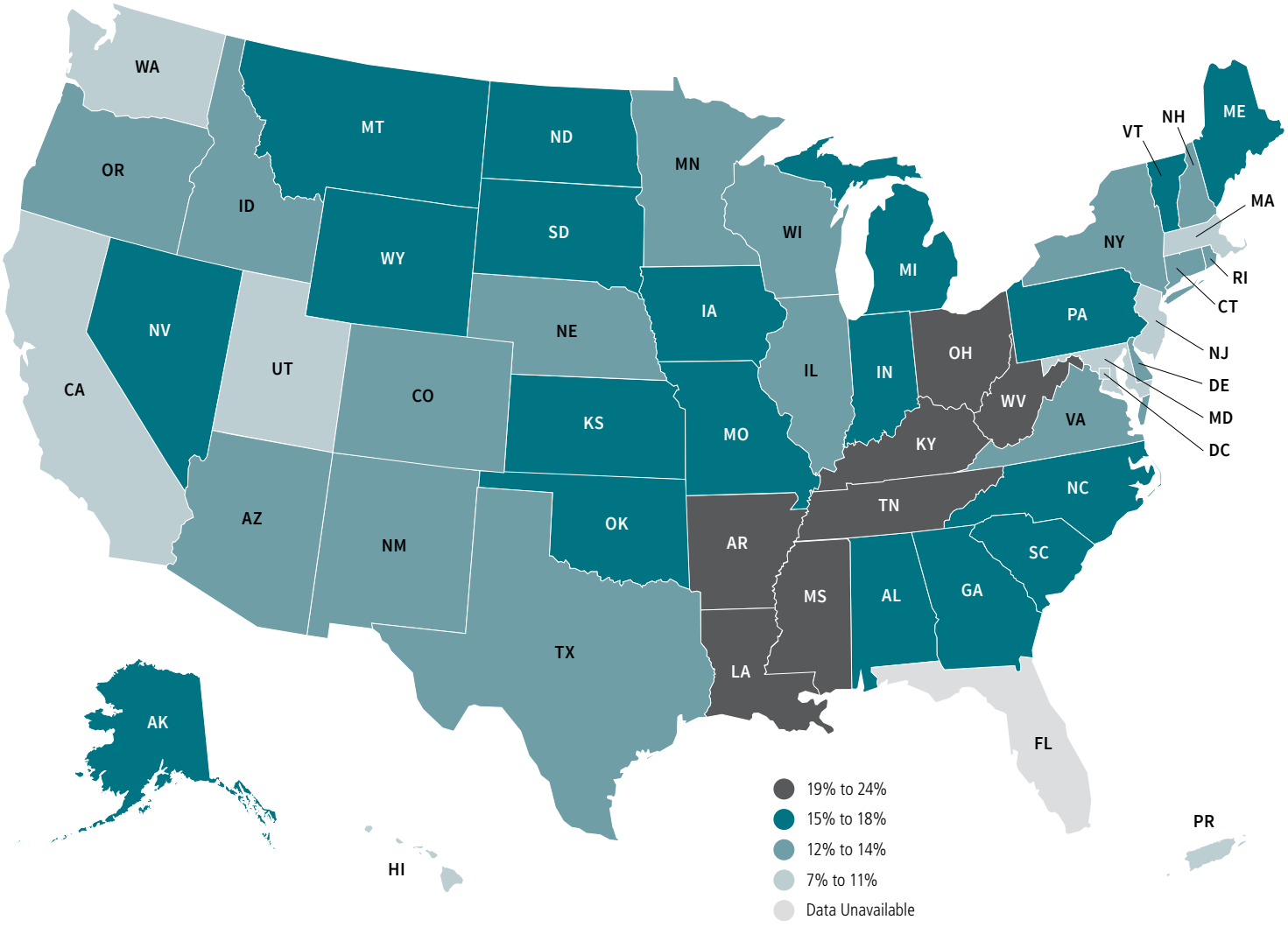
American Cancer Society®

Cancer Prevention & Early Detection
Facts & Figures 2023–2024

Current* Cigarette Smoking (%), Adults 18 Years and Older by State, US, 2021



*Ever smoked 100 cigarettes in lifetime and now smoke every day or some days.
Source: Behavioral Risk Factor Surveillance System, 2021.

Contents

This publication attempts to summarize current scientific information about cancer. Except when specified, it does not represent the official policy of the American Cancer Society.

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Highlights

Tobacco

- Current adult cigarette smoking prevalence in the United States declined from 14% in 2019 to 12% in 2021. Yet, disparities persisted, with about 1 in 5 or more adults who were GED-educated (31%), bisexual (21%), Medicaid- or publicly insured (22%), uninsured (20%), below the federal poverty level (22%) or less than high school-educated (21%), American Indian/Alaska Native (19%), or West Virginian (24%) still smoking in 2021.
- The quit ratio (proportion of people who have quit among those who ever smoked) among US adults reached a historic high of 67% (56 million) in 2021. However, this proportion was <50% among persons who were below the federal poverty level (46%), uninsured (40%), or Medicaid- or publicly insured (44%).
- E-cigarettes have been the most commonly used tobacco product among high school students since 2014. In 2022, 14% of high school students currently used e-cigarettes, 3% smoked cigars, and 2% smoked cigarettes.
- The largest disease and economic burden attributable to cigarette smoking is found in certain Southern and Midwestern states with historically underfunded tobacco control programs. 8 of 17 Southern states and 5 of 12 Midwestern states have tobacco control funding levels less than 10% of the Centers for Disease Control and Prevention's (CDC) recommended levels for 2023.
- Menthol flavoring may increase cigarette and cigar initiation among youth and young adults, increase nicotine dependence, and make quitting more difficult. In April 2022, the US Food and Drug Administration (FDA) proposed product standards to prohibit menthol in cigarettes and all flavoring in cigars. Massachusetts and California are the only states to have implemented statewide laws restricting the sale of menthol cigarettes and other flavor tobacco products, and about 360 localities have passed local flavored tobacco sales restrictions, including 170 menthol cigarette sales restrictions.

Excess Body Weight, Physical Activity, Diet, and Alcohol

- Among adults, overweight prevalence has remained relatively stable since the early 1960s, but obesity has increased markedly. In 2017-2020, approximately 7 in 10 adults were overweight or obese and about 4 in 10 were obese; in 2021, obesity prevalence ranged from 25% in Colorado and the District of Columbia, to 41% in Alabama, Kentucky, and West Virginia.
- Among youth (ages 2-19 years), obesity prevalence increased four-fold, from 5% in the early 1970s to 20% during 2017-2020.
- Less than half of adults (48%) reported meeting physical activity recommendations in 2020; in 2021, only 24% of adults reported eating ≥2 servings of fruit daily and about 11% reported consuming ≥3 servings of vegetables daily.
- In 2017-2018, 67% and 57% of total daily energy intake was from consumption of ultra-processed foods among US youth and adults, respectively.

Ultraviolet Radiation

- In 2020, prevalence of past-year sunburn among adults was approximately 27%, and it was highest in younger adults ages 18-24 years (40%), among whom inconsistent sun protective behaviors' prevalence was also highest (39%).
- Despite declining use in recent years, 6% of female high school students in 2019 still reported use of indoor tanning in the past year. As of January, 2023, only 20 states and the District of Columbia have a law prohibiting tanning for minors under 18 years of age without exemptions.

Infectious Agents

- In 2021, 64% of girls and 60% of boys ages 13-17 years were up to date for the HPV vaccination series, though these estimates ranged widely by state from 33% in Mississippi to 81% in the District of Columbia among girls and from 33% in Mississippi to 86% in Rhode Island among boys.
- Only 41% of girls and 40% of boys were up to date for HPV vaccination before their 13th birthday, with estimates ranging from 24% in Florida and Wyoming to 61% in the District of Columbia in girls and boys combined.

Cancer Screening

- In 2021, 64% of women ages 45 years and older were up to date with breast cancer screening. However, screening rates were low among uninsured women (29%) and recent immigrants (37%).
- In 2021, 75% of women ages 25-65 years were up to date with cervical cancer screening. Screening utilization was lowest among recent immigrants (55%), those with less than a high school education (56%), and uninsured women (58%).
- In 2021, 59% of adults ages 45 years and older were up to date for colorectal cancer screening. However, fewer than one-third of adults ages 45-49 years (20%), uninsured persons (21%), and recent immigrants (29%) were up to date.
- In 2021, 35% of men ages 50 years and older received prostate specific antigen testing for screening purposes in the past year. Testing was lowest in men who were uninsured (10%) or Medicaid- or publicly insured (19%), Asian (21%), with less than a high school education (21%), or with income below 100% of the federal poverty level (22%).

Introduction

Cancer prevention and early detection are central to the American Cancer Society's goal to ensure everyone has an opportunity to prevent, detect, treat, and survive cancer. Large reductions in smoking and improvements in earlier cancer detection have contributed to steady declines in cancer mortality since the early 1990s, averting an estimated 3.8 million cancer deaths.[1] Additional cancer morbidity and mortality could be prevented by implementing evidence-based interventions throughout all population groups.[2] In 2014, an estimated 42% of cancer cases and 45% of cancer deaths in the US could be attributed to modifiable risk factors.[3] Furthermore, cancer screening tests can prevent thousands of additional cancer cases and deaths through identification and removal of premalignant abnormalities (colorectal and cervical) and detection of cancers at an early stage when treatment is more effective.

References

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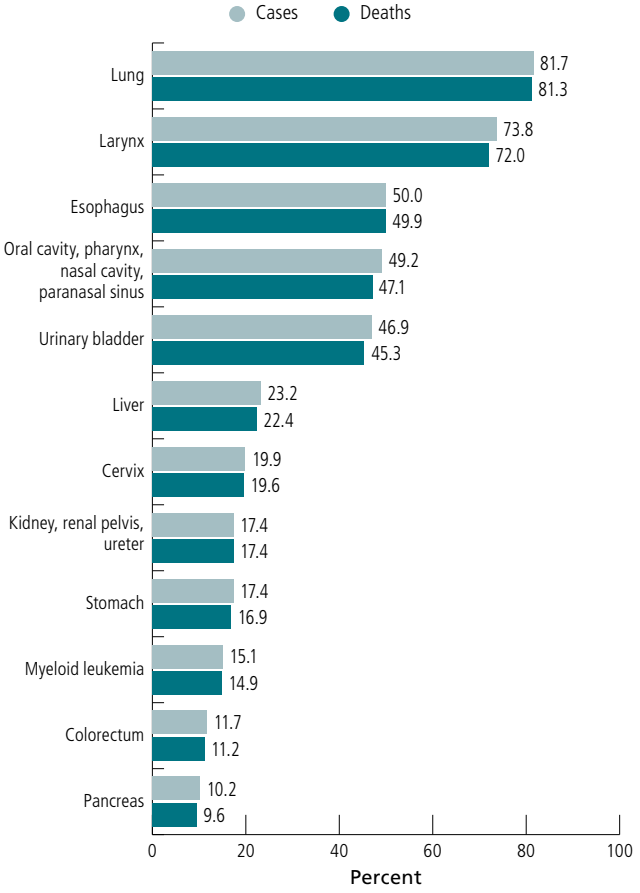
Tobacco

The first US Surgeon General's Report (SGR) on Smoking and Health in 1964 concluded that cigarette smoking caused lung cancer.[1] Since then, other tobacco products, including cigars, cigarillos, waterpipes, and smokeless tobacco, have also been causally linked to lung cancer and other cancer types.[2] Despite decades of declining

Figure 1A. Proportion of Cancer Cases and Deaths Attributable to Cigarette Smoking, Adults 30 Years and Older, US, 2014



Source: Islami F et al, 2018.[5]

prevalence, tobacco use remains the most common, preventable cause of death in the US.[3] This is partly because smoking prevalence remains high in many segments of the population, including among those with low socioeconomic status, mental illness, and sexual and gender diverse persons.[4] As a result, about 30% of all cancer deaths in the US[5] and as much as 40% in parts of the South and Appalachia are still caused by smoking.[6]

Cigarette Smoking

In addition to lung cancer, cigarette smoking increases the risk of many cancers, including those of the oral cavity and pharynx, larynx, esophagus, pancreas, uterine cervix, kidney, bladder, stomach, colorectum, liver, and acute myeloid leukemia.[2] Evidence suggests that smoking may also increase the risk of fatal prostate cancer and a rare type of ovarian cancer.[2, 7] Harmful health effects increase with both duration and intensity of smoking. The proportion of cases and deaths attributable to smoking varies across cancer type (Figure 1A).[5] Since almost 90% of adults who smoke regularly began smoking before the age of 18 and smoking causes nicotine addiction among adolescents, tobacco use in youth is an important public health issue.[8]

Adult Cigarette Smoking

- The prevalence of current smoking among adults ages ≥18 years decreased from 14% in 2019 to 12% in 2021 (men: 13%; women: 10%) during the COVID-19 pandemic (Table 1A), continuing a long-term declining trend from the peak level of 42% in 1965. However, more than 28 million adults still currently smoke.
- Smoking prevalence declined across race/ethnicity groups, although substantial disparities remain (Figure 1B). In 2021, smoking prevalence was lowest among Asian (5%) persons and highest among American Indian/Alaska Native (19%) persons. (Table 1A).
- By state, smoking prevalence in 2021 was lowest in Utah (7%) and highest in West Virginia (24%) (Cover, Table 1B).
- While declines were observed in smoking prevalence between 2019 and 2021, per capita cigarette consumption (sales) increased by 1.9% more than expected in 2020 and persisted well into 2021.[9] It is yet unclear whether these contrasting trends reflect increases in smoking prevalence, smoking intensity, or are an artifact of changes in data collection methods enacted in 2020 in response to the pandemic.

Youth Cigarette Smoking

- In 2022, the prevalence of current cigarette smoking (past month) among high school students was 2% (males: 2%, females: 2%) (Table 1C).[13]

Table 1A. Current Cigarette Smoking, Quit Ratio, Past-year Quit Attempts, and Recent Successful Cessation (%), Adults 18 Years and Older, US, 2020-2021

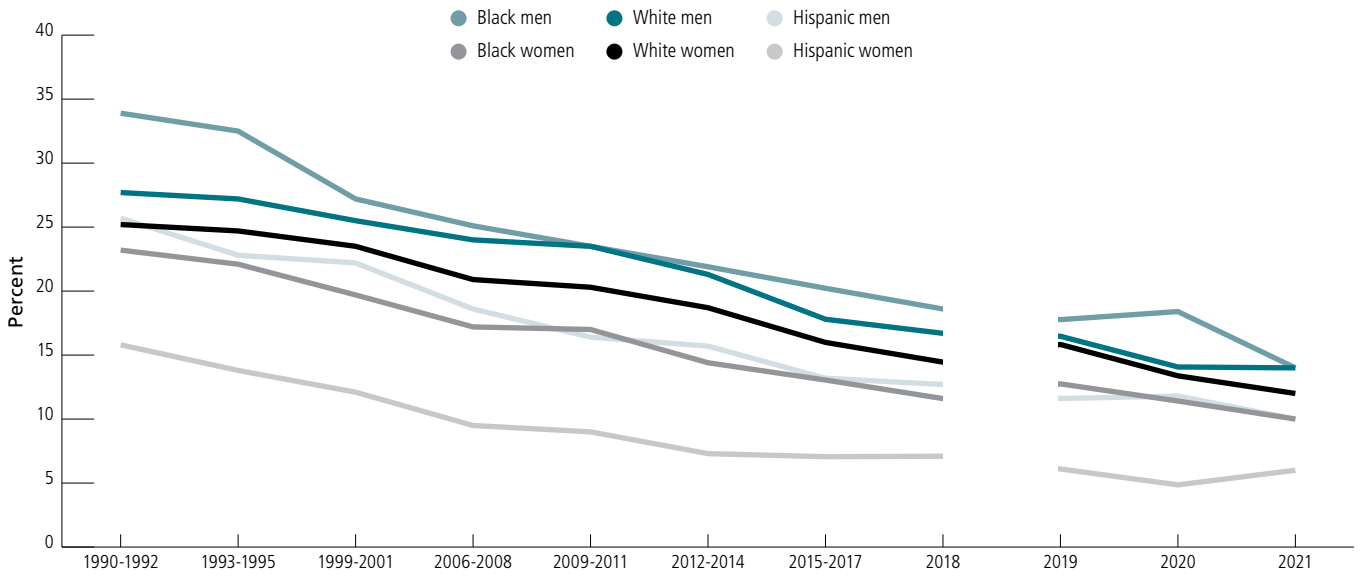
	Current Smoking* (2021)			Quit Ratio† (2021)	Past-year Quit Attempt‡ (2020)	Recent Successful Cessation§ (2020)
	Males	Females	Overall	Overall	Overall	Overall
Overall	**13**	**10**	**12**	**67**	**55**	**8**
Sex						
Males	–	–	–	67	56	8
Females	–	–	–	65	55	8
Age (years)						
18-24	6	4	5	50	69	15
25-44	15	10	13	59	60	11
45-64	16	14	15	62	50	5
65+	9	7	8	82	50	6
Race/Ethnicity						
Hispanic	10	6	8	68	58	6
White only	14	12	13	68	53	9
Black only	14	10	12	54	63	7
Asian only	10	2	5	70	68	¶
AIAN only or multiple	20	18	19	59	46	¶
Sexual orientation						
Gay or lesbian	14	14	14	66	65	¶
Straight	13	10	11	67	54	8
Bisexual	17	23	21	58	71	¶
Immigration status						
Born in US/US territory	14	12	13	66	55	8
In US fewer than 10 years	10	6	8	63	58	¶
In US 10+ years	10	3	6	73	60	6
Education (≥25 years)						
No HS diploma	24	18	21	55	53	6
GED	33	29	31	52	50	¶
HS diploma	20	16	18	62	54	6
Some college	17	14	16	66	56	9
Undergraduate degree	6	5	5	80	55	13
Graduate degree	4	3	3	86	52	12
Income level						
<100% FPL	26	20	22	46	56	6
100 to less than 200% FPL	22	14	18	57	55	6
≥200% FPL	10	7	9	73	55	10
Insurance status						
Uninsured	24	15	20	40	55	4
Private	10	8	9	70	55	10
Medicaid/Public/Dual eligible	25	20	22	44	60	7
Medicare (ages ≥65 years)	9	8	8	79	48	4
Other	16	10	14	68	52	8

AIAN-American Indian or Alaska Native. HS-high school. GED-General Educational Development high school equivalency. FPL-federal poverty level. *Ever smoked 100 cigarettes in lifetime and now smoke every day or some days. †Persons who formerly smoked (do not smoke currently) among those who ever smoked 100 cigarettes in lifetime. ‡Persons who reported that they stopped smoking for >1 day during the past 12 months because they were trying to quit smoking among those currently smoking and persons who quit during the past year among those who formerly smoked. §Persons who quit smoking for ≥6 months during the past year among those who quit during the past year and among those currently smoking who had smoked for >=2 years. ¶ Estimates are statistically unstable. See Special Notes on page 68.

Source: National Health Interview Survey, 2020 and 2021.

- Current cigarette smoking among high school students continued a declining trend in the 2000s and 2010s in all race/ethnic groups after peaking in 1999.[10, 11] However, the pace of decline among all US students may have slowed from 2015 onward compared to declines since the early 2000s.[12]
- In 2019, cigarette smoking prevalence among high school students was lowest in Utah (2%) and highest in West Virginia (14%). Nearly half of participating states had a prevalence of ≤5.[14]

Figure 1B. Current Cigarette Smoking* Trends (%), Adults 18 Years and Older by Sex and Race/Ethnicity, US, 1990-2021



*Ever smoked 100 cigarettes in lifetime and now smoke every day or some days.

Sources: 1990-2017: National Center for Health Statistics. Health, United States, 2017: With special feature on mortality. Hyattsville, MD. 2018-2021: National Health Interview Survey, 2018-2021.

Other Combustible Tobacco Products

In addition to cigarettes, tobacco is used in other combustible forms, such as cigars, cigarillos or little cigars, pipes, waterpipes (also known as hookahs or shishas), and roll-your-own products. Smoking cigars increases the risk of cancers of the lung, oral cavity, larynx, and esophagus compared to those who do not smoke them.[15-18] Cigars are substantially less regulated and often cost less than cigarettes, are sold as singles or smaller pack sizes, and many include flavorings – factors that are particularly appealing to youth.[19, 20] Waterpipes, often used in social settings (e.g., hookah bars), are designed to heat tobacco (often flavored) and pass smoke through water. Their use is associated with an increased risk of lung, oral, and esophageal cancers, as well as non-cancer respiratory illnesses.[21-23]

Adult Other Combustible Tobacco Use

- In 2021, 4% of adults (6% men and 1% women) reported currently smoking cigars, and use was more common among Black (5%) and White persons (4%) than among Hispanic (2%) or Asian (1%) persons.[24]
- About 1% of men and women currently smoked pipes (regular pipes or waterpipes) in 2021.[24]

Youth Other Combustible Tobacco Use

- In 2022, cigars replaced cigarettes as the most commonly smoked combustible product; 3% of high school students (males: 4%, females: 2%) reported current cigar use (Table 1C).
- While overall cigar smoking among high school students declined between 2011 and 2020,[25, 26] trends were variable across racial/ethnic groups, with prevalence consistently higher in Black students (4% in 2021) than in White (3%) or Hispanic (2%) students.[27]
- In 2022, 5% of high school students and 2% of middle school students smoked any combustible tobacco product (cigarettes, cigars, waterpipes, pipes or bidis); prevalence was higher among Black (8%), American Indian/Alaska Native (7%), and multiracial (7%) high school students than White (5%) or Hispanic (5%) students (Figure 1C).

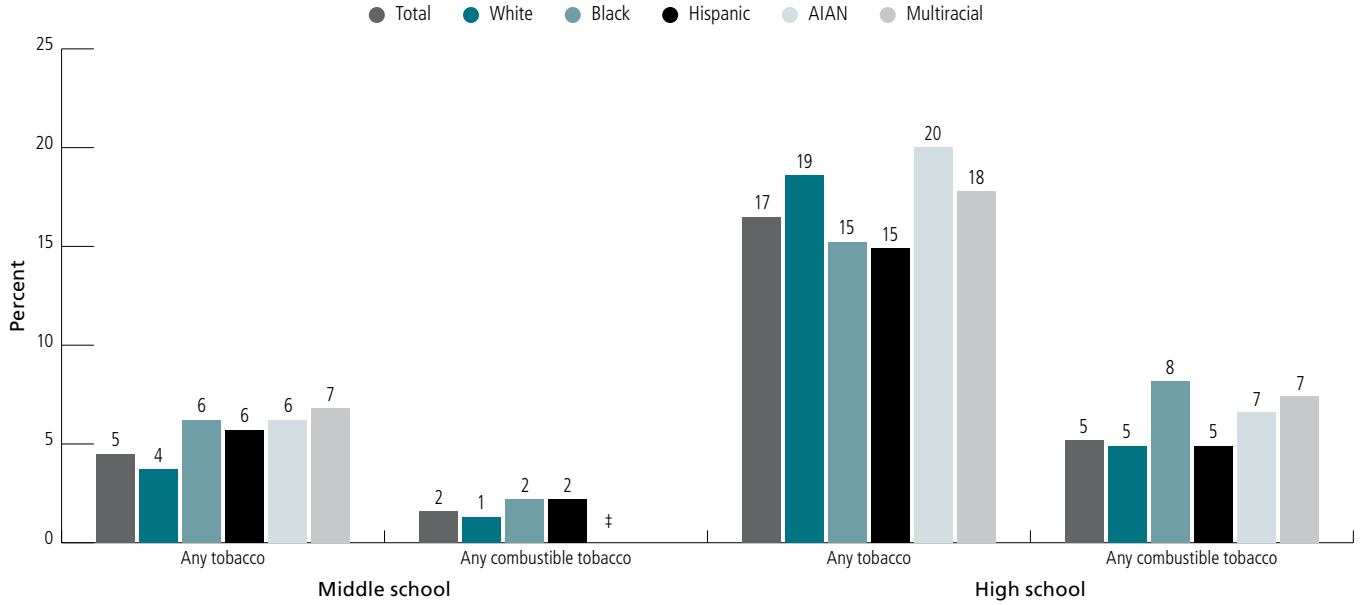
Table 1B. Current Tobacco Use and Smoking Cessation (%), Adults 18 Years and Older by State, US, 2020-2021

State	Cigarettes* (2021)					E-cigarettes¶ (2021)	Smoking Cessation		
	Overall	Rank† (1=high)	Males	Females	Low education‡		Quit ratio (2021)	Past-year quit attempt (2020)	Recent successful cessation (2020)
United States (median)	**15**		**17**	**14**	**32**	**7**	**60**	**62**	**6**
Range	*7-24*		*8-23*	*6-25*	*11-54*	*2-9*	*49-68*	*56-71*	*3-11*
Alabama	18	11	20	16	45	9	57	69	5
Alaska	17	13	17	17	54	6	60	62	**
Arizona	14	33	16	11	25	9	64	63	6
Arkansas	22	2	22	22	45	7	50	57	4
California	9	50	11	6	13	5	67	69	8
Colorado	12	41	13	11	20	7	67	66	8
Connecticut	12	42	13	10	20	5	64	70	5
Delaware	14	27	17	11	25	6	59	66	**
District of Columbia	9	49	10	9	21	5	63	71	6
Florida	–	–	–	–	–	–	–	64	6
Georgia	16	21	18	14	34	8	58	66	7
Hawaii	10	46	12	9	19	7	68	63	5
Idaho	14	31	14	14	35	7	62	62	6
Illinois	13	39	14	11	22	6	61	62	8
Indiana	18	9	19	17	33	8	56	60	4
Iowa	15	22	17	14	28	6	59	60	5
Kansas	16	16	18	15	38	7	58	59	7
Kentucky	20	3	20	21	40	9	53	56	6
Louisiana	20	6	22	18	41	9	52	64	6
Maine	17	15	17	17	45	6	61	58	7
Maryland	10	47	12	9	21	5	64	64	6
Massachusetts	11	43	12	10	22	5	64	66	6
Michigan	18	10	19	17	43	8	59	64	6
Minnesota	14	30	15	13	30	6	62	60	6
Mississippi	20	4	22	19	43	6	49	66	3
Missouri	18	8	19	17	46	7	57	61	6
Montana	15	24	14	16	33	6	59	59	7
Nebraska	14	29	15	13	26	7	61	61	6
Nevada	15	23	18	13	29	7	60	62	10
New Hampshire	13	37	12	14	32	5	66	61	5
New Jersey	11	43	12	9	19	6	65	69	7
New Mexico	14	28	15	13	21	7	61	65	7
New York	12	40	15	10	21	5	61	67	7
North Carolina	15	25	19	12	30	7	60	60	7
North Dakota	16	20	17	14	42	7	60	57	6
Ohio	19	7	19	19	44	8	54	59	4
Oklahoma	18	12	18	17	34	9	58	61	4
Oregon	13	38	14	12	22	7	66	59	8
Pennsylvania	15	26	16	14	33	6	59	63	6
Rhode Island	13	35	14	12	24	6	62	66	9
South Carolina	16	18	19	14	33	7	59	63	6
South Dakota	16	17	17	16	43	6	57	59	5
Tennessee	20	5	22	19	44	9	53	58	5
Texas	13	34	17	10	24	6	58	66	7
Utah	7	51	8	6	23	7	66	67	11
Vermont	16	19	18	14	49	5	60	61	6
Virginia	13	36	14	12	34	7	62	65	7
Washington	11	45	12	9	23	7	67	64	8
West Virginia	24	1	23	25	51	7	49	58	7
Wisconsin	14	32	15	13	28	6	62	61	7
Wyoming	17	14	17	18	34	8	59	59	7
Puerto Rico	10	48	14	6	11	2	59	63	5

*Ever smoked 100 cigarettes in lifetime and now smoke every day or some days. †Based on overall % for age ≥18 years. ‡Less than a high school education among adults ≥25 years. §Some days or every day. ¶Reported using e-cigarettes or other electronic vaping products now "every day"or "some days." Estimate not comparable to prior years. See BRFSS Special Notes on page 68 for more information. **Estimates are statistically unstable. See Special Notes on page 68.

Source: Behavioral Risk Factor Surveillance System, 2020 and 2021.

Figure 1C. Current Use of Any Tobacco* and Any Combustible Tobacco Product† (%), Middle and High School Students, US, 2022



AIAN-American Indian or Alaska Native. *Any tobacco product use is defined as current use of one or more of the following tobacco products on ≥1 day during the past 30 days: e-cigarettes, cigars, cigarettes, smokeless tobacco (chewing tobacco, snuff, and dip; snus; and dissolvable tobacco products), hookahs, nicotine pouches, heated tobacco products, pipe tobacco, or bidis (small brown cigarettes wrapped in a leaf). †Any combustible tobacco product use was defined as current use of one or more of the following tobacco products on ≥1 day during the past 30 days: cigars, cigarettes, hookahs, pipe tobacco, or bidis. ‡ Unstable estimates suppressed for AIAN and Multiracial students. See Special Notes on page 68 for suppression criteria.

Source: Park-Lee et al (2022).[13]

- Cigar smoking among high school students in 2019 was lowest in Utah (1%) and highest in Louisiana (12%).[11]
- Use of waterpipes among high school students was 2% in 2022 (Table 1C).

E-cigarettes (Vaping Devices)

E-cigarettes, also referred to as "e-cigs," "vapes," "e-hookahs," "vape pens," and "electronic nicotine delivery systems (ENDS)," are battery-powered devices that allow the user to inhale an aerosol produced from cartridges or tanks. Devices are filled with a liquid typically containing nicotine, propylene glycol (PG) and/or vegetable glycerin (VG), and flavoring.[28-30] Newer generation e-cigarettes are shaped like USB flash drives, pens, and other everyday items – most recently available in disposable versions – and are used with "pods" that contain amounts of nicotine comparable to a pack of 20 cigarettes and come in a variety of flavors that often appeal to youth.[31, 32]

Although evidence suggests that switching completely from conventional cigarettes to e-cigarettes reduces exposure to numerous toxicants and carcinogens among persons who smoke,[33] there is accumulating evidence of negative short-term effects on airways and blood vessels.[34-36] The risks associated with long-term use are not clear.[33] Metals and other hazardous chemicals can seep into the inhaled aerosol, and some commonly used flavoring components (e.g., diacetyl) are hazardous to the lungs. Importantly, e-cigarettes are addictive and may lead to the use of combustible tobacco products among adolescents and young adults; those who use e-cigarettes are two to four times more likely than nonusers to begin using combustible tobacco products.[37-40]

Meta-analyses among adults in "real-word" population-based samples suggest that e-cigarettes were not associated with smoking cessation.[41] However, reviews based on controlled trials suggest that randomization to e-cigarettes with nicotine increases quit rates compared to e-cigarettes without nicotine and

Table 1C. Current* Tobacco Use (%), High School Students, US, 2022

	E-cigarettes	Cigars	Cigarettes	Smokeless Tobacco†	Waterpipe
Overall	14	3	2	2	2
Sex					
Males	13	4	2	2	2
Females	15	2	2	1	1
Race/Ethnicity					
White	17	3	2	2	1
Black	11	4	†	†	3
Hispanic	12	2	2	1	2

*In the past 30 days. †Includes chewing tobacco/snuff/dip, snus, and dissolvable tobacco. †Estimates are statistically unstable. See Special Notes on page 68.

Source: Park-Lee et al (2022).[13]

compared to nicotine replacement therapy, although these findings are subject to substantial variability across studies.[41, 42] The 2020 SGR on smoking cessation concluded that there is presently inadequate evidence to conclude that e-cigarettes, in general, increase smoking cessation.[43] In 2021, the US Preventive Services Task Force (USPSTF) found insufficient evidence for the use of e-cigarettes for smoking cessation in adults, including pregnant persons.[44] Currently, no e-cigarette has been FDA-approved as a cessation aid. Visit cancer.org/healthy/stay-away-from-tobacco/e-cigarette-position-statement.html for the American Cancer Society's position statement on e-cigarettes.

Adult E-cigarette Use

- About 5% of adults (5% of men and 4% of women) were current users of e-cigarettes in 2021.[24]
- Between 2019 and 2021, current e-cigarette use prevalence increased from 9% to 11% (2.7 to 3.1 million users) among adults ages 18-24 years but remained stable among older adults ages 25-44 years (6%), ages 45-64 years (3%), and ages ≥65 years (1%).[24]
- E-cigarette use in 2021 ranged from 2% in Puerto Rico to 9% in Alabama, Arizona, Kentucky, Louisiana, Oklahoma, and Tennessee (Table 1B).

Youth E-cigarette Use

- E-cigarettes have been the most commonly used tobacco product among high school students since 2014.[25, 26, 45, 46] In 2022, 14% (2.14 million users, girls: 15%, boys: 13%) of high school students (Table 1C) and 3% (0.38 million, girls: 4%, boys: 3%) of middle school students currently used e-cigarettes.[13]
- Current e-cigarette use in 2022 was higher in White (17%) than Black (11%) and Hispanic (12%) high school students (Table 1C), contributing to the generally higher any tobacco use in White students (19%) (Figure 1C).[11]
- In 2022, among high school and middle school students who used e-cigarettes, about 85% used flavored e-cigarettes. The most commonly used flavors were fruit (69%); candy, desserts, or other sweets (38%); mint (29%); and menthol (27%).[47]
- In 2019, e-cigarette use among high school students ranged from 9% in Puerto Rico to 36% in West Virginia.[11]

Smokeless Tobacco Products

Smokeless tobacco includes products such as chewing tobacco, moist snuff, snus (a "spitless," moist powder tobacco, often in a pouch), and a variety of other tobacco-containing products that are not smoked. These products can cause oral, esophageal, and pancreatic cancer, as well as precancerous lesions of the mouth.[7] Switching from smoking to using spit tobacco products has been shown to result in a higher risk of tobacco-related death than complete tobacco cessation.[48]

Adult Smokeless Tobacco Use

- In 2021, current smokeless tobacco use was reported by 4% of men and <1% of women and was the same level reported in 2019.[49] In 2021, about 3% of White persons and American Indian/Alaska Native persons compared to <1% of other race/ethnic persons were current smokeless tobacco users.[24]
- Smokeless tobacco use in 2019 was lowest in Puerto Rico (0.4%) and highest in Wyoming (9%).[50]

Youth Smokeless Tobacco Use

- In 2022, 2% (girls: 1%, boys: 2%) of high school students were current smokeless tobacco users (Table 1C).
- In 2019, current use of smokeless tobacco among high school students ranged from 1% in Utah to 12% in Louisiana.[11]

Secondhand Smoke

Secondhand smoke (SHS) exposure causes an estimated 3% of all lung cancer deaths each year, which is the equivalent of about 3,600 deaths in 2023.[5, 51]

- Nationwide, SHS exposure (measured by testing a person's blood for cotinine, a byproduct of nicotine) among people who don't smoke declined from 88% in 1988-1991 to 28% in 2009-2010 and 19.5% in 2017-2020 but remained substantially higher among Black (35%) persons than other racial/ethnic groups (Hispanic: 18%, White: 17%, Asian: 21%); exposure also decreased with increasing family income.[52]
- Nearly 31% of nonsmoking youth ages 3-17 years were exposed to SHS in 2017-2020, with higher exposure among Black (58%) youth than White (29%), Hispanic (20%), or Asian (10%) youth.[52]

Tobacco Cessation

Smoking cessation reduces the risk of developing all cancers caused by smoking.[43] People who successfully quit smoking can add as much as a decade of life expectancy and reduce their risk of lung cancer by half after quitting for 10-15 years compared to people who continue to smoke.[43] Quitting at any age is beneficial to health, but the benefit is greatest when done at a younger age.[53] Smoking cessation at the time of cancer diagnosis can also improve outcomes for cancer survivors who smoke.[2]

Quitting successfully usually requires multiple attempts. FDA-approved cessation medications, including nicotine replacement therapy (NRT), prescription medications (e.g., bupropion and varenicline), and behavioral counseling (individual, group, or telephone), improve the chances of long-term cessation among adults, especially when used in combination.[43, 44, 54] Evidence regarding clinical interventions for youth cessation is mixed. In 2020, the USPSTF found that evidence is insufficient to recommend for or against providing primary-care feasible interventions (counseling or medication) for cessation of tobacco use (including e-cigarettes) in youth.[54, 55]

Lung cancer screening using low-dose computed tomography (LDCT) for persons with long-term heavy smoking (see page 63 for screening guidelines) provides an opportunity to promote cessation among the 6.8 million to 8.0 million eligible individuals who are currently smoking. The 2020 US SGR on smoking cessation found sufficient evidence that LDCT can trigger quit attempts, cessation treatment uptake, and even increase cessation.[43] However, the report found suggestive, but not sufficient, evidence that fully and consistently integrating standardized, evidence-based cessation interventions into lung cancer screening increases cessation while avoiding potential adverse effects.

The 2020 US SGR on smoking cessation noted historical improvements in several cessation indicators among US adults overall, but also found persistent disparities by sociodemographic, racial/ethnic, and geographic factors.[43]

Adult Tobacco Cessation

- The quit ratio (proportion of persons who have quit among those who ever smoked) among US adults was 67% (56 million persons formerly smoked) in 2021 compared to 62% (55 million) in 2019, but this proportion was <50% among persons who were below the federal poverty level (46%), uninsured (40%), or Medicaid- or publicly insured (44%) (Table 1A).
- The quit ratio in 2021 was lower in Southern and Midwestern states compared to other regions and ranged from 49% in Mississippi and West Virginia to 68% in Hawaii (Table 1B).

- More than one-half of adults who smoked cigarettes (55%) in 2020 had attempted to quit in the past year, but only about 8% had quit successfully for ≥6 months among all persons who smoked during the past year (Table 1A).
- For the first time since 2011, the annual prevalence of past-year quit attempts among US adults who smoke declined from 2019 to 2020, coinciding with the onset of the COVID-19 pandemic, with the largest declines in Black persons and persons with multiple comorbidities.[56]
- Only about one-third (34%) of people in 2018-2019 who tried to quit smoking cigarettes used recommended cessation aids, including counseling and/or medications.[49]

Youth Tobacco Cessation

- Among high school students in 2019 who used any tobacco product, about 60% tried to quit in the previous year (boys: 59%, girls: 62%).[57]
- In 2019, only 26% of high school students who smoked in Puerto Rico made a recent quit attempt compared to 61% in South Dakota.[14]

Empowered to Quit is a free and effective smoking cessation program developed and offered by the American Cancer Society (cancer.org/empoweredtoquit). Other cessation resources are available at the American Cancer Society (cancer.org/healthy/stay-away-from-tobacco/guide-quitting-smoking.html), the Centers for Disease Control and Prevention (cdc.gov/tobacco/quit_smoking/how_to_quit/index.htm), and smokefree.gov.

Reducing Tobacco Use and Exposure

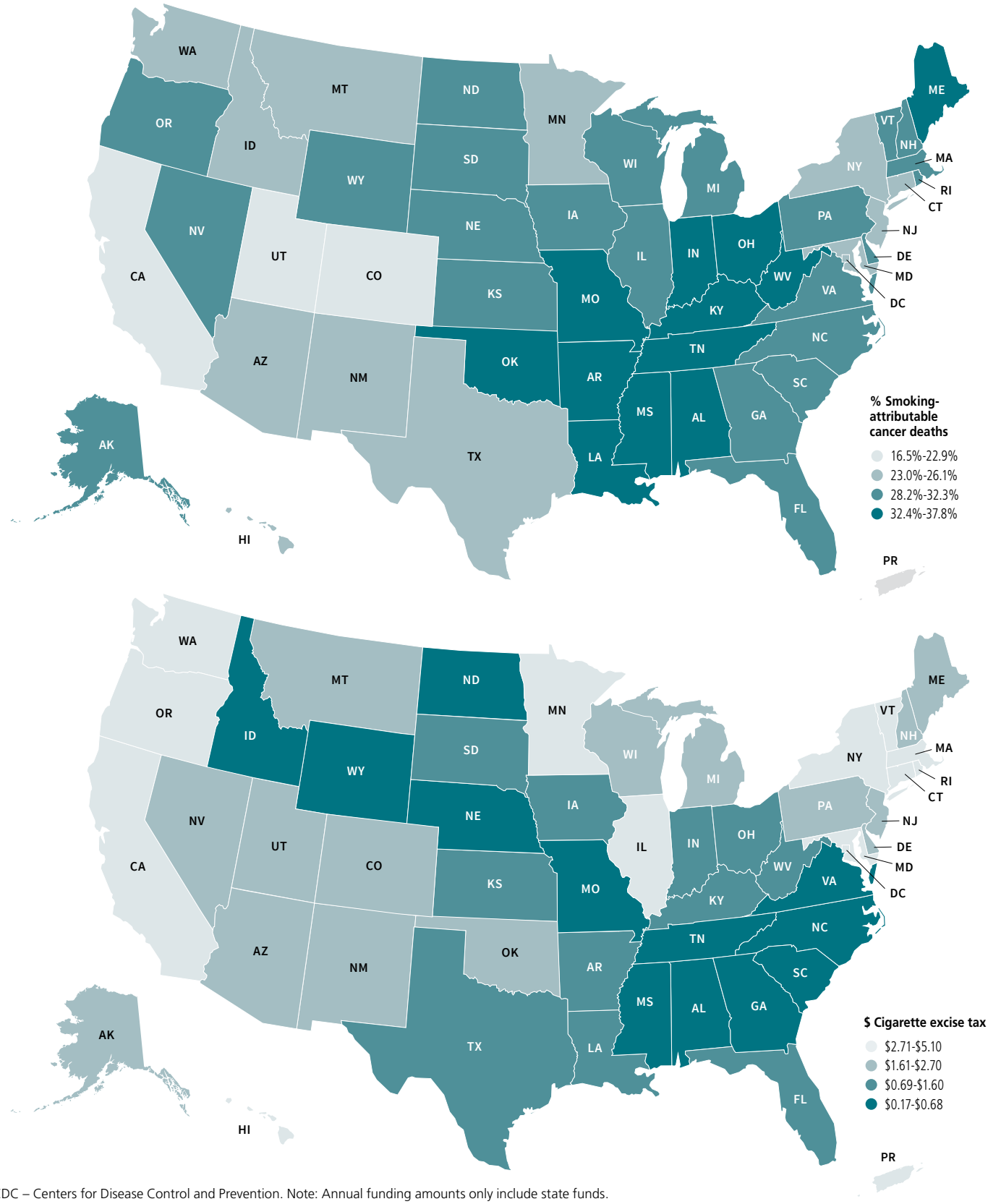
Numerous federal, state, and local tobacco control policies have been enacted since the 1964 SGR on Smoking and Health, including increased cigarette taxes; improved access/availability to cessation treatment; smoke-free policies in worksites, bars, and restaurants; health warnings; and prevention programs. Such initiatives are estimated to have averted 8 million premature deaths during 1964-2012 and led to an extended mean life span of 19 to 20 years.[58] The 2020 SGR on smoking cessation concluded that population tobacco control efforts, including raising the price of cigarettes, adopting comprehensive smoke-free policies, implementing mass media campaigns, requiring pictorial health warnings, and maintaining comprehensive statewide tobacco control programs, increase cessation.[43] Research also indicates that increased state spending on tobacco control is associated with lower youth and adult smoking prevalence.[59, 60] American Cancer Society researchers have shown that 122,951 cancer deaths were attributable to cigarette smoking in 2019,[61] and cumulative economic losses from cigarette smoking totaled nearly $900 billion in 2020, with the largest burden among Southern and Midwestern states (Figure 1D, Panel A), which have weaker tobacco control policies, including cigarette excise taxes (Figure 1D, Panel B) and historically underfunded tobacco control programs (Table 1D).[62, 63] For fiscal year 2023, the funding level for state tobacco prevention programs continues to be suboptimal and is less than 2% of the CDC recommended level for three states (Michigan, West Virginia, and Texas) and less than 50% of the CDC recommended level for all states, except Alaska, California, Hawaii, Delaware, Maine, North Dakota, Oklahoma, Oregon, and Utah (Table 1D).[64]

In addition to the information that follows, visit fightcancer.org to review a state-by-state assessment of cancer care and control efforts.

Regulation of Tobacco Products

The Family Smoking Prevention and Tobacco Control Act (TCA) of 2009 granted the US Food and Drug Administration (FDA) authority to regulate the manufacturing, marketing, and selling of tobacco products.[65] Key provisions of the act include requiring the FDA to review new products before they can go on the market and create standards to make tobacco products less toxic, less addictive, and less appealing. In 2016, the FDA expanded their regulations to include additional tobacco products (e.g., waterpipes, e-cigarettes, loose tobacco, and cigars), as well as future products that meet the statutory definition of a tobacco product.[65] Particularly, the rapidly evolving e-cigarette market, marked by unregulated innovations in product

Figure 1D. Cigarette Smoking-attributable Cancer Deaths (2019) vs. Cigarette Excise Taxes (2023) by State, US



CDC – Centers for Disease Control and Prevention. Note: Annual funding amounts only include state funds.
Sources: Islami F et al, 2022.[61] American Cancer Society Cancer Action Network, 2022.[81]

Table 1D. Tobacco Control Measures by State, US, 2023

	Cigarette tax per pack ($)*	100% smoke-free laws†				E-cigarette use also restricted	Tobacco control funding as % of CDC recommendation
		W	R	B	G		
United States *(average)*	**$1.91**						
Range	*$0.17-$4.50*						
Alabama	$0.675						3.1
Alaska	$2.00						63.5
Arizona	$2.00	✓	✓	✓	✓		27.5
Arkansas	$1.15						24.5
California	$2.87	✓	✓	✓	✓	✓	57.3
Colorado	$1.94	✓	✓	✓	✓	✓	46.7
Connecticut	$4.35		✓	✓	✓	✓	42.6
Delaware	$2.10	✓	✓	✓	✓	‡	74.5
District of Columbia	$4.50	✓	✓	✓		✓	17.8
Florida	$1.339	✓	✓		✓	§	40.0
Georgia	$0.37						2.0
Hawaii	$3.20	✓	✓	✓		✓	55.3
Idaho	$0.57		✓				28.5
Illinois	$2.98	✓	✓	✓	✓		7.4
Indiana	$0.995	✓	✓				10.2
Iowa	$1.36	✓	✓	✓			14.2
Kansas	$1.29	✓	✓	✓			3.6
Kentucky	$1.10						3.5
Louisiana	$1.08	✓	✓				8.6
Maine	$2.00	✓	✓	✓	‡	§	100.0
Maryland	$3.75	✓	✓	✓	✓		42.9
Massachusetts	$3.51	✓	✓	✓	✓	✓	9.2
Michigan	$2.00	✓	✓	✓			1.7
Minnesota	$3.04	✓	✓	✓	✓	✓	22.1
Mississippi	$0.68						23.8
Missouri	$0.17						3.9
Montana	$1.70	✓	✓	✓	✓		33.2
Nebraska	$0.64	✓	✓	✓	✓		12.4
Nevada	$1.80	✓	✓			✓	11.5
New Hampshire	$1.78		✓	✓		✓	3.0
New Jersey	$2.70	✓	✓	✓		✓	6.9
New Mexico	$2.00	✓	✓	✓		✓	24.9
New York	$4.35	✓	✓	✓	✓	‡	19.3
North Carolina	$0.45		✓	✓			13.5
North Dakota	$0.44	✓	✓	✓	✓	✓	58.0
Ohio	$1.60	✓	✓	✓	✓		11.2
Oklahoma	$2.03						78.0
Oregon	$3.33	✓	✓	✓	✓	✓	135.1
Pennsylvania	$2.60	✓					11.1
Rhode Island	$4.25	✓	✓	✓		‡	3.2
South Carolina	$0.57						9.8
South Dakota	$1.53	✓	✓	✓	✓	✓	38.5
Tennessee	$0.62						2.6
Texas	$1.41						1.3
Utah	$1.70	✓	✓	✓		✓	80.3
Vermont	$3.08	✓	✓	✓	✓	‡	32.0
Virginia	$0.60						13.0
Washington	$3.025	✓	✓	✓	✓		10.3
West Virginia	$1.20						1.6
Wisconsin	$2.52	✓	✓	✓	✓		9.2
Wyoming	$0.60						29.0
Puerto Rico	$5.10	✓	✓	✓	✓	✓	–

W-workplaces, R-restaurants, B-bars, G-state-run gambling establishments. *Effective as of March 2023. †Passed or implemented, reported as of January 2023. Other state laws that do not explicitly address e-cigarettes may be interpreted as prohibiting their use. ‡Some exceptions; see sources for more information. §FL: workplaces, restaurants, & bars. ME: restaurants & bars.

Sources: Taxes and Funding: American Cancer Society Cancer Action Network.[64, 81] Smoke-free laws: American Nonsmokers Rights Foundation.[86, 87]

types (tanks, prefilled cartridges or pods, disposable) and e-liquid contents (nicotine concentration or flavors), necessitates ongoing government regulation of these products to address potential usage in younger populations. The American Cancer Society Cancer Action Network℠ (ACS CAN), our advocacy affiliate, and partner organizations have worked to ensure that the FDA meets their statutory obligations under the TCA, including by successfully bringing lawsuits that resulted in premarket review of e-cigarettes and issuance of a final rule requiring graphic warnings on cigarette packs and advertising.

In addition, ACS CAN and partner organizations support the prohibition of flavors in all products, including menthol in combustible tobacco products. Menthol flavoring, which is associated with increased cigarette and cigar initiation among youth and young adults, may increase nicotine dependence and make quitting more difficult.[66-68] In April 2022, after substantial public health advocacy, including from ACS CAN, the FDA proposed product standards to prohibit menthol in cigarettes and all flavoring in cigars.[69] If this regulation goes into effect, it has the potential to reduce smoking initiation and encourage cessation, especially among Black persons, LGBTQ persons, and those with lower socioeconomic status who have a disproportionately high use of menthol and flavored products because of targeted advertising by the tobacco industry.[70-72] American Cancer Society researchers have shown that in Massachusetts, only 1 of 2 states that has implemented a statewide menthol cigarettes sales restriction, overall cigarette consumption has declined significantly without a

substantial increase in cross-border purchases from neighboring states.[73, 74] As robust federal action is pending on flavored tobacco regulation, 360 localities have passed local flavored tobacco sales restrictions, including 170 menthol cigarette sales restrictions.[75]

Tobacco Taxes

Tax increases that raise cigarette prices lower smoking initiation among youth, increase smoking cessation among adults, and lower smoking intensity among those who smoke; these effects are greater among lower socioeconomic status persons and youth, who tend to be relatively more price sensitive.[43, 76-78] Unfortunately, loopholes in tax regulations and tobacco industry tactics can negate the benefits of cigarette excise tax increases.[79] Additionally, taxes on tobacco products other than cigarettes vary by product type[80] and continue to lag behind, often providing less expensive alternatives to combustible cigarettes.

- Unchanged since 2009, the federal cigarette tax is $1.01. As of March 2023, the average cigarette excise tax rate across 50 states and the District of Columbia was $1.91, ranging from 17 cents per pack in Missouri to $4.50 per pack in the District of Columbia. Puerto Rico had the highest tax in the nation at $5.10 per pack (Table 1D).
- E-cigarettes are not taxed at the federal level, but as of November 2022, 29 states, the District of Columbia, and Puerto Rico had an e-cigarette tax.[81]

Cessation Assistance

Comprehensive, barrier-free, widely promoted insurance coverage of cessation treatments increases their usage, improves cessation outcomes, and is cost-effective.[43] Provisions of the Affordable Care Act (ACA) require coverage for evidence-based cessation treatments for people in most private insurance plans and Medicaid expansion plans. In addition, pregnant persons covered by Medicaid have access to no-cost tobacco cessation services.[82] Additionally, telephone quitlines have broad accessibility and can deliver effective behavioral counseling to diverse groups of people who use tobacco.[43] Integrating standard NRT into state quitline programs can further improve quit rates.[54, 83]

- While tobacco cessation services are required to be covered by most private insurance plans, Medicaid expansion plans, and Medicare, there are major gaps in coverage for traditional Medicaid recipients. As of March 2023, only 17 states – California, Colorado, Connecticut, Illinois, Indiana, Kansas, Kentucky, Massachusetts, Maine, Missouri, North Dakota, Ohio, Oregon, Rhode Island, South Carolina, Virginia, and Wisconsin – had comprehensive coverage in traditional Medicaid plans that includes individual, group, and phone counseling, as well as all seven FDA-approved tobacco cessation medications.[84] Arkansas, Kentucky, Missouri, and Wisconsin are the only states with no barriers (e.g., copays, prior authorizations, and treatment duration limitations) in place to accessing any of these treatments.

Secondhand Smoke Exposure Policies

Comprehensive smoke-free laws (e.g., laws that prohibit smoking in public places and create smoke-free environments) reduce secondhand smoke (SHS) exposure, deter smoking initiation, promote cessation, and reduce the risk of smoking-related diseases.[2, 43, 85]

- As of January 2023, 27 states, the District of Columbia, Puerto Rico, and 1,159 cities and counties representing 62.5% of the US population had 100% smoke-free laws in non-hospitality workplaces, restaurants, and bars (Table 1D).[86, 87]

Age Restrictions

In December 2019, Congress raised the federal minimum age for the sale of tobacco products from 18 to 21.[88]

Countering Tobacco Industry Marketing

Exposure to tobacco industry marketing (advertising and promotions) significantly increases both the likelihood of adolescent tobacco use and cigarette consumption in adults and youth.[89] Tobacco companies

increased their cigarette advertising and promotional expenditures from $6.7 billion in 1998 to a peak of $15.1 billion in 2003; in 2021, expenditures totaled $8.1 billion, about 11 times the total state tobacco control funding expenditures ($733 million) allocated for fiscal year 2023 (Table 1D).[90 64] Efforts such as the FDA's "The Real Cost" smoking prevention campaign, which educates at-risk teens on the harmful effects of smoking, are an attempt to counter industry marketing. These efforts were associated with preventing between 380,000 and 587,000 youth from initiating smoking between 2014 and 2016, with a savings of $31 billion in smoking-related costs.[91, 92]

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Excess Body Weight, Physical Activity, Diet, and Alcohol

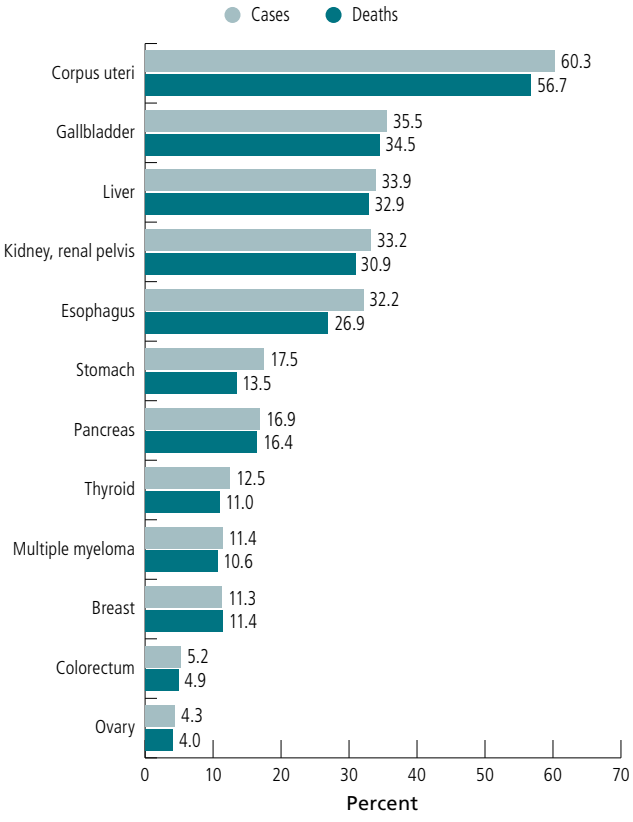
Aside from avoiding tobacco use, maintaining a healthy weight, staying active throughout life, following a healthy eating pattern, and avoiding or limiting alcohol consumption (for those who drink) are among the most effective strategies for reducing cancer risk.[1] An estimated 18% of cancer cases and 16% of cancer deaths are attributable to the combined effects of excess body weight, alcohol consumption, physical inactivity, and consuming an unhealthy diet.[2] The American Cancer Society's 2020 diet and physical activity guidelines for cancer prevention provide recommendations for healthy behaviors. (See sidebar, page 20.) Adults who most closely follow American Cancer Society guidelines are 10%-20% less likely to be diagnosed with cancer and 25% less likely to die from cancer.[3] Community action strategies are also included in the guidelines because of the strong environmental influence on individual food and activity choices. Cancer survivors can also benefit from healthy eating and active living and are often eager to learn about healthy behaviors to improve outcomes and quality of life.[4, 5]

Excess Body Weight

Excess body weight (i.e., overweight or obesity) is associated with an increased risk of developing several types of cancer: uterine corpus (endometrium), esophagus (adenocarcinoma), liver, stomach (cardia), kidney (renal cell), meningioma, multiple myeloma, pancreas, colorectum, gallbladder, ovary, female breast (postmenopausal), and thyroid.[6] Excess body weight may also increase the risk of mouth, pharynx, larynx, non-Hodgkin lymphoma (diffuse large B-cell lymphoma), male breast cancer, and fatal prostate cancer.[7] Accumulating evidence suggests that excess body weight also negatively impacts breast cancer survival.[8] Yet, research suggests that even modest sustained weight loss can mitigate breast cancer risk among women ages 50 years and older not using postmenopausal hormones.[9]

Nationally, an estimated 5% of cancer cases in men and 11% in women are attributed to excess body weight.[2] Some cancers are more strongly attributed to excess body weight than others. For example, 4% of ovarian cancer cases are attributed to excess body weight compared to 60% of uterine corpus cases (Figure 2A). In 2011-2015, the proportion of cancer cases attributable to excess body weight was lowest in Montana and highest in Texas among men; among women, the proportion was lowest in Hawaii and highest in the District of Columbia, largely reflecting state variation in the prevalence of excess body weight.[10]

Figure 2A. Proportion of Cancer Cases and Deaths Attributable to Excess Body Weight in Adults 30 Years and Older, US, 2014

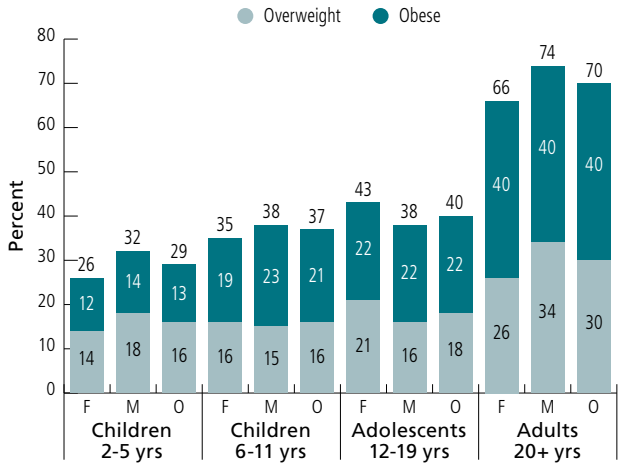


Source: Islami F, et al., 2018.[2]

Adult Overweight and Obesity

- Adult overweight prevalence has remained relatively stable since the early 1960s (men: 34%-40%, women: 25%-30%).[11] However, obesity prevalence has markedly increased; in 1960-1962, obesity prevalence was 11% in men and 16% in women among adults ages 20-74 years (data for ages ≥75 years were unavailable).[11] By 2017-2020, obesity prevalence was approximately 40% among men and women ages ≥20 years (Figure 2B).
- In 2017-2020, overweight or obesity prevalence was 74% among men and 66% among women; the prevalence of overweight was higher among men (34%) than women (26%), whereas obesity prevalence was similar in women and men (Figure 2B).
- In 2017-2020, among men, obesity prevalence was lowest among Asian (19%) and notably higher among Hispanic (46%), White (44%), and Black (41%) males. Among women, it was lowest among Asian (15%) females, followed by White (40%), Hispanic (46%), and Black (59%) females (Figure 2C).

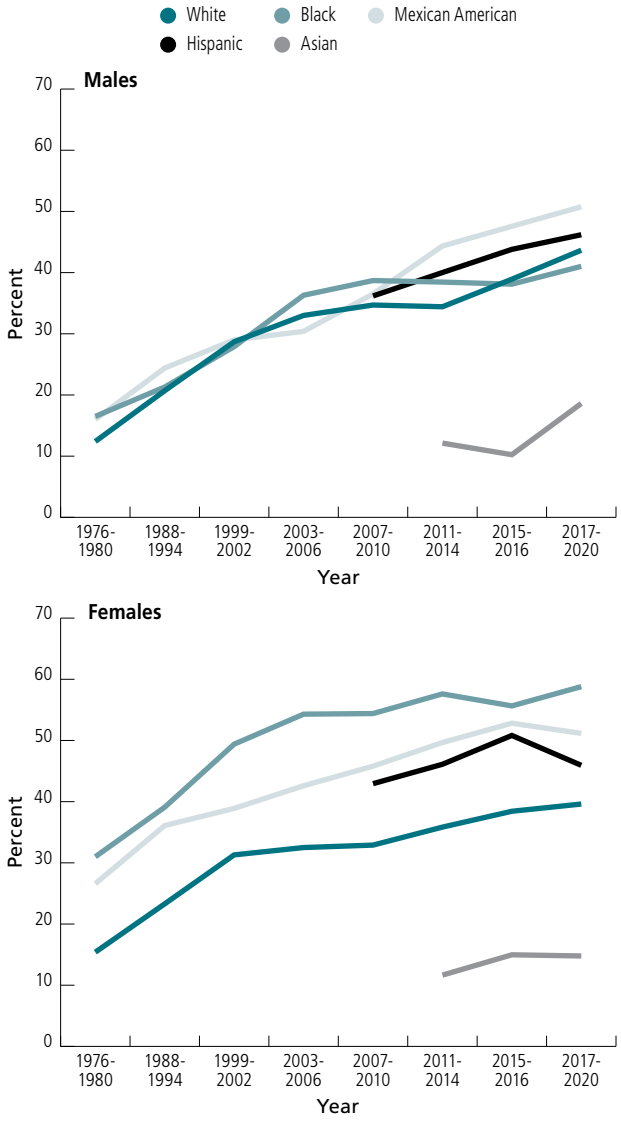
Figure 2B. Excess Body Weight* (%), Youth and Adults, US, 2017-2020



F: females, M: males, O: overall. *For adults, a BMI of 25.0-29.9 kg/m^2 is overweight; a BMI of ≥30.0 kg/m^2 is obese. Excess body weight is a BMI of ≥ 25.0 kg/m^2. For youth (ages 2-19 years), BMI is based on percentile rankings of the individual's height and weight on age- and sex-specific growth charts; BMIs between the 85th and 94.9th percentile are considered overweight, and BMIs at or above the 95th percentile are classified as obese.

Source: National Health and Nutrition Examination Survey, 2017-March 2020.

Figure 2C. Obesity* Trends (%), Adults 20-74 Years by Sex and Race/Ethnicity†, US, 1976-2020



*Body mass index ≥30.0 kg/m^2. †See Special Notes for more information.

Source: National Center for Health Statistics, 2014.[34] National Health and Nutrition Examination Surveys, 2011-March 2020.

- Studies indicate that US adult obesity prevalence increased during the COVID-19 pandemic, although more years of data are needed to assess whether this may be a continuation of the established trend.[12, 13]
- Obesity prevalence in 2021 was higher in the Midwest (36%) and South (36%) than in the Northeast (31%) and the West (31%) and ranged from 25% in Colorado and the District of Columbia to 41% in Alabama, Kentucky, and West Virginia (Table 2A).

- Across states with available data, obesity prevalence in 2021 was ≥35% in 36 states and the District of Columbia among Black adults, in 31 states among American Indian/Alaska Native adults, in 27 states and Guam among Hispanic adults, and in 10 states among White adults.[14]

Youth Overweight and Obesity

- Among youth (ages 2-19 years), overweight prevalence increased from 10% in the early 1970s to 17% during 2017-2020, whereas obesity prevalence rose four-fold, from 5% in the early 1970s to 20% during 2017-2020.[15, 16]
- In 2017-2020, obesity prevalence ranged from 13% in young children (ages 2-5 years) to 22% in adolescents (ages 12-19 years) (Figure 2B); between 2011-2020, obesity prevalence increased in young children and adolescents, but not children ages 6-11 years.[19]
- Among adolescent boys, prevalence has consistently been highest among Mexican American boys (2017-2020: 36%), while among girls, prevalence has been highest among Black girls (2017-2020: 39%); since 1999-2000, obesity prevalence increased among Mexican American (22% to 33%) and Black (21% to 29%) adolescents ages 12-19 years but not among White adolescents (14% to 19%)[16, 20] (Figure 2D).
- Based on cohort studies, obesity prevalence among youth appears to have risen more sharply during the COVID-19 pandemic compared to the pre-pandemic period, particularly among children ages 6-11 years, among whom the rate of increase in body mass index (BMI) was 2.5 times steeper.[17, 18]
- In 2019, the prevalence of obesity among high school students ranged from 10% in Utah to 23% in Mississippi.[21]

Physical Activity

Physical activity is defined as movement that uses skeletal muscles and more energy than what is required at rest. Its intensity is measured by the amount of energy expended. Approximately 3% of

Table 2A. Overweight and Obesity* (%), Adults 18 Years and Older by State, US, 2021

	Overweight	Obese	Rank† (1=high)
United States (median)	**34**	**34**	–
Range	*31-37*	*25-41*	–
Alabama	31	41	2
Alaska	34	33	29
Arizona	36	32	35
Arkansas	31	39	6
California	36	28	47
Colorado	35	25	51
Connecticut	35	31	42
Delaware	34	34	27
District of Columbia	31	25	50
Florida	–	–	–
Georgia	34	34	26
Hawaii	35	26	49
Idaho	36	32	33
Illinois	34	34	23
Indiana	33	37	13
Iowa	34	37	11
Kansas	34	37	12
Kentucky	32	41	3
Louisiana	32	39	8
Maine	33	32	34
Maryland	34	34	24
Massachusetts	33	28	48
Michigan	34	35	22
Minnesota	34	32	31
Mississippi	34	39	5
Missouri	31	38	10
Montana	35	32	36
Nebraska	35	36	16
Nevada	36	32	38
New Hampshire	35	31	39
New Jersey	37	28	46
New Mexico	35	35	21
New York	34	29	44
North Carolina	32	36	14
North Dakota	35	36	19
Ohio	33	38	9
Oklahoma	32	40	4
Oregon	34	31	40
Pennsylvania	32	33	30
Rhode Island	36	31	41
South Carolina	34	36	15
South Dakota	33	39	7
Tennessee	36	35	20
Texas	34	36	17
Utah	34	32	37
Vermont	31	29	43
Virginia	34	34	24
Washington	35	29	45
West Virginia	32	41	1
Wisconsin	34	34	28
Wyoming	37	32	32
Puerto Rico	36	36	18

*For adults, a BMI of 25.0-29.9 kg/m^2 is overweight; a BMI of ≥30.0 kg/m^2 is obese. †Based on % obese.

Source: Behavioral Risk Factor Surveillance System, 2021.

2020 American Cancer Society Guideline on Diet and Physical Activity for Cancer Prevention[1]

Recommendations for individuals

1. Achieve and maintain a healthy body weight throughout life.

- Keep body weight within the healthy range, and avoid weight gain in adult life.

2. Be physically active.

- Adults should engage in 150-300 minutes of moderate-intensity physical activity per week, or 75-150 minutes of vigorous-intensity physical activity, or an equivalent combination; achieving or exceeding the upper limit of 300 minutes is optimal.
- Children and adolescents should engage in at least 1 hour of moderate- or vigorous-intensity activity each day.
- Limit sedentary behavior, such as sitting, lying down, and watching television, and other forms of screen-based entertainment.

3. Follow a healthy eating pattern at all ages.

- A healthy eating pattern includes:
- Foods that are high in nutrients in amounts that help achieve and maintain a healthy body weight
- A variety of vegetables – dark green, red, and orange, fiber-rich legumes (beans and peas), and others
- Fruits, especially whole fruits with a variety of colors
- Whole grains
- A healthy eating pattern limits or does not include:
- Red and processed meats
- Sugar-sweetened beverages
- Highly processed foods and refined-grain products

4. It is best not to drink alcohol.

- People who do choose to drink alcohol should limit their consumption to no more than 1 drink per day for women and 2 drinks per day for men.

Recommendation for Community Action

Public, private, and community organizations should work collaboratively at national, state, and local levels to develop, advocate for, and implement policy and environmental changes that increase access to affordable, nutritious foods; provide safe, enjoyable, and accessible opportunities for physical activity; and limit alcohol for all individuals.

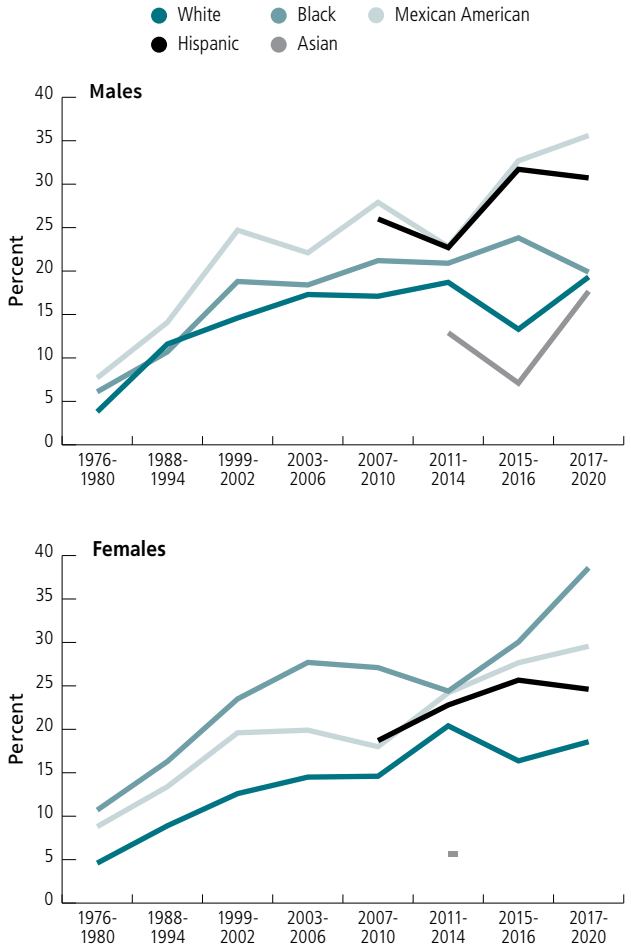
For more information:

- Visit cancer.org/healthy/eat-healthy-get-active/acs-guidelines-nutrition-physical-activity-cancer-prevention/guidelines.html for guidelines for cancer prevention.
- Visit cancer.org/health-care-professionals/american-cancer-society-prevention-early-detection-guidelines/nupa-guidelines-for-cancer-survivors.html for guidelines for cancer survivors.[5]

cancer cases are attributed to physical inactivity, ranging from 2% in Utah to 4% in Kentucky, although this is likely an underestimate because it excludes lung cancers and other cancer sites that might be associated with physical inactivity.[2, 26] Mounting evidence also suggests that greater time spent in sedentary behavior may increase the risk of colon, endometrial, and possibly lung cancers,[24, 25] and extended leisure-time sitting has also been associated with increased risk of cancer death.[24] Conversely, physical activity can decrease the risk of colon (but not rectal), breast, kidney, endometrial, bladder, esophageal (adenocarcinoma), stomach (cardia), and possibly lung cancers.[22-24]

The benefits of physical activity are observed even among people who are classified as overweight, obese, and have a history of smoking.[27] While being active at high levels helps to prevent weight gain and obesity, which contributes to a reduced risk of developing obesity-related cancers,[1, 28] replacing sedentary time with even short durations of moderate-to-vigorous physical activity appears to reduce cancer mortality.[29] Additionally, physically active cancer survivors are less likely to have adverse effects and to die from their cancer, and have better mental and physical quality of life, than those who are inactive.[30, 31]

Figure 2D. Obesity* Trends (%), Adolescents 12-19 Years by Sex and Race/Ethnicity†, US, 1976-2020



*Body max index at or above the 95th percentile. †See Special Notes for more information.

Sources: National Center for Health Statistics, 2014.[34] National Health and Nutrition Examination Survey, 2015-March 2020.

Adult Physical Activity

- The prevalence of adults who met recommended aerobic activity levels increased from 40% in 1998 to 54% in 2018; a drop in 2020 to 48% (Table 2B), may at least partly reflect changes in the survey design in 2019.[32, 33]
- Historically, a higher proportion of men than women have met physical activity recommendations,[34] a trend that continued in 2020, with 53% of men meeting recommendations compared to 44% of women (Table 2B).
- In 2020, adults with a college degree (61%) reported meeting recommended levels of physical activity at more than double the level of those with less than a high school diploma (30%) (Table 2B).
- In 2021, Puerto Rico (46%) had the highest proportion of adults who reported no leisure-time physical activity while Colorado, the District of Columbia, and Vermont, (16%) had the lowest (Table 2C).
- Most states where a relatively high proportion of adults reported no leisure-time physical activity also had a relatively high prevalence of excess body weight in 2021, with these states concentrated in the South and Midwest (Figure 2E).

Youth Physical Activity

- A global meta-analysis of studies measuring longitudinal changes in physical activity during the COVID-19 pandemic reported an estimate of 17 minutes per day decline in moderate-to-vigorous physical activity among children ages 18 years or younger.[35]
- In 2019, about 16% of high school students reported no physical activity in the past week, ranging from 9% in Utah to 26% in Louisiana.[21]
- About 23% of high school students reported at least 60 minutes of daily physical activity in 2019,[21] continuing a downward trend since 2011 (29%).[36]

Diet

About 4%-5% of cancer cases can be attributed to poor diet.[2] Unhealthy dietary patterns are associated with a higher risk of developing cancer (predominantly colon).[2] In contrast, dietary patterns with an emphasis on a variety of fruits and vegetables, whole grains, legumes, fish or poultry, and fewer red and processed meats are associated with lower cancer risk, predominantly colorectal and breast cancer.[1, 37, 38] One review found that individuals with the healthiest diets have an 11%-24% lower risk of cancer death than those with the least healthy diet.[39] Furthermore, improving diet quality over time is associated with an overall

Table 2B. Alcohol and Physical Activity (%), Adults 18 Years and Older, US, 2020

	No leisure-time physical activity in past week	Met rec. levels of aerobic activity*	Heavy alcohol consump-tion**
Overall	**26**	**48**	**6**
Sex			
Males	25	53	6
Females	28	44	6
Age (years)			
18-24	20	57	4
25-44	21	53	7
45-64	29	44	7
65+	39	38	5
Race/Ethnicity			
Hispanic	35	41	4
White only	23	52	8
Black only	33	41	3
Asian only	23	49	2
AIAN only or multiple	37	39	7
Sexual orientation			
Gay/lesbian	25	53	6
Straight	26	48	6
Bisexual	31	48	12
Immigration status			
Born in US/US Territory	25	50	7
In US fewer than 10 years	33	42	1
In US 10+ years	32	44	3
Education (25 years and older)			
Less than high school	49	30	4
High school diploma	36	39	7
Some college	26	46	7
College graduate	14	61	7
Income level			
<100% FPL	44	32	4
100 to less than 200% FPL	38	38	5
≥200% FPL	21	53	7
Insurance status (18 to 64 years)			
Uninsured	35	42	6
Private	21	53	7
Medicaid/Public/Dual eligible	40	34	5
Medicare (ages ≥65 years)	41	36	5
Other	36	41	6

FPL-federal poverty level. *Includes 150 minutes of moderate-intensity activity or 75 minutes of vigorous-intensity activity each week. **>14 drinks/week in the past year for men or >7 drinks/week in the past year for women.

Source: National Health Interview Survey, 2020.

reduced risk of death.[40] Healthy dietary patterns are also associated with better health outcomes in cancer survivors.[5] Cancer survivors who follow a healthy diet pattern have between a 10% and 12% lower risk of dying from cancer or any cause, respectively.[38]

Processed Meats and Red Meats

Processed meat (e.g., lunch meats, bacon, and hot dogs) has been classified as a human carcinogen, and red meat (e.g., beef, lamb, and pork) has been classified as a probable carcinogen based primarily on the evidence of their association with increased colorectal cancer risk.[41] While specific mechanisms are unknown, substances such as nitrates or nitrites used to preserve processed meats and heme iron in red meat can contribute to the formation of nitrosamines, which are involved in carcinogenesis.[42-44] Smoking, curing, and cooking meat at high temperatures, such as pan frying or grilling, can form carcinogenic chemicals, which may also contribute to increased risk.[45] In addition, fatty meats and fried meats are major sources of saturated fat and cholesterol in the American diet.

Vegetables and Fruits

Vegetables (including legumes) and fruits contain numerous vitamins, minerals, fiber, carotenoids (plant-based pigment that is a type of antioxidant), and other bioactive substances that may help prevent cancer. There is probable evidence that a greater consumption of non-starchy vegetables (e.g., broccoli, green beans, and lettuce) and fruits is associated with lower risk of mouth, pharynx, larynx, esophageal, and stomach cancers.[22] Evidence also suggests that cruciferous and carotenoid-rich (e.g., yellow, orange, and red color) vegetable intake may lower the risk of aggressive, hard-to-treat breast tumors.[46, 47] Potential benefits of vegetable and fruit consumption on cancer risk may also stem from their replacement of more calorie-dense foods and associated maintenance of a healthy weight.[22, 48]

Whole Grains

Whole-grain foods (made from the entire grain seed) are an important part of a healthful diet and are relatively low in caloric density and high in fiber, vitamins, and minerals compared to refined-flour products.[49] Although evidence of the association between whole-grain foods and different types of cancer is limited, studies support the role of a diet high in whole-grain foods and fiber in

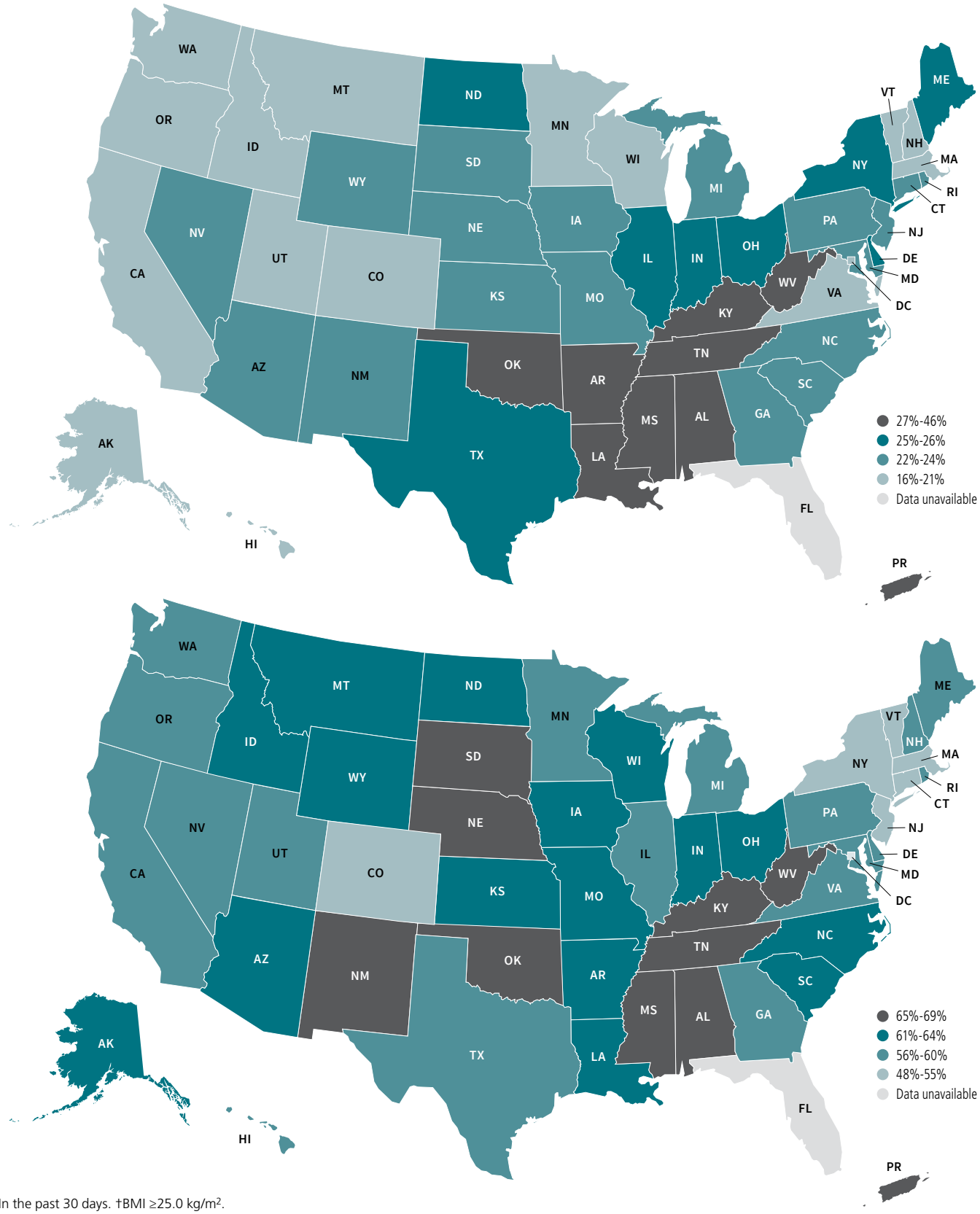
Table 2C. Alcohol, Diet, and Physical Activity (%), Adults 18 Years and Older by State, US, 2019 and 2021

	Consumed ≥2 fruit servings a day (2021)	Consumed ≥3 vegetable servings a day (2021)	Heavy alcohol consumption* (2021)	Met recommended levels of aerobic activity† (2019)	No leisure-time physical activity in past week (2021)
United States (median)	**24**	**11**	**6**	**45**	**23**
Range	*14-32*	*2-18*	*3-9*	*29-58*	*16-46*
Alabama	19	10	5	40	30
Alaska	24	14	8	51	20
Arizona	24	11	6	46	22
Arkansas	25	15	6	41	29
California	30	13	6	48	20
Colorado	27	13	7	52	16
Connecticut	27	14	5	46	22
Delaware	25	10	5	45	26
District of Columbia	30	16	7	46	16
Florida	–	–	–	45	–
Georgia	25	13	6	41	23
Hawaii	24	13	7	50	19
Idaho	22	9	7	50	20
Illinois	20	9	5	45	26
Indiana	24	14	6	40	25
Iowa	24	10	7	43	24
Kansas	23	10	6	43	23
Kentucky	22	15	4	‡	29
Louisiana	20	8	7	39	28
Maine	27	11	8	46	25
Maryland	28	11	4	45	21
Massachusetts	26	12	6	46	21
Michigan	25	13	6	47	22
Minnesota	27	11	7	52	20
Mississippi	19	9	6	35	30
Missouri	20	9	7	41	24
Montana	24	12	8	58	20
Nebraska	24	11	7	44	23
Nevada	24	10	5	44	23
New Hampshire	28	17	7	48	19
New Jersey	28	14	5	NA	23
New Mexico	24	9	5	50	22
New York	29	16	5	41	25
North Carolina	22	11	5	45	22
North Dakota	21	11	6	44	25
Ohio	22	11	6	43	25
Oklahoma	16	6	3	32	27
Oregon	23	11	8	50	20
Pennsylvania	25	12	6	46	23
Rhode Island	27	14	6	43	24
South Carolina	23	13	6	41	24
South Dakota	23	11	7	42	22
Tennessee	21	13	5	40	27
Texas	26	13	5	42	25
Utah	26	11	4	51	18
Vermont	32	18	9	54	16
Virginia	25	11	6	43	20
Washington	29	13	6	50	17
West Virginia	19	11	5	45	28
Wisconsin	28	10	8	49	19
Wyoming	22	10	6	49	22
Puerto Rico	14	2	4	29	46

*Men: >14 drinks per week, women: >7 drinks per week †Includes 150 minutes of moderate-intensity activity or 75 minutes of vigorous-intensity activity each week. ‡Suppressed as missing data were >20%.

Source: Behavioral Risk Factor Surveillance System, 2019 and 2021.

Figure 2E. No Leisure-time Physical Activity* and Excess Body Weight† (%), Adults 18 Years and Older by State, US, 2021



*In the past 30 days. †BMI ≥25.0 kg/m^2.

Source: Behavioral Risk Factor Surveillance System, 2021.

reducing the risk of colorectal cancer.[22] Some evidence also shows reduced mortality with increased fiber intake after a colorectal cancer diagnosis.[50]

Added Sugars and Highly Processed Foods

Consumption of white (processed) sugar, raw and brown sugar, corn sweetener, high-fructose corn syrup, and other added sugars in sugar-sweetened beverages (SSBs, also known as sugary drinks) and energy-dense foods (e.g., traditional "fast food" or heavily processed foods) is associated with risk of weight gain, overweight, or obesity, which itself causes nearly 13 different cancers.[22] There is also probable evidence that endometrial cancer risk is increased with a higher "glycemic load" diet, reflecting its blood sugar-raising potential.[22] Ultra- or highly processed foods, which tend to be higher in fat, added sugars, refined grains, and/or sodium, include industrially produced grain-based desserts, ready-to-eat or ready-to-heat foods, snack foods, SSBs, or candy. There is accumulating evidence, including from American Cancer Society researchers, that higher consumption of ultra-processed foods,[51, 52] including SSBs,[53] is associated with increased cancer risk and mortality.

Adult Dietary Patterns

- The median across US states of adult self-reported consumption of two or more servings of fruits daily was 24% in 2021, down from 27% in 2019; in 2021, estimates ranged from 14% in Puerto Rico to 32% in Vermont (Table 2C).
- Only 11% of adults consumed three or more servings of vegetables per day in 2021 (median of US states) versus 13% in 2019; estimates ranged from 2% in Puerto Rico to 18% in Vermont (Table 2C).
- Between 1999-2002 and 2015-2018, total energy intake (kcal) from carbohydrates (51% to 45%) declined, while intake from fat (33% to 36%) and protein (15% to 16%) increased among adults ages 20 years and older.[54]
- Among US adults, the percentage of total energy consumed from ultra-processed foods (e.g. packaged snacks, SSBs, candy, industrial breads/cereals, ready-to-eat dishes, and reconstituted meat) increased from 54% kcal in 2001-2002 to 57% kcal in 2017-2018, while that of minimally processed foods decreased from 33% kcal to 27% kcal.[55]
- In one study, 16% and 36% of US adults, respectively, reported "often/always" or "sometimes" consuming more unhealthy snacks and desserts during the early phase of the COVID-19 pandemic, while 10% and 22%, respectively, reported drinking more SSBs "often/always" or "sometimes."[56]

Youth Dietary Patterns

- About 29% of high school students consumed 100% fruit juice or fruit two or more times a day in 2019, ranging from 20% in Hawaii to 31% in Connecticut and Vermont.[21]
- In 2019, only 14% of high school students reported consuming vegetables three or more times per day, ranging from 9% in Kentucky, Oklahoma, Tennessee, and Texas to 19% in Vermont.[5]
- During 2015-2018, over one-third (36%) of youth ages 2-19 years consumed fast food on a given day and received 14% of their daily calories from fast food. The proportion was higher among Black (17%) and Hispanic (15%) children versus White (13%) youth.[57]
- Among youth ages 2-19 years, the average percentage of estimated daily energy intake from SSBs declined from 9% in 2003-2004 to 5% in 2015-2016,[58] but about 63% consumed at least one SSB on a given day in 2011-2014.[59]
- Between 1999 and 2018, the percentage of total energy consumed from ultra-processed foods among youth ages 2-19 years increased from 61% to 67%, with significantly larger increases in Black and Mexican American youth than among White youth.[60]

Alcohol

Alcohol consumption increases the risk for cancers of the mouth, pharynx, larynx, esophagus, liver, colorectum, female breast, and stomach.[22] Approximately three or more drinks per day may also increase the risk of stomach and pancreatic cancer.[22, 61] Cancer risk increases with alcohol volume, and even a few drinks per week may be associated with a slightly elevated risk of female breast cancer.[62] Results from the Global Burden of Disease study indicated that the amount of alcohol consumption that minimized harm across health outcomes was zero.[65] Combined with tobacco use, alcohol consumption increases the risk of cancers of the mouth, pharynx, larynx, and esophagus far more than the independent effect of either drinking or smoking alone.[63] An estimated 5% to 6% of cancer cases are attributed to alcohol consumption, ranging from 3% in Utah to 7% in Delaware.[2, 64]

Alcohol Consumption

- In 2020, 70% of adults reported current alcohol consumption (12+ drinks in lifetime and ≥1 drink in past year).[33]
- About 6% of adults reported heavy drinking in 2020, with higher levels among White (8%) and American Indian/Alaska Native (7%) than Black (3%), Hispanic (4%), and Asian (2%) adults (Table 2B).[33]
- Heavy alcohol drinking prevalence ranged from 3% in Oklahoma to 9% in Vermont in 2021 (Table 2C).
- A global meta-analysis reported that 29% of respondents in studies based on US samples reported increased alcohol consumption during the COVID-19 pandemic, whereas 16% reported decreases.[66]
- Although self-reported alcohol consumption in the past month declined in high school students between 2009 and 2019, 29% of high school students in 2019 still reported current use, with higher levels in females (32%) than males (26%) and ranging from 33% in Montana and Kansas to 10% in Utah.[67]
- In an online survey of US high school students (grades 9-12) during January-June 2021, 20% reported current alcohol use; close to 1-in-4 (22.4%) of current users drank ≥6 times per month; and about 1 in 3 students who ever used alcohol reported increased use during the COVID-19 pandemic.[68]

Type 2 Diabetes

Type 2 diabetes, a chronic condition in which the body loses its ability to respond to insulin, shares several risk factors with cancer, including excess body weight, poor diet, and physical inactivity. Mounting evidence suggests that type 2 diabetes independently increases risk for several cancers, including liver, endometrium, pancreas, colorectum, kidney, bladder, breast, and perhaps ovary.[69-72] The biology underlying this association is not completely understood, but may involve abnormal glucose control and related factors, including inflammation.

- From 2001-2004 to 2017-2020, diabetes prevalence among adults ≥18 years of age increased from 10% to 15% (37 million). About 90% to 95% of all diabetes cases are type 2.[73]
- In 2018-2019, the prevalence of diagnosed diabetes was higher among American Indian/Alaska Native (15%), Black (12%), and Hispanic (12%) persons than those who were Asian (1%) and non-Hispanic White (7%).[73] However, some Hispanic (Mexicans: 14%, Puerto Rican: 12%) and Asian (Asian Indian: 12%, Filipino: 10%) subpopulations had substantially higher rates.[73]

Community Action

The 2020 American Cancer Society diet and physical activity guidelines for cancer prevention recognized the influence of socioenvironmental factors in individuals' ability to practice healthy eating and active living behaviors and recommended that community action strategies to support these behaviors be implemented to facilitate healthier lifestyles to curtail the future cancer burden.[1] Specifically, organizations should work collaboratively at multiple government levels to develop and implement policies and allocate or expand resources to facilitate changes that support individuals' efforts for healthy eating and active living. (See sidebar, page 27.)

Culturally appropriate and equitable support are needed for groups that have been historically marginalized (e.g., people living in poverty, people of color, LGBTQ communities, people who have a disability or who live in a rural community, and others who have historically been excluded) and have fewer opportunities to modify behaviors to improve health. An example of such an effort would be to address structural barriers to healthy eating and active living behaviors, such as the higher prevalence of food deserts (i.e., areas with limited access to a variety of healthy and affordable food) and safe greenspaces in communities with a larger proportion of racial/ethnic minority groups and residents with low socioeconomic status.[74, 75]

It is also important to create health-promoting environments for children and adolescents as lifelong healthy behaviors are best established early in life.[76]

Public policy efforts at the national, state, and local levels that improve access to or provide information on healthy food choices, or conversely limit advertising and accessibility of foods and beverages of low nutritional value (including alcoholic and sugary drinks), alongside standards and increased funding for physical activity infrastructure, are central to helping individuals achieve healthy eating and active living goals.[1] Similarly, health care providers and systems are key partners in promoting cancer preventive behaviors.

- States and school districts can require that students receive recommended amounts of high-quality physical education and implement evidence-based nutrition standards for school meals and snacks. Thanks to improvements in the nutritional quality of school meals, school breakfasts and lunches have more, and a greater variety of, fruits and vegetables, more whole grains, and age-appropriate portion sizes. During the COVID-19 pandemic, ACS CAN supported the school meal eligibility expansion waivers for all students to receive meals and snacks before, during, and after regular school hours and the flexibility for school officials to safely deliver meals to students at various locations.

Recommendation for Community Action[1]

Public, private, and community organizations should work collaboratively at national, state, and local levels to develop, advocate for, and implement policy and environmental changes that:

Increase access to affordable, nutritious foods via:

- Community food retail strategies that market and make available healthier options, shelf-labeling systems, in-store healthy food option promotions, healthy checkout aisles, etc.
- Enabling positive health choices outside the home; restaurant menu changes such as the addition of nutrient-dense, low-energy dining options; healthy workplace food availability, etc.

Provide safe, enjoyable, and accessible opportunities for physical activity via:

- Built environment modifications such as active transportation systems (pedestrian and bicycle routes), promoting mixed-land use environments to integrate live, work, and leisure time, etc.
- Shared-use agreements between government or other organizations' facilities for use by the broader community
- Quality school physical education programs, including well-designed physical education curriculum; changing instructional practices to better incorporate more time for moderate-to-vigorous physical activity and play, etc.

Limit access to alcohol via:

- Retail environment regulations such as retail outlet density policies, including limits on days of operation and hours when alcohol can be sold and consumed on premises; enforcement of laws prohibiting sales to underage persons; advertising and marketing restrictions of alcoholic beverages that target youth

- Establishing and raising excise taxes on sugary drinks reduces consumption of these products,[77] and tax revenues can be reallocated back to promote societal well-being. Alcohol taxes vary widely by state. Currently, no state has an excise tax on sugary drinks, but soda taxes are levied locally in eight cities and the Navajo Nation.[78]

- Health care professionals can assess weight status and refer patients with a BMI ≥30 kg/m^2 to intensive, multicomponent behavioral interventions; and provide alcohol screening and brief counseling in primary care, as recommended by the US Preventive Services Task Force.[79,80] In addition to behavioral interventions, evidence-based treatment for obesity can also include pharmacotherapy and surgery when appropriate. In 2015-2018, 40% of US adults who had seen a health care provider in the past year received counseling to control/lose weight, 50% to increase exercise/physical activity, and 39% to reduce fat/calorie intake. In 2017, 81% of US adults in selected states were screened by their health care provider regarding alcohol consumption, but only 38% had been asked about binge drinking at a checkup in the past 2 years.[81] Moreover, 80% received no advice to reduce their drinking among those screened as current binge drinkers.

Initiatives of the American Cancer Society/American Cancer Society Cancer Action Network

The American Cancer Society and our advocacy affiliate, the American Cancer Society Cancer Action Network[SM] (ACS CAN), also have specific initiatives in nutrition and physical activity research and work with communities to help identify and address barriers to healthy eating and active living. ACS CAN advocates for the U.S. Dietary Guidelines for Americans (DGA, dietaryguidelines.gov/) to be science-based guidelines to help Americans make healthful food and beverage choices and because the DGA is the foundation of the school meals programs. The American Cancer Society and ACS CAN strongly advocate that the DGA reflect the current science regarding diet, physical activity, and cancer risk. We also advocate to ensure that future DGA guidelines will address the scientific factors that would reduce cancer cases and deaths. ACS CAN also supports well-designed taxes on sugary drinks as a component of multifaceted efforts to promote healthy eating and active living. Visit fightcancer.org to learn more about ACS CAN's initiatives.

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Ultraviolet Radiation

More than 90% of melanoma cases are caused by exposure to excessive ultraviolet radiation (UVR) primarily from sunlight or use of tanning devices, with 91% of melanoma cases attributable to UV exposure during 2011-2015.[1] Invasive melanoma represents only about 1% of all skin cancer cases but accounts for the majority of skin cancer deaths. The American Cancer Society estimates that 97,610 new cases of invasive melanoma will be diagnosed, and 7,990 deaths will occur in 2023.[2] Melanoma incidence rates have been increasing for decades but appear to have stabilized in recent years. The 5-year relative survival rate for melanoma is about 92%.[2] Basal cell and squamous cell carcinomas, also referred to as keratinocyte carcinoma (KC), are the most frequently diagnosed and are highly curable forms of skin cancer.[3] The most recent study of KC occurrence estimated over 5 million KCs were diagnosed in the US in 2012, costing over $4.8 billion in treatment annually.[4]

Intermittent high-intensity UVR exposure, whether from sunlight or indoor tanning devices, is a risk factor for all types of skin cancer. Skin cancer risk is also higher among people with a weakened immune system, a personal or family history of melanoma, and the presence of atypical, large, or numerous (more than 50) moles.[5-7]

Solar UVR Exposure

Everyone is exposed to naturally occurring solar UVR, which is an invisible kind of radiation that can penetrate, change, and damage skin cells. The sensitivity of a person's skin to UVR and the duration and intensity of UVR exposure are important risk factors for skin cancers. The damaging effects of UVR are cumulative over a lifetime.[8] Some studies indicate that unprotected sun exposure during childhood poses an especially elevated risk for melanoma and other skin cancers later in life; other studies have found unprotected sun exposure to be harmful regardless of the age when it occurred.[9-11]

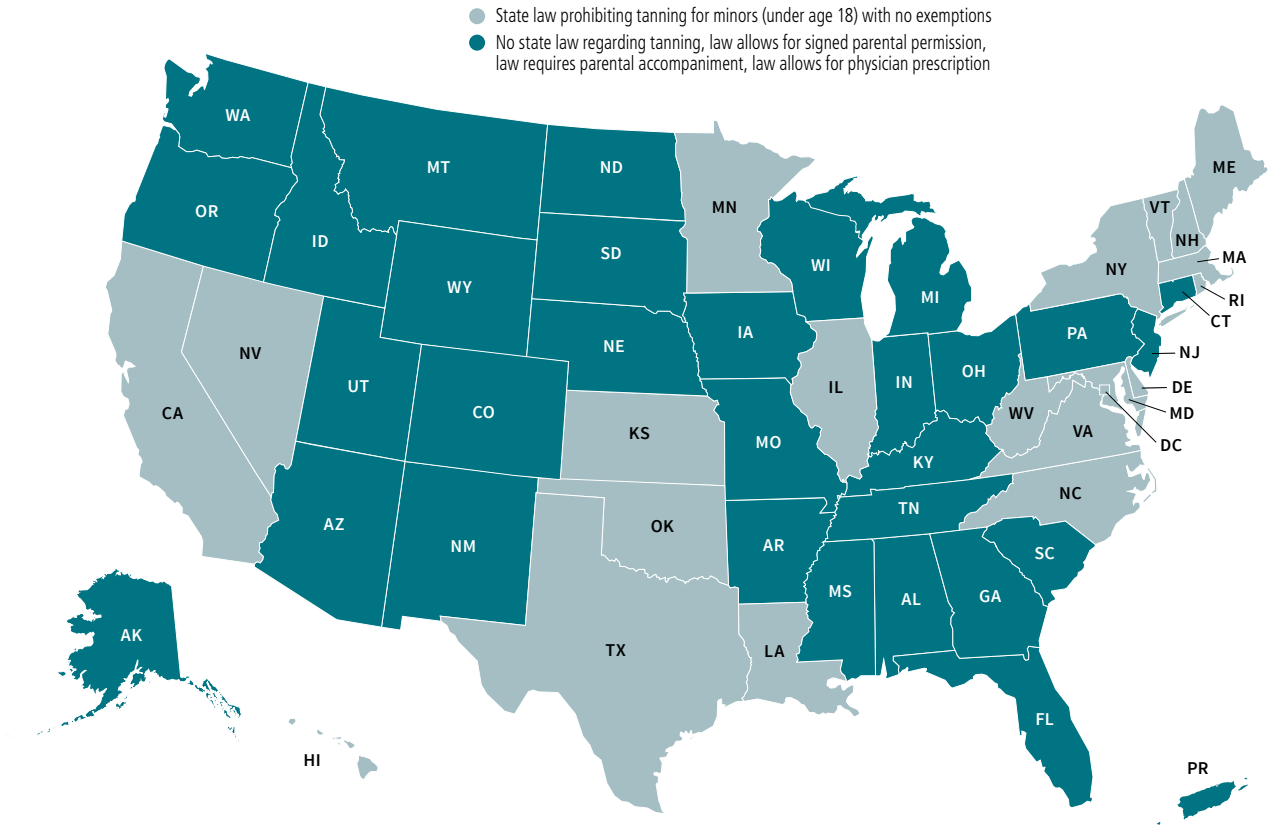
UVR is also a source of vitamin D, which is important for bone health. Vitamin D is naturally present in a few foods (e.g., oily fish and eggs), added to others (e.g., milk and cereal), and available as a dietary supplement, although evidence suggests vitamin D supplementation may not provide substantial benefits.[12-13] Additional research is underway to improve the understanding of vitamin D levels and their effects on health, including their potential protective association with some cancers.

Artificial UVR Exposure (Indoor Tanning)

The International Agency for Research on Cancer (IARC) classifies UV-emitting indoor tanning devices as carcinogenic to humans.[14] In the US, more than 410,000 cases of KC and 6,000 cases of melanoma can be attributed to indoor tanning annually.[15] The risk of melanoma is about 60% higher for people who begin using indoor tanning devices before the age of 35, and risk increases with the number of total hours, sessions, or years that indoor tanning devices are used.[16, 17]

These devices are promoted by the indoor tanning industry and often used for cosmetic purposes, especially among teenagers and young adults. Evidence suggests that age restrictions are effective in reducing indoor tanning among high school girls, and states with restrictions have observed declining indoor tanning use among adults.[18, 19] While several states and localities have passed indoor tanning use laws that restrict the age at which adolescents can use tanning devices and require signage warning about health risks, there is variation in regulation compliance and enforcement.[20] As of January 2023, only 22 states and the District of Columbia had a law prohibiting tanning for minors (under the age of 18), two of which (Washington and Oregon) had prescription exemptions (Figure 3A).

Figure 3A. State Indoor Tanning Restrictions for Minors, US, 2023



Note: There is no medical indication for the use of a tanning device in the diagnosis or treatment of a disease. Reported as of January 1, 2022.
Source: American Cancer Society Cancer Action Network, Inc., 2022.

UVR Protective Behaviors

UVR damage of unprotected skin can be minimized by avoiding tanning devices, timing outdoor activities when UVR is less intense, wearing protective clothing, seeking shade, and applying and reapplying adequate amounts of sunscreen to exposed skin.[22] Visit cancer.org/healthy/be-safe-in-sun/ for additional information.

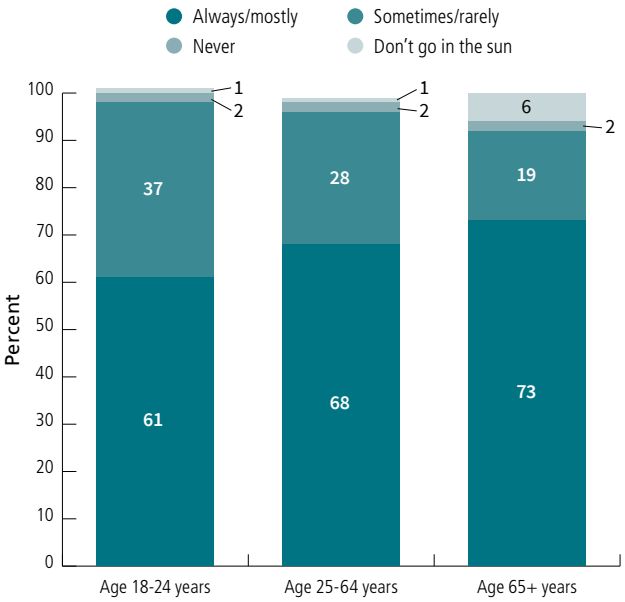
Adult UVR Exposure

- Prevalence of past-year sunburn reports remained consistent at one-third of adults between 2005 and 2015; in 2020, the prevalence of sunburn was 27% and was highest among younger adults ages 18-24 years (40%) and White people (36%).[23, 24]
- In 2020, 34% of US adults reported intentional outdoor tanning in the past year, with increased prevalence among women (39%), adults younger than 25 years of age (45%), and sun-sensitive adults (40%).[25]
- Among adults, the prevalence of using an indoor tanning device in the past year declined from 10% in 2007 to 4% in 2018, with the steepest declines among adults ages 18-34 years (14% to 4%) and women (14% to 4%).[19]
- Despite declining use, in 2018, about 1-in-4 adults who reported any indoor tanning did so more than 25 times in the previous year.[19]

Adult Sun Protective Behaviors

- In 2020, about 39% of adults ages 18-24 years inconsistently (sometimes, rarely, or never) practiced sun protective behaviors when outside on a sunny day for more than an hour, compared to 21% of those ages 65 years and older (Figure 3B).

Figure 3B. Sun Protective Behaviors* (%), Adults 18 Years and Older, US, 2020



*At least one of the following: wear wide-brimmed hat, long-sleeve shirt, sunscreen; or seek the shade.

Source: National Health Interview Survey, 2020.

Youth UVR Exposure

- Among high school students surveyed in 2017, 57% (girls: 62%, boys: 53%) reported having had a sunburn in the past year.[26]
- Consistent with a decline among adolescents globally, indoor tanning prevalence among US high school girls decreased from 25% in 2009 to 6% in 2019, with larger declines in White and Hispanic female students. Prevalence among high school boys also declined from 7% in 2009 to 3% in 2019.[27, 28]
- During 2009-2015, indoor tanning was lower among high school girls residing in states with an age restriction for indoor tanning (7%), compared to those in states with parental permission (20%) or no restriction (25%).[29]

Youth Sun Protective Behaviors

- The percentage of US high school students who reported rarely or never wearing sunscreen with an SPF of 15 or higher remained unchanged from 2001 (15%) to 2019 (16%).[30]

Prevention Strategies in Skin Cancer

As a result of the growing public health burden of UVR and skin cancer, in 2014 the US Surgeon General released a Call to Action to Prevent Skin Cancer to strengthen preventive strategies to reduce skin cancer incidence and mortality.[31] The call to action set forth five overarching goals:

- Increase opportunities for sun protection in outdoor settings.
- Provide individuals with the information they need to make informed, healthy choices about UVR exposure.
- Promote policies that advance the national goal of preventing skin cancer.
- Reduce harms from indoor tanning.
- Strengthen research, surveillance, monitoring, and evaluation related to skin cancer prevention.

One study estimated that about 230,000 melanoma cases in the US could be averted from 2020 to 2030 if a nationwide comprehensive skin cancer prevention program were implemented.[32] Several strategies have been identified to help reach these goals. For example, communities can help increase shade in outdoor recreational settings by planting trees or building structures to provide shade to frequently used areas.[33] Skin cancer prevention can be included in school curricula from an early age, and implementing specific policies, such as sun safety in the workplace, can also help reduce skin cancer by limiting or reducing UVR exposure while on the job. Further, strongly enforcing existing laws that prohibit indoor tanning among minors would help reduce the harms associated with indoor tanning, as current compliance varies widely by jurisdiction, undermining the effectiveness of these legislations.[31, 34] Visit ephtracking.cdc.gov/Applications/melanomadashboard/ to see the CDC's Melanoma Dashboard, which provides state- and county-level data to support community-level strategies to reduce UVR exposure.

Health care professionals also play an important role in educating their patients on the importance of skin cancer prevention. In March 2018, the US Preventive Services Task Force (USPSTF) published updated recommendations stating that to reduce skin cancer risk, young adults, adolescents, children, and parents of young children ages 6 months to 24 years with fair skin types should be counseled about minimizing UVR exposure. It was also recommended that adults over the age of 24 with fair skin types may be selectively offered counseling about minimizing sun exposure in an effort to reduce skin cancer risk, although the net benefits of this may be small.[35] The USPSTF is currently in the process of updating these recommendations.[36] In 2015, approximately 34% of pediatricians reported discussing the importance of sun protection with at least 75% of their patients.[37] Social norms about tanned skin appearing healthy and attractive present barriers to sun protective behaviors. Therefore, another important approach to promoting individual protection against UVR exposure focuses on appearance, emphasizing the harms of sun exposure (i.e., age spots and wrinkles) to physical appearance and increasing the perceived attractiveness of untanned skin.[31, 38]

Early Detection of Skin Cancer

Early detection of skin cancer may include an inspection by a clinician and/or self-examination. The American Cancer Society does not have a guideline on the early detection of skin cancer, and there is some uncertainty as to whether routine skin examinations by a primary care provider would improve outcomes and survival for average-risk adults who develop skin cancer. In 2023, the USPSTF concluded that the current evidence was insufficient to assess the balance of benefits and harms of visual skin examination by a clinician to screen for skin cancer in adolescents and adults.[39] The American Academy of Dermatology supports skin self-examinations for all individuals, but especially for those with red or blond hair, blue or green eyes, fair skin, or men ages 50 years and older given their increased risk for skin cancer.[40] In 2015, about 1 in 5 adults reported having had a total body skin examination by a clinician at least once in their lifetime, with a greater proportion among adults with higher-risk profiles.[41, 42] Anyone with new, suspicious growths or anything changing on the skin should be evaluated promptly by a physician. The ABCDE rule can serve as a helpful guide for the warning signs of the most common types of melanoma. (See sidebar, above.)

Visit cancer.org/cancer/skin-cancer/prevention-and-early-detection for guidance on how to perform a skin self-exam in addition to general information about skin cancer prevention.

ABCDE Rule: Warning Signs of Melanoma

Asymmetry – One-half of the mole does not match the other half.

Border irregularity – Edges of the mole are ragged, notched, or blurred.

Color – Pigmentation of the mole is not uniform. For example, different shades of tan, brown, or black are often present; dashes of red, white, and blue can add to the spotted appearance.

Diameter – Melanomas usually are >6mm in diameter, or about the size of pencil eraser, but they can be smaller.

Evolving – A particular mole looks different than the others or is changing in size, shape, or color.

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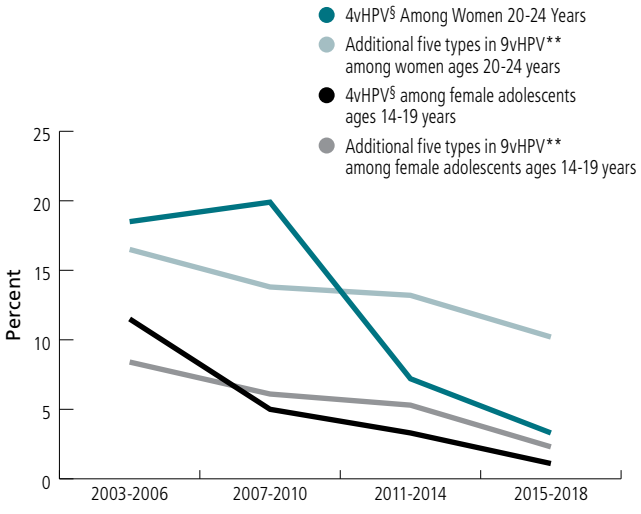
Infectious Agents

There are several infectious agents known to cause cancer and are classified as class 1 carcinogens by the International Agency for Research on Cancer, such as human papillomavirus, Epstein-Barr virus, hepatitis B virus, hepatitis C virus, and *Helicobacter pylori*. In the US, about 3% of all cancers are attributable to infections, accounting for an estimated 51,440 cases in 2014.[1] Fortunately, many of these infections are amenable to prevention and/or treatment, thereby averting cancer occurrence and death.

Human Papillomavirus

Human papillomavirus (HPV) infection is relatively common, is spread primarily through intimate skin-to-skin contact, and is usually asymptomatic. Most infections are cleared by the body and do not cause cancer. However, out of the more than 150 types of HPV, about 14 high-risk HPV strains cause cancer.[2] Persistent high-risk HPV infection causes almost all cervical cancers, 90% of anal cancers, about 70% of oropharyngeal cancers, and 60%-70% of vaginal, vulvar, and penile cancers.[3] Cervical cancer is the most common HPV-related cancer in women, and oropharyngeal cancer is the most common in men.[4] Based on data from 2015-2019, approximately 47,200 HPV-associated cancer cases occur in the United States each year, with 35,500 of these cases directly attributable to HPV.[5] Incidence rates for several HPV-related cancers, including oropharyngeal, anal, and vulvar, have increased. Overall cervical cancer incidence rates have declined because of widespread screening that can prevent this cancer, but rates have stabilized in recent years.[6]

Figure 4A. Prevalence (%) of Human Papillomavirus Strains Targeted by Vaccines Among Female Adolescents and Women Ages 14-24 Years, 2003-2018



§HPV strains 6, 11, 16, and 18. ** HPV strains 31, 33, 45, 52, and 58.
Source: Rosenblum, at al.[8]

HPV Prevention and Control

The HPV vaccine currently used in the US (Gardasil®9) was FDA-approved in 2014 and protects against nine HPV types and has the potential to avert about 90% of HPV-caused cancers.[3] This vaccine covers five additional strains of high-risk HPV than its predecessor, the first generation Gardasil® vaccine, which was FDA-approved in 2006. Receipt of the HPV vaccination before the age of 17 in girls has been shown to lower the risk of cervical cancer by 90%.[7] Among females ages 14-19 years, prevalence of HPV strains directly targeted by the first generation Gardasil® and updated Gardasil®9 vaccines declined by 92% and 75%, respectively,

American Cancer Society Recommendations for HPV Vaccine Use

- HPV vaccination works best when given to boys and girls between ages 9 and 12 years.
- Children and young adults ages 13 through 26 years who have not been vaccinated or who have not received all of their shots should get the vaccine as soon as possible. Vaccination of young adults will not prevent as many cancers as vaccination of children and teens.
- The American Cancer Society does not recommend HPV vaccination for persons older than 26 years of age.

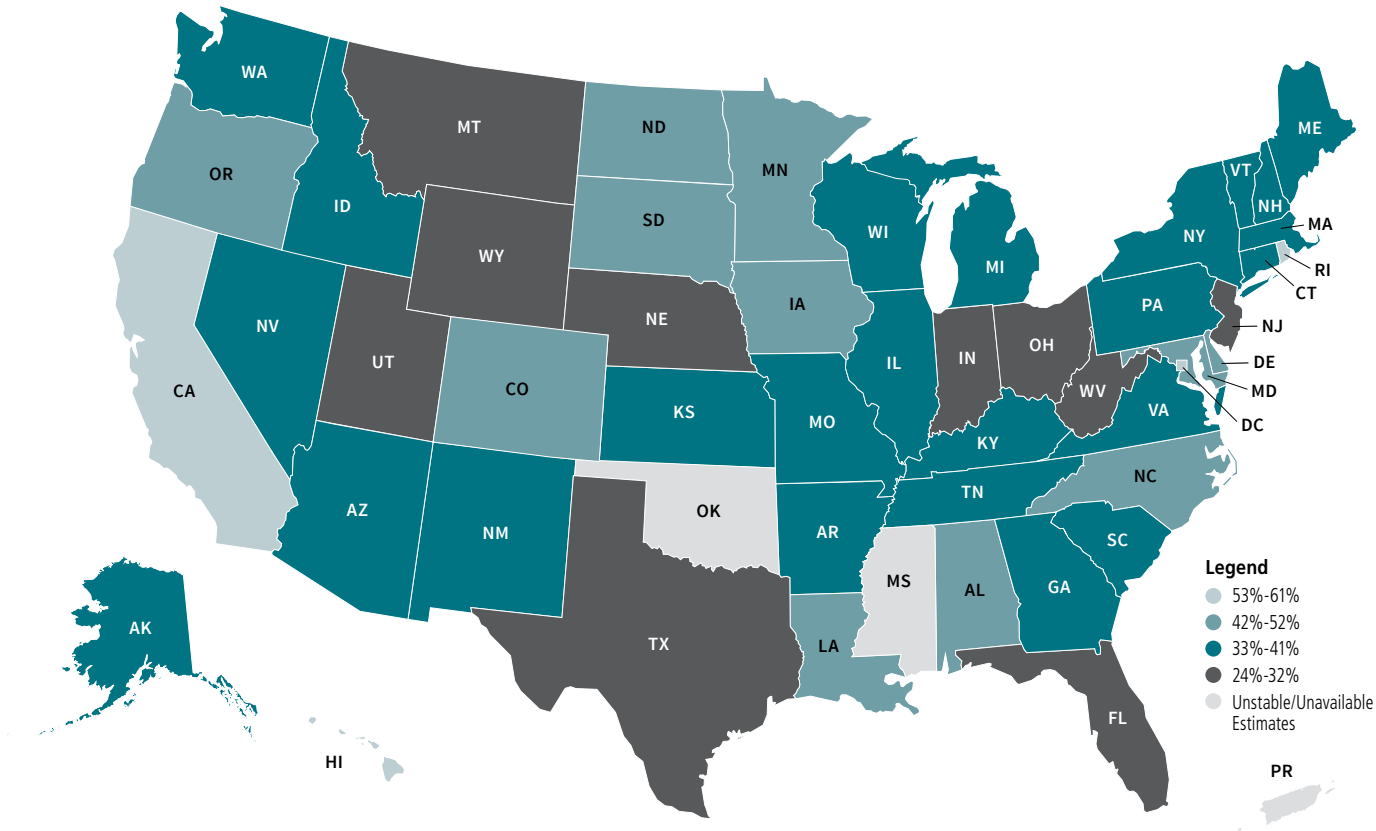
Table 4A. Vaccination Coverage (%), Youth by Sex, Race/Ethnicity, and Poverty Status, US, 2021

	Before 13th birthday						13-17 years			
	HPV						HPV			Hepatitis B
	Females		Males		Overall		Females	Males	Overall	Overall
	Initiation	Up-to-date*	Initiation	Up-to-date*	Initiation	Up-to-date*	Up-to-date*	Up-to-date*	Up-to-date*	≥ 3 doses
Overall	**70**	**41**	**65**	**40**	**68**	**41**	**64**	**60**	**62**	**92**
Race/Ethnicity										
White	68	36	59	32	63	34	63	57	60	93
Black	75	45	73	44	74	44	67	63	65	92
Hispanic	72	43	73	50	72	47	60	63	62	90
Other	70	52	64	50	68	51	69	62	66	94
Poverty Status										
Below poverty level	81	47	81	58	81	54	68	66	67	91
At or above poverty level	68	40	60	35	64	38	63	59	61	92

*According to recommendations; see sources for more information.

Sources: TeenVaxView, 2022.[57] National Immunization Survey-Teen, 2021.

Figure 4B. Up-to-date* Human Papillomavirus Vaccination (%) Before 13th Birthday, Adolescents 13-17 Years by State, US, 2019-2021



*According to recommendations; see sources for more information.

Source: TeenVaxView, 2022.[57]

The National HPV Vaccination Roundtable

In 2014 the American Cancer Society, in collaboration with the Centers for Disease Control and Prevention (CDC), established the National HPV Vaccination Roundtable (HPVRT). These organizations have been at the forefront of advancing public health initiatives and reducing mortality and morbidity through prevention and promotion. The roundtable is a national coalition of over 70 organizations working at the intersection between immunization and cancer prevention. The National HPV Vaccination Roundtable leverages the expertise and talents of their diverse members to identify evidence-based strategies and develop new, innovative projects that go beyond the limits of individual organizations. HPVRT is on a mission to raise HPV vaccination rates and prevent HPV cancers in the United States. The roundtable's three primary areas of activity are:

- CONVENE: We convene national organizations, experts, and key stakeholders to ideate, strategize, and problem solve.
- COMMUNICATE: We communicate and inform providers, systems, coalitions, parents, and the public about the importance of HPV vaccination as cancer prevention.
- CATALYZE: We catalyze our members, and by extension the public, to take action to close the adolescent vaccination gap.

Through convening, communicating, and catalyzing, the National HPV Vaccination Roundtable influences vaccinators, their supporting health systems, and parent decision-makers to vaccinate all age-eligible children on time to prevent HPV-related cancers. The roundtable believes that by working together over the long term, we can move toward ending vaccine-preventable HPV cancers as a public health problem. Visit hpvroundtable.org for more information.

NATIONAL HPV VACCINATION ROUNDTABLE

between 2003 and 2018 (Figure 4A). Cervical cancer incidence has declined by 11% annually since 2012 and 2019 in women ages 20-24 years, suggesting potential vaccine impact on cervical cancer burden.[9]

The American Cancer Society's HPV vaccination guidelines were updated in 2020 to recommend routine vaccination for girls and boys between ages 9 and 12 years, rather than ages 11 and 12, due to increasing evidence supporting the benefits of early series initiation.[10, 11] (See sidebar, page 36). Vaccination is recommended for teenagers and adults through the age of 26 who have not been adequately vaccinated, in accordance with the Advisory Committee on Immunization Practices (ACIP).[12] Vaccination does not prevent established infections from progressing to precancer or cancer and does not prevent infection of all HPV types; therefore, women and persons with a cervix in the appropriate age groups should receive regular cervical cancer screening. (See page 63.)

The promise of preventing multiple types of cancers will be fully realized only if high vaccination rates are achieved in adolescents. Recommended strategies for increasing HPV vaccination rates in the US focus on improving provider recommendation, parental awareness, series initiation at the earliest opportunity (i.e., age 9), and increasing access to vaccination in medical (e.g., physicians' offices) and non-medical settings (e.g., schools, pharmacies, and health departments).[13-15] There are several proven strategies to improve rates, including reminder-recall systems and removal of administrative and financial barriers to vaccination.[16, 17] The Affordable Care Act (ACA) requires private insurance plans to cover HPV vaccination without cost sharing for eligible children, adolescents, and adults.[18] Furthermore, the federal Vaccines for Children program covers vaccine costs for children and teens who meet certain eligibility requirements (i.e., uninsured, underinsured, eligible for Medicaid, or of American Indian/Alaska Native).[19]

In 2014, the American Cancer Society and the CDC established the National HPV Vaccination Roundtable to improve HPV vaccine uptake. (See sidebar, left.)

Table 4B. Human Papillomavirus Vaccination Coverage (%), Youth by State, US, 2019-2021

	Before 13th Birthday† (2019-2021)		13-17 Years (2021)			
	Overall		Females	Males	Overall	
	Up-to-date*		Up-to-date*	Up-to-date*	Up-to-date*	
United States	**37**	**Rank**	**66**	**61**	**63**	**Rank**
Range	*24-61*	(1=low)	*33-81*	*33-86*	*33-83*	(1=low)
Alabama	45	37	58	67	62	26
Alaska	38	27	61	52	56	8
Arizona	33	12	63	60	62	21
Arkansas	36	19	59	55	57	13
California	57	48	67	71	69	43
Colorado	44	36	69	70	69	44
Connecticut	34	14	67	66	66	35
Delaware	46	40	69	69	69	42
District of Columbia	61	49	81	78	79	51
Florida	24	2	49	49	49	3
Georgia	33	11	67	55	61	17
Hawaii	49	44	69	70	69	45
Idaho	33	13	64	60	62	20
Illinois	38	30	65	60	62	24
Indiana	32	10	62	49	55	7
Iowa	46	39	70	62	66	34
Kansas	41	34	71	58	64	29
Kentucky	36	21	49	65	57	14
Louisiana	48	42	61	67	64	28
Maine	34	15	68	56	62	19
Maryland	46	38	74	70	72	46
Massachusetts	38	29	78	72	75	50
Michigan	35	18	69	61	65	31
Minnesota	48	43	69	62	66	33
Mississippi	‡	–	33	33	33	1
Missouri	39	32	63	56	59	16
Montana	29	5	49	56	53	48
Nebraska	31	9	63	61	62	22
Nevada	38	28	55	58	56	10
New Hampshire	35	17	77	68	72	48
New Jersey	27	3	63	47	55	6
New Mexico	37	23	63	53	58	15
New York	35	16	68	61	64	30
North Carolina	48	41	73	63	68	39
North Dakota	49	45	69	76	72	47
Ohio	30	6	69	56	62	24
Oklahoma	‡	–	55	58	57	12
Oregon	42	35	63	71	67	37
Pennsylvania	37	22	68	69	69	41
Rhode Island	56	47	80	86	83	52
South Carolina	37	25	61	63	62	23
South Dakota	52	46	78	71	75	49
Tennessee	36	20	64	49	56	11
Texas	27	4	55	48	51	4
Utah	31	8	63	60	61	18
Vermont	38	26	64	69	67	17
Virginia	40	33	73	57	65	32
Washington	39	31	65	70	68	40
West Virginia	31	7	67	46	56	9
Wisconsin	37	24	67	60	63	27
Wyoming	24	1	49	47	48	2
Puerto Rico	–	–	69	66	67	38

†Estimates based on vaccinations received before 13th birthday among 13-year-olds. *According to recommendations; see sources for more information. ‡Estimates are statistically unstable. Please see Special Notes on page 68.

Sources: TeenVaxView, 2022.[57] National Immunization Survey-Teen, 2019-2021.

Additionally, the CDC provided the American Cancer Society with funding to develop HPV VACs (Vaccinate Adolescents against Cancers), a national program to engage health care systems, health plans, states, and other public health actors to raise HPV vaccination rates for cancer prevention. The CDC launched an HPV communication campaign called "You Are the Key" to educate parents and clinicians about immunizations recommended for adolescents,[20] and, in 2018, the American Cancer Society launched its *Mission: HPV Cancer Free* public health campaign, with the goal of protecting 80% of 13-year-olds in the United States by 2026, the 20-year anniversary of the HPV vaccine's release. See cancer.org/hpv for more information.

HPV Infection Prevalence

- In 2018, there were an estimated 43 million HPV infections in the United States, with approximately 13 million new infections that year.[21]
- In 2013-2016, an estimated 4% (men: 7%, women: 2%) of adults ages 18-69 years had high-risk oral HPV, and 26% (men: 30%, women: 26%) had high-risk genital HPV infection.[22]
- High-risk genital HPV prevalence declined with age (18-24 years: 31%: 25-34 years: 29%, 34-44 years: 27%, 45-59 years: 25%), but high-risk oral HPV prevalence was similar across age groups.[22]

- Among adults ages 18-69 years, high-risk oral HPV infection was lower among Asian persons (1%) than White (4%), Black (5%), and Hispanic (3%) persons. Among adults ages 18-59 years, high-risk genital HPV prevalence ranged from 14% in Asian persons to 27% in White persons and 26% in Hispanic persons to 39% in Black persons.[22]

HPV Vaccination

- In 2021, 70% of girls and 65% of boys ages 13-17 years initiated (at least one dose) the HPV vaccine before their 13th birthday; 41% and 40%, respectively, received both doses before their 13th birthday (Table 4A), but estimates varied widely across states from 24% in Florida and Wyoming to 61% in the District of Columbia in girls and boys combined (Figure 4B, Table 4B).
- The initiation rate of the HPV vaccination series increased among girls ages 13-17 years from 49% in 2010 to 79% in 2021 and among boys ages 13-17 years from 21% in 2012 to 75% in 2021.[23]
- In 2021, 64% of girls and 60% of boys ages 13-17 years were up to date for the HPV vaccination series (Table 4A), but estimates differed widely across states with the lowest in Mississippi (33% for girls and boys) and highest in the District of Columbia (81% for girls and in Rhode Island (86%) for boys (Table 4B).
- Although evidence from the National Immunization Survey-Teen suggests a continued increase in uptake in HPV vaccinations during the COVID-19 pandemic,[24] other studies show evidence of declines in vaccination rates during 2020 and 2021.[25]
- In 2019, among adult women and men ages 19-26 years, 52% and 32%, respectively, reported ever having received at least one dose of HPV vaccine.[26]

Helicobacter Pylori

Chronic infection with *Helicobacter pylori (H. pylori),* a bacterium that grows in and causes damage to the stomach lining, can lead to stomach cancer and gastric lymphoma.[27, 28] In the US, about 31% of all stomach cancers and 65% of non-cardia gastric cancers (cancers in the lower part of the stomach) are attributable to *H. pylori* infection.[1]

Approximately one-half of the world's population is infected, but most people will remain unaware of their infection because they do not experience symptoms and will not develop stomach cancer.[29] *H. pylori* transmission is thought to occur from person to person through fecal-oral and oral-oral routes and is facilitated by crowded living conditions and relatively poor sanitation. There is evidence that gastric cancer incidence and mortality rates may be reduced among people with *H. pylori* infection who were treated with antibiotics compared to those who were not.[30] In the US, there is no recommendation to screen asymptomatic people for *H. pylori* because of the relatively low gastric cancer incidence.

H. Pylori in the US

- About one-third of the US population is infected with *H. pylori*.[1, 31]
- *H. pylori* prevalence is five to nine times higher in adults over the age of 50 compared to adults in their 20s and two to three times higher among Mexican American and Black persons, compared to White persons; prevalence is also greater among those who recently immigrated to the US.[32, 33]

Hepatitis B Virus

Chronic infection with hepatitis B virus (HBV) can cause liver cancer and is increasingly recognized as a risk factor for a small proportion of non-Hodgkin lymphoma cases.[34, 35] In the US, about 7% of all liver cancers are attributable to HBV.[1] The virus is transmitted through blood or mucosal contact with infectious blood or body fluids (e.g., semen and saliva) and can be transmitted to infants at birth or shortly after.

Vaccination against HBV has been the primary prevention strategy in reducing prevalence of the virus. In 1991, the CDC first outlined a nationwide strategy aimed at reducing HBV, including a three-dose HBV

vaccination series for children.[36] The CDC currently recommends that the following groups receive the vaccine: infants, all youth <19 years of age who have not been vaccinated, and unvaccinated adults who are at high risk for infection (e.g., health care workers and travelers to regions with HBV).[36] In the US, HBV vaccination is typically given during infancy. There are several drugs that effectively treat HBV; if infection progresses to liver disease, liver transplantation is also a treatment option.

In 2023, the CDC recommended a one-time universal screening of adults ages 18 years and older for hepatitis B virus (HBV) infection, based on evidence that chronic hepatitis B infection treatment is associated with better health outcomes and is cost effective.[37]

Most HBV infections today occur in unvaccinated adults who practice risky behaviors (e.g., injection drug users, men who have unprotected sex with men, and adults who have sex with multiple partners).[36]

HBV Prevalence and Vaccination in the US

- An estimated 580,000 to 2.4 million persons are living with HBV infection in the US; non-US-born persons account for 14% of the general population, but account for 69% of those living with chronic HBV infection.[37-39]
- HBV acute infection rates were markedly higher in West Virginia and Kentucky (≥3 per 100,000), compared to the national average and other states, where acute infection rates were ≤ 1 per 100,000.[40]
- In 2021, 92% of adolescents (ages 13-17 years) received at least three HBV vaccine doses (Table 4A); By state, adolescent HBV vaccination coverage in 2021 ranged from 84% in Texas and West Virginia to 98% in Iowa).[57]

Hepatitis C Virus

Chronic infection with hepatitis C virus (HCV) can cause cirrhosis and liver cancer and has been shown to increase the risk of some non-Hodgkin lymphoma.[34, 41]

Liver cancer incidence and mortality rates have increased rapidly in the US for several decade, but incidence rates have recently stabilized and mortality rates have even declined among males.[9] These increases are thought to be, in part, due to the HCV epidemic that began in the late 1960s, primarily through injection drug use.[42, 43] Nearly one-quarter of liver cancers in the US are attributable to HCV, with nearly one-third having evidence of HCV infection.[1, 44]

Today, most HCV is spread through injection drug use, and it can be, but rarely is, transmitted through needle-stick injuries in health care settings, mother-to-child transmission during birth, and sexual contact with an infected individual. Prior to 1992, HCV could also be transmitted through blood infusion and organ transplants from infected donors, but this mode has been eliminated through effective and efficient screening of donated blood and organ/tissue donors for the virus to eliminate infected samples. Most (75%-85%) people with HCV will become chronically infected and are unaware of their infection until liver disease develops. In contrast to HBV infection, there is no vaccine to protect against HCV infection, which often becomes chronic regardless of age at infection. Primary prevention strategies include both educating uninfected individuals who are at high risk for infection about exposure prevention and counseling infected individuals about how to avoid transmission to others.

In 2020, the US Preventive Services Task Force updated their guidelines recommending one-time screening among men and women ages 18 to 79 years.[44] Those who test positive for HCV are advised to begin antiviral treatment in order to reduce health effects related to HCV infection.[46] These treatments are effective at eliminating HCV infection, but are also expensive.

HCV Prevalence and Testing in the US

- Approximately 2.5 million persons (1%) were living with acute HCV infection in 2020,[46, 47] and rates were highest among those ages 20-39 years, the age group most affected by fatal overdoses and injection drug use related to the opioid crisis.[40]

- During 2020, the incidence rate of chronic hepatitis was 40.7 per 100,000 persons (107,300 new cases), but rates were higher among American Indian/Alaska Native persons (66.8) and those ages 30-39 years (73.6).[47]

Human Immunodeficiency Virus

The human immunodeficiency virus (HIV) is primarily transmitted through sexual intercourse and injection drug use, though other infection routes are possible. HIV is a virus that may be present in the body for a long period of time without resulting in symptoms; however, as HIV progresses, the immune system is weakened, and acquired immunodeficiency syndrome (AIDS) develops.

Before the development of highly active antiretroviral therapy (HAART), there were several AIDS-defining cancers, including Kaposi sarcoma, high-grade non-Hodgkin lymphoma (NHL), and cervical cancer. The term AIDS-defining means that if people who are HIV infected develop one of these cancers, HIV has progressed to AIDS.[48] People who are HIV infected and on HAART still experience elevated risk for these cancers despite well-controlled infection.

HIV-infected individuals are at an increased risk of developing other cancers, often referred to as non-AIDS-defining cancers, including Hodgkin lymphoma, lung, anal, and liver cancers.[34, 49] The weakened immune system, along with shared routes of transmission with other cancer-causing infectious agents (e.g., HPV and HCV), increases the risk of cancers in this population.[50] Elevated risk for lung cancer among people infected with HIV is also thought to be related to higher smoking rates, as well as immunosuppression in this population.[51] Approximately 77%, 11%, 8%, 5% and <1% of Kaposi sarcoma, anal cancer, non-Hodgkin and Hodgkin lymphomas, and cervical cancers in the US are attributed to HIV infection.[1] Among deaths occurring in persons with HIV, there was a decline in AIDS-defining cancers and stabilization of non-AIDS-defining cancers between 2001 and 2015; however, it is expected that the incidence of some cancers may increase as people living with HIV age.[52, 53]

There are several primary prevention strategies for HIV, such as safe sex practices and using sterile needles. There is no vaccine against HIV, but pre-exposure prophylaxis is available for people at risk for the disease. Among those infected with HIV, effective antiretroviral medications can suppress virus replication and boost the immune system, but these medication regimens must be taken throughout life. Furthermore, HIV-infected individuals are recommended to receive tailored screenings for certain cancers, including cervical cancer. Visit cdc.gov/hiv/default.html for more information.

HIV Prevalence and Trends in the US

- Since the mid-1990s, the prevalence of HIV infection has increased due to improvements in survival among those with the virus. Improvements in survival have also resulted in increased cumulative incidence and burden of cancer among persons living with HIV.[54]
- In 2020, 1.1 million adults and adolescents were estimated to be living with HIV. Of those, approximately 87% knew they had HIV. The majority of people living with HIV are men and men who have sex with men.[55, 56]
- In 2020, Black and Hispanic persons accounted for 42% and 27% of HIV diagnoses, respectively.[55, 56]
- HIV prevalence is higher in urban areas, as well as in Northeastern states; however, the rate of newly acquired HIV is highest in Southern states.[55, 56]
- Overall, HIV incidence declined between 2014 and 2020; the 17% decline during COVID-19 in 2020 may be an artifact attributable to disruptions in clinical care services, shortages in HIV testing materials, or patient hesitancy in seeking clinical care during the COVID-19 pandemic.[56]

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Occupational and Environmental Cancer Risk Factors

Carcinogens are substances and exposures that can lead to cancer; they can be synthetic or naturally occurring and will not cause cancer in everyone who is exposed. An individual's risk of cancer from carcinogen exposure is dependent on the intensity and duration of exposure, as well as other risk and biological factors.

The US National Toxicology Program (NTP) and the World Health Organization's International Agency for Research on Cancer (IARC) are the primary agencies that evaluate and classify substances. The NTP's 15th *Report on Carcinogens*, published in 2021, classified 63 substances that are known to be, and 193 substances as reasonably anticipated to be human carcinogens.[1] The IARC invites multidisciplinary scientific teams to review and classify carcinogens. As of March 2023, 126 agents were classified as Group 1 carcinogens (i.e., carcinogenic to humans), and 94 agents were classified as Group 2A

carcinogens. (i.e., probably carcinogenic to humans).[2] The American Cancer Society does not classify carcinogens but provides summary information for the public (cancer.org/cancer/cancer-causes.html). We also fund and manage the Cancer Prevention Studies, which examine the association between many exposures, including some important occupational and environmental factors, and cancer risk.[3, 4]

Some cancer-causing exposures, such as tobacco smoke and certain infectious agents, have been detailed in other sections of this publication. This section describes environmental carcinogens found in the air, water, and soil, as well as occupational carcinogens encountered in the workplace.[5-7]

Visit ntp.niehs.nih.gov/pubhealth/roc/index-1.html for more information about specific carcinogens and how they are identified. Visit monographs.iarc.who.int/agents-classified-by-the-iarc/ to review the current listing of agents classified by IARC monographs.

Occupational Cancer Risk Factors

Workers are often exposed to certain substances at higher levels and over a longer period than the public, conferring greater cancer risk. An estimated 45,760 cancer deaths in the United States were attributed to occupational exposures in 2019 alone.[8]

Occupational exposures are known to cause many types of cancer, though the most common are those of the lung, skin, bone, and urinary bladder, as well as mesothelioma and leukemia. Examples of occupational exposures and the cancers they cause include diesel engine exhaust among workers in the trucking, mining, and railroad industries,[9] and lung and possibly bladder cancers; [10, 11] coal tar products used in roofing and paving, and lung and skin cancers; and leather dust exposure from the manufacturing and repair of leather footwear, and nasal cavity and paranasal sinus cancers.[12, 13]

Occupational Exposure Among Firefighters

In 2022, the IARC evaluated the carcinogenicity of occupational exposure as a firefighter.[14] Firefighters experience a unique exposure to a wide variety of combustion products, including diesel exhaust, firefighting foams, flame retardants, and building materials, among other hazards, as they respond to both fire and non-fire events.[14] Occupational exposure as a firefighter was identified as a Group 1 carcinogen to humans, as there was sufficient evidence that exposure causes mesothelioma and bladder cancer.[14] There was also limited evidence connecting exposure to colon, prostate, testicular, and skin cancer, as well as non-Hodgkin lymphoma.[14]

In 2021, the American Cancer Society and the International Association of Fire Fighters (IAFF) launched a collaboration to assist firefighters and emergency medical service personnel with cancer detection, treatment, and prevention. The American Cancer Society's free cancer helpline is available 24/7 in English and Spanish, and more than 200 other languages through a translation service, to all IAFF members to answer questions about cancer and to connect them with resources to meet their needs. Visit iaff.org/fightcancer/ for more information on the collaboration and available resources.

Pesticides

Pesticides are a group of chemicals used to control plants, molds, and insects in agricultural, commercial, and residential settings. New pesticide formulations are regularly developed, leading to thousands of combinations of them. Although some pesticides have been phased out of use, they may still be present in the environment. For more information, see *Cancer Prevention & Early Detection Facts & Figures 2021-2022*.[15]

Working Conditions

Certain working conditions may also contribute to cancer risk. For example, outdoor workers may have prolonged exposure to ultraviolet radiation, a risk factor for skin cancer.[16] For more information, see *Cancer Prevention & Early Detection Facts & Figures 2021-2022*.[15]

Workplace Regulation

Some carcinogens are now more tightly regulated than in the past, leading to declines in present-day exposure. One important example is asbestos, a mineral fiber that causes cancers of the lung, larynx, ovary, peritoneum, and pleura.[17] While asbestos is rarely produced and consumed in the US today, it may exist in buildings constructed prior to modern regulations and is still produced in other countries.

For information regarding workplace regulations and occupational cancer risk factors, see *Cancer Prevention & Early Detection Facts & Figures 2021-2022*.[15] Visit cdc.gov/niosh/topics/cancer/default.html for occupation/industry and cancer research in the United States and osha.gov/SLTC/carcinogens/index.html for workplace standards and carcinogens in the United States.

Environmental Cancer Risk Factors

There are carcinogenic substances in the air, water, and soil.[5-7] The risk of cancer associated with these types of exposures is typically small, though if the exposure is widespread, the impact on a population can be considerable.[18]

For more information on environmental cancer risk factors, see *Cancer Prevention & Early Detection Facts & Figures 2021-2022*.[15]

Radon

Radon is a form of ionizing radiation that is of particular concern because it accounts for most naturally occurring radiation exposure and is estimated to be the second-leading cause of lung cancer death in the US, accounting for about 21,000 lung cancer deaths annually.[19] The Environmental Protection Agency (EPA) recommends that homeowners test for radon; for those with measured levels exceeding 4 pCi/L, remediation to reduce exposure is recommended.

For more information, see *Cancer Prevention & Early Detection Facts & Figures 2021-2022*.[15] Visit epa.gov/radon for more information by the EPA.

Outdoor Air Pollution

In 2013, the IARC classified outdoor air pollution as a carcinogen based on evidence that it causes lung cancer. There is also limited evidence that it increases the risk of bladder cancer.[20] Outdoor air pollution is estimated to account for about 4% of all lung cancers in the United States.[8]

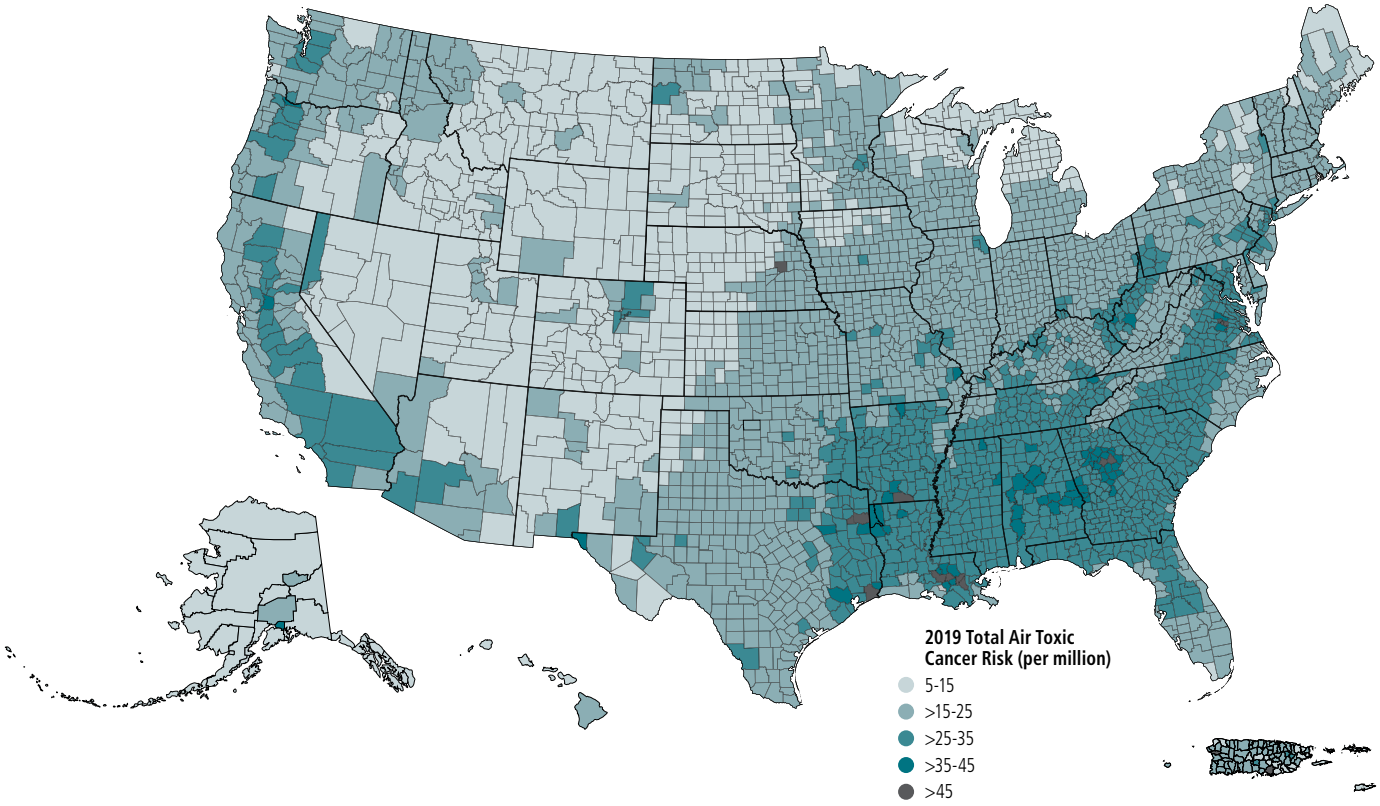
Exposure to outdoor air pollution varies by geographic location, season/temperature, and proximity to pollution sources; typically, these originate from fossil fuel infrastructure (including extraction, transportation, processing and consumption, such as power generation), vehicle emissions, manufacturing, and the burning of plant and animal material.[21-25] In the US, the concentration of pollutants declined between 1990 and 2020, though there had been a slowing of these declines in recent years.[26, 27] The EPA defines an acceptable upper level of air toxic cancer risk, or the lifetime cancer risk from exposure to known air toxics every day, as 100 in 1 million persons. However, other health and risk factors can lower this acceptable limit. Few geographic areas have exposures above 100 in 1 million, but the Southeast US had a noticeably higher air toxic cancer risk than the rest of the country in 2019 (Figure 5A).

For more information on outdoor air pollution, see *Cancer Prevention & Early Detection Facts & Figures 2021-2022*.[15] Visit epa.gov/AirToxScreen for more information on air toxic cancer risk and the air toxic screening assessment.

Unconventional Natural Extraction Sites

In recent years, particular attention has been brought to the air quality near shale oil and gas development companies. While shale gas has economic benefits attributed to recent major technological advances, including horizontal drilling and high-volume hydraulic fracturing, there are concerns regarding air pollution.[28, 29] Shale gas can replace coal use and the greenhouse gas emissions associated with it, but that does not necessarily improve the environmental impact.[29] A study found that people living or working nearby natural extraction sites have a higher exposure to polycyclic aromatic hydrocarbons, a carcinogen, in the air.[28, 30, 31]

Figure 5A. Total Lifetime* Cancer Risk from Prolonged Exposure to Toxic Air Pollutants, US, 2019



The EPA defines an acceptable upper level of air toxic cancer risk, or the lifetime (70 years) cancer risk from exposure to known air toxics every day, as 100 in 1 million persons. However, other health and risk factors can lower this acceptable limit.

Source: 2019 Air Toxic Screening Assessment, US EPA, www.epa.gov/AirToxScreen/2019-airtoxscreen.

In addition, proximity to shale gas and oil producers increases exposure to fine particulate matter, sulfur dioxide, acetaldehyde, benzene, ethylbenzene, formaldehyde, n-hexane, toluene, xylenes, and hydrogen sulfide.[28] Generally, exposure to these compounds from shale oil and gas extraction are below estimated standards, apart from benzene.[32, 33] The impact to air quality and associated health is concerning, as it can be connected to additional morbidity and mortality.[34-36]

Visit epa.gov/outdoor-air-quality-data for more information on outdoor air pollution.

Climate Change

Climate describes long-term weather patterns, and climate change is the long-term shift in global, regional, and local climates. The term climate change is used to describe the current rise in global average temperatures caused by human activities, primarily the burning of fossil fuels.

Anthropogenic climate change influences exposure to environmental carcinogens in a variety of ways. Extraction, processing, transportation, and consumption of fossil fuels are causes of climate change[37-40] and also release carcinogens in surrounding communities.[41, 42] There has been an increase in wildfire activity in the US, including increases in the areas burned, number of large fires, and fire season length, which coincided with climatic conditions more conducive to wildfire.[43-46] Wildfire smoke contains carcinogens not only from the combustion of biomass, including PM2.5 and benzene that can travel far distances, but also from household products and building materials.[47]

Extreme weather events, such as hurricanes, intense precipitation, and heat waves, occur more frequently with climate change.[48] Intense heat can make carcinogens more volatile, and extreme weather events can cause carcinogens to be released into surrounding communities.[49] For example, in 2017, carcinogens from oil refineries, chemical plants, and superfund sites leaked into the community during Hurricane Harvey. These carcinogens included dioxins, a group of persistent organic pollutants that can linger in the environment for over 50 years after they are released.[50]

In an American Cancer Society-led study, lung cancer patients receiving cancer treatment during hurricane disasters experienced delays in completion of radiation therapy and poorer survival compared to similar patients receiving radiation in the same hospitals but at a time when no extreme weather events happened.[51] The COVID-19 pandemic may have exacerbated the impact of climate change on cancer outcomes. For example, Hurricane Ida, a natural disaster that was likely exacerbated by climate change, resulted in emergency protocols (gathering people in shelters), which contradicted the established COVID-19 protocols (social distancing and isolation guidelines).[52] Emergency response plans should identify individuals diagnosed with cancer as a vulnerable population, with specific needs that must be prioritized to ensure provision of continuous care during disasters.[53]

Environmental Health Disparities and Environmental Justice

Exposure to environmental contaminants is inherently dependent on geography. Contaminants usually come from specific sources, such as factories, roadways, and landfills. People who live or work close to sources of pollution are frequently exposed to higher amounts of these pollutants. Due to discriminatory policies and practices, individuals from marginalized communities are more likely to reside in proximity to existing polluting infrastructure and future development of new polluting infrastructure.[54-59] When the burden of environmental hazards disproportionately impacts minority and low-income groups, the result is environmental inequality.[60]

In the United States, environmental inequalities have been demonstrated for a variety of exposures, including transportation pollution[61] and particulate matter in outdoor air,[57, 62] industrial pollution,[63] water contamination,[64] and hazardous waste sites,[65] as well as cumulative environmental burden.[66] In addition, racial disparities have been found in biomarkers of chemical exposure.[67] As a result, several racial/ethnic groups and low-income communities experience more adverse health outcomes, including cancer.[68-71] Structural racism also exacerbates climate-related health inequities through greater exposure to climate hazards along with less capacity to adapt to climate-related health inequities.[54] Apart from structural changes to address these inequities, clinical practitioners are key agents in addressing disparities in care.[54]

The American Cancer Society remains committed to supporting the principles of environmental justice to reduce health disparities throughout our work. Visit epa.gov/environmentaljustice for more information on environmental justice at the EPA. Visit niehs.nih.gov/research/supported/translational/justice/index.cfm for more information about environmental health disparities and environmental justice work at the National Institute of Environmental Health Sciences.

Conclusions

There are several known occupational and environmental cancer risk factors, but there are many still uncovered. There is much to explore about the relationships between cancer and environmental exposures, including drinking water contaminants, electromagnetic fields, ionizing radiation (e.g., natural sources, including radon and manmade sources, including x-rays), and endocrine disruptors. Further, continued research on the impacts of substances or working conditions on cancer and other outcomes, especially as technology and working conditions change, is needed to inform occupational health and safety standards.[72] It is also important that the environmental impact of cancer care be considered, specifically its carbon footprint from energy expenditure, pharmaceuticals, medical devices, food, transportation, procurement and supply chain, and medical/food waste.[73]

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Cancer Screening

Early detection through screening reduces mortality from cancers of the breast, cervix, colon and rectum (colorectal), prostate, and lung. Screening refers to testing individuals who have no symptoms or history for a particular disease. In addition to detecting cancer early, screening can prevent cervical and colorectal cancers by identifying and treating precancerous lesions. Despite the promise of cancer screening and the associated reductions in mortality, overall, the potential of screening is unfulfilled due to lower than optimal uptake and quality issues. Further, not all groups have equally benefited, and health care disruptions during the COVID-19 pandemic potentially exacerbated existing racial/ethnic and socioeconomic status (SES) disparities in receipt of screening services.[1,2]

Breast Cancer Screening

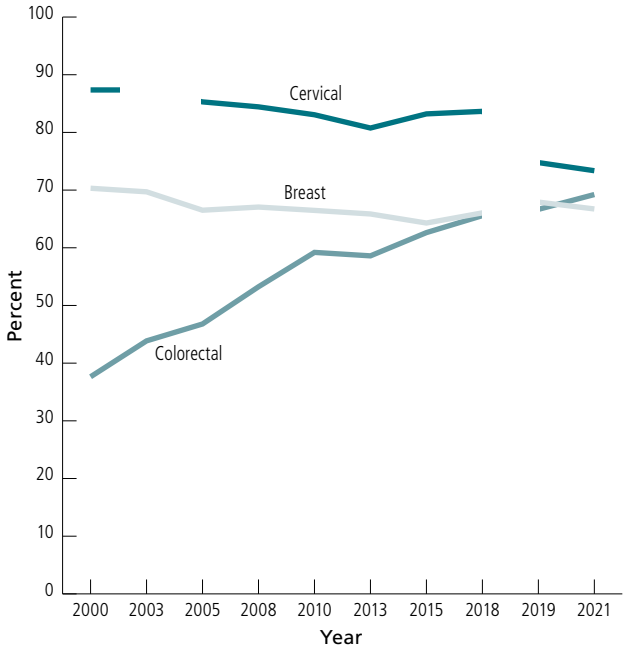
Among women in the US in 2023, an estimated 297,790 cases of invasive breast cancer will be diagnosed, and 43,170 deaths will occur.[3] Early detection by mammography screening and improvements in treatment have contributed to declines in breast cancer death rates.[3-5] However, in the past 10-15 years, the decline in breast cancer death rates have slowed.[6]

Breast Cancer Screening Among Average-risk Women

In 2015, the American Cancer Society recommended that women with an average-risk of breast cancer begin annual screening at age 45, with an option to change to biennial exams at age 55. Women ages 40-44 years should have the choice to begin annual screening. The primary screening exam for average-risk women is mammography, which reduces breast cancer mortality by detecting breast cancers at an earlier and more treatable stage.[7-9] In 2016, the United States Preventive Services Task Force (USPSTF) recommended biennial screening for women ages 50-74 years, with women having a choice to begin biennial screening between ages 40 and 49 years.[10] Both the American Cancer Society and the USPSTF are in the process of updating their breast cancer screening recommendations.

There are several types of mammographic screening. Digital or 2D mammography (DM) has replaced older film-screen versions that were used in the 1980s and 1990s. About 12% of women screened with DM require follow-up imaging; a smaller percentage will not have suspicious findings reconciled by additional imaging and will go on to biopsy, and for every 1,000 screening mammograms performed, about five breast cancers will be detected.[11] In addition to benefits, mammography has some limitations. It will not detect all breast cancers; some breast cancers detected with mammography will still have poor prognosis, and a small percentage of breast neoplasms detected by screening, particularly

Figure 6A. Trends in Breast*, Cervical†, and Colorectal‡ Cancer Screening (%), US, 2000-2021



*Mammography in the past 2 years among women 40+ years. †Pap test in the past 3 years (2000-2013) or HPV and Pap co-testing in the past 5 years (2015, 2018) among women 21-65 years with an intact uteri; hysterectomy data not available in 2003. ‡Colonoscopy, sigmoidoscopy, and stool-testing in the past 10, 5, and 1 years; CT colonography in the past 5 years (2010, 2015, 2018); sDNA in the past 3 years (2018, 2019, 2021) among men and women 50+ years.

Source: National Health Interview Surveys, 2000-2021.

ductal carcinoma in situ, may not progress, and thus may be treated unnecessarily. For all women, there is also the potential for false-positive results, which are most common when a woman has her first screening, and the possibility of undergoing a biopsy for benign abnormalities.

A newer type of mammographic screening is digital breast tomosynthesis (DBT) or 3D mammography, which was approved by the US Food and Drug Administration (FDA) in 2011. It takes multiple images, in combination with conventional 2D DM images (as required by the FDA), to create synthetic 3D images that allow the radiologist to view multiple images of the breast from different angles, which can also be viewed as a series of layers. This allows the radiologist to eliminate the influence of overlapping tissues that occurs during breast compression and can mimic an abnormality or obscure a small cancer. Emerging evidence shows that DBT may detect more breast cancers and has fewer false positives than DM alone over multiple rounds of screening.[12, 13] It is not yet known whether DBT is better at reducing mortality compared to DM; ongoing studies are examining this question.[14]

Mammographic breast density is an indicator of the amount of glandular and connective tissue relative to fatty tissue measured during a mammogram and is not determined by how "firm" the breast feels. Following a mammogram, women with "heterogenous" or "extremely" dense tissue are generally classified as having dense breasts. Women with dense breast tissue have a 15%-20% greater risk for developing breast cancer and having a false-negative mammogram since mammography does not as readily reveal breast cancers among women with dense breast tissue due to "masking" (i.e., when mammographic breast density obscures a breast cancer).[15] Recently, DBT has been shown to have a lower risk of advanced breast cancer compared to digital mammography among women with extremely dense breasts who were also at high risk for breast cancer.[16] Supplemental imaging may also be used to help detect breast cancer among women with dense breast tissue. One supplemental imaging option is an ultrasound, which when combined with mammography may be slightly more sensitive than mammography alone; however, it also increases the likelihood of false-positive results.[17, 18] Other supplemental imaging options include abbreviated and full-protocol MRIs, which may detect more breast cancers than DBT

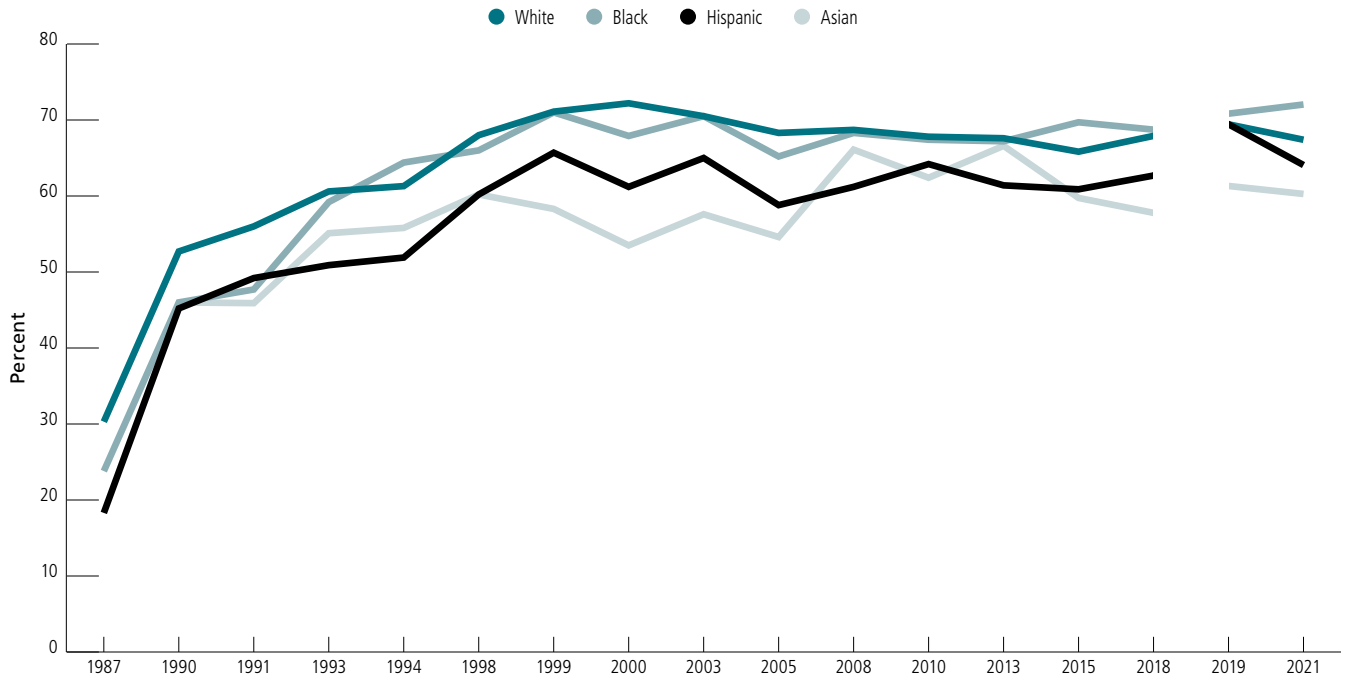
Table 6A. Mammography (%), Women 45 Years and Older, US, 2021

	ACS* ≥45 yrs	USPSTF† 50-74 yrs
Overall	**64**	**76**
Age (years)		
45-54	50	–
50-64	76	–
55-64	–	76
65-74	77	77
75+	56	–
Race/Ethnicity		
Hispanic	60	74
White only	65	76
Black only	69	82
Asian only	56	67
AIAN only or multiple	47	59
Sexual orientation		
Gay/lesbian	70	78
Straight	64	76
Bisexual	55	–
Immigration status		
Born in US/US territory	65	77
In US fewer than 10 years	37	60
In US 10+ years	60	74
Education		
Less than high school	49	64
High school diploma	60	73
Some college	65	77
College graduate	71	81
Income level		
<100% FPL	52	65
100 to less than 200% FPL	56	70
≥200% FPL	67	79
Insurance status		
Uninsured	29	42
Private	69	80
Medicaid/Public/Dual eligible	59	71
Medicare (ages ≥65 years)	67	75
Other	69	78

FPL-federal poverty level. *Mammogram within the past year (ages 45-54 years) or past two years (ages ≥55 years). †Mammogram within the past two years (ages 50-74). ‡Estimates are statistically unstable. Please see Special Notes on page 68.

Source: National Health Interview Survey, 2021.

Figure 6B. Trends in Mammography Within the Past Two Years (%), Women 40 Years and Older by Race/Ethnicity, US, 1987-2021



Note: Estimates are not age-adjusted and estimates for Asians may be Hispanic or non-Hispanic.
Source: National Center for Health Statistics, 2018. National Health Interview Survey, 2018-2021.

alone.[19-20] Most states require some aspect of density notification for individuals with dense breasts.[21] In March 2023, the FDA approved a proposed rule that would, among other provisions, amend the Mammography Quality Standards Act of 1992 to require that women be notified of their breast density and how it may reduce the sensitivity of mammography.[22] The rule also called for health care providers to discuss breast density with patients and explore supplemental screening options.[22] Health facilities are required to institute the new FDA provisions within 18 months.[22]

Breast Cancer Screening Among High-risk Women

The American Cancer Society breast cancer screening recommendations for high-risk women are defined as having an estimated lifetime risk of approximately 20%-25% due to the presence of known mutations in the breast cancer susceptibility genes *BRCA1* and *BRCA2*, a first-degree relative (parent, sibling, or child) with a *BRCA1* or *BRCA2* gene mutation, a strong family history of breast and/or ovarian cancer resulting in high risk as estimated by risk estimation software, or prior chest radiation therapy (e.g., for Hodgkin lymphoma).[23] Women who meet these criteria are recommended to receive annual magnetic resonance imaging (MRI), in addition to mammograms, beginning at age 30. These guidelines were last updated in 2007.

National Mammography Screening

- The percentage of women ages 40 years and older who self-reported having a mammogram within the past two years increased from the late 1980s to its peak in 2000, before gradually reaching levels of 64%-66% between 2000 and 2018 (Figure 6A). During the COVID-19 pandemic, up-to-date breast cancer screening remained unchanged between 2019 and 2021, but reports of past-year screening declined from 60% in 2019 to 57% in 2021 in women ages 50-74 years.[25]

Table 6B. Mammography (%), Women 45 Years and Older by State, US, 2020

	ACS*		USPSTF†	
	Overall ≥45 years	Uninsured 45-64 years	Overall 50-74 years	Uninsured 50-64 years
United States (median)	**67**	**35**	**78**	**41**
Range	*56-76*	*21-56*	*65-87*	*28-70*
Alabama	67	28	78	44
Alaska	56	27	70	‡
Arizona	63	42	75	55
Arkansas	66	50	75	‡
California	60	25	76	‡
Colorado	60	31	72	41
Connecticut	73	44	81	63
Delaware	68	51	79	‡
District of Columbia	66	‡	81	‡
Florida	65	35	79	37
Georgia	67	35	78	51
Hawaii	76	56	84	‡
Idaho	60	30	71	42
Illinois	67	‡	80	‡
Indiana	62	32	73	41
Iowa	70	25	81	36
Kansas	64	29	73	39
Kentucky	66	‡	75	‡
Louisiana	74	44	82	56
Maine	72	23	83	34
Maryland	70	43	81	39
Massachusetts	75	‡	87	‡
Michigan	64	42	79	70
Minnesota	67	40	79	47
Mississippi	64	36	73	40
Missouri	67	26	76	35
Montana	63	21	73	35
Nebraska	64	36	76	42
Nevada	65	‡	76	‡
New Hampshire	67	23	78	28
New Jersey	66	38	79	50
New Mexico	61	32	75	39
New York	71	48	82	58
North Carolina	70	44	80	50
North Dakota	72	‡	79	‡
Ohio	67	35	78	40
Oklahoma	62	35	72	33
Oregon	67	39	79	56
Pennsylvania	68	‡	81	‡
Rhode Island	74	39	85	‡
South Carolina	70	41	78	53
South Dakota	72	30	80	45
Tennessee	67	46	77	29
Texas	65	35	78	49
Utah	60	35	71	41
Vermont	63	46	74	‡
Virginia	70	39	79	43
Washington	63	35	75	40
West Virginia	68	36	78	55
Wisconsin	70	53	81	‡
Wyoming	56	27	65	33
Puerto Rico	66	46	83	‡

*Mammogram within the past year (ages 45-54 years) or past two years (ages ≥55 years). †Mammogram within the past two years (ages 50-74). ‡Estimates are statistically unstable. Please see Special Notes on page 68

Source: Behavioral Risk Factor Surveillance System, 2020.

- In 2021, 64% of women ages 45 years and older were up to date with breast cancer screening; about 76% of women ages 50-74 years had a mammogram in the past two years (Table 6A).
- Following a generally consistent pattern since the early 2000s (Figure 6B), the 2021 prevalence of up-to-date mammography was lower among American Indian/Alaska Native (47%) and Asian (56%) women than Black (69%), White (65%), and Hispanic (60%) women ages 45 years and older (Table 6A). During the COVID-19 pandemic, larger declines were observed among non-Hispanic Asian and Hispanic women.[2, 25]
- Uninsured women (29%), immigrants in the US fewer than 10 years (37%), women without a high school diploma (49%), and women ages 45-54 years (50%) otherwise had the lowest prevalence of up-to-date mammography use (Table 6A).

State-level Mammography Screening

- In 2020, the prevalence of up-to-date mammography among women ages 45 years and older ranged from 56% in Alaska and Wyoming to 76% in Hawaii (Table 6B).
- In 2020, among women ages 50-64 years without insurance, receipt of a mammogram in the past two years ranged from 28% in New Hampshire to 70% in Michigan (Table 6B).

Visit cancer.org/research/cancer-facts-statistics/breast-cancer-facts-figures.html for the current edition of *Breast Cancer Facts & Figures*.

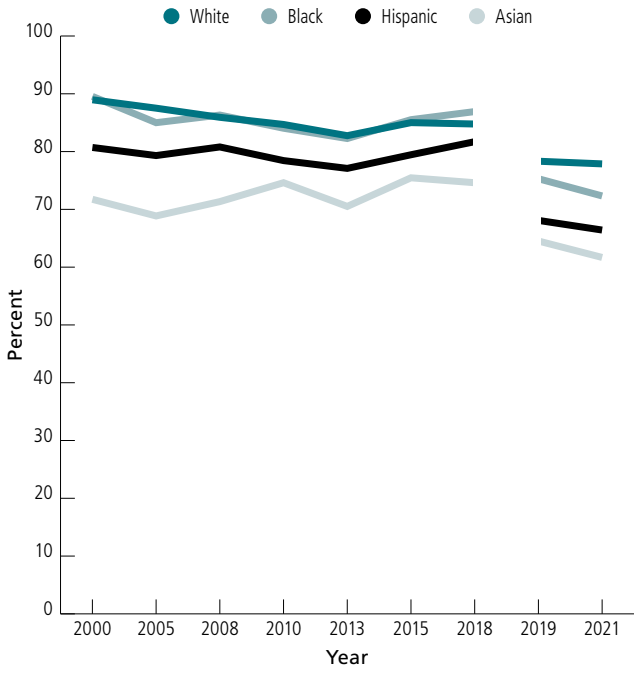
Cervical Cancer Screening

In the US, an estimated 13,960 cases of invasive cervical cancer will be diagnosed in 2023, and 4,310 deaths will occur.[3] Cervical cancer incidence and mortality rates have decreased by more than 50% over the past three decades. These decreases are primarily attributed to screening, which can detect both cervical cancer at an early stage and precancerous lesions.[26] Persistent HPV infection causes almost all cervical cancers. HPV

vaccination uptake, initially recommended for adolescent girls in 2006, has contributed to declining cervical cancer incidence among young women in the US since 2013.[3, 27] Rates for some cervical cancers are increasing in a cohort of middle-aged women for whom the HPV vaccine wasn't available.[28] Of note, because it does not protect against established infections or all HPV types, HPV vaccination supplements rather than replaces cervical cancer screening. (See the Infectious Agents section, page 36.)

In 2020, the American Cancer Society updated our cervical cancer screening guidelines with two main changes. (See page 63). First, screening is now recommended every five years with primary HPV testing as a preferred option, a test that can be used on its own to detect the presence of high-risk HPV infection. Other acceptable options include 1) screening every three years with Pap (Papanicolaou)

Figure 6C. Trends in Cervical Cancer Screening* (%), Women 21-65 Years by Race/Ethnicity, US, 2000-2021



*Pap test in the past 3 years (2000-2013) or HPV and Pap co-testing in the past 5 years (2015, 2018, 2019, 2021) among women 21-65 years with an intact uteri; hysterectomy data not available in 2003

Source: National Health Interview Surveys, 2000-2021.

Table 6C. Cervical Cancer Screening* (%), Women 25-65 Years, US, 2021

	Pap test in past 3 yrs	Pap test and HPV test in past 5 yrs	ACS†	USPSTF**
Overall	**72**	**38**	**75**	**73**
Age (years)				
21-29	–	–	–	64
25-29	74	45	74	---
30-39	76	48	80	80
40-49	71	36	76	76
50-65	67	27	72	72
Race/Ethnicity				
Hispanic	66	37	68	66
White only	75	39	80	78
Black only	74	40	76	72
Asian only	60	26	64	62
AIAN only or multiple	65	31	68	65
Sexual orientation				
Gay/lesbian	66	36	72	69
Straight	72	37	76	74
Bisexual	76	52	81	78
Immigration status				
Born in US/US territory	75	40	79	76
In US fewer than 10 years	53	30	55	53
In US 10+ years	66	32	69	65
Education				
Less than high school	54	28	56	56
High school diploma	64	31	67	67
Some college	74	43	77	77
College graduate	79	40	83	83
Income level				
<100% FPL	60	34	64	63
100 to <200% FPL	63	35	66	65
≥200% FPL	76	39	79	77
Insurance status				
Uninsured	53	31	58	55
Private	77	38	80	77
Medicaid/Public/Dual eligible	66	40	69	68
Medicare (ages ≥65 years)	52	17	57	57
Other	66	35	70	68

FPL-federal poverty level. *Among women with intact uteri. †Pap test in the past 3 years among women 25-65 years OR Pap test and HPV test within the past 5 years among women 30-65 years. Primary HPV testing estimates are not available due to questionnaire limitations. **Pap test in the past 3 years among women 21-65 years OR Pap test and HPV test within the past 5 years among women 30-65 years. Primary HPV testing estimates are not available due to questionnaire limitations.

Source: National Health Interview Survey, 2021.

testing, which detects abnormal cells in the cervix or 2) co-testing every five years with both HPV and Pap tests. Screening with an HPV test is preferred because it has fewer false negatives compared with Pap testing and has equivalent long-term sensitivity to detect cervical cancers compared with co-testing, and has fewer false positives.[29] Second, the age to begin screening was raised from 21 to 25 years of age because very few cancers occur prior to age 25, screening usually does not detect these cancers, and the potential harms of screening are highest in this age group.[29] The USPSTF recommendations were last updated in 2018 and still recommend screening for women ages 21-65 years. However, these recommendations are in the process of being updated.[30]

The COVID-19 pandemic has brought further attention to the importance of home-based screening, where possible, during health care disruptions.[31] Self-sampling devices are currently under review for approval by the FDA.

National Cervical Cancer Screening

- Between 2000 and 2013, cervical cancer screening prevalence in women ages 21-65 years declined modestly (Figure 6A) and stabilized at around 84%. During the COVID-19 pandemic, cervical cancer screening prevalence declined.[2, 25, 32]
- In 2021, the prevalence of up-to-date cervical cancer screening among women ages 25-65 years was 75% overall, and was higher among White (80%) and Black (76%) women, but lower among Asian (64%), Hispanic (68%), and American Indian/Alaska Native (68%) women (Table 6C), consistent with the pattern observed between 2000-2018 (Figure 6C).

Table 6D. Cervical Cancer Screening* (%), Women 25-65 Years by State, US, 2020

	Pap test within the past 3 years	Pap test and HPV test within the past 5 years	ACS†		USPSTF‡
	Overall (25-65 years)	Overall (25-65 years)	Overall (25-65 years)	No health insurance (25-64 years)	Overall (21-65 years)
United States (median)	**79**	**52**	**87**	**72**	**84**
Range	*69-85*	*42-70*	*79-91*	*61-84*	*77-88*
Alabama	79	48	86	69	86
Alaska	69	50	79	69	77
Arizona	75	50	84	73	81
Arkansas	76	43	83	67	83
California	81	52	87	80	84
Colorado	77	56	86	78	84
Connecticut	85	51	91	84	88
Delaware	78	55	86	75	84
District of Columbia	83	58	89	§	86
Florida	79	54	85	68	82
Georgia	78	53	85	73	83
Hawaii	79	45	84	61	81
Idaho	72	47	82	65	79
Illinois	71	46	83	74	81
Indiana	77	48	85	77	83
Iowa	78	49	87	64	85
Kansas	78	48	88	73	85
Kentucky	83	54	88	§	85
Louisiana	80	51	86	68	83
Maine	80	55	88	76	86
Maryland	81	56	89	81	86
Massachusetts	78	56	87	64	83
Michigan	81	56	88	72	87
Minnesota	78	54	87	70	84
Mississippi	82	46	89	80	87
Missouri	79	48	86	69	84
Montana	77	53	87	75	83
Nebraska	80	45	87	70	84
Nevada	75	47	81	72	81
New Hampshire	80	57	90	78	87
New Jersey	81	51	87	75	84
New Mexico	76	51	85	72	82
New York	82	56	87	79	84
North Carolina	83	52	90	83	87
North Dakota	77	51	86	§	84
Ohio	78	52	86	61	83
Oklahoma	71	42	81	69	79
Oregon	79	59	88	77	85
Pennsylvania	79	52	87	66	86
Rhode Island	82	55	89	84	85
South Carolina	79	47	85	66	84
South Dakota	80	52	90	70	88
Tennessee	78	51	87	71	85
Texas	76	51	82	69	80
Utah	72	42	83	69	79
Vermont	76	56	87	80	85
Virginia	82	56	87	67	85
Washington	74	51	83	69	81
West Virginia	81	53	87	66	85
Wisconsin	79	55	87	75	85
Wyoming	72	46	82	69	81
Puerto Rico	82	70	88	82	84

*Among women with intact uteri. †Pap test in the past 3 years among women 25-65 years OR Pap test and HPV test within the past 5 years among women 30-65 years. Primary HPV testing estimates are not available due to questionnaire limitations. ‡Pap test in the past 3 years among women 21-65 years OR Pap test and HPV test within the past 5 years among women 30-65 years. Primary HPV testing estimates are not available due to questionnaire limitations. §Estimates are statistically unstable. Please see Special Notes on page 68.

Source: Behavioral Risk Factor Surveillance System, 2020.

- Cervical cancer screening in 2021 was lowest among recent immigrants in the US fewer than 10 years (55%), women without a high school diploma (56%), and uninsured women (58%) (Table 6C).

State-level Cervical Cancer Screening

- In 2020, up-to-date cervical cancer screening prevalence in women ages 25-65 years ranged from 79% in Alaska to 91% in Connecticut (Table 6D).
- In 2020, among women ages 25-64 years with no health insurance, screening prevalence ranged from 61% in Hawaii and Ohio to 84% in Connecticut and Rhode Island (Table 6D).

Colorectal Cancer Screening

An estimated 106,970 cases of colon cancer and 46,050 cases of rectal cancer will be diagnosed in the US in 2023.[3] Colorectal cancer (CRC) is the second-leading cause of cancer death when men and women are combined, with 52,550 deaths estimated to occur in 2023. Screening reduces CRC incidence and mortality both by detecting and removing potentially precancerous lesions, thus preventing the disease, and by detecting invasive tumors at earlier, more treatable stages. While improvements in screening have contributed to reductions in CRC incidence and mortality,[33] progress has been uneven, particularly for Native American persons under 65 years of age and individuals under 50 years of age among whom CRC mortality rates increased 0.5%-3% annually between 2011-2020.[33]

The American Cancer Society's 2018 CRC screening guideline recommends that adults ages 45 years and older undergo regular screening.[34] The recommended age to begin screening was lowered from 50 to 45 because of the increasing CRC risk in younger generations,[35] and modeling studies indicate that the benefit of screening people ages 45-49 years exceeds the risk. In May 2021, the US Preventive Services Task Force issued new guidelines similarly lowering the recommended age to begin screening from 50 to 45.[36]

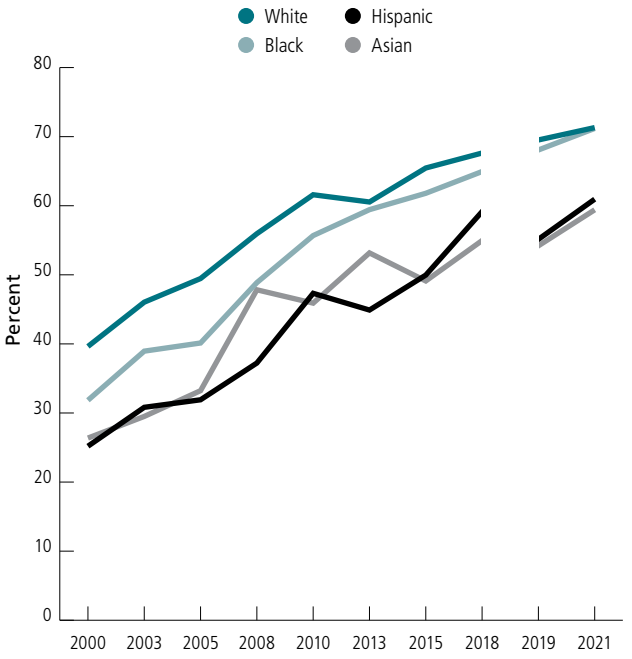
Table 6E. Colorectal Cancer Screening (%), Adults 45 Years and Older, US, 2021

	Stool test*	Colono-scopy†	ACS‡	USPSTF§
	≥45 years	≥45 years	≥45 years	45-75
Overall	**10**	**54**	**59**	**58**
Sex				
Males	9	54	58	56
Females	10	55	60	60
Age (years)				
45-49	3	18	20	20
50-54	9	43	50	51
55-64	11	65	70	72
65-75	–	–	–	83
65-74	15	74	80	–
75+	10	67	70	–
Race/Ethnicity				
Hispanic	14	46	52	51
White only	9	57	61	60
Black only	11	57	61	59
Asian only	10	45	50	48
AIAN only or multiple	10	48	52	52
Sexual orientation				
Gay/lesbian	12	57	64	61
Straight	10	55	59	58
Bisexual	**	48	51	57
Immigration status				
Born in US/US Territory	9	57	61	60
In US fewer than 10 years	9	25	29	30
In US 10+ years	12	48	53	52
Education				
Less than high school	11	43	48	47
High school diploma	9	51	55	54
Some college	11	56	61	59
College graduate	9	60	64	63
Income level				
<100% FPL	11	42	47	46
100 to <200% FPL	12	47	52	51
≥200% FPL	9	58	62	61
Insurance status				
Uninsured	4	18	21	22
Private	9	59	63	64
Medicaid/Public/ Dual eligible	11	48	52	53
Medicare (ages ≥65 years)	15	69	75	82
Other	15	68	73	74

FPL: federal poverty level. *Fecal occult blood test (FOBT) OR fecal immunochemical test (FIT) within the past 1 year OR sDNA test within the past 3 years. †Within the past 10 years. ‡FOBT/FIT, sigmoidoscopy, colonoscopy, computed tomography (CT) colonography, OR sDNA test in the past 1, 5, 10, 5 and 3 years, respectively. §FOBT/FIT, sigmoidoscopy, colonoscopy, computed tomography (CT) colonography, OR sDNA test in the past 1, 5, 10, 5 and 3 years, respectively, OR sigmoidoscopy in past 10 years with FOBT/FIT in past 1 year. **Estimates are statistically unstable. Please see Special Notes on page 68.

Source: National Health Interview Survey, 2021.

Figure 6D. Trends in Colorectal Cancer Screening* (%), Adults 50 Years and Older by Race/Ethnicity, US, 2000-2021



*Colonoscopy, sigmoidoscopy, and stool-testing in the past 10, 5, and 1 years; CT colonography in the past 5 years (2010, 2015, 2018); sDNA in the past 3 years (2018, 2019, 2021).

Source: National Health Interview Surveys, 2000-2021.

There are several recommended methods for CRC screening among average-risk persons. (See page 63.) Offering patients different test options substantially increases adherence to screening recommendations, and the American Cancer Society guideline specifically states that adults should receive either a direct visual exam or stool test.[34] Structural (visual) examinations include colonoscopy, computed tomography (CT) colonography, and flexible sigmoidoscopy. High-sensitivity stool-based tests include the fecal immunochemical test (FIT), high-sensitivity guaiac-based fecal occult blood test (gFOBT), and the multi-target stool DNA (MT-sDNA) test, which combines an FIT test with an sDNA test. Low-sensitivity guaiac-based tests and gFOBT in a clinical setting after a digital rectal exam are not recommended due to their low sensitivity for advanced neoplasia. All recommended tests can reduce CRC death rates when performed at the appropriate intervals and with recommended follow-up. However, some people do not receive adequate or timely follow-up after a positive stool test, which is associated with a greater risk of advanced-stage CRC.[37-39] Receipt of a follow-up colonoscopy after a positive or abnormal stool test, despite having a referral for one, has shown to be particularly low in community health centers and underserved populations.[37, 40] While the federal government guidance has clarified that Medicare plans, non-grandfathered group health plans, and Medicaid expansion plans are required to cover, without cost sharing, a follow-up colonoscopy after a positive or abnormal non-colonoscopy test, patients may still experience cost-sharing for recommended follow-up testing that is part of the screening continuum.[41, 42] Visit https://www.cancer.org/health-care-professionals/american-cancer-society-prevention-early-detection-guidelines/overview/acs-position-on-cost-sharing-for-screening-and-follow-up.html to read the American Cancer Society's position statement that urges the elimination of cost sharing for recommended cancer screening and follow-up testing.

National Colorectal Cancer Screening

- In 2021, 59% of adults ages 45 years and older were up to date with CRC screening with 54% reporting a colonoscopy in the past 10 years, 10% a stool test in the past year, and <4% a sigmoidoscopy or CT colonography in the past five years (Table 6E).
- Between 2000 and 2018, CRC screening prevalence increased overall among adults ages 50 years and older (Figure 6A).[25]
- In 2021 and in most prior periods, CRC screening was highest among White (61%) and Black (61%), followed by Hispanic (52%), American Indian/Alaska Native (52%), and Asian (50%) persons (Figure 6D, Table 6E).
- CRC screening prevalence is lowest in people ages 45-49 years (20%), uninsured persons (21%), immigrants in US fewer than 10 years (29%), those below the federal poverty level (47%), and those without a high school diploma (48%) (Table 6E).

Table 6F. Colorectal Cancer Screening (%), Adults 45 Years and Older by State, US, 2020

	Stool test*	Colonoscopy†	ACS‡		USPSTF§
	≥45 years	≥45 years	≥45 years	No health insurance 45 to 64 years	45 to 75 years
United States (median)	**8**	**58**	**64**	**31**	**59**
Range	*4-40*	*37-66*	*53-70*	*19-42*	*47-65*
Alabama	8	62	67	29	63
Alaska	6	56	63	31	58
Arizona	11	51	59	31	54
Arkansas	10	53	61	35	57
California	17	37	53	19	47
Colorado	8	56	63	24	58
Connecticut	7	62	67	35	63
Delaware	5	61	66	38	61
District of Columbia	11	61	70	**	65
Florida	16	55	65	29	59
Georgia	10	58	64	27	59
Hawaii	17	54	65	34	61
Idaho	6	52	57	19	53
Illinois	5	55	59	31	55
Indiana	7	54	61	29	55
Iowa	6	58	63	26	58
Kansas	6	56	61	21	56
Kentucky	8	59	66	34	60
Louisiana	8	58	65	25	60
Maine	8	63	69	30	65
Maryland	9	60	67	31	62
Massachusetts	7	66	70	42	65
Michigan	9	60	66	33	61
Minnesota	7	59	65	35	61
Mississippi	7	57	62	35	57
Missouri	7	58	63	32	58
Montana	8	53	59	22	55
Nebraska	5	57	62	33	58
Nevada	11	54	61	34	56
New Hampshire	5	61	66	37	61
New Jersey	8	56	62	33	58
New Mexico	8	52	58	25	53
New York	8	61	67	33	63
North Carolina	9	59	66	30	61
North Dakota	7	57	63	31	59
Ohio	8	58	65	31	60
Oklahoma	9	50	56	22	51
Oregon	12	54	64	36	59
Pennsylvania	7	60	66	37	63
Rhode Island	7	63	69	41	65
South Carolina	9	60	67	40	62
South Dakota	5	60	65	39	60
Tennessee	8	58	65	29	60
Texas	11	50	59	26	53
Utah	5	60	64	28	60
Vermont	5	61	65	32	62
Virginia	9	60	66	30	62
Washington	10	55	63	29	58
West Virginia	8	57	63	30	58
Wisconsin	6	47	55	36	52
Wyoming	4	51	55	39	51
Puerto Rico	40	43	67	27	63

*Home-based blood stool test within the past year. †Within the past 10 years. ‡For ages 45+: blood stool test, sigmoidoscopy, or colonoscopy within the past 1, 5, or 10 years, respectively. For ages 45-75: blood stool test within the past year OR blood stool test within the past 3 years with sigmoidoscopy within the past 5 years OR colonoscopy within the past 10 years. §FOBT/FIT, sigmoidoscopy, colonoscopy, computed tomography (CT) colonography, OR sDNA test in the past 1, 5, 10, 5 and 3 years, respectively, OR sigmoidoscopy in past 10 years with FOBT/FIT in past 1 year. **Estimates are statistically unstable. Please see Special Notes on page 68.

Source: Behavioral Risk Factor Surveillance System, 2020.

State-level Colorectal Cancer Screening

- In 2020, the percentage of adults ages 45 years and older who were up to date with CRC screening ranged from 53% in California to 70% in the District of Columbia and Massachusetts (Table 6F).
- Stool-testing use ranged from 4% in Wyoming to 40% in Puerto Rico in 2020. Colonoscopy prevalence ranged from 37% in California to 66% in Massachusetts (Table 6F).
- In 2020, among uninsured adults ages 45-64 years, only 19% in California and Idaho were up to date with CRC screening compared to 42% in Massachusetts (Table 6F).

Visit cancer.org/research/cancer-facts-statistics/colorectal-cancer-facts-figures.html for the current edition of *Colorectal Cancer Facts & Figures*.

Lung Cancer Screening

Among men and women in the US, an estimated 238,340 new cases of lung and bronchus cancer will be diagnosed in 2023.[3] Despite long-term declines and recent sharp decreases in lung cancer mortality rates, lung cancer is the leading cause of cancer death for both men and women; about 127,070 deaths are expected to occur in 2023.[3] Most lung cancers are still detected at a distant stage, which has a 5-year relative survival rate of only 6%.[3]

The American Cancer Society's update to our 2018 lung cancer screening guidelines will be available in 2023.[43] In the interim,

we recommend following the updated 2021 USPSTF recommendation, which expanded eligibility criteria by lowering the recommended age to begin annual screening with a low-dose computed tomography (LDCT) scan to age 50 years and the pack-year threshold to 20 years for persons who currently or formerly smoked who quit in the past 15 years.[44-47] Prior to the USPSTF guideline update, studies indicated that Black individuals who had ever smoked were less likely to be eligible for lung cancer screening compared to their White counterparts, primarily associated with fewer smoking pack-years among the former. This finding provided the basis for the pack-year threshold to be reduced from 30 to 20 years in the 2021 USPSTF recommendation.[47] A small reduction in disparities for lung cancer screening eligibility has been recently reported, but disparities still persist between Black and White persons who ever smoked.[48] Continued efforts toward understanding factors other than age and pack-year thresholds will be necessary to truly address these racial disparities.[48]

An LDCT scan can also provide a teachable moment to promote cessation among people who currently smoke, and the 2020 US Surgeon General's report on smoking cessation found sufficient evidence that LDCT can trigger quit attempts, cessation treatment uptake, and even increase cessation.[49, 50]

The potential harms associated with LDCT screening include cumulative radiation exposure from multiple scans, although a small risk of future carcinogenesis is significantly outweighed by the potential benefits of lung cancer screening in high-risk individuals.[45] Additionally, patients may have a false-positive result that leads to more scans or invasive procedures, and a smaller fraction may undergo an invasive biopsy.[45]

National Lung Cancer Screening

- The proportion of eligible people who currently smoke or formerly smoked who reported LDCT for lung cancer screening in the past 12 months remained low and constant, from 3.3% in 2010 to 3.9% in 2015.[51] Using the American College of Radiology's Lung Cancer Screening Registry, nationwide lung cancer screening rates increased from 3.3% in 2016 to 5.0% in 2018.[52]
- From registry and national survey data, lung cancer screening rates between 2019 and 2020 remained steady from 6.6% to 6.5% among the approximately 8.5 million US adults eligible to be screened.[53] However, screening rate ratios from 2019 to 2020 declined by 23% to 52% in Utah, Rhode Island, Vermont, Hawaii, and Maryland. Meanwhile lung cancer screening rate ratios increased by >= 20% in Nevada, West Virginia, Maine, and Kentucky.[53]

Prostate Cancer Screening

In 2023, an estimated 288,300 new cases of prostate cancer will be diagnosed in the US; approximately 34,700 men will die of the disease.[3] In the US, cancer of the prostate is the most common type of cancer and the second-leading cause of cancer death among men. Mortality rates for prostate cancer have been declining over the long term, in part, due to improvements in treatment, management of recurrent disease, and early detection with the prostate-specific antigen (PSA) test (a blood test to assess the levels of a protein made by the prostate).[54] However, there's been a recent uptick in regional- and distant-stage prostate cancer incidence and stabilization of prostate cancer mortality rates, coinciding with the declines in PSA testing that occurred around 2013 due to the USPSTF recommending against PSA testing.[3, 55, 56] The USPSTF has since reversed that decision and returned to recommending shared decision-making.

The American Cancer Society recommends that average-risk, asymptomatic men ages 50 years and older who have a life expectancy of at least 10 years have an opportunity to make an informed decision with their health care provider about whether to be screened for prostate cancer.[57] African American men and men who have a first-degree relative with a prostate cancer diagnosis before age 65 should begin consultation with their health care provider at age 45. Men at the highest

Table 6G. Prostate Specific Antigen Test* (%), Men 50 Years and Older, US, 2021

	Within the past year
Overall	**35**
Age (years)	
50-64	26
65+	46
Race/Ethnicity	
Hispanic	28
White only	38
Black only	31
Asian only	21
AIAN only or multiple	29
Sexual orientation	
Gay	40
Straight	35
Bisexual	†
Immigration status	
Born in US/US Territory	37
In US fewer than 10 years	†
In US 10+ years	27
Education	
Less than high school	21
High school diploma	32
Some college	37
College graduate	41
Income level	
<100% FPL	22
100 to <200% FPL	24
≥200% FPL	39
Insurance status	
Uninsured	10
Private	36
Medicaid/Public/Dual eligible	19
Medicare (ages ≥65 years)	44
Other	39

FPL: federal poverty level. *Among men who have not been diagnosed with prostate cancer. †Estimates are statistically unstable. Please see Special Notes on page 68.

Source: National Health Interview Survey, 2021.

risk, who have more than one first-degree relative, should begin that conversation at age 40. The American Cancer Society average-risk guideline generally aligns with other groups' recommendations, including those from the USPSTF, which endorses shared decision-making (SDM) for PSA testing among men ages 55-69 years, after a brief period (2012-2016) when they did not recommend routine screening.[58] The USPSTF does not make a separate specific recommendation for African American men or those with a family history of prostate cancer, but believes that it is appropriate for those men to be informed of their increased risk to make an informed decision about screening.[58]

Studies have shown that informed discussion and SDM measures are inconsistently utilized in clinical practice and that when such discussions do take place, the content varies widely and frequently falls short of accepted standards.[59, 60] To help address this issue, the American Cancer Society provides patients and clinicians with tools to facilitate SDM; visit cancer.org/health-care-professionals/prostate-md.html for more information.

National Prostate Cancer Testing and Shared Decision-making

- Between 2005 and 2010, approximately 41%-44% of men ages 50 years and older received a PSA test in the past year; this proportion declined to approximately 31% in 2013 and remained stable thereafter, reaching 35% in 2021 (Table 6G).[61, 62]
- In 2021, the prevalence of prostate cancer screening among men ages 50 years and older was higher in White (38%) than Black (31%), American Indian/Alaska Native (29%), Hispanic (28%), and Asian (21%) persons (Table 6G).
- Men who were uninsured (10%), Medicaid- or publicly insured (19%), those without a high school diploma (21%), and those below 100% of the federal poverty level (22%) were otherwise the least likely to have had a recent PSA test (Table 6G).
- In 2018, less than 40% of men who received PSA testing participated in full shared decision-making.[62]

State Prostate Cancer Testing and Shared Decision-Making

- In 2020, the percentage of men ages 50 years and older who received prostate cancer screening ranged from 22% in New Mexico and Vermont to 48% in Puerto Rico (Table 6H).

Table 6H. Prostate Specific Antigen Test* (%), Men 50 Years and Older by State, US, 2020

	Within the Past Year
United States (median)	**31**
Range	*22-48*
Alabama	37
Alaska	28
Arizona	29
Arkansas	35
California	27
Colorado	28
Connecticut	30
Delaware	30
District of Columbia	29
Florida	36
Georgia	34
Hawaii	26
Idaho	28
Illinois	30
Indiana	27
Iowa	29
Kansas	33
Kentucky	31
Louisiana	33
Maine	25
Maryland	33
Massachusetts	31
Michigan	31
Minnesota	25
Mississippi	34
Missouri	32
Montana	29
Nebraska	32
Nevada	27
New Hampshire	30
New Jersey	33
New Mexico	22
New York	34
North Carolina	37
North Dakota	31
Ohio	32
Oklahoma	31
Oregon	27
Pennsylvania	33
Rhode Island	30
South Carolina	32
South Dakota	37
Tennessee	32
Texas	28
Utah	26
Vermont	22
Virginia	33
Washington	24
West Virginia	35
Wisconsin	31
Wyoming	37
Puerto Rico	48

FPL: federal poverty level. All estimates are age-adjusted. *Among men who have not been diagnosed with prostate cancer.

Source: BRFSS 2020.

Barriers, Disparities, Health Care Policy, and Cancer Screening

Barriers to cancer screening are not mutually exclusive and occur and interact at multiple levels, including policy, health system, provider, community, and patient levels. As noted above, individuals without insurance, with lower educational attainment, and some racial/ethnic groups are less likely to be up to date with screening because of systemic and structural barriers to screening. Access can be improved by reducing administrative barriers and costs; offering alternative and flexible screening sites and hours; and providing childcare, transportation, and translation services. Health system-wide reminders, feedback, and incentives can improve providers' recommendations, and small media and educational campaigns can improve patient demand for screening.[63]

Broader health policies, including the Affordable Care Act (ACA), which aims to improve health-delivery systems, prevention efforts, and access to care, can also facilitate cancer screening and early detection. More than 20 million uninsured adults gained health insurance coverage as a result of the ACA.[64] Gains in insurance coverage among low-income adults have led to improvements in earlier stage at diagnosis for several screen-detected cancers (e.g., breast and colorectal) in states that expanded Medicaid eligibility.[65] Yet, 27 million or 14% of adults under the age of 65 remained uninsured as of 2021. The proportion of uninsured adults is even greater among Hispanic (29%) and Black (15%) persons and people who live in states that did not expand Medicaid (21%) compared to states that did (10%).[66] Provisions of the ACA have helped reduce or eliminate out-of-pocket costs for breast, cervical, colorectal, and lung cancer screening for those Medicare or privately insured persons.

Cancer Screening Initiatives and Programs

Ensuring access to affordable, quality health care for all is a top priority for the American Cancer Society and our advocacy affiliate, the American Cancer Society Cancer Action Network℠ (ACS CAN). While the federal

American Cancer Society Recommendations for the Early Detection of Cancer in Average-risk Asymptomatic People*

Cancer Site	Population	Test or Procedure	Recommendation
Breast	Women, ages 40-54	Mammography	Women should have the opportunity to begin annual screening between the ages of 40 and 44. Women should undergo regular screening mammography starting at age 45. Women ages 45 to 54 should be screened annually.
	Women, ages 55+		Transition to biennial screening, or have the opportunity to continue annual screening. Continue screening as long as overall health is good and life expectancy is 10+ years.
Cervix	Women, ages 25-65	HPV DNA test, **OR** Pap test & HPV DNA test	**Preferred:** Primary HPV test alone every 5 years with an FDA-approved test for primary HPV screening. **Acceptable:** Co-testing (HPV test and Pap test) every 5 years or Pap test alone every 3 years.
	Women, ages >65		Discontinue screening if results from regular screening in the past 10 years were negative, with the most recent test within the past 5 years.
	Women who have been vaccinated against HPV		Follow age-specific screening recommendations (same as unvaccinated individuals).
	Women who have had a total hysterectomy		Individuals without a cervix and without a history of cervical cancer or a history of CIN2 or a more severe diagnosis in the past 25 years should not be screened.
Colorectal†	Men and women, ages 45+	Guaiac-based fecal occult blood test (gFOBT) with at least 50% sensitivity or fecal immunochemical test (FIT) with at least 50% sensitivity, **OR**	Annual testing of spontaneously passed stool specimens. Single stool testing during a clinician office visit is not recommended, nor are "throw in the toilet bowl" tests. In comparison with guaiac-based tests for the detection of occult blood, immunochemical tests are more patient-friendly and are likely to be equal or better in sensitivity and specificity. There is no justification for repeating FOBT in response to an initial positive finding.
		Multi-target stool DNA test, **OR**	Every 3 years
		Flexible sigmoidoscopy (FSIG), **OR**	Every 5 years alone, or consideration can be given to combining FSIG performed every 5 years with a highly sensitive gFOBT or FIT performed annually
		Colonoscopy, **OR**	Every 10 years
		CT Colonography	Every 5 years
Endometrial	Women at menopause		Women should be informed about risks and symptoms of endometrial cancer and encouraged to report unexpected bleeding to a physician.
Lung	Persons who currently smoke or formerly smoked ages 50-80 in fairly good health with 20+ pack-year history	Low-dose helical CT (LDCT)	Updated American Cancer Society lung cancer screening guidelines will be available in 2023. In the interim we recommend following the updated guidelines from the US Preventive Services Task Force (uspreventiveservicestaskforce.org/uspstf/recommendation/lung-cancer-screening), which recommends annual LDCT screening in adults ages 50-80 who have a 20-pack year smoking history and currently smoke or have quit within the past 15 years.
Prostate	Men, ages 50+	Prostate-specific antigen test with or without digital rectal examination	Men who have at least a 10-year life expectancy should have an opportunity to make an informed decision with their health care provider about whether to be screened for prostate cancer, after receiving information about the potential benefits, risks, and uncertainties associated with prostate cancer screening. Prostate cancer screening should not occur without an informed decision-making process. African American men should have this conversation with their provider beginning at age 45.

CT-Computed tomography. *All individuals should become familiar with the potential benefits, limitations, and harms associated with cancer screening.
†All positive tests (other than colonoscopy) should be followed up with colonoscopy.

government guidance has clarified that Medicare plans, non-grandfathered group health plans, and Medicaid expansion plans are required to cover, without cost sharing, a follow-up colonoscopy after a positive or abnormal non-colonoscopy test, patients may still experience cost sharing for recommended follow-up testing that is part of the screening continuum. Visit cancer.org/health-care-professionals/american-cancer-society-prevention-early-detection-guidelines/overview/acs-position-on-cost-sharing-for-screening-and-follow-up to read the American Cancer Society's position statement that urges the elimination of cost sharing for recommended cancer screening and follow-up testing.

Visit fightcancer.org for resources related to health insurance and the work of ACS CAN.

The Centers for Disease Control and Prevention's (CDC) cancer screening programs provide key resources to states and communities to prevent cancer and detect it early by ensuring that at-risk, low-income communities have access to vital cancer screening programs. For instance, the National Breast and Cervical Cancer Early Detection Program (NBCCEDP) provides low-income, uninsured, and underinsured women access to breast and cervical cancer screening, as well as diagnostic and follow-up services. Since 1991, the NBCCEDP has served more than 6.1 million women, providing more than 15.7 million screening examinations and diagnosing more than 75,900 breast cancers and 24,000 premalignant breast lesions, 235,000 premalignant cervical lesions, and 5,114 cases of invasive cervical cancers.[67] ACS CAN advocates at the state and federal level to protect this important program and ensure it receives adequate funding.

Visit cdc.gov/cancer/nbccedp/index.htm for more information.

The CDC's Colorectal Cancer Control Program (CRCCP) goal is to implement evidence-based strategies to improve CRC screening and follow-up. To date the CRCCP has funded 35 award recipients: 20 states, eight universities, two tribal organizations, and five other organizations.[68] These programs have supported colorectal outreach, screening navigation and education within high-need communities reaching uninsured men and women. In the initial year of the program, CRC screening rates improved in partnering clinics and an additional 24,096 people were screened for CRC.[69]

Visit cdc.gov/cancer/crccp/index.htm for more information

American Cancer Society Roundtables

An American Cancer Society roundtable is a coalition of organizations dedicated to giving all people a fair and just opportunity to prevent and survive cancer. American Cancer Society roundtables are a recommended and proven model for creating sustained partnerships across diverse sectors and diverse communities to tackle both long-standing and emerging issues in cancer.

The American Cancer Society, in partnership with the CDC, launched the National Colorectal Cancer Roundtable (NCCRT), in 1997, the first of six mission-critical, cancer-focused national roundtables for which we provide organizational leadership and staff support. Since then, the American Cancer Society has worked with partners to establish the National HPV Vaccination Roundtable (2014), the National Lung Cancer Roundtable (2017), and the National Navigation Roundtable (2017). In October 2022, the National Breast Cancer Roundtable and the National Roundtable on Cervical Cancer were launched in response to the Biden Administration's Cancer Moonshot.

Visit cancer.org/about-us/our-partners/american-cancer-society-roundtables.html for more information on each of the roundtables.

National Colorectal Cancer Roundtable

The National Colorectal Cancer Roundtable (NCCRT) is a coalition of more than 190 member organizations and individual experts dedicated to reducing colorectal cancer (CRC) incidence and mortality in the US through coordinated leadership, strategic planning, and advocacy.

The goal of the NCCRT is to increase the use of recommended CRC screening tests among appropriate populations. The NCCRT's 80% in Every Community initiative aims to substantially reduce CRC as a major public health problem by increasing colorectal screening rates to 80% or higher in communities across the nation. Over 1,800 organizations – including health plans, medical professional societies, hospitals, health-delivery systems, survivor groups, government agencies, and cancer coalitions – pledged to make this goal a priority. The 80% in Every Community campaign focuses on addressing persistent screening-rate disparities so that every community can benefit from lifesaving CRC screening.

Visit nccrt.org for more information.

National Breast Cancer Roundtable

The National Breast Cancer Roundtable (NBCRT) is a national coalition of member organizations with a collective aim to accelerate progress across the breast cancer continuum through strategic partnerships to eliminate disparities and reduce mortality. The NBCRT works to ensure all women have access to quality screening and treatment, including Black women and women in other historically excluded communities, and to address the social and emotional needs of patients and their families.

Visit nbcrt.org for more information.

National Cervical Cancer Roundtable

The National Roundtable on Cervical Cancer aims to reduce barriers to care, eliminate disparities, reduce harms, and promote new technologies in all persons with a cervix.

Visit cervicalroundtable.org for more information.

National Lung Cancer Roundtable

Established by the American Cancer Society in 2017, the National Lung Cancer Roundtable (NLCRT) has galvanized 195 member organizations and over 200 leading experts, as well as patient and caregiver advocate representatives, at the national, state, and local levels to collectively partner to problem-solve and achieve enduring systematic change to reduce deaths from lung cancer. We engage experts in multidisciplinary collaborations, catalyze action to create, build, and strengthen innovative solutions, and develop and disseminate evidence-based interventions and best practices. The work of the NLCRT is guided by their steering committee and carried out through the efforts of their 10 task groups.

The NLCRT engages in public, patient, and provider education, targeted research, and health policy initiatives to increase lung cancer awareness and risk reduction. The roundtable advances lung cancer-related health equity by identifying and working to overcome barriers to equitable access to promote implementation, uptake, and adherence of lung cancer screening and nodule detection and management, promote guideline-concordant staging, and optimize the use of biomarker testing to guide appropriate and timely therapy and care, eliminate the pervasive stigma and nihilism associated with lung cancer, and strengthen state-based initiatives.

Visit nlcrt.org for more information.

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Special Notes

Glossary

Body mass index (ages 2-19 years): After a BMI value is calculated for a child based on their weight and height, the BMI value is plotted on the Centers for Disease Control and Prevention's (CDC) BMI for age- and sex-specific growth charts to obtain a percentile ranking. The percentile indicates the relative position of the child's BMI value among children of the same sex and age. Visit cdc.gov/healthyweight/assessing/bmi/childrens_bmi/about_childrens_bmi.html for more information regarding youth BMI.

Sample surveys: Population-based surveys are conducted by selecting a sample of people to estimate the prevalence in a population using weights. The population-based survey methodology introduces sampling error to the estimated prevalence since a true prevalence is not calculated.

Data quality: The sources of data used for this report are from government-sponsored national and state systems of behavioral and health surveillance. These systems employ standardized techniques for sampling and use the latest advances in survey research methodology to survey targeted population groups on an ongoing basis. The design and administration of these surveillance systems can provide sources of good-quality data from which to derive population estimates of specific behaviors in a targeted population. The data included in this report are subject to at least four limitations. First, with regards to phone-based surveys such as the Behavioral Risk Factor Surveillance System, the participants are from households with either a landline telephone or cell phone. Second, both in-person and phone surveys have varying proportions of individuals who do not participate for a variety of reasons (e.g., could not be reached during the time of data collection or refused to participate). Third, most estimates presented herein are based on self-reported data, which may be subject to bias. Finally, estimates for the same measure from different surveys may differ, even for overlapping survey years, due to differences in survey methodology (mode of administration, sampling), questionnaires, nature of survey (general health survey versus topic-specific survey), etc.

Suppression criteria: Survey estimates were considered unstable and suppressed if denominator sample size was <50 or the Relative Standard Error (calculated by dividing the standard error of the estimate by the estimate itself, then multiplying that result by 100) was >=30%.

Age-adjusted prevalence: A statistical method used to adjust prevalence estimates to allow for valid comparisons between populations with different age compositions

Range: The lowest and highest values of a group of prevalence estimates

Median: Middle value in a range of prevalence estimates. Estimates are arranged from smallest to largest values; the median is the middle value.

Survey Sources

Behavioral Risk Factor Surveillance System (BRFSS): This survey of US states and territories is conducted by the CDC and the National Center for Chronic Disease Prevention and Health Promotion. Since 1996, all 50 states, the District of Columbia, and Puerto Rico have participated in this annual survey. Data are gathered through monthly computer-assisted telephone interviews with adults ages 18 years and older living in households in a state or US territory. The methods are generally comparable from state to state. Due to methodological changes, BRFSS results within this publication are not directly comparable to BRFSS data prior to 2011. BRFSS continued telephone-based interviews during the COVID-19 pandemic in 2020, although some states paused interviews during

pandemic-related shutdowns. E-cigarette prevalence in 2021 is not comparable to prior years when respondents were asked about both ever (lifetime) use and current use (some days or everyday). Screening estimates do not distinguish between examinations for screening and diagnosis.

BRFSS website: cdc.gov/brfss/

Complete citation: Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2021.

National Health and Nutrition Examination Survey (NHANES): Three cycles of this US national survey were conducted between 1971 and 1994. Beginning in 1999, the NHANES survey was implemented as a continuous annual survey. Data are gathered through in-person interviews and direct physical exams in mobile examination centers. Due to the COVID-19 pandemic, the 2019-2020 survey suspended data collection in March 2020, before the full two-year data collection was completed. As a result, the National Center for Health Statistics merged the 2019-March 2020 NHANES data with the 2017-2018 NHANES data to create a special pre-pandemic data set, referred to as 2017-2020 dataset in this report. Estimates for Hispanic adults exclude Mexican Americans. Estimates for adults presented herein are age adjusted to the 2000 US standard population.

NHANES website: cdc.gov/nchs/nhanes.htm

Complete citation: National Center for Health Statistics. National Health and Nutrition Examination Survey. Public-use data file and documentation. https://wwwn.cdc.gov/nchs/nhanes/Default.aspx.

National Health Interview Survey (NHIS): The CDC's NHIS has monitored the health of the nation since 1957 and is designed to provide national estimates. Data are gathered through a computer-assisted personal interview of adults ages 18 years and older living in households in the US. The NHIS underwent a significant redesign in 2019, and estimates for certain measures are not strictly comparable to prior years.

For NHIS data represented herein, estimates for White, Black, American Indian/Alaska Native, and Asian persons are among non-Hispanics unless otherwise noted. The Asian group does not include Native Hawaiians or other Pacific Islanders. Estimates for people born in US territories include those who have been in the US for any length of time. Screening estimates do not distinguish between examinations for screening and diagnosis. Estimates are age adjusted to the 2000 standard US population, except for by age group and insurance status. Due to changes in NHIS survey design, 2019 estimates are not directly comparable to prior years and are separated from the trend line. The NHIS survey data collection mode was modified after the onset of the COVID-19 pandemic, where interviews changed to telephone-based modes in the second quarter of 2020 through April 2021 versus in-person modes in prior years and the first quarter of 2020. In May 2021, interviewers were directed to return to in-person interviews with some flexibility to conduct follow-up through telephone interviews. Readers are referred to the NHIS website for further information on potential biases due to COVID-19 related data collection changes.

NHIS website: cdc.gov/nchs/nhis/index.htm

Complete citation: National Center for Health Statistics. National Health Interview Surveys, 2000-2021. Public-use data files and documentation. cdc.gov/nchs/nhis/index.htm

National Immunization Survey-Teen (NIS-Teen): This survey is sponsored and conducted by the National Center for Immunizations and Respiratory Diseases, the National Center for Health Statistics, and the CDC. It is designed to monitor national, state, and selected local area vaccination coverage among children ages 13-17 years in the US. Telephone (landline and cellular) interviews of adolescents' parents/guardians are conducted in all 50 states and the District of Columbia.

Immunization data for surveyed adolescents are also collected through a mail survey of their pediatricians, family physicians, and other health care providers. Race/ethnicity is reported by a parent or guardian. Estimates for White, Black, American Indian/Alaska Native, and Asian persons are among non-Hispanics. Those identified as Hispanic might be of any race. Native Hawaiian or other Pacific Islanders and persons of multiple races were not included due to small sample sizes. Adolescents were classified as below poverty if their total family income was less than the federal poverty level. Methods for calculating HPV initiation before 13 years of age are described here: Fedewa et al, *Cancer* 2018. ncbi.nlm.nih.gov/m/pubmed/30257056/

NIS-Teen website:
cdc.gov/vaccines/imz-managers/nis/about.html

National Youth Tobacco Survey (NYTS): This national survey was first conducted in the fall of 1999. Beginning in 2011, the CDC's Office on Smoking and Health and the US Food and Drug Administration's Center for Tobacco Products began collaborating on the NYTS. Now an annual survey, it is designed to provide national data for public and private students in grades 6-12. In 2020 and prior years, data were gathered through a self-administered questionnaire completed during a required subject or class period. Post COVID-19 pandemic, the 2021 the survey was administered online to allow participation by eligible students at home, school, or somewhere else, and the 2022 NYTS survey was conducted using an online survey, with nearly all (99.3%) students completing it on a school campus. Because of survey mode changes, 2021 and 2022 NYTS results cannot be compared with previous NYTS survey results.

NYTS website: cdc.gov/TOBACCO/data_statistics/surveys/NYTS/

Tobacco Use Supplement to the Current Population Survey (TUS-CPS): This national and state-level survey is an NCI-sponsored survey of tobacco use that has been administered as part of the US Census Bureau's Current Population Survey approximately every three to four years since 1992-93. The most recent publicly released data are for the 2018-2019 TUS-CPS (July 2018, January 2019, and May 2019). The TUS-CPS is an in-person survey of adults ≥18 years of age that measures national and state-level tobacco use behaviors and related outcomes, and the 2018-2019 data were used to estimate state-level cessation behavior prevalence; only self-respondents were included, and response rates ranged from 56.2% to 58.9%.

TUS-CPS website: cancercontrol.cancer.gov/brp/tcrb/tus-cps

Complete citation: US Department of Commerce. National Cancer Institute and Food and Drug Administration co-sponsored Tobacco Use Supplement to the Current Population Survey, 2018-2019. cancercontrol.cancer.gov/brp/tcrb/tus-cps.

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