

# 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

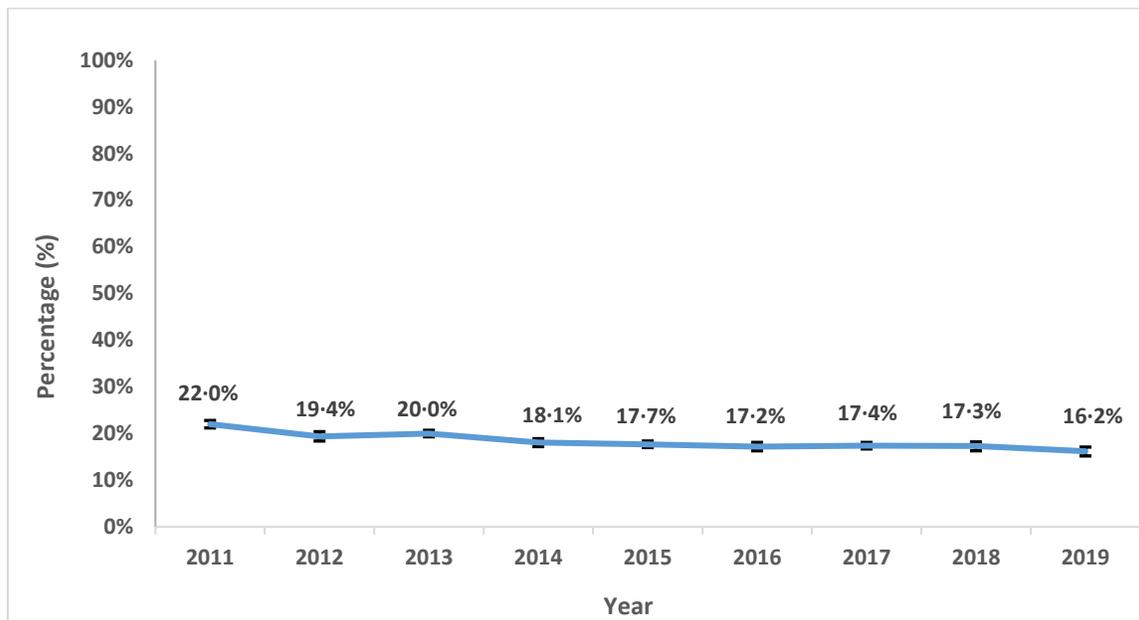
In 2019, 16.2 percent (95% Confidence Interval (CI): 15.2% to 17.1%) of Kansas adults 18 years and older were current smokers (Table 11-1, Figure 11-1). The trend analysis of smoking prevalence among Kansas adults over the years showed that the percent of the current smokers significantly decreased annually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

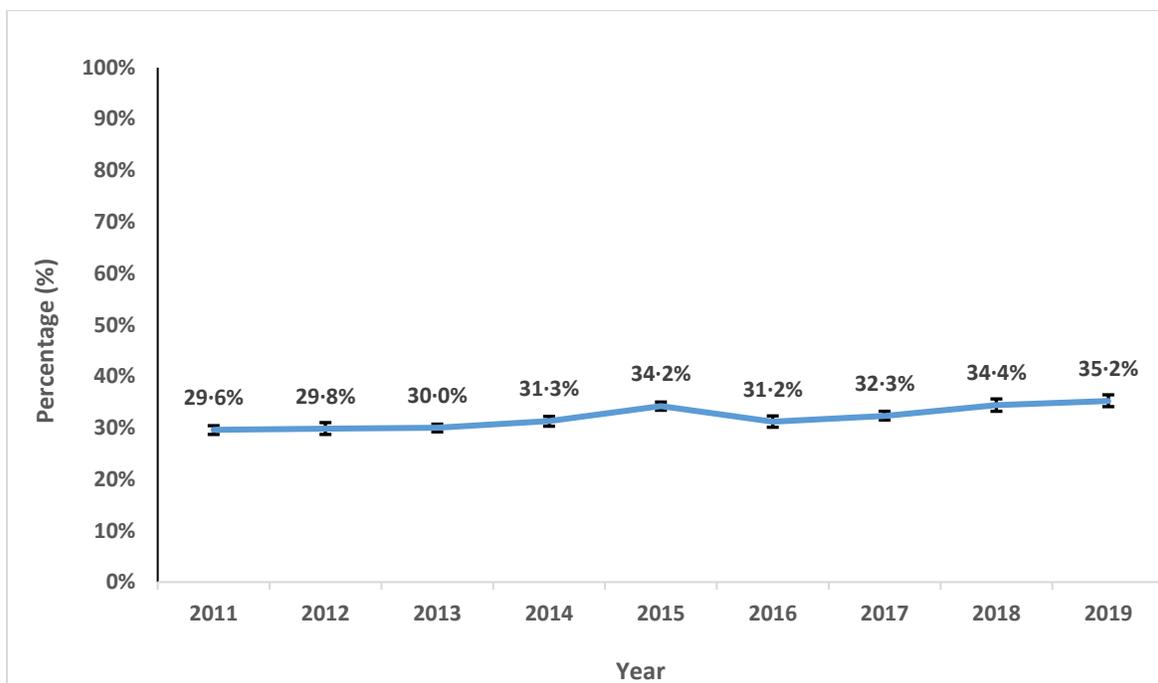
<sup>41</sup> American Cancer Society (2012). Radon. <http://www.cancer.org/Cancer/CancerCauses/OtherCarcinogens/Pollution/radon>

<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).