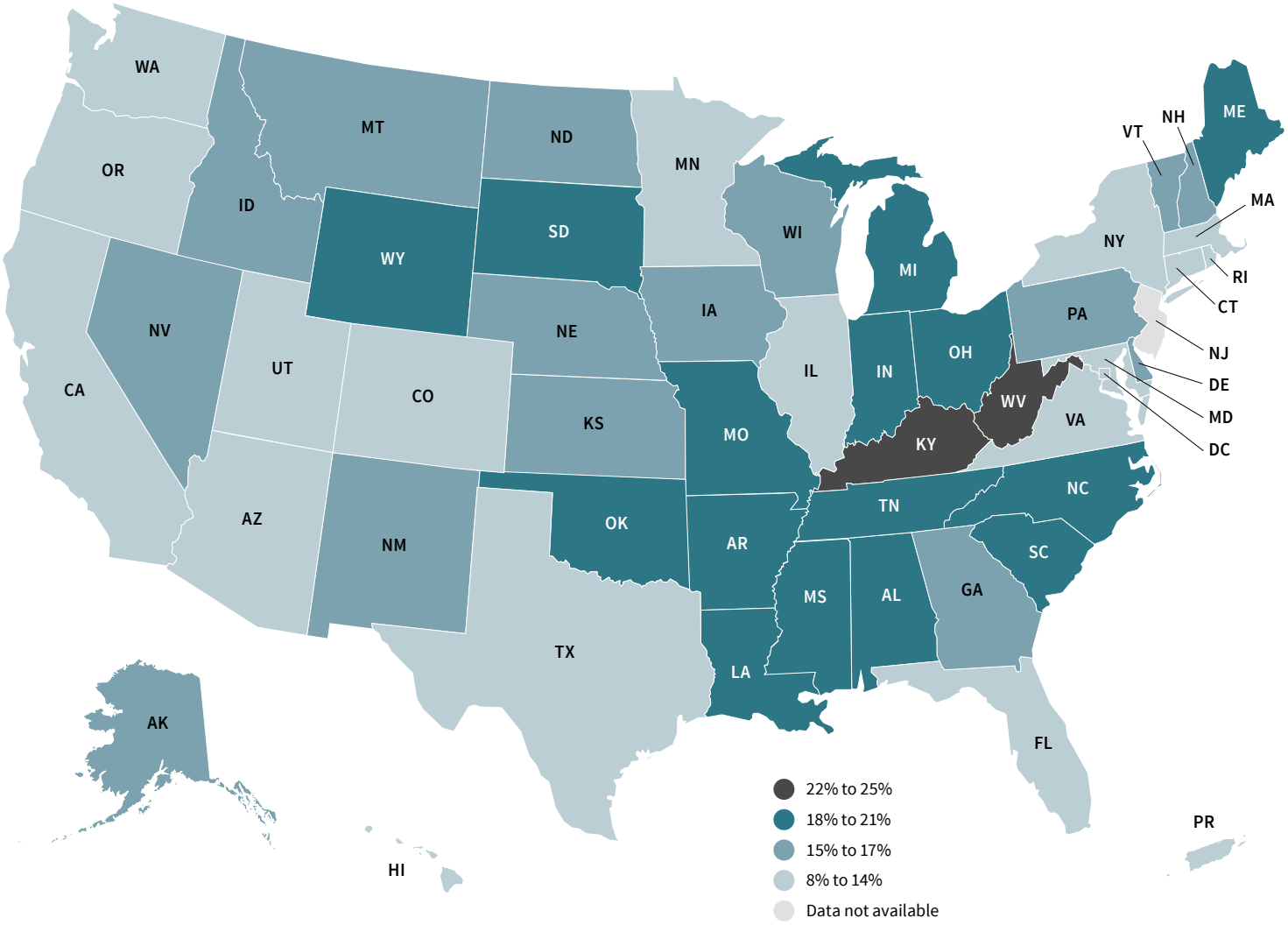
American Cancer Society®

Cancer Prevention & Early Detection
Facts & Figures 2021-2022

Current* Cigarette Smoking (%), Adults 18 Years and Older by State, 2019



*Smoked 100 cigarettes in lifetime and are current smokers (every day or some days).
Source: Behavioral Risk Factor Surveillance System, 2019.

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, CPED 2021-2022

Tobacco

- In 2019, current adult smoking prevalence reached a historic low of 14% overall, but more than one in four American Indian/Alaska Native (25%), GED-educated (34%), and Medicaid- or publicly insured (25%) persons smoked; prevalence ranged from 8% in Utah to 25% in West Virginia.
- There have been more former smokers than current smokers in the US since 2002. In 2019, 62% of persons who had ever smoked had quit.
- Current cigarette smoking among high school students declined from 29% in 1999 to 5% in 2020 and ranged from 2% in Utah to 14% in West Virginia.
- Raising cigarette prices by increasing excise taxes reduces cigarette consumption. As of March 2021, the average state cigarette excise tax was $1.91 per pack, ranging from 17 cents in Missouri to $4.50 in the District of Columbia and $5.10 in Puerto Rico.
- Although comprehensive barrier-free coverage of cessation treatments improves cessation outcomes, only 14 states provide coverage for all evidence-based counseling and medications in their traditional Medicaid programs, and only 4 states do so with no access barriers (co-pays, deductibles, etc.).

Excess Body Weight, Physical Activity, Diet, and Alcohol

- Among adults, overweight prevalence has remained relatively stable since the early 1960s, but obesity has markedly increased. In 2017-2018, approximately 7 in 10 adults were overweight or obese; about 4 in 10 were obese; obesity prevalence ranged from 24% in Colorado and the District of Columbia to 41% in Mississippi in 2019.
- Among youth (ages 2-19 years), obesity prevalence tripled between 1971 and 2002, further increasing to 19% in 2017-2018.
- In 2018, about half of adults (54%) reported meeting physical activity recommendations and only a quarter (23%) of high school youth met recommendations in 2019.
- In 2019, only 27% of adults reported eating ≥2 servings of fruit daily; about 13% reported consuming ≥3 servings of vegetables daily. Similarly, only 29% of high school students reported consuming fruit ≥2 times daily and 14% reported consuming vegetables ≥3 times per day.
- In 2018, approximately 5% of adults reported drinking heavily.

Ultraviolet Radiation

- Based on the most recent data available, in 2015, approximately 4% of adults reported using an indoor tanning device in the past year; use was highest among women (6%, men: 2%) and younger adults (18-29 years: 6%, 50+ years <3%).
- 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 1, 2021, only 20 states and the District of Columbia have a law prohibiting tanning for minors (under the age of 18) without exemptions.

Infectious Agents

- In 2019, 57% of girls and 52% of boys ages 13-17 years were up to date with HPV vaccination, though this ranged widely by state from 32% in Mississippi to 78% in Rhode Island among girls and 29% in Mississippi to 80% in Rhode Island among boys.

Cancer Screening

- In 2018, 63% of women 45 years and older were up to date with breast cancer screening and the lowest prevalence of up-to-date breast cancer screening occurred among uninsured women ages 45-64 years (31%).
- In 2018, 84% of women ages 21-65 years were up to date with cervical cancer screening. Screening utilization was lowest among the uninsured (65%) and recent immigrants (63%).
- In 2018, 66% of adults aged 50 years and older were up to date for colorectal cancer screening. However, fewer than half of uninsured adults (30%), recent immigrants (26%), and those aged 50-54 years (48%) were up to date.
- In 2018, only 5-6% of adults who were eligible received a low-dose computed tomography (LDCT) to screen for lung cancer in the past year.

Introduction

Cancer prevention and early detection are central to our mission to save lives, celebrate lives, and lead the fight for a world without cancer. Large reductions in smoking and earlier cancer detection have contributed to steady declines in cancer mortality since the early 1990s, averting an estimated 3.2 million cancer deaths.[1] Additional cancer morbidity and mortality could be prevented by equitably implementing evidence-based interventions.[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

1. Siegel RL, Miller KD, Fuchs HE, Jemal A. Cancer Statistics, 2021. *CA Cancer J Clin*. 2021; 71:7-33.

2. Siegel RL, Jemal A, Wender RC, Gansler T, Ma J, Brawley OW. An assessment of progress in cancer control. *CA Cancer J Clin*. 2018; 68: 329-339.

3. Islami F, Goding Sauer A, Miller KD, et al. Proportion and number of cancer cases and deaths attributable to potentially modifiable risk factors in the United States. *CA Cancer J Clin*. 2018;68: 31-54.

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 been causally linked to lung cancer and other cancer types as well.[2] Despite decades of declining prevalence, tobacco use remains the most common preventable cause of death in the US. Additionally, smoking prevalence remains high in many segments of the population, including among those with low socioeconomic status and/or mental illness.[3] As a result, about 30% of all cancer deaths in the US[4, 5] and as much as 40% in parts of the South region and Appalachia are still caused by smoking.[6]

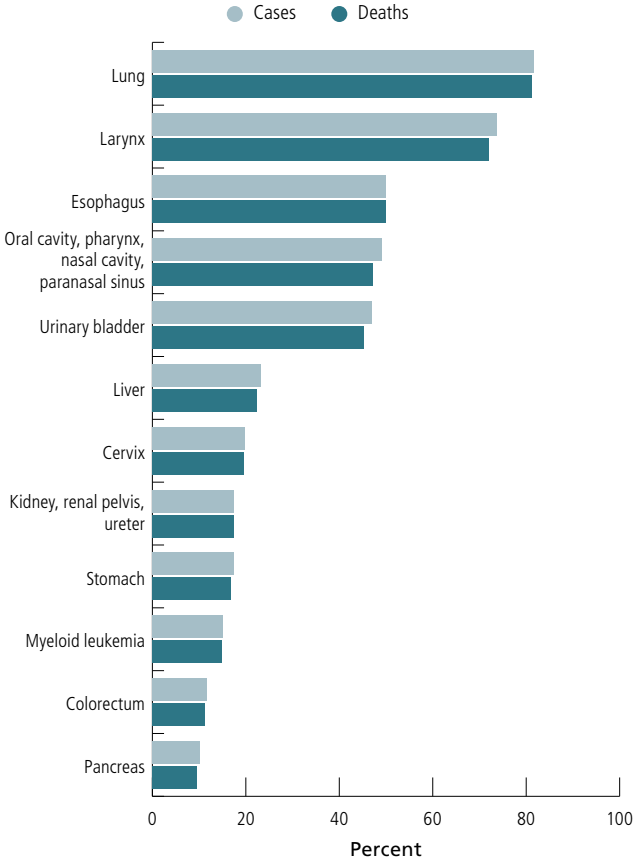
Cigarette Smoking

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, and liver, as well as 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 adolescents appear to be more easily addicted to nicotine, tobacco use in youth is an important public health issue.[8]

Adult Cigarette Smoking

- The prevalence of current cigarette smoking among adults ages ≥18 years decreased from 42% in 1965 to 14% in 2019 overall (men: 15%; women: 13%), but more than 34 million adults are still current smokers. (Table 1A).
- Smoking prevalence declined across race/ethnicity and sex, though substantial disparities remain (Figure 1B). In 2019, smoking prevalence was lowest among Asian (7%) persons and highest among American Indian/ Alaska Native (25%) persons. (Table 1A).
- By state, smoking prevalence in 2019 was lowest in Utah (8%) and highest in West Virginia (25%) (Cover, Table 1B).

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]

Youth Cigarette Smoking

- Current cigarette smoking among high school students continued a declining trend in the 2000s and 2010s (from 16% in 2011 to 5% in 2020) and in all racial/ethnic groups (Figure 1C, Table 1C), after peaking in 1999.[9]
- Current smoking prevalence in 2014-2017 among American Indian/Alaska Native (17%) and Native Hawaiian/Other Pacific Islander (13%) high school students was higher than that of White (10%), Hispanic (8%), Black (4%), and Asian (3%) students.[10]
- 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% (Table 1D).[11]

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. In contrast to cigarettes, which are wrapped in paper, cigars are wrapped in leaf tobacco or other materials containing tobacco. Cigar smokers have an increased risk of cancers of the lung, oral cavity, larynx, and esophagus compared to those who do not smoke cigars.[12-14] Due to a more favorable tax structure, cigars often cost less than cigarettes, leading some smokers to switch from cigarettes to little cigars that are similar in size and shape to cigarettes.[15] Additionally, cigars are often sold as singles and many include flavorings, both of which are particularly appealing to youth.[8] Waterpipes heat tobacco (often flavored) and smoke is passed through water, a process that cools the smoke and enables deeper inhalation among novice smokers. Waterpipes are often used in social settings (e.g., hookah bars). Although many individuals perceive waterpipe smoking to be less harmful than cigarettes, it is known to increase the risk of lung, oral, and esophageal cancers, as well as non-cancer respiratory illnesses.[16-18]

Adult Other Combustible Tobacco Use

- In 2019, 4% of adults (6% men and 1% women) were current cigar smokers.[19]
- Cigar smoking was more common in American Indian/Alaska Native (5%) and Black persons (5%) than White (4%), Hispanic (3%) or Asian (1%) persons.[19]

Youth Other Combustible Tobacco Use

- In 2020, 5% of high school students reported current cigar use (Table 1C).
- While overall cigar smoking among high school students declined between 2011-2020,[20, 21] trends were variable across racial/ethnic groups, with prevalence consistently higher in Black students (9% in 2020) than in White (4%) or Hispanic (6%) students (Figure 1C).

Table 1A. Current Cigarette Smoking* (%), Quit Ratio, Past-year Quit Attempts, and Recent Successful Cessation, Adults 18 Years and Older, US, 2018, 2019

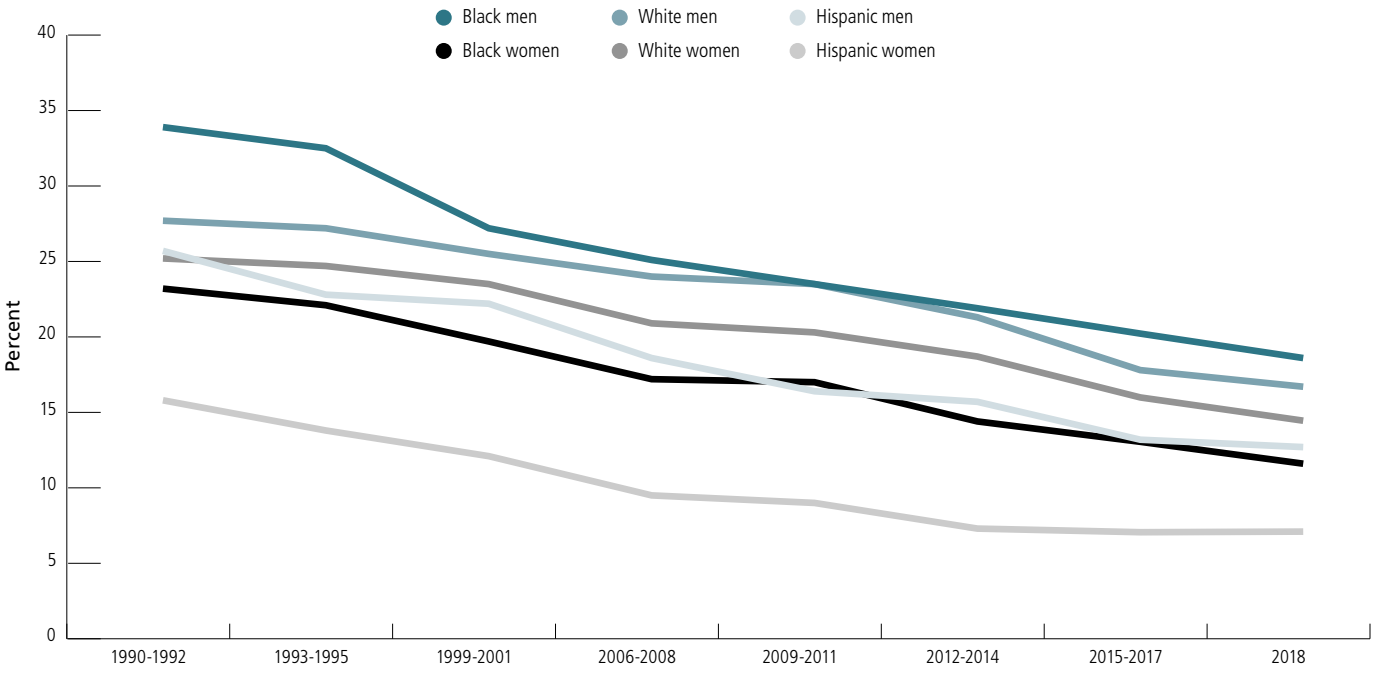
	Current Smoking (2019)			Quit Ratio† (2019)	Past-year Quit Attempt‡ (2018)	Recent Successful Cessation§ (2018)
	Males	Females	Overall	Overall	Overall	Overall
Overall	**15**	**13**	**14**	**62**	**55**	**8**
Sex						
Males	–	–	–	63	55	8
Females	–	–	–	60	55	7
Age (years)						
18-24	8	8	8	40	72	18
25-44	19	15	17	51	57	9
45-64	18	16	17	58	51	4
65+	9	7	8	82	50	8
Race/Ethnicity						
Hispanic	12	6	9	62	59	7
White only	16	16	16	64	53	8
Black only	18	13	15	47	62	5
Asian only	11	3	7	60	68	10
AIAN only or multiple	24	27	25	49	44	–
Sexual orientation						
Gay or lesbian	18	18	18	53	64	–
Straight	15	13	14	62	55	7
Bisexual	11	21	20	49	72	–
Immigration status						
Born in US/US territory	17	15	16	61	55	8
In US fewer than 10 years	11	4	8	50	58	–
In US 10+ years	11	4	7	68	60	4
Education (≥25 years)						
No HS diploma	26	20	23	51	53	4
GED	35	33	34	47	57	6
HS diploma	22	17	20	56	51	6
Some college	17	15	16	63	57	8
Undergraduate degree	7	7	7	75	59	15
Graduate degree	5	3	4	83	64	–
Income level						
<100% FPL	27	22	24	42	57	5
100 to less than 200% FPL	23	19	21	51	55	5
≥200% FPL	13	10	11	69	55	9
Insurance status						
Uninsured	25	20	23	40	53	6
Private	12	10	11	67	56	9
Medicaid/Public/Dual eligible	27	24	25	40	59	6
Medicare (ages ≥65 years)	9	8	8	82	46	6
Other	20	15	18	66	54	6

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. †Former smokers (do not smoke currently) among those who ever smoked 100 cigarettes in lifetime. ‡Current smokers who reported that they stopped smoking for >1 day during the past 12 months because they were trying to quit smoking and former smokers who quit during the past year. §Former smokers who quit smoking for ≥6 months during the past year among current smokers who smoked for ≥2 years or former smokers who quit during the past year.

Source: National Health Interview Survey, 2018, 2019.

- Cigar smoking among high school students in 2019 was lowest in Utah (1%) and highest in Louisiana (12%) (Table 1D).
- Use of waterpipes among high school students declined from 9% in 2014[22] to 3% in 2020 (Table 1C).

Figure 1B. Current Cigarette Smoking* (%), Adults 18 Years and Older by Sex and Race/Ethnicity, US, 1990-2018



*Ever smoked 100 cigarettes in lifetime and now smoke every day or some days.
Source: 1990-2017: National Center for Health Statistics. *Health, United States, 2017*: With special feature on mortality. Hyattsville, MD.
2018: National Health Interview Survey, 2018.

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.[23-25] 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.[26, 27]

Although evidence suggests that switching completely from conventional to e-cigarettes reduces smokers' exposure to numerous toxicants and carcinogens,[28] there is accumulating evidence of negative short-term effects on airways and blood vessels.[29-31] The risks associated with long-term use are not clear.[28] 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. An outbreak of e-cigarette, or vaping, product use-associated lung injury (EVALI) – causing more than 2,807 hospitalized cases or deaths of as of February 2020[32] – has been strongly linked to exposure to Vitamin E acetate, an additive in tetrahydrocannabinol (THC)-containing e-cigarettes.[33] 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.[34-36] The 2020 SGR on smoking cessation concluded that there is presently inadequate evidence to conclude that e-cigarettes, in general, increase smoking cessation.[37] The 2021 US Preventive Services Task Force (USPSTF) also found insufficient evidence on the use of e-cigarettes for smoking cessation in adults, including pregnant persons, and could not determine the balance of benefits and harms.[38] Currently, no e-cigarette has been FDA-

Table 1B. Current Tobacco Use (%) and Smoking Cessation, Adults 18 Years and Older by State, 2019

State	Cigarettes*					E-cigarettes (2018-2019)	Smoking Cessation		
	Overall	Rank† (1=high)	Males	Females	Low education‡		Quit ratio	Past-year quit attempt	Recent successful cessation
United States (median)	**16**		**17**	**14**	**29**	**3**	**58**	**65**	**6**
Range	*8-25*		*10-25*	*6-25*	*12-52*	*1-5*	*48-67*	*57-73*	*4-9*
Alabama	20	6	22	19	38	4	51	66	6
Alaska	17	21	18	15	46	2	58	69	5
Arizona	14	33	17	12	23	4	59	66	7
Arkansas	20	7	22	19	28	3	51	64	4
California	9	50	12	7	12	2	65	71	9
Colorado	13	41	14	11	19	3	63	66	7
Connecticut	12	46	13	10	19	–	61	68	4
Delaware	16	27	15	16	22	1	58	66	7
District of Columbia	12	48	14	10	38	1	60	73	8
Florida	14	38	15	13	25	2	56	67	5
Georgia	15	29	18	13	29	2	53	70	5
Hawaii	12	42	15	10	16	3	64	67	9
Idaho	16	25	17	14	29	3	57	57	4
Illinois	14	34	17	12	21	2	60	71	7
Indiana	19	10	20	17	35	3	53	60	5
Iowa	17	22	18	15	24	3	55	58	5
Kansas	16	23	16	16	36	3	57	64	6
Kentucky	23	2	22	25	42	4	49	58	4
Louisiana	21	3	23	19	41	2	48	67	5
Maine	19	13	21	16	52	4	58	62	7
Maryland	12	43	14	11	24	2	59	67	5
Massachusetts	12	47	14	10	19	2	62	64	7
Michigan	19	11	20	17	40	2	54	65	6
Minnesota	14	35	16	13	32	2	60	61	7
Mississippi	20	5	24	17	32	2	48	66	4
Missouri	20	8	21	19	41	3	54	61	5
Montana	17	20	17	17	37	3	58	65	7
Nebraska	15	32	16	14	25	3	60	60	5
Nevada	15	31	17	13	17	2	58	65	5
New Hampshire	16	25	17	14	41	2	60	62	8
New Jersey	–	–	–	–	–	2	–	–	–
New Mexico	16	24	18	14	24	3	56	64	7
New York	12	44	13	11	15	2	60	65	6
North Carolina	18	14	21	16	28	3	52	63	5
North Dakota	17	19	18	16	34	3	54	62	4
Ohio	21	4	21	20	47	3	50	62	5
Oklahoma	18	15	20	16	33	5	54	65	6
Oregon	14	36	15	14	21	3	61	65	7
Pennsylvania	17	18	18	17	29	3	55	65	5
Rhode Island	13	40	15	11	20	–	62	72	8
South Carolina	18	17	19	16	40	2	53	67	7
South Dakota	19	12	19	19	40	4	57	57	4
Tennessee	19	9	20	18	41	2	52	63	4
Texas	14	37	17	11	23	2	55	63	6
Utah	8	51	10	6	13	3	67	66	7
Vermont	15	30	17	14	38	2	62	60	6
Virginia	14	39	15	12	24	3	59	66	5
Washington	12	45	13	11	20	2	63	65	7
West Virginia	25	1	25	25	51	4	49	60	4
Wisconsin	15	28	17	14	30	3	58	66	7
Wyoming	18	16	18	18	32	4	54	60	5
Puerto Rico	10	49	14	7	18	–	59	67	6

*Smoked 100 cigarettes in lifetime and are current smokers (everyday 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. E-cigarette estimates are from the Tobacco Use Supplement of the Current Population Survey, 2018-2019.

Source: Behavioral Risk Factor Surveillance System, 2019; Tobacco Use Supplement, Current Population Survey, 2018-2019.

Table 1C. Current* Tobacco Use (%), High School Students, US, 2020

	E-cigarettes	Cigars	Cigarettes	Smokeless Tobacco†	Waterpipe
Overall	**20**	**5**	**5**	**3**	**3**
Sex					
Males	20	5	5	5	3
Females	19	5	4	1	3
Race/Ethnicity					
White	23	4	5	4	2
Black	9	9	3	–	4
Hispanic	19	6	5	2	4

*In the past 30 days. †Includes chewing tobacco/snuff/dip, snus, and dissolvable tobacco.

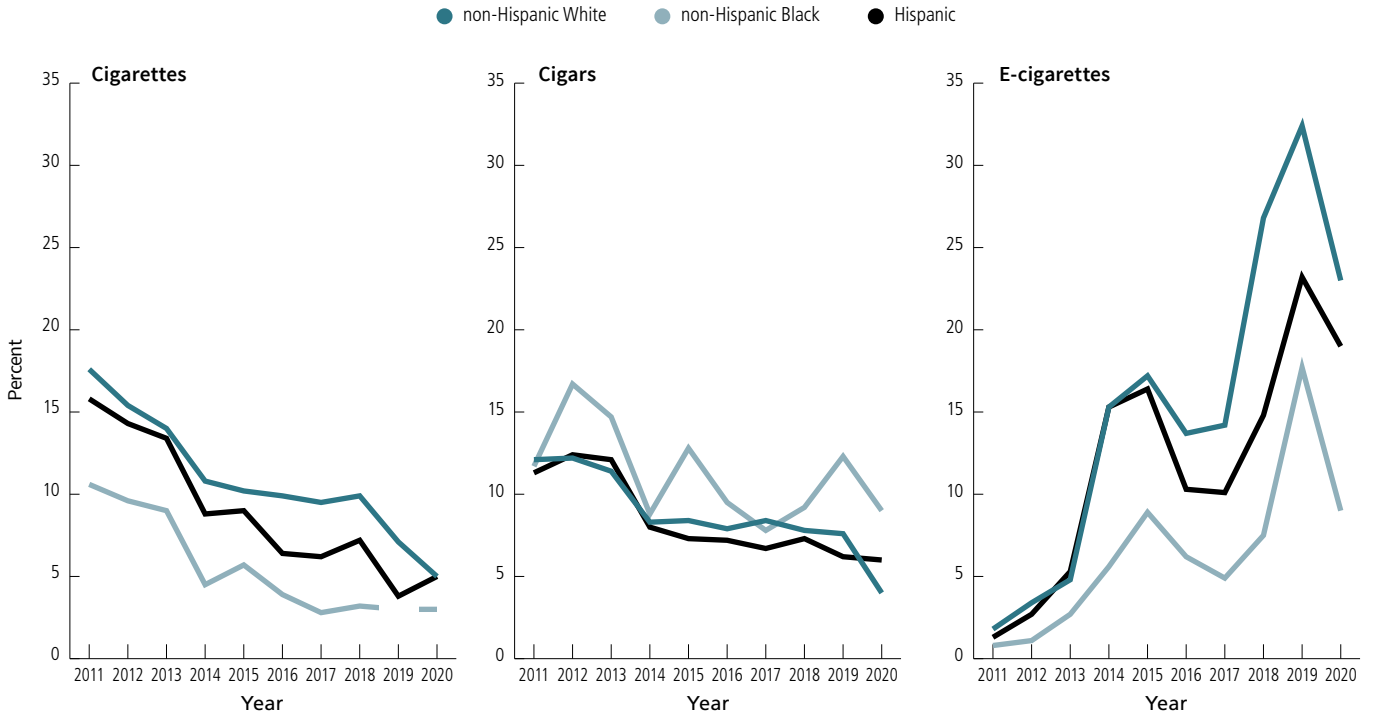
Source: Gentzke AS et al., 2020.[20]

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 were current users of e-cigarettes in 2019, with prevalence higher in younger people (18-24 years: 9%; 25-44 years: 6%) than older people (45-54 years: 3%, 65-74 years: 1%, ≥75 years: 0.2%).[19]
- Current e-cigarette use increased from 5% to 7% (2.7 to 3.6 million users) between 2014-2018 among US younger adults ages 18-29 years, with the most notable population increase among persons who had never smoked cigarettes (0.5 to 1.4 million). Conversely, use during the corresponding period remained stable (from 4% to 3%) among middle-aged adults ages 25-49 years (3.3 to 2.8 million users), and declined among older adults ages ≥50 years from 3% to 2% (2.8 to 1.7 million users).[39]
- E-cigarette use in 2018-2019 ranged from 1% in the District of Columbia to 5% in Oklahoma (Table 1B).

Figure 1C. Current* Use of Selected Tobacco Products (%) by Race/Ethnicity, High School Students, US, 2011-2020



*In the past 30 days; Question related to 2020 e-cigarette use is not strictly comparable to prior years.

Sources: 2020: Gentzke AS, et al. 2020.[21]; **2019:** Wang T, et al. 2019.[40]; **2018:** Gentzke AS et al. 2019.[21]; **2017:** Wang T, et al. 2018.[85]; **2016:** Jamal A, et al. 2017.[86]; **2015:** Singh T, et al. 2016.[87]; **2014:** Arrazola RA, et al. 2015.[22]; **2013:** Arrazola RA, et al. 2014.[88]; **2011 & 2012:** Arrazola RA, et al. 2013.[89]

Table 1D. Current* Tobacco Use (%), High School Students by State, 2019

	Cigarettes	Rank† (1=high)	Cigars‡	E-cigarettes§	Smokeless tobacco use¶
Range	*2-14*		*1-12*	*9-36*	*1-12*
Alabama	7	12	10	19	10
Alaska	8	7	5	26	5
Arizona	5	24	5	18	5
Arkansas	10	3	8	24	8
California	–	–	–	18	–
Colorado	5	24		29	–
Connecticut	4	37	4	27	4
Delaware	–	–	–	–	–
District of Columbia	5	24	7	13	6
Florida	5	24	–	–	–
Georgia	4	37	5	17	5
Hawaii	5	24	–	31	–
Idaho	5	24	4	22	4
Illinois	5	24	6	20	6
Indiana	–	–	–	–	–
Iowa	7	12	4	20	4
Kansas	6	20	5	22	5
Kentucky	9	4	8	26	8
Louisiana	8	7	12	23	12
Maine	7	12	5	30	5
Maryland	5	24	6	23	6
Massachusetts	5	24	5	32	5
Michigan	5	16	5	21	5
Minnesota	–	–	–	–	–
Mississippi	7	12	9	21	9
Missouri	7	12	5	21	5
Montana	8	7	7	30	7
Nebraska	4	37	4	17	4
Nevada	4	37	–	24	–
New Hampshire	6	20	–	34	–
New Jersey	4	37	–	28	–
New Mexico	9	4	8	34	8
New York	4	37	7	22	7
North Carolina	8	7	–	35	–
North Dakota	8	7	5	33	5
Ohio	5	24	7	30	7
Oklahoma	9	4	7	28	7
Oregon	–	–	–	–	–
Pennsylvania	7	12	6	24	6
Rhode Island	4	37	5	30	5
South Carolina	6	20	9	21	9
South Dakota	12	2	7	24	7
Tennessee	7	12	9	22	9
Texas	5	24	6	19	6
Utah	2	45	1	10	1
Vermont	7	12	6	26	6
Virginia	5	24	5	20	5
Washington	–	–	–	–	–
West Virginia	14	1	11	36	11
Wisconsin	6	20	5	21	5
Wyoming	–	–	–	–	–
Puerto Rico	3	44	3	9	2

*On at least 1 day in the past 30 days. †Based on % current cigarette smoking. †Cigars, cigarillos, or little cigars. ‡E-cigarettes, e-cigars, e-pipes, vape pipes, vaping pens, e-hookahs, and hookah pens. ¶Chewing tobacco, snuff, dip, snus, or dissolvable tobacco products.

Source: Youth Risk Behavior Survey, 2019

Youth E-cigarette Use

- E-cigarettes have been the most commonly used tobacco product among high school students since 2014; prevalence increased from 2% in 2011 to 28% (4.1 million users) in 2019,[20, 40] then declined to 20% (3 million users) in 2020.[21, 41]
- Data from the Monitoring the Future Survey, which differentiated by e-liquid type, reported a stable prevalence of current nicotine vaping between 2019 (8th graders: 17%, 10th graders: 31%; 12th graders: 35%) and 2020 (17%, 31%, and 35% respectively), but a decline in frequent use (≥20 of past 30 days) in 10th and 12th graders.[42]
- E-cigarette use among high school students increased in all racial/ethnic groups between 2011-2019 and was lower among Black (9%) than White (23%) or Hispanic (19%) students in 2020 and across all time points (Table 1C, Figure 1C).
- In 2019, e-cigarette use among high school students ranged from 9% in Puerto Rico to 36% in West Virginia (Table 1D).

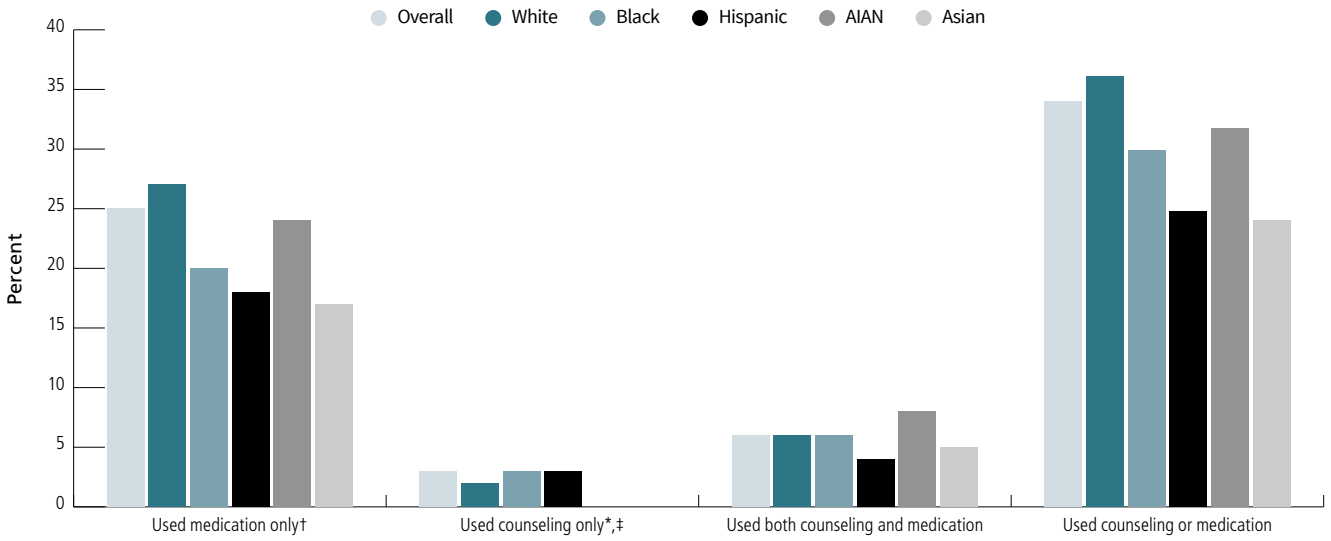
Smokeless Tobacco Products

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 in comparison to complete tobacco cessation.[43]

Adult Smokeless Tobacco Use

- The prevalence of smokeless tobacco use among adults has remained stable since 2003;[44] in 2019, about 5% of men and <1% of women were current smokeless tobacco users.[45]
- Smokeless tobacco use in 2019 was lowest in Puerto Rico (0.4%) and highest in Wyoming (9%).[46]

Figure 1D. Use of Evidence-based Counseling and/or Medications for Cessation, Adults Ages 18 years and Older by Race/Ethnicity, US, 2018-2019



AIAN-American Indian or Alaska Native.*Used one-on-one counseling; attended a stop-smoking clinic, class, or support group; and/or sought a telephone helpline or quitline during the past year among current smokers who tried to quit during the past year or former smokers who quit during the past 2 years when stopped smoking. †Used nicotine patch, nicotine gum or lozenge, nicotine-containing nasal spray or inhaler, varenicline (US trade name: Chantix), and/or bupropion (including trade names Zyban and Wellbutrin) during the past year among current smokers who tried to quit during the past year or used by former smokers who quit during the past 2 years when stopped smoking. ‡Unstable estimates suppressed for AIAN, Asian persons.

Source: Tobacco Use Supplement to the Current Population Survey, 2018-2019.

Youth Smokeless Tobacco Use

- Among high school students in 2020, 5% of boys and 1% of girls were current smokeless tobacco users, and use was higher among White (4%) than Hispanic (2%) students (Table 1C).
- In 2019, current use of smokeless tobacco among high school students ranged from 1% in Utah to 12% in Louisiana (Table 1D).

Secondhand Smoke

Secondhand smoke (SHS) exposure causes an estimated 3% of all lung cancer deaths, which is the equivalent of 3,590 deaths in 2021.[5, 47]

Secondhand Smoke Exposure

- Nationally, SHS exposure among nonsmokers (measured by testing a person's blood for cotinine, a byproduct of nicotine) declined from 88% in 1988-1991 to 21% in 2017-2018, but remains substantially higher among lower socioeconomic and Black populations.[48]
- Nearly 36% of nonsmoking youth aged 3-17 years were exposed to SHS in 2013-2016, with higher exposure among Black (62%) youth than White (34%), Asian (18%), or Hispanic (25%) youth.[49]
- In 2015, nearly 1 in 5 (19%) nonsmoking workers reported exposure to workplace SHS in the past year, with higher exposure among younger, male, and manual labor workers.[50, 51]

Tobacco Cessation

Smoking cessation reduces the risk of developing all 12 cancers caused by smoking.[37] 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.[37] Quitting at any age is beneficial to health, but the benefit is greatest when done at a younger age. Smoking cessation at the time of a cancer diagnosis can also improve outcomes for cancer survivors who are current smokers.[2]

Quitting successfully usually requires multiple attempts. FDA-approved cessation medications, including nicotine replacement therapy (NRT), prescription medications (e.g., buproprion and varenicline), and behavioral counseling (individual, group, or telephone), improve the chances of long-term cessation among adults, especially when used in combination.[37, 38, 52] However, in youth, the 2020 USPSTF found insufficient evidence to recommend for or against providing primary care-feasible interventions (counseling or medication) for cessation of tobacco use (including e-cigarettes).[52, 53]

Lung cancer screening using low-dose computed tomography (LDCT) for long-term heavy smokers (see page 57 for screening guidelines) provides an opportunity to promote cessation among the 6.8 to 8.0 million eligible individuals who are current smokers. The 2020 US SGR on smoking cessation found sufficient evidence that LDCT can trigger quit attempts, cessation treatment uptake, and even increase cessation.[37]

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.[37]

Adult Tobacco Cessation

- In 2019, the quit ratio (proportion of ever smokers who are now former smokers) among US adults was 62% (55 million former smokers) but this proportion was <50% in persons who are 18-24 years (40%), American Indian or Alaska Native (49%), Black (47%), bisexual (49%), GED-educated (47%), at <100% FPL (42%), and uninsured or Medicaid insured (40%) (Table 1A).
- The quit ratio in 2019 exceeded 60% in 30 states, DC, and Puerto Rico and ranged from 48% in Mississippi to 67% in Utah (Table 1B).
- More than one-half of adult cigarette smokers (55%) in 2018 had attempted to quit in the past year (Table 1A), but only about 8% had quit successfully for ≥6 months among all persons who smoked during the past year (Table 1A).
- 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 (Figure 1D).[54]
- Use of recommended cessation aids to quit smoking in 2018-2019 was lower among Hispanic (25%), Asian (24%), and Black (30%) persons than White (36%) persons, largely driven by differences in the use of cessation medications (Figure 1D).

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%).[55]
- In 2019, only 26% of high school students who smoked in Puerto Rico made a recent quit attempt compared to 61% in South Dakota.[11]

Cessation resources are available at the American Cancer Society Great American Smokeout® website (cancer.org/healthy/stay-away-from-tobacco/great-american-smokeout), CDC Tips From Former Smokers site (cdc.gov/tobacco/campaign/tips/; 1-800-QUIT-NOW), 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 cessation treatments; enforced worksite, bar, and restaurant restrictions; improved health warnings; and restricted advertising. 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.[56] The 2020 SGR on smoking cessation concluded that population tobacco control efforts, including raising cigarette prices, adopting comprehensive smoke-free policies, implementing mass media campaigns, requiring pictorial health warnings, and maintaining comprehensive statewide tobacco control programs, increase cessation.[37] Research also indicates that increased state spending on tobacco control is associated with lower youth and adult smoking prevalence.[57, 58] Unfortunately, for fiscal year 2021,

the funding level for state tobacco prevention programs was less than 1% of the recommended level for four states (Connecticut, Georgia, Missouri, Tennessee) and less than 50% of the recommended level for all states except Alaska, California, Hawaii, Delaware, Maine, North Dakota, Oklahoma, and Utah (Figure 1E).[59]

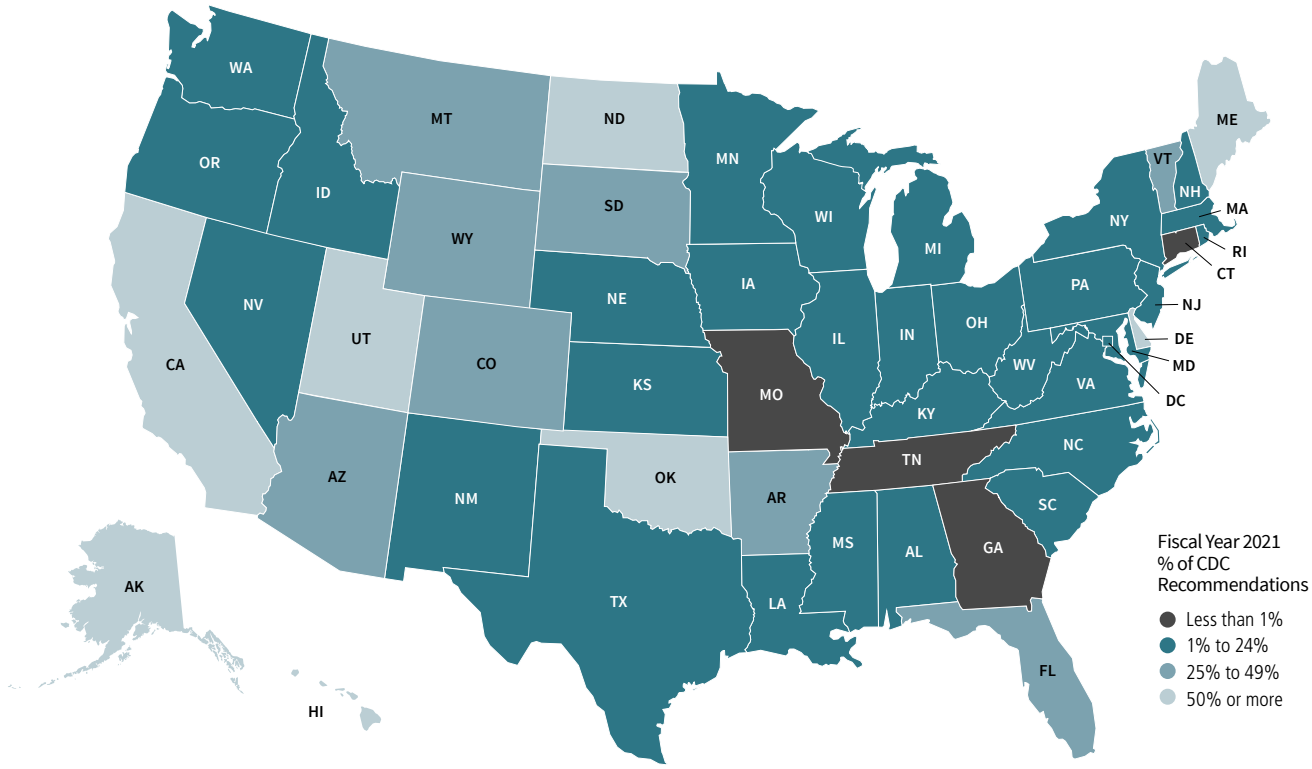
In addition to the information that follows, visit fightcancer.org to review the most recent edition of *How Do You Measure Up?* – a state-by-state assessment of cancer care and control efforts. Visit tobaccoatlas.org for a comprehensive presentation of tobacco-related problems and solutions.

Regulation of Tobacco Products

The Family Smoking Prevention and Tobacco Control Act of 2009 granted the Food and Drug Administration (FDA) authority to regulate the manufacturing, marketing, and selling of tobacco products.[60] 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. As a result of legal efforts by the American Cancer Society, the American Cancer Society Cancer Action Network℠ (ACS CAN), and partner organizations, the FDA is court-mandated to implement the requirements of the law, including finalizing graphic warnings that cover the top half of cigarette packs and one-fifth of cigarette advertisements and requiring all new tobacco products to undergo scientific review.[61]

In 2016, the FDA expanded their regulations to include additional tobacco products (e.g., waterpipes, e-cigarettes, loose tobacco, cigars), as well as future products that meet the statutory definition of a tobacco product.[62] The EVALI epidemic of 2019 – which largely impacted young

Figure 1E. State Funding for Tobacco Control, Fiscal Year 2021



CDC-Centers for Disease Control and Prevention. Note: Annual funding amounts only include state funds. Data not available for Puerto Rico.
Sources: American Cancer Society Cancer Action Network, 2021.[58]

adults – was primarily linked to contamination in illicit THC-containing e-cigarette products.[33] This episode contains a broader lesson about the dangers of poor regulation with respect to products designed to be inhaled that come into close contact with highly sensitive lung tissues. Additionally, e-liquid flavors appeal to youth – among high school e-cigarette users in 2020, more than 4 in 5 (85%) used flavored e-cigarettes, with fruit (73%), mint (56%), menthol (37%), candy, dessert, or other sweet (36%) flavors being the most popular.[41] The rapidly evolving e-cigarette market therefore necessitates ongoing government regulation of innovations in product types (tanks, pre-filled cartridges or pods, disposable) and e-liquid contents (nicotine or flavors) to address potential usage in younger populations.[41, 63]

In addition, ACS CAN and partner organizations advocate for the prohibition of flavors in all products, including menthol in combustible tobacco products. Menthol use may increase cigarette and cigar initiation among youth and young adults, may increase nicotine dependence, and make quitting more difficult.[64, 65, 66] Addressing menthol in combusted tobacco products is particularly important from a health equity perspective, as menthol smoking is substantially higher among Black persons who smoke (in 2019: 85%) than among other racial/ethnic groups (30% of White and 48% of Hispanic persons),[67] a pattern which is a likely result of targeted marketing of menthol products in Black communities.[68]

Tobacco Taxes

Tax increases that raise cigarette prices improve smoking cessation among adults, lower smoking initiation among youth, and lower smoking intensity among those who smoke. These effects are greater among lower socio-economic status persons and youth, who tend to be relatively more price sensitive.[37, 69-71] Unfortunately, loopholes in tax regulations and tobacco industry tactics can negate the benefits of cigarette excise tax increases.[72] Additionally, taxes on tobacco products other than cigarettes vary by product type[73] and continue to lag behind, often providing less expensive alternatives to conventional cigarettes.

- Unchanged since 2009, the federal cigarette tax is $1.01. As of March 2021, the average state/territory cigarette excise tax rate was $1.91, ranging from 17 cents per pack in Missouri to $4.50 per pack in the District of Columbia and $5.10 in Puerto Rico (Table 1E).
- E-cigarettes are not taxed at the federal level, but as of January 2021, 28 states, DC and Puerto Rico had an e-cigarette tax.[74]

Cessation Assistance

Comprehensive, barrier-free, widely promoted insurance coverage of cessation treatments increases their usage, improves cessation outcomes, and is cost-effective.[37] Provisions of the Affordable Care Act (ACA) require coverage for evidence-based cessation treatments for people in most private and some public health insurance plans. In addition, pregnant women and people covered by Medicaid in states that have expanded coverage under ACA have access to no-cost tobacco cessation services.[75] Additionally, telephone quitlines have broad accessibility and can deliver effective behavioral counseling to diverse groups of tobacco users.[37] Integrating standard NRT into state quitline programs can further improve quit rates.[52, 76]

- While tobacco cessation services are required to be covered by most private insurance plans and Medicare, there are major gaps in coverage for traditional Medicaid recipients. As of September 30, 2020, 14 states – California, Connecticut, Kansas, Kentucky, Maine, Massachusetts, Missouri, New York, Ohio, Oregon, Pennsylvania, Rhode Island, South Carolina, and Wisconsin – had comprehensive coverage in traditional Medicaid plans that includes individual and group counseling, and all seven FDA-approved tobacco cessation medications.[75] Arkansas, Kentucky, Missouri, and Wisconsin are the only states with no barriers 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; reduce youth and young adult smoking; promote cessation; and reduce the risk of smoking-related diseases.[2, 37, 77]

- Workers in states with comprehensive statewide smoke-free laws in 2015 reported lower exposure to workplace SHS exposure (8.6%) than workers in states with no laws (11%).[50]
- As of January 2021, 27 states, the District of Columbia, Puerto Rico, the US Virgin Islands, and 1,131 cities and counties representing 61% of the US population had 100% smoke-free laws in non-hospitality workplaces, restaurants, and bars (Table 1E).[78, 79]

Age Restrictions

In December 2019, Congress raised the federal minimum age for the sale of tobacco products from 18 to 21. In addition, 33 states, DC, and Guam, along with hundreds of localities, have passed legislation to increase the minimum age for the sale of tobacco products to 21.[80]

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.[81] 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 2018, expenditures totaled $8.4 billion, about 12 times the total state tobacco control funding expenditures ($721.6 million) in FY 2021.[59, 82] Efforts such as the FDA's smoking prevention campaign, "The Real Cost," which educates at-risk teens on the harmful effects of smoking, are an attempt to counter industry marketing. "The Real Cost" has been associated with preventing between 380,000–587,000 youth from initiating smoking between 2014 and 2016, with a savings of $31 billion in smoking-related costs.[83, 84]

Table 1E. Tobacco Control Measures by State, 2021

		100% smoke-free laws†				
	Cigarette tax per pack ($)*	W	R	B	G	E-cigarette use also restricted
United States (average)	**$1.91**					
Range	*$0.17-$4.50*					
Alabama	$0.675					
Alaska	$2.00					
Arizona	$2.00	✓	✓	✓	✓	
Arkansas	$1.15					
California	$2.87	✓	✓	✓	✓	✓
Colorado	$1.94	✓	✓	✓	✓	✓
Connecticut	$4.35		✓	✓	✓	✓
Delaware	$2.10	✓	✓	✓	✓	‡
District of Columbia	$4.50	✓	✓	✓		
Florida	$1.339	✓	✓		✓	§
Georgia	$0.37					
Hawaii	$3.20	✓	✓	✓		✓
Idaho	$0.57		✓			
Illinois	$2.98	✓	✓	✓	✓	
Indiana	$0.995	✓	✓			
Iowa	$1.36	✓	✓	✓		
Kansas	$1.29	✓	✓	✓		
Kentucky	$1.10					
Louisiana	$1.08	✓	✓			
Maine	$2.00	✓	✓	✓	‡	§
Maryland	$3.75	✓	✓	✓	✓	
Massachusetts	$3.51	✓	✓	✓	✓	✓
Michigan	$2.00	✓	✓	✓		
Minnesota	$3.04	✓	✓	✓	✓	✓
Mississippi	$0.68					
Missouri	$0.17					
Montana	$1.70	✓	✓	✓	✓	
Nebraska	$0.64	✓	✓	✓	✓	
Nevada	$1.80	✓	✓			✓
New Hampshire	$1.78		✓	✓		
New Jersey	$2.70	✓	✓	✓		✓
New Mexico	$2.00	✓	✓	✓		✓
New York	$4.35	✓	✓	✓	✓	‡
North Carolina	$0.45		✓	✓		
North Dakota	$0.44	✓	✓	✓	✓	✓
Ohio	$1.60	✓	✓	✓	✓	
Oklahoma	$2.03					
Oregon	$3.33	✓	✓	✓	✓	✓
Pennsylvania	$2.60	✓				
Rhode Island	$4.25	✓	✓	✓		‡
South Carolina	$0.57					
South Dakota	$1.53	✓	✓	✓	✓	✓
Tennessee	$0.62					
Texas	$1.41					
Utah	$1.70	✓	✓	✓		✓
Vermont	$3.08	✓	✓	✓	✓	‡
Virginia	$0.60					
Washington	$3.025	✓	✓	✓	✓	
West Virginia	$1.20					
Wisconsin	$2.52	✓	✓	✓	✓	
Wyoming	$0.60					
Puerto Rico	$5.10	✓	✓	✓	✓	✓

W – workplaces, R – restaurants, B – bars, G – state-run gambling establishments. *Effective as of December 28, 2020. †Passed or implemented, reported as of March, 2021. 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: American Cancer Society Cancer Action Network.[73]
Smoke-free laws: American Nonsmokers Rights Foundation, 2020.[77, 78]

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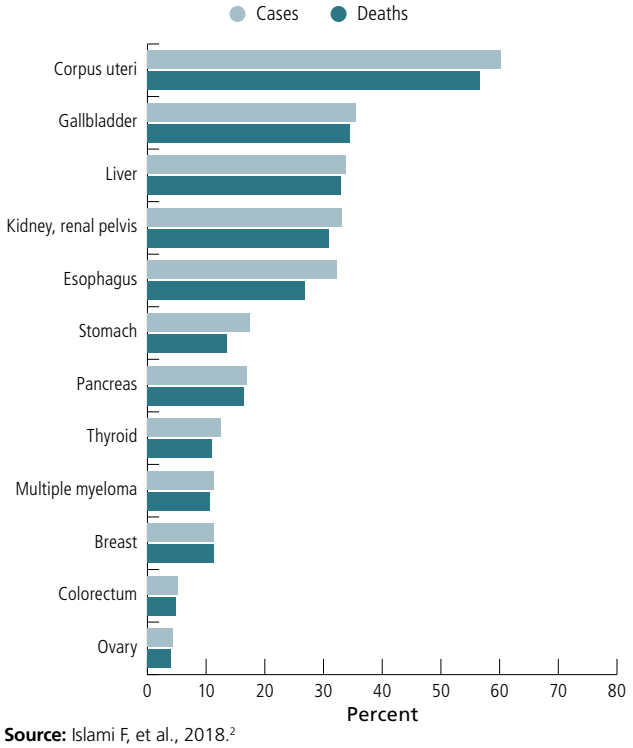
Excess Body Weight, Physical Activity, Diet, and Alcohol

Aside from avoiding tobacco use, maintaining a healthy weight, staying active throughout life, following a healthy eating pattern, and avoiding or limiting alcohol consumption 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 nutrition and physical activity guidelines provide recommendations to help individuals adopt healthy behaviors (see sidebar, page 20). Studies show that adults who most closely follow American Cancer Society recommendations 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,

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]

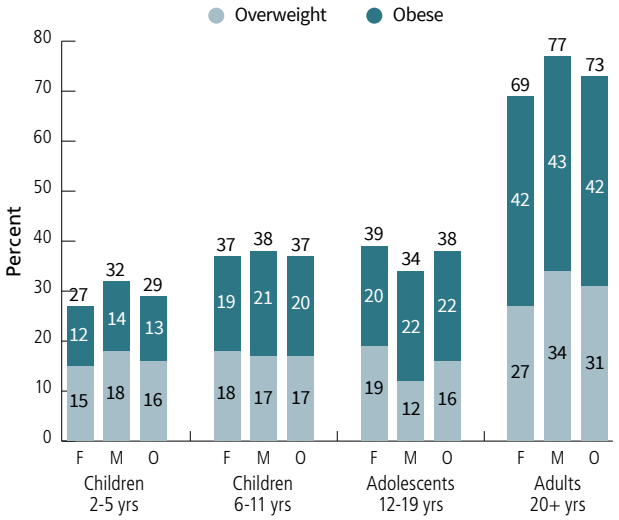
pancreas, colorectum, gallbladder, ovary, female breast (postmenopausal), and thyroid.[6] Excess body weight may also increase the risk of cancers of the mouth, pharynx, larynx, and male breast; non-Hodgkin lymphoma (diffuse large B-cell lymphoma); and fatal prostate cancer.[7] Accumulating evidence suggests that excess body weight also negatively impacts breast cancer survival.[8] However, emerging research suggests that even modest sustained weight loss can mitigate breast cancer risk among women 50 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] Excess body weight increases the risk of some cancers more 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.[10]

Adult Overweight and Obesity

- The proportion of men (34%-40%) and women (25%-30%) classified as overweight (BMI of 25.0-29.9 kg/m^2) has remained relatively stable since the early 1960s.[11] However, obesity (BMI ≥30 kg/m^2) prevalence has markedly increased; in 1960-1962, 11% of men and 16% of women ages 20-74 years (data for ages ≥75 years were unavailable) were classified as obese.[11] By 2017-2018, approximately 43% of men and 42% of women ages ≥20 years were obese[12] (Figure 2B).
- In 2017-2018, 77% of men and 69% of women were overweight or obese; the prevalence of overweight was higher among men (34%) than women (27%), whereas obesity prevalence was similar in women and men (Figure 2B).
- In 2015-2018, among men, obesity prevalence was lowest among Asian (14%) and notably higher among Black (40%), White (42%), and Hispanic (45%) males. Among women, it was lowest among Asian (16%) females, followed by White (39%), Hispanic (48%), and Black (57%) females (Figure 2C).[13]
- In 2019, by state, obesity prevalence among adults ranged from 24% in Colorado and the District of Columbia to 41% in Mississippi (Table 2A).

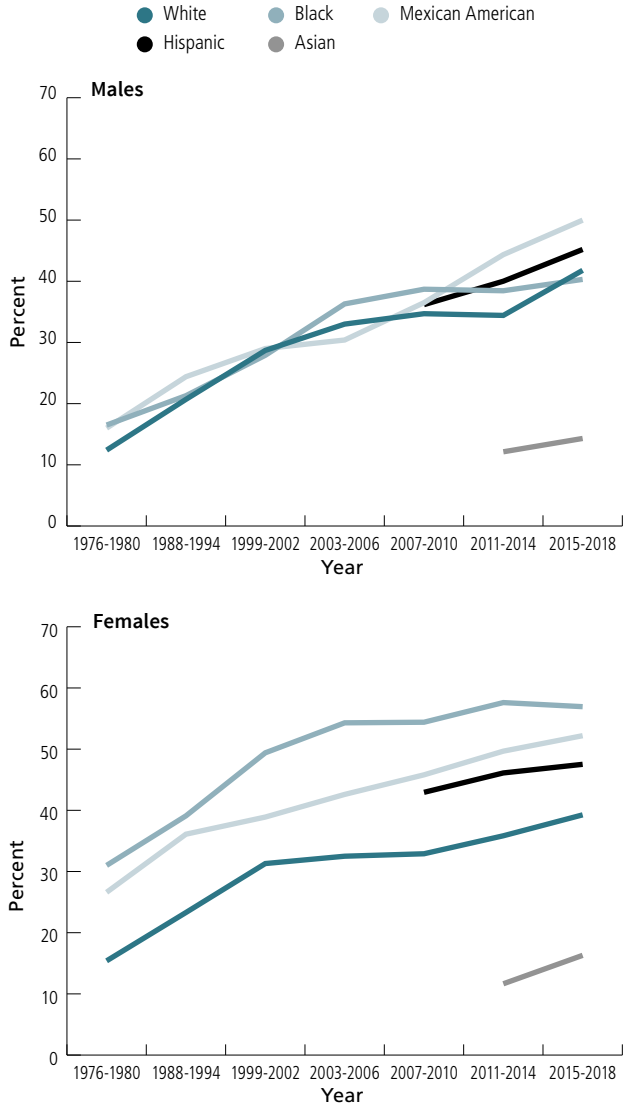
Figure 2B. Excess Body Weight (%), Youth and Adults, US, 2017-2018



F: females, M: males, O: overall. *See Special Notes for more information.

Source: National Health and Nutrition Examination Survey, 2017-2018.

Figure 2C. Obesity (%), Adults 20-74 Years by Sex and Race/Ethnicity*, US, 1976-2018



*See Special Notes for more information.

Source: National Center for Health Statistics, 2014.[13] National Health and Nutrition Examination Surveys, 2011-2018.

- Across states, obesity prevalence was ≥35% in 34 states and the District of Columbia among Black adults; in 15 states among Hispanic adults; and in 6 states among White adults.[14]

Youth Overweight and Obesity

- From 1971 to 2002, the prevalence of obesity (BMI at or above the 95th percentile) among youth ages 2-19 years tripled from 5% to 15%, and further increased to 19% in 2017-2018.[15, 16]
- The prevalence of overweight (BMI between 85th-94.9th percentile) among youth ages 2-19 years increased from 10% in 1971-1974 to 16% in 2017-2018.[15, 16]
- By age, in 2017-2018, obesity prevalence ranged from 13% in young children (ages 2-5 years) to 22% in adolescents (ages 12-19 years) (Figure 2B).
- Trends in obesity prevalence vary by sex and race/ethnicity (Figure 2D).[13, 17] Among adolescent boys, prevalence has consistently been highest among Mexican American boys (2015-2018: 33%) while among girls, prevalence has been highest among Black girls (2015-2018: 34%). Among both boys (13%) and girls (10%), prevalence is lowest among Asian adolescents.
- In 2019, the prevalence of obesity among high school students ranged from 10% in Utah and Colorado to 23% in Mississippi (Table 2B).

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. Research has shown that physical activity can decrease the risk of colon (but not rectal), breast, kidney, endometrial, bladder, esophageal (adenocarcinoma), stomach (cardia) and possibly lung cancers.[18-20] Mounting evidence also suggests that greater time spent in sedentary behavior may increase risk of colon, endometrial, and possibly lung cancers,[20, 21] and extended leisure-time sitting has also been associated with increased risk of cancer death.[20] At least 3% of cancer cases can be attributed to physical inactivity, but this estimate is likely higher as only colon, female breast, and endometrial cancers were considered in the estimation.[2]

Additionally, cancer survivors who are physically active are less likely to have adverse effects and to die from their cancer than those who are inactive.[23] Studies have shown that being active at high levels helps to prevent weight gain and obesity, which contributes to a reduced risk of developing obesity-related cancers.[1, 24] In addition, replacing sedentary time with even short durations of moderate vigorous physical activity appears to reduce cancer mortality.[25]

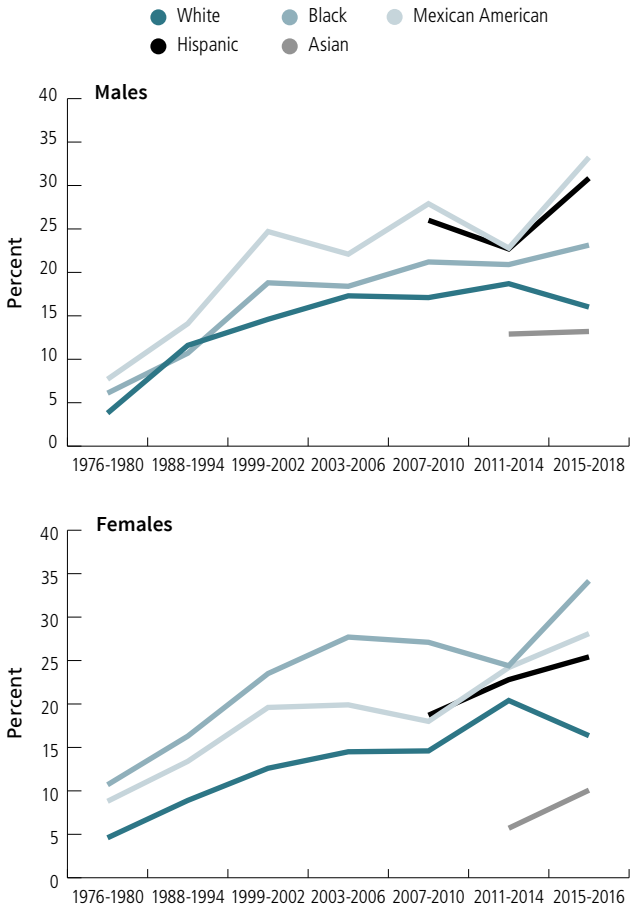
Table 2A. Overweight and Obesity (%), Adults 18 Years and Older by State, 2019

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

*Based on % obese. Note: Puerto Rico not included in range or median.

Source: Behavioral Risk Factor Surveillance System, 2019.

Figure 2D. Obesity (%), Adolescents 12-19 Years by Sex and Race/Ethnicity*, US, 1976-2018



*See Special Notes for more information.

Source: National Center for Health Statistics, 2014.[13] National Center for Health Statistics, 2018.[17] National Health and Nutrition Examination Survey, 2015-2018.

The American Cancer Society recommends that adults limit sedentary behavior in addition to getting 150 to 300 minutes of moderate-intensity exercise (brisk walking, dancing, lawn mowing, and lifting as part of a job, etc.) or 75 to 150 minutes of vigorous-intensity exercise (jogging, martial arts, heavy manual labor, etc.) per week, or an equivalent combination. Children and adolescents should engage in at least 1 hour of moderate- or vigorous-intensity activity each day.

Adult Physical Activity

- About 54% of adults met physical activity recommendations in 2018 (men: 58%, women: 51%). [26] (Table 2C).

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; and
  - Whole grains.
- A healthy eating pattern limits or does not include:
  - Red and processed meats;
  - Sugar-sweetened beverages; or
  - 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:

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

- In 2018, meeting recommendations for physical activity among those with a college degree (66%) was nearly double than those with less than high school diploma (35%) (Table 2C).
- In 2019, Puerto Rico (29%) had the lowest proportion of adults who reported meeting recommended levels of physical activity, while Montana (58%) had the highest (Table 2D).
- Estimated total sitting time increased 1 hour/day from 2007 to 2016 (5.5 to 6.4 hours/day), with significantly higher levels in 2015-2016 among males and persons who are Black and obese or physically inactive.[27]

Youth Physical Activity

- In 2019, about 17% of high school students reported no physical activity in the past week, ranging from 9% in Utah to 26% in Louisiana (Table 2D).
- About 23% of high school students reported at least 60 minutes of daily physical activity in 2019 (Table 2D), continuing a downward trend since 2011 (2017: 26%; 2015: 27%; 2013: 27%; 2011: 29%).[28]
- From 2007 to 2016, estimated total sitting time increased among adolescents overall (7.0 to 8.2 hours/day) and across all race/ethnic groups.[27]

Table 2B. Overweight and Obesity (%), High School Students by State, 2019

	Overweight	Obese	Rank* (1=high)
United States	**16**	**15**	–
Range	*12-20*	*10-23*	–
Alabama	20	17	9
Alaska	15	15	18
Arizona	17	13	35
Arkansas	20	22	3
California	15	16	15
Colorado	12	10	45
Connecticut	15	14	28
Delaware	–	–	–
District of Columbia	18	17	9
Florida	16	14	28
Georgia	18	18	5
Hawaii	14	16	15
Idaho	12	12	41
Illinois	15	15	18
Indiana	–	–	–
Iowa	16	17	9
Kansas	16	15	18
Kentucky	18	18	5
Louisiana	18	16	15
Maine	15	15	18
Maryland	16	13	35
Massachusetts	15	14	28
Michigan	16	15	18
Minnesota	–	–	–
Mississippi	18	23	1
Missouri	16	18	5
Montana	13	12	41
Nebraska	13	13	35
Nevada	17	12	41
New Hampshire	14	13	35
New Jersey	15	12	41
New Mexico	16	15	18
New York	16	13	35
North Carolina	16	15	18
North Dakota	16	14	28
Ohio	12	17	9
Oklahoma	18	18	5
Oregon	–	–	–
Pennsylvania	14	15	18
Rhode Island	15	14	28
South Carolina	16	17	9
South Dakota	16	14	28
Tennessee	18	21	4
Texas	18	17	9
Utah	12	10	45
Vermont	14	13	35
Virginia	16	15	18
Washington	–	–	–
West Virginia	17	23	1
Wisconsin	15	15	18
Wyoming	–	–	–
Puerto Rico	16	14	28

*Based on % obese. See Special Notes for more information.

Source: Youth Risk Behavior Surveillance System, 2019

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).[29] 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.[30, 31] 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.[32] Furthermore, improving diet quality over time is associated with an overall reduced risk of death.[33] Moreover, cancer survivors who follow a healthy diet pattern have a 10-12% lower risk of dying from cancer or any cause.[31]

Processed Meats and Red Meats

Processed meat (e.g., lunch meats, bacon, hot dogs) has been classified as a human carcinogen, and red meat (e.g., beef, lamb, pork) has been classified as a probable carcinogen based primarily on the evidence of their association with increased colorectal cancer risk.[34] 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.[35-37] 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.[38]

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 greater consumption of non-starchy vegetables (e.g., broccoli, green beans, lettuce) and fruits is associated with lower risk of mouth, pharynx, larynx, esophageal, and stomach cancers.[18, 39] Evidence also suggests that cruciferous and carotenoid-rich (e.g., yellow, orange, red color) vegetable intake may lower the risk of aggressive, hard-to-treat breast tumors.[40, 41] 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.[42]

Table 2C. Physical Activity (%), Adults 18 Years and Older, US, 2018

	No leisure-time physical activity in past week	Met rec. levels of aerobic activity*
Overall	**26**	**54**
Sex		
Males	23	58
Females	28	51
Age (years)		
18-24	17	65
25-44	22	59
45-64	27	52
65+	38	41
Race/Ethnicity		
White	22	58
Black	34	47
Hispanic	34	48
American Indian/Alaska Native	23	52
Asian	21	54
Sexual orientation		
Gay/lesbian	21	56
Straight	26	54
Bisexual	19	56
Immigration status		
Born in US	24	56
Born in US territory	46	38
In US fewer than 10 years	37	40
In US 10+ years	29	51
Education (25 years and older)		
Less than high school	48	35
High school diploma	36	43
Some college	27	52
College graduate	14	66
Income level		
<100% FPL	41	40
100 to less than 200% FPL	36	43
≥200% FPL	21	59
Insurance status (18 to 64 years)		
Uninsured	34	47
Private	20	60
Medicaid/Public/Dual eligible	40	40
Medicare (ages ≥65 years)	38	41
Other	35	43

FPL-federal poverty level. *Includes 150 minutes of moderate-intensity activity or 75 minutes of vigorous-intensity activity each week.

Source: National Health Interview Survey, 2018.

Whole Grains

Whole-grain foods (made from the entire grain seed) are an important part of a healthful diet, relatively low in caloric density and high in fiber, vitamins, and minerals compared to refined flour products.[43] Studies support the role of a diet high in whole-grain foods and fiber in reducing the risk of colorectal cancer.[18] Some evidence also shows reduced mortality with increased fiber intake after a colorectal cancer diagnosis.[44]

Added Sugars and Highly Processed Foods

Consumption of added sugars in sugar-sweetened beverages and energy-dense foods (e.g., traditional "fast food" or heavily processed foods) are associated with risk of weight gain, overweight, or obesity, which itself causes nearly 13 different cancers.[18] There is also probable evidence that endometrial cancer risk is increased with a higher "glycemic load" diet, reflecting its blood sugar-raising potential.[18] Highly or ultra-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, sugar-sweetened beverages, or candy. There is accumulating evidence that ultra-processed foods are associated with cancer.[45]

Adult Dietary Patterns

- Overall dietary patterns, as measured by the Healthy Eating Index (HEI), improved between 1999 and 2016, largely driven by increases in percent of energy intake from whole fruit, whole grains, nuts and poultry, and declines in percent of energy intake from added sugars and fruit juice. However, these improvements were only restricted to persons who were White, higher educated, and not poor.[46]
- Consumption of processed meats did not change between 1999-2016.[47]
- The contribution of whole grains to total grain intake was lower among Hispanic (11%) and Black (14%) adults than White (17%) and Asian (18%) adults, and in those with lower (12%) than higher (18%) family incomes.[48]
- Despite a decrease in SSBs consumption over time,[49] their contribution to total beverage consumption in 2015-2018 was higher among Black (15%) and Hispanic (14%) adults, compared with White (9%) and Asian (4%) adults.[50]

Table 2D. Physical Activity, Diet, and Alcohol use (%), Adults 18 Years and Older by State, 2019

	Met rec. levels of aerobic activity	Consumed ≥2 fruit servings a day	Consumed ≥3 vegetable servings a day	Alcohol consumption*
United States (median)	**45**	**27**	**13**	**6**
Range	*29-58*	*14-32*	*4-18*	*4-9*
Alabama	40	22	10	6
Alaska	51	25	13	7
Arizona	46	28	14	5
Arkansas	41	25	13	6
California	48	29	13	6
Colorado	52	28	13	6
Connecticut	46	30	15	6
Delaware	45	27	12	7
District of Columbia	46	29	16	7
Florida	45	25	11	7
Georgia	41	23	13	5
Hawaii	50	27	16	8
Idaho	50	25	13	7
Illinois	45	28	11	7
Indiana	40	27	14	5
Iowa	43	27	11	7
Kansas	43	25	14	6
Kentucky	–	21	9	6
Louisiana	39	22	10	7
Maine	46	28	16	9
Maryland	45	28	12	5
Massachusetts	46	30	13	7
Michigan	47	27	10	6
Minnesota	52	29	12	7
Mississippi	35	23	11	6
Missouri	41	23	11	6
Montana	58	26	13	9
Nebraska	44	27	12	6
Nevada	44	23	9	6
New Hampshire	48	28	13	6
New Jersey	–	–	–	–
New Mexico	50	25	11	6
New York	41	29	15	5
North Carolina	45	24	14	5
North Dakota	44	25	10	7
Ohio	43	23	11	6
Oklahoma	32	18	8	4
Oregon	50	27	15	8
Pennsylvania	46	27	11	6
Rhode Island	43	28	15	6
South Carolina	41	23	12	9
South Dakota	42	26	12	7
Tennessee	40	24	13	5
Texas	42	26	14	5
Utah	51	28	11	4
Vermont	54	32	18	9
Virginia	43	28	13	5
Washington	50	28	14	5
West Virginia	45	20	10	5
Wisconsin	49	28	10	8
Wyoming	49	25	12	6
Puerto Rico	29	14	4	4

*Men: >14 drinks per week, women: >7 drinks per week. †Includes 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity activity each week.

Source: Behavioral Risk Factor Surveillance System, 2019.

- In 2013-2016, nearly 37% of US adults consumed "fast-food" on any given day, and levels were higher among Black (42%) than White (37%), Asian (31%), and Hispanic (36%) adults.[51]
- In 2019, the self-reported consumption of ≥2 servings of fruits daily ranged from 14% in Puerto Rico to 32% in Vermont and consumption of ≥3 servings of vegetables daily ranged from 4% in Puerto Rico to 19% in the District of Columbia (Table 2E). Nationally, fruit consumption declined and vegetable consumption remained stable between 1999-2018.[52]

Youth Dietary Patterns

- During 2015–2018, about 36.3% of youth 2-19 years consumed fast food on a given day, 53 and about 63% consumed at least one SSB on a given day in 2011-2014.[54]
- In 2019, about 29% of high school students consumed fruit or 100% fruit juice ≥2 times/day and 14% of consumed vegetables ≥3 times per day (Table 2E).

Alcohol

An estimated 6% of cancer cases can be attributed to alcohol consumption,[2] which increases the risk for cancers of the mouth, pharynx, larynx, esophagus, liver, colorectum, and female breast.[18] Approximately three or more drinks per day may also increase the risk of stomach and pancreatic cancer.[18, 55] Even a few drinks per week may be associated with a slightly elevated risk of female breast cancer.[56] 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.[57] Moreover, the amount of alcohol consumption that minimized harm across health outcomes was zero.[58]

The American Cancer Society and others recommends that it is best to avoid alcohol. People who drink alcohol should limit their intake to no more than two drinks per day for men and one drink per day for women.[1] The recommended limit is lower for women because of their smaller body size and slower metabolism of alcohol.

Table 2E. Physical Activity and Diet (%), High School Students by State, 2019

	No physical activity*	Met rec. levels of physical activity†	Consumed fruit or 100% fruit juice ≥2 times/day	Consumed vegetables ≥3 times/ day	Alcohol consump-tion‡
United States	**17**	**23**	**29**	**14**	**29**
Range	*9-29*	*15-30*	*21-31*	*9-19*	*10-33*
Alabama	18	23	29	12	22
Alaska	16	18	25	17	22
Arizona	18	22	24	12	27
Arkansas	22	23	22	10	25
California	21	21	26	–	21
Colorado	13	25	27	17	31
Connecticut	18	23	31	15	26
Delaware	–	–	–	–	–
District of Columbia	28	15	–	–	20
Florida	22	23	28	13	26
Georgia	20	24	27	14	17
Hawaii	20	17	20	13	20
Idaho	11	22	25	12	27
Illinois	12	26	30	12	27
Indiana	–	–	–	–	–
Iowa	13	26	25	12	26
Kansas	16	26	25	13	33
Kentucky	19	19	21	9	23
Louisiana	26	21	24	12	29
Maine	16	20	29	–	23
Maryland	22	19	27	12	24
Massachusetts	16	22	26	11	30
Michigan	17	22	25	11	25
Minnesota	–	–	–	–	–
Mississippi	20	23	23	10	26
Missouri	14	25	20	10	28
Montana	12	25	24	12	33
Nebraska	16	28	25	11	21
Nevada	16	22	22	–	26
New Hampshire	13	23	–	–	27
New Jersey	15	23	27	–	30
New Mexico	17	27	25	15	29
New York	20	19	28	–	26
North Carolina	20	20	27	12	24
North Dakota	14	25	23	10	28
Ohio	20	24	23	11	26
Oklahoma	15	29	20	9	27
Oregon	–	–	–	–	–
Pennsylvania	13	25	25	11	26
Rhode Island	15	21	29	14	21
South Carolina	21	20	24	10	23
South Dakota	13	30	24	12	26
Tennessee	19	22	23	9	22
Texas	20	23	24	9	28
Utah	9	21	27	12	10
Vermont	14	22	31	19	31
Virginia	17	22	26	–	25
Washington	–	–	–	–	–
West Virginia	15	26	23	10	30
Wisconsin	16	21	–	–	30
Wyoming	–	–	–	–	–
Puerto Rico	29	15	24	9	28

*No physical activity for a total of ≥60 minutes on any day during the preceding 7 days. †Physical activity that increased heart rate and made breathing difficult some of the time for a total of ≥60 minutes/day on all 7 days preceding the survey. ‡At least one drink of alcohol, on at least 1 day during the 30 days before the survey

Source: Youth Risk Behavior Surveillance System, 2019

Alcohol Consumption

- In 2018, 67% of adults reported current alcohol consumption (12+ drinks in lifetime and ≥1 drink in past year).[59]
- About 5% of adults reported heavier drinking (men: >14 drinks/week, women: >7 drinks/week in past year) in 2018, with higher levels among White (6%) than Black (3%), Hispanic (3%), and Asian (2%) adults.[60]
- Heavy alcohol drinking ranged from 4% in Oklahoma, Utah, and Puerto Rico to 9% in Maine, Montana, South Carolina, and Vermont in 2019 (Table 2E).
- Although self-reported alcohol consumption in the past month declined in high school students between 2009-2019, 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.[61]

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.[62-65] The biology underlying this association is not completely understood, but may involve abnormal glucose control and related factors, including inflammation.

- In 2013-2016, 13% (34 million) of adults ≥18 years had diabetes. About 90% to 95% of all diabetes cases are type 2.[66]
- In 2017-2018, the prevalence of diagnosed diabetes was higher among American Indian/Alaska Native (15%), Black (12%), and Hispanic (13%) persons than those who were Asian (9%) and non-Hispanic White (8%).[66] However, some Hispanic (Mexicans: 14%, Puerto Rican: 12%) and Asian (Asian Indian: 13%, Filipino: 10%) subpopulations had substantially higher rates.[66]

Community Action

The 2020 American Cancer Society guidelines recognized the influence of socioenvironmental factors in individuals' ability to practice healthy eating and active living behaviors. Therefore, they recommended that community action strategies to support healthy eating and active living 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 support individuals' efforts for healthy eating and active living (see Sidebar, page 25). 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.[67,68] It is also important to create health-promoting environments for children and adolescents, as lifelong healthy behaviors are best established in childhood and adolescence.

Central to helping individuals achieve healthy eating and active living goals are national, state, and local public policies that improve access to and provide information on healthy food choices; limit advertising and accessibility of low-nutrition foods and beverages, including alcoholic and sugary drinks; and establish standards and increase funding for physical activity infrastructure.[1] Similarly, health care providers and systems are key partners in promoting cancer preventive behaviors.

- The Food and Drug Administration's rule to modify the Nutrition Facts label for packaged foods to include more prominently presented caloric and portion size information, including the amount and % daily value of added sugars, came into effect in 2020-2021.[69]

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 options' promotions; healthy checkout aisles, etc.
- Enabling positive health choices outside the home; restaurant menu changes such as addition of nutrient-dense, low-energy dining options; healthy workplace food availability, etc.

Provide safe, enjoyable, 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 premise; enforcement of laws prohibiting sales to underage persons; advertising and marketing restrictions of alcoholic beverages that target youth.

- Federal nutrition assistance programs, including the Special Supplemental Nutrition Program for Women, Infants, and Children Program and the Supplemental Nutrition Assistance Program (SNAP), allow for healthy food purchases and have been shown to improve dietary patterns and even health.[1] However, substantially more effort is required to ensure equitable

access to healthy foods within these programs, as SNAP recipients experienced fewer gains in healthy diet scores between 2003-2014 than more economically resourced groups.[70]

- 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. The prevalence of self-reported attendance in any physical education class on at least 1 day per week among high school students ranged from 31% in Kentucky and Michigan to 90% in New York in 2019. Nationally, about half (52%) of students reported any PE attendance, a level that has remained largely unchanged since 1991.[28]
- Establishing and raising excise taxes on sugary drinks and alcohol also can reduce consumption of these products, and tax revenues can be reallocated back to promote societal well-being. Currently, no state has an excise tax on sugary drinks, but soda taxes are levied locally in 7 cities and the Navajo Nation.[71]
- 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.[72] 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.[73] 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 the American Cancer Society Cancer Action Network℠ (ACS CAN), our nonprofit, nonpartisan advocacy affiliate, 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 also supports well-designed taxes on SSBs as a component of multifaceted efforts to promote healthy eating and active living. Visit fightcancer.org to learn more about ACS CAN's initiatives and to view the most recent edition of *How Do You Measure Up?* – a state-by-state assessment of cancer care and control efforts.

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Ultraviolet Radiation

Most cases of melanoma are caused by exposure to excessive ultraviolet radiation (UVR) from sunlight or 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 106,110 new cases of invasive melanoma will be diagnosed, and 7,180 deaths will occur in 2021.[2] Melanoma most commonly occurs in non-Hispanic White people and incidence rates are increasing in non-Hispanic White men and women over the ages of 54 and 44, respectively, but are declining in younger adults.[3] The 5-year relative survival rate for melanoma is about 92%.[4] 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.[5] The most recent study of KC occurrence estimated that in 2012, 3.3 million people were diagnosed with at least one KC.[6]

Heavy UVR exposure, 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.[7-9]

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.[10] Some studies indicate that excessive sun exposure during childhood poses an especially elevated risk for melanoma and other skin cancers later in life; other studies have found excessive sun exposure to be harmful regardless of the age when it occurred.[11-13]

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, eggs), added to others (e.g., milk, cereal), and available as a dietary supplement.[14] 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.[15] In the US, 6,000 cases of melanoma can be attributed to indoor tanning annually.[16] 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.[17, 18]

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.[19] Some 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, but there is variation in regulation compliance and enforcement.[20] At the federal level, the Food and Drug Administration (FDA) has proposed a rule to prohibit indoor tanning in tanning facilities among adolescents under the age of 18. If this rule were finalized, an estimated 62,000 melanoma cases would be averted and $343 million in treatment costs would be saved over the lifetime of 61 million youth.[21] This rule would also require all users, regardless of age, to acknowledge that they are aware of the health risks of indoor tanning devices.[22]

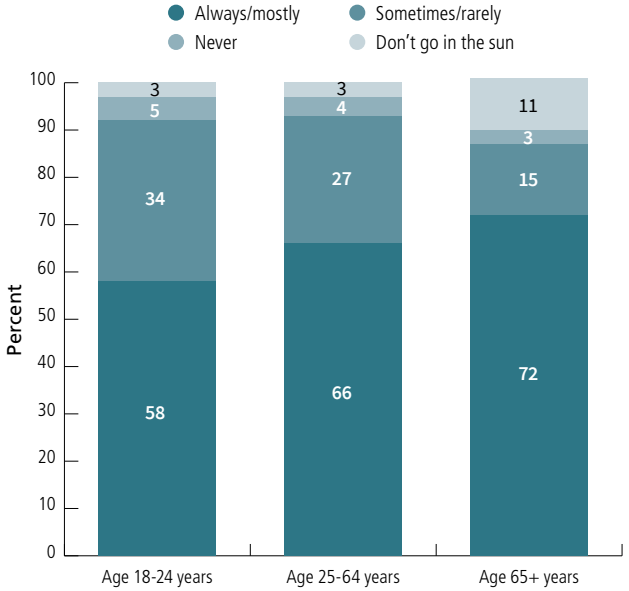
UVR Protective Behaviors

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

Adult UVR Exposure

- Prevalence of sunburn among adults remained stable, between 2005-2015. For the most recent national data available from 2015, about one-third of adults reported having had a sunburn in the past year; sunburn prevalence was highest among younger adults 18-39 years (44-47%) and White adults (43%).[23]

Figure 3A. Sun Protective Behaviors* (%), Adults 18 Years and Older, US, 2015



*Reported at least one of the following: wearing wide-brimmed hat, long pants, long-sleeve shirt, sunscreen (SPF 30+); or seeking the shade. Note: Estimates are age-adjusted to the 2000 US standard population.

Source: National Health Interview Survey, 2015.

- In 2015, one in five sun-sensitive adults over the age of 65 in 2015 reported having had a sunburn in the past year.[24]
- Among adults, the prevalence of using an indoor tanning device in the past year declined from 6% in 2010 to 4% in 2015.[25,26]
- In 2015, indoor tanning use was higher among women (6%, men: 2%), younger adults (18-29 years: 6%, 50-64 years: 3%, 65+ years: <1%) and among those living in the Midwest (5%, other regions: 2-4%).[27]
- Despite declining use, in 2015, about one in five White women age 18-21 years reported using an indoor tanning device in the previous year.[25]

Adult Sun Protective Behaviors

- In 2015, about 40% of adults age 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 18% of those age 65 years and older (Figure 3A).

Youth UVR Exposure

- Among high school students surveyed in 2017, 57% (girls: 62%, boys: 53%) reported having had a sunburn in the past year (Table 3A).
- In 2009, 25% of high school girls reported recent use of an indoor tanning device compared to 6% in 2019, with larger reported declines in non-Hispanic White and Hispanic female students.[28,29] Prevalence among high school boys has also declined from 7% in 2009 to 3% in 2019 (Table 3A).[28]
- As of January 1, 2021, only 20 states and the District of Columbia have a law prohibiting tanning for minors (under the age of 18) without exemptions (Figure 3B).
- During 2009-2015, indoor tanning use 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%).[19]

Table 3A. Sunburn and Use of an Indoor Tanning Device* (%), High School Students, US, 2017 and 2019

	Males	Females	Overall
Sunburn (2017)			
Overall	**53**	**62**	**57**
Race/Ethnicity			
White	71	79	75
Black	10	16	13
Hispanic	40	50	45
American Indian/Alaska Native	–	–	–
Asian	32	39	36
Indoor tanning device (2019)			
Overall	**3**	**6**	**4**
Race/Ethnicity			
White	3	8	6
Black	5	1	3
Hispanic	3	3	3
American Indian/Alaska Native	–	–	–
Asian	1	0	1

*At least once in the past 12 months.

Source: High School Youth Risk Behavior Survey, 2017, 2019

Youth Sun Protective Behaviors

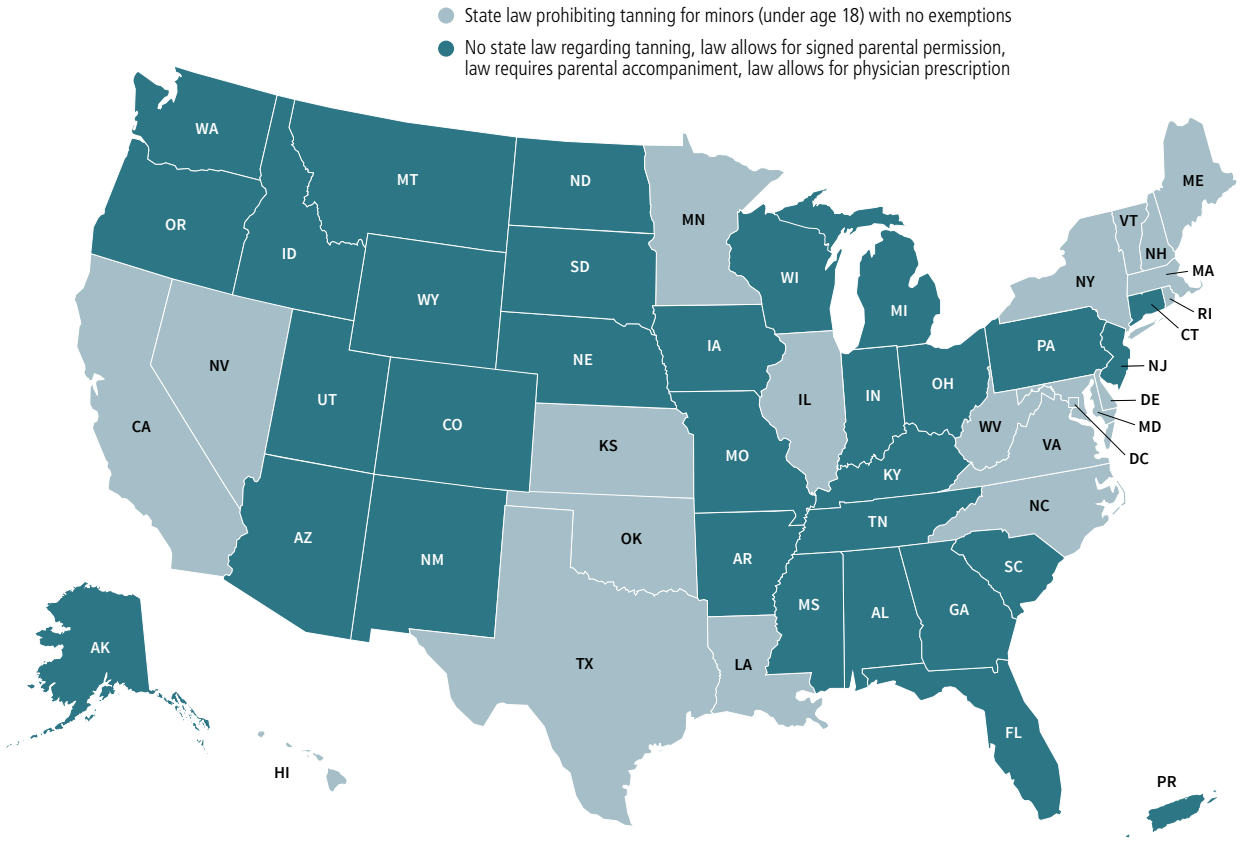
- High school students who reported rarely or never wearing sunscreen with an SPF of 15 or higher remained stable from 2001 (15%) to 2019 (16%).[30]

Prevention Strategies in Skin Cancer

In 2014, the Surgeon General released a call to action that set forth five overarching goals to support skin cancer prevention:[31]

- 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.

Figure 3B. State Indoor Tanning Restrictions for Minors, 2021



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, 2021.
Source: American Cancer Society Cancer Action Network, Inc., 2021.

One study estimated that about 230,000 melanoma cases 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 workplace sun safety policies, 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]

Health care professionals also play an important role in educating their patients about 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 should be counseled about minimizing UVR exposure among those age 6 months to 24 years with fair skin types.[35] In 2015, approximately 34% of pediatricians reported discussing the importance of sun protection with at least 75% of their patients.[36] 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.[31,37]

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, but they can be smaller.

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

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 for 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 2016, the USPSTF concluded that there was insufficient evidence to recommend for or against visual skin examination by a clinician for people at average-risk and without symptoms.[38] The American Academy of Dermatology supports self-skin examinations for individuals with red or blond hair, blue or green eyes, or fair skin given their increased risk for skin cancer.[39] Anyone with new suspicious growths or anything changing, itching, or bleeding 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. Visit fightcancer.org to learn more about skin cancer initiatives and to view the most recent edition of *How Do You Measure Up?* – a state-by-state assessment of cancer care and control efforts.

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Infectious Agents

There are several infectious agents known to cause cancer, such as human papillomavirus, *Helicobacter pylori*, hepatitis B virus, and hepatitis C virus. In the US, about 3% of all cancers are attributable to infections, accounting for an estimated 51,440 cases in 2014.[1] Fortunately, there are opportunities to prevent and treat many of these infections, thereby averting cancer occurrence and death.

Human Papillomavirus

Human papillomavirus (HPV) infection is relatively common, and spreads through intimate skin to skin contact. HPV is usually asymptomatic. Most infections are cleared by the body and do not cause cancer. However, persistent 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.[2] Cervical cancer is the most common HPV-related cancer in women, and oropharyngeal cancer is the most common in men.[3] Based on data from 2013-2017, approximately 45,300 HPV-associated cancer cases occur in the United States each year, with 34,800 of these cases directly attributable to HPV.[4] Incidence rates for several HPV-related cancers, including oropharyngeal, anal, and vulvar, have increased. Overall cervical cancer incidence rates have stabilized recently after declining for many decades due to widespread screening that can

American Cancer Society Recommendations for HPV Vaccine Use

- HPV vaccination works best when given to boys and girls between ages 9 and 12 years.
- Teenagers 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.

prevent this cancer.[5] Yet, incidence rates during the most recent period are increasing in young adults likely due to changes in sexual practice and inability to receive the HPV vaccine as youth.[6]

HPV Prevention and Control

There are more than 100 types of HPV, only about 14 of which cause cancer.[7] The HPV vaccine currently used in the US protects against 9 HPV types and has the potential to avert about 90% of HPV-caused cancers.[2] Receipt of the HPV vaccination before the age of 17 years has recently been shown to lower the risk of cervical cancer by 90%.[8] The HPV vaccine was initially recommended for girls in 2007, which may be contributing to the decrease in cervical cancer incidence among young women ages 20 to 29 in the US, though rates for certain types of cervical cancers are increasing in a cohort of middle-aged women for whom the HPV vaccine wasn't available.[5]

The American Cancer Society's 2020 HPV vaccination guidelines recommend routine vaccination of both girls and boys between 9-12 years of age (see sidebar, above).[9] Vaccination is also 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).[10] Vaccination does not prevent established infections from progressing to precancer or cancer and does not prevent infection of all HPV types; therefore, women in the appropriate age groups should receive regular cervical cancer screening (see page 57).

The promise of preventing multiple types of cancers will be fully realized only if high coverage with HPV vaccine is achieved in adolescents. Recommended strategies for increasing rates of HPV vaccination in the US focus on improving provider recommendation, parental awareness, increasing access to vaccination in medical (e.g., physicians' offices) and non-medical (e.g., schools, pharmacies, health departments) settings.[11, 12] Research has shown that there are many missed opportunities within the health care system for children to be vaccinated.[13] There are several proven strategies to improve coverage, including reminder-recall systems and removal of administrative and financial barriers to vaccination.[14] The Affordable Care Act (ACA) requires private insurance plans to cover all ACIP- and USPSTF-recommended vaccinations including HPV vaccination without cost sharing for eligible children, adolescents, and adults.[15] 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 descent).[16]

In 2014, the American Cancer Society and the CDC established the National HPV Vaccination Roundtable to improve HPV vaccine uptake (see sidebar, page 34). Additionally, the CDC provided the American Cancer Society with funding to develop the HPV VACs (Vaccinate Adolescents against Cancers) Project, which focuses on expanding current cancer prevention and early detection interventions in federally qualified health care centers and hospital systems to increase HPV vaccination. Furthermore, the American Cancer Society is collaborating with state health departments and other state-based entities to facilitate changes in the health system that increase the availability and utilization of the HPV vaccine, and, in 2018, the American Cancer Society launched its *Mission: HPV Cancer Free* public health campaign. See www.cancer.org/hpv for more information.

Table 4A. Vaccination Coverage (%), Adolescents 13-17 years by Sex, Race/Ethnicity, and Poverty Status, US, 2019

	Before 13th birthday				13-17 years		
	HPV				HPV		Hepatitis B
	Females		Males		Females	Males	Overall
	Initiation	Up-to-Date*	Initiation	Up-to-Date*	Up-to-Date*	Up-to-Date*	≥ 3 doses
Overall	**62**	**37**	**60**	**33**	**57**	**52**	**92**
Race/Ethnicity							
White	57	34	54	30	54	49	94
Black	59	29	69	32	53	55	91
Hispanic	72	45	65	37	63	53	87
American Indian/Alaska Native	–	–	–	–	55	60	94
Asian	–	–	–	–	67	62	90
Poverty Status							
Below poverty level	71	43	66	35	59	57	92
At or above poverty level	57	34	60	33	56	51	92

*According to recommendations; see sources for more information.

Source: TeenVaxView, 2020.[53] National Immunization Survey-Teen, 2019.

National HPV Vaccination Roundtable

The National HPV Vaccination Roundtable is a national coalition of over 70 organizations working at the intersection of immunization and cancer prevention. The mission is to raise HPV vaccination rates and prevent HPV cancers in the United States. Our work is to convene, communicate, and catalyze to prevent HPV cancers.

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

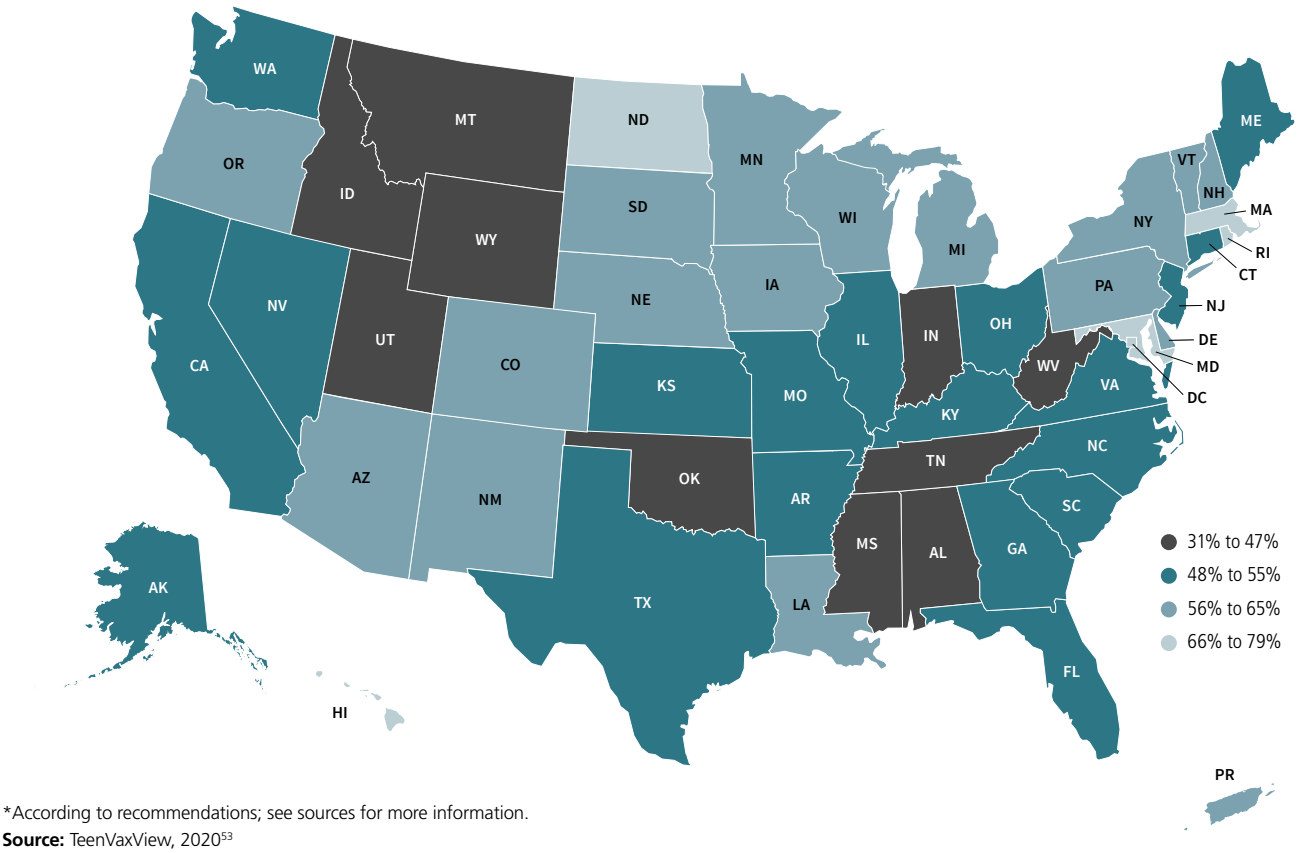
Visit hpvroundtable.org for more information.

National HPV Vaccination Roundtable

HPV Prevalence in the US

- In 2018, there were 43 million HPV infections in the United States, with approximately 13 million new infections.[17]
- In 2013-2016, an estimated 4% of adults aged 18-69 years had high-risk oral HPV and 26% had high-risk genital HPV infection. Prevalence of HPV infection was higher among men (oral: 7%, genital: 30%) than women (oral: 2%, genital: 26%).[18]
- Among adults ages 18-69 years, high-risk oral HPV infection was lower among Asian persons (1%) than Hispanic (3%), White (4%), and Black (5%) persons. Among adults ages 18-59, 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.[18]
- High-risk genital HPV was most prevalent among those aged 18-24 (31%) followed by those aged 25-34 (29%), 34-44 (27%), and 45-59 years (25%). Prevalence of high-risk oral HPV infection was consistent among age groups.[18]

Figure 4A. Up-to-date* Human Papillomavirus Vaccination (%), Adolescents 13-17 Years by State, 2019



*According to recommendations; see sources for more information.
Source: TeenVaxView, 2020[53]

HPV Vaccination in the US

- The uptake of HPV vaccination is increasing in youth; among girls aged 13-17 years, 49% initiated (had at least one dose) the HPV vaccine in 2010 compared to 72% in 2019. Among boys aged 13-17 years, 1% initiated the HPV vaccine in 2010 compared to 70% in 2019.[19]
- In 2019, 57% of girls and 52% of boys age 13-17 years were up to date with HPV vaccination (Table 4A).
- Among girls 13-17 years, up-to-date HPV vaccination was lowest in Black (53%) and highest in Asian (67%) girls. Among boys, vaccination was also lowest in White (49%) and highest in Asian (62%) boys (Table 4A).
- Up-to-date HPV vaccination ranged from 31% in Mississippi to 79% in Rhode Island (Figure 4A, Table 4B).
- In 2019, 62% of girls and 60% of boys initiated (at least one dose) the HPV vaccine before their 13th birthday; 37% and 33% received both doses before their 13th birthday, respectively (Table 4A).
- 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.[20]

Helicobacter Pylori

Chronic infection with *Helicobacter pylori* (*H. pylori*), a bacterium that grows in and causes damage to the stomach lining, may lead to stomach cancer and gastric lymphoma.[20-23] In the US, about 65% of non-cardia gastric cancers (cancers in the lower part of the stomach) and 31% of all stomach cancers 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.[24] *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.[25, 26]

H. Pylori in the US

- About a third of the US population is infected with *H. pylori*.[1, 27]
- *H. pylori* prevalence is 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.[28, 29]
- *H. pylori* prevalence is five to nine times higher in adults over the age of 50 compared to adults in their 20s.[29]

Hepatitis B Virus

Chronic infection with hepatitis B virus (HBV) can cause liver cancer and is increasingly recognized as a risk factor for non-Hodgkin lymphoma.[30, 31] 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, saliva). Most new HBV infections occur in unvaccinated adults who practice risky behaviors (e.g., injection drug users, men who have unprotected sex with men, adults who have sex with multiple partners).[32] About 95% of newly infected adults will clear the virus within six months of infection, whereas the majority of infected infants will become chronically infected.[33]

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.[32] The CDC currently recommends

Table 4B. Vaccination Coverage (%), Adolescents 13-17 Years by State, 2019

	Females	Males	Overall	
	Up-to-Date*	Up-to-Date*	Up-to-Date*	
United States	**57**	**52**	**54**	**Rank**
Range	32-78	29-80	31-79	(1=low)
Alabama	52	43	47	9
Alaska	58	48	53	18
Arizona	57	56	57	31
Arkansas	55	46	51	16
California	62	51	56	29
Colorado	70	57	64	45
Connecticut	56	51	54	23
Delaware	61	58	59	34
District of Columbia	73	78	76	50
Florida	56	56	56	28
Georgia	56	44	50	15
Hawaii	66	66	66	47
Idaho	48	41	44	6
Illinois	55	55	55	25
Indiana	42	41	41	2
Iowa	60	61	61	42
Kansas	47	52	50	12
Kentucky	62	48	55	25
Louisiana	58	61	60	36
Maine	57	49	53	18
Maryland	69	69	69	48
Massachusetts	74	75	74	49
Michigan	58	61	59	35
Minnesota	64	50	57	30
Mississippi	32	29	31	1
Missouri	55	54	54	24
Montana	51	42	47	8
Nebraska	62	59	61	39
Nevada	56	50	53	20
New Hampshire	67	59	63	44
New Jersey	53	50	51	17
New Mexico	54	66	60	37
New York	60	55	57	32
North Carolina	53	46	50	12
North Dakota	77	77	77	51
Ohio	52	47	50	14
Oklahoma	42	41	42	4
Oregon	64	58	61	41
Pennsylvania	61	59	60	38
Rhode Island	78	80	79	52
South Carolina	59	47	53	21
South Dakota	59	63	61	43
Tennessee	51	36	43	5
Texas	51	46	48	11
Utah	48	41	45	7
Vermont	67	60	64	46
Virginia	53	58	55	27
Washington	60	47	53	22
West Virginia	51	44	47	10
Wisconsin	67	54	61	39
Wyoming	43	40	42	3
Puerto Rico	60	57	58	33

*According to recommendations; see sources for more information.

Source: TeenVaxView, 2020[53]

that the following groups receive the vaccine: infants, all youth <19 years who have not been vaccinated, and unvaccinated adults who are at high-risk for infection (e.g., health care workers, travelers to regions with HBV).[32] 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 2020, the US Preventative Services Task Force maintained its previous screening recommendations for HBV after considering new evidence that treating HBV infections leads to better health outcomes. Hepatitis B surface antigen (HBsAg) screening is recommended for adolescents and adults at increased risk for contracting HBV (e.g., live in areas with high regional prevalence, persons with HIV), including those already vaccinated.[34]

HBV Prevalence and Vaccination in the US

- HBV infection rates have been steady since 2010, and approximately 21,600 Americans were estimated to be living with acute HBV infections in 2018.[35]
- In 2018, HBV infection was higher in adults aged 40-49 (2.6 per 100,000) than those aged 30-39 (2.0 per 100,000) and 50-59 (1.6 per 100,000) years and rare among children ≤19 years.[35]
- HBV acute infection rates were markedly higher in West Virginia and Kentucky (>5 per 100,000), compared to the national average and other states, where acute infection rates were ≤1 per 100,000.[35]
- In 2017, 92% of adolescents (age 13-17 years) had received at least three HBV vaccine doses; vaccination was lowest among Hispanic (87%) and highest among White (94%) adolescents (Table 4A).
- By state, adolescent HBV vaccination coverage in 2019 ranged from 84% in Texas and West Virginia to 97% in Rhode Island (Table 4B).

Hepatitis C Virus

Chronic infection with hepatitis C virus (HCV) causes cirrhosis and liver cancer and has been shown to increase the risk of non-Hodgkin lymphoma.[30, 36] Liver cancer incidence and mortality rates have increased rapidly in the US for several decades, as has HCV-related mortality; these increases are thought to be, in part, due to the HCV epidemic that began in the late 1960s primarily through injection drug use.[37, 38] Nearly a quarter of liver cancers in the US are attributable to HCV, with nearly a third having evidence of HVC infection and a quarter directly attributable to HVC.[1, 39, 40]

In recent years, most HCV is spread through injection drug use. It can also 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 was also transmitted through blood infusion and organ transplants, but since this time, donated blood and tissues have been screened for the virus. Most 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 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; they previously only recommended screening in adults born between 1945 and 1965, as nearly three-quarters of people living with HCV in 1999-2008 were in this cohort.[41] Those who test positive for HCV are advised to begin antiviral treatment in order to reduce health effects related to HCV infection.[42] These treatments are very effective at eliminating HCV infection, but can be very expensive.

HCV Prevalence and Testing in the US

- The incidence of acute HCV infection, which will become chronic in 75-85% of those infected, was steady between 2005-2010, but rates more than tripled between 2010 and 2018 from 0.3 to 1.3 cases per 100,000 in men and from 0.3 to 1.0 cases per 100,000 in women.[43]
- In 2018, the rates of acute HCV infection increased the most among those aged 20-39, which is consistent with populations most impacted by the opioid crisis in the US.[43]
- In the US, approximately 2.4 million persons were living with current HCV infection from 2013 through 2016, and 4.1 million persons had ever been infected.[44]
- The prevalence of having ever been infected with HCV is particularly high in certain groups, including the homeless (14.7% from 2013-2016), the incarcerated (16.1% from 2013-2016), and veterans (8.4% in 2011).[44, 45]
- In 2016, approximately 14% of adults (men: 15%, women: 12%) born between 1945 and 1965 had ever been tested for HCV. Testing was least common among people who were non-Hispanic Asian (10%) and those who did not attend college (11%).[46]

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 AIDS develops.

There are several acquired immunodeficiency syndrome (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 human immunodeficiency virus (HIV)-infected develop one of these cancers, HIV has progressed to AIDS.[47]

HIV-infected individuals are at an increased risk of developing other cancers, often referred to as non-AIDS-defining cancers, including Hodgkin lymphoma, some head and neck cancers, anal, and liver cancers.[30] The weakened immune system, along with shared routes of transmission with other cancer-causing infectious agents (e.g., HPV, HCV), increases the risk of cancers in this population.[48] Furthermore, people infected with HIV have higher rates of lung cancers, which is thought to be related to higher smoking rates as well as immunosuppression in this population.[49] Approximately 77%, 11%, 8% and 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 has been a decline in AIDS-defining cancers and stabilization of non-AIDS-defining cancers between 2001-2015.[50]

There are several primary prevention strategies for HIV, such as safe sex practices and using sterile needles. There is no vaccine against HIV, but prophylaxis is available for men 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 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 HIV. Improvements in survival have also resulted in increased cumulative incidence and burden of cancer among persons living with HIV.[51]
- In 2018, 1.2 million adults and adolescents were estimated to be living with HIV.[52]
- Overall, HIV incidence declined between 2014-2018, but has increased in some groups including those aged 25-34 years, American Indian/Alaska Native, and Native Hawaiian/Other Pacific Islander persons.[52]

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Occupational and Environmental Cancer Risk Factors

Carcinogens are synthetic or natural substances and exposures that can lead to cancer, but will not cause cancer in everyone who is exposed. An individual's risk of cancer from exposure to a carcinogen 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 as carcinogens.[1, 2] The IARC invites multidisciplinary scientific teams to review and classify carcinogens. As of November 2020, 121 agents are classified as Group 1 carcinogens (i.e., carcinogenic to humans) and 88 agents are 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). ACS also funds and manages the Cancer Prevention Studies that 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 carcinogens encountered in the workplace. For more information about specific carcinogens and how they are identified, visit ntp.niehs.nih.gov/pubhealth/roc/index-1.html to see the NTP report and monographs.iarc.fr/ENG/Classification/ 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 of time than the general public, conferring greater cancer risk. An estimated 46,549 cancer deaths in the United States were attributed to occupational exposures in 2019 alone.[5] Occupational-associated cancer deaths are about four times greater in men than women.[5]

Occupational exposures are known to cause many types of cancer, though the most common are lung, skin, bone, and urinary bladder cancers, 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[6] – lung and possibly bladder cancers; coal tar products used in roofing and paving – lung and skin cancers; leather dust exposure from the manufacturing and repair of leather footwear – nasal cavity and paranasal sinus cancers.[7, 8]

Pesticides

Pesticides are a group of chemicals used to control plants, molds, and insects in agricultural, commercial, and residential settings. Although many pesticides have been phased out of use, they may still be present in the environment. Further, new pesticide formulations are regularly developed, leading to thousands of pesticide combinations. Beginning in 2015, high-priority evaluations led by IARC have classified several specific pesticides as human carcinogens (lindane and pentachlorophenol), and probable carcinogens (malathion, diazinon, and DDT).[9, 10] Carcinogenic pesticides are strongly associated with non-Hodgkin lymphoma among people regularly exposed through their occupations (e.g., agriculture workers and pesticide applicators), with weaker associations for other cancer sites (e.g., lung, liver, prostate, and breast), but more research is needed.[9, 10] The general population is primarily exposed to pesticides through the food they consume, however there is not much evidence that these small amounts cause cancer, and the benefits of consuming fruits and vegetables is considered greater than potential risks from pesticides.

Working Conditions

Certain working conditions may also contribute to cancer risk. Outdoor workers may have prolonged exposure to ultraviolet radiation, a risk factor for skin cancers.[11] Night shift work can cause disruption of the circadian system leading to hormonal changes and chronic inflammation that may increase cancer risk. In 2019, night shift work was again classified as "probably carcinogenic to humans" by the IARC monographs with suggestive evidence of a relationship for breast, prostate, and colorectal cancer.[12]

Workplace Regulation

The federal government's Occupational Safety and Health Administration is responsible for regulation enforcement, and the National Institute for Occupational Safety and Health is responsible for research to inform regulations. 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.[13] It was increasingly used for fire-protection and building materials following World War II, peaked in the mid-1970s, then declined due to concerns over its harmful impacts on health and was classified as a carcinogen in 1980.[14] 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.[14] Notably, like many other environmental carcinogens, asbestos-related cancer can occur many decades after exposures have ceased.

For more information regarding:

Occupation/industry and cancer research in the United States, visit: cdc.gov/niosh/topics/cancer/default.html

Workplace standards and carcinogens in the United States, visit: osha.gov/SLTC/carcinogens/index.html

Environmental Cancer Risk Factors

There are also carcinogenic substances in the air, water, and soil. 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. This section highlights a few carcinogens that people might be exposed to outside the workplace. Visit cancer.org for more information on these and other carcinogens. Additionally, information on environmental carcinogens including arsenic and ionizing radiation were featured in previous versions of *Cancer Prevention and Early Detection Facts and Figures*.

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.[15] While radon-related lung cancers occur in both people who smoke and those who do not, approximately 85% develop in people who smoke due to the synergistic effect that radon and tobacco smoke have on lung cancer risk.[16]

Radon is a colorless and odorless gas that occurs from the breakdown of radioactive elements, including uranium, an element in the Earth's crust. Virtually everyone is exposed to some level of radon; however, long-term and elevated exposure is of concern due to its negative impact on health. People are typically exposed by inhaling indoor air where radon gas has been trapped. This may occur in tightly sealed buildings or residences constructed in areas with relatively high levels of naturally occurring radon. Radon exposure in homes is typically higher in the basement and lower living areas and decreases in the upper floors of homes. Radon levels vary widely by geographic location (Figure 5A). Visit the EPA's Consumer's Guide to Radon Reduction at epa.gov/radon/consumers-guide-radon-reduction-how-fix-your-home for more information.

Outdoor Air Pollution

In 2013, IARC classified outdoor air pollution as a carcinogen based on evidence that it causes lung cancer and limited evidence that it increases the risk of bladder cancer.[17] Outdoor air pollution is estimated to account for about 5% of all lung cancer deaths in the United States.[18] It contains a mixture of pollutants, such as particulate matter (solid particles and liquid droplets of varying sizes), sulfur dioxide, ozone, and nitrogen dioxide gases, and other substances.[19] Particulate matter was also separately classified as a carcinogen based on its association with lung cancer. Fine particulate matter, defined as particles <2.5 millionths of a meter across (a single human hair is about 30 times greater in width), also referred to as $PM_{2.5}$, is particularly harmful to human health because these small particles can penetrate deep into the respiratory system and lungs.

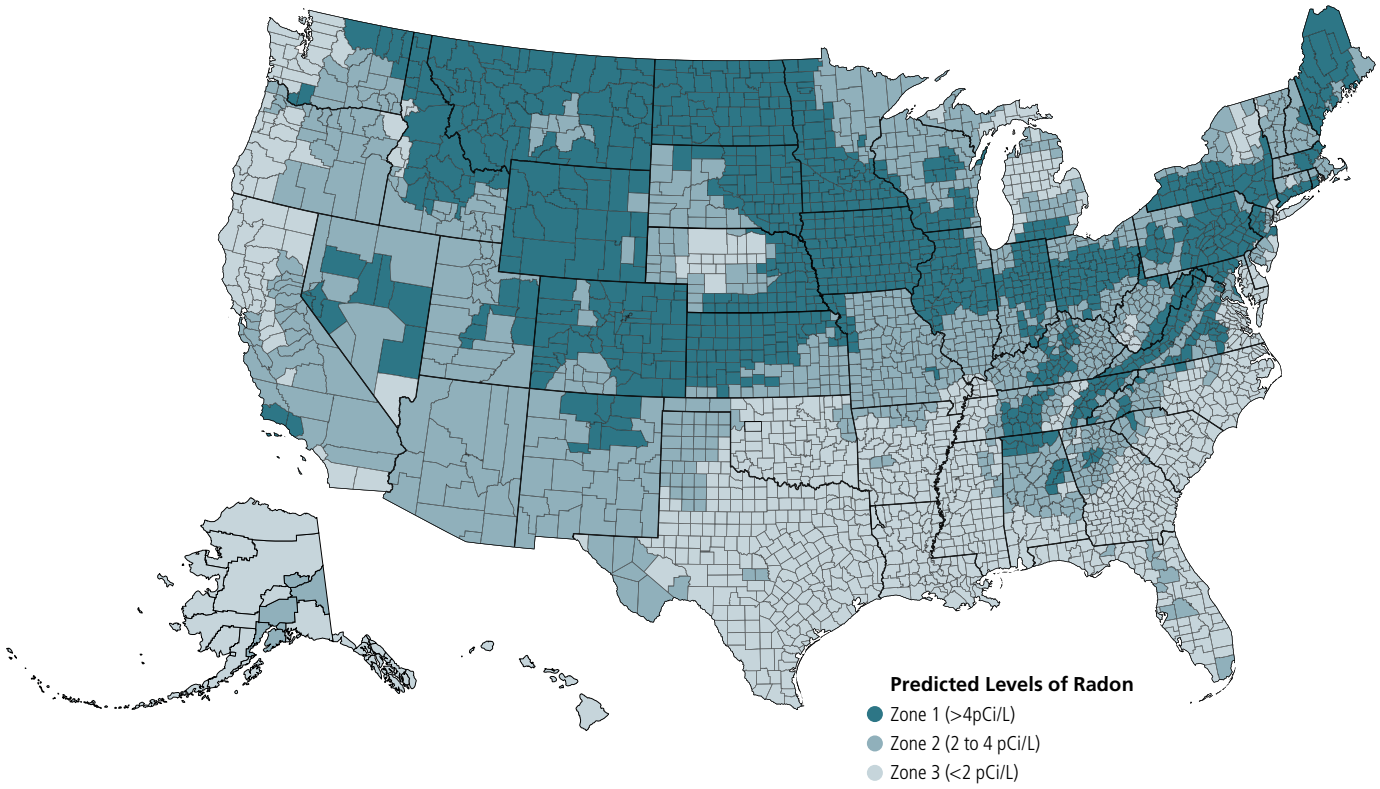
Exposure to outdoor air pollution varies by geographic location, season/temperature, and proximity to pollution sources, which typically originate from transportation, power generation, manufacturing, and the burning of plant and animal material. In the US, the concentration of pollutants has declined between 1990 and 2016, though there has been a recent slowing of these declines.[20, 21]

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

Climate Change

Climate describes long-term weather patterns, and climate change is the long-term shift in global, regional, and local climates. Climate change is caused by human activities, including the burning of fossil fuels. It influences exposure to environmental carcinogens in a variety of ways. There has been a widespread increase in fire activity in the US coinciding with climatic conditions more conducive to wildfire and urban areas encroaching on wildlife.[22-24, 25] Wildfire smoke contains pollutants, including $PM_{2.5}$, that can travel far distances.[26] Extreme weather events, such as hurricanes, intense precipitation, and heat waves, occur more frequently with climate change.[27] Intense heat can make carcinogens more volatile, and extreme weather events can cause carcinogens to be released into surrounding communities.[28] 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.[29] Extreme weather events can also impact cancer patient care and outcomes. In an ACS-led study, lung cancer

Figure 5A. Predicted Levels of Naturally Occurring Radon by US County



The Environmental Protection Agency recommends that homeowners test for radon; for those with measured levels exceeding 4 pCi/L, remediation to reduce exposure is recommended. See source for more information. Zone designation in Puerto Rico is under development.

Source: US Environmental Protection Agency.[42]

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.[30]

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, and people who live or work closer to sources of pollution are frequently exposed to higher amounts of those pollutants. When people who live closest to environmental hazards are disproportionately communities of color and low-income groups, the result is environmental inequality.[31]

In the United States, environmental inequalities have been demonstrated for a variety of exposures including transportation pollution[32] and particulate matter in outdoor air,[33] industrial pollution,[34] water contamination,[35] and hazardous waste sites.[36] In addition, several racial/ethnic groups and low-income communities[37] experience more adverse health outcomes, including cancer.[38-39]

Beginning in the 1980s, increasing recognition of these disparities led to the development of environmental justice advocacy based on the foundational belief that all people have a right to live, work, learn, and play in a healthy environment.[40] The CDC, National Institute of Environmental Health Sciences, and EPA have incorporated environmental justice principles into aspects of their work. The American Cancer Society remains committed to supporting the principles of environmental justice to reduce health disparities throughout its work.

More information about environmental justice at EPA can be found here: www.epa.gov/environmentaljustice

More information about environmental health disparities and environmental justice work at NIEHS can be found here: https://www.niehs.nih.gov/research/supported/translational/justice/index.cfm

Conclusions

There are several known occupational and environmental cancer risk factors, although there is much more to be learned. The relationships between cancer and environmental exposures, including drinking water contaminants, electromagnetic fields, ionizing radiation (e.g., natural sources including radon and manmade sources such as x-rays), and endocrine disruptors are still being studied. 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 standards.[41] Ensuring safe and healthy workplaces and environments for all, as well incorporating climate change into cancer control planning and efforts, is needed.

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Cancer Screening

Early detection of cancer through screening reduces mortality from cancers of the breast, cervix, colon and rectum, prostate, and lung. Screening refers to testing individuals who have no symptoms for a particular disease. In addition to detecting cancer early, screening can prevent cervical and colorectal cancers by identifying and treating removable precancerous lesions. Despite the promise of cancer screening and the associated reductions in mortality, not all population groups have equally benefited. As noted throughout this section, certain racial/ethnic groups, people with lower socioeconomic status, and those without insurance are less likely to be up to date with recommended cancer screenings.

Breast Cancer Screening

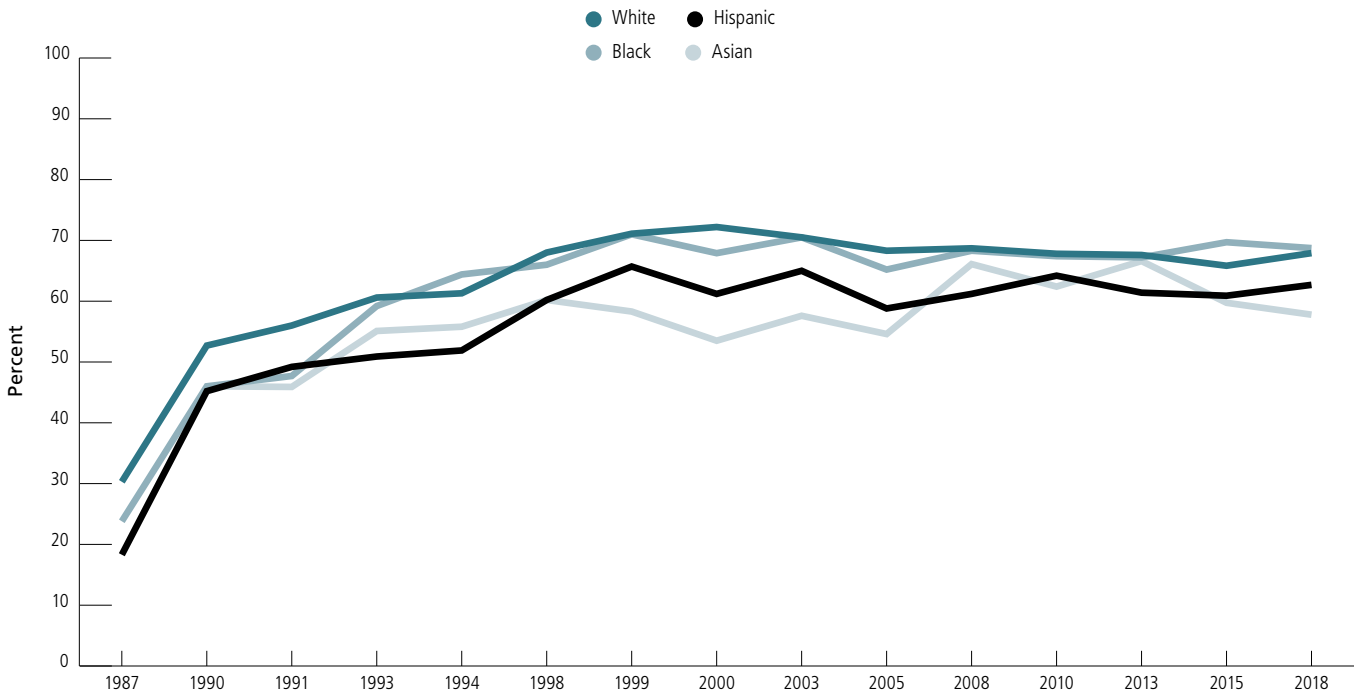
Among women in the United States, an estimated 281,550 cases of invasive breast cancer will be diagnosed and 43,600 deaths will occur in 2021.[1] Early detection with mammographic screening and improvements in treatment have contributed to declines in breast cancer death rates.[1-3] However, breast cancer death rates are declining more slowly among women with lower socioeconomic status, reflecting unequal progress in breast cancer screening and early detection, as well as prevention and treatment.[1-3]

Breast Cancer Screening Among Average-risk Women

The American Cancer Society recommends that women with an average risk of breast cancer begin annual screening at age 45 years, with an option to change to biannual exams at age 55 years. Women should have a choice to begin screening at age 40 years. The primary screening exam for average-risk women is mammography, which can detect breast cancers at earlier and more treatable stages and reduce the risk of dying from breast cancer.[4, 5, 6]

There are several types of mammographic screening. Digital or 2D mammography (DM) has replaced older film versions that were used in the 1980s and 1990s. About 12% of women screened with DM require follow-up imaging or biopsy, and for every 1,000 screening mammograms performed, about five breast cancers are

Figure 6A. Breast Cancer Screening (%), Women 40 Years and Older by Race/Ethnicity, US, 1987-2018



Note: Mammogram in the past 2 years. 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

detected.[7] Mammography has limitations, however. 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 ductal carcinoma in situ, may not progress and thus may be treated unnecessarily. For all women, there is also 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, digital breast tomosynthesis (DBT) or 3D mammography, was approved by the Food and Drug Administration in 2011. This new technology takes multiple images, in combination with DM, to create a synthetic 3D image. Emerging evidence shows that DBT may detect more breast cancers and has fewer false positives than DM alone over multiple rounds of screening.[8, 9] It is not yet known whether DBT is better at reducing mortality compared to DM; ongoing studies are examining this question. A concern with DBT is that when it is performed with a 2D mammogram, women receive a greater radiation dose. However, the FDA has recently approved the use of tomographic images to produce synthetic 2D images, which reduces the radiation dose to a level comparable to DM, although this practice is not yet widespread. Furthermore, DBT may not be fully covered by all health plans.

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.[10] Supplemental imaging may be used to help detect breast cancer among women with dense breast tissue. One supplemental image is an ultrasound which, when combined with mammography, has been shown to be modestly more sensitive than mammography

Table 6A. Breast Cancer Screening (%), Women 45 Years and Older, US, 2018

	Up-to-date* ≥45 yrs	Biannual 50-74 yrs
Overall	**63**	**73**
Age (years)		
45-54	53	–
50-64	–	72
55-64	73	–
65-74	75	75
75+	51	–
Race/Ethnicity		
White	64	73
Black	66	74
Hispanic	60	71
American Indian/ Alaska Native	64	66
Asian	55	71
Sexual orientation		
Gay/lesbian	70	79
Straight	63	73
Bisexual	–	–
Immigration status		
Born in US	64	73
Born in US territory	68	–
In US fewer than 10 years	43	54
In US 10+ years	61	74
Education		
Less than high school	52	63
High school diploma	61	69
Some college	64	72
College graduate	70	81
Income level		
<100% FPL	51	59
100 to less than 200% FPL	53	62
≥200% FPL	67	76
Insurance status		
Uninsured	31	40
Private	69	78
Medicaid/Public/Dual eligible	54	63
Medicare (ages ≥65 years)	63	74
Other	65	73

FPL-federal poverty level. *Mammogram within the past year (ages 45-54 years) or past two years (ages ≥55 years)

Source: National Health Interview Survey, 2018.

alone; however, it also increases the likelihood of false-positive results.[11, 12] Other supplemental imaging includes magnetic resonance imaging (MRI). A recent study of women with dense breasts showed that abbreviated MRI detected more breast cancers than DBT alone.[13] Full-field MRI has greater sensitivity among women with extremely dense breasts, with both an increased cancer detection rate and a reduced interval cancer rate.[14] In March 2019, the FDA issued a proposed rule that would, among other provisions, require that women be notified of their breast density and the significance of it.

Breast Cancer Screening Among High-risk Women

The American Cancer Society has established breast cancer screening recommendations for high-risk women, who 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; or prior chest radiation therapy (e.g., for Hodgkin lymphoma).[15] Women who meet these criteria are recommended to receive annual MRI, in addition to mammograms, beginning at age 30. These guidelines were last published in 2007, and an update is anticipated in 2021.

National Mammography Screening

- The percentage of women ages 40 years and older who reported having a mammogram within the past two years increased from 29% in 1987 to its peak at 70% in 2000, before gradually declining to 64%-66% between 2000-2018.[16] Trends in mammography prevalence are relatively similar across races/ethnicities (Figure 6A).
- In 2018, 53% of women ages 45-54 years had received a mammogram in the past year; about 73%-76% of women ages 55-74 years had received a mammogram in the past two years (Table 6A). Overall, 63% of women 45 years and older were up to date with breast cancer screening.
- The 2018 prevalence of up-to-date breast cancer screening was lower among Asian (55%) and Hispanic (60%) women than American Indian/Alaska Native (64%), White (64%) and Black (66%) women 45 years and older (Table 6A).

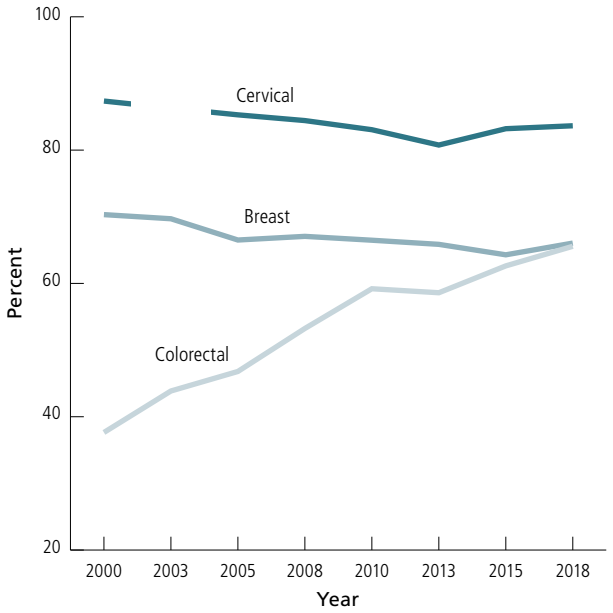
Table 6B. Breast Cancer Screening (%), Women 45 Years and Older by State, 2018

	Up-to-date*		Biannual	
	Overall ≥45 years	Uninsured 45-64 years	Overall 50-74 years	Uninsured 50-64 years
United States (median)	**68**	**37**	**78**	**48**
Range	*57-75*	*23-61*	*67-87*	*34-75*
Alabama	70	39	80	60
Alaska	60	–	67	–
Arizona	64	35	73	43
Arkansas	65	43	72	–
California	68	42	81	54
Colorado	60	31	71	36
Connecticut	74	49	83	68
Delaware	75	33	84	48
District of Columbia	67	–	80	–
Florida	71	34	81	44
Georgia	70	32	80	48
Hawaii	74	61	87	56
Idaho	59	26	68	34
Illinois	69	39	79	–
Indiana	66	36	77	43
Iowa	70	42	81	49
Kansas	66	24	74	34
Kentucky	64	42	78	75
Louisiana	70	47	83	69
Maine	72	34	81	55
Maryland	71	44	81	50
Massachusetts	75	–	87	–
Michigan	68	26	80	41
Minnesota	71	47	82	64
Mississippi	63	32	70	38
Missouri	65	27	75	38
Montana	64	27	74	40
Nebraska	65	35	75	44
Nevada	60	39	73	–
New Hampshire	71	43	83	–
New Jersey	72	–	81	–
New Mexico	60	33	72	36
New York	72	57	82	71
North Carolina	72	42	80	57
North Dakota	69	–	79	–
Ohio	68	39	78	47
Oklahoma	64	26	74	35
Oregon	67	31	78	37
Pennsylvania	69	47	78	–
Rhode Island	75	–	87	–
South Carolina	67	39	77	58
South Dakota	72	39	82	48
Tennessee	66	37	76	60
Texas	64	41	75	55
Utah	61	35	72	47
Vermont	64	31	77	–
Virginia	73	56	81	59
Washington	63	23	75	37
West Virginia	68	40	75	–
Wisconsin	67	27	78	–
Wyoming	57	28	68	41
Puerto Rico	73	–	83	–

*Mammogram within the past year (ages 45-54 years) or past two years (ages ≥55 years). Note: Puerto Rico not included in range or median.

Source: Behavioral Risk Factor Surveillance System, 2018.

Figure 6B. Breast*, Cervical†, and Colorectal‡ Cancer Screening (%), US, 2000-2018



*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) among men and women 50+ years.

Source: National Health Interview Surveys, 2000-2018

- Only 52% of women without a high school diploma were up to date compared to 70% of women with a college degree (Table 6A).
- Uninsured women (31%) and recent immigrants (43%) reported the lowest prevalence of up-to-date mammography use (Table 6A).

State-level Mammography Screening

- In 2018, the prevalence up-to-date breast cancer screening among women ages 45 years and older ranged from 57% in Wyoming to 75% in Massachusetts (Table 6B).
- In 2018, among women ages 45-64 years without insurance, up-to-date breast cancer screening ranged from 23% in Washington to 61% in Hawaii (Table 6B).

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

Cervical Cancer Screening

In the US, an estimated 14,480 cases of invasive cervical cancer will be diagnosed in 2021, and 4,290 deaths will occur.[1] Cervical cancer incidence and mortality rates have decreased by more than 50% over the past three decades and are attributed to screening, which can detect both cervical cancer at an early stage and precancerous lesions.[17] Persistent HPV infection causes almost all cervical cancers. HPV vaccination, initially recommended for adolescent girls in 2007, accounts for decreasing cervical cancer incidence among young women in the US,[18] though rates for some cervical cancers are increasing in a cohort of middle-aged women for whom the HPV vaccine wasn't available.[19] Because it does not protect against established infections or all HPV types, HPV vaccination supplements rather than replaces cervical cancer screening (see Infectious Agents section, page 33).

In 2020, the American Cancer Society updated its cervical cancer screening guidelines with two main changes (see page 57). ACS now recommends screening every 5 years with primary HPV testing, 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 3 years with Pap testing, which detects abnormal cells in the cervix or 2) co-testing every 5 years with both HPV and Pap tests. Primary HPV testing with an approved stand-alone HPV test is preferred because it has fewer false negatives compared with Pap testing, has equivalent long-term sensitivity to detect cervical cancers compared with co-testing (but requires fewer tests), and has fewer false positives.[20] The second change to the 2020 ACS guideline was increasing the age to begin screening from 21 to 25 years; 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.[20]

National Cervical Cancer Screening

- Between 2000-2013, cervical cancer screening prevalence in women ages 21-65 years modestly declined (Figure 6B) and then stabilized between 2013-2018, when about 84% of women were up to date.
- In 2018, the prevalence of up-to-date cervical cancer screening among women 21-65 years was similar among White (85%) and Black (87%) women, but lower among Hispanic (82%), American Indian/Alaska Native (80%), and Asian women (75%) (Table 6C).

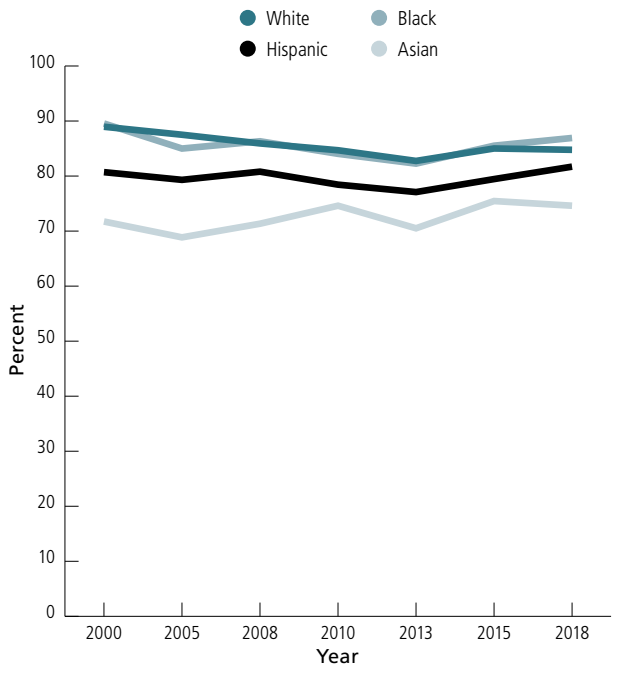
Table 6C. Cervical Cancer Screening* (%), Women 21-65 Years, US, 2018

	Pap test in past 3 yrs (21-65 yrs)	Pap test and HPV test in past 5 yrs (30-65 yrs)	Up-to-date† (21-65 yrs)
Overall	**81**	**45**	**84**
Age (years)			
21-29	74	–	74
30-39	87	53	90
40-49	85	48	89
50-65	76	33	80
Race/Ethnicity			
White	82	46	85
Black	85	48	87
Hispanic	79	41	82
American Indian/ Alaska Native	73	62	80
Asian	72	37	75
Sexual orientation			
Gay/lesbian	66	33	66
Straight	81	45	84
Bisexual	80	47	85
Immigration status			
Born in US	82	47	85
Born in US territory	75	–	78
In US fewer than 10 years	61	24	63
In US 10+ years	78	41	80
Education (25 to 65 years)			
Less than high school	71	32	74
High school diploma	77	39	81
Some college	83	49	86
College graduate	87	48	90
Income level			
<100% FPL	69	36	71
100 to <200% FPL	75	39	78
≥200% FPL	84	48	87
Insurance status			
Uninsured	62	33	65
Private	84	46	87
Medicaid/Public/Dual eligible	79	41	81
Medicare (ages ≥65 years)	70	44	74
Other	80	44	82

FPL-federal poverty level. *Among women with intact uterus. †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.

Source: National Health Interview Survey, 2018.

Figure 6C. Cervical Cancer Screening* (%), Women 21-65 Years by Race/Ethnicity, US, 2000-2018



*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 uterus; hysterectomy data not available in 2003.

Source: National Health Interview Surveys, 2000-2018.

- In 2018, utilization of cervical cancer screening was lowest among uninsured women (65%), recent immigrants (63%), and women who identify as Gay/Lesbian (66%) (Table 6C).
- The most recent National Health Interview Survey data were collected before the release of the 2020 American Cancer Society guidelines recommending that screening begin at age 25 years. In 2018, 86% of women ages 25-65 were screened for cervical cancer.

State-level Cervical Cancer Screening

- In 2018, up-to-date cervical cancer screening prevalence in women ages 21-65 years ranged from 80% in Idaho and New Jersey to 90% in Maine and New Hampshire (Table 6D).
- In 2018, among women with no health insurance, screening prevalence ranged from 56% in South Carolina to 83% in Rhode Island (Table 6D).

Table 6D. Cervical Cancer Screening* (%), Women 21-65 Years by State, 2018

	Pap test within the past 3 years	Pap test and HPV test within the past 5 years	Up-to-Date†	
	Overall (21-65 years)	Overall (30-65 years)	Overall (21-65 years)	No health insurance (21-64 years)
United States (median)	**80**	**52**	**85**	**71**
Range	*68-86*	*41-64*	*80-90*	*56-83*
Alabama	80	49	85	66
Alaska	75	49	83	64
Arizona	78	54	83	66
Arkansas	76	47	87	76
California	81	52	83	73
Colorado	76	56	85	74
Connecticut	86	55	88	74
Delaware	86	55	86	71
District of Columbia	82	62	88	–
Florida	81	57	84	71
Georgia	81	53	86	74
Hawaii	85	48	86	64
Idaho	68	47	80	64
Illinois	80	51	83	70
Indiana	80	48	86	67
Iowa	81	47	86	71
Kansas	79	44	85	72
Kentucky	76	44	86	81
Louisiana	84	48	88	80
Maine	82	62	90	79
Maryland	85	60	86	65
Massachusetts	86	57	87	76
Michigan	83	54	88	72
Minnesota	83	53	87	70
Mississippi	75	45	87	73
Missouri	80	54	85	66
Montana	77	46	84	68
Nebraska	80	46	85	78
Nevada	76	58	83	72
New Hampshire	84	57	90	67
New Jersey	79	49	80	59
New Mexico	75	53	81	69
New York	84	56	85	81
North Carolina	81	57	87	76
North Dakota	81	51	84	67
Ohio	79	55	85	68
Oklahoma	71	42	82	67
Oregon	78	64	87	78
Pennsylvania	79	54	84	73
Rhode Island	84	55	89	83
South Carolina	79	49	87	71
South Dakota	78	48	80	56
Tennessee	80	50	86	70
Texas	76	47	82	65
Utah	73	41	80	71
Vermont	77	57	85	75
Virginia	85	53	88	79
Washington	78	52	84	73
West Virginia	75	49	86	79
Wisconsin	81	55	88	69
Wyoming	76	52	83	71
Puerto Rico	81	54	83	76

*Among women with an intact uterus. †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. Note: Puerto Rico not included in range or median.

Source: Behavioral Risk Factor Surveillance System, 2018.

Colorectal Cancer Screening

An estimated 104,270 cases of colon cancer and 45,230 cases of rectal cancer will be diagnosed in the US in 2021.[1] Colorectal cancer (CRC) is the second-leading cause of cancer death when men and women are combined, with 52,980 deaths estimated to occur in 2021. CRC screening can reduce CRC death rates both by detecting and removing potentially precancerous lesions, thus preventing the disease, and by detecting invasive tumors at earlier, more treatable stages. There has been an accelerated decline in CRC incidence and death rates during the past decade, primarily reflecting the increased uptake of screening and removal of precancerous lesions among older adults.[1] CRC death rates have declined at a faster pace in college-educated adults compared to those with less education, in part due to differences in screening utilization.[3] Additionally, CRC incidence rates are rising in younger adults, prompting changes in screening guidelines.[21]

The American Cancer Society's 2018 CRC screening guideline recommends that adults ages 45 years and older undergo regular screening.[22] ACS lowered the recommended age to begin screening from 50 to 45 years because of the increasing CRC risk in younger generations and the conclusion that the benefits of screening people 45-49 years of age are greater than risks. In October 2020, the US Preventive Services Task Force (USPSTF) issued draft guidelines similarly lowering their recommended age to begin screening from 50 to 45 years.[23]

There are several recommended methods for screening persons at average risk (see page 57). Offering patients different test options substantially increases adherence to screening recommendations.[24]

All recommended tests can reduce CRC death rates when performed at the appropriate intervals and with recommended follow-up. However, some people, especially those seen in clinics serving lower income populations, do not receive adequate or timely follow-up after a positive stool test, which is associated with a greater risk of advanced-stage CRC.[25, 26, 27] Additionally, some health insurers apply cost sharing to colonoscopies that follow a positive stool test, as they consider a follow-up

Table 6E. Colorectal Cancer Screening (%), Adults 45 Years and Older, US, 2018

	Stool test*	Colono-scopy†	Up-to-date‡		
	≥50 years	≥50 years	≥50 years	≥45 years	50-75 years
Overall	**11**	**61**	**66**	**56**	**67**
Sex					
Males	12	62	67	57	67
Females	10	60	64	55	66
Age (years)					
45-49	–	–	–	21	–
50-64	10	56	61	61	62
50-54	9	42	48	48	–
55-64	10	63	68	68	–
65+ / 65-75	12	66	71	71	77
65-74	13	71	76	76	–
75+	10	60	63	63	–
Race/Ethnicity					
White	10	63	68	58	69
Black	12	60	65	57	66
Hispanic	15	52	59	49	59
American Indian/ Alaska Native	12	53	59	48	56
Asian	15	47	55	47	58
Sexual orientation					
Gay/lesbian	18	68	76	64	76
Straight	11	61	66	56	67
Bisexual	25	49	58	53	–
Immigration status					
Born in US	10	63	68	58	69
Born in US territory	–	76	80	65	84
In US fewer than 10 years	–	20	26	22	30
In US 10+ years	14	49	56	48	58
Education					
Less than high school	11	46	52	44	53
High school diploma	10	57	62	53	63
Some college	11	62	68	58	68
College graduate	11	68	73	62	73
Income level					
<100% FPL	12	49	55	46	57
100 to <200% FPL	12	48	55	49	57
≥200% FPL	11	65	70	60	70
Insurance status					
Uninsured	5	26	30	24	30
Private	9	64	68	60	69
Medicaid/Public/ Dual eligible	14	50	58	52	61
Medicare (ages ≥65 years)	14	63	69	69	77
Other	14	65	72	68	76

FPL: federal poverty level. *Fecal occult blood test (FOBT) OR fecal immunochemical test (FIT) OR sDNA test within the past 1 and 3 years, respectively. †Within the past 10 years. ‡For ages ≥45 and ≥50 years: FOBT/FIT, sigmoidoscopy, colonoscopy, computed tomography (CT) colonography, OR sDNA test in the past 1, 5, 10, 5 and 3 years, respectively. For ages 50-75 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.

Source: National Health Interview Survey, 2018.

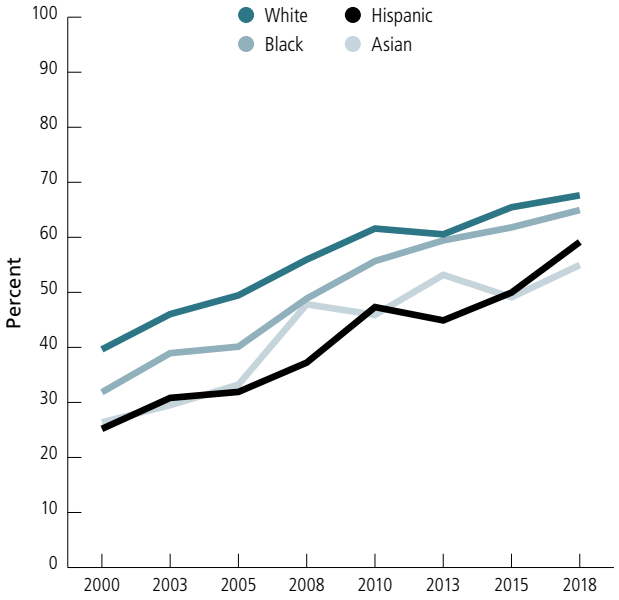
Table 6F. Colorectal Cancer Screening (%), Adults 50 Years and Older by State, 2018

	Stool Test*	Colonoscopy†	Up-to-date‡				
	≥50 years	≥50 years	≥50 years	50 to 64 years	≥65 years	No health insurance 50 to 64 years	50 to 75 years
United States (median)	**9**	**65**	**70**	**63**	**75**	**33**	**69**
Range	*4-21*	*56-72*	*60-76*	*50-72*	*66-82*	*22-57*	*58-77*
Alabama	10	66	70	63	76	37	70
Alaska	8	57	62	52	70	24	60
Arizona	12	62	67	59	76	34	66
Arkansas	12	61	67	58	74	33	66
California	21	64	73	64	82	32	72
Colorado	9	64	69	62	74	27	69
Connecticut	8	72	75	71	78	57	75
Delaware	7	70	73	67	78	31	72
District of Columbia	13	67	74	69	78	–	74
Florida	17	63	71	61	80	29	69
Georgia	14	64	70	61	78	30	68
Hawaii	20	62	73	69	75	46	75
Idaho	6	63	67	59	72	29	66
Illinois	8	63	67	61	70	34	67
Indiana	9	63	68	61	73	30	68
Iowa	7	67	71	66	74	39	71
Kansas	7	65	68	60	74	31	67
Kentucky	9	66	70	63	76	47	69
Louisiana	10	65	70	64	76	33	69
Maine	9	71	75	69	79	34	75
Maryland	10	68	73	67	78	36	73
Massachusetts	8	71	76	72	78	51	77
Michigan	9	69	74	69	77	43	74
Minnesota	8	69	73	68	77	46	73
Mississippi	8	61	64	54	73	24	62
Missouri	9	65	69	62	75	35	69
Montana	8	60	65	56	71	31	64
Nebraska	6	65	68	62	72	35	68
Nevada	12	56	62	52	69	22	60
New Hampshire	6	72	75	70	78	30	75
New Jersey	10	63	68	59	75	–	67
New Mexico	11	56	63	55	66	25	64
New York	8	67	70	65	75	41	70
North Carolina	10	67	71	64	77	38	71
North Dakota	7	63	67	61	72	27	67
Ohio	11	63	68	61	75	37	67
Oklahoma	11	59	64	54	73	22	62
Oregon	13	64	72	66	77	23	72
Pennsylvania	9	65	70	66	72	42	72
Rhode Island	9	71	75	70	79	47	76
South Carolina	9	68	72	62	80	33	70
South Dakota	6	66	69	63	74	32	69
Tennessee	12	65	70	60	77	33	69
Texas	11	56	62	53	71	25	60
Utah	4	67	69	63	73	29	70
Vermont	6	67	71	65	72	40	71
Virginia	8	66	70	63	75	34	70
Washington	14	64	72	65	77	31	72
West Virginia	10	64	68	61	74	38	67
Wisconsin	6	70	74	69	77	50	75
Wyoming	5	57	60	50	67	28	58
Puerto Rico	9	54	58	48	70	24	55

*Home-based blood stool test within the past year. †Within the past 10 years. ‡For ages 50 and older: blood stool test, sigmoidoscopy, or colonoscopy within the past 1, 5, or 10 years, respectively. For ages 50-75: blood stool testing 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. Note: Puerto Rico not included in range or median.

Source: Behavioral Risk Factor Surveillance System, 2018.

Figure 6D. Colorectal Cancer Screening* (%), Adults 50 Years and Older by Race/Ethnicity, US, 2000-2018



*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).

Source: National Health Interview Surveys, 2000-2018.

colonoscopy to be a diagnostic procedure rather than a preventive screening test.

National Colorectal Cancer Screening

- Between 2000 and 2018, CRC screening prevalence increased from 38% to 66% among adults ages 50 years and older (Figure 6C).
- In 2018, screening was highest among White (68%) individuals, followed by Black (65%), American Indians/Alaska Native (59%), Hispanic (59%), and Asian (55%) persons (Table 6E).
- CRC screening prevalence is lowest in the uninsured (30%), recent immigrants (26%), those without a high school diploma (52%), and people 50-54 years of age (48%) (Table 6E).
- The most recent screening data from the National Health Interview Survey were collected before the release of the updated American Cancer Society guideline in May 2018, recommending that screening begin at age 45. In 2018, 56% of adults ages 45 years and older had been screened for CRC (Table 6E).

State-level Colorectal Cancer Screening

- In 2018, the percentage of adults ages 50 years and older who were up to date with CRC screening ranged from 60% in Wyoming to 76% in Massachusetts (Table 6F).
- In 2018, among uninsured adults ages 50-64 years, only 22% in Nevada reported up-to-date CRC screening compared to 57% in Connecticut (Table 6F).

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

Lung Cancer Screening

Among men and women in the US, an estimated 235,760 new cases of lung cancer will be diagnosed in 2021.[1] 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 131,880 deaths are expected in 2021.[1] Most lung cancers are still detected at a distant stage, which has a 5-year relative survival rate of only 6%.[1]

The American Cancer Society issued lung cancer screening guidelines in 2013 (see page 57) for annual screening with low-dose computed tomography (LDCT) for adults 55-74 years of age who formerly or currently smoke and have a 30 pack-year history of smoking, a marker of the length and amount that an individual smoked.[28] The 2013 ACS and USPSTF recommendations are similar, except that the USPSTF extends eligibility to age 80.[29] In 2021, the USPSTF issued recommendations expanding eligibility criteria by lowering the recommended age to begin screening to 50 years and pack-year threshold to 20.[30] This decision was made based on risk-prediction and modeling studies showing benefits of screening younger people and those with lower pack-years, especially among Black individuals who smoke.[31, 32] An update to the ACS guidelines will be initiated in 2021.

The potential harms associated with LDCT screening include cumulative radiation exposure from multiple scans, although the small risk of future carcinogenesis is outweighed by the potential benefits of lung cancer screening in high-risk individuals. Additionally, patients

may have a false-positive exam and undergo an invasive biopsy.[31] Another concern is that some people who currently smoke might use screening as a reason to continue to do so, though evidence suggests that receipt of a screening test may be related to smoking abstinence, especially among adults with a positive finding.[33] LDCTs can also provide a teachable moment to promote cessation among current longtime smokers, 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.[34]

National Lung Cancer Screening

- The proportion of eligible people who have previously or currently smoke who reported LDCT for lung cancer screening in the past 12 months remained low and constant, from 3% in 2010 to 4% in 2015.[35]
- There are approximately 8 million adults eligible for lung cancer screening in 2018.[36]
- According to estimates using registry and survey data, the prevalence of LDCT for lung cancer among adults with a heavy smoking history in 2018 was about 5%-6% nationally and ranged from <4% in several Southern and Western states (Arkansas, West Virginia, Florida, California, and Nevada) to 10%-15% in Kentucky as well as several Northeastern states (Massachusetts, New Hampshire).[36]

Prostate Cancer Screening

In 2021, an estimated 248,530 new cases of prostate cancer will be diagnosed in the US; approximately 34,130 men will die of the disease.[1] 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, due in part 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).[37] However, there's been a recent uptick in distant-stage prostate cancer incidence and stabilization of prostate cancer mortality rates, coinciding with the declines in PSA testing that occurred around 2013.[38, 39]

Table 6G. Prostate-specific Antigen Test* (%), Men 50 Years and Older, US, 2018

	Within the past year
Overall	**35**
Age (years)	
50-64	30
65+	41
Race/Ethnicity	
White	37
Black	33
Hispanic	30
American Indian/Alaska Native	–
Asian	30
Sexual orientation	
Gay/lesbian	43
Straight	35
Bisexual	–
Immigration status	
Born in US	36
Born in US territory	–
In US fewer than 10 years	–
In US 10+ years	30
Education	
Less than high school	24
High school diploma	31
Some college	35
College graduate	43
Income level	
<100% FPL	25
100 to <200% FPL	23
≥200% FPL	39
Insurance status	
Uninsured	9
Private	39
Medicaid/Public/Dual eligible	23
Medicare (ages ≥65 years)	36
Other	36

FPL: federal poverty level. *Among men who have not been diagnosed with prostate cancer.

Source: National Health Interview Survey, 2018.

The American Cancer Society recommends that average-risk, asymptomatic men aged 50+ 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 (see page 57). This 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, following a brief period (2012-2016) when they did not recommend routine screening.[40]

Studies have shown that informed 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.[41, 42] To help address this issue, the American Cancer Society provides patients and clinicians with tools to facilitate SDM; visit https://www.cancer.org/health-care-professionals/prostate-md.html.

National Prostate Cancer Testing and Shared Decision Making

- Between 2005-2010, approximately 41%-44% of men ages 50 years and older received a PSA test in the past year; this proportion declined to approximately 35% in 2013 and remained stable through 2013-2018[43, 44] (Table 6G).
- Persons who were uninsured (9%), Asian men (30%), and those with less than a high school education (24%) were the least likely to have had a recent PSA test (Table 6G).
- In 2018, fewer than 40% of men who received PSA testing reported participating in full SDM.[44]

Barriers, Disparities, Health Care Policy, and Cancer Screening

Barriers to cancer screening occur and interact at multiple levels including national and state policy, health system, provider, community, and patient levels. As noted above, individuals without insurance or with lower educational attainment and some racial/ethnic groups are less likely to be up to date with screening as a result of systematic and structural barriers to screening. For example, people who are uninsured, Black, Hispanic, and have lower educational attainment are less likely to receive a physician recommendation for screening, which is a necessary step in the screening process and a key predictor of cancer screening utilization.[45-47] Other barriers include lack of transportation and paid sick leave, as well as time constraints, which are more common among people with lower socioeconomic status and communities that have lower access to health care.[48] Multicomponent interventions can improve screening rates. Access can be improved by reducing administrative barriers and costs, offering alternative and flexible screening sites and hours, and providing childcare, transportation, and translation. Health system-wide reminders, feedback, and incentives can improve providers' recommendations, and small media and educational campaigns can improve patient demand for screening.[48]

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.[49] 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.[50] Yet, 29 million adults under the age of 65 (14%) remained uninsured as of 2019. The proportion of uninsured adults is even greater among Hispanic (30%) and Black (15%) persons and people who live in states that did not expand Medicaid (21%) compared to states that did (11%).[51] Provisions of the ACA have helped reduce or eliminate out-of-pocket costs for breast, cervical, colorectal, and lung cancer screening for those who are privately or Medicare insured. Researchers have documented increases in CRC screening in the period following implementation of the ACA, particularly among people with lower incomes.[52]

Initiatives and Programs to Improve Cancer Screening Utilization

Ensuring access to affordable, quality health care for all is a top priority for the American Cancer Society and the American Cancer Society Cancer Action Network℠ (ACS CAN), a nonprofit, nonpartisan advocacy affiliate. The American Cancer Society and ACS CAN, as well as other organizations, have raised concerns about the cost imposed on Medicare beneficiaries who had a polyp removed during their screening colonoscopy. In

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+	Mammography	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	Primary HPV test (preferred), Pap test alone or co-testing (acceptable)	Primary HPV test every 5 years. If primary HPV testing is not available, screening may be done with either a co-test that combines an HPV test with a Papanicolaou (Pap) test every 5 years or a Pap test alone every 3 years.
	Women, ages 66+		Those over age 65 who have had regular screening in the past 10 years with normal results and no history of CIN2 or more serious diagnosis within the past 25 years should stop cervical cancer screening. Once stopped, it should not be started again.
	Women who have had a total hysterectomy		Stop cervical cancer screening.
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	Current or former smokers ages 55-74 in good health with 30+ pack-year history	Low-dose helical CT (LDCT)	Clinicians with access to high-volume, high-quality lung cancer screening and treatment centers should initiate a discussion about annual lung cancer screening with apparently healthy patients ages 55-74 who have at least a 30 pack-year smoking history, and who currently smoke or have quit within the past 15 years. A process of informed and shared decision making with a clinician related to the potential benefits, limitations, and harms associated with screening for lung cancer with LDCT should occur before any decision is made to initiate lung cancer screening. Smoking cessation counseling remains a high priority for clinical attention in discussions with current smokers, who should be informed of their continuing risk of lung cancer. Screening should not be viewed as an alternative to smoking cessation.
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.

National Colorectal Cancer Roundtable

The National Colorectal Cancer Roundtable (NCCRT), established in 1997 by the American Cancer Society and the CDC, is a coalition of more than 150 member organizations and individual experts dedicated to reducing 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, systems, survivor groups, government agencies, and cancer coalitions – pledged to make this goal a priority. 80% in Every Community focuses on addressing persistent screening rate disparities so that every community can benefit from lifesaving CRC screening.

Visit nccrt.org for more information.

December 2020, Congress passed a bill to ensure that Medicare beneficiaries are not assessed cost sharing in connection with a colonoscopy screening, regardless of whether a polyp is removed. 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 ensure 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 exams, as well as diagnostic and follow-up services. Since 1991, the NBCCEDP has provided more than 15 million screening examinations, and diagnosed more than 71,000 breast cancers; 222,000 precancerous cervical lesions; and 4,860 cases of invasive cervical cancers.[53] 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 35 state, university (managing state programs), and tribal grantees that partner with health systems to increase CRC screening.[54] In the initial year of the program, CRC screening rates have improved in partnering clinics and an additional 24,096 additional people were screened for CRC.[55] ACS CAN advocates at the state and federal levels to protect this important program and ensure it receives adequate funding.

The American Cancer Society, along with the CDC and many other organizations, also formed the National Colorectal Cancer Roundtable (NCCRT). Its goal is to raise CRC screening rates to 80% in every community (see sidebar, left). In 2017, the American Cancer Society launched the National Lung Cancer Roundtable (NLCRT) to engage key organizations in the common mission of reducing incidence, morbidity, and mortality from lung cancer (see sidebar, next page).

The COVID-19 Pandemic and Cancer Screening

There are many questions about how the COVID-19 pandemic that emerged in early 2020 is impacting cancer screening and early detection. During March-April 2020, breast, cervical, and colorectal cancer screening rates plummeted, but appeared to rebound some during the summer of 2020, although not to pre-pandemic levels.[56] During the COVID-19 pandemic, unemployment rates have risen to levels greater than, and not seen since, the Great Recession (2007-2009), resulting in temporary or permanent loss of health insurance for millions, which is anticipated to further hinder cancer screening utilization.[57] For more information on the COVID-19 pandemic and cancer, please see an American Cancer Society report on the COVID-19 pandemic and cancer: https://www.cancer.org/research/cancer-facts-statistics/all-cancer-facts-figures/cancer-facts-figures-2021.html

National Lung Cancer Roundtable

In 2017, the American Cancer Society launched the National Lung Cancer Roundtable (NLCRT), a national coalition of 143 public, private, and voluntary organizations and invited individuals dedicated to reducing lung cancer incidence, morbidity, and mortality in the United States. Through coordinated leadership, strategic planning, advocacy, and action, the Roundtable serves as a catalyst to stimulate greater levels of collaborative engagement among its 143 member organizations to work on key lung cancer issues. The work of the Roundtable is guided by its Steering Committee and carried out through the efforts of its 10 Task Groups, which are composed of 190 national and international experts and patient advocates.

The NLCRT is focused on promoting the following through public education, provider education, targeted research, and health policy initiatives:

- Increased lung cancer awareness, risk reduction, and early detection
- Management of lung nodules identified during screening or incidentally, assurance of optimal diagnosis and therapy
- Eliminating lung cancer-related stigma and nihilism
- Other related focus areas include imaging quality assurance, advancing state-based initiatives, and addressing lung cancer in women.

Visit nlcrt.org for more information

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Special Notes

Glossary

Body Mass Index (ages 2-20 years): Centers for Disease Control and Prevention's (CDC) age- and sex-specific growth charts are used to establish relative BMI values in youth. 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 limitations. For example, 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). Most estimates presented herein are based on self-reported data, which may be subject to bias. Additionally, screening estimates do not distinguish between examinations for screening and diagnosis. Finally, estimates for the same measure from different surveys may differ, even for overlapping survey years, due to differences in survey methodology.

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 the 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 age 18 years and older living in households in a state or US territory. Due to methodological changes, BRFSS results within this publication are not directly comparable to BRFSS data prior to 2011.

BRFSS website: cdc.gov/brfss/

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 was implemented as a continuous annual survey. Data are gathered through in-person interviews and direct physical exams in mobile examination centers. Estimates for adults presented herein are age-adjusted to the 2000 US standard population.

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

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 age 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. Estimates are age adjusted to the 2000 standard US population, except for by age-group and insurance status.

NHIS website: 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. Up to date vaccination: HPV UTD includes those with ≥3 doses, and those with 2 doses when the first HPV vaccine dose was initiated before age 15 years. Methods for calculating HPV initiation before 13 years of age are described here: Fedewa et al, *Cancer* 2018. https://www.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. Data are gathered through a self-administered questionnaire completed during a required subject or class period.

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 3-4 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 that measures national and state-level tobacco use behaviors and related outcomes, and the 2018-2018 data were used to estimate state-level cessation behavior prevalence; only self-respondents were included, and response rates ranged from 56.2%-58.9%.

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

Youth Risk Behavior Surveillance System (YRBSS): This biennial survey of the CDC's National Center for Chronic Disease Prevention and Health Promotion began in 1991. It is designed to provide national, state, and local prevalence estimates. Data are gathered through a self-administered questionnaire completed during a required subject or class period. Data that do not meet the weighting requirements are not publicly available and are not presented within this publication.

YRBSS website: cdc.gov/HealthyYouth/yrbs/index.htm; nccd.cdc.gov/Youthonline/App/Default.aspx

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