71.5%; 95% CI: 69.4% to 73.7%).

The percentage of Kansans 50-75 years who had a colonoscopy was significantly lower among those without health insurance (31.7%; 95% CI: 25.2% to 38.1%) compared to others with health insurance (67.4%; 95% CI: 65.8% to 69.0%). Additionally, the percentage of Kansans 50-75 years who had a colonoscopy was significantly lower among Kansans living in rural counties (60.5%; 95% CI: 57.8% to 63.2%) compared to those living in urban counties (66.6%; 95% CI: 64.6% to 68.5%). In Kansas, the percentage of adults 50-75 years who had a colonoscopy was significantly lower among those living with a disability (61.2%; 95% CI: 58.2% to 64.2%) compared to those living without a disability (66.3%; 95% CI: 64.5% to 68.2%).

The percentage of Kansans 50-75 years who had a colonoscopy in the past 10 years did not differ significantly by gender groups.

**Table 10-2. Percentage of adults 50-75 years who have had a colonoscopy during the past 10 years by selected characteristics, Kansas 2018**

Characteristic	Percentage adults 50-75 years and older who have had a colonoscopy during the past 10 years by selected characteristics	95% Confidence Interval		
			to	
<b>Total</b>	64.6%	63.1%	to	66.2%
<b>Gender</b>				
Male	63.4%	61.0%	to	65.7%
Female	65.8%	63.7%	to	68.0%
<b>Age group</b>				
50-64	60.1%	58.0%	to	62.2%
65-75	73.3%	71.6%	to	75.9%
<b>Race</b>				
White	65.7%	64.1%	to	67.3%
African American	57.3%	48.2%	to	66.3%
American Indian/Native Alaskan	50.8%	35.0%	to	66.7%
Asian/Pacific Islander	37.3%	18.7%	to	55.6%
<b>Ethnicity</b>				
Hispanic	50.2%	40.7%	to	59.7%
Non-Hispanic	65.5%	63.9%	to	67.1%
<b>Education</b>				
Less than high school	45.8%	38.2%	to	53.4%
High school graduate or GED	61.0%	57.9%	to	64.0%
Some college	64.5%	61.7%	to	67.3%
College graduate	72.9%	70.7%	to	75.1%
<b>Household Income</b>				
Less than \$15,000	42.8%	36.4%	to	49.2%
\$15,000 to \$24,999	52.9%	47.6%	to	58.1%
\$25,000 to \$34,999	60.3%	54.8%	to	65.8%
\$35,000 to \$49,999	66.4%	62.3%	to	70.6%
\$50,000 or higher	71.5%	69.4%	to	73.7%
<b>Insurance Status</b>				
Uninsured	31.7%	25.2%	to	38.1%
Insured	67.4%	65.8%	to	69.0%
<b>County Population Density</b>				
Rural	60.5%	57.8%	to	63.2%
Urban	66.6%	64.6%	to	68.5%
<b>Disability Status</b>				
Living with a disability	61.2%	58.2%	to	64.2%
Living without a disability	66.3%	64.5%	to	68.2%

\*Prevalence estimates are unable to be presented due to insufficient counts.

Source: 2018 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. See Technical Appendix for details on how prevalence estimates were calculated. County population density peer groups are based on the population for each county in the 2000 population, where rural group included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while urban included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile).

## Colorectal Cancer Screening: Fecal Occult Blood Test (FOBT) in the past year

In 2018, 6.5 percent (95% Confidence Interval (CI): 5.7% to 7.2%) of Kansas adults 50-75 years have had an FOBT in the past year (Table 10-3).

The percentage of Kansans who have had an FOBT in the past year was significantly lower among Kansans aged 50 to 64 years (4.5%; 95% CI: 3.6% to 5.3%) compared to Kansans aged 65-75 years (10.5%; 95% CI: 9.0% to 11.9%).

However, the percentage of Kansans 50-75 years who had an FOBT in the past year was significantly lower among college graduates (4.7%; 95% CI: 3.8% to 5.7%) when compared with high school graduates (8.2%; 95% CI: 6.7% to 13.4%).

In Kansas, the percentage of adults 50-75 years who had an FOBT in the past year was significantly lower among those living without a disability (5.4%; 95% CI: 4.6% to 6.2%) compared to those living with a disability (8.7%; 95% CI: 7.1% to 10.2%).

In 2018, the percentage of Kansans 50-75 years who had an FOBT in the past year did not differ significantly by race, household income, or the county population density. It was not available to evaluate differences by ethnicity or the insurance status due to the insufficient numbers to calculate the rates in some categories.

The percentage of Kansans who had an FOBT in the past two years did not differ significantly by gender.

**Table 10-3. Percentage of adults 50-75 years and older who have had an FOBT in the past year by selected characteristics, Kansas 2018**

Characteristic	Percentage adults 50-75 years and older who have had an FOBT in the past by selected characteristics	95% Confidence Interval		
<b>Total</b>	6.5%	5.7%	to	7.2%
<b>Gender</b>				
Male	7.2%	6.1%	to	8.3%
Female	5.8%	4.8%	to	6.8%
<b>Age group</b>				
50-64	4.5%	3.6%	to	5.3%
65-75	10.5%	9.0%	to	11.9%
<b>Race</b>				
White	6.5%	5.7%	to	7.3%
African American	5.6%	2.3%	to	9.0%
American Indian/Native Alaskan*	-	-	-	-
Asian/Pacific Islander*	-	-	-	-
<b>Ethnicity</b>				
Hispanic*	-	-	-	-
Non-Hispanic	6.7%	5.9%	to	7.5%
<b>Education</b>				
Less than high school	6.1%	3.0%	to	9.9%
High school graduate or GED	8.2%	6.7%	to	13.4%
Some college	6.9%	5.5%	to	8.2%
College graduate	4.7%	3.8%	to	5.7%
<b>Household Income</b>				
Less than \$15,000	9.0%	5.3%	to	12.8%
\$15,000 to \$24,999	6.3%	4.1%	to	8.4%
\$25,000 to \$34,999	8.1%	5.3%	to	11.0%
\$35,000 to \$49,999	6.6%	4.6%	to	8.6%
\$50,000 or higher	6.0%	5.0%	to	7.1%
<b>Insurance Status</b>				
Uninsured*	-	-	-	-
Insured	6.9%	6.1%	to	7.6%
<b>County Population Density</b>				
Rural	7.0%	5.7%	to	8.3%
Urban	6.2%	5.3%	to	7.1%
<b>Disability Status</b>				
Living without a disability	5.4%	4.6%	to	6.2%
Living with a disability	8.7%	7.1%	to	10.2%

\*Prevalence estimates are unable to be presented due to insufficient counts.

Source: 2018 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. See Technical Appendix for details on how prevalence estimates were calculated. County population density peer groups are based on the population for each county in the 2000 population, where rural group included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while urban included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile).

## Colorectal Cancer Screening: Meeting the U.S. Prevention Services Task Force Recommendations

The U.S. Preventive Services Task Force (USPSTF) recommends screening for colorectal cancer among adults age 50-75 years using FOBT or FIT annually, FIT-DNA annually or every three years, sigmoidoscopy every 5 years, CT colonography every 5 years, sigmoidoscopy every 10 years combined with annual FIT, or colonoscopy every 10 years.<sup>29</sup>

In 2018, 67.3 percent (95% Confidence Interval (CI): 65.7% to 68.8%) of Kansas adults aged 50-75 years old met the USPSTF recommendation for colorectal cancer screening (Table 10-4).

The percentage of Kansans adults who met the USPSTF recommendation for colorectal screening was significantly lower among Kansans aged 50-64 years (62.1%; 95% CI: 60.0% to 64.2%) compared to Kansans aged 65-75 years (77.6%; 95% CI: 75.6% to 79.6%).

In 2018, the percentage of Kansans aged 50-75 years old who met the USPSTF recommendation for colorectal screening was significantly lower among Hispanics (51.5%; 95% CI: 41.9% to 61.0%) compared to Non-Hispanics (65.5; 95% CI: 63.9% to 67.1%).

In 2018, the percentage of Kansans aged 50-75 years old who have met the USPSTF recommendation for colorectal screening were significantly lower among those with education level less than high school, followed by those who were high school graduates, and significantly higher among those who graduated from college, followed by those who attended some college education.

In Kansas, there is a trend of increasing the screening rate of colorectal cancer with increasing the household income, where the lowest percentage of Kansans aged 50-75 years who have met the USPSTF recommendation for colorectal screening was for those whose annual household income was less than \$15,000 (47.0%; 95% CI: 40.5% to 53.6%) and the highest percentage was for those whose annual household income was \$50,000 or more (73.7%; 95% CI: 71.5% to 75.6%).

The percentage of Kansans aged 50-75 years old who have met the USPSTF recommendation for colorectal screening was significantly lower among those without health insurance (32.7%; 95% CI: 26.2% to 39.2%) compared to adults with health insurance (70.2%; 95% CI: 68.6% to 71.7%) in 2018.

The percentage of Kansans aged 50-75 years old who have met the USPSTF recommendation for colorectal screening was significantly lower among Kansans living in rural (63.2%; 95% CI: 60.5% to 65.9%) when compared to those living in urban counties (69.2%; 95% CI: 67.3% to 71.1%).

In Kansas, the percentage of adults aged 50-75 years old who have met the USPSTF recommendation for colorectal screening did not differ significantly by gender, race, or the disability status.

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<sup>29</sup> Force USPST, Bibbins-Domingo K, Grossman DC, Curry SJ, Davidson KW, Epling JW, Jr., et al. 2016b. Screening for colorectal cancer: Us preventive services task force recommendation statement. JAMA 315:2564-2575.

**Table 10-4. Percentage of adults aged 50-75 years old who have met the USPSTF screening guidelines for colorectal cancer, Kansas 2018**

Characteristic	Percentage adults 50-75 years old who have met the USPSTF screening guidelines by selected characteristics	95% Confidence Interval		
			to	
<b>Total</b>	67.3%	65.7%	to	68.8%
<b>Gender</b>				
Male	65.8%	63.5%	to	68.2%
Female	68.6%	66.5%	to	70.7%
<b>Age group</b>				
50-64	62.1%	60.0%	to	64.2%
65-75	77.6%	75.6%	to	79.6%
<b>Race</b>				
White	68.2%	66.6%	to	69.8%
African American	60.3%	51.3%	to	69.3%
American Indian/Native Alaskan	55.2%	39.0%	to	71.3%
Asian/Pacific Islander	43.5%	24.0%	to	63.0%
<b>Ethnicity</b>				
Hispanic	51.5%	41.9%	to	61.0%
Non-Hispanic	65.5%	63.9%	to	67.1%
<b>Education</b>				
Less than high school	49.5%	41.9%	to	57.1%
High school graduate or GED	63.9%	60.9%	to	66.9%
Some college	67.6%	64.9%	to	70.3%
College graduate	74.6%	72.4%	to	76.7%
<b>Household Income</b>				
Less than \$15,000	47.0%	40.5%	to	53.6%
\$15,000 to \$24,999	56.0%	50.7%	to	61.2%
\$25,000 to \$34,999	64.2%	58.8%	to	69.6%
\$35,000 to \$49,999	68.7%	64.6%	to	72.8%
\$50,000 or higher	73.6%	71.5%	to	75.6%
<b>Insurance Status</b>				
Uninsured	32.7%	26.2%	to	39.2%
Insured	70.2%	68.6%	to	71.7%
<b>County Population Density</b>				
Rural	63.2%	60.5%	to	65.9%
Urban	69.2%	67.3%	to	71.1%
<b>Disability Status</b>				
Living with a disability	64.5%	61.5%	to	67.4%
Living without a disability	68.6%	66.8%	to	70.4%

Source: 2018 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. See Technical Appendix for details on how prevalence estimates were calculated. County population density peer groups are based on the population for each county in the 2000 population, where rural group included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while urban included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile).



## Breast Cancer Screening: Having a mammogram within the past two years

In 2018, 69.1 percent (95% Confidence Interval (CI): 67.4% to 70.8%) of Kansas women aged 40 years and older had a mammogram within the past two years (Table 10-5).

The percentage of women who had a mammogram within the past two years was significantly lower among Kansas women aged 40 to 49 years (57.3%; 95% CI: 52.8% to 61.8%) compared to women 50 years and older.

In 2018, there is a trend of increasing the prevalence of breast cancer screening among Kansas women 40 years and older with increased level of education and household income, where the percentage of women 40 years and older who had a mammogram within the past two years was significantly lower among those who did not graduate from high school (55.2%; 95% CI: 46.3% to 64.2%) compared to those who attended some or graduated from college. On the other side, the percentage of women 40 years and older who had a mammogram within the past two years was significantly higher among college graduates (75.3%; 95% CI: 72.9% to 77.8%) compared to those with less education levels.

Regarding the household income, the percentage of women 40 years and older who had a mammogram within the past two years was significantly lower among those whose annual household income was less than \$15,000 (57.2%; 95% CI: 50.3% to 64.1%) compared to those whose annual household income was \$50,000 or higher (77.4%; 95% CI: 75.1% to 79.7%). Additionally, the percentage of women 40 years and older who had a mammogram within the past two years was significantly lower among those whose annual household income was less than \$25,000 compared to those whose annual household income was \$35,000 or higher. On the other hand, the percentage of women 40 years and older who had a mammogram within the past two years was significantly higher among those whose annual household income was \$50,000 or higher (77.4%; 95% CI: 75.1% to 79.7%) compared to those whose annual household income was less than \$50,000.

In Kansas, the percentage of Kansans women 40 years and older who had a mammogram within the past two years was significantly lower among those without health insurance (30.2%; 95% CI: 23.3% to 37.2%) when compared with adults with health insurance (72.3%; 95% CI: 70.6% to 74.0%).

The percentage of women 40 years and older who had a mammogram within the past two years was significantly lower among women with disability (62.3%; 95% CI: 59.1% to 65.5%) compared to women without disability (72.5%; 95% CI: 70.5% to 74.6%).

The percentage of women 40 years and older who had a mammogram within the past two years did not differ significantly by race, ethnicity and county population density.

**Table 10-5. Percentage of women 40 years and older who have had a mammogram within the past two years by selected characteristics, Kansas 2018**

Characteristic	Percentage of women 40 years and older who have had a mammogram within the past two years	95% Confidence Interval		
			to	
<b>Total</b>	69.1%	67.4%	to	70.8%
<b>Age group</b>				
40-49	57.3%	52.8%	to	61.8%
50-64	72.4%	69.9%	to	75.0%
65 and older	73.0%	70.8%	to	75.2%
<b>Race</b>				
White	70.1%	68.4%	to	71.8%
African American	68.7%	59.2%	to	78.2%
American Indian/Alaskan Native	63.4%	47.6%	to	79.2%
Asian/Pacific Islander	49.4%	28.5%	to	70.3%
<b>Ethnicity</b>				
Hispanic	61.8%	51.6%	To	72.1%
Non-Hispanic	69.6%	67.9%	to	71.3%
<b>Education</b>				
Less than high school	55.2%	46.3%	to	64.2%
High school graduate or GED	66.3%	63.1%	to	69.6%
Some college	68.6%	65.6%	to	71.6%
College graduate	75.3%	72.9%	to	77.8%
<b>Household Income</b>				
Less than \$15,000	57.2%	50.3%	to	64.1%
\$15,000 to \$24,999	53.3%	47.9%	to	58.7%
\$25,000 to \$34,999	63.1%	57.7%	to	68.6%
\$35,000 to \$49,999	65.9%	61.0%	to	70.9%
\$50,000 or higher	77.4%	75.1%	to	79.7%
<b>Insurance Status</b>				
Uninsured	30.2%	23.3%	to	37.2%
Insured	72.3%	70.6%	to	74.0%
<b>County Population Density</b>				
Rural	67.3%	64.5%	to	70.1%
Urban	70.0%	67.8%	to	72.1%
<b>Disability Status</b>				
Living with a disability	62.3%	59.1%	to	65.5%
Living without a disability	72.5%	70.5%	to	74.6%

Source: 2018 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. See Technical Appendix for details on how prevalence estimates were calculated. County population density peer groups are based on the population for each county in the 2000 population, where rural group included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while urban included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile).

## Breast Cancer Screening: Discussion with health care providers

Discussing the need for breast cancer screening with health care providers is important, especially if women are at high risk for breast cancer. Some people have an inherited mutation in one or both of BRCA1 and BRCA2 genes that increases their risk of breast cancer. BRCA1 and BRCA2 mutations can be passed to offspring from either parent and can affect the risk of cancers in both women and men. A person who has a BRCA1 or BRCA2 mutation is sometimes called a BRCA1 or BRCA2 carrier. Like other gene mutations, BRCA1 and BRCA2 mutations are rare in the general population. In the United States, about 1 in 400 people have a BRCA1 or BRCA2 mutations, prevalence varies by ethnic group and data is not available for all ethnicities. For BRCA1, the prevalence is 1%, 8-10%, 2-3%, and 4% for African-American, Ashkenazi Jewish, White (non-Ashkenazi Jewish), and Hispanic women, respectively. For BRCA2, the prevalence is 3% and 2% for African-American and White (non-Ashkenazi Jewish) women, respectively.<sup>30</sup> It is important for women to know their own family history of breast cancer and if they need to be tested for the BRCA1 and BRCA2 gene mutations to know their personal risk.

In 2018, 86.5 percent (95% Confidence Interval (CI): 84.7% to 88.3%) of Kansas women 40 years and older had a discussion with their health care provider about screening for breast cancer (Table 10-6).

In 2018, Kansas women 40 years and older who had a discussion with their health care provider about screening for breast cancer was significantly lower among those who did not graduate from high school (76.3%; 95% CI: 66.2% to 86.3%) compared to college graduates (91.9%; 95% CI: 89.8% to 93.9%).

In Kansas, the percentage of women 40 years and older who had a discussion with their health care provider about screening for breast cancer was significantly lower among those whose annual household income was less than \$15,000 (71.1%; 95% CI: 61.8% to 80.4%) compared to those whose annual household income was \$25,000 or higher. And the percentage of women 40 years and older who had a discussion with their health care provider about screening for breast cancer was significantly lower among those whose annual household income was less than \$25,000 compared to those whose annual household income was \$35,000 or higher.

In Kansas, the percentage of women 40 years and older who had a discussion with their health care provider about screening for breast cancer was significantly lower among those without health insurance (67.3%; 95% CI: 56.8% to 77.8%) compared to adults with insurance (87.9%; 95% CI: 86.2% to 89.7%).

In 2018, the percentage of Kansas women 40 years and older who had a discussion with their health care provider about screening for breast cancer was significantly lower among those living with a disability (82.4%; 95% CI: 78.8% to 85.9%) compared to those living without a disability (88.6%; 95% CI: 86.6% to 90.7%).

The percentage of women 40 years and older who had a discussion with their health care provider about screening for breast cancer did not differ significantly by age, race, ethnicity, and county population density.

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<sup>30</sup> Malone KE, Daling JR, Doody DR, Hsu L, Bernstein L, Coates RJ, et al. 2006. Prevalence and predictors of brca1 and brca2 mutations in a population-based study of breast cancer in white and black american women ages 35 to 64 years. *Cancer Res* 66:8297-8308.

**Table 10-6. Percentage of women 40 years and older who have had a discussion with their health care provider about screening for breast cancer by selected characteristics, Kansas 2018**

Characteristic	Percentage of women 40 years and older who had a discussion with their health care provider about screening for breast cancer	95% Confidence Interval		
<b>Total</b>	86.5%	84.7%	to	88.3%
<b>Age group</b>				
40-49	84.5%	79.6%	to	89.4%
50-64	87.7%	85.1%	to	90.3%
65 and older	86.5%	83.9%	to	89.0%
<b>Race</b>				
White	87.5%	85.8%	to	89.3%
African American	77.3%	63.4%	to	91.1%
American Indian/Alaskan Native	66.4%	41.7%	to	91.1%
Asian/Pacific Islander	76.7%	50.2%	to	100.0%
<b>Ethnicity</b>				
Hispanic	84.3%	74.8%	To	93.7%
Non-Hispanic	86.6%	84.8%	to	88.5%
<b>Education</b>				
Less than high school	76.3%	66.2%	to	86.3%
High school graduate or GED	83.4%	79.6%	to	87.1%
Some college	86.2%	83.0%	to	89.4%
College graduate	91.9%	89.8%	to	93.9%
<b>Household Income</b>				
Less than \$15,000	71.1%	61.8%	to	80.4%
\$15,000 to \$24,999	80.1%	74.1%	to	86.1%
\$25,000 to \$34,999	87.4%	81.8%	to	93.0%
\$35,000 to \$49,999	91.2%	87.4%	to	95.0%
\$50,000 or higher	91.7%	89.4%	to	94.0%
<b>Insurance Status</b>				
Uninsured	67.3%	56.8%	to	77.8%
Insured	87.9%	86.2%	to	89.7%
<b>County Population Density</b>				
Rural	86.6%	83.7%	to	89.6%
Urban	86.4%	84.2%	to	88.7%
<b>Disability Status</b>				
Living with a disability	82.4%	78.8%	to	85.9%
Living without a disability	88.6%	86.6%	to	90.7%

Source: 2018 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. See Technical Appendix for details on how prevalence estimates were calculated. County population density peer groups are based on the population for each county in the 2000 population, where rural group included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while urban included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile).

## **Cervical Cancer Screening: Meeting the U.S. Prevention Services Task Force Recommendations**

In 2018, 83.9 percent (95% Confidence Interval (CI): 82.0% to 85.8%) of Kansas women aged 21-65 years old who met the USPSTF recommendation for cervical cancer screening (Table 10-7). USPSTF recommends women aged 21-65 years receive a Pap test every three years or, for women aged 30 to 65 years, receive primary HPV test (an HPV test that is done by itself for screening) every five years, or HPV-Pap co-testing every five years.

In Kansas, the percentage of Kansas women who met the USPSTF recommendation for cervical cancer screening was the lowest among women aged 21 to 30 years (74.5%; 95% CI: 69.5% to 79.6%) compared to women in older age groups. In addition, the percentage of Kansas women who met the USPSTF recommendation for cervical cancer screening was higher among women aged 31 to 40 years old (92.1%; 95% CI: 89.2% to 95.0%) compared to women in the 21 to 30 and 51 to 65 age groups. Furthermore, the screening rate was higher among women aged 41 to 50 years old (89.5%; 95% CI: 86.3% to 92.6%) compared to women aged 21 to 30 and 51 to 65 years old.

In 2018, the percentage of Kansas women aged 21-65 years old who met the USPSTF recommendation for cervical cancer screening was significantly higher among college graduate (89.1%; 95% CI: 86.8% to 91.3%) compared to those who graduated from high school and those who attended some college.

In Kansas, the percentage of women aged 21-65 years old who met the USPSTF recommendation for cervical cancer screening was significantly higher among those whose annual household income was \$50,000 and more (90.8%; 95% CI: 88.8% to 92.8%) compared to those with lower annual household income in 2018.

In 2018, the percentage of Kansas women aged 21-65 years old who met the USPSTF recommendation for cervical cancer screening was significantly lower among those without health insurance (71.0%; 95% CI: 64.0% to 78.0%) when compared with women with health insurance (86.4%; 95% CI: 84.5% to 88.3%).

In addition, the percentage of Kansas women aged 21-65 years old who met the USPSTF recommendation for cervical cancer screening was significantly lower among those living with a disability (78.0%; 95% CI: 73.1% to 82.9%) compared to those living without a disability (85.8%; 95% CI: 83.7% to 87.8%).

The percentage of Kansas women aged 21-65 years old who met the USPSTF recommendation for cervical cancer screening did not differ significantly by race, ethnicity, or county population density subgroups in 2018.

**Table 10-7. Percentage of women 21-65 years old who have had screening for cervical cancer according to USPSTF guidelines by selected characteristics, Kansas 2018**

Characteristic	Percentage of women 21-65 years old who had screening for cervical cancer according to USPSTF guidelines	95% Confidence Interval		
			to	
<b>Total</b>	83.9%	82.0%	to	85.8%
<b>Age group</b>				
21-30	74.5%	69.5%	to	79.6%
31-40	92.1%	89.2%	to	95.0%
41-50	89.5%	86.3%	to	92.6%
51-65	82.2%	80.1%	to	85.6%
<b>Race and Ethnicity</b>				
White	84.2%	82.1%	to	86.2%
African American	90.3%	83.8%	to	96.8%
American Indian/Alaskan Native	81.1%	64.6%	to	97.6%
Asian/Pacific Islander	68.1%	49.3%	to	86.3%
<b>Ethnicity</b>				
Hispanic	79.3%	71.2%	to	87.4%
Non-Hispanic	84.7%	82.7%	to	86.6%
<b>Education</b>				
Less than high school	78.8%	67.7%	to	89.9%
High school graduate or GED	80.6%	76.1%	to	85.0%
Some college	81.9%	78.3%	to	85.5%
College graduate	89.1%	86.8%	to	91.3%
<b>Household Income</b>				
Less than \$15,000	74.7%	66.1%	to	83.2%
\$15,000 to \$24,999	78.9%	73.0%	to	84.9%
\$25,000 to \$34,999	82.5%	76.3%	to	88.6%
\$35,000 to \$49,999	82.3%	76.7%	to	87.9%
\$50,000 or higher	90.8%	88.8%	to	92.8%
<b>Insurance Status</b>				
Uninsured	71.0%	64.0%	to	78.0%
Insured	86.4%	84.5%	to	88.3%
<b>County Population Density</b>				
Rural	79.8%	76.0%	to	83.6%
Urban	85.5%	83.3%	to	87.8%
<b>Disability Status</b>				
Living with a disability	78.0%	73.1%	to	82.9%
Living without a disability	85.8%	83.7%	to	87.8%

Source: 2018 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. See Technical Appendix for details on how prevalence estimates were calculated. County population density peer groups are based on the population for each county in the 2000 population, where rural group included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while urban included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile).

## Prostate Cancer Screening: Having a PSA test within the past two years

In 2018, 32.9 percent (95% Confidence Interval (CI): 31.1% to 34.7%) of Kansas men aged 40 years and older had a PSA test within the past two years (Table 10-8).

The percentage of men who had a PSA test within the past two years was significantly lower among Kansas men aged 40 to 49 years (9.1%; 95% CI: 6.3% to 11.9%), followed by the age group of 50 to 64 (31.2%; 95% CI: 28.4% to 34.1%), and was significantly higher among men aged 65 years and older (54.7%; 95% CI: 51.7% to 57.7%).

The percentage of men aged 40 years and older who had a PSA test within the past two years was significantly higher among White (34.5%; 95% CI: 32.6% to 36.4%) when compared with other racial subgroups in 2018. In addition, the percentage of men aged 40 years and older who had a PSA test within the past two years was significantly lower among Hispanics (18.1%; 95% CI: 9.6% to 26.7%) compared to non-Hispanics (33.9%; 95% CI: 32.0% to 35.7%) in 2018.

In 2018, the percentage of men aged 40 years and older who had a PSA test within the past two years was significantly higher among college graduates (42.6%; 95% CI: 39.6% to 45.5%) as compared to those who attained lower levels of education.

The percentage of men aged 40 years and older who had a PSA test within the past two years was significantly lower among those whose annual household income was less than \$15,000 (16.6%; 95% CI: 10.1% to 22.1%) compared to those whose annual household income was \$25,000 and more. In addition, the percentage of men aged 40 years and older who had a PSA test within the past two years was significantly lower among those whose annual household income was less than \$25,000 compared to those whose annual household income was \$35,000 and more.

In Kansas, the percentage of men aged 40 years and older who had a PSA test within the past two years was significantly lower among adults without health insurance (7.1%; 95% CI: 4.0% to 10.1%) when compared with those with health insurance (35.6%; 95% CI: 33.6% to 37.5%).

The percentage of men aged 40 years and older who had a PSA test within the past two years did not differ significantly by county population density or disability status subgroups.

**Table 10-8. Percentage of men 40 years and older who have had a PSA test within the past two years by selected characteristics, Kansas 2018**

Characteristic	Percentage of men 40 years and older who have had a PSA test within the past two years	95% Confidence Interval		
<b>Total</b>	32.9%	31.1%	to	34.7%
<b>Age group</b>				
40-49	9.1%	6.3%	to	11.9%
50-64	31.2%	28.4%	to	34.1%
65 and older	54.7%	51.7%	to	57.7%
<b>Race</b>				
White	34.5%	32.6%	to	36.4%
African American	21.1%	13.1%	to	29.2%
American Indian/Alaskan Native	19.8%	7.4%	to	32.2%
Asian/Pacific Islander*	-	-	-	-
<b>Ethnicity</b>				
Hispanic	18.1%	9.6%	to	26.7%
Non-Hispanic	33.9%	32.0%	to	35.7%
<b>Education</b>				
Less than high school	25.1%	18.1%	to	32.0%
High school graduate or GED	26.6%	23.4%	to	29.9%
Some college	30.9%	27.5%	to	34.3%
College graduate	42.6%	39.6%	to	45.5%
<b>Household Income</b>				
Less than \$15,000	16.6%	10.1%	to	22.1%
\$15,000 to \$24,999	21.8%	16.9%	to	26.6%
\$25,000 to \$34,999	31.8%	25.5%	to	38.1%
\$35,000 to \$49,999	39.1%	34.1%	to	44.3%
\$50,000 or higher	36.0%	33.5%	to	38.6%
<b>Insurance Status</b>				
Uninsured	7.1%	4.0%	to	10.1%
Insured	35.6%	33.6%	to	37.5%
<b>County Population Density</b>				
Rural	35.7%	32.5%	to	38.9%
Urban	31.6%	29.3%	to	33.8%
<b>Disability Status</b>				
Living with a disability	34.2%	30.9%	to	37.5%
Living without a disability	32.4%	30.2%	to	34.6%

\*Prevalence estimate are unable to be presented due to insufficient counts Source: 2018 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. See Technical Appendix for details on how prevalence estimates were calculated. County population density peer groups are based on the population for each county in the 2000 population, where rural group included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while urban included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile).



# CHAPTER 11: CANCER RISK AND PROTECTIVE FACTORS

## Environmental Exposures and Cancer

Exposures to natural and manufactured substances in the environment are estimated to account for at least two-thirds of all cases of cancer in the United States. These environmental factors include lifestyle choices such as: smoking, excessive alcohol consumption, poor diet, lack of exercise, and exposure to certain medical drugs and hormones. Other environmental factors include excessive exposure to sunlight, viruses (e.g., Human Papilloma Virus, HPV), bacteria, and chemicals that may be present in the air, water, food, and the workplace. Chemicals are classified according to research studies that evaluate whether they are carcinogens (cancer-causing substances).<sup>31</sup>

Different environmental exposures are linked to specific kinds of cancer. For example, exposure to asbestos is linked primarily to lung cancer, whereas exposure to benzidine, a chemical found in certain dyes, is associated with bladder cancer. In contrast, smoking is linked to cancers of the lung, bladder, mouth, colon, kidney, throat, voice box, esophagus, lip, stomach, cervix, liver, and pancreas. In this chapter of the burden document, the most common types of these environmental factors will be discussed, i.e., smoking, radon, obesity, consuming fruits and vegetables, physical activity, HPV vaccination, and exposure to ultraviolet radiation.<sup>32</sup>

## Smoking

Smoking is the major cause of lung cancer in the United States. About 90 percent of lung cancer deaths in men and almost 80 percent of lung cancer deaths in women in the U.S. are due to smoking. Smoking also causes several other cancers, including cancer of the bladder, cervix, esophagus, kidney, larynx, oral cavity, pancreas, throat and stomach, as well as acute myeloid leukemia.<sup>33</sup>



## Smoking among Kansas Adults

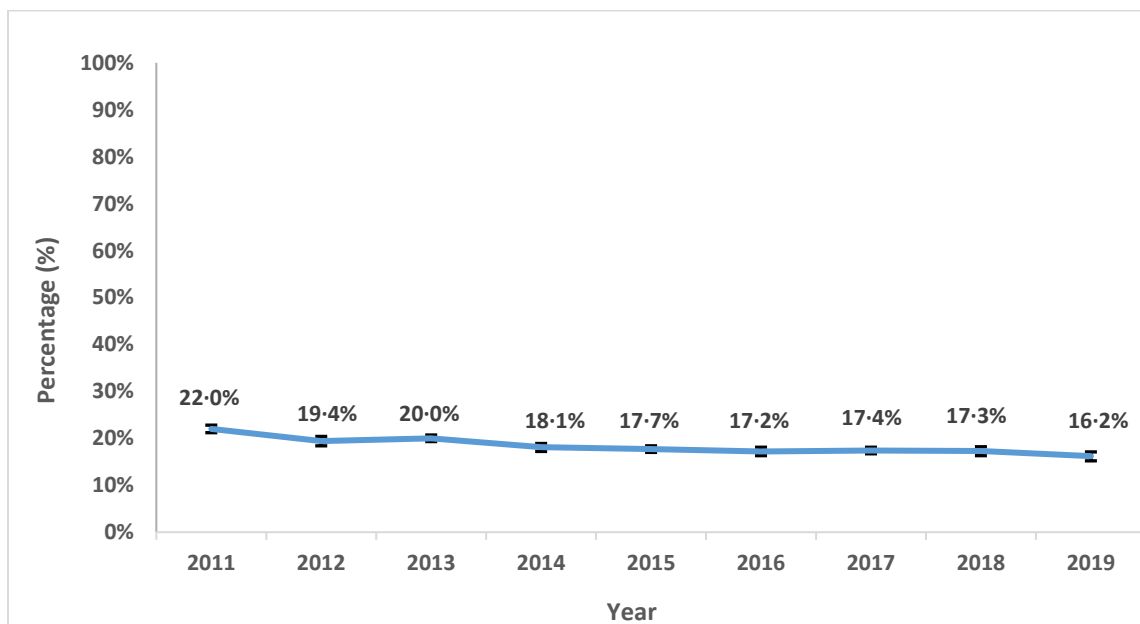
In 2019, 16.2 percent (95% Confidence Interval (CI): 15.2% to 17.1%) of Kansas adults 18 years and older were current smokers (Table 11-1, Figure 11-1). The trend analysis of smoking prevalence among Kansas adults over the years showed that the percent of the current smokers significantly decreased annually by an average of 3.5% from 2011 to 2019.

<sup>31</sup> NIH. 2003. Cancer and the environment: What you need to, what you can do. Bethesda, MD:National Institute of Health.

<sup>32</sup> Parsa N. 2012. Environmental factors inducing human cancers. Iran J Public Health 41:1-9.

<sup>33</sup> CDC. 2010. How tobacco smoke causes disease: The biology and behavioral basis for smoking-attributable disease: A report of the surgeon general. Atlanta (GA): Centers for Disease Control and Prevention (US); Centers for Disease Control and Prevention (US); National Center for Chronic Disease Prevention and Health Promotion (US); Office on Smoking and Health (US).

**Figure 11-1. Percentage of adults 18 years and older who are current smokers, Kansas 2011-2019.**



Source: 2011-2019 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Department of Health and Environment. Vertical bars indicate 95% CIs.

The percentage of Kansans who were current smokers in 2019 was significantly higher among Kansans aged 35 to 44 years (21.6%; 95% CI: 19.0% to 24.3%) and adults aged 25 to 34 years (20.9%; 95% CI: 18.2% to 23.6%) compared to adults aged 18 to 24 years (13.1%; 95% CI: 9.8% to 16.5%) and 65 years and older (8.3%; 95% CI: 7.3% to 9.3%). The percentage of current smokers was also higher among adults aged 45 to 64 years (17.6%; 95% CI: 16.1% to 19.0%) compared to adults aged 65 years and older. However, the percentage of Kansans who were current smokers was significantly lower among Kansans aged 65 years and older as compared to other age groups (Table 11-1).

The percentage of Kansans 18 years and older who were current smokers was significantly higher among American Indian/Alaskan Native (38.7%; 95% CI: 27.9% to 49.5%) compared to other race groups.

In 2018, the percentage of Kansans 18 years and older who were current smokers was significantly lower among college graduates (6.5%; 95% CI: 5.6% to 7.3%) compared to those who attained lower levels of education. On the other side, the percentage of Kansans 18 years and older who were current smokers was significantly higher among those who did not graduate from high school (34.5%; 95% CI: 29.0% to 39.9%) compared to those who attained higher levels of education.

The percentage of Kansans 18 years and older who were current smokers was significantly lower among those whose annual household income was \$50,000 or higher (10.9%; 95% CI: 9.7% to 12.0%) compared to those with lower household income. Furthermore, the percentage of Kansans 18 years and older who were current smokers was significantly higher among those whose annual household income was less than \$15,000 (38.7%; 95% CI: 33.5% to 44.0%) compared to those with higher household income. The percentage of Kansans 18 years and older who were current smokers was also significantly higher among those whose annual household income was \$15,000 to \$24,999 (25.3%; 95% CI: 21.7% to 28.8%) compared to those whose household income was \$35,000 to \$49,999 (15.8%; 95% CI: 13.4% to 18.2%).

In Kansas, the percentage of adults 18 years and older who were current smokers was significantly higher among those living with a disability (26.9%; 95% CI: 24.6% to 29.1%) compared to those living without a disability (12.2%; 95% CI: 11.2% to 16.6%).

The percentage of Kansans 18 years and older who were current smokers did not differ significantly by gender, ethnicity and county population density subgroups.

### **Smoking among Kansas Adults with and without History of Cancer Diagnosis**

In 2019, the percent (13.8%; 95% CI: 11.7% to 15.9%) of current cigarette smokers among Kansas adults 18 years and older ever diagnosed with cancer did not differ significantly from that percent (16.5%; 95% CI: 15.5% to 17.6%) among Kansas adults with no history of cancer diagnosis.

### **Smoking among Kansas Adolescents**

In 2019, approximately 6 percent (5.8%; 95% CI: 4.4% to 7.7%) of Kansas high school students in grades 9-12 currently smoked cigarettes.<sup>34</sup> The percentage of Kansas high school students in grades 9-12 who currently smoked cigarettes did not differ significantly by gender groups. The percentage of high school students in grade 9-12 (males, females, or both) who currently smoked cigarettes did not differ significantly by race/ethnic groups or by students' grades.

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<sup>34</sup> YRBS. 2017a. Kansas 2017 results. Youth Risk Behavior Surveillance System. <https://nccd.cdc.gov/Youthonline/App/Results.aspx?LID=KS>. Accessed on August 18, 2010.

**Table 11-1. Percentage of adults 18 years and older who are current smokers, by selected characteristics, Kansas 2019**

<b>Characteristic</b>	<b>Percentage of adults 18 years and older who are current smokers</b>	<b>95% Confidence Interval</b>		
<b>Total</b>	16.2%	15.2%	to	17.1%
<b>Gender</b>				
Male	16.4%	15.1%	to	17.7%
Female	16.0%	14.7%	to	17.3%
<b>Age Group</b>				
18-24	13.1%	9.8%	to	16.5%
25-34	20.9%	18.2%	to	23.6%
35-44	21.6%	19.0%	to	24.3%
45-64	17.6%	16.1%	to	19.0%
65 and older	8.3%	7.3%	to	9.3%
<b>Race</b>				
White	15.2%	14.3%	to	16.2%
African American	20.8%	16.1%	to	25.6%
American Indian/Alaskan Native	38.7%	27.9%	to	49.5%
Asian/Pacific Islander	12.7%	4.5%	to	21.0%
<b>Ethnicity</b>				
Hispanic	16.6%	12.4%	to	20.7%
Non-Hispanic	16.1%	15.2%	to	17.1%
<b>Education</b>				
Less than high school	34.5%	29.0%	to	39.9%
High school graduate or GED	19.7%	17.9%	to	21.4%
Some College	16.6%	15.1%	to	18.1%
College Graduate	6.5%	5.6%	to	7.3%
<b>Household Income</b>				
Less than \$15,000	38.7%	33.5%	to	44.0%
\$15,000 to \$24,999	25.3%	21.7%	to	28.8%
\$25,000 to \$34,999	20.1%	16.9%	to	23.3%
\$35,000 to \$49,999	15.8%	13.4%	to	18.2%
\$50,000 or higher	10.9%	9.7%	to	12.0%
<b>County Population Density</b>				
Rural	16.9%	15.3%	to	18.6%
Urban	15.9%	14.8%	to	17.0%
<b>Disability Status</b>				
Living with a disability	26.9%	24.6%	to	29.1%
Living without a disability	12.2%	11.2%	to	13.1%

Source: 2019 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. See Technical Appendix for details on how prevalence estimates were calculated. County population density peer groups are based on the population for each county in the 2000 population, where rural group included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while urban included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile).

## Smokeless Tobacco Use

Smokeless tobacco includes chewing tobacco, which is placed between the cheek and gums, and snuff, which can be placed between the cheek or lip and gums or taken orally or inhaled through the nostrils. Newer smokeless tobacco products include lozenges, tablets, tabs, strips, and sticks. Smokeless tobacco is known to cause oral, esophageal, and pancreatic cancer.<sup>35</sup>

### Smokeless Tobacco Use among Kansas Adults

During 2018-2019, 5.4 percentage of Kansas adults 18 years and older used smokeless tobacco products (95% Confidence Interval (CI): 5.0% to 5.8%) (Table 11-2). Due to the relatively low smokeless tobacco use among females in Kansas, two years of data were combined to maximize sample size and to allow for descriptive analyses by selected characteristics.

In Kansas, the percent of Kansas males 18 years and older used smokeless tobacco products was far significantly higher among males (10.2%; 95% CI: 9.4% to 10.9%) compared to females (0.8%; 95% CI: 0.5% to 1.1%) during 2018-2019.<sup>36</sup>

The percentage of Kansas adults 18 years and older who currently used smokeless tobacco during 2018-2019 was lower among Kansans aged 65 years and older (2.8%; 95% CI: 2.3% to 3.3%) compared to Kansas adults in other age groups. Conversely, the percentage of Kansas adults 18 years and older who currently used smokeless tobacco during 2018-2019 was higher among Kansans aged 25 to 34 years (7.8%; 95% CI: 6.5% to 9.1%) compared to Kansans ages 45 to 64 years (5.0%; 95% CI: 4.4% to 5.6%).

In Kansas, the percentage of Kansas adults 18 years and older who currently used smokeless tobacco during 2018-2019 was higher among Whites (5.5%; 95% CI: 5.1% to 5.9%) compared to African Americans (2.8%; 95% CI: 1.3% to 4.3%). In addition, the percentage of Kansas adults 18 years and older who currently used smokeless tobacco during 2018-2019 was higher among non-Hispanics (5.6%; 95% CI: 5.2% to 6.1%) compared to Hispanics (3.0%; 95% CI: 1.6% to 4.4%).

During 2018-2019, the percentage of Kansas adults 18 years and older who currently used smokeless tobacco was significantly lower among college graduates (2.9%; 95% CI: 2.5% to 3.4%) compared to those with lower levels of education.

The percentage of Kansas adults 18 years and older who currently used smokeless tobacco was significantly higher among adults living in rural counties (8.3%; 95% CI: 7.4% to 9.1%) compared to those living in urban counties (4.3%; 95% CI: 3.8% to 4.7%) during 2018-2019.

The percentage of Kansas adults 18 years and older who currently used smokeless tobacco did not differ significantly by annual household income or disability status during 2018-2019.

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<sup>35</sup> World Health Organization. Smokeless Tobacco and Some Tobacco-Specific N-Nitrosamines. International Agency for Research on Cancer Monographs on the Evaluation of Carcinogenic Risks to Humans Vol. 89. Lyon (France): World Health Organization, 2007.

<sup>36</sup> Source: 2018-2019 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment.

**Table 11-2. Percentage of adults 18 years and older who currently use smokeless tobacco, by selected characteristics, Kansas 2018-2019.**

Characteristic	Percentage of adults 18 years and older who currently use smokeless tobacco	95% Confidence Interval		
			to	
<b>Total</b>	5.4%	5.0%	to	5.8%
<b>Gender</b>				
Male	10.2%	9.4%	to	10.9%
Female	0.8%	0.5%	to	1.1%
<b>Age Group</b>				
18-24	6.5%	4.9%	to	8.1%
25-34	7.8%	6.5%	to	9.1%
35-44	6.2%	5.0%	to	7.3%
45-64	5.0%	4.4%	to	5.6%
65 and older	2.8%	2.3%	to	3.3%
<b>Race</b>				
White	5.5%	5.1%	to	5.9%
African American	2.8%	1.3%	to	4.3%
American Indian/Alaskan Native	8.9%	3.2%	to	14.7%
Asian/Pacific Islander	-	-	-	-
<b>Ethnicity</b>				
Hispanic	3.0%	1.6%	to	4.4%
Non-Hispanic	5.6%	5.2%	to	6.1%
<b>Education</b>				
Less than high school	7.7%	5.5%	to	9.9%
High school graduate or GED	6.5%	5.6%	to	7.3%
Some College	6.1%	5.4%	to	6.8%
College Graduate	2.9%	2.5%	to	3.4%
<b>Household Income</b>				
Less than \$15,000	5.3%	3.8%	to	6.8%
\$15,000 to \$24,999	5.4%	3.9%	to	6.8%
\$25,000 to \$34,999	4.2%	3.0%	to	5.3%
\$35,000 to \$49,999	5.1%	3.9%	to	6.3%
\$50,000 or higher	6.3%	5.7%	to	6.9%
<b>County Population Density</b>				
Rural	8.3%	7.4%	to	9.1%
Urban	4.3%	3.8%	to	4.7%
<b>Disability Status</b>				
Living with a disability	5.8%	4.9%	to	6.7%
Living without a disability	5.2%	4.8%	to	5.7%

\*Prevalence estimate are unable to be presented due to insufficient counts Source: 2018-2019 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. See Technical Appendix for details on how prevalence estimates were calculated. County population density peer groups are based on the population for each county in the 2000 population, where rural group included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while urban included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile).

## Smokeless Tobacco Use among Kansas Adolescents

In 2019, 4.5 percent (95% Confidence Interval (CI): 2.9% to 7.2%) of high school students in grade 9-12 in Kansas currently used smokeless tobacco. This percentage was significantly higher among males (6.9%; 95% CI: 3.7% to 12.3%) compared to females (1.9%; 95% CI: 1.0% to 3.4%).<sup>37</sup> The percentage of high school students in grades 9-12 (males, females, or both) who currently used smokeless tobacco did not differ significantly by grade level or race/ethnicity groups, except that the females in great 11<sup>th</sup> did not report any use of smokeless tobacco.

## Secondhand Smoke

Secondhand smoke contains hundreds of chemicals known to cause cancer, and nonsmokers who are exposed to secondhand smoke at home or at work increase their risk of developing lung cancer by 20 to 30 percent.<sup>38</sup>

In 2019, 12.7 percent (95% Confidence Interval (CI): 9.5% to 15.9%) of Kansas adults 18 years and older were exposed to secondhand smoke at home at least once during the past week. There was no significant difference in reported exposure to secondhand smoke at home by gender groups.<sup>39</sup>

In 2019, 16.9 percent (95% CI: 15.1% to 18.8%) of Kansas adults 18 years and older were exposed to secondhand smoke at work at least once during the past week. The percentage of Kansas males 18 years and older who were exposed to secondhand smoke in vehicles (20.1%; 95% CI: 17.5% to 22.7%) was significantly higher as compared to adult females (13.1%; 95% CI: 10.5% to 15.8%).

About 18 percent of Kansas adults 18 years and older were exposed to secondhand smoke in vehicles during this period (17.6%; 95% CI: 16.1% to 19.0%). There was no significant difference in reported exposure to secondhand smoke in vehicles by gender groups.

## Radon

Although cigarette smoking is responsible for about 90 percent of lung cancers in the U.S.,<sup>40</sup> long-term exposure to radon—a colorless, odorless, radioactive gas—can also cause lung cancer. In fact, radon is the second leading cause of lung cancer, after cigarette smoking. The combination of cigarette smoking and exposure to radon increases the risk of lung cancer even greater than exposure to either risk factor alone. For most, the largest source of radon exposure occurs at home, and there are several options that people can choose to reduce their exposure, including using radon-resistant building techniques in new homes or installing radon-mitigation systems in existing homes.<sup>41</sup> As of 2019, about 26 percent of purchased homes in Kansas were tested for Radon, and seven Kansas cities have adopted building codes requiring radon-resistant building techniques.<sup>42</sup>

## Obesity

Obesity is associated with increased risk of esophageal, postmenopausal breast, endometrial colorectal, kidney, pancreatic, thyroid, and gallbladder cancer. Although the mechanisms that link

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<sup>37</sup> YRBS. 2017b. Yrbs (2017). Kansas 2017 results. Available: <https://nccd.cdc.gov/Youthonline/App/Results.aspx?LID=KS8/18/2020>].

<sup>38</sup> U.S. Department of Health and Human Services. The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2006.

<sup>39</sup> Source: 2019 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment.

<sup>40</sup> U.S. Department of Health and Human Services. The Health Consequences of Smoking: A Report of the Surgeon General (2004).

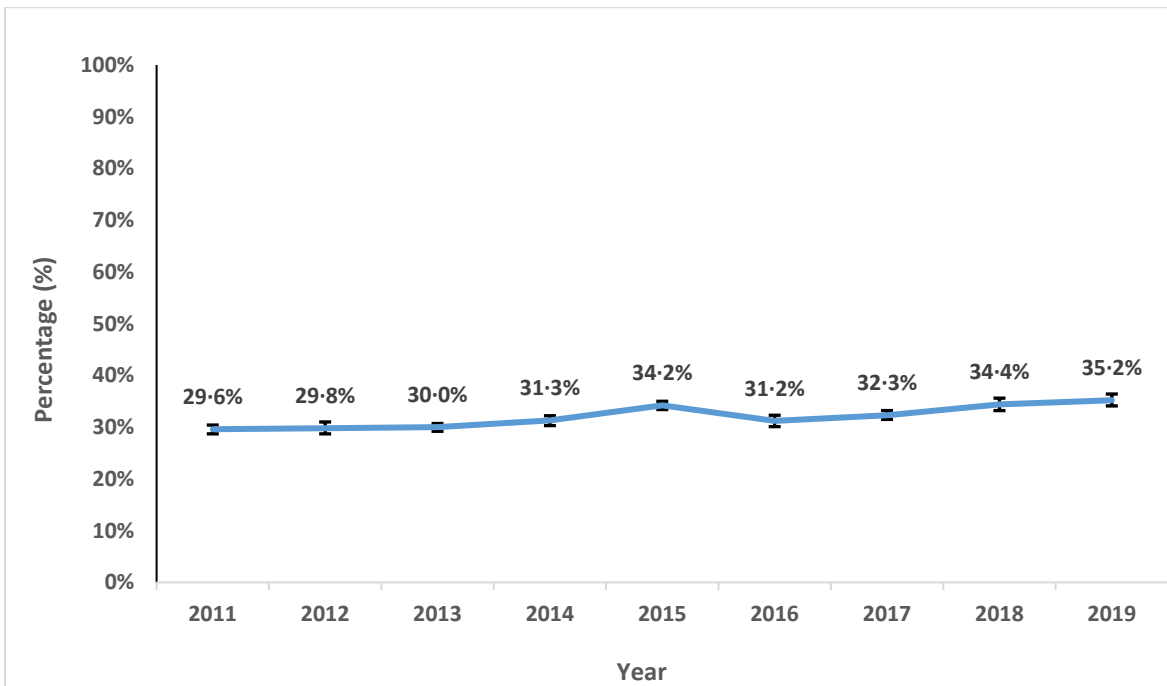
<sup>41</sup> American Cancer Society (2012). Radon. <http://www.cancer.org/Cancer/CancerCauses/OtherCarcinogens/Pollution/radon>

<sup>42</sup> Kansas Radiation Control Program, Kansas Department of Health and Environment.

obesity and cancer remain unknown, several possible explanations include excessive hormone production; increased levels of insulin and insulin-like growth-factor; and chronic low-level inflammation.<sup>43</sup>

In 2019, 35.2 percent (95% Confidence Interval (CI): 34.1% to 36.4%) of Kansas adults 18 years and older were obese (Table 11-3, Figure 11-2).<sup>44</sup> The trend analysis of the prevalence of obesity among Kansas adults over the years showed that the percentage of obese adults significantly increased annually by 2.1% from 2011 to 2019.

**Figure 11-2. Percentage of adults 18 years and older who are obese, Kansas 2011-2019.**



Source: 2011-2019 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. Vertical bars indicate 95% CIs.

The percentage of Kansans who were obese in 2019 was significantly higher among Kansans aged 45 to 64 years (39.9%; 95% CI: 38.0% to 41.8%) compared to Kansas adults aged 18 to 34 and 65 years and older. In addition, the percent of Kansans adults who were obese was significantly higher among adults aged 35 to 44 years (39.8%; 95% CI: 36.7% to 42.9%) compared to Kansas adults aged 18 to 24 and 65 years and older. On the other hand, the percent of Kansans adults who were obese was significantly lower among adults aged 18 to 24 years (23.8%; 95% CI: 20% to 27.5%) compared to Kansas adults in older age groups.

The percentage of Kansas adults 18 years and older who were obese was significantly higher among African Americans (44.8%; 95% CI: 39.0% to 50.6%) compared to Whites (35.2%; 95% CI: 34.0% to 36.4%) and Asian/Pacific Islanders (13.3%; 95% CI: 7.1% to 19.5%). The obesity rate among Asian/Pacific Islanders was also the lowest in comparison to other racial groups in 2019.

<sup>43</sup> National Cancer Institute. Obesity and Cancer Risk, 2012. <http://www.cancer.gov/cancertopics/factsheet/Risk/obesity>

<sup>44</sup> Source: 2019 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment.



In 2019, the percentage of Kansans 18 years and older who were obese was significantly higher among those who attended some college (39.1%; 95% CI: 37.1% to 41.1%) compared to those who did not graduate from high school (31.9%; 95% CI: 26.7% to 37.0%) and college graduates (31.3%; 95% CI: 29.6% to 32.9%). In addition, the percentage of Kansans 18 years and older who were obese was significantly higher among those who graduated from high school (35.9%; 95% CI: 33.7% to 38.1%) compared to college graduates.

In Kansas, the percentage of adults 18 years and older who were obese in 2019 was significantly higher among those living with a disability (43.0%; 95% CI: 40.7% to 45.3%) compared to those living without a disability (31.9%; 95% CI: 30.6% to 33.3%).

The percentage of Kansans 18 years and older who were obese in 2019 did not differ significantly by gender, ethnicity, annual household income, and county population density.

**Table 11- 3. Percentage of adults 18 years and older who are obese, by selected characteristics, Kansas 2019.**

<b>Characteristic</b>	<b>Percentage of adults 18 years and older who are obese</b>	<b>95% Confidence Interval</b>		
<b>Total</b>	35.2%	34.1%	to	36.4%
<b>Gender</b>				
Male	34.0%	32.5%	to	35.6%
Female	36.4%	34.7%	to	38.1%
<b>Age Group</b>				
18-24	23.8%	20.0%	to	27.5%
25-34	34.3%	31.2%	to	37.4%
35-44	39.8%	36.7%	to	42.9%
45-64	39.9%	38.0%	to	41.8%
65 and older	32.9%	31.1%	to	34.7%
<b>Race</b>				
White	35.2%	34.0%	to	36.4%
African American	44.8%	39.0%	to	50.6%
American Indian/Alaskan Native	33.6%	24.3%	to	43.0%
Asian/Pacific Islander	13.3%	7.1%	to	19.5%
<b>Ethnicity</b>				
Hispanic	34.6%	29.8%	to	39.4%
Non-Hispanic	35.3%	34.2%	to	36.5%
<b>Education</b>				
Less than high school	31.9%	26.7%	to	37.0%
High school graduate or GED	35.9%	33.7%	to	38.1%
Some College	39.1%	37.1%	to	41.1%
College Graduate	31.3%	29.6%	to	32.9%
<b>Household Income</b>				
Less than \$15,000	40.2%	35.1%	to	45.3%
\$15,000 to \$24,999	36.9%	33.1%	to	40.6%
\$25,000 to \$34,999	36.6%	32.6%	to	40.5%
\$35,000 to \$49,999	38.1%	34.9%	to	41.3%
\$50,000 or higher	35.3%	33.7%	to	36.9%
<b>County Population Density</b>				
Rural	36.8%	34.9%	to	38.8%
Urban	34.6%	33.1%	to	36.0%
<b>Disability Status</b>				
Living with a disability	43.0%	40.7%	to	45.3%
Living without a disability	31.9%	30.6%	to	33.3%

Source: 2019 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. See Technical Appendix for details on how prevalence estimates were calculated. County population density peer groups are based on the population for each county in the 2000 population, where rural group included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while urban included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile).

## Fruit and Vegetable Consumption

The American Cancer Society (ACS) recommends eating at least 2½ cups of fruits and vegetables per day to reduce the risk of cancer. Research studies have reported associations between higher fruit and vegetable consumption and lower risk of breast, colorectal, oral, esophageal, prostate, and stomach cancers.<sup>45</sup>

In 2019, about 50 percent (50.4%; 95% Confidence Interval (CI): 49.2% to 51.7%) of Kansas adults 18 years and older consumed both fruits and vegetables one or more times per day (Table 11-4).

The percentage of Kansas males 18 years and older who consumed both fruits and vegetables one or more times per day in 2019 (46.0%; 95% CI: 44.3% to 47.7%) was significantly lower than the percentage of Kansas females (54.8%; 95% CI: 53.0% to 56.5%) who did.

In 2019, the percentage of Kansans who consumed both fruits and vegetables one or more times per day was significantly higher among adults 65 years and older (57.6%; 95% CI: 55.6% to 59.5%) compared to adults in other age groups except those of 35-44 years old. In addition, the percentage of Kansans who consumed both fruits and vegetables one or more times per day was significantly higher among adults aged 35 to 44 years (53.4%; 95% CI: 50.1% to 56.6%) compared to adults aged 18 to 24 years (41.2%; 95% CI: 36.8% to 45.6%).

The percentage of adults 18 years and older who consumed both fruits and vegetables one or more times per day in 2019 was significantly lower among African Americans (43.6%; 95% CI: 37.7% to 49.2%) compared to Whites (51.0%; 95% CI: 49.7% to 52.3%).

The percentage of Kansas adults 18 years and older who consumed both fruits and vegetables one or more times per day in 2019 was significantly higher among college graduates (61.9%; 95% CI: 60.1% to 63.7%) compared to those who attained lower levels of education. In addition, the percentage of Kansas adults 18 years and older who consumed both fruits and vegetables one or more times per day was significantly higher among those who had some college education (48.0%; 95% CI: 46.0% to 50.1%) compared to high school graduates (43.0%; 95% CI: 40.7% to 45.4%).

In 2019, the percentage of Kansas adults who consumed both fruits and vegetables one or more times per day was significantly higher among those whose annual household income was \$50,000 or higher (55.2%; 95% CI: 53.5% to 56.9%) compared to those whose annual household income was less than \$35,000, and significantly lower among those with annual household income less than \$15,000 (38.5%; 95% CI: 33.2% to 43.8%) compared to those whose household income was \$35,000 to \$49,999 (51.3%; 95% CI: 48.0% to 54.6%).

In Kansas, the percentage of adults 18 years and older who consumed both fruits and vegetables one or more times per day was significantly higher among those living without a disability (52.3%; 95% CI: 50.8% to 53.8%) compared to those living with a disability (46.1%; 95% CI: 43.7% to 48.5%).

The percentage of Kansans 18 years and older who consumed both fruits and vegetables one or more times per day in 2019 did not differ significantly by ethnicity and county population density.

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<sup>45</sup> Kushi, L. H., Doyle, C., McCullough, M., Rock, C. L., Demark-Wahnefried, W., Bandera, E. V., Gapstur, S., Patel, A. V., Andrews, K., Gansler, T. and The American Cancer Society 2010 Nutrition and Physical Activity Guidelines Advisory Committee (2012), American Cancer Society guidelines on nutrition and physical activity for cancer prevention. CA: A Cancer Journal for Clinicians, 62: 30–67.

**Table 11- 4. Percentage of adults 18 years and older who consume both fruits and vegetables one or more times per day by selected characteristics, Kansas 2019.**

Characteristic	Percentage of adults 18 years and older who consume both fruits and vegetables 1+ times/day	95% CI		
			to	
<b>Total</b>	50.4%	49.2%	to	51.7%
<b>Gender</b>				
Male	46.0%	44.3%	to	47.7%
Female	54.8%	53.0%	to	56.5%
<b>Age Group</b>				
18-24	41.2%	36.8%	to	45.6%
25-34	47.1%	43.7%	to	50.4%
35-44	53.4%	50.1%	to	56.6%
45-64	49.9%	48.0%	to	51.8%
65 and older	57.6%	55.6%	to	59.5%
<b>Race</b>				
White	51.0%	49.7%	to	52.3%
African American	43.6%	37.7%	to	49.2%
American Indian/Alaskan Native	45.7%	35.1%	to	56.3%
Asian/Pacific Islander	51.1%	39.5%	to	62.7%
<b>Ethnicity</b>				
Hispanic	50.1%	44.8%	to	55.4%
Non-Hispanic	50.5%	49.2%	to	51.7%
<b>Education</b>				
Less than high school	42.7%	36.7%	to	48.8%
High school graduate or GED	43.0%	40.7%	to	45.4%
Some College	48.0%	46.0%	to	50.1%
College Graduate	61.9%	60.1%	to	63.7%
<b>Household Income</b>				
Less than \$15,000	38.5%	33.2%	to	43.8%
\$15,000 to \$24,999	45.7%	41.6%	to	49.8%
\$25,000 to \$34,999	44.5%	40.4%	to	48.6%
\$35,000 to \$49,999	51.3%	48.0%	to	54.6%
\$50,000 or higher	55.2%	53.5%	to	56.9%
<b>County Population Density</b>				
Rural	50.7%	48.6%	to	52.8%
Urban	50.3%	48.8%	to	51.8%
<b>Disability Status</b>				
Living with a disability	46.1%	43.7%	to	48.5%
Living without a disability	52.3%	50.8%	to	53.8%

Source: 2019 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. See Technical Appendix for details on how prevalence estimates were calculated. County population density peer groups are based on the population for each county in the 2000 population, where rural group included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while urban included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile).

## Physical Activity

The U.S. Department of Health and Human Services' 2015-2020 Physical Activity Guidelines for Americans and the American Cancer Society's ACS Guidelines on Nutrition and Physical Activity for Cancer Prevention recommend that adults participate in at least 150 minutes a week of moderate-intensity aerobic activity, or 75 minutes a week of vigorous-intensity aerobic activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity, and muscle strengthening activity on two or more days a week.<sup>46-47</sup> Physical activity has been linked to lower risk of several types of cancer, including cancers of the breast, colon/rectum, uterus, pancreas, and prostate.

In 2019, 27.0 percent (95% Confidence Interval (CI): 25.8% to 28.3%) of Kansas adults 18 years and older met physical activity guidelines (i.e. 150 minutes a week of moderate-intensity aerobic activity, or 75 minutes a week of vigorous-intensity aerobic activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity) (Table 11-5).

In 2019, Kansas adults aged 18 to 24 years (36.9%; 95% CI: 31.7% to 42.2%) were significantly more likely to meet physical activity guidelines compared to adults aged 35 years and older and was significantly higher among adults aged 25-34 years (29.1%; 95% CI: 25.4% to 32.7%) compared to adults aged 45 years and older.

The percentage of Kansas adults 18 years and older were significantly more likely to meet physical activity guidelines among Hispanics (34.1%; 95% CI: 28.1% to 40.1%) compared to non-Hispanics (26.2%; 95% CI: 25.0% to 27.4%) in 2019.

In 2019, the percentage of Kansas adults 18 years and older who met physical activity guidelines was significantly higher among college graduates (34.3%; 95% CI: 32.3% to 36.4%) compared to those with lower levels of education. Similarly, the percentage of Kansas adults 18 years and older who met physical activity guidelines was significantly higher among those who attended some college (26.9%; 95% CI: 24.8% to 29.1%) compared to those with lower levels of education. In addition, the percentage of Kansas adults 18 years and older who met physical activity guidelines was significantly higher among those whose annual household income was \$50,000 or higher (31.1%; 95% CI: 29.2% to 32.9%) compared to those with lower annual household income.

The percentage of Kansas adults 18 years and older who met physical activity guidelines in 2019 was significantly lower among those living rural counties (24.3%; 95% CI: 22.2% to 26.4%) as compared to those living in urban counties (28.2%; 95% CI: 26.6% to 29.7%).

In Kansas, the percentage of adults 18 years and older who met physical activity guidelines in 2019 was significantly lower among those living with a disability (21.6%; 95% CI: 19.3% to 24.0%) compared to those living without a disability (29.3%; 95% CI: 27.8% to 30.8%).

The age-adjusted percentage of adults 18 years and older who met physical activity guidelines in 2019 did not differ significantly by gender and race.

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<sup>46</sup> U.S. Department of Health and Human Services. Physical Activity Guidelines for Americans (2015-2020).

<sup>47</sup> Kushi, L. H., Doyle, C., McCullough, M., Rock, C. L., Demark-Wahnefried, W., Bandera, E. V., Gapstur, S., Patel, A. V., Andrews, K., Gansler, T. and The American Cancer Society 2010 Nutrition and Physical Activity Guidelines Advisory Committee (2012), American Cancer Society guidelines on nutrition and physical activity for cancer prevention. *CA: A Cancer Journal for Clinicians*, 62: 30–67.

**Table 11-5. Percentage of adults 18 years and older who met physical activity guidelines, by selected characteristics, Kansas 2019.**

Characteristic	Percentage of adults 18 years and older who met physical activity guidelines	95% CI		
			to	
<b>Total</b>	27.0%	25.8%	to	28.3%
<b>Gender</b>				
Male	28.6%	26.7%	to	30.4%
Female	25.5%	23.8%	to	27.3%
<b>Age Group</b>				
18-24	36.9%	31.7%	to	42.2%
25-34	29.1%	25.4%	to	32.7%
35-44	27.7%	24.3%	to	31.2%
45-64	23.4%	21.6%	to	25.3%
65 and older	24.9%	23.2%	to	26.7%
<b>Race</b>				
White	26.4%	25.1%	to	27.7%
African American	28.4%	22.3%	to	34.5%
American Indian/Alaskan Native	31.1%	20.8%	to	41.4%
Asian/Pacific Islander	33.5%	20.9%	to	46.1%
<b>Ethnicity</b>				
Hispanic	34.1%	28.1%	to	40.1%
Non-Hispanic	26.2%	25.0%	to	27.4%
<b>Education</b>				
Less than high school	21.9%	16.2%	to	27.5%
High school graduate or GED	21.4%	19.2%	to	23.6%
Some College	26.9%	24.8%	to	29.1%
College Graduate	34.3%	32.3%	to	36.4%
<b>Household Income</b>				
Less than \$15,000	20.5%	14.8%	to	26.1%
\$15,000 to \$24,999	23.9%	19.9%	to	27.8%
\$25,000 to \$34,999	21.8%	18.1%	to	25.5%
\$35,000 to \$49,999	24.4%	21.1%	to	27.8%
\$50,000 or higher	31.1%	29.2%	to	32.9%
<b>County Population Density</b>				
Rural	24.3%	22.2%	to	26.4%
Urban	28.2%	26.6%	to	29.7%
<b>Disability Status</b>				
Living with a disability	21.6%	19.3%	to	24.0%
Living without a disability	29.3%	27.8%	to	30.8%

Source: 2019 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, KDHE. See Technical Appendix for details on how prevalence estimates were calculated. County population density peer groups are based on the population for each county in the 2000 population, where rural group included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while urban included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile).

ACS Guidelines on Physical Activity for Cancer Prevention recommends that adults participate in at least 150 minutes a week of moderate-intensity aerobic activity, or 75 minutes a week of vigorous-intensity aerobic activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity, and muscle strengthening activity on two or more days a week.

## Human Papillomavirus (HPV) Vaccination

Human papillomavirus (HPV) is a common virus that is transmitted during sexual intercourse. Although HPV often does not cause apparent health problems, nearly all cervical cancers are caused by HPV.<sup>48</sup> HPV also increases the risk of vulvar, vaginal, penile, anal, and oropharyngeal (throat) cancer.

There are currently three HPV vaccines available and licensed by the US Food and Drug Administration (FDA) shown to protect against most cervical cancers: Cervarix®; Gardasil®; and Gardasil® 9. Since late 2016, Gardasil® 9 has been the only HPV vaccine available for use in the U.S. Two doses of the HPV vaccine are recommended for all boys and girls at ages 11–12; the vaccine can be given as early as age 9. Children who start the vaccine series on or after their 15th birthday need three shots given over 6 months. If the teen has not received the vaccine yet, he/she should be given the vaccine as soon as possible.<sup>49</sup>

In 2018, 62.3 percent (95% Confidence Interval (CI): 55.7% to 68.9%) of Kansas Adolescents ages 13-17 years received one or more doses of the HPV vaccine.<sup>50</sup> This percentage did not differ significantly between females (60.5 percent; 95% CI: 50.7% to 70.3%) and males (64.0 percent; 95% CI: 51.8% to 72.7%). In addition, 28.1 percent (95% CI: 21.9% to 34.3%) of Kansas Adolescents ages 13-17 years received the recommended three (or more) doses of the vaccine. This percentage did not differ significantly between females (29.8 percent; 95% CI: 20.7% to 38.9%) and males (26.6 percent; 95% CI: 18.2% to 35.0%).

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<sup>48</sup> Centers for Disease Control and Prevention (2012). Cervical cancer risk factors. [http://www.cdc.gov/cancer/cervical/basic\\_info/risk\\_factors.htm](http://www.cdc.gov/cancer/cervical/basic_info/risk_factors.htm)

<sup>49</sup> Markowitz LE, Dunne EF, Saraiya M, Chesson HW, Curtis CR, Gee J, et al. 2014. Human papillomavirus vaccination: Recommendations of the advisory committee on immunization practices (acip). *MMWR Recomm Rep* 63:1-30.

<sup>50</sup> CDC. 2018. 2018 adolescent human papillomavirus (hvp) vaccination coverage report. Centers for Disease Control and Prevention. <https://www.cdc.gov/vaccines/imz-managers/coverage/teenvaxview/data-reports/hpv/reports/2018.html>. Accessed on August 18, 2020

## Ultraviolet Radiation (UV): Using sunscreen or sun-block

About 65-90% of melanomas are caused by exposure to ultraviolet (UV) light, which is an invisible kind of radiation that comes from the sun, tanning beds, and sunlamps.<sup>51</sup> Unprotected and/or excessive exposure to UV light and a history of severe sunburns increases the risk for melanoma.<sup>52</sup>

In 2017, Kansas BRFSS collected population-based data related to prevalence estimates of using sunscreen or sun-block when people stay outside on a sunny day for more than an hour among adults 18 years and older. About 24.0 percent (95% Confidence Interval (CI): 23.0% to 25.1%) of Kansas adults always or nearly always used sunscreen or sun-block when they stayed outside on a sunny day for more than an hour (Table 11-6).

The percentage of Kansas adults 18 years and older who always or nearly always used sunscreen or sun-block when they stayed outside on a sunny day for more than an hour were significantly lower among males (14.3%; 95% CI: 13.1% to 15.5%) compared to females (33.7%; 95% CI: 32.0% to 35.4%).

In 2017, the percentage of Kansans who always or nearly always used sunscreen or sun-block when they stayed outside on a sunny day for more than an hour was significantly lower among adults aged 18 to 24 years (15.3%; 95% CI: 12.2% to 18.5%) compared to adults in older age groups. In addition, the percentage of Kansans who always or nearly always used sunscreen or sun-block when they stayed outside on a sunny day for more than an hour was significantly lower among adults aged 65 years and older (22.0%; 95% CI: 20.3% to 23.6%) compared to Kansas adults aged 35-64 years old. Furthermore, this percentage was significantly lower among Kansas adults aged 25-34 years (23.0%; 95% CI: 20.1% to 26.0%) compared to adults aged 35-44 years (29.8%; 95% CI: 26.6% to 33.0%).

The percentage of adults 18 years and older who always or nearly always used sunscreen or sun-block when they stayed outside on a sunny day for more than an hour was significantly lower among African Americans (10.7%; 95% CI: 6.7% to 14.7%) compared to other race subgroups.

In 2017, the percentage of Kansas adults 18 years and older who always or nearly always used sunscreen or sun-block when they stayed outside on a sunny day for more than an hour was significantly highest among college graduates (35.8%; 95% CI: 34.0% to 37.6%), followed by the percentage among those who attended some college (23.3%; 95% CI: 21.5% to 25.1%), and then by the percentage among high school graduates (16.4%; 95% CI: 14.5% to 18.2%).

Similarly, the percentage of Kansas adults 18 years and older who always or nearly always used sunscreen or sun-block when they stayed outside on a sunny day for more than an hour was significantly higher among those whose annual household income was \$50,000 or more (31.1%; 95% CI: 29.4% to 32.8%) compared to those whose annual household income was less than \$50,000.

In Kansas, the percentage of adults 18 years and older who always or nearly always used sunscreen or sun-block when they stayed outside on a sunny day for more than an hour was significantly lower among those living with a disability (17.2%; 95% CI: 15.4% to 19.1%) compared to those living without a disability (26.4%; 95% CI: 25.1% to 27.7%).

In 2017, the percentage of adults 18 years and older who always or nearly always used sunscreen or sun-block when they stayed outside on a sunny day for more than an hour was significantly lower among those living in rural counties (18.8%; 95% CI: 17.3% to 20.4%) compared to those living in urban counties (26.2%; 95% CI: 24.8% to 27.5%).

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<sup>51</sup> Armstrong BK, Kricger A. How much melanoma is caused by sun exposure? *Melanoma Research* 1993;3(6):395-401.

<sup>52</sup> American Cancer Society. *Skin Cancer Facts* (2012).



The percentage of Kansas adults 18 years and older who always or nearly always used sunscreen or sun-block when they stayed outside on a sunny day for more than an hour did not differ significantly by ethnicity.

**Table 11-6. Percentage of adults 18 years and older who Always or nearly always using sunscreen or sun-block if they stayed outside on a sunny day for more than one hour, by selected characteristics, Kansas 2017.**

Characteristic	Percentage of adults 18 years reported using sunscreen or sun-block	95% CI		
			to	
<b>Total</b>	24.0%	23.0%	to	25.1%
<b>Gender</b>				
Male	14.3%	13.1%	to	15.5%
Female	33.7%	32.0%	to	35.4%
<b>Age Group</b>				
18-24	15.3%	12.2%	to	18.5%
25-34	23.0%	20.1%	to	26.0%
35-44	29.8%	26.6%	to	33.0%
45-64	26.6%	24.9%	to	28.3%
65 and older	22.0%	20.3%	to	23.6%
<b>Race</b>				
White	25.4%	24.3%	to	26.5%
African American	10.7%	6.7%	to	14.7%
American Indian/Alaskan Native*	-	-	-	-
Asian/Pacific Islander	19.8%	11.6%	to	28.0%
<b>Ethnicity</b>				
Hispanic	22.0%	16.9%	to	27.1%
Non-Hispanic	24.3%	23.2%	to	25.3%
<b>Education</b>				
Less than high school	11.3%	7.2%	to	15.4%
High school graduate or GED	16.4%	14.5%	to	18.2%
Some College	23.3%	21.5%	to	25.1%
College Graduate	35.8%	34.0%	to	37.6%
<b>Household Income</b>				
Less than \$15,000	15.6%	11.5%	to	19.7%
\$15,000 to \$24,999	18.3%	15.2%	to	21.3%
\$25,000 to \$34,999	16.8%	14.0%	to	19.5%
\$35,000 to \$49,999	19.1%	16.6%	to	21.7%
\$50,000 or higher	31.1%	29.4%	to	32.8%
<b>County Population Density</b>				
Rural	18.8%	17.3%	to	20.4%
Urban	26.2%	24.8%	to	27.5%
<b>Disability Status</b>				
Living with a disability	17.2%	15.4%	to	19.1%
Living without a disability	26.4%	25.1%	to	27.7%

\*Prevalence estimates are unable to be presented due to insufficient counts.

Source: 2017 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. See Technical Appendix for details on how prevalence estimates were calculated. County population density peer groups are based on the population for each county in the 2000 population, where rural group included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while urban included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile).

## Ultraviolet Radiation (UV): Using tanning or sun lamps

In 2017, 3.3 percent (95% Confidence Interval (CI): 2.9% to 3.8%) of Kansas adults 18 years and older used tanning or sunlamps within the past 12 months (Table 11-6).

The percentage of Kansas adults 18 years and older who used tanning or sun lamps within the past 12 months were significantly higher among females (4.7%; 95% CI: 3.7% to 5.4%) compared to males (2.0%; 95% CI: 1.5% to 2.5%).

In 2017, the percentage of Kansans who used tanning or sun lamps within the past 12 months was significantly lower among adults aged 65 years and older (1.3%; 95% CI: 0.8% to 1.8%) compared to adults in younger age groups.

In 2017, The percentage of Kansas adults 18 years and older who used tanning or sun lamps within the past 12 months was significantly higher among those whose annual household income was \$50,000 or more (4.5%; 95% CI: 3.7% to 5.3%) compared to those whose annual household income of \$15,000 to \$24,999 (1.7%; 95% CI: 0.9% to 2.5%).

In Kansas, the percentage of adults 18 years and older who used tanning or sun lamps within the past 12 months in 2017 was significantly lower among those living with a disability (2.3%; 95% CI: 1.6% to 3.0%) compared to those living without a disability (3.7%; 95% CI: 3.1% to 4.3%).

The percentage of Kansas adults 18 years and older who used tanning or sun lamps within the past 12 months in 2017 did not differ significantly by ethnicity, education, or county population density. The comparison by race was not available due to the small sample size to calculate the rates of most of race groups.

**Table 11-6. Percentage of adults 18 years and older who reported using tanning or sunlamps during the last year by selected characteristics, Kansas 2017.**

Characteristic	Percentage of adults 18 years reported using tanning or sun lamps	95% CI		
			to	
<b>Total</b>	3.3%	2.9%	to	3.8%
<b>Gender</b>				
Male	2.0%	1.5%	to	2.5%
Female	4.7%	3.7%	to	5.4%
<b>Age Group</b>				
18-24	4.7%	3.0%	to	6.4%
25-34	3.6%	2.3%	to	4.8%
35-44	5.1%	3.5%	to	6.6%
45-64	3.2%	2.5%	to	3.9%
65 and older	1.3%	0.8%	to	1.8%
<b>Race</b>				
White	3.5%	3.0%	to	4.0%
African American*	-	-	-	-
American Indian/Alaskan Native*	-	-	-	-
Asian/Pacific Islander*	-	-	-	-
<b>Ethnicity</b>				
Hispanic	4.7%	2.4%	to	7.0%
Non-Hispanic	3.2%	2.8%	to	3.7%
<b>Education</b>				
Less than high school*	-	-	-	-
High school graduate or GED	2.4%	1.7%	to	3.2%
Some College	4.1%	3.2%	to	5.1%
College Graduate	3.9%	3.1%	to	4.7%
<b>Household Income</b>				
Less than \$15,000	2.8%	1.1%	to	4.5%
\$15,000 to \$24,999	1.7%	0.9%	to	2.5%
\$25,000 to \$34,999	2.9%	1.4%	to	4.4%
\$35,000 to \$49,999	3.6%	2.3%	to	4.8%
\$50,000 or higher	4.5%	3.7%	to	5.3%
<b>County Population Density</b>				
Rural	3.8%	2.9%	to	4.6%
Urban	3.2%	2.6%	to	3.7%
<b>Disability Status</b>				
Living with a disability	2.3%	1.6%	to	3.0%
Living without a disability	3.7%	3.1%	to	4.3%

\*Prevalence estimates are unable to be presented due to insufficient counts. Source: 2017 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. See Technical Appendix for details on how prevalence estimates were calculated. County population density peer groups are based on the population for each county in the 2000 population, where rural group included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while urban included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile).

## CHAPTER 12: SHARING FAMILY HISTORY & GENETIC COUNSELING



### Genetic Counseling

The National Cancer Institute describes cancer genetics as having implications for all aspects of cancer management, including prevention, screening, and treatment. The etiology of cancer is multifactorial, with genetic, environmental, medical, and lifestyle factors interacting to produce a given malignancy. Knowledge of cancer genetics is rapidly improving understanding of cancer biology, helping to identify at-risk individuals, establishing treatment tailored to the molecular fingerprint of the disease, and leading to the

development of new therapeutic modalities.

Some cancers are caused by an abnormal gene that is passed from generation to generation. Only about 5-10 percent of all cancers result directly from inherited genetic mutations. Having a genetic risk does not mean that a person will develop cancer; not having a genetic risk does not mean that a person will not develop cancer. Cancer is such a common disease that most families have at least a few members who have had cancer. Sometimes, this is because family members have risk factors in common, such as tobacco use or obesity, which can cause cancer or influence cancer risk.<sup>53</sup> Having a genetic counseling can help people make informed decisions about genetic testing and follow-up care.

### Sharing collected family history of chronic diseases including cancer among Kansas Adults

In 2019, about 93 percent of Kansas adults 18 years and older who actively collected family history of chronic diseases including cancer have shared it with their healthcare providers (92.6%; 95% Confidence Interval (CI): 91.1% to 94.2%) (Table 12-1). It was also estimated that about 32.1% of Kansas adults have already collected family history of chronic diseases including cancer in 2019 (data not shown).

The percentage of Kansans who collected family history of chronic diseases including cancer and shared it with healthcare providers in 2019 was significantly lower among males (87.1%; 95% CI: 83.6% to 90.6%) as compared to females (95.5%; 95% CI: 94.1% to 96.9%).

In 2019, the percentage of Kansans 18 years and older who collected family history of chronic diseases including cancer and shared it with healthcare providers was significantly lower among adults aged 18-24 years (84.7%; 95% CI: 76.5% to 92.8%) as compared to adults aged 65 years and older (95.3%; 95% CI: 93.3% to 97.3%).

In Kansas, all those in the Asian/Pacific Islander group shared the family history of chronic diseases they collected with their healthcare providers in 2019. There was no significance difference between the other racial groups regarding sharing collected family history of chronic diseases including cancer.

In Kansas, the percentage of Kansans 18 years and older who collected family history of chronic diseases including cancer and shared it with healthcare providers was significantly lower among adults without insurance (82.8%; 95% CI: 75.1% to 90.5%) as compared to adults with insurance (93.9%; 95% CI: 92.5% to 95.4%).

<sup>53</sup> American Cancer Society. Family Cancer Syndromes. Available at: <http://www.cancer.org/cancer/cancercauses/geneticsandcancer/heredity-and-cancer>. Accessed August 19, 2020.

The percentage of Kansans 18 years and older with family history of cancer and received genetic counseling did not differ significantly by ethnicity, education level, annual household income level, disability status, or county population density subgroups.

**Table 12-1. Percentage of adults who shared collected family history of chronic diseases including cancer with their healthcare provider during the past year, Kansas 2019**

Characteristic	Percentage of adults shared collected family history with healthcare providers	95% Confidence Interval		
<b>Total</b>	92.6%	91.1%	to	94.2%
<b>Gender</b>				
Male	87.1%	83.6%	to	90.6%
Female	95.5%	94.1%	to	96.9%
<b>Age group</b>				
18-39	84.7%	76.5%	to	92.8%
25-34	89.3%	84.5%	to	94.1%
35-44	94.3%	90.6%	to	97.9%
45-64	94.0%	92.1%	to	96.0%
65 and older	95.3%	93.3%	to	97.3%
<b>Race</b>				
White	93.3%	91.8%	to	94.8%
African American	88.4%	77.2%	to	99.7%
American Indian/Alaskan Native	94.2%	86.2%	to	100.0%
Asian/Pacific Islanders	100.0%	100.0%	to	100.0%
<b>Ethnicity</b>				
Hispanic	92.7%	85.0%	to	100.0%
Non-Hispanic	92.6%	91.0%	to	94.1%
<b>Education</b>				
Less than high school	95.1%	89.0%	to	100.0%
High school graduate or GED	89.5%	85.3%	to	93.6%
Some college	91.9%	89.0%	to	94.7%
College graduate	94.4%	92.5%	to	96.2%
<b>Household Income</b>				
Less than \$15,000	84.7%	76.3%	to	93.2%
\$15,000 to \$24,999	93.6%	89.4%	to	97.9%
\$25,000 to \$34,999	93.8%	89.7%	to	97.9%
\$35,000 to \$49,999	90.0%	84.3%	to	95.6%
\$50,000 or higher	94.6%	92.8%	to	96.4%
<b>Insurance Status</b>				
Insured	93.9%	92.5%	to	95.4%
Uninsured	82.8%	75.1%	to	90.5%
<b>County Population Density</b>				
Rural	92.9%	90.5%	to	95.3%
Urban	92.5%	90.6%	to	94.4%
<b>Disability Status</b>				
Living with a disability	93.8%	91.4%	to	96.3%
Living without a disability	92.0%	90.1%	to	94.0%

Source: 2019 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. See Technical Appendix for details on how prevalence estimates were calculated. County population density peer groups are based on the population for each county in the 2000 population, where rural group included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while urban included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile).

## Genetic Counseling for Cancer among Kansas Adults

In 2019, about 13 percent (12.9%; 95% Confidence Interval (CI): 11.3% to 14.5%) of Kansas adults 18 years who have a family history of cancer have received genetic counseling for cancer (Table 12-2).

The percentage of Kansans who have a family history of cancer and have received genetic counseling for cancer in 2019 was significantly lower among males (9.4%; 95% CI: 7.5% to 11.3%) as compared to females (15.4%; 95% CI: 13.1% to 17.7%).

In 2019, the percentage of Kansans adults with family history of cancer and received genetic counseling for cancer was significantly lower among adults aged 25-34 years (7.4%; 95% CI: 4.0% to 10.8%) as compared to adults in older age groups.

In Kansas, the percentage of Kansans 18 years and older with family history of cancer and received genetic counseling for cancer was significantly lower among adults living without a disability (11.1%; 95% CI: 9.4% to 12.8%) as compared to adults live with a disability (17.1%; 95% CI: 13.8% to 20.3%).

The percentage of Kansans 18 years and older with family history of cancer and received genetic counseling did not differ significantly by race/ethnicity, education level, annual household income level, insurance status, or county population density subgroups.



**Table 12-2. Percentage of adults with family history of cancer who received genetic counseling, Kansas 2019**

Characteristic	Percentage of adults with family history of cancer and received genetic counseling	95% Confidence Interval		
<b>Total</b>	12.9%	11.3%	to	14.5%
<b>Gender</b>				
Male	9.4%	7.5%	to	11.3%
Female	15.4%	13.1%	to	17.7%
<b>Age group</b>				
18-39*	-	-	-	-
25-34	7.4%	4.0%	to	10.8
35-44	11.3%	6.9%	to	15.6%
45-64	15.2%	12.6%	to	17.8%
65 and older	16.1%	13.5%	to	18.2%
<b>Race</b>				
White	12.4%	10.8%	to	14.1%
African American	15.5%	5.9%	to	25.1%
American Indian/Alaskan Native	21.1%	7.9%	to	34.2%
<b>Ethnicity</b>				
Hispanic*	-	-	-	-
Non-Hispanic	13.2%	11.6%	to	14.8%
<b>Education</b>				
Less than high school	16.2%	7.3%	to	25.1%
High school graduate or GED	13.2%	10.4%	to	16.1%
Some college	11.7%	9.2%	to	14.2%
College graduate	13.1%	10.7%	to	15.4%
<b>Household Income</b>				
Less than \$15,000	12.6%	7.2%	to	17.9%
\$15,000 to \$24,999	16.5%	10.3%	to	22.8%
\$25,000 to \$34,999	12.4%	7.3%	to	17.5%
\$35,000 to \$49,999	9.7%	6.3%	to	13.0%
\$50,000 or higher	13.1%	10.9%	to	15.2%
<b>Insurance Status</b>				
Insured	12.6%	11.0%	to	14.2%
Uninsured	15.3%	8.9%	to	21.8%
<b>County Population Density</b>				
Rural	14.0%	11.5%	to	16.6%
Urban	12.4%	10.5%	to	14.5%
<b>Disability Status</b>				
Living with a disability	17.1%	13.8%	to	20.3%
Living without a disability	11.1%	9.4%	to	12.8%

\*Prevalence estimates are unable to be presented due to insufficient counts.

Source: 2019 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. See Technical Appendix for details on how prevalence estimates were calculated. County population density peer groups are based on the population for each county in the 2000 population, where rural group included Frontier (fewer than 6 persons per square mile), Rural (6 to 19.9 persons per square mile), Densely-Settled Rural (20 to 39.9 persons per square mile), while urban included Semi-Urban (40 to 149.9 persons per square mile), and Urban (150 or more persons per square mile).

## CHAPTER 13: CANCER SURVIVORSHIP



Cancer survivors are at greater risk for recurrence and developing second cancers due to effects of treatment, lifestyle behaviors, genetics or risk factors that contributed to the first cancer. Cancer survivors can help enhance their quality of life, maintain their health and improve survival.

About 1 in 10 adult cancer survivors in Kansas were diagnosed before age 35. Survivors of childhood cancer have special health care needs and require follow-up care and medical surveillance for the rest of their lives.<sup>54</sup> This specialized care is

necessary to monitor late effects that may develop months or years after treatment has ended.<sup>55</sup> The risk of late effects depends on the type of cancer, the type and dosage of treatment received, and the child's age.<sup>56</sup> Late effects of childhood cancer may include recurrence, second cancers, premature death, disability, impaired development, and learning problems.

While prevention is key to the public health response to cancer among adults, little is known about how to develop evidence-based interventions to prevent cancer among children. Further, there are no nationally-recognized cancer screening guidelines to detect childhood cancers in their early stage.

### Health risk behaviors, health status, and health care access among cancer survivors

In 2019, 7.6 percent of Kansas adults 18 years and older reported they currently have cancer (excluding skin cancer) (data not shown).

In 2019, the percentage of Kansans who are current smokers did not differ significantly by cancer status. On the other hand, the percentage of Kansans who reported having ever drunk alcohol in the past 30 days was significantly lower among adults with cancer compared to adults without cancer ( $p < 0.001$ , Table 13-1).

The percentage of Kansans who consume fruits one or more times per day was significantly higher among adults with cancer compared to adults without cancer ( $p = 0.02$ ) in 2019. Conversely, the percentage of Kansans who consume vegetables one or more times per day did not differ significantly by cancer status.

The percentage of Kansans who reported they did not participate in any physical activities in the past 30 days in 2019 was significantly lower among adults with cancer compared to adults without cancer ( $p < 0.001$ ). However, the percentage of Kansans who are overweight/obese did not differ significantly by cancer status.

<sup>54</sup> American Cancer Society. Cancer in Children. Available at: <http://www.cancer.org/acs/groups/cid/documents/webcontent/002287-pdf>. Accessed August 19, 2020.

<sup>55</sup> National Cancer Institute. Cancer in Children and Adolescents. Available at: <http://www.cancer.gov/types/childhood-cancers/child-adolescent-cancers-fact-sheet#r2>. Accessed August 19, 2020

<sup>56</sup> Centers for Disease Control and Prevention. Basic Information for Cancer Survivors. Available at: [http://www.cdc.gov/cancer/survivorship/basic\\_info/index.htm](http://www.cdc.gov/cancer/survivorship/basic_info/index.htm). Accessed September 1, 2016.

After adjustment for gender, age, race, ethnicity, employment and education, the prevalence of the previous health risk factors did not significantly differ between adults with a cancer and those without a cancer.

In 2019, the percentages of Kansans who self-reported fair/poor health, living with disability, physically unhealthy for 14 days or more in the past month, and poor health interfered with usual activities for 14 days or more in the past month were significantly higher among adults with cancer as compared to those without cancer. The percentage of Kansans who were physically unhealthy for 14 days or more in the past month did not differ significantly by cancer status. After adjustment for gender, age, race, ethnicity, employment and education, the prevalence of these health statuses also remained significantly higher among adults with a cancer compared to those without a cancer.

In 2019, the percentages of Kansans who did not have insurance and of those who reported not having a health care provider were significantly higher among adults without cancer as compared to those with cancer ( $p < 0.001$ ). The percentage of Kansans who could not see doctor because of cost did not differ significantly by cancer status. After adjustment for gender, age, race, ethnicity, employment and education, the percentages of Kansans who did not have insurance and of those who reported not having a health care provider did not differ significantly between those without cancer as compared to those with cancer.

**Table 13-1. Adjusted prevalence of health risk behaviors, health status, and health care access indicators among adults 18 years and older, by history of cancer diagnosis, Kansas, 2019**

Cancer status	Unadjusted Prevalence			Adjusted Prevalence*		
	Cancer	No cancer	P-value	Cancer	No cancer	P-value
<b>Health Risk Behaviors</b>	% ± SE	% ± SE		% ± SE	% ± SE	
Current smoker	15.9 ± 1.5	16.2 ± 0.5	0.9	20.1 ± 2.7	19.5 ± 1.8	0.7
Drank alcohol in past 30 days	45.3 ± 2.0	56.2 ± 0.6	< 0.001	39.3 ± 3.1	40.0 ± 2.4	0.8
Consume fruits ≥ 1 times per day	62.7 ± 2.0	58.3 ± 0.7	0.04	60.5 ± 3.0	58.7 ± 2.3	0.4
Consume vegetables ≥ 1 times per day	81.9 ± 1.6	80.2 ± 0.6	0.3	74.3 ± 3.0	73.7 ± 2.3	0.8
Physical activity in past 30 days	65.8 ± 1.8	73.7 ± 0.6	< 0.001	67.4 ± 3.0	70.4 ± 2.2	0.1
Overweight/obese (BMI ≥ 25kg/m <sup>2</sup> )	72.5 ± 1.7	69.8 ± 0.6	0.2	70.9 ± 2.8	69.7 ± 2.3	0.6
<b>Health Status</b>						
Self-reported fair/poor health	66.8 ± 1.9	84.1 ± 0.5	< 0.001	51.6 ± 3.9	68.7 ± 2.6	< 0.001
Living with disability	44.3 ± 1.9	26.1 ± 0.6	< 0.001	53.0 ± 3.5	44.8 ± 2.8	< 0.001
Physically unhealthy for ≥ 14 days in past 30 days	23.8 ± 1.7	10.6 ± 0.4	< 0.001	27.9 ± 3.6	17.3 ± 2.1	< 0.001
Emotionally unhealthy for ≥ 14 days in past 30 days	15.1 ± 1.4	13.7 ± 0.5	0.4	23.3 ± 3.1	19.0 ± 2.0	0.05
Poor health interfered with usual activities for ≥ 14 days in past 30 days	16.4 ± 1.5	8.2 ± 0.4	< 0.001	22.4 ± 3.5	15.1 ± 2.1	< 0.001
<b>Health Care Access</b>						
Uninsured	6.9 ± 1.0	12.6 ± 0.5	< 0.001	17.1 ± 2.9	18.0 ± 0.2	0.7
Do not have health care provider	9.7 ± 1.3	22.2 ± 0.6	< 0.001	24.4 ± 3.3	30.3 ± 2.2	0.06
Could not see doctor because of cost	11.7 ± 1.3	13.2 ± 0.5	0.3	23.9 ± 3.2	21.2 ± 1.9	0.3

\* Predicted population margins; adjusted for age, sex, race/ethnicity, employment status, and education level. SE= standard error. P-values < 0.05 indicate statistically significant between-group differences.

Source: 2019 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment

## Receiving treatment summary and care plan, financial hardship, participating in clinical trial, and pain management among cancer survivors

Starting from 2016, Cancer Program included the cancer survivorship module in the Kansas BRFSS questionnaire. The module questions collected information whether the cancer survivors received treatment summaries and survivorship care plans, faced financial hardship due to cancer, participated in clinical trials, and if they had their pain managed. In addition to the survivorship module, the cancer program added another set of questions in 2018 to collect more detailed information about the financial hardship among cancer survivors, i.e., inability to get cancer screening test; inability to get a cancer diagnostic test if they were recommended to do; or if they went in a financial hardship such as borrowing money or going into debt because of their cancer, its treatment, or the late effects of treatment. These questions were asked to any respondent with cancer, including skin cancer. The weighted percentages of cancer survivors in Kansas were 11.5%, 12.0%, and 12.2%, in 2016, 2017, and 2018, respectively (Data not shown).

During 2016-2018, less than half of cancer survivors received a summary of their treatment from their health care providers. The percentage of cancer survivors who received a summary of their treatment ranged from 41.3% (2017) to 48.7% (2016), without significant differences between the three years (Table 13-2).

About three quarters of cancer survivors have received a survivorship care plan during 2016-2018 in Kansas. This care plan referred to instructions from a healthcare professional on where the survivors should return or who they should see for routine cancer check-ups after completing their treatment. The percentage of cancer survivors who received a survivorship care plan ranged from 70.0% (2017) to 77.1% (2016), without significance differences between the three years. The great majority of those who received a survivor care plan (77.0%-79.6%) received it written down or printed on paper format during 2016-2018, also without significant differences between the three years.

As for the financial burden from cancer, insurance paid for all or part of cancer treatment for most of Kansas cancer survivors (94.9%-97.1%) with their most recent diagnosis of cancer, whereas a small percentage of Kansas cancer survivors were denied insurance because of cancer (6.7%-8.3%) during 2016-2018. There were no significant differences between the three years regarding these two components of hardship.

In 2018, only 2.5 percent of cancer survivors in Kansas were unable to obtain cancer screening due to cost, while about 11% were unable to obtain recommended cancer screening testing due to cost, and about 9 percent of cancer survivors experienced financial hardship due to cancer, treatment or late effects of treatment.

The percentage of cancer survivors who participated in a clinical trial during their course of treatment ranged from 3.1% (2018) to 5.0% (2016), there were also no significant differences between the three years.

During 2016-2018, the percentages of cancer survivors who experienced pain caused by cancer or cancer treatment ranged from 8.1% (2016) to 10.0% (2018). The majority of those with pain got their pain under control (72.3%-78.6%) with or without medication. These percentages did not differ significantly between the three years.

**Table 13-2. Percentages of receiving treatment summary and care plan, financial hardship, participating in clinical trial, and pain management among cancer survivors, Kansas, 2016-2018**

	Percentage		
	2016 % (95% CI)	2017 % (95% CI)	2018 % (95% CI)
<b>Receiving treatment summary and care plan</b>			
Ever given a written summary of cancer treatment	48.7 (43.7-53.6)	41.3 (37.5-45.2)	45.5 (40.5-50.6)
Ever received a survivorship care plan <sup>a</sup>	77.1 (73.1-81.0)	70.0 (66.3-73.4)	74.4 (69.9-78.8)
The survivorship care plan is written <sup>a</sup>	79.6 (75.3-83.9)	77.9 (74.1-81.7)	77.0 (71.8-82.2)
<b>Financial hardship due to cancer</b>			
Insurance paid for all or part of cancer treatment	96.7 (94.9-98.4)	94.9 (93.2-96.6)	97.1 (95.5-98.7)
Denied insurance because of cancer	6.7 (4.5-8.9)	7.6 (5.4-9.8)	8.3 (5.4-11.2)
Unable to obtain cancer screening due to cost <sup>b</sup>			2.5 (2.0-3.1)
Unable to obtain recommended cancer diagnostic testing due to cost <sup>b</sup>			10.6 (7.1-14.1)
Financial hardship due to cancer, treatment or late effects of treatment <sup>b</sup>			8.6 (6.2-10.9)
<b>Participation in a clinical trial</b>			
Participated in a clinical trial	5.0 (3.1-6.9)	6.3 (4.3-8.3)	3.1 (1.6-4.6)
<b>Pain management</b>			
Has pain caused by cancer or cancer treatment	8.1 (5.5-10.6)	9.8 (7.3-12.3)	10.0 (6.7-13.4)
Pain is under control	78.6 (64.9-92.3)	72.3 (59.1-85.5)	73.6 (58.3-88.8)

<sup>a</sup> The survivorship care plan referred to instructions from a healthcare professional on where the survivors should return or who should see him/her for routine cancer check-ups after completing his/her treatment

<sup>b</sup> Data are not available in 2016 and 2017 BRFSS.

Source: 2016-2018 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, Kansas Department of Health and Environment. See Technical Appendix for details on how prevalence estimates were calculated.

## Technical Notes

### Data Sources

#### Kansas Cancer Registry

The Kansas Cancer Registry (KCR), which operates on behalf of the Kansas Department of Health and Environment by the University of Kansas Medical Center, is the only population-based source of information on cancer incidence in Kansas. Per Kansas statute and administrative regulation, cancer has been a reportable disease in Kansas since 1982. Hospitals and physicians provide information to the KCR on all cancer diagnoses in the state, including type of cancer (primary site), date of diagnosis, and stage at diagnosis. Patient demographics, including sex, age, race/ethnicity, and county of residence, as well as survival status are also collected. Kansas residents who are diagnosed or treated with cancer in Missouri, Nebraska, Colorado, Oklahoma, Texas, and Washington are included in the KCR database through data exchange.

Types of cancer are defined according to the National Cancer Institute (NCI) Surveillance Epidemiology and End Results (SEER) Site Recode International Classification of Diseases for Oncology, Third Edition (ICD-O-3) (1/27/2003) definitions ([http://seer.cancer.gov/siterecode/icdo3\\_d01272003](http://seer.cancer.gov/siterecode/icdo3_d01272003)).

Several considerations should be taken into account when interpreting cancer incidence data in this report:

- All incidence data reflects invasive cancers only, with the exception of bladder cancer, which includes both invasive and in situ cancers.
- The KCR identifies approximately 95% of the expected cases of cancer within 24 months of the close of the year of diagnosis. KCR continues to update the cancer cases from previous years as they are reported to the registry; thus, counts may change slightly over time as the data become more complete.
- Hispanics were defined as persons of Mexican, Puerto Rican, Cuban, South or Central American, Other Spanish, Spanish not otherwise specified, or Dominican Republic ethnicity. Persons with Spanish surname only or unknown ethnicity were excluded. Other data reporting systems (e.g. Kansas Information for Communities) may define Hispanic origin differently, which may yield slightly different results from data presented in this report.

#### Kansas Vital Statistics

All deaths in Kansas are reported to the Kansas Department of Health and Environment's Office of Vital Statistics. Death certificates are completed and registered through the efforts of physicians, hospital personnel, funeral directors, attorneys, and local courts. Underlying cause of death is defined as the disease or injury that initiated the chain of events leading directly to death and is classified according to the International Classification of Diseases, 10th Revision (ICD-10). For this report, cancer causes of death were defined according to the National Cancer Institute (NCI) Surveillance Epidemiology and End Results (SEER) Cause of Death Recode 1969+ (9/17/2004) definitions ([http://seer.cancer.gov/codrecode/1969+\\_d09172004/index.html](http://seer.cancer.gov/codrecode/1969+_d09172004/index.html)).

Several considerations should be taken into account when interpreting cancer mortality data in this report:

- All mortality data in this report include only deaths of Kansas residents registered in the annual research summary files that are provided to the Bureau of Health Promotion by the Office of Vital Statistics. The number of deaths in this database may differ slightly from those available through

the National Center for Health Statistics due to differences in the procedures for collecting mortality data.

- Mortality data reported by the Office of Vital Statistics in the Annual Summary or Vital Statistics include only deaths that are registered by June 1 of the year after the year the death occurred. Mortality data presented in this report also include deaths registered at later dates. Thus, the number of deaths reported by the Office of Vital Statistics and this report may differ slightly.
- Kansas residents who die in other states or abroad may be less likely to be included than Kansas residents who die in Kansas.
- In 2005, the Kansas death certificate was revised to allow reporting of multiple races and collect race separately from ethnicity. Race and ethnicity data are reported as five-year averages for the time period 2010-2014 in this report.

### Behavioral Risk Factor Surveillance System (BRFSS)

The BRFSS is an ongoing, population-based, random-digit-dial survey of non-institutionalized adults ages 18 years and older living in private residences or college housing with landline or cell phone service in Kansas. The survey is coordinated by the Centers for Disease Control and Prevention (CDC) and is conducted annually by all 50 states, the District of Columbia, and several U.S. territories. Due to weighting methodology changes after 2011, this report includes only data collected by the Kansas Department of Health and Environment from 2011-2019. The complex survey methodology and analytical procedures for BRFSS are designed to produce prevalence estimates that can be generalized to Kansas adults statewide. A more detailed explanation of the weighting methodology used for the Kansas BRFSS is available at: <http://www.kdheks.gov/brfss/technotes.html>.

Several considerations should be taken into account when interpreting BRFSS estimates:

- BRFSS estimates do not apply to individuals without telephone service, those who reside on military bases or within institutions, or those who are unable to complete a telephone survey.
- BRFSS prevalence estimates are self-reported and are subject to bias due to respondents' inability or unwillingness to provide accurate information about their own behaviors or characteristics.

### Youth Risk Behavior Survey (YRBS)

The Kansas YRBS is part of a biennial national effort coordinated by the CDC to monitor health risks and behaviors among youth, including tobacco use. In spring 2013, the Kansas State Department of Education and the Kansas Department of Health and Environment conducted the YRBS in a random sample of Kansas high schools, which included nearly 2,000 students in grades 9-12. Weighted YRBS data can be generalized to all 9th-12th grade students in Kansas. Additional Kansas YRBS data can be found on the Kansas Coordinated School Health website at [www.kshealthykids.org](http://www.kshealthykids.org).

### National Immunization Survey (NIS-Teen)

The NIS-Teen, conducted by the Centers for Disease Control and Prevention (CDC), collects data on vaccination coverage of adolescents in the United States. Randomly-selected households in all 50 States, the District of Columbia, and selected areas for oversampling are interviewed by telephone. To assure the accuracy and precision of the vaccination coverage estimates, immunization data for surveyed adolescents are also collected through a mail survey of their health care providers. For more information about NIS-Teen, visit [http://www.cdc.gov/nchs/nis/about\\_nis.htm#nis\\_teen](http://www.cdc.gov/nchs/nis/about_nis.htm#nis_teen)



## Statistical Methods

### Incidence and Mortality Rates

Incidence and mortality rates presented in this report are calculated as the number of cancer diagnoses or deaths divided by Kansas' total population or subpopulation of interest. Kansas population estimates were attained from the National Cancer Institute's (NCI) Surveillance Epidemiology and End Results (SEER) website. These population estimates are a modification of the Vintage 2009 annual time series of July 1 county population estimates by age, sex, race and Hispanic origin produced by the U.S. Census Bureau's Population Estimates Program, in collaboration with the National Center for Health Statistics, with support from the NCI. Detailed information on these population estimates are available at: <http://seer.cancer.gov/popdata/methods.html>

### Age-adjusted Rates

Age adjustment is a statistical method for standardizing rates so that groups with different underlying age distributions are more comparable. Age-adjusted rates can be used to compare two different groups at the same time or the same group over time, if the underlying age distributions are different or change. Age-adjusted rates are not actual measures of burden and are not comparable to unadjusted (crude) rates.

Age-adjusted rates in this report are calculated using the direct method. Briefly, rates are first calculated within each age subgroup to create age-specific rates. Each age-specific rate is then multiplied by the proportion of the U.S. Standard Population in that particular age category.<sup>57</sup> These products are then summed across age subgroups to produce an age-adjusted rate. For age-adjusted incidence and mortality rates, age-specific rates are based on 19 age groups (<1, 1-4, 5-9, 10-14, 15-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80-84, 85+).

### 95% Confidence Interval (CI)

All rates and prevalence estimates are estimates of a true value (population parameter) and are thus subject to random variation. 95% CIs are used to characterize this variability and can be thought of as a range of values that will contain the true value 95% of the time. CIs for incidence and mortality rates were computed using a method based on the gamma distribution.<sup>58</sup> For BRFSS prevalence estimates, the complex survey design is taken into account for variance estimation and 95% CIs are computed using a normal approximation.

All statistical analyses presented in this report were conducted using SAS, Version 9.4.

### Trend Analysis

The trend of the annual incidence and mortality rates was analyzed using the Joinpoint software. The software takes the annual rates and fits the simplest joinpoint model that the data allow. The user supplies the minimum and maximum number of joinpoints. The program starts with the minimum number of joinpoints (e.g. 0 joinpoints, which is a straight line) and tests whether more joinpoints are statistically significant and must be added to the model (up to that maximum number). This enables the user to test that an apparent change in trend is statistically significant. The tests of significance use a

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<sup>57</sup> Klein RJ, Schoenborn CA. Age adjustment using the 2000 Projected U.S. Population. Healthy People Statistical Notes, no. 20. Hyattsville, Maryland: National Center for Health Statistics. January 2001.

<sup>58</sup> Fay MP, Feuer EJ. CIs for directly standardized rates: a method based on the gamma distribution. (1997). *Statistics in Medicine*, 16, 791-801.

Monte Carlo Permutation method. The models may incorporate estimated variation for each point (e.g. when the responses are age adjusted rates) or use a Poisson model of variation. In addition, the models may also be linear on the log of the response (e.g. for calculating annual percentage rate change). The software also allows viewing one graph for each joinpoint model, from the model with the minimum number of joinpoints to the model with maximum number of joinpoints. Once the line segments are established, the estimated annual percent change (APC) is used to describe and test the statistical significance of the trends in the model. Testing the hypothesis (two-sided P value = .05) that the annual percent change is equal to zero is equivalent to testing the hypothesis that the trend in the cancer rates is neither increasing nor decreasing. For the purpose of the burden document, we only presented the outcomes of the 0 joinpoints models.

### County Population Density Subgroups

County population density subgroups were established by the Kansas Department of Health and Environment’s Office of Local and Rural Health (Table T-1). County population density peer groups are based on the population for each county in the 2000 population and are defined as follows: frontier (fewer than 6 persons per square mile), rural (6 to 19.9 persons per square mile), densely-settled rural (20 to 39.9 persons per square mile), semi-urban (40 to 149.9 persons per square mile), and urban (150 or more persons per square mile).

Category	Population Density	Kansas Counties
Frontier	Fewer than 6 persons per square mile	Barber, Chase, Cheyenne, Clark, Comanche, Decatur, Edwards, Elk, Gove, Graham, Greeley, Hamilton, Hodgeman, Jewell, Kearny, Kiowa, Lane, Lincoln, Logan, Meade, Morton, Ness, Osborne, Rawlins, Rush, Sheridan, Smith, Stanton, Trego, Wallace, Wichita
Rural	6 to 19.9 persons per square mile	Anderson, Brown, Chautauqua, Clay, Cloud, Coffey, Ellsworth, Grant, Gray, Greenwood, Harper, Haskell, Jackson, Kingman, Linn, Marion, Marshall, Mitchel, Morris, Nemaha, Norton, Ottawa, Pawnee, Phillips, Pratt, Republic, Rice, Rooks, Russel, Scott, Sherman, Stafford, Stevens, Thomas, Wabaunsee, Washington, Wilson, Woodson
Densely-Settled Rural	20 to 39.9 persons per square mile	Allen, Atchison, Barton, Bourbon, Cherokee, Cowley, Dickinson, Doniphan, Ellis, Finney, Ford, Jefferson, Labette, McPherson, Neosho, Osage, Pottawatomie, Seward, Sumner
Semi-Urban	40 to 149.9 persons per square mile	Butler, Crawford, Franklin, Geary, Harvey, Leavenworth, Lyon, Miami, Montgomery, Reno, Riley, Saline
Urban	150 or more persons per square mile	Douglas, Johnson, Sedgwick, Shawnee, Wyandotte

