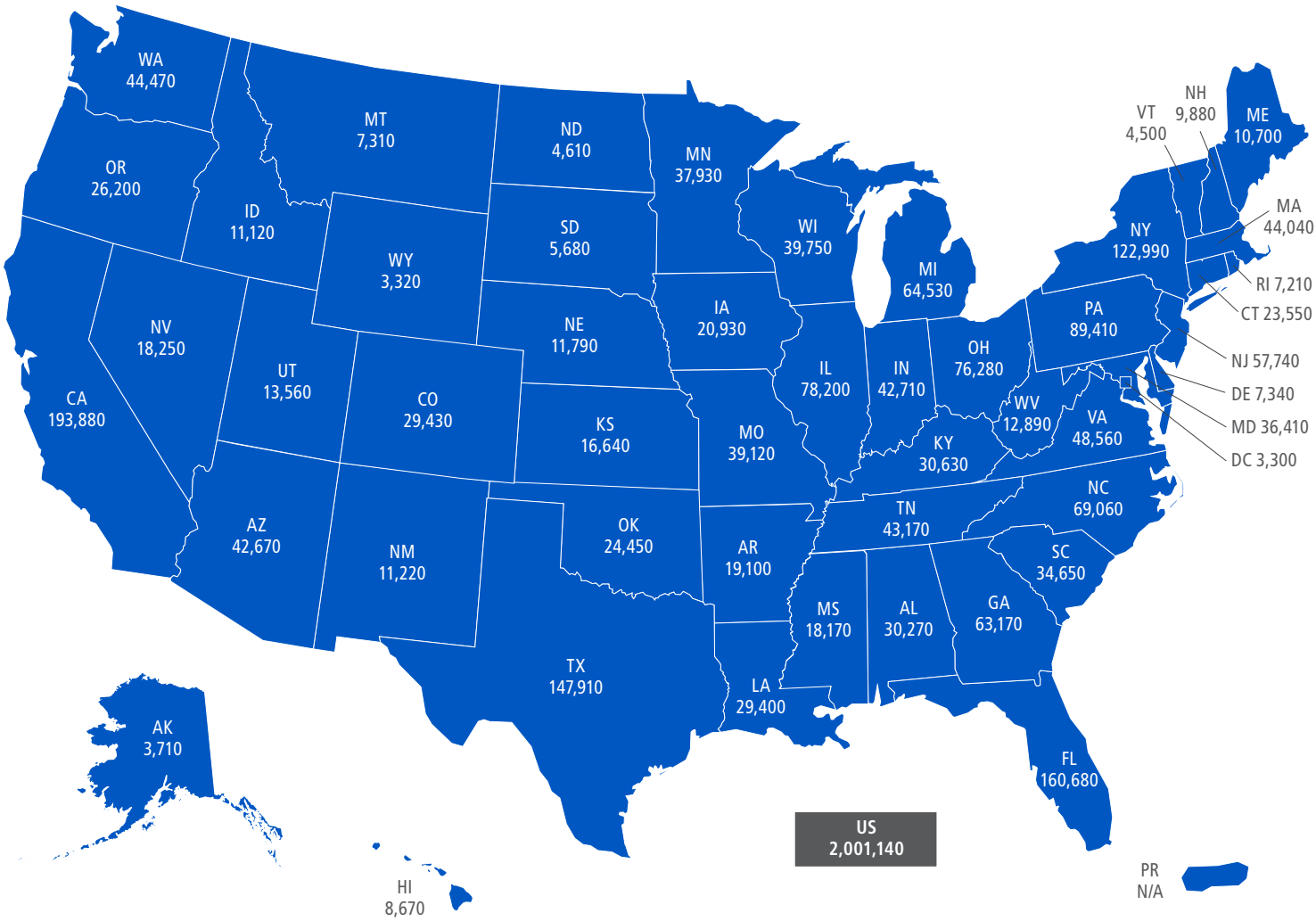
American Cancer Society®

Cancer Facts & Figures 2024



Estimated number of new cancer cases for 2024, excluding basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder. Estimates are not available for Puerto Rico.

Note: Incidence counts are model-based projections and should be interpreted with caution. State estimates may not equal US total due to rounding.

Special Section: Cancer in People Who Identify as Lesbian, Gay, Bisexual, Transgender, Queer, or Gender-nonconforming – see page 32

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

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Basic Cancer Facts

What Is Cancer?

Cancer is a group of diseases characterized by the uncontrolled growth and spread of abnormal cells that can result in death if not treated. Although the cause of most cancers is not well understood, numerous factors are known to increase risk, including many that are potentially modifiable (e.g., tobacco use and excess body weight) and others that are not (e.g., inherited genetic mutations). These risk factors may act simultaneously or in sequence to initiate and/or promote cancer growth.

Can Cancer Be Prevented?

A substantial proportion of cancers could be prevented, including all cancers caused by tobacco use and other unhealthy behaviors. Excluding non-melanoma skin cancer, at least 42% of newly diagnosed cancers in the US – about 840,000 cases in 2024 – are potentially avoidable, including the 19% of cancers caused by smoking and at least 18% caused by a combination of excess body weight, alcohol consumption, poor nutrition, and physical inactivity. Certain cancers caused by infectious agents, such as human papillomavirus (HPV), hepatitis B virus (HBV), hepatitis C virus (HCV), and *Helicobacter pylori (H. pylori)*, could be prevented through behavioral changes, vaccination to prevent infection, or by treating the infection. Many of the more than 5 million skin cancers diagnosed annually could be prevented by protecting skin from excessive sun exposure and not using indoor tanning devices.

Screening can contribute to the prevention of colorectal and cervical cancers by detecting precancers that can be removed. Screening can also reduce mortality for these cancers and for cancers of the breast, lung (among people with a history of heavy smoking), and prostate by detecting cancer early, when treatment is often less intensive and more successful. In addition, being aware of changes in the body (such as a new mole or lump under the skin) and bringing these to the attention of a health care professional can result in the earlier detection of cancer. For complete cancer screening guidelines, see page 82.

How Many People Alive Today Have Ever Had Cancer?

More than 18 million Americans with a history of invasive cancer were alive on January 1, 2022, most of whom were diagnosed many years ago and have no current evidence of the disease.

How Many New Cases and Deaths Are Expected to Occur in 2024?

A little over 2 million new cancer cases are expected to be diagnosed in the US in 2024 (Table 1). This estimate excludes basal cell and squamous cell skin cancers, which are not required to be reported to cancer registries, and carcinoma in situ (noninvasive cancer) except for urinary bladder. Table 2 provides estimated new cancer cases in 2024 by state.

Approximately 611,720 deaths from cancer are expected in the US in 2024 (Table 1), which is about 1,680 deaths per day. Cancer is the second most common cause of death in the US, exceeded only by heart disease. Table 3 provides estimated cancer deaths by state in 2024.

How Much Progress Has Been Made Against Cancer?

The best measure of progress against cancer is a reduction in the likelihood of dying from the disease, referred to as the cancer mortality or death rate. This is because mortality rates are less affected by changes in detection practice than incidence (new diagnoses) and survival rates. The overall age-adjusted cancer death rate rose during most of the 20th century because of the smoking epidemic, but has dropped from its peak in 1991 by 33% as a result of reductions in smoking and advances in treatment, as well as early detection for some cancers. This translates to 4.1 million fewer cancer deaths during 1991 through 2021 than would

have occurred if the death rate had remained at its peak, and is mostly driven by the four most common cancers – lung, colorectal, breast, and prostate (Figure 1 and Figure 2). Over the past decade (2012-2021), the cancer death rate dropped by 1.6% per year.

In contrast, the cancer incidence rate, the likelihood of developing cancer, increased slowly in women over the past decade largely due to continued increases in breast and uterine corpus (endometrial) cancers and melanoma, offsetting declines in lung and colorectal cancers. In men, incidence rates stabilized in recent years after declining from the mid-2000s until around 2013, largely driven by trends in prostate cancer, which have increased in recent years.

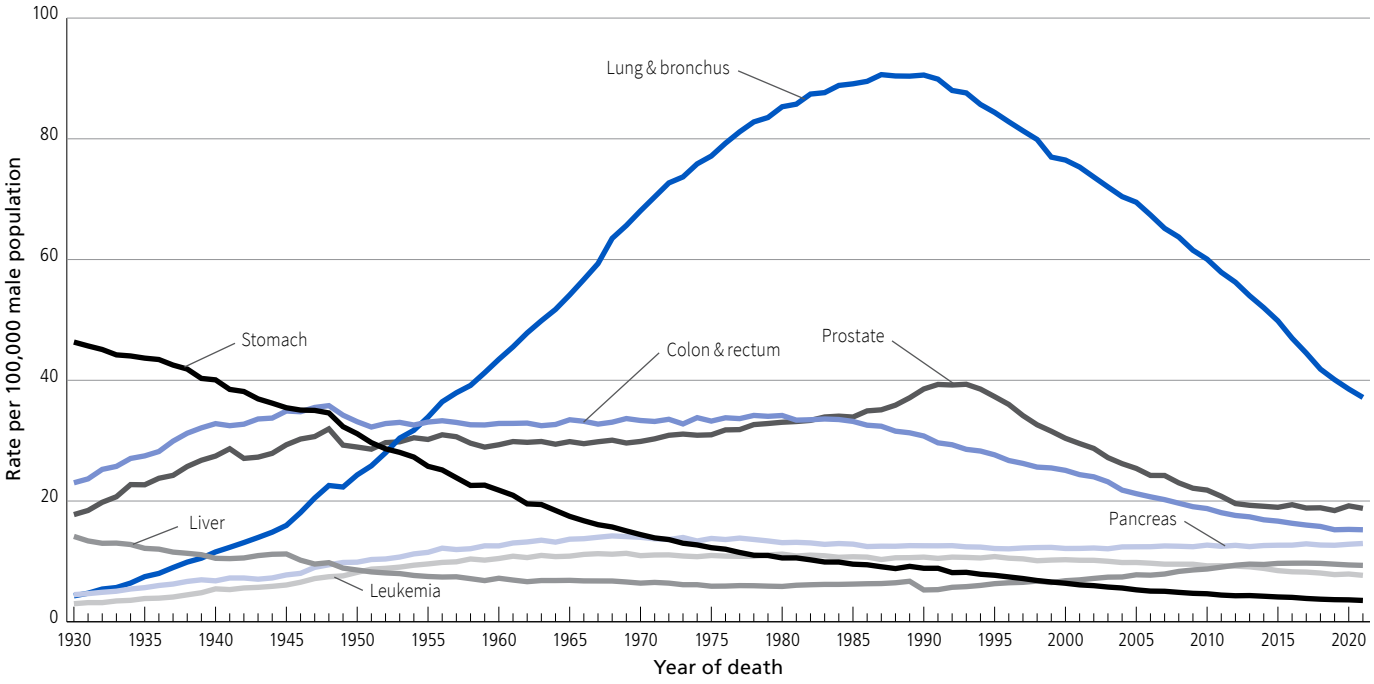
Do Cancer Incidence and Death Rates Vary by State?

Variations in cancer rates among states differ by cancer type, with the largest for lung cancer, reflecting vast historical and continuing differences in smoking prevalence and implementation of tobacco control interventions. Table 4 and Table 5 provide average annual incidence and death rates for selected cancer types by state.

Who Is at Risk of Developing Cancer?

Everyone is at risk of developing cancer, although incidence increases greatly with age; 88% of people diagnosed with cancer in the US are 50 years of age or older, and 57% are 65 or older. Risk is also increased by certain behaviors and other modifiable factors, such as smoking, having excess body weight, drinking alcohol, and eating an unhealthy diet. In the US, an estimated 42 out of 100 men and 40 out of 100 women will develop cancer during their lifetime (Table 6). However, these probabilities are based on cancer occurrence in the general population and may differ in individuals because of variations in lifestyle exposures (e.g., smoking, excess body weight), family history, and/or genetic susceptibility. A family history of cancer is thought primarily to reflect similar lifestyle/environmental exposures, often in

Figure 1. Trends in Age-adjusted Cancer Death Rates by Site, Males, US, 1930-2021



Rates are age adjusted to the 2000 US standard and exclude deaths in Puerto Rico and other US territories. Note: Due to changes in ICD coding, numerator information differs from contemporary data for cancers of the liver, lung and bronchus, and colon and rectum.

Source: US Mortality Volumes 1930 to 1959, US Mortality Data 1960 to 2021, National Center for Health Statistics, Centers for Disease Control and Prevention.

combination with inherited genetic variations that confer slight-to-moderate increased risk. Inheritance of genetic alterations that confer a very high risk occurs much less frequently.

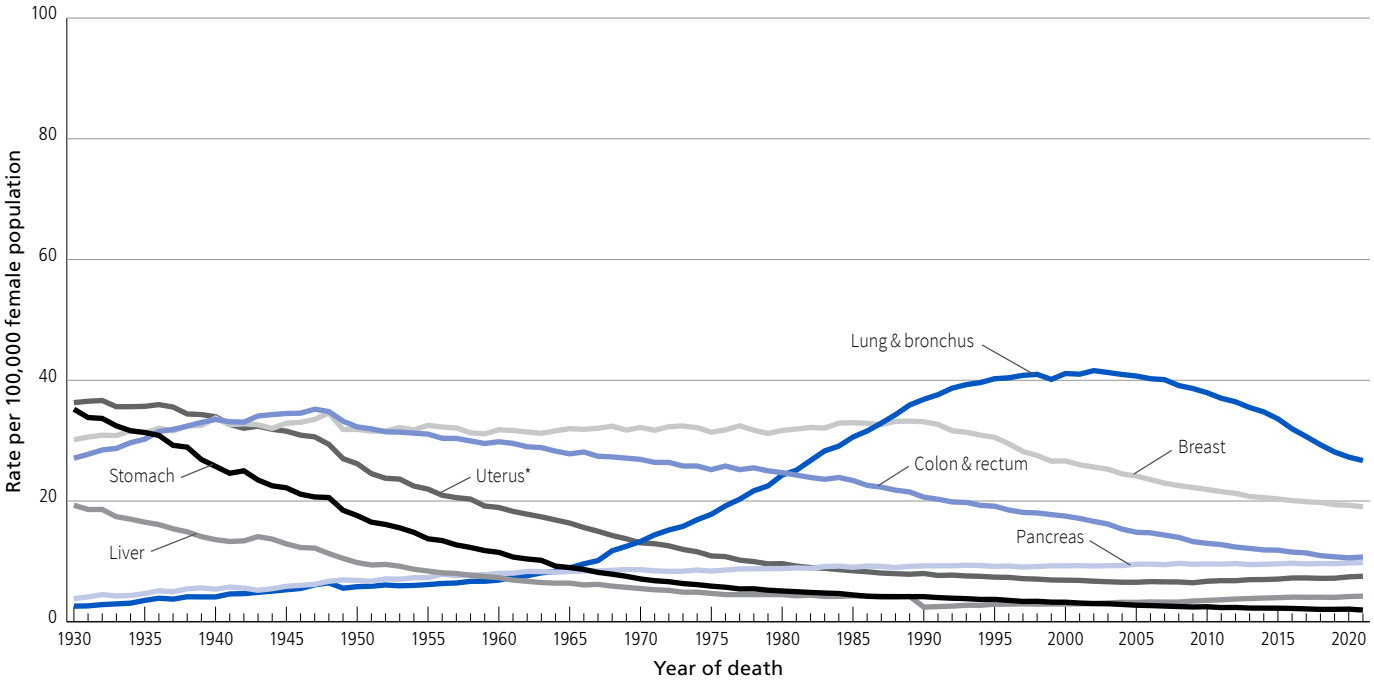
Relative risk is the strength of the relationship between exposure to a given risk factor and cancer. It is measured by comparing the rate of cancer in a group of people with a certain exposure or trait to the rate in a group of people without this characteristic. For example, individuals who smoke cigarettes are about 25 times more likely to develop lung cancer than people who never smoked, so the relative risk of lung cancer among people who smoke is 25. Most relative risks are not this large; for example, the relative risk of breast cancer among women who have a mother, sister, or daughter with a history of breast cancer is about 2. However, if they are common, even exposures associated with a relatively small excess risk can have a large influence on the number of cancers in the population (e.g., excess body weight).

What Percentage of People Survive Cancer?

Cancer survival is typically described in terms of relative survival, which is a measure of life expectancy among cancer patients compared to that among the general population of the same age, race, and sex. The 5-year relative survival rate for all cancers combined has increased substantially since the early 1960s, from 39% to 69% among White people and from 27% to 65% among Black people. Improvements in survival (Table 7) reflect advances in treatment, as well as earlier diagnosis for some cancers. Survival varies greatly by cancer type and stage (Table 8), as well as age at diagnosis.

Relative survival provides some indication about the average experience of cancer patients, but rates should be interpreted with caution for several reasons. First, they do not reflect the most recent advances in detection and treatment because they are based on cancer diagnosis several years in the past to allow time for follow-up (i.e., 2013-2019 for 5-year survival rates

Figure 2. Trends in Age-adjusted Cancer Death Rates by Site, Females, US, 1930-2021



Rates are age adjusted to the 2000 US standard population and exclude deaths in Puerto Rico and other US territories. *Uterus refers to uterine cervix and uterine corpus combined. Note: Due to changes in ICD coding, numerator information differs from contemporary data for cancers of the liver, lung and bronchus, colon and rectum, and uterus.

Source: US Mortality Volumes 1930 to 1959, US Mortality Data 1960 to 2020, National Center for Health Statistics, Centers for Disease Control and Prevention.

Table 1. Estimated Number* of New Cancer Cases and Deaths by Sex, US, 2024

	Estimated New Cases			Estimated Deaths		
	Both sexes	**Male**	**Female**	**Both sexes**	**Male**	**Female**
All sites	2,001,140	1,029,080	972,060	611,720	322,800	288,920
Oral cavity & pharynx	58,450	41,510	16,940	12,230	8,700	3,530
Tongue	19,360	13,870	5,490	3,320	2,270	1,050
Mouth	15,490	8,730	6,760	3,060	1,820	1,240
Pharynx	21,830	17,710	4,120	4,300	3,410	890
Other oral cavity	1,770	1,200	570	1,550	1,200	350
Digestive system	353,820	197,390	156,430	174,320	100,310	74,010
Esophagus	22,370	17,690	4,680	16,130	12,880	3,250
Stomach	26,890	16,160	10,730	10,880	6,490	4,390
Small intestine	12,440	6,730	5,710	2,090	1,150	940
Colon & rectum†	152,810	81,540	71,270	53,010	28,700	24,310
Colon	106,590	54,210	52,380			
Rectum	46,220	27,330	18,890			
Anus, anal canal, & anorectum	10,540	3,360	7,180	2,190	1,000	1,190
Liver & intrahepatic bile duct	41,630	28,000	13,630	29,840	19,120	10,720
Gallbladder & other biliary	12,350	5,900	6,450	4,530	1,950	2,580
Pancreas	66,440	34,530	31,910	51,750	27,270	24,480
Other digestive organs	8,350	3,480	4,870	3,900	1,750	2,150
Respiratory system	252,950	130,090	122,860	130,450	69,880	60,570
Larynx	12,650	10,030	2,620	3,880	3,120	760
Lung & bronchus	234,580	116,310	118,270	125,070	65,790	59,280
Other respiratory organs	5,720	3,750	1,970	1,500	970	530
Bones & joints	3,970	2,270	1,700	2,050	1,100	950
Soft tissue (including heart)	13,590	7,700	5,890	5,200	2,760	2,440
Skin (excluding basal & squamous)	108,270	64,220	44,050	13,120	8,700	4,420
Melanoma of the skin	100,640	59,170	41,470	8,290	5,430	2,860
Other nonepithelial skin	7,630	5,050	2,580	4,830	3,270	1,560
Breast	313,510	2,790	310,720	42,780	530	42,250
Genital system	427,800	310,870	116,930	70,100	36,250	33,850
Uterine cervix	13,820		13,820	4,360		4,360
Uterine corpus	67,880		67,880	13,250		13,250
Ovary	19,680		19,680	12,740		12,740
Vulva	6,900		6,900	1,630		1,630
Vagina & other genital, female	8,650		8,650	1,870		1,870
Prostate	299,010	299,010		35,250	35,250	
Testis	9,760	9,760		500	500	
Penis & other genital, male	2,100	2,100		500	500	
Urinary system	169,360	118,330	51,030	32,350	22,360	9,990
Urinary bladder	83,190	63,070	20,120	16,840	12,290	4,550
Kidney & renal pelvis	81,610	52,380	29,230	14,390	9,450	4,940
Ureter & other urinary organs	4,560	2,880	1,680	1,120	620	500
Eye & orbit	3,320	1,780	1,540	560	260	300
Brain & other nervous system	25,400	14,420	10,980	18,760	10,690	8,070
Endocrine system	48,010	14,480	33,530	3,300	1,580	1,720
Thyroid	44,020	12,500	31,520	2,170	990	1,180
Other endocrine	3,990	1,980	2,010	1,130	590	540
Lymphoma	89,190	49,220	39,970	21,050	12,330	8,720
Hodgkin lymphoma	8,570	4,630	3,940	910	550	360
Non-Hodgkin lymphoma	80,620	44,590	36,030	20,140	11,780	8,360
Myeloma	35,780	19,520	16,260	12,540	7,020	5,520
Leukemia	62,770	36,450	26,320	23,670	13,640	10,030
Acute lymphocytic leukemia	6,550	3,590	2,960	1,330	640	690
Chronic lymphocytic leukemia	20,700	12,690	8,010	4,440	2,790	1,650
Acute myeloid leukemia	20,800	11,600	9,200	11,220	6,290	4,930
Chronic myeloid leukemia	9,280	5,330	3,950	1,280	750	530
Other leukemia‡	5,440	3,240	2,200	5,400	3,170	2,230
Other & unspecified primary sites‡	34,950	18,040	16,910	49,240	26,690	22,550

*Rounded to the nearest 10; cases exclude basal cell and squamous cell skin cancer and in situ carcinoma except urinary bladder. About 56,500 cases of female breast ductal carcinoma in situ and 99,700 cases of melanoma in situ will be diagnosed in 2024. †Deaths for colon and rectal cancers are combined because a large number of deaths from rectal cancer are misclassified as colon. ‡More deaths than cases may reflect a lack of specificity in recording an underlying cause of death on death certificates and/or an undercount in the case estimate.

Source: Estimated new cases are based on 2006-2020 incidence data reported by the North American Association of Central Cancer Registries (NAACCR). Estimated deaths are based on 2007-2021 US mortality data, National Center for Health Statistics, Centers for Disease Control and Prevention.

Table 2. Estimated Number* of New Cases for Selected Cancers by State, US, 2024

State	All sites	Female breast	Colon & rectum	Leukemia	Lung & bronchus	Melanoma of the skin	Non-Hodgkin lymphoma	Prostate	Urinary bladder	Uterine cervix	Uterine corpus
Alabama	30,270	4,800	2,570	780	4,230	1,400	1,000	5,180	1,190	230	840
Alaska	3,710	540	350	100	420	130	160	630	160	†	140
Arizona	42,670	6,830	3,280	1,260	4,350	3,020	1,690	4,630	2,060	290	1,380
Arkansas	19,100	2,680	1,570	580	2,840	1,040	720	2,950	750	140	500
California	193,880	32,660	16,170	5,700	16,920	10,570	8,320	26,350	7,330	1,560	7,140
Colorado	29,430	5,150	2,130	940	2,660	1,990	1,180	4,490	1,200	190	870
Connecticut	23,550	3,790	1,580	750	2,780	870	1,040	3,530	1,120	120	870
Delaware	7,340	1,140	500	210	920	420	300	1,320	350	†	250
Dist. of Columbia	3,300	630	260	80	380	70	110	390	120	†	150
Florida	160,680	23,160	11,920	6,420	18,580	9,880	7,940	24,090	7,520	1,170	4,860
Georgia	63,170	9,840	4,940	1,920	7,350	3,470	2,180	9,620	2,250	480	1,890
Hawaii	8,670	1,440	770	210	850	520	350	1,270	320	50	360
Idaho	11,120	1,730	810	420	1,070	890	460	1,660	550	70	360
Illinois	78,200	11,870	6,140	2,210	9,430	4,000	3,030	11,800	3,090	510	2,800
Indiana	42,710	6,270	3,390	1,270	5,930	2,250	1,660	6,470	1,840	310	1,470
Iowa	20,930	3,010	1,620	760	2,600	1,380	850	3,200	940	120	710
Kansas	16,640	2,620	1,420	500	2,190	920	670	2,820	710	120	470
Kentucky	30,630	4,320	2,630	890	5,120	1,490	1,110	3,510	1,240	220	950
Louisiana	29,400	4,230	2,520	890	3,740	1,200	1,050	4,330	1,100	200	690
Maine	10,700	1,490	700	340	1,600	530	410	1,560	610	†	400
Maryland	36,410	5,950	2,620	1,060	4,080	1,810	1,420	6,150	1,400	230	1,390
Massachusetts	44,040	7,150	2,790	1,300	5,620	1,530	1,790	6,420	1,950	210	1,600
Michigan	64,530	9,410	4,640	1,880	8,690	3,080	2,570	10,480	2,870	390	2,470
Minnesota	37,930	5,480	2,550	1,310	3,880	1,660	1,610	5,210	1,540	160	1,220
Mississippi	18,170	2,710	1,700	470	2,760	720	600	2,680	650	150	540
Missouri	39,120	5,980	3,020	1,220	5,820	1,760	1,520	5,510	1,570	260	1,360
Montana	7,310	1,070	550	250	740	540	280	1,070	360	†	220
Nebraska	11,790	1,770	940	380	1,190	660	470	2,270	500	70	380
Nevada	18,250	2,880	1,520	580	2,110	840	720	2,230	780	140	540
New Hampshire	9,880	1,460	650	290	1,290	570	400	1,570	510	†	390
New Jersey	57,740	8,880	4,240	1,940	5,600	2,330	2,490	9,860	2,540	370	2,230
New Mexico	11,220	1,780	960	370	950	560	470	1,370	420	100	420
New York	122,990	19,160	8,780	3,860	14,200	4,050	5,010	20,630	5,330	840	4,610
North Carolina	69,060	11,190	4,760	2,240	8,920	3,960	2,560	10,260	2,750	450	2,140
North Dakota	4,610	630	370	170	530	270	180	1,020	190	†	130
Ohio	76,280	11,500	5,890	2,050	10,390	4,290	2,880	10,670	3,380	510	2,680
Oklahoma	24,450	3,490	1,930	770	3,230	1,170	890	3,020	950	200	690
Oregon	26,200	4,440	1,860	760	3,000	1,350	1,040	3,000	1,230	140	880
Pennsylvania	89,410	13,370	6,550	2,710	11,200	3,870	3,610	13,010	4,290	510	3,460
Rhode Island	7,210	1,090	470	230	960	280	310	970	370	†	270
South Carolina	34,650	5,840	2,580	950	4,720	1,930	1,200	5,920	1,400	250	1,150
South Dakota	5,680	850	450	200	680	330	220	1,300	250	†	170
Tennessee	43,170	6,720	3,460	1,250	6,440	1,910	1,530	6,150	1,760	320	1,280
Texas	147,910	23,290	12,260	4,940	14,430	5,340	5,760	20,790	4,720	1,450	4,790
Utah	13,560	2,200	950	490	810	1,490	600	2,380	510	100	510
Vermont	4,500	670	300	140	520	310	190	690	220	†	170
Virginia	48,560	8,180	3,640	1,320	5,980	2,480	1,920	9,200	1,930	310	1,690
Washington	44,470	7,450	3,140	1,480	4,780	2,650	1,890	6,350	1,910	290	1,490
West Virginia	12,890	1,690	1,070	420	2,150	580	480	1,620	600	70	400
Wisconsin	39,750	5,710	2,610	1,400	4,610	2,040	1,630	6,870	1,690	180	1,450
Wyoming	3,320	510	270	110	330	240	120	570	170	†	100
United States	**2,001,140**	**310,720**	**152,810**	**62,770**	**234,580**	**100,640**	**80,620**	**299,010**	**83,190**	**13,820**	**67,880**

*Rounded to nearest 10. Excludes basal and squamous cell skin cancers and in situ carcinomas except urinary bladder. Estimates for Puerto Rico are unavailable.
†Estimate is fewer than 50 cases. These estimates are offered as a rough guide and should be interpreted with caution. State estimates may not sum to US total due to rounding and exclusion of state estimates of fewer than 50 cases.

Please note: Estimated cases for additional cancer sites by state can be found in Supplemental Data at cancer.org/statistics and via the Cancer Statistics Center (cancerstatisticscenter.cancer.org).

Table 3. Estimated Number* of Deaths for Selected Cancers by State, US, 2024

State	All sites	Brain/ nervous system	Female breast	Colon & rectum	Leukemia	Liver‡	Lung & bronchus	Non-Hodgkin lymphoma	Ovary	Pancreas	Prostate
Alabama	10,600	310	710	900	360	510	2,550	280	200	850	560
Alaska	1,220	†	60	110	†	70	210	†	†	80	60
Arizona	13,280	410	950	1,220	590	560	2,380	430	310	1,090	890
Arkansas	6,360	180	390	550	230	330	1,670	190	110	470	360
California	59,930	2,150	4,570	5,500	2,330	3,580	9,320	2,160	1,410	5,120	4,200
Colorado	8,480	300	700	820	370	370	1,290	280	200	730	630
Connecticut	6,440	230	420	470	290	300	1,270	230	140	610	410
Delaware	2,250	60	160	170	90	120	480	80	80	210	170
Dist. of Columbia	980	†	90	90	†	70	160	†	†	90	70
Florida	48,110	1,460	3,160	3,980	2,020	2,180	10,230	1,560	1,050	4,070	2,800
Georgia	18,740	570	1,420	1,660	670	860	3,770	550	410	1,560	1,070
Hawaii	2,650	50	180	240	90	170	470	100	90	240	180
Idaho	3,200	90	240	300	150	120	550	120	80	290	210
Illinois	23,280	670	1,680	2,090	920	1,060	4,910	660	400	2,100	1,160
Indiana	14,280	350	910	1,190	510	520	3,390	460	250	1,220	760
Iowa	6,250	180	370	520	270	260	1,360	230	130	510	300
Kansas	5,660	180	370	490	240	220	1,250	200	120	440	270
Kentucky	10,250	280	640	940	400	500	2,630	330	130	750	440
Louisiana	8,970	240	670	860	330	530	2,120	290	170	730	440
Maine	3,510	110	180	270	130	130	840	120	60	300	270
Maryland	10,310	310	830	1,000	340	500	2,010	340	250	920	660
Massachusetts	12,410	440	730	860	480	600	2,490	380	290	1,140	700
Michigan	21,480	610	1,350	1,880	830	1,000	4,920	760	440	1,900	1,130
Minnesota	10,320	300	630	830	440	370	2,140	390	210	900	660
Mississippi	6,650	200	480	650	260	290	1,580	160	120	500	410
Missouri	13,170	410	810	1,050	490	600	3,240	410	190	1,040	650
Montana	2,230	80	150	180	80	80	380	70	†	140	140
Nebraska	3,590	140	270	380	150	160	700	120	70	320	230
Nevada	5,440	150	430	560	220	310	1,050	200	100	460	370
New Hampshire	2,930	100	180	190	100	130	620	90	60	240	170
New Jersey	15,110	500	1,170	1,330	630	620	2,700	520	340	1,440	740
New Mexico	3,890	120	300	340	120	300	550	130	70	330	290
New York	30,990	940	2,080	2,700	1,050	1,260	6,100	1,000	780	3,010	1,630
North Carolina	20,820	570	1,450	1,670	780	1,000	4,640	630	360	1,690	1,170
North Dakota	1,320	†	70	110	60	†	280	50	†	110	70
Ohio	24,810	700	1,630	2,070	960	1,000	5,670	810	480	1,910	1,250
Oklahoma	8,650	250	570	790	340	480	2,070	280	170	590	410
Oregon	8,670	270	580	640	350	480	1,760	310	160	740	540
Pennsylvania	27,570	820	1,820	2,230	1,070	1,310	5,570	930	570	2,400	1,500
Rhode Island	2,090	80	120	150	80	130	440	70	†	190	110
South Carolina	11,100	340	780	920	420	520	2,600	410	170	920	650
South Dakota	1,780	60	100	160	80	100	400	80	†	150	90
Tennessee	14,530	410	1,020	1,220	520	640	3,730	450	300	1,120	750
Texas	44,360	1,330	3,280	4,410	1,630	2,960	8,050	1,430	960	3,600	2,360
Utah	3,780	160	330	320	190	190	460	140	110	310	330
Vermont	1,460	50	80	120	50	80	290	50	†	120	120
Virginia	16,420	460	1,160	1,390	610	730	3,380	500	340	1,380	970
Washington	13,640	480	960	1,070	520	720	2,580	490	320	1,240	880
West Virginia	4,750	120	280	430	190	220	1,220	120	80	330	210
Wisconsin	11,700	370	680	870	480	520	2,380	410	230	1,060	740
Wyoming	1,320	†	70	110	†	50	210	†	†	90	70
United States	**611,720**	**18,760**	**42,250**	**53,010**	**23,670**	**29,840**	**125,070**	**20,140**	**12,740**	**51,750**	**35,250**

*Rounded to nearest 10. †Estimate is fewer than 50 deaths. ‡Liver includes intrahepatic bile duct. These estimates are offered as a rough guide and should be interpreted with caution. State estimates may not sum to US total due to rounding and exclusion of state estimates of fewer than 50 deaths. Estimates are not available for Puerto Rico.

Please note: Estimated deaths for additional cancer sites by state can be found in Supplemental Data at cancer.org/statistics and via the Cancer Statistics Center (cancerstatisticscenter.cancer.org).

Table 4. Incidence Rates for Selected Cancers by State, US, 2016-2020

	All sites		Breast	Colon & rectum*		Lung & bronchus		Non-Hodgkin lymphoma		Prostate	Uterine cervix
State	**Male**	**Female**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
Alabama	498.6	398.8	122.1	45.5	34.2	75.8	47.9	18.7	12.3	120.3	9.4
Alaska	444.7	405.0	122.3	42.3	36.6	57.0	48.9	21.3	14.6	99.0	7.0
Arizona	398.2	361.6	113.0	33.5	25.6	45.1	38.7	17.9	11.7	76.4	6.1
Arkansas†	547.9	437.7	123.2	49.1	35.9	90.5	62.1	23.3	15.0	119.1	9.2
California	419.9	379.9	120.9	36.6	28.1	41.8	34.4	21.4	14.7	95.4	7.3
Colorado	410.9	381.9	129.3	32.9	25.8	40.0	37.2	20.3	13.4	98.5	5.9
Connecticut	494.2	435.1	138.5	36.6	27.2	59.0	52.6	24.4	17.4	122.7	5.4
Delaware	500.2	427.1	134.6	38.5	27.6	62.4	52.7	21.8	14.3	125.0	7.1
Dist. of Columbia	437.8	389.3	134.0	36.6	29.9	47.8	39.4	18.6	11.4	130.5	7.2
Florida	487.3	427.2	121.3	38.7	29.1	61.2	48.9	25.4	18.1	97.0	9.1
Georgia	527.2	418.2	129.2	44.1	31.9	70.3	48.5	21.5	14.2	134.7	8.0
Hawaii	438.9	399.4	140.2	43.3	31.3	49.6	35.2	17.8	12.4	101.1	6.9
Idaho	486.1	412.0	130.7	37.9	27.9	48.8	43.7	23.1	15.3	118.8	7.2
Illinois	496.8	436.5	132.6	44.3	32.5	66.4	54.1	22.8	15.8	115.1	7.4
Indiana†	503.7	436.4	126.6	45.4	34.3	80.1	61.2	22.3	15.1	104.6	8.5
Iowa	531.7	456.0	134.7	43.2	33.9	69.7	53.7	25.4	17.6	120.4	7.5
Kansas	491.4	429.2	132.4	42.3	32.5	58.4	48.2	23.1	15.4	116.4	7.8
Kentucky	554.3	475.1	126.7	51.1	36.9	97.4	74.5	23.0	16.6	108.3	9.7
Louisiana	549.7	424.5	127.5	49.9	36.0	75.4	50.6	22.2	15.6	138.1	8.8
Maine	507.1	449.9	128.1	37.4	29.4	74.3	65.5	25.4	15.3	98.3	5.9
Maryland	490.4	422.9	133.2	37.5	30.0	56.4	48.5	22.0	14.7	135.7	6.6
Massachusetts	481.5	428.8	135.8	35.4	26.6	61.9	57.5	23.0	15.4	113.2	5.2
Michigan	477.2	410.9	122.7	38.3	29.9	66.3	54.5	22.5	15.4	112.1	6.6
Minnesota	510	448.7	136.3	38.7	29.4	59.2	51.6	27.1	17.5	113.1	5.4
Mississippi	537.1	412.5	122.3	52.7	38.0	89.1	55.3	20.3	13.1	131.4	8.9
Missouri	481.0	429.8	130.9	42.2	32.1	77.3	61.1	22.2	15.2	96.0	8.2
Montana	494.5	426.4	134.2	40.4	28.8	47.8	47.6	21.6	14.4	131.2	7.0
Nebraska	498.3	432.6	131.0	42.8	34.3	57.9	48.1	23.0	16.3	124.8	7.2
Nevada‡	403.3	369.9	111.4	38.4	29.9	46.8	44.4	17.6	11.9	90.4	8.5
New Hampshire	510.3	452.5	138.9	36.9	28.3	63.3	59.4	24.9	17.5	114.2	4.9
New Jersey	531.0	450.2	137.1	42.3	32.3	55.9	48.3	26.0	17.5	143.4	7.4
New Mexico	385.9	359.0	113.8	36.7	27.2	37.9	30.5	16.8	12.2	85.6	8.3
New York	517.8	446.6	134.0	40.6	30.0	60.8	51.7	25.1	17.8	130.3	7.4
North Carolina	514.7	429.8	137.6	38.6	28.6	74.4	54.0	21.6	14.4	123.9	6.9
North Dakota	487.9	428.4	131.5	43.0	32.6	60.9	52.9	22.6	15.4	122.0	6.1
Ohio	506.4	438.2	129.5	43.1	32.2	74.8	57.1	23.2	15.5	114.1	7.8
Oklahoma	482.7	416.5	122.6	44.7	32.4	73.1	55.4	19.6	14.7	100.5	9.8
Oregon	436.5	409.6	128.8	35.2	27.4	51.9	47.0	21.6	14.8	94.4	6.6
Pennsylvania	503.2	445.5	130.6	41.9	31.6	67.3	53.9	23.7	16.7	108.9	7.2
Rhode Island	496.2	444.6	139.9	34.3	27.3	70.1	59.7	22.4	15.6	114.2	7.1
South Carolina	476.6	397.4	128.6	39.5	29.0	70.8	49.1	19.3	12.5	109.8	7.9
South Dakota	495.0	432.8	123.8	43.6	32.9	60.0	53.3	22.5	16.5	123.2	6.4
Tennessee	514.7	415.9	122.4	43.8	31.9	82.8	59.6	21.4	14.1	116.1	7.8
Texas	455.7	381.6	116.3	42.8	29.4	55.1	39.7	20.7	14.2	103.4	9.4
Utah	442.8	373.0	115.5	30.3	23.6	28.2	22.1	22.1	14.6	117.4	5.8
Vermont	481.2	437.7	131.9	37.4	26.3	60.9	52.7	22.9	14.9	101.9	5.3
Virginia	438.0	389.4	126.4	36.6	28.1	59.6	46.3	20.1	13.8	102.1	6.0
Washington	458.8	420.4	132.7	36.1	28.4	52.2	47.3	22.8	15.7	100.3	6.5
West Virginia	512.0	463.1	119.9	48.4	36.5	84.7	68.7	23.3	16.2	97.7	9.5
Wisconsin	507.2	435.9	134.6	37.1	28.9	63.1	52.4	25.3	16.8	118.9	6.1
Wyoming	430.6	384.8	116.1	37.0	28.7	42.1	39.5	19.1	12.9	113.7	8.8
Puerto Rico††	391.5	323.5	97.3	45.0	30.1	20.3	11.1	16.6	11.8	141.1	12.0
United States**	**492.5**	**426.6**	**129.0**	**40.7**	**30.6**	**62.2**	**49.4**	**23.0**	**15.7**	**115.0**	**7.7**

Rates are per 100,000, age adjusted to the 2000 US standard population using 19 age groups. *Colorectal cancer incidence rates exclude appendix with the exception of Nevada. †Rates for these states are based on data collected from 2016-2019. ‡Rates are based on data published in North American Central Cancer Registries' North America Explorer and age adjusted to 20 age groups. ††Data for 2017 based on cases diagnosed January through June. **Rates are adjusted for delays in reporting and exclude Nevada and Puerto Rico.

Source: NAACCR, 2023. Data are collected by cancer registries participating in the National Cancer Institute's SEER program and the Centers for Disease Control and Prevention's National Program of Cancer Registries.

Table 5. Death Rates for Selected Cancers by State, US, 2017-2021

	All sites		Breast	Colon & rectum		Lung & bronchus		Non-Hodgkin lymphoma		Pancreas		Prostate
State	**Male**	**Female**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**
Alabama	202.9	134.8	20.6	17.8	12.0	57.1	31.6	6.6	3.2	13.6	10.1	20.0
Alaska	172.4	125.6	17.1	15.5	13.5	35.6	28.5	6.8	4.5	11.3	8.2	20.7
Arizona	154.2	114.7	18.3	14.6	10.1	30.9	23.9	5.8	3.3	11.7	8.8	17.2
Arkansas	204.7	140.3	19.7	17.7	12.3	58.3	37.6	6.9	3.9	13.4	9.3	19.1
California	156.3	117.0	18.9	14.1	10.2	28.5	20.7	6.4	3.7	11.8	9.1	19.8
Colorado	150.2	111.6	18.7	13.2	9.9	25.8	20.5	5.9	3.3	11.2	8.6	21.6
Connecticut	161.1	117.5	17.1	12.4	8.6	33.6	26.0	6.6	3.6	12.6	10.0	18.6
Delaware	185.4	132.1	21.1	14.7	10.5	43.7	30.9	7.3	3.8	14.5	10.6	18.8
Dist. of Columbia	171.0	136.7	23.6	15.7	12.2	32.9	23.1	5.5	3.4	13.4	12.1	27.2
Florida	165.3	120.4	18.5	14.6	10.1	39.4	27.7	6.0	3.5	12.3	9.0	16.4
Georgia	183.7	129.0	20.9	16.8	11.4	46.0	28.0	6.1	3.5	12.8	9.6	21.1
Hawaii	148.3	105.2	16.1	14.3	9.5	30.6	20.7	5.9	3.6	12.3	9.2	15.2
Idaho	166.3	124.0	19.8	14.6	10.9	30.4	24.5	6.4	4.6	12.6	9.5	20.9
Illinois	180.1	133.6	20.4	16.6	11.6	42.7	30.6	6.7	3.9	13.5	10.1	19.1
Indiana	199.4	142.5	20.4	17.5	12.5	52.8	36.2	7.3	4.5	14.0	10.5	19.9
Iowa	182.0	129.7	17.9	15.8	11.2	43.7	30.7	7.4	4.2	12.3	9.6	20.0
Kansas	182.1	133.6	19.6	16.9	11.6	44.1	32.0	7.1	4.2	13.4	9.3	17.8
Kentucky	218.1	152.3	21.2	19.7	13.3	63.6	43.8	7.6	4.6	13.3	10.1	18.1
Louisiana	204.2	139.8	22.3	19.1	12.8	54.5	32.5	7.1	4.0	13.9	10.8	19.9
Maine	194.7	137.5	16.8	14.7	11.0	47.4	37.5	7.3	4.3	13.5	10.2	19.6
Maryland	171.1	126.9	20.5	15.6	11.2	37.3	27.7	6.3	3.4	13.0	9.8	19.7
Massachusetts	169.0	121.0	16.1	12.9	8.9	36.0	29.2	6.6	3.7	13.5	10.0	18.3
Michigan	188.0	138.7	20.2	16.0	11.4	46.4	34.2	7.7	4.5	14.3	10.8	18.7
Minnesota	168.3	123.6	17.4	13.8	9.7	35.1	27.7	7.8	4.1	12.7	9.6	19.8
Mississippi	224.2	148.2	23.8	21.8	14.1	64.3	35.8	6.5	3.5	14.1	10.9	25.1
Missouri	195.5	139.0	19.8	16.8	11.5	52.4	36.4	7.1	4.1	14.0	9.8	17.8
Montana	166.6	124.0	17.8	14.3	9.9	31.7	27.3	6.3	3.3	11.5	8.9	21.3
Nebraska	175.5	130.5	20.4	17.6	12.0	38.6	28.2	7.0	3.7	14.1	10.1	19.2
Nevada	168.9	130.7	21.6	16.9	12.0	35.6	30.7	6.5	3.8	12.2	9.2	19.7
New Hampshire	174.8	125.5	17.7	13.8	9.8	38.7	31.9	6.2	3.7	12.8	9.9	19.8
New Jersey	157.9	122.4	19.7	14.6	10.7	33.3	25.0	6.1	3.5	13.1	10.2	16.4
New Mexico	159.8	115.0	19.7	15.5	10.2	27.3	18.7	5.9	3.5	11.6	8.5	19.7
New York	154.0	117.9	17.8	13.6	9.9	33.6	24.6	6.1	3.5	12.5	9.6	16.2
North Carolina	185.4	131.0	20.2	14.8	10.7	48.4	31.1	6.6	3.5	12.6	9.8	19.8
North Dakota	166.2	121.4	16.8	15.5	9.9	38.4	27.8	6.3	3.6	12.7	8.9	18.5
Ohio	197.1	140.0	20.8	17.1	11.9	50.7	34.1	7.5	4.2	14.2	10.4	19.4
Oklahoma	208.6	150.0	22.6	19.3	13.6	55.6	37.9	7.7	4.5	12.8	9.6	19.9
Oregon	173.1	132.1	19.0	14.0	10.4	35.1	30.0	7.1	4.4	12.8	10.2	20.2
Pennsylvania	184.9	133.4	19.9	16.1	11.2	43.2	30.0	7.3	4.2	14.0	10.3	18.4
Rhode Island	178.1	126.8	16.6	12.0	10.4	40.4	31.4	6.9	3.8	14.1	9.1	18.4
South Carolina	191.3	131.1	21.0	16.6	10.8	49.0	30.2	6.2	3.6	13.5	9.8	20.8
South Dakota	179.3	132.2	18.3	16.2	12.1	40.2	31.7	7.4	4.5	12.9	9.9	19.0
Tennessee	203.5	141.5	21.5	17.9	11.9	55.9	36.8	7.2	4.0	13.0	10.0	19.4
Texas	172.0	122.5	19.7	17.0	11.0	37.3	24.6	6.6	3.7	12.0	9.1	17.8
Utah	138.5	105.9	20.0	11.3	9.4	18.8	13.9	6.5	3.4	11.1	8.0	21.7
Vermont	184.1	131.1	17.0	15.6	11.2	38.9	29.8	7.2	3.5	12.7	10.6	21.8
Virginia	177.6	127.5	20.6	15.5	10.9	42.2	28.3	6.7	3.7	13.1	9.8	19.9
Washington	168.7	127.2	19.2	14.0	10.0	34.5	27.7	6.9	4.2	12.4	10.1	20.1
West Virginia	211.2	151.9	21.2	20.2	13.3	58.9	41.1	7.8	4.3	13.2	9.7	17.5
Wisconsin	178.4	128.5	17.9	13.9	10.1	39.1	30.2	7.4	4.2	13.8	10.1	20.8
Wyoming	161.2	125.7	19.0	14.4	11.4	31.6	27.7	6.6	3.8	12.7	8.9	18.5
Puerto Rico*	132.1	86.4	17.0	17.7	10.7	14.8	7.2	4.3	2.6	7.9	5.2	21.4
United States	**175.0**	**127.4**	**19.5**	**15.5**	**10.9**	**40.4**	**28.4**	**6.6**	**3.8**	**12.8**	**9.7**	**18.8**

Rates are per 100,000, age adjusted to the 2000 US standard population. *Rates for Puerto Rico are for 2016-2020, were obtained from statecancerprofiles.cancer.gov, and are not included in overall US combined rates.

Source: US Mortality Data, National Center for Health Statistics, Centers for Disease Control and Prevention, 2023.

presented in this report). Second, they do not account for many factors that influence individual survival, such as access to high-quality cancer treatment, and biological or behavioral characteristics. Third, improvements in survival rates over time do not always indicate progress against cancer; earlier diagnosis through screening increases average survival rates by increasing the time since diagnosis (lead time) but does not always extend life. Similarly, survival rates may be artificially elevated when screening detects cancers that would never have caused harm if left undetected (overdiagnosis). For more information about how survival was calculated for this report, see Sources of Statistics on page 79.

How Is Cancer Staged?

Stage describes the extent or spread of cancer and is assigned at the time of diagnosis, but also sometimes after treatment has begun. Proper staging is essential for optimizing therapy and assessing prognosis. For most cancers, stage is based on the size or extent of the primary tumor and whether the cancer has spread to nearby lymph nodes or other areas of the body. Several staging systems are used to classify cancer. This report uses a system of summary staging that is standard for descriptive analyses of population-based cancer registry data and particularly useful for tracking trends.

According to this system, if cancer is confined to the layer of cells where it began growing and has not spread, the stage is in situ. If cancer cells have penetrated beyond the original layer of tissue, the cancer has become invasive and is categorized as local, regional, or distant based on the extent of spread. (For a more detailed description of these categories, see the footnotes in Table 8.) Some cancers (such as leukemia and brain tumors) cannot be staged using this system, so stage distribution for all cancers combined is unavailable.

Another staging system that is used more often by clinicians is called TNM (tumor size, nodes involved, and presence of metastasis). TNM similarly assesses cancer growth and spread and assigns a stage from 0 (in situ) for the earliest stage up to I, II, III, or IV for more advanced disease. However, some cancers do not have a stage 0 (e.g., sarcomas), some do not have a stage IV (e.g., testis), and others (e.g., lymphoma) have alternative staging systems. As the biology of cancer has become better understood, additional tumor-specific features have been incorporated into staging for some cancers. See cancer.org/treatment/understanding-your-diagnosis/staging for more information on cancer staging.

What Are the Costs of Cancer?

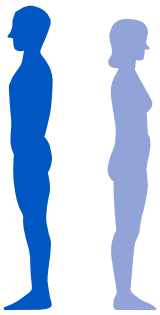
The costs of cancer are estimated in several ways, including direct medical costs (total of all health care expenditures), as well as indirect costs, such as lost earnings due to missed work from illness or premature death. The National Cancer Institute estimated that cancer-related medical costs in the US were $208.9 billion in 2020, which was likely an underestimate because it did not account for the growing cost of treatment; for example, the list price for many prescription medicines is more than $100,000 annually. Cancer-related costs to patients are estimated at $21.1 billion, including $16.2 billion in total out-of-pocket costs and $4.9 billion in patient time costs (travel to/from treatment and waiting for and receiving care).

Lack of health insurance coverage is strongly associated with medical financial hardship and prevents many people from receiving optimal cancer care across the continuum, from prevention to early detection and treatment. Despite reductions in the number of people under 65 years of age without health insurance – from 18% in 2010 to 10% in 2022 as a result of the implementation of the Affordable Care Act (ACA), 28 million people were still uninsured at some point in 2022 based on National Health Interview Survey estimates. The highest prevalence in 2021 was among Hispanic (34%), Native Hawaiian or other Pacific Islander (31%), American Indian or Alaska Native (29%), and Black (19%) individuals. Uninsured individuals and those from other marginalized populations are much more likely to be diagnosed with cancer at an advanced stage, when treatment is usually more involved, costlier, and less successful. To learn more about how the ACA helps save lives from cancer, see the Advocacy

Figure 3. Leading Sites of New Cancer Cases and Deaths – 2024 Estimates

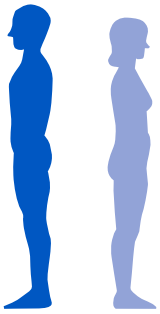
Estimated New Cases

Male			Female		
Prostate	299,010	29%	Breast	310,720	32%
Lung & bronchus	116,310	11%	Lung & bronchus	118,270	12%
Colon & rectum	81,540	8%	Colon & rectum	71,270	7%
Urinary bladder	63,070	6%	Uterine corpus	67,880	7%
Melanoma of the skin	59,170	6%	Melanoma of the skin	41,470	4%
Kidney & renal pelvis	52,380	5%	Non-Hodgkin lymphoma	36,030	4%
Non-Hodgkin lymphoma	44,590	4%	Pancreas	31,910	3%
Oral cavity & pharynx	41,510	4%	Thyroid	31,520	3%
Leukemia	36,450	4%	Kidney & renal pelvis	29,230	3%
Pancreas	34,530	3%	Leukemia	26,320	3%
All sites	**1,029,080**		**All sites**	**972,060**	



Estimated Deaths

Male			Female		
Lung & bronchus	65,790	20%	Lung & bronchus	59,280	21%
Prostate	35,250	11%	Breast	42,250	15%
Colon & rectum	28,700	9%	Pancreas	24,480	8%
Pancreas	27,270	8%	Colon & rectum	24,310	8%
Liver & intrahepatic bile duct	19,120	6%	Uterine corpus	13,250	5%
Leukemia	13,640	4%	Ovary	12,740	4%
Esophagus	12,880	4%	Liver & intrahepatic bile duct	10,720	4%
Urinary bladder	12,290	4%	Leukemia	10,030	3%
Non-Hodgkin lymphoma	11,780	4%	Non-Hodgkin lymphoma	8,360	3%
Brain & other nervous system	10,690	3%	Brain & other nervous system	8,070	3%
All sites	**322,800**		**All sites**	**288,920**	



Estimates are rounded to the nearest 10, and cases exclude basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder. Estimates do not include Puerto Rico or other US territories. Ranking is based on modeled projections and may differ from the most recent observed data.

section on page 71. Importantly, medical financial hardship and lost income due to cancer diagnosis are not limited to those without health insurance, as insurance premiums and out-of-pocket costs have risen dramatically over the past decade. Many costs are not covered by insurance, and insured individuals often report difficulty paying medical bills, anxiety about treatment costs, and delayed or forgone medical care due to cost, especially those who are younger and/or low-income.

Selected Cancers

This section provides information on the occurrence, risk factors, symptoms, early detection, and treatment for the most commonly diagnosed cancers but may have limited relevance for specific cancer subtypes. Incidence trends are based on population-based registry data for cases diagnosed from 1998 through 2019 (covering 90% of the US population) that have been adjusted for delays in reporting; data for 2020 were excluded from trend analysis for improved accuracy based on guidance from the National Cancer Institute. See *Impact of COVID on 2020 SEER Incidence Data* at seer.cancer.gov for more information. Mortality trends are based on death certificate data from 1975 through 2021 reported to the National Vital Statistics System. See Sources of Statistics on page 79 for more information on data sources and methods.

Breast

New cases and deaths: In the US in 2024, there will be an estimated 310,720 new cases of invasive breast cancer diagnosed in women and 2,790 cases in men, with an additional 56,500 cases of ductal carcinoma in situ (DCIS) diagnosed in women (Table 1; Figure 3). An estimated

42,780 breast cancer deaths (42,250 in women, 530 in men) will occur in 2024.

Incidence trends: Invasive female breast cancer incidence rates have been increasing by about 0.6% per year since the mid-2000s, likely due at least in part to increases in excess body weight and reproductive trends, such as increases in age at first birth and decreases in number of childbirths, each of which slightly increases breast cancer risk. The rise is a little steeper in women younger than 50 years of age than in those 50 and older (1% versus 0.5% per year from 2012 through 2019).

Mortality trends: The breast cancer death rate among females peaked in 1989 and has declined by 42% as of 2021 because of earlier detection through screening mammography, increased breast cancer awareness, and improved treatment, translating to approximately 490,500 fewer breast cancer deaths than would have been expected if mortality had remained at its peak. The death rate decreased by 1% per year from 2012 through 2021. Progress would be accelerated by reducing the racial disparity in breast cancer mortality; the death rate has remained about 40% higher in Black women than in White women since the early 2000s, despite lower breast cancer incidence in Black women.

Risk factors: Increasing age and being born female are the strongest risk factors for breast cancer. Potentially modifiable factors associated with increased risk include having excess body weight or gaining weight during adulthood (postmenopausal breast cancer only); using menopausal hormone therapy (combined estrogen and progestin), previously referred to as hormone replacement therapy (HRT); drinking alcohol; and being physically inactive. Breastfeeding for at least one year decreases risk of breast cancer. Non-modifiable factors that increase risk include a personal or family history of breast cancer, especially when due to inherited genetic mutations in breast cancer susceptibility genes (e.g., *BRCA1* or *BRCA2*). *BRCA1* or *BRCA2* mutations are most common among people with a strong family history of breast, ovarian, and/or some other cancers. Additional medical risk factors include certain benign breast conditions, such as atypical hyperplasia, a history of DCIS or lobular carcinoma in situ (LCIS), high breast tissue density (the amount of glandular and connective tissue relative to fatty tissue measured on a mammogram), and high-dose radiation to the chest before 30 years of age (e.g., for treatment of lymphoma). Reproductive and hormonal factors that increase risk include a long menstrual history (menstrual periods that start early and/or end late in life), not having children or having a first child after age 30, high natural levels of estrogen or testosterone, and recent use of hormonal contraceptives.

Prevention: In addition to reducing risk through lifestyle choices mentioned in the preceeding section, some women at high risk because of a strong family history or inherited genetic mutations may consider medicines (e.g., tamoxifen) or surgery (prophylactic mastectomy, or removal of the breasts) to reduce risk. Women taking tamoxifen should be made aware of a small increased risk of blood clots and uterine cancer and report any abnormal vaginal bleeding, discharge, or spotting to their clinician immediately.

Early detection: Early diagnosis reduces the risk of death from breast cancer and increases treatment options. Mammography is a low-dose x-ray procedure used to detect breast cancer before it becomes symptomatic. However, like any screening test, it is not perfect. Mammography can sometimes miss cancer (a false-negative result) or appear abnormal in the absence of cancer (a false-positive result); about 12% of women who are screened have abnormal results that require further testing, but only 4% of women with an abnormal mammogram have cancer. Follow-up testing may cause anxiety and additional costs (e.g., medical and transportation). Other potential harms of screening include detection and treatment of breast cancers and in situ lesions (e.g., DCIS) that would never have progressed or caused harm (i.e., overdiagnosis and overtreatment). Although radiation exposure from mammograms is cumulative over time, it does not meaningfully increase breast cancer risk or outweigh the benefit of screening. The American Cancer Society recommends that women at average risk of developing breast cancer undergo mammography annually beginning at age 45, with the

option to transition to every two years beginning at age 55; women ages 40 to 44 should have the option to begin annual mammography. Screening should continue as long as overall health is good and life expectancy is 10 or more years. For some women at higher risk of developing breast cancer due to family history or other factors, annual breast magnetic resonance imaging (MRI) is recommended along with mammography, often starting before age 40. See cancer.org/cancer/types/breast-cancer/screening-tests-and-early-detection for more information on breast cancer screening.

Signs and symptoms: The most common signs/symptoms of breast cancer are a lump or mass in the breast; persistent changes to the breast, including swelling or skin redness or thickening; and nipple abnormalities, such as spontaneous discharge (especially if bloody), scaliness, or retraction (drawing back within itself). However, early-stage breast cancer often causes no signs or symptoms, which is why screening is important.

Treatment: There are two general types of treatment for breast cancer – local therapy (surgical and radiation treatments to the breast and/or nearby lymph nodes and chest) and systemic therapy (such as hormone therapy and chemotherapy). Treatment to the breast usually involves either breast-conserving surgery (surgical removal of the tumor and a rim of surrounding normal tissue) combined with radiation or mastectomy (surgical removal of the entire breast). One or more underarm lymph nodes are usually evaluated to determine whether the tumor has spread beyond the breast. For early-stage breast cancer (no spread to the skin, chest wall, or distant organs), breast-conserving surgery plus radiation therapy results in long-term survival that is equivalent to mastectomy. Patients undergoing mastectomy may also need radiation if the tumor is large or there is lymph node involvement. Women undergoing mastectomy who elect breast reconstruction have several options, including the type of tissue or implant used to restore breast shape. Reconstruction may be performed at the time of mastectomy or later, but often requires more than one surgery. Depending on cancer stage, subtype, and sometimes other test results, such as tumor gene expression profiling (e.g., Oncotype DX), treatment may also involve chemotherapy (before and/or after surgery), hormone (anti-estrogen) therapy, targeted therapy, and/or immunotherapy (e.g., immune checkpoint inhibitors).

Survival: The 5- and 10-year relative survival rates are 91% and 85%, respectively, for invasive breast cancer overall, mostly because two-thirds of women are diagnosed with localized-stage disease. Despite progress over time, the 5-year survival rate is 10% lower (in absolute terms) for Black women (83%) than for White women (93%; Table 7), partly reflecting lower likelihood of localized-stage diagnosis (56% versus 67%). Reducing this and other cancer disparities is a focus of the American Cancer Society and many other organizations.

See *Breast Cancer Facts & Figures* at cancer.org/statistics for more information on breast cancer.

Cancer in Children and Adolescents

New cases and deaths: In 2024, an estimated 9,620 children (ages 0 to 14 years) and 5,290 adolescents (ages 15-19 years) will be diagnosed with cancer, and 1,040 children and 550 adolescents will die from the disease. Cancer is the leading disease-related cause of death among both children and adolescents. The most commonly diagnosed cancers in children and adolescents are leukemia (28% and 13%, respectively); brain, including benign and borderline malignant tumors (25% and 22%); and lymphoma (12% and 19%).

Incidence trends: Incidence in children overall has stabilized since 2015 after increasing since at least 1975, whereas rates in adolescents continued to rise by 1% per year, although trends vary by cancer type.

Mortality trends: The cancer death rate has declined by more than half from 1970 to 2021 in both children (from 6.3 per 100,000 to 1.9) and adolescents (from 7.2 per 100,000 to 2.7), largely due to improvements in treatment and high participation in clinical trials for the most common cancers (e.g., leukemia), especially among children. However, progress lags for some cancer types, such as diffuse midline glioma, a type of brain cancer.

Risk factors: Cancers that occur during childhood or adolescence have few established risk factors, and most are thought to be due to random gene mutations without an external cause. Exposure to ionizing radiation, such as that from prior radiation therapy, increases the risk of leukemia, brain tumors, and possibly other neoplasms. Prior chemotherapy also increases the risk of leukemia. Solid organ transplant recipients are at increased risk for non-Hodgkin lymphoma, largely due to drugs that suppress the immune system to prevent organ rejection. Infection with Epstein-Barr virus is associated with some types of non-Hodgkin lymphoma, such as Burkitt lymphoma. Cancer risk is also increased in children and adolescents with certain genetic disorders (e.g., Down syndrome, Li-Fraumeni syndrome, and Beckwith-Wiedemann syndrome) or a family history of certain childhood cancers (e.g., hereditary retinoblastoma).

Signs and symptoms: Many early signs and symptoms of childhood and adolescent cancer include nonspecific symptoms shared by common childhood conditions, which can delay diagnosis. Parents or other caregivers should ensure regular medical checkups and be alert to unusual, persistent symptoms, including an unusual mass or swelling; unexplained paleness or loss of energy; a sudden increase in the tendency to bruise or bleed; persistent, localized pain or limping; prolonged, unexplained fever or illness; frequent headaches, often with vomiting; sudden eye or vision changes; and excessive, rapid weight loss.

Following are more specific symptoms for the major categories of pediatric cancer according to the International Classification of Childhood Cancer (ICCC):

- Leukemia may cause bone and joint pain, fatigue, weakness, pale skin, bleeding or bruising easily, fever, or infection.
- Brain and other central nervous system tumors may cause headaches, nausea, vomiting, blurred or double vision, seizures, dizziness, and difficulty walking or handling objects.
- Lymphoma often causes lymph nodes to swell, which can appear as a lump in the neck, armpit, or groin; other symptoms can include fatigue, swelling or pain in the abdomen, weight loss, sweating (especially at night), and fever.
- Neuroblastoma, a cancer of immature nerve cells that is most common in children under 5 years of age, can develop anywhere but often appears as a swelling in the abdomen, sometimes accompanied by loss of appetite.
- Wilms tumor, also called nephroblastoma, is a kidney cancer that may appear as swelling or a lump in the abdomen, sometimes with blood in the urine.
- Rhabdomyosarcoma is a soft tissue sarcoma that occurs in muscle tissue, most often in the head or neck, genitourinary area, or extremities, and may cause pain and/or a mass or swelling at the tumor site.
- Retinoblastoma, an eye cancer that usually occurs in children under 5 years of age, may cause vision problems and is often recognized because the pupil appears white or pink instead of the normal red color in flash photographs or during an eye examination.
- Osteosarcoma, a bone cancer that most often occurs in adolescents, commonly appears as sporadic pain in the affected bone that may worsen at night or with activity and eventually progresses to local swelling.
- Ewing sarcoma, another cancer usually arising in the bone in adolescents, typically appears as pain or swelling at the tumor site.
- Gonadal germ cell tumors in girls occur in the ovaries and can be difficult to detect because symptoms, such as abdominal pain, often do not present until the tumor is advanced; in boys, these tumors occur in the testes and are often visible and may cause pain at an early stage.

Table 6. Probability (%) of Developing Invasive Cancer During Selected Age Intervals by Sex, US, 2017-2019*

Site	Sex	0-49	50-64	65-84	85+	Birth to death
All sites†	Male	3.5 (1 in 29)	11.8 (1 in 8)	31.9 (1 in 3)	19.1 (1 in 5)	41.6 (1 in 2)
	Female	5.9 (1 in 17)	10.8 (1 in 9)	24.3 (1 in 4)	14.4 (1 in 7)	39.6 (1 in 3)
Breast	Female	2.1 (1 in 48)	4.0 (1 in 25)	7.2 (1 in 14)	2.6 (1 in 38)	13.0 (1 in 8)
Colon & rectum	Male	0.4 (1 in 239)	1.2 (1 in 83)	2.7 (1 in 37)	1.8 (1 in 57)	4.3 (1 in 23)
	Female	0.4 (1 in 265)	0.9 (1 in 117)	2.2 (1 in 46)	1.7 (1 in 60)	3.9 (1 in 25)
Kidney & renal pelvis	Male	0.3 (1 in 384)	0.7 (1 in 142)	1.5 (1 in 67)	0.6 (1 in 178)	2.3 (1 in 43)
	Female	0.2 (1 in 603)	0.3 (1 in 287)	0.8 (1 in 126)	0.3 (1 in 303)	1.4 (1 in 73)
Leukemia	Male	0.3 (1 in 375)	0.3 (1 in 287)	1.2 (1 in 82)	0.9 (1 in 117)	1.9 (1 in 53)
	Female	0.2 (1 in 488)	0.2 (1 in 448)	0.7 (1 in 136)	0.5 (1 in 196)	1.3 (1 in 75)
Lung & bronchus	Male	0.1 (1 in 840)	1.2 (1 in 82)	5.1 (1 in 20)	2.7 (1 in 37)	6.3 (1 in 16)
	Female	0.1 (1 in 738)	1.1 (1 in 90)	4.3 (1 in 23)	1.9 (1 in 52)	5.9 (1 in 17)
Melanoma of the skin‡	Male	0.4 (1 in 243)	0.9 (1 in 116)	2.4 (1 in 42)	1.4 (1 in 73)	3.6 (1 in 28)
	Female	0.6 (1 in 160)	0.7 (1 in 153)	1.1 (1 in 92)	0.5 (1 in 188)	2.5 (1 in 41)
Non-Hodgkin lymphoma	Male	0.3 (1 in 395)	0.5 (1 in 196)	1.6 (1 in 63)	0.9 (1 in 105)	2.4 (1 in 42)
	Female	0.2 (1 in 528)	0.4 (1 in 264)	1.2 (1 in 86)	0.7 (1 in 153)	1.9 (1 in 52)
Prostate	Male	0.2 (1 in 449)	3.9 (1 in 26)	10.4 (1 in 10)	3.1 (1 in 32)	12.9 (1 in 8)
Thyroid	Male	0.2 (1 in 483)	0.2 (1 in 480)	0.3 (1 in 354)	0.1 (1 in 1429)	0.7 (1 in 153)
	Female	0.8 (1 in 124)	0.5 (1 in 200)	0.5 (1 in 217)	0.1 (1 in 1194)	1.7 (1 in 58)
Uterine cervix	Female	0.3 (1 in 337)	0.2 (1 in 554)	0.2 (1 in 564)	0.1 (1 in 1535)	0.7 (1 in 152)
Uterine corpus	Female	0.3 (1 in 303)	1.1 (1 in 91)	1.7 (1 in 58)	0.4 (1 in 239)	3.1 (1 in 32)

*For those who are free of cancer at the beginning of each age interval. †All sites excludes basal and squamous cell skin cancers and in situ cancers except urinary bladder. ‡Statistic is for non-Hispanic White individuals.

Source: DevCan: Probability of Developing or Dying of Cancer Software, Version 6.9.0. Statistical Research and Applications Branch, National Cancer Institute, 2023. surveillance.cancer.gov/devcan/.

Please note: The probability of developing cancer for additional sites, as well as the probability of cancer death, can be found in Supplemental Data at cancer.org/research/cancer-facts-statistics.html.

Treatment: Treatment is based on type and stage of cancer and is typically coordinated by a team of experts, including pediatric oncologists and nurses, social workers, psychologists, and others trained to assist young patients and their families. Outcomes are generally most successful when treatment is at a children's cancer center, where health care professionals are specialized in caring for children with cancer. Adolescents may be treated in the pediatric or adult oncology setting depending on cancer type and preference, although outcomes appear to be better in a pediatric setting for some cancers (e.g., acute lymphocytic leukemia). If the child or adolescent is eligible, participation in a clinical trial, which usually compares a new treatment with the best available standard treatment, should be considered.

Survival: Excluding benign and borderline malignant brain tumors, for which 5-year relative survival is >97% in children and adolescents, the 5-year relative survival rate during 2013 to 2019 for all cancers combined classified by the ICCC was 85% among children and 87% among adolescents. However, rates vary considerably depending on cancer type, patient age, and other factors. The overall survival rate among adolescents is heavily influenced by high survival for thyroid cancer (>99%) and Hodgkin lymphoma (98%), masking lower survival than children for several other cancers, including acute lymphocytic leukemia (76% versus 92%) and Ewing sarcoma (68% versus 81%). (See the Cancer Statistics Center for more childhood and adolescent survival rates.) Some treatment-related side effects may persist, or even begin long after treatment ends, including impaired organ function (e.g., memory or heart problems) and new cancers. The burden of these and other chronic health conditions among childhood cancer survivors is nearly double that of the general population by age 50. The Children's Oncology Group (COG) has developed guidelines for screening for and managing late effects in survivors of childhood cancer. See the COG website at survivorshipguidelines.org for more information.

For more information on cancer in children and adolescents, visit cancer.org/childrensreport to see *Translating Discovery into Cures for Children with Cancer: Childhood Cancer Research Landscape Report*.

Colon and Rectum

New cases and deaths: In 2024, an estimated 106,590 cases of colon cancer and 46,220 cases of rectal cancer will be diagnosed in the US, and a total of 53,010 people will die from these cancers (Table 1). Unfortunately, accurate statistics on deaths from colon versus rectal cancers are not available because many deaths from rectal cancer are misclassified as colon cancer on death certificates. The misclassification is largely attributed to historically widespread use of "colon cancer" to refer to colon and rectal cancer in educational messaging because of cultural reluctance to use the word "rectum."

Incidence trends: Colorectal cancer incidence rates have declined since the mid-1980s due to changing patterns in risk factors and the widespread uptake of screening (which can prevent this cancer) since 2000 among adults ages 50 and older. From 2011 through 2019, rates decreased by about 1% per year overall, although declining incidence is confined to individuals 65 and older; rates have increased by 1% to 2% per year since the mid-1990s in those younger than 55 years of age and stabilized in adults 55-64. (These incidence rates/trends exclude appendiceal tumors because they are increasingly understood to differ biologically from colorectal cancer.)

Mortality trends: Colorectal cancer mortality rates have dropped by 56%, from 29.2 (per 100,000) in 1970 to 12.8 in 2021 due to reductions in incidence, earlier detection through screening, and improvements in treatment; during the past decade, the death rate declined by 1.8% per year in both men and women. Similar to incidence, however, this progress is confined to older adults; mortality rates in individuals under 55 years of age have increased by about 1% per year since the mid-2000s.

Risk factors: More than half (55%) of colorectal cancers in the US are attributable to potentially modifiable risk factors, including excess body weight, physical inactivity, long-term smoking, high consumption of red or processed meat, heavy alcohol consumption, and low calcium, whole-grain, and/or fiber intake. Hereditary/genetic and medical factors that increase risk include a personal or family history of colorectal cancer or adenomatous polyps, certain inherited genetic disorders (e.g., Lynch syndrome), a personal history of chronic inflammatory bowel disease (ulcerative colitis or Crohn's disease), and type 2 diabetes. Regular long-term use of nonsteroidal anti-inflammatory drugs, such as aspirin, reduces risk, but can have serious adverse health effects, primarily gastrointestinal bleeding.

Prevention and early detection: In addition to reducing risk through lifestyle choices noted previously, screening can prevent colorectal cancer through the detection and removal of precancerous growths (polyps), and can also detect cancer at an early stage, when treatment is usually more successful. Thus, regular adherence to screening with either a stool test (fecal immunochemical test [FIT], highly sensitive guaiac-based fecal occult blood test [hsFOBT], or a multi-target stool DNA test [Cologuard®]) or direct visual exam (e.g., colonoscopy, flexible sigmoidoscopy, or computed tomography colonography) reduces risk of colorectal cancer incidence and death. The American Cancer Society and the US Preventive Services Task Force recommend that individuals at average risk for colorectal cancer begin screening at age 45 and continue through age 75, with more individualized decision-making from ages 76 to 85 based on health status, life expectancy, patient preferences, and prior screening history. For more information on colorectal cancer screening, see the American Cancer Society's screening guidelines on page 82. People at increased risk because of a family history of the disease or other reasons should talk to their doctor about starting screening earlier than age 45.

Signs and symptoms: The most common signs and symptoms are rectal bleeding, blood in the stool, changes in bowel habits (e.g., constipation or diarrhea) or stool shape (e.g., narrower than usual), the feeling that the bowel is not completely empty, abdominal cramping or pain, decreased appetite, and weight loss. In some cases, the cancer causes blood loss that is not noticeable but results in anemia (low red blood cell count) that may be detected on a blood test and/or because of symptoms such as weakness, fatigue, or shortness of breath. Increasing incidence of colorectal cancer in younger individuals, who are often diagnosed with advanced disease, reinforces the need for timely evaluation of persistent symptoms in patients of all ages. Early-stage colorectal cancer typically does not cause symptoms, which is why screening according to patient risk is so important.

Treatment: Surgery is the most common treatment for colorectal cancer that has not spread to distant sites. A permanent colostomy (creation of an abdominal opening for elimination of body waste) is rarely necessary for colon cancer and not usually required for rectal cancer. When cancer has penetrated the bowel wall deeply or spread to lymph nodes, colon cancer patients typically receive chemotherapy after surgery, whereas rectal cancer patients may receive chemotherapy before and/or after surgery, alone or in combination with radiation. For colorectal cancer that has spread to other parts of the body (metastatic colorectal cancer), treatments typically include chemotherapy and/or targeted therapy. Immunotherapy is an option that can be highly effective for a select group of advanced cancers.

Survival: The 5-year relative survival rate for colorectal cancer is 64% overall, but drops to 14% for distant-stage disease (Table 8). Only 1 in 3 new cases is localized, for which 5-year survival is 91%.

See *Colorectal Cancer Facts & Figures* at cancer.org/statistics for more information on colorectal cancer.

Kidney and Renal Pelvis

New cases and deaths: In 2024, an estimated 81,610 new cases of kidney (renal) cancer will be diagnosed in the US and 14,390 people will die from the disease (Table 1). Most kidney cancers are renal cell carcinomas; other types include cancer of the renal pelvis (5%), which behaves more like bladder cancer, and Wilms tumor (1%), a childhood cancer that usually develops before the age of 5. (See Cancer in Children and Adolescents on page 12.) Men are twice as likely as women to be diagnosed with kidney cancer.

Incidence trends: The long-term increase in kidney cancer incidence is partly attributed to incidental detection of asymptomatic tumors through increased medical imaging. Incidence rates from 2015 to 2019 increased by 1.5% per year confined to localized tumors, with stable rates for regional- and distant-stage disease.

Mortality trends: In contrast to incidence trends, kidney cancer mortality rates have been declining since the mid-1990s, with the pace accelerating to 1.6% per year from 2012 through 2021.

Risk factors: Cigarette smoking and excess body weight are major risk factors for kidney cancer, accounting for nearly half of the cases in the United States. Chronic high blood pressure, chronic renal failure, and occupational exposure to certain chemicals, such as trichloroethylene also increase risk. A small proportion of kidney cancers are the result of rare hereditary conditions (e.g., von Hippel-Lindau disease). Although moderate alcohol consumption (up to about 2 drinks per day) appears to be associated with a reduced risk of renal cell carcinoma, other health harms, including increased risk of several other cancers (e.g., oral cavity and liver), far outweigh this benefit.

Signs and symptoms: Signs and symptoms of kidney cancer can include blood in the urine, pain or a lump in the lower back or abdomen, fatigue, weight loss, fever, and anemia.

Treatment: Surgery is the primary treatment for most kidney cancers, although active surveillance (observation) may be an option for some small tumors. Patients who are not surgical candidates may be offered ablation therapy, a procedure that uses extreme heat or cold to destroy the tumor. Adjuvant treatment (after surgery) with an immunotherapy or targeted therapy drug may be an option for certain patients at high risk for cancer recurrence. For metastatic disease, immunotherapy and targeted drug therapies are the main treatment options, sometimes along with removal of the kidney.

Survival: The 5-year relative survival rate is 79% for cancer that develops in the kidney but just 51% for tumors in the renal pelvis, partly because they are less likely to be diagnosed at a localized stage.

Leukemia

New cases and deaths: In 2024, an estimated 62,770 new cases of leukemia will be diagnosed in the US and 23,670 people will die from the disease (Table 1). Leukemia is a cancer of the bone marrow and blood that is classified into four main groups based on cell type and rate of growth: acute lymphocytic leukemia (ALL), acute myeloid leukemia (AML), chronic myeloid leukemia (CML), and chronic lymphocytic leukemia (CLL). (Although CLL is categorized with leukemia in this report to enable description of trends over time, it is now recognized as being the same as a type of non-Hodgkin lymphoma called small lymphocytic lymphoma [SLL], and these cancers are referred to collectively as CLL/SLL.) The most common types of leukemia among adults (20 years of age and older) are CLL (38%) and AML (31%) and among children and adolescents (ages 0 to 19 years) are ALL (76%) and AML (16%). (See Cancer in Children and Adolescents on page 12.)

Incidence trends: Although trends vary by subtype, the overall leukemia incidence rate has stabilized in children but continues to increase in adolescents by about 1% per year since at least 1975; in adults ages 20 and older, rates declined from 2015 through 2019 by 0.5% per year after increasing since the late 1990s. Trends are strikingly similar by sex.

Mortality trends: In contrast to incidence, leukemia mortality has declined since the mid-1970s in children and adolescents and since the mid-1990s in adults; from 2012 to 2021, the death rate decreased by almost 3% per year in children and adolescents and by 2% per year in adults, but again with variation by subtype.

Risk factors: The risk of leukemia is increased among individuals exposed to high-level ionizing radiation, most commonly from prior cancer treatment. Some types of chemotherapy also increase risk. In addition, risk is increased in people with certain genetic abnormalities or inherited syndromes (e.g., Li-Fraumeni or Down syndrome) and in workers exposed to certain chemicals, such as benzene (e.g., during oil refining or rubber manufacturing). Cigarette smoking increases risk for AML in adults, and there is accumulating evidence that parental smoking before and after childbirth may increase risk of acute leukemia in children.

Signs and symptoms: Signs and symptoms of leukemia, which can appear suddenly for acute subtypes, may include fatigue, pale or lighter-colored skin, weight loss, repeated infections, fever, bleeding or bruising easily, bone or joint pain, and swelling. Chronic leukemias typically progress slowly with few symptoms during early stages and are sometimes diagnosed because of abnormal blood cell counts.

Treatment: Chemotherapy, sometimes in combination with targeted drugs, is used to treat most acute leukemias. Several targeted drugs are effective for treating CML because they attack cells with the Philadelphia chromosome, the acquired genetic abnormality that is the hallmark of the disease. Some of these drugs are also used to treat a type of ALL with a similar genetic defect. Patients with CLL that is not progressing or causing symptoms may not require treatment right away but should be closely monitored. More aggressive CLL is typically treated with targeted drugs and/or chemotherapy. Certain types of leukemia may be treated with high-dose chemotherapy followed by stem cell transplantation under appropriate conditions. Newer treatments that boost the body's

Table 7. Trends in 5-year Relative Survival Rates* (%) by Race, US, 1975-2019

	All races & ethnicities			White			Black		
	1975-77	1995-97	2013-19	1975-77	1995-97	2013-19	1975-77	1995-97	2013-19
All sites	49	63	69	50	64	69	39	54	65
Brain & other nervous system	23	32	34	22	31	31	25	39	39
Breast (female)	75	87	91	76	89	93	62	75	83
Colon & rectum**	50	61	64	50	62	65	45	54	59
Colon**	51	61	63	51	62	64	45	54	57
Rectum	48	62	67	48	62	67	44	55	65
Esophagus	5	13	22	6	14	23	4	9	17
Hodgkin lymphoma	72	84	89	72	85	90	70	82	88
Kidney & renal pelvis	50	62	78	50	62	78	49	62	77
Larynx	66	66	62	67	68	62	58	52	55
Leukemia	34	48	67	35	50	68	33	42	61
Liver & intrahepatic bile duct	3	7	22	3	7	21	2	4	21
Lung & bronchus	12	15	25	12	15	25	11	13	23
Melanoma of the skin	82	91	94	82	91	94	57†	76†	71
Myeloma	25	32	60	24	32	59	29	32	61
Non-Hodgkin lymphoma	47	56	74	47	57	76	49	49	70
Oral cavity & pharynx	53	58	69	54	60	70	36	38	55
Ovary	36	43	51	35	43	50	42	36	42
Pancreas	3	4	13	3	4	12	2	4	11
Prostate	68	97	97	69	97	98	61	94	97
Stomach	15	22	36	14	20	36	16	22	37
Testis	83	96	95	83	96	97	73‡†	86†	91
Thyroid	92	95	99	92	96	99	90	95	97
Urinary bladder	72	80	78	73	81	79	50	63	65
Uterine cervix	69	73	67	70	74	68	65	66	57
Uterine corpus	87	84	81	88	86	84	60	62	63

*Rates are age adjusted for normal life expectancy and are based on cases diagnosed in the SEER 9 areas for 1975-1977 and 1995-1997, and in the SEER 22 areas for 2013-2019; all cases were followed through 2020. Rates for White and Black patients diagnosed during 2013-2019 are exclusive of Hispanic ethnicity. †The standard error is between 5 and 10 percentage points. ‡Survival rate is for cases diagnosed from 1978 to 1980. **Excludes appendix.

Sources: 2013-2019 survival – SEER*Explorer, National Cancer Institute, 2023. Available from https://seer.cancer.gov/explorer/. Colon & rectal cancer – SEER*Stat software (version 8.4.0.1), National Cancer Institute, 2023. Historical survival was previously calculated using SEER*Stat version 8.3.9.

immune system, such as CAR T-cell therapy, have shown much promise, even against some hard-to-treat leukemias.

Survival: Five-year relative survival varies substantially by age and leukemia subtype; among adults ages 20 and older, the rate is 29% for AML, 45% for ALL, 70% for CML, and 88% for CLL, whereas among youth ages 0 to 19 years it is 70% for AML and 90% for ALL. Age-related differences in part reflect a large variation in cancer biology in children versus adults. Treatment advances such as the development of targeted drugs have resulted in large survival improvements for some types of leukemia; for example, the current 5-year relative survival rate for CML is three-fold higher than it was in the mid-1970s (22%).

Liver

New cases and deaths: In 2024, an estimated 41,630 new cases of liver cancer will be diagnosed in the US and 29,840 people will die from the disease (Table 1). The most common types of liver cancer are hepatocellular carcinoma (HCC; 71%) and intrahepatic bile duct cancer (cholangiocarcinoma; 20%). Liver cancer incidence is almost 3 times higher in men than in women.

Incidence trends: Liver cancer incidence rates tripled over the past four decades; although the rate continues to increase in women by 2% per year, it has stabilized in men since 2015.

Mortality trends: Mirroring incidence, the steep increase in mortality since the 1980s continued in women from 2017 to 2021 (by 1% per year) but reversed in men, among whom rates declined by 1% per year during this time.

Risk factors: At least 70% of liver cancers in the US are caused by potentially modifiable risk factors, such as excess body weight, hepatitis C virus (HCV) and/or hepatitis B virus (HBV) infection, smoking, heavy alcohol consumption (3 or more drinks per day), and type 2 diabetes. Risk is also increased by eating food contaminated with aflatoxin (poison from a fungus that can grow on improperly stored foods, such as nuts and grains). Low-dose aspirin is associated with reduced risk.

Prevention: Although a vaccine that protects against HBV infection has long been recommended for infants and unvaccinated children, 70% of adults are not vaccinated. To fill this gap, the Centers for Disease Control and Prevention (CDC) recommends one-time HBV screening of adults 18 years of age and older and vaccination of all adults ages 19-59 years and high-risk adults >60; additionally, women should be screened during every pregnancy. Regular testing is also recommended for many people at high risk, such as those who have injected drugs. There are similar screening and testing recommendations for HCV, for which there is no vaccine. Visit the CDC website at cdc.gov/hepatitis for more information on viral hepatitis. Preventive measures for HBV and HCV infection include screening of donated blood, organs, and tissues; adhering to infection control practices during medical and dental procedures; needle-exchange programs for people who inject drugs; and avoiding unsafe sex. For people with HCV, one course of antiviral therapy can usually clear established infections and reduce cancer risk. Antiviral therapies can also reduce cancer risk for people with HBV by slowing liver damage, but they cannot eliminate infection and treatment is typically lifelong.

Early detection: Although screening for liver cancer is not recommended for most people, many professional societies recommend testing individuals at high risk (e.g., those with cirrhosis) with ultrasound, computerized tomography (CT), and/or blood tests.

Signs and symptoms: Symptoms, which do not usually appear until the cancer is advanced, can include abdominal pain and/or swelling, weight loss, nausea, loss of appetite, jaundice (a yellowish discoloration of the skin and white areas of the eyes), and fever. Enlargement of the liver is the most common physical sign.

Treatment: Early-stage liver cancer can sometimes be treated successfully with surgery to remove part of the liver (although few patients have enough healthy liver for this option) or liver transplantation. Other local treatments include tumor ablation (destruction), embolization (blocking blood flow), or radiation therapy. Some patients diagnosed at an advanced stage may be offered targeted drug therapies and/or immunotherapy.

Survival: The 5-year relative survival rate for liver cancer is 22%, up from 3% four decades ago (Table 7). Even for the 43% of patients diagnosed with localized-stage disease, 5-year survival is only 37% (Table 8).

Lung and Bronchus

New cases and deaths: In 2024, an estimated 234,580 new cases of lung cancer will be diagnosed in the US and 125,070 people will die from the disease (Table 1). Most lung cancers are classified as either non-small cell lung cancer (NSCLC; 80%) or small cell lung cancer (SCLC; 14%).

Incidence trends: Lung cancer incidence has been declining since the mid-1980s in men, but only since the mid-2000s in women because of sex differences in historical patterns of smoking uptake and cessation; declines since have remained about twice as steep in men (2.5% per year) as in women (1% per year).

Mortality trends: Lung cancer mortality rates have declined by 59% since 1990 in men and by 36% since 2002 in women largely due to reductions in smoking; however, recent major advances in treatment for NSCLC, as well as earlier detection have accelerated declines. From 2017 through 2021, the death rate decreased by about 4% per year in both men and women.

Risk factors: Cigarette smoking is by far the most important risk factor, with approximately 80% of lung cancer deaths in the US still caused by smoking. Risk increases with both quantity and duration of smoking. Cigar and pipe smoking also increase risk. (See the Tobacco section, page 55, for more information.) Exposure to radon gas, which is released from soil and can accumulate in indoor air, is the second-leading cause of lung cancer in the US. Other risk factors include exposure to secondhand smoke (2.7% of lung cancers, the equivalent of 6,300 new cases in 2024), asbestos (particularly among people who smoke), certain metals (chromium, cadmium, and arsenic), some organic chemicals, radiation, air pollution, and diesel exhaust. Specific occupational exposures that increase risk include rubber manufacturing, paving, roofing, painting, and chimney sweeping.

Early detection: Lung cancer screening with low-dose spiral computed tomography (LDCT) has been shown to reduce lung cancer mortality in people at high risk. The American Cancer Society updated our lung cancer screening guideline in 2023, and now recommends annual LDCT for generally healthy adults ages 50 to 80 years with a minimum 20 pack-year smoking history, regardless of number of years since quitting for people who no longer smoke. The years-since-quitting restriction in the new recommendation was eliminated because evidence showed that it excluded many individuals from screening who had risk equivalent to or higher than individuals who did meet eligibility criteria.

Signs and symptoms: Symptoms, which usually do not appear until the cancer is advanced, can include persistent cough, sputum streaked with blood, chest pain, a hoarse voice, worsening shortness of breath, and recurrent pneumonia or bronchitis.

Treatment: Treatment is based on whether the cancer is NSCLC or SCLC, as well as its stage and molecular characteristics. For early-stage NSCLC, surgery is the usual treatment for otherwise healthy individuals, sometimes with other treatments such as chemotherapy, targeted drugs, immunotherapy, and/or radiation therapy. Advanced-stage NSCLC is usually treated with chemotherapy, targeted drugs, and/or immunotherapy. Early-stage SCLC is usually treated with chemotherapy combined with radiation. Radiation to the brain (prophylactic cranial radiation) is sometimes given in early-stage SCLC to reduce the risk of brain metastases. People with advanced SCLC might be treated with chemotherapy with or without immunotherapy; a large percentage of patients on these regimens experience temporary remission.

Survival: The 5-year relative survival rate for lung cancer is 25% overall, but it is lower for men (21%) than for women (30%) and for SCLC (8%) than for NSCLC (30%). About one-quarter of lung cancers are diagnosed at a localized stage, for which the 5-year survival rate is 63% (Table 8).

Lymphoma

New cases and deaths: In 2024, an estimated 89,190 new cases of lymphoma will be diagnosed in the US and 21,050 people will die from the disease (Table 1). These cancers begin in immune system cells and can occur almost anywhere in the body. Lymphomas are broadly grouped as Hodgkin lymphoma (8,570 cases and 930 deaths in 2024) or non-Hodgkin lymphoma (NHL, 80,620 cases and 20,140 deaths), and are further classified based on cell composition and characteristics, such as cell-surface markers and anatomic site. (Although chronic lymphocytic leukemia [CLL], which occurs in the blood and bone marrow, is now understood to be the same disease as a type of NHL that occurs in the lymph nodes [small lymphocytic lymphoma], statistics for NHL herein exclude CLL for the purpose of describing historical trends.)

Incidence trends: Incidence rates have declined by about 1% per year for Hodgkin lymphoma since the mid-2000s and for NHL since 2015.

Table 8. Five-year Relative Survival Rates* (%) by Stage at Diagnosis, US, 2013-2019

	All stages	Local	Regional	Distant		All stages	Local	Regional	Distant
Breast (female)	91	99	86	31	Non-Hodgkin lymphoma	74	86	78	67
Colon & rectum†	64	91	73	14	Oral cavity & pharynx	69	87	69	39
Colon†	63	91	73	13	Ovary	51	92	73	32
Rectum	67	90	74	18	Pancreas	13	44	16	3
Esophagus	22	49	28	6	Prostate	97	>99	>99	34
Kidney & renal pelvis	78	93	74	17	Stomach	36	75	35	7
Larynx	62	79	47	34	Thyroid	99	>99	98	54
Liver‡	22	37	14	4	Urinary bladder§	78	71	39	8
Lung & bronchus	25	63	35	8	Uterine cervix	67	91	60	19
Melanoma of the skin	94	>99	74	35	Uterine corpus	81	95	70	18

*Rates are adjusted for normal life expectancy and are based on cases diagnosed in the SEER 22 areas from 2013-2019; all cases were followed through 2020. †Excludes appendix. ‡Includes intrahepatic bile duct. §Rate for in situ cases is 96%.

Stage classification based on Combined Summary Stage. **Local:** an invasive malignant cancer confined entirely to the organ of origin. **Regional:** a malignant cancer that 1) has extended beyond the limits of the organ of origin directly into surrounding organs or tissues; 2) involves regional lymph nodes; or 3) has both regional extension and involvement of regional lymph nodes. **Distant:** a malignant cancer that has spread to parts of the body remote from the primary tumor either by direct extension or by discontinuous metastasis to distant organs, tissues, or via the lymphatic system to distant lymph nodes.

Source: SEER*Explorer, National Cancer Institute, 2023. Available from https://seer.cancer.gov/explorer/. Colon & rectal cancer – SEER*Stat software (version 8.4.0.1), National Cancer Institute, 2022.

Mortality trends: The death rate has been declining since at least 1975 for Hodgkin lymphoma and since 1997 for NHL due to reductions in incidence, advances in treatment, and improved survival for human immunodeficiency virus (HIV)-associated lymphoma. From 2012 to 2021, the death rate decreased by about 4% per year for Hodgkin lymphoma and 2% per year for NHL.

Risk factors: Typical of most cancers, the overall risk of NHL increases with age. In contrast, Hodgkin lymphoma incidence peaks first during adolescence/early adulthood and then again in later life. Most known risk factors for lymphoma are associated with severely altered immune function. For example, risk is elevated in people who receive immune suppressants to prevent organ transplant rejection and those who have certain autoimmune disorders (e.g., Sjögren syndrome, systemic lupus, and rheumatoid arthritis). Certain infectious agents (e.g., Epstein-Barr virus) increase the risk of some lymphoma subtypes directly, whereas others increase risk indirectly by weakening the immune system (e.g., HIV) or continuously activating it (e.g., *Helicobacter pylori* and hepatitis C virus). Family history of lymphoma also increases risk.

Signs and symptoms: The most common symptoms of lymphoma are caused by swollen lymph nodes, and include lumps in the neck, underarm, or groin; chest pain; shortness of breath; abdominal fullness; and loss of appetite. Other symptoms can include itching, night sweats, fatigue, unexplained weight loss, and intermittent fever.

Treatment: NHL is usually treated with chemotherapy, although targeted drugs, immunotherapy, and/or radiation might also be part of treatment for some stages and subtypes. If NHL persists or recurs after standard treatment, stem cell transplantation may be an option. Newer therapies that help the body's immune system recognize and attack lymphoma cells (e.g., CAR T-cell therapy) are also options and have shown promising results for some hard-to-treat or recurrent lymphomas.

Hodgkin lymphoma is usually treated with chemotherapy and/or radiation therapy, depending on disease stage and cell type. If these treatments are ineffective, options may include stem cell transplantation and/or treatment with a monoclonal antibody linked to a chemotherapy drug, as well as other immunotherapies.

Survival: Survival varies widely by lymphoma subtype, stage of disease, and age at diagnosis; overall 5-year relative survival is 89% for Hodgkin lymphoma and 74% for NHL.

Oral Cavity and Pharynx

New cases and deaths: In 2024, an estimated 58,450 new cases of cancer of the oral cavity (mouth) and pharynx (throat) will be diagnosed in the US and 12,230 people will die from the disease (Table 1). Incidence rates are almost 3 times higher in men than in women. The distribution of oral cavity cancers has shifted because of changing patterns in risk factors (e.g., less smoking), with the proportion of cases occurring on the tongue or tonsils doubling from 1 in 4 during the late 1970s to 1 in 2 during 2016-2020.

Incidence trends: Incidence rates have increased by about 1% per year since the mid-2000s, mostly driven by cancers occurring in the oropharynx (the part of the throat behind the oral cavity that includes the back one-third of the tongue, soft palate, and tonsils) associated with human papillomavirus (HPV).

Mortality trends: After decades of decline, the mortality rate for cancers of the oral cavity and pharynx combined increased by 0.6% per year from 2009 through 2021, mostly because of an increase of about 2% per year in deaths from HPV-associated cancers of the tongue, tonsil, and oropharynx.

Risk factors: Known risk factors include any form of tobacco use and alcohol consumption, with a 30-fold increased risk for individuals who both smoke and drink heavily. HPV infection of the mouth and throat, believed to be transmitted through sexual contact, also increases risk.

Prevention: In 2020, the FDA added oral cancer prevention as an indication for the HPV vaccine, originally introduced for cervical cancer prevention. Unfortunately, immunization rates are low, with only 63% of adolescents ages 13 to 17 years (61% of boys and 65% of girls) up to date with vaccination in 2022.

Signs and symptoms: Symptoms may include a sore in the throat or mouth that bleeds easily and does not heal; a persistent red or white patch, lump, or thickening in the throat or mouth; ear pain; a neck mass; or coughing up blood. Difficulty chewing, swallowing, or moving the tongue or jaw are often later symptoms.

Treatment: Treatment is based largely on the stage of oropharyngeal cancer and whether it is caused by an HPV infection, but other factors can also be important. Surgery and/or radiation therapy are standard treatments; chemotherapy is often added for high-risk or advanced disease. Chemotherapy or targeted drug therapy may be combined with radiation as initial treatment in some cases. Immunotherapy with or without chemotherapy is a newer option for advanced or recurrent cancer.

Survival: The 5-year relative survival rate for cancers of the oral cavity and pharynx is 69% overall but is much lower in Black people (55%) than in White people (70%; Table 7). Although this may partly reflect more HPV-associated cancers (which have better outcomes) in Whites, the survival disparity persists regardless of tumor HPV status.

Ovary

New cases and deaths: In 2024, an estimated 19,680 new cases of ovarian cancer will be diagnosed in the US and 12,740 women will die from the disease (Table 1). About 90% of cases are epithelial ovarian cancer, the majority of which are high-grade serous tumors, which primarily originate in the fallopian tubes.

Incidence trends: The ovarian cancer incidence rate declined by 1% to 2% per year from 1990 to the mid-2010s and by almost 3% per year from 2015 to 2019. This trend is likely due at least in part to increased oral contraceptive use in the latter half of the past century and decreased menopausal hormone therapy use during the 2000s, both of which are associated with lower risk.

Mortality trends: Ovarian cancer mortality has decreased by 40% since 1975, with most of this progress occurring since the mid-2000s; from 2004 through 2021, the death rate declined by 2.4% per year, reflecting both decreased incidence and improved treatment.

Risk factors: The most important risk factor other than age is a family history of breast or ovarian cancer, some of which is related to certain inherited gene mutations (e.g., *BRCA1* or *BRCA2* or those related to Lynch syndrome). Other medical conditions and characteristics associated with increased risk include a personal history of breast cancer, endometriosis, or pelvic inflammatory disease, and tall adult height. Modifiable factors associated with increased risk include use of menopausal hormone therapy (estrogen alone or combined with progestin), previously referred to as hormone replacement therapy or HRT, and excess body weight for some subtypes. Cigarette smoking is associated with a rare subtype (mucinous). Factors associated with lower risk include pregnancy/higher number of children, later age at menarche, earlier age at menopause, fallopian tube ligation or removal (salpingectomy), and use of hormonal contraceptives. Accumulating evidence suggests that frequent aspirin use is also associated with reduced risk, although this can have serious adverse health effects and should only occur in consultation with a health care provider. The weight of the evidence does not support an association between ovarian cancer and genital exposure to talc-based powder.

Prevention: Some women at high risk because of a strong family history or inherited genetic mutations may consider preventive surgery to remove both ovaries and fallopian tubes (prophylactic bilateral salpingo-oophorectomy), which greatly reduces risk. Women at average risk who are having pelvic surgery for other reasons (e.g., hysterectomy) may choose to reduce ovarian cancer risk by having their fallopian tubes removed (opportunistic salpingectomy).

Early detection: Currently, there are no recommended screening tests for ovarian cancer. Women who are at high risk because of inherited genetic mutations may be offered a thorough pelvic exam in combination with transvaginal ultrasound and a blood test for the CA125 tumor marker; however, this strategy has not been proven to reduce ovarian cancer mortality and is associated with serious harms, including surgery in many cases when no cancer is present (false-positive). The US Preventive Services Task Force recommends against screening asymptomatic average-risk women for ovarian cancer.

Signs and symptoms: Early ovarian cancer usually causes no obvious symptoms. However, some women experience persistent, nonspecific symptoms, such as back pain, bloating, pelvic or abdominal pain, difficulty eating or feeling full quickly, or urinary urgency or frequency in the months before diagnosis. Women who experience such symptoms daily for more than a few weeks should seek prompt medical evaluation. The most common sign of ovarian cancer is swelling of the abdomen caused by fluid accumulation (ascites) when the disease is advanced, which is when most women are diagnosed.

Treatment: Treatment includes surgery and often chemotherapy and targeted therapy. Surgery usually involves removal of both ovaries and fallopian tubes (bilateral salpingo-oophorectomy), the uterus (hysterectomy), and the omentum (fatty tissue attached to some of the organs in the abdomen), along with biopsies of the peritoneum (lining of the abdominal cavity). Additional abdominal organs may be removed in women with advanced disease, whereas only the involved ovary and fallopian tube may be removed in younger women with very early-stage tumors who want to preserve fertility. The goals of surgery are to remove as much of the tumor as possible, referred to as debulking, and accurately stage the cancer. Some women with advanced disease may benefit from chemotherapy administered directly into the abdomen (intraperitoneal). Targeted drugs can sometimes be used after other treatments to slow growth of advanced cancers or as maintenance treatment to keep the cancer from recurring after chemotherapy.

Survival: Ovarian cancer is the most fatal gynecologic cancer; the 5-year relative survival rate is 51% overall, but ranges from 42% among Black women to 61% among Asian American/Pacific Islander women. For the 1 in 5 women who are diagnosed with localized disease, the 5-year survival rate is 92% (Table 8), spurring continued efforts to develop an effective early-detection strategy.

Pancreas

New cases and deaths: In 2024, an estimated 66,440 new cases of pancreatic cancer will be diagnosed in the US and 51,750 people will die from the disease (Table 1). Ninety-two percent of cases develop in the exocrine tissue of the pancreas, which makes enzymes to digest food. Endocrine tumors, commonly referred to as pancreatic neuroendocrine tumors (NETs), develop in hormone-producing cells, have a younger median age at diagnosis, and typically have a much better prognosis.

Incidence trends: The incidence rate for pancreatic cancer has increased by about 1% per year since the late 1990s in both men and women.

Mortality trends: For the past several decades, the death rate for pancreatic cancer has increased slowly by 0.2% to 0.3% per year in men and women.

Risk factors: People who smoke have about twice the risk of pancreatic cancer as people who've never smoked, and the use of smokeless tobacco also increases risk. Other risk factors include type 2 diabetes, excess body weight, a family history of pancreatic cancer, and a personal history of chronic pancreatitis. Risk is also increased among people with certain genetic syndromes (e.g., Lynch syndrome) and inherited mutations (e.g., in *BRCA1* or *BRCA2* genes). Heavy alcohol consumption may increase risk.

Early detection: Studies with long-term follow-up suggest that individuals at high risk for pancreatic cancer because of genetic predisposition or a strong family history can benefit from annual surveillance with endoscopic ultrasound and/or magnetic resonance imaging (MRI). The US Preventive Services Task Force recommends against screening asymptomatic average-risk individuals for pancreatic cancer.

Signs and symptoms: Signs and symptoms of pancreatic cancer, which usually do not appear until the disease is advanced, can include weight loss, abdominal pain that may radiate to the back, jaundice (yellowing of the skin and whites of the eyes), nausea, and vomiting.

Treatment: Surgery, radiation therapy, and chemotherapy are treatment options that may extend survival and/or relieve symptoms, but seldom produce a cure. Fewer than 20% of patients are candidates for surgery because the cancer has usually spread beyond the pancreas at diagnosis. For those who do undergo surgery, postoperative treatment with chemotherapy (and sometimes radiation) may lower the risk of recurrence and might help people live longer. For advanced disease, chemotherapy, sometimes along with a targeted therapy drug, may be used; a small number of patients might be eligible for immunotherapy.

Survival: For all stages combined, the 5-year relative survival rate is 13%, but this ranges from 8% for exocrine tumors to 72% for NETs. Even for the 15% of people diagnosed with localized disease, the 5-year survival rate is only 44% (Table 8).

Prostate

New cases and deaths: In 2024, an estimated 299,010 new cases of prostate cancer will be diagnosed in the US and 35,250 men will die from the disease (Table 1). The incidence of prostate cancer is about 70% higher in Black men than in White men for reasons that remain unclear.

Incidence trends: Changes in prostate cancer incidence rates largely reflect screening with the prostate-specific antigen (PSA) blood test, which mostly detects localized-stage disease. Overall incidence declined sharply from 2007 to 2014, coinciding with less PSA testing because of changes in screening

recommendations from the US Preventive Services Task Force; since 2014, however, the incidence rate has increased by 3% per year overall and by about 5% per year for advanced-stage disease.

Mortality trends: Due to earlier detection through PSA testing and advances in treatment, the prostate cancer death rate declined by half from its peak of 39.3 per 100,000 men in 1993 to 18.8 per 100,000 men in 2017. However, in recent years, rates have stabilized, likely reflecting the increase in advanced-stage diagnoses.

Risk factors: The only well-established risk factors for prostate cancer are increasing age, African ancestry, a family history of the disease, and certain inherited genetic conditions (e.g., Lynch syndrome and *BRCA1* and *BRCA2* mutations). Black men in the US and the Caribbean have the highest documented prostate cancer incidence rates in the world. Smoking and excess body weight may increase risk of aggressive and/or fatal disease.

Early detection: No major medical organization presently endorses routine screening for men at average risk because of concerns about the high rate of overdiagnosis (detecting disease that would never have caused symptoms or harm), especially given the potential for serious side effects associated with prostate cancer treatment. However, because prostate cancer is a leading cause of cancer death in men, many organizations recommend "shared decision-making," whereby men are educated about the benefits and harms of PSA screening, and encouraged to make a personal choice. The American Cancer Society recommends that beginning at age 50, men who are at average risk of prostate cancer and have a life expectancy of at least 10 years have a conversation with their health care provider about the benefits and harms of PSA testing and make an informed decision about whether to be tested. Black men and those with a close relative diagnosed with prostate cancer before the age of 65 should have this discussion beginning at age 45, and men at even higher risk (those with several close relatives diagnosed at an early age and *BRCA* mutation carriers) should have this discussion beginning at age 40. For men who elect to participate in PSA testing, newer biomarker and imaging tests are increasingly used to limit unnecessary biopsies and reduce overdiagnosis and overtreatment.

Signs and symptoms: Early-stage prostate cancer usually causes no symptoms. More advanced disease shares symptoms with benign prostate conditions, including weak or interrupted urine flow; difficulty starting or stopping urination; frequent urination, especially at night; blood in the urine; or pain or burning with urination. Late-stage prostate cancer commonly spreads to the bones, which can cause pain in the hips, spine, ribs, or other areas.

Treatment: Recent changes in the grading system for prostate cancer, as well as newer genomic tests, have improved tumor characterization and disease management. Careful monitoring of disease (called active surveillance) instead of immediate treatment is appropriate for many patients, particularly men who are diagnosed at an early stage, have less aggressive tumors, and are older. The main treatment options for early-stage disease include surgery, external beam radiation, and radioactive seed implants (brachytherapy). Focal therapies, in which only part of the prostate is treated, are also being studied. Hormone therapy may be used along with surgery or radiation in locally advanced cases. Treatment often impacts a man's quality of life due to temporary or long-term side effects or complications, such as urinary and erectile difficulties.

Late-stage prostate cancer treatment options include hormonal therapy, chemotherapy, and/or radiation therapy. Hormone treatment may control advanced prostate cancer for long periods of time by shrinking the size or limiting the growth of the cancer, thus helping to relieve pain and other symptoms. An option for some men with advanced prostate cancer that is no longer responding to hormones is a cancer vaccine designed to stimulate the patient's immune system to attack prostate cancer cells specifically. Targeted drugs (PARP inhibitors) can be used along with hormone therapy for men whose cancers have *BRCA* or other DNA repair gene mutations, and other types of drugs can be used to treat prostate cancer that has spread to the bones.

Survival: The 5-year relative survival rate approaches 100% for the vast majority (83%) of men diagnosed with localized- or regional-stage prostate cancer, but drops to 34% for those diagnosed with distant-stage disease (Table 8). The 10-year survival rate for all stages combined is 98%.

Skin

New cases and deaths: Skin cancer is the most commonly diagnosed cancer in the US. However, the actual number of the most common types – basal cell and squamous cell (i.e., keratinocyte carcinoma or KC) – is unknown because these cases are not required to be reported to cancer registries. The most recent study of KC occurrence estimated that in 2012, 5.4 million cases were diagnosed among 3.3 million people.

Invasive melanoma accounts for only 1% of all skin cancer cases but the majority of deaths. In 2024, an estimated 100,640 new cases of invasive and 99,700 cases of in situ melanoma will be diagnosed in the US, while 8,290 people will die from the disease (Table 1). Incidence rates are higher in women than in men before age 50, but thereafter are much higher in men, presumably reflecting age differences in historical occupational and recreational exposure to ultraviolet (UV) radiation, as well as higher use of indoor tanning among young women.

Incidence trends: Invasive melanoma incidence trends vary by age and sex; rates among individuals younger than age 50 have stabilized in women and declined by about 1% per year in men since the early 2000s, whereas in adults ages 50 and older, rates continue to increase in women by almost 3% per year but have stabilized in recent years in men.

Mortality trends: In contrast to incidence, melanoma mortality has been declining since the early 1990s in women but only since around 2010 in men. Progress accelerated from 2013 through 2017, with declines of 6% to 7% per year in both men and women, because of major advances in treatment for advanced disease, although rates have since stabilized.

Risk factors: Excess exposure to UV radiation from sunlight or indoor tanning increases risk for almost all skin cancers, and people with light skin color are most susceptible. For example, melanoma incidence ranges from 1.0 (per 100,000) in Black individuals and 1.3 in Asian/Pacific Islander individuals to 4.8 in Hispanic individuals, 10.3 in Native American individuals, and 30.6 in White individuals. A personal history of the disease and advanced age also increase risk. Risk of squamous cell carcinoma (SCC) is increased with a history of actinic keratoses (a common lesion containing abnormal [dysplastic] cells caused by chronic sun exposure). A weakened immune system increases risk of SCC and melanoma, with transplant patients at particular risk of aggressive SCC. Additional melanoma risk factors include a strong family history of the disease and the presence of atypical, large, or numerous (more than 50) moles.

Prevention: Most skin cancer cases and deaths are caused by exposure to UV radiation, and thus are potentially preventable. Exposure to intense UV radiation can be minimized by wearing protective clothing (e.g., long sleeves, a wide-brimmed hat, etc.) and sunglasses that block UV rays; avoiding the sun at peak hours; applying broad-spectrum sunscreen that has a sun protection factor (SPF) of at least 30 to unprotected skin as directed; seeking shade; and not sunbathing or tanning indoors. Children and adolescents should be especially protected from excessive UV radiation exposure because severe sunburns early in life may particularly increase risk of melanoma. Communities can help prevent skin cancer through educational interventions in schools and providing shade in communities and at schools, recreational sites, and occupational settings. In 2014, the US Surgeon General released a Call to Action to Prevent Skin Cancer because of the growing burden of this largely preventable disease. The purpose of this initiative is to increase awareness and encourage all Americans to engage in behaviors that reduce the risk of skin cancer. See surgeongeneral.gov/library/calls/prevent-skin-cancer/call-to-action-prevent-skin-cancer.pdf for more information. Additionally, there are new treatments available to help reduce skin cancer risk among people

at high risk, such as those with a high incidence of actinic keratosis or genetic susceptibility.

Early detection: The best way to detect skin cancer early is to be aware of new or changing skin spots or growths, particularly those that look unusual. Any new lesions or a progressive change in a lesion's appearance (size, shape, color, new bleeding, etc.) should be evaluated promptly by a clinician. Periodic skin examination, preferably monthly and with the help of a partner for areas that are hard to see, may help identify changes.

Signs and symptoms: Warning signs of all skin cancers include changes in the size, shape, or color of a mole or other skin lesion; the appearance of a new skin growth; or a sore that does not heal. Changes that progress over a month or more should be evaluated by a clinician. Basal cell carcinoma may appear as a growth that is flat, or as a small, raised pink or red translucent, shiny area that may bleed following minor injury. Squamous cell carcinoma may appear as a growing lump, often with a rough surface, or as a flat, reddish patch that grows slowly. The ABCDE rule outlines warning signs of the most common type of melanoma: A is for asymmetry (one half of the mole does not match the other half); B is for border irregularity (the edges are ragged, notched, or blurred); C is for color (the pigmentation is not uniform); D is for diameter greater than 6 millimeters (about the size of a pencil eraser); and E is for evolution, meaning a change in the mole's appearance over time. Not all melanomas have these signs, so be alert for any new or changing skin growths or spots.

Treatment: Most cases of KC are cured by removing the lesion through minor surgery or other techniques (e.g., freezing). Radiation therapy and/or certain topical medications may also be used. For more advanced cancers (which are uncommon), immunotherapy or targeted drugs might be options. For melanoma, the primary tumor and surrounding normal tissue are surgically removed, and sometimes a nearby lymph node is biopsied to determine stage; if this node contains cancer, more extensive surgery may be needed. Melanomas with deep invasion or that have spread to lymph nodes may be treated with surgery, immunotherapy, targeted drug therapy, and/or radiation therapy. The treatment of advanced melanoma has changed greatly in recent years with the development of several new immunotherapy and targeted drugs that can be very effective. Traditional chemotherapy may be used but is usually much less effective than newer treatments.

Survival: Almost all cases of KC can be cured, especially if detected and treated early. Although melanoma is also highly curable when detected in its earliest stages, it is more likely than KC to spread to other parts of the body. The 5-year relative survival rate for melanoma overall is 94%, ranging from >99% for cases diagnosed at a localized stage to 35% for distant-stage disease, up from 15% in the mid-2000s due to treatment breakthroughs.

Thyroid

New cases and deaths: In 2024, there will be an estimated 44,020 new cases of thyroid cancer diagnosed in the US and 2,170 people will die from the disease (Table 1). The incidence rate is almost 3 times higher in women than in men and is 40% to 50% lower in Black people than in any other racial or ethnic group.

Incidence trends: Thyroid was the most rapidly increasing cancer in the US during the 2000s, largely due to increased incidental detection, including some overdiagnosis of small papillary tumors (the most common subtype) because of increased imaging and more sensitive diagnostic procedures. However, due in part to the adoption of more conservative diagnostic criteria, since 2014 the incidence rate has declined by about 2% per year.

Mortality trends: The death rate for thyroid cancer has remained stable since 2009.

Risk factors: Risk factors for thyroid cancer include being female; having a history of goiter (enlarged thyroid), thyroid nodules, or a family history of thyroid cancer; radiation exposure early in life (e.g., during cancer treatment); excess body weight; and certain rare

genetic syndromes, such as familial adenomatous polyposis (FAP). People who test positive for a mutation in the RET gene, which causes a hereditary form of thyroid cancer (familial medullary thyroid carcinoma), can lower their risk of developing the disease by having the thyroid gland surgically removed.

Signs and symptoms: The most common symptom of thyroid cancer is a lump in the neck that is noticed by a patient or felt by a clinician during an exam. Other symptoms can include a tight or full feeling in the neck, difficulty breathing or swallowing, hoarseness, swollen lymph nodes, and pain in the throat or neck that does not go away. Many thyroid cancers are diagnosed incidentally in people without symptoms when an abnormality is seen on an imaging test done for another reason.

Treatment: Most thyroid cancers are highly curable, but about 3% (medullary and anaplastic thyroid cancers) are more aggressive and likely to spread to other organs. Treatment depends on patient age, tumor size and cell type, and extent of disease, but is usually surgery to partially (lobectomy) or totally (thyroidectomy) remove the thyroid gland and sometimes nearby lymph nodes. Radioactive iodine (I-131) treatment may be recommended after complete thyroidectomy for large papillary or follicular tumors or when cancer has spread outside the thyroid to destroy any remaining thyroid tissue. Thyroid hormone replacement therapy is given after thyroidectomy to replace hormones normally made by the thyroid gland, and to lower the likelihood of recurrence by preventing the pituitary gland from producing excess thyroid-stimulating hormone. For some types of advanced thyroid cancer, targeted drugs or chemotherapy can be used to help shrink or slow tumor growth.

Survival: The 5-year relative survival rate for thyroid cancer overall is 99% (Table 8) because two-thirds of cases are diagnosed at a local stage and treatment is usually successful for the more common tumor types; survival drops to 89% for medullary thyroid cancer and 15% for anaplastic cancer, a rare but highly aggressive subtype.

Urinary Bladder

New cases and deaths: In 2024, an estimated 83,190 new cases of bladder cancer will be diagnosed in the US and 16,840 people will die from the disease (Table 1). Bladder is the only cancer for which in situ disease (diagnosed before it has spread beyond the layer of cells where it developed) is included in the case estimate because of its high likelihood of progression and recurrence. The incidence of bladder cancer is 4 times higher in men than in women and 2 times higher in White men than in Black, Hispanic, or Asian/Pacific Islander men.

Incidence trends: Bladder cancer incidence decreased slowly during the late 2000s, then accelerated to 1.7% per year from 2015 through 2019.

Mortality trends: Bladder cancer mortality was stable during the 1990s and 2000s, but declined by 1.5% per year from 2015 to 2021.

Risk factors: Smoking is the most well-established risk factor for bladder cancer, accounting for almost half (Figure 4) of all cases in the US. Risk is also increased among workers in the dye, rubber, leather, and aluminum industries; painters and firefighters; people who live in communities with high levels of arsenic in the drinking water; and people with certain bladder birth defects or long-term urinary catheters.

Early detection: There is currently no screening method recommended for people at average risk. People at increased risk may be screened by examination of the bladder wall with a cystoscope (slender tube fitted with a camera lens and light that is inserted through the urethra), microscopic examination of cells from urine or bladder tissue, or biomarker tests, although these have low sensitivity for early-stage cancer.

Signs and symptoms: Bladder cancer is usually detected because of blood in the urine or other symptoms, including increased frequency or urgency of urination, or pain or irritation during urination.

Treatment: Surgery, alone or in combination with other treatments, is used in more than 90% of cases. Early-stage cancers may be treated by removing the tumor and then administering immunotherapy (BCG, or bacillus Calmette-Guérin) or chemotherapy drugs directly into the bladder (intravesical therapy). More advanced cancers may require removal of the entire bladder (cystectomy). This might be followed by systemic immunotherapy, especially in people at higher risk for recurrence. Patient outcomes are improved with the use of chemotherapy before cystectomy. Distant-stage cancers are typically treated with chemotherapy, sometimes along with radiation. Systemic immunotherapy and targeted therapy drugs are newer options, mainly when chemotherapy cannot be used or is no longer working. Timely follow-up care after treatment is extremely important for all patients because of the high likelihood of cancer recurrence or a subsequent bladder cancer. An estimated 72% of individuals with metastatic bladder cancer were originally diagnosed with early-stage disease.

Survival: The 5-year relative survival rate for bladder cancer is 78%, largely because half of all cases are in situ, for which 5-year survival is 97% (Table 8).

Uterine Cervix

New cases and deaths: In 2024, an estimated 13,820 cases of invasive cervical cancer will be diagnosed in the US and about 4,360 women will die from the disease (Table 1).

Incidence trends: Cervical cancer incidence rates decreased by more than half from the mid-1970s to the mid-2000s, largely due to the widespread uptake of screening, but have stabilized over the past decade. However, trends vary widely by age, and decades of decline have reversed in women ages 30-44 years, among whom rates increased by 1.7% per year from 2012-2019. In sharp contrast, declines accelerated during this time period to 11% per year among women ages 20-24 years, likely reflecting the first signs of cancer prevention because of HPV vaccination.

Mortality trends: Cervical cancer mortality rates have also dropped by more than half since the mid-1970s because of prevention and early detection through screening, although rates have stabilized in recent years. Despite the preventability of cervical cancer death, the death rate in Black women and Native American women is about 65% higher than in White women.

Risk factors: Almost all cervical cancers are caused by persistent infection with certain types of human papillomavirus (HPV). HPV infections are common in healthy people and usually resolve before becoming chronic, only rarely causing cancer. Individuals are at increased risk for HPV infection if they began having sex at an early age or if they or their partners have had many sexual partners, although infection can occur with only one sexual partner. Several factors are known to increase the risk of both persistent HPV infection and progression to cancer, including a suppressed immune system, a high number of childbirths, and cigarette smoking. Long-term use of oral contraceptives is also associated with increased risk that gradually declines after cessation.

Prevention: The HPV vaccine protects against the types of HPV that cause 90% of cervical cancers, as well as several other cancers and diseases. Studies are increasingly demonstrating steep reductions in the risk of invasive cervical cancer among vaccinated women that are largest with immunization at or soon after the recommended age. The American Cancer Society recommends routine vaccination between ages 9 and 12, with catch-up vaccination for all persons through age 26 who are not adequately vaccinated. Unfortunately, the immunization rate remains lower than other adolescent vaccines in the US and was stable from 2021 to 2022, when 65% of girls and 61% of boys 13 to 17 years of age were up to date with the HPV vaccination series. HPV vaccination cannot protect against established infections or all types of HPV, which is why it is important for all people with a cervix, even those who have been vaccinated, to follow cervical cancer screening guidelines.

Screening can prevent cervical cancer through detection and treatment of precancerous lesions, which are detected far more frequently than invasive cancer. Cancer can usually be prevented if an individual is screened regularly because most cervical precancers develop slowly. Historically, the only screening option was the Pap test, during which a small sample of cells is collected from the cervix and examined under a microscope to look for abnormalities. The newer HPV test also uses a cervical cell sample but detects the viral infection that precedes cancer occurrence. The HPV test can also identify individuals at risk for cervical adenocarcinoma, which accounts for about 30% of all cervical cancers and is more often missed by Pap test than other subtypes.

Early detection: In addition to preventing cervical cancer, screening can detect invasive cancer early, when treatment is usually less intensive and more successful. Half of those diagnosed with cervical cancer have never been screened. The American Cancer Society guidelines indicate that the preferred method of cervical cancer screening is with a primary HPV test every 5 years for individuals ages 25 through 65 who have a cervix and are at average risk of cervical cancer; only certain HPV tests are approved by the FDA for use as a primary test. If a primary HPV test is unavailable, co-testing (HPV testing in combination with Pap test) every 5 years or screening with a Pap test alone every 3 years is acceptable. Individuals ages 65 and older should continue screening if they have not had regular screening with normal results over the past 10 years or have a history of cervical precancer (cervical intraepithelial neoplasia) or a more serious diagnosis within the past 25 years. For more detailed information on the American Cancer Society's screening guidelines for the early detection of cervical cancer, see page 82.

Signs and symptoms: Preinvasive cervical lesions usually cause no symptoms. Once abnormal cells become cancerous and invade nearby tissue, the most common symptom is abnormal vaginal bleeding, which may start and stop between regular menstrual periods or cause menstrual bleeding to last longer or be heavier than usual. Bleeding may also occur after sexual intercourse, douching, a pelvic exam, or menopause. Increased vaginal discharge may also be a symptom.

Treatment: Precancerous cervical lesions may be treated with a loop electrosurgical excision procedure (LEEP), which removes abnormal tissue with a wire loop heated by electric current; cryotherapy (the destruction of cells by extreme cold); laser ablation (destruction of tissue using a laser beam); or conization (the removal of a cone-shaped piece of tissue containing the abnormal tissue). Early-stage invasive cervical cancers are generally treated with surgery and/or radiation, sometimes combined with chemotherapy. Minimally invasive surgery (laparoscopy) is not often used because it is associated with worse survival than open surgery. Chemotherapy, typically along with immunotherapy and/or a targeted therapy drug, is often used to treat advanced disease.

Survival: The 5-year relative survival rate for cervical cancer is 67% overall, but as low as 57% in Black women (Table 7) and 47% in women 65 years of age and older.

Uterine Corpus

New cases and deaths: In 2024, an estimated 67,880 cases of cancer of the uterine corpus (body of the uterus) will be diagnosed in the US and 13,250 women will die from the disease (Table 1). Cancer of the uterine corpus is often referred to as endometrial cancer because more than 90% of cases occur in the endometrium (inner lining of the uterus).

Incidence trends: Over the past decade, incidence rates have continued to increase by about 1% per year in White women and 2% to 3% per year in women of all other racial/ethnic groups.

Mortality trends: Uterine corpus is one of the few cancers with increasing mortality; since the mid-2000s the death rate has risen by 1.7% per year.

Risk factors: According to American Cancer Society research, an estimated 70% of uterine corpus cancers are attributable to excess body weight and insufficient physical activity, and are thus potentially preventable. Overall excess body weight and abdominal fatness each substantially increase the risk of uterine cancer, partly by increasing the amount of circulating estrogen, which is a strong risk factor. Other factors that increase estrogen exposure or contribute to a hormonal imbalance include the use of estrogen-only menopausal hormone therapy, late menopause, and a history of polycystic ovary syndrome. Tamoxifen, a drug used to treat/prevent breast cancer, increases risk because of estrogen-like effects on the uterus. Medical conditions that increase risk include Lynch syndrome and type 2 diabetes. Pregnancy and use of hormonal contraceptives and continuous estrogen-plus-progestin menopausal hormone therapy are associated with reduced risk.

Early detection: There are no recommended screening tests for women at average risk; however, most cases (69%) are diagnosed at an early stage because of postmenopausal bleeding. Women are encouraged to report any unexpected bleeding or spotting to a clinician. The American Cancer Society recommends that women with known or suspected Lynch syndrome be offered annual screening with endometrial biopsy and/or transvaginal ultrasound beginning at age 35.

Signs and symptoms: The most common symptom is abnormal uterine bleeding or spotting, especially in postmenopausal women. Pain during urination or intercourse, pain in the pelvic area, and non-bloody vaginal discharge can also be symptoms.

Treatment: Uterine cancers are usually treated with surgery (e.g., hysterectomy), radiation, hormones, and/or chemotherapy, depending on the stage of disease. Immunotherapy and targeted therapy drugs might be options in certain situations.

Survival: The 5-year relative survival rate for uterine corpus cancer is 84% for White women but only 63% for Black women, one of the largest racial disparities in cancer. This is partly because Black women are much less likely to be diagnosed with localized-stage disease (56% versus 72%), although survival is lower for Black women for every stage.

Special Section: Cancer in People Who Identify as Lesbian, Gay, Bisexual, Transgender, Queer, or Gender-nonconforming

Introduction

In 2021, an estimated 7% of US adults reported identifying as lesbian, gay, bisexual, transgender, queer, questioning, or other diverse sexual orientation or gender identity (LGBTQ+), with larger percentages among younger generations (21% of Gen Z compared to 3% of baby boomers).[1] More than half of LGBTQ+ adults have experienced harassment, including slurs, micro-aggressions, sexual harassment, and violence, and 1 in 3 have experienced discrimination simply trying to use the bathroom.[2] This discrimination is most common among people of color and extends to health care settings.[2] One in 6 LGBTQ+ adults, and 1 in 5 transgender adults specifically, avoid health care due to previous discrimination.[2]

Similarly, LGBTQ+ individuals with cancer experience disparate outcomes across the cancer continuum, including prevention, screening and early detection, diagnosis, treatment, and palliative care. Although knowledge of these inequalities is accumulating, surveillance data on cancer in the LGBTQ+ population are currently limited to national surveys on risk factors and screening. Population-based data are unavailable for incidence and mortality because sexual orientation and gender identity are not consistently collected in medical records. In this special section, we describe the latest information on the prevalence of major modifiable cancer risk factors and screening in the LGBTQ+ population, as well as challenges faced by LGBTQ+ individuals with cancer based on current data.

Glossary

Sex: Assigned at birth as male, female, or intersex, based on external anatomy, reproductive organs, and chromosomes

Sexual orientation: A person's identity in relation to the gender or genders to which they are sexually attracted. These identities include heterosexual (opposite gender) gay/lesbian (same gender); bisexual (both binary genders); pansexual (all gender identities); and asexual (low or absent interest in sexual activity)

Gender: Socially constructed norms, behaviors, and roles associated with male and female sex

Gender identity: A person's internal sense of self that can exist across the spectrum of male and female

Gender dysphoria: Discomfort or distress that can occur when a person's gender identity differs from their sex assigned at birth or sex characteristics

Cisgender: A person whose gender identity aligns with their sex assigned at birth

Transgender: A person who identifies as other than the sex they were assigned at birth. This can include identifying with a different binary gender (male or female), both binary genders (bigender), a gender besides male or female (nonbinary or genderqueer), no gender (agender), or other.

Cancer Risk Factors

More than 40% of all cancers in the general population are attributable to potentially modifiable risk factors, such as tobacco use, excess body weight, alcohol consumption, and unhealthy diet.[3] Elevated prevalence of some cancer risk factors among LGBTQ+ individuals can be partially explained by minority stress (see inset).[4] The statistics in this section are based on the National Health Interview Survey for information by sexual orientation and the state-based Behavioral Risk

Factor Surveillance System for gender identity, both of which are conducted by the Centers for Disease Control and Prevention.

Smoking

Cigarette smoking increases the risk of lung cancer by 25-fold,[5] and increases the risk of at least 11 other cancers.[6] An estimated 16% of lesbian, gay, or bisexual individuals currently smoke cigarettes, compared to 12% of heterosexual individuals (Figure S1). Prevalence is highest among bisexual women (23%, versus 10% in heterosexual women and 17% in bisexual men). There is some evidence that bisexual individuals initiate smoking at younger ages than gay or lesbian individuals.[7] After adjusting for age, sex, education, race, and place of residence, lesbian and gay individuals are 27% more likely to smoke cigarettes than heterosexual individuals, and bisexual individuals are 66% more likely to smoke (Table S1). Transgender individuals are more likely than cisgender individuals to smoke cigarettes (17% versus 14%), although this disparity is confined to women (22% versus 12% among cisgender women, Figure S2).

Higher smoking rates in LGBTQ+ persons have been explained as a maladaptive coping mechanism (e.g., smoking viewed as stress reliever), in response to minority stressors, facilitated by predatory tobacco advertisements targeted at these communities.[8-11] These stressors may have a larger impact in LGBTQ+ persons of color, who are also at risk of experiencing racial discrimination[11, 12] and have larger differences in smoking prevalence by sexual orientation compared to White individuals (Figure S3).

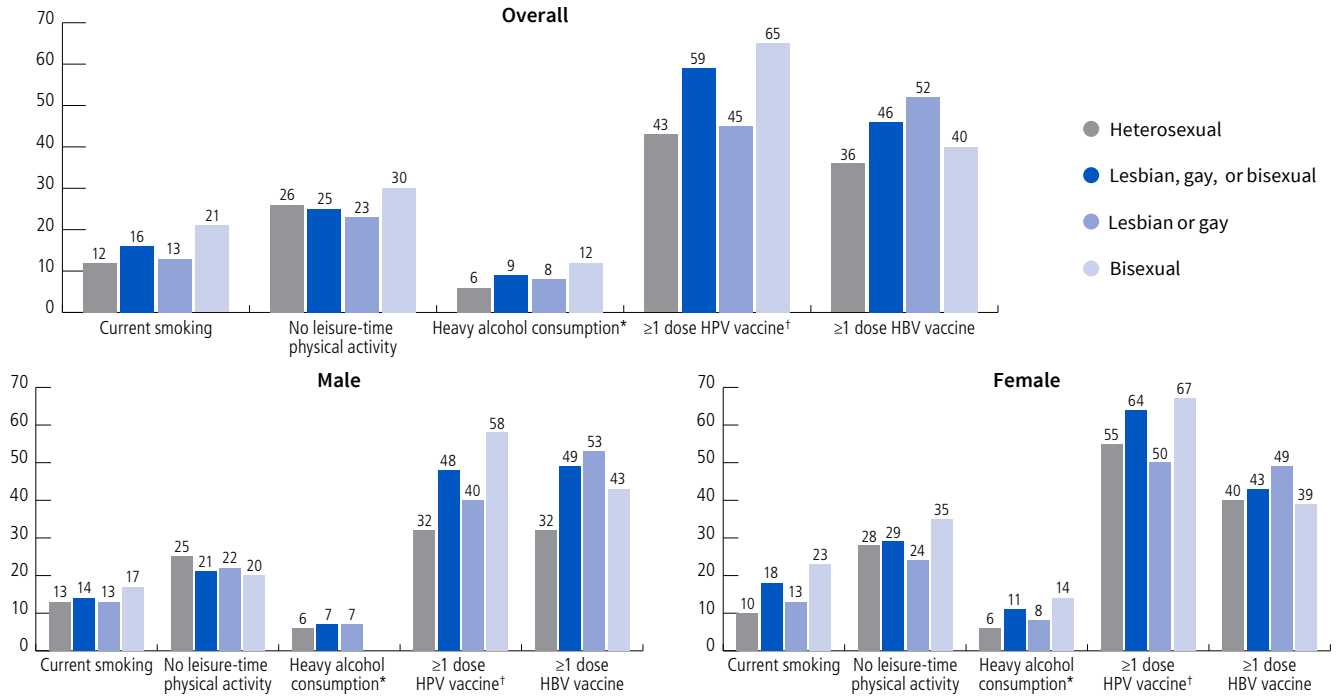
Tobacco use in youth is an important public health issue as nearly 90% of adults who smoke regularly began smoking before the age of 18, and 99% before the age of 26.[13] Lesbian, gay, and bisexual youth in grades 6-12 are much more likely to smoke cigarettes than heterosexual youth (4% versus 1%), and to use e-cigarettes (13% versus 8%, Figure S4). Transgender youth are also more likely to smoke cigarettes than cisgender youth (5% versus 1%) and to use e-cigarettes (11% versus 9%), although this difference is not statistically significant. LGBTQ+ youth also report earlier smoking initiation compared to non-LGBTQ+

Minority Stress and Intersectionality

Health disparities among LGBTQ+ individuals have been attributed in part to minority stress, which refers to "the discrepancy and conflict that arises between the values of a historically minoritized group and the dominant culture or society," as conceptualized by IH Meyer in 2003.[14] Minority stressors faced by LGBTQ+ individuals can be individual or structural and include overt prejudice, rejection, discrimination, and internalized homophobia. Exposure to these stressors may lead to increased prevalence of mental health or substance use disorders and unhealthy behaviors that increase cancer risk.[15] At the cellular level, psychological stress influences biochemical changes such as increased cortisol levels, which can lead to chronic inflammation that increases the risk of cancer and other diseases.[16] Research has also found that individuals who experience greater minority stress are more likely to express gene mutations that are functionally related to cancer,[17] and to have chronic side effects of cancer treatment.[18]

Intersectionality describes the interconnected nature of social categorizations, such as gender, sexual orientation, race, origin, class, and disability, and the resulting patterns of discrimination and disadvantage.[19] Individuals who identify with more than one marginalized group may experience multiple forms of minority stress.[20] Therefore, LGBTQ+ persons, along with other marginalized identities, such as persons of color or with lower socioeconomic status, may experience multiple intersecting systems of oppression (e.g., heterosexism, racism, and classism). Reducing minority stressors by implementing interventions at the structural, interpersonal, and individual level is a crucial component of mitigating cancer disparities in LGBTQ+ communities.[21] These interventions include establishing institutional safe spaces for LGBTQ+ individuals and programs designed to increase knowledge and empathy among providers.[21]

Figure S1. Cancer Risk Factors (%) by Sexual Orientation and Sex, Adults 18 Years and Older, US



HPV: Human papillomavirus. HBV: Hepatitis B virus. Survey estimates were considered unstable and suppressed if denominator sample size was <50 or the relative standard error was >=30%. *Males >14 drinks/week. Females >7 drinks/week. †Ages 18-29.

Source: National Health Interview Survey, 2021-2022 for smoking, 2020 and 2022 for physical activity and alcohol consumption, 2019 and 2022 for HPV vaccination, and 2021 for HBV vaccination.

youth.[22] Reasons for elevated smoking prevalence are similar to adults, but also include additional stressors related to coming out and family rejection.[23, 24]

There are many examples of successful interventions to reduce tobacco smoking in LGBTQ+ adults, including group cessation counseling and community-based programs, but less so among youth. To combat tobacco use among LGBTQ+ youth and young adults, the Food and Drug Administration launched the "This Free Life" campaign in 2016,[23] primarily on digital media, but also in some print and out-of-home marketing (e.g., billboards, bus shelters, etc.) marketing, in 12 designated market areas.[23] The campaign was successful in reaching more

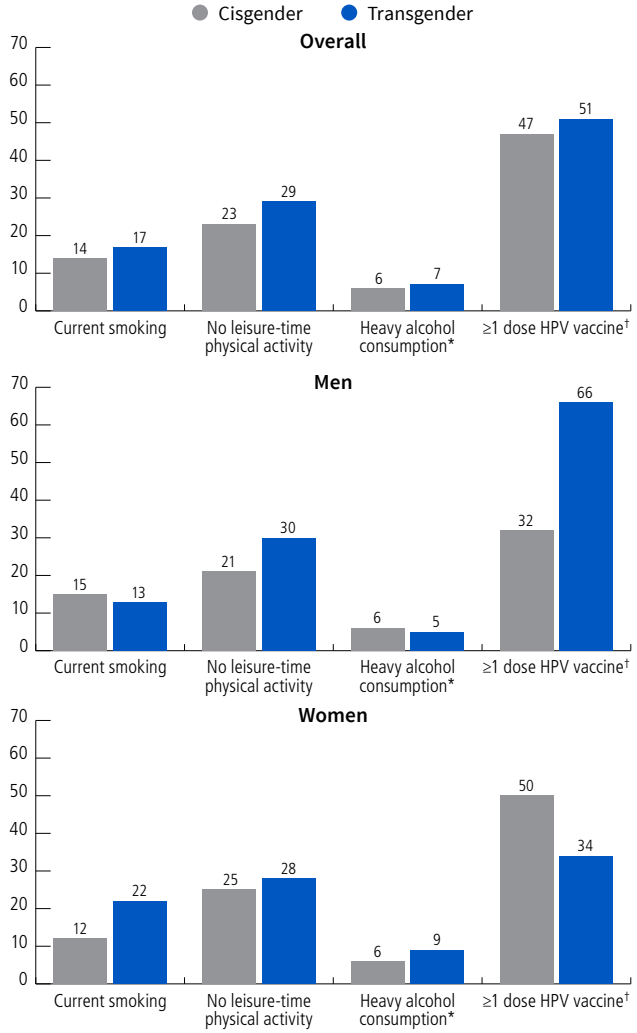
Table S1. Adjusted Prevalence Ratios for Cancer Screening Rates and Cancer Risk Factors by Sexual Orientation, Adults 18 Years and Older, US

	Cancer screening			Cancer risk factors				
	Breast Females 50-74 years	Cervical Females 21-65 years	Colorectal All adults 45-75 years	Current smoking	No leisure-time physical activity	Heavy alcohol consumption*	≥1 dose HPV vaccine†	≥1 dose HBV vaccine
Heterosexual	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Gay/Lesbian	0.97 (0.87, 1.08)	0.92 (0.84, 1.00)	1.14 (1.03, 1.26)	1.27 (1.07, 1.51)	1.06 (0.94, 1.20)	1.16 (0.91, 1.48)	0.98 (0.80, 1.20)	1.39 (1.25, 1.54)
Bisexual	0.94 (0.80, 1.10)	0.97 (0.91, 1.03)	0.89 (0.78, 1.02)	1.66 (1.44, 1.92)	1.08 (0.95, 1.22)	1.77 (1.39, 2.26)	1.29 (1.16, 1.43)	1.02 (0.89, 1.16)

HPV: Human papillomavirus; HBV: Hepatitis B virus. Adjusted for age, sex (when applicable), education, race/ethnicity, region. *Males >14 drinks/week. Females >7 drinks/week. †Ages 18-29

Source: National Health Interview Survey, 2021-2022 for smoking, 2020 and 2022 for physical activity and alcohol consumption, 2019 and 2022 for HPV vaccination, and 2021 for HBV vaccination.

Figure S2. Cancer Risk Factors (%) by Gender Identity, Adults 18 Years and Older, US



HPV: Human papillomavirus. *Males >14 drinks/week. Females >7 drinks/week. †Ages 18-29. HPV vaccination data includes data from AR, CT, GA, HI, IL, MA, MS, NJ, ND, SC, TN, and WV.

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

than half of LGBTQ+ young adults in the market areas, resulting in greater intention to quit and increased awareness of harms, such as a greater proportion believing that using tobacco makes life harder.[23, 25] Notably, the prevalence of an attempt to quit smoking in the past year is higher among sexual minorities, bisexual (71%) and gay/lesbian (65%), compared to heterosexual (54%).[26] Increasing the number of smoking cessation programs, particularly for youth at a local level, and expanding target populations to all LGBTQ+ individuals (as opposed to primarily gay men) would help reduce the burden of cigarette smoking among LGBTQ+ individuals.[27, 28] Structural interventions, such as FDA regulation of the marketing and sale of tobacco products targeted at LGBTQ+ communities and broader interventions to combat structural homophobia and transphobia, are needed to reduce smoking and other tobacco use among both LGBTQ+ adults and youth.

Excess Body Weight and Physical Inactivity

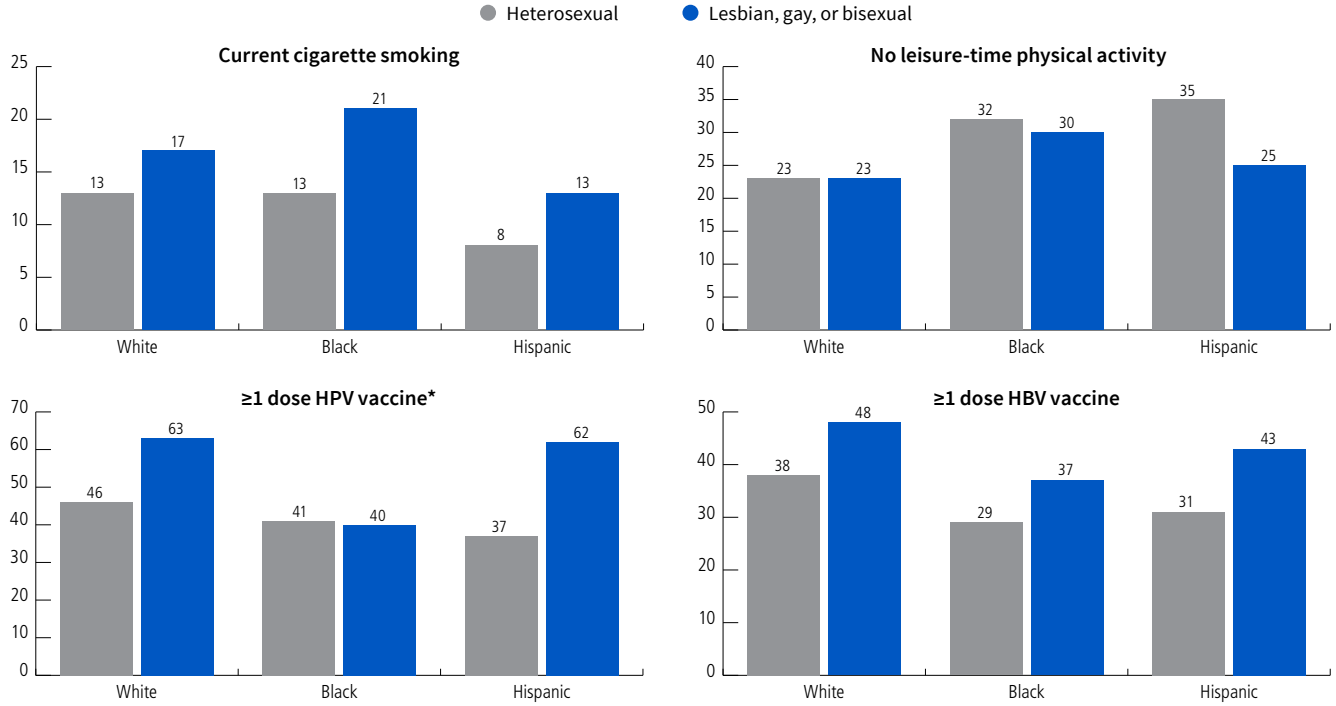
Excess body weight (body mass index [BMI] ≥ 25 kg/m^2) is associated with an increased risk of developing at least 12 types of cancer, including those of the uterine corpus, liver, kidney, esophagus, postmenopausal female breast cancer, and pancreas.[29] Lesbian and bisexual women are more likely to have excess body weight than heterosexual women, whereas gay men are less likely to have excess body weight compared to heterosexual men.[30] The reasons for greater prevalence of excess body weight among lesbian and bisexual women are unclear, but may be partly related to a lower level of engagement in physical activity.[31] For example, 35% of bisexual women report no leisure-time physical activity compared to 24% of lesbian women and 28% of heterosexual women (Figure S1). Physical inactivity is associated with an increased risk of seven cancer types, including bladder, colon, endometrium, and lung,[32-34] and excess leisure-time sitting is associated with an increased risk of cancer death.[33]

Minority stress may also contribute to excess body weight among lesbian and bisexual women, as the primary stress hormone, cortisol, is elevated among obese individuals.[35] Additionally, the influence of pervasive sexual objectification of the female body, body shame, and the development of eating disorders may be exacerbated in lesbian and bisexual women.[36, 37] However, some social scientists caution against the characterization of lesbians as "at risk" for obesity or other health conditions until more extensive high-quality research is available.[38]

Alcohol Use

Alcohol consumption increases the risk of liver, esophageal, colorectal, oral, stomach, and female breast cancers.[39] Lesbian, gay, or bisexual individuals

Figure S3. Cancer Risk Factors (%) by Sexual Orientation, Race, and Ethnicity, Adults 18 Years and Older, US



HPV: Human papillomavirus. HBV: Hepatitis B virus. *Ages 18-64. Survey estimates for Black and Hispanic individuals were unstable for heavy alcohol consumption, and are not shown. Survey estimates for gay, lesbian, and bisexual Asian American and Pacific Islander & American Indian and Alaska Native individuals were unstable and are not shown.

Source: National Health Interview Survey, 2021-2022 for smoking, 2020 and 2022 for physical activity, 2019 and 2022 for HPV vaccination, and 2021 for HBV vaccination.

are more likely than heterosexual people to drink alcohol excessively, especially among women.[40] For example, 14% of bisexual women consume more than 7 drinks per week compared to 8% of lesbian women and 6% of heterosexual women (Figure S1). Although the prevalence of heavy drinking is similar among transgender and cisgender individuals (Figure S2), heavier drinking has previously been reported among young transgender adults.[41] Reasons for excess alcohol use may include sexual minority stress and inaccurate perceptions of high peer alcohol consumption, perhaps related to nightlife settings in social media content.[42, 43] Alcohol is also more available in LGBTQ+-friendly spaces,[42, 44, 45] likely due to targeted advertisement by alcohol manufacturers.[46] Research documenting effective, targeted interventions to reduce alcohol use among LGBTQ+ individuals is lacking, particularly for transgender individuals and sexual minority women.[42, 47]

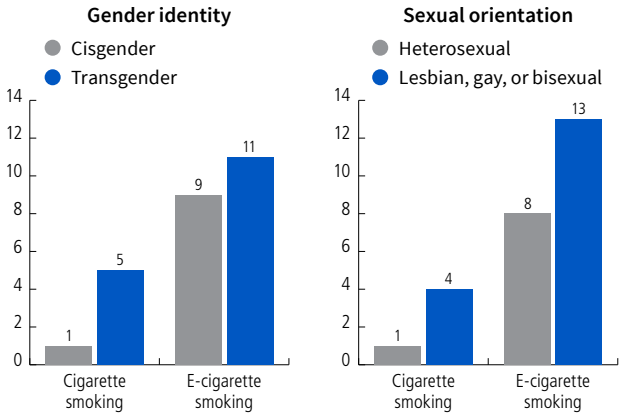
Infectious Agents

Although less than 5% of cancers in the US are attributable to infectious agents,[3] infection-related cancers are more prevalent in gay and bisexual men because anal intercourse is a common mode of viral transmission.[48] For example, 70% of human immunodeficiency virus (HIV) infections were attributed to male-to-male sexual contact in 2019, versus 22% to heterosexual contact and 7% to injection drug use.[49] Further, HIV-infected individuals have a 10-fold higher burden of infection-related cancers than the general population.[50]

Human Immunodeficiency Virus (HIV)

HIV is primarily transmitted through sexual intercourse and illicit injection drug use. HIV differs from other cancer-causing viruses because infection does not cause cancer directly, but indirectly through suppression of the immune system, which also results in an increased risk of cancers caused by other types of viral infection.[51]

Figure S4. Current Cigarette and E-Cigarette Use (%), Middle and High School Students, US, 2022



Source: National Youth Tobacco Survey, 2022.

At least 10 cancers are associated with HIV-infection,[52] three of which (non-Hodgkin lymphoma, Kaposi sarcoma, and cervical cancer) signal clinically relevant immunosuppression and progression to acquired immunodeficiency syndrome (AIDS), referred to as AIDS-defining cancers.[53] Additional HIV-associated cancers include liver, anal, lung, and Hodgkin lymphoma.[52]

Estimated annual incidence of HIV infection has declined from a peak of >130,000 in the mid-1980s to about 35,000 in 2019, with Black and Hispanic people representing 41% and 29%, respectively, of recent infections.[49] Effective HIV prevention strategies, such as pre-exposure prophylaxis with antiretroviral drugs,[54, 55] condom usage,[56] prompt and sustained treatment, and other harm-reduction strategies,[57] have contributed to recent declines in new infections and could accelerate progress with expanded and equitable access. Highly active antiretroviral therapy (HAART) is a treatment that can prevent or delay progression from HIV to AIDS.[58] The widespread uptake of HAART in the US in 1996 is associated with a 70% drop in the incidence of Kaposi sarcoma and a 50% drop in non-Hodgkin lymphoma among HIV-infected individuals.[59] In contrast, the risk increased by 40% for cervical cancer and by two-fold for non-AIDS-defining cancers, likely in large part due to an increase in life expectancy.[58, 59]

Human Papillomavirus (HPV)

HPV infection spreads primarily through intimate skin-to-skin contact and is common regardless of sexual orientation. Although most infections are asymptomatic and cleared by the body, persistent HPV infection causes nearly all cervical cancers, 90% of anal cancers, about 70% of oropharyngeal cancers, and 60% to 70% of vaginal, vulvar, and penile cancers.[60] There is evidence of higher HPV prevalence in some LGBTQ+ population groups. For example, one study of nearly 30,000 men found a prevalence of high-risk anal HPV of 41% in gay and bisexual men compared to 7% in heterosexual men among those who were HIV-negative, and 74% among HIV-positive gay and bisexual men.[61] Prior research has similarly shown elevated prevalence of HPV types associated with anal, cervical, and oral cancers cancer among people with HIV infection.[62, 63]

The first HPV vaccine, approved in 2006, protects against 4 types of HPV, while the most recent vaccine (Gardasil®9), approved in 2014, protects against 9 HPV types and has the potential to avert about 90% of HPV-caused cancers.[60] (For information about American Cancer Society recommendations for HPV vaccination, see cervical cancer prevention on page 29.) As a result of vaccine uptake, the prevalence of infection with vaccine-targeted HPV types declined by more than 80% between 2003-2006 and 2015-2018 among people ages 14-34 years.[64] Receipt of HPV vaccination is highest in people ages 18-29 years who are bisexual (65%), with similar prevalence among gay/lesbian (45%) and heterosexual individuals (43%, Figure S1). Regardless of sexual orientation, receipt of HPV vaccination is lower among Black versus White individuals (Figure S3). HPV vaccination is similar among transgender and cisgender individuals (Table S2).

Hepatitis B Virus (HBV)

Chronic HBV infection causes about 7% of all liver cancers in the United States[3] and is recognized as a risk factor for a small number of non-Hodgkin lymphoma cases.[65, 66] The virus is transmitted through blood or mucosal contact with infectious bodily fluids, including blood, saliva, and semen. It can also be transmitted to infants at birth or shortly thereafter. Most infections

Table S2. Adjusted Prevalence Ratios for Cancer Screening Rates and Cancer Risk Factors by Gender Identity, Adults 18 Years and Older, US

	Cancer screening			Cancer risk factors			
	Breast Females 50-74 years	Cervical Females 21-65 years	Colorectal All adults 45-75 years	Current smoking	No leisure-time physical activity	Heavy alcohol consumption*	≥1 dose HPV vaccine†
Cisgender	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Transgender	0.98 (0.86, 1.12)	0.69 (0.59, 0.80)	0.93 (0.81, 1.05)	1.14 (0.98, 1.33)	1.09 (0.92, 1.30)	1.29 (0.71, 2.35)	1.22 (0.93, 1.59)

Adjusted for age, sex (when applicable), education, race/ethnicity, region. *Males > 14 drinks/week. Female >7 drinks/week. †Ages 18-29. HPV vaccination data includes data from AR, CT, GA, HI, IL, MA, MS, NJ, ND, SC, TN, and WV.

Source: Behavioral Risk Factor Surveillance System, 2018 and 2020 for screening, 2020 and 2021 for risk factors.

occur in unvaccinated adults who engage in high-risk behaviors, including illicit injection drug use, sex with multiple partners, and unprotected anal intercourse.[67, 68]

Although a vaccine against HBV has been available since 1982, with infant vaccination recommended by the CDC beginning in 1991, 70% of adults ages 19 and older reported being unvaccinated in 2018.[69] As a result, the CDC now recommends vaccination of adults ages 19 to 59 universally and ages 60 and older who are high-risk (e.g., men with male sex partners), as well as in individuals younger than 19 years of age. Vaccination in 2021 was higher among lesbian, gay, or bisexual adults compared to heterosexual adults overall (46% versus 36%), with even larger disparities among men (49% versus 32%; Figure S1). Data on vaccination status by gender identity were unavailable. The CDC also recommends one-time HBV screening of all adults ages 18 and older because available treatment can slow the progress of HBV-associated liver disease and is associated with better health outcomes.[70] Although contemporary population estimates of HBV prevalence in the LGBTQ+ population are lacking in the US, a meta-analysis spanning 2000-2021 found a pooled, chronic HBV prevalence of 16% among transgender individuals,[71] significantly higher than the 4.3% reported nationally during 2015-2018.[72]

Hepatitis C Virus (HCV)

Nearly 25% of liver cancers are attributable to chronic HCV infection, which also increases the risk of non-Hodgkin lymphoma.[3] HCV mostly spreads through injection drug use, but is occasionally also transmitted through needle-stick injuries, mother-to-child transmission during birth, or sexual contact with an infected individual. Other risk factors for HCV infection include a higher number of sexual partners and a compromised immune system.[73, 74]

Compared to the general population, the prevalence of HCV infection is 58% higher among HIV-negative gay and bisexual men and more than six-fold higher among HIV-positive gay and bisexual men.[75] This may be, in part, because an estimated 10% to 20% of gay and bisexual men have injected illicit drugs,[76, 77] compared to 2% of the general male population.[78] Similar to alcohol use and cigarette smoking, illicit injection drug use may serve as a coping mechanism for unique minority stressors experienced by gay and bisexual men.[14] HCV prevalence is approximately 30% in gay and bisexual men with a history of illicit injection drug use compared to 3% in those without.[75] The prevalence of HCV among transgender individuals in the US is estimated to be 10%,[71] with higher prevalence among transgender women than transgender men,[79] as well as those with a history of illicit injection drug use.[80]

Most HCV infections become chronic, although only about 1 in 5 individuals are aware of their infection status. Therefore, one-time HCV screening is recommended for all adults ages 18-79 years because available antiviral treatment regimens can eliminate the infection and reduce cancer risk.[81] Unfortunately, lack of access and prohibitive cost has limited uptake.[82] A recent study based on claims data found that less than two-thirds of HCV-positive insured individuals received direct-acting antiviral treatment.[83] Screening and

treatment are part of a 5-year program proposed by the Biden administration to eliminate HCV infection in the United States, along with prevention and monitoring of HCV infections.[82] To maximize their effectiveness, HCV elimination programs at the national, state, and local level should include transgender individuals and gay and bisexual men with a history of illicit injection drug use as a high-risk group.[84]

Barriers to Cancer Care

Although LGBTQ+ individuals were historically less likely to have health insurance than the general population, increased access to care as a result of the implementation of the Affordable Care Act in 2014 and the marriage equality Supreme Court decision in 2015 have narrowed this gap.[85] Perhaps the greatest health disparity faced by LGBTQ+ communities is the presumption-of-care gap, which is the fear that a provider will refuse care due to gender identity or sexual orientation.[86] There are currently 9 states (Alabama, Arkansas, Florida, Illinois, Mississippi, Montana, Ohio, South Carolina, and Tennessee) where it is legal for medical professionals to refuse care to LGBTQ+ patients, covering an estimated 20% of the LGBTQ+ population.[87]

Even where care is accessible, it may not be equitable, especially for transgender patients. One survey of medical students found that 95% were comfortable caring for lesbian, gay, or bisexual patients but only 70% were comfortable caring for transgender patients, and only 1 in 4 were confident regarding the health needs of transgender patients.[88] Among oncologists working at NCI-designated comprehensive cancer centers, only 40% were confident in their knowledge of health needs for lesbian, gay, or bisexual individuals, while only 20% were confident in their knowledge of the health needs of transgender individuals.[89] Inclusion of transgender health in medical and nursing school curricula and continuing education is a crucial step toward the provision of equitable care for transgender individuals with cancer.[90]

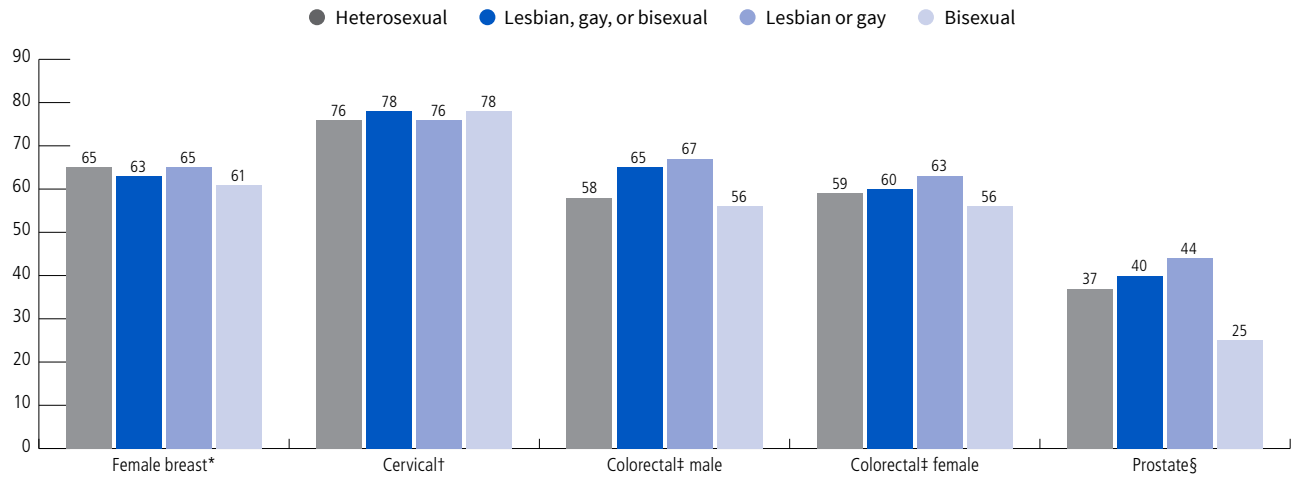
Additional barriers to care include fear of discrimination, discriminatory health care experiences, lack of usual source of care, and cost.[91-94] Transgender individuals with cancer frequently experience misgendering (use of incorrect pronouns), dismissal of their health concerns, discomfort with gender-labeled oncology services, and provider paternalism (choosing a course of action without patient input or consent).[95] These barriers to care lead to poor outcomes. For example, transgender individuals with cancer are more likely to be diagnosed with advanced-stage disease, less likely to receive treatment, and have poorer survival for many cancer types compared to cisgender individuals.[96]

Discriminatory care is even greater among LGBTQ+ individuals who have other marginalized identities, such as African Americans.[97] For example, one recent study found that among women with abnormal mammogram results or a breast cancer diagnosis, Black women who were sexual minorities were five times more likely to experience delays in care than White heterosexual women.[98] Black sexual minority women were also much less likely to have social support. Reducing racism and discrimination against LGBTQ+ individuals in health care is an essential step toward health equity.[99, 100]

Gender-affirming Care

Gender-affirming care for transgender individuals, including medical interventions such as hormone therapy and surgical procedures, is associated with reductions in depression, suicidal behaviors, and other negative health outcomes in an increasing number of studies.[101, 102] However, evidence for a relationship between receipt of gender-affirming care and cancer prevention and treatment is lacking and more research is needed. Patients who do undergo gender-affirming surgery should be assessed for possible genetic cancer predisposition and seek genetic counseling if appropriate.[103] In particular, individuals at very high risk of breast or ovarian cancer (e.g., those with pathogenic *BRCA* gene variants) may consider risk-reducing mastectomy or bilateral salpingo-oophorectomy. Although many cancer treatments are hormone-based and may interact with gender-affirming hormone therapy, most transgender patients are not counseled about potential issues and clinical guidelines are lacking.[104, 105]

Figure S5. Cancer Screening Prevalence (%) by Sexual Orientation, Adults 18 Years and Older, US, 2019 & 2021



Screening prevalence is based on American Cancer Society guidelines. *Mammogram within the past year (ages 45-54 years) or past two years (ages ≥55 years). †Pap test in the past 3 years among women ages 25-65 years OR Pap test and HPV test within the past 5 years among women ages 30-65 years. ‡FOBT/FIT, sigmoidoscopy, colonoscopy, computed tomography (CT) colonography, OR sDNA test in the past 1, 5, 10, 5 and 3 years, respectively. §Prostate specific antigen test within the past year, among males ages 50+ years who have not been diagnosed with prostate cancer.

Source: National Health Interview Survey, 2019 & 2021.

Cancer Screening

According to the National Health Interview Survey, cancer screening prevalence is lower among bisexual individuals compared to heterosexuals except for cervical cancer, with the largest gap for prostate cancer (25% versus 37%; Figure S5). In gay or lesbian individuals, however, screening is similar or higher, including 67% of gay men being current for colorectal cancer screening versus 58% of heterosexual men. Transgender individuals have lower prevalence of sex-specific cancer screenings compared to cisgender individuals, particularly for cervical cancer (59% versus 87%, Figure S6). While HPV infection prevalence among transgender men is similar to cisgender women, receipt of testosterone-based gender-affirming hormone therapy causes atrophy of the vagina and cervix, making the Pap test a less effective screening option.[106, 107] Therefore, screening every 5 years with a primary HPV test is especially important for transgender men.

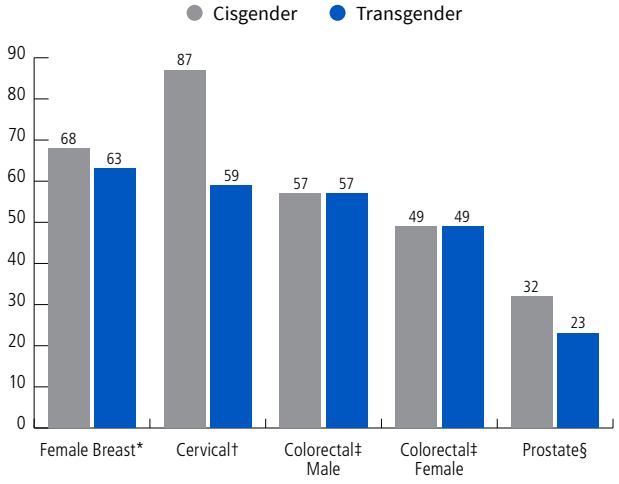
Lack of education and emotional and financial distress are common deterrents to screening among LGBTQ+ individuals,[94] with 65% unsure of which screenings they should receive and 70% unsure about when to begin cancer screening.[108] For example, a common misconception among lesbian women is that they have a lower risk of cervical cancer than heterosexual women.[109] Among transgender individuals, a significant barrier to screening is fear of misgendering, which can result in confusion or lack of insurance coverage for indicated tests.[108] In addition, screening recommendations often exclude specific guidance for transgender individuals. For example, prostate cancer screening guidelines do not include transgender women, many of whom utilize gender-affirming hormone therapy that will change their baseline prostate-specific antigen (PSA) level, the biomarker used to screen for prostate cancer.[110] Including recommendations for transgender individuals in screening guidelines is an important step toward health equity in these communities.

Disparities in Cancer Occurrence

Breast Cancer

Lesbian and bisexual women likely have a higher risk of breast cancer due to higher prevalence of risk factors, including fewer childbirths and higher alcohol use and excess body weight.[111] Although population-based breast cancer incidence is lacking,[112] one modeling study found a 10% higher breast cancer risk among bisexual women

Figure S6. Cancer Screening Prevalence (%) by Gender Identity, Adults 18 Years and Older, US, 2018 & 2020



Screening prevalence is based on American Cancer Society guidelines. *Mammogram within the past year (ages 45-54 years) or past two years (ages ≥55 years). †Pap test in the past 3 years among women ages 25-65 years OR Pap test and HPV test within the past 5 years among women ages 30-65 years. ‡FOBT/FIT, sigmoidoscopy, colonoscopy, computed tomography (CT) colonography, OR sDNA test in the past 1, 5, 10, 5 and 3 years, respectively. §Prostate specific antigen test within the past year, among males ages 50+ years who have not been diagnosed with prostate cancer.

Source: Behavioral Risk Factor Surveillance System, 2018 and 2020.

and 6% higher risk among lesbian women compared to heterosexual cisgender women.[113] Data on breast cancer associated with gender-affirming hormone therapy have been mixed, but transgender women appear to be at an increased risk during hormone treatment compared to cisgender men.[95, 114] Transgender men appear to have a higher risk of breast cancer compared to cisgender men,[113] likely due to lack of top surgery (surgery that removes or augments breast tissue for masculinization or feminization) or incomplete breast tissue removal during top surgery.[114] However, transgender men have a lower risk compared to transgender women.[95, 115]

Breast cancer outcomes are impacted by access to high-quality screening and treatment. Although breast cancer screening rates are similar regardless of sexual orientation, lesbian and bisexual women are more likely to receive a diagnostic mammogram than heterosexual women.[111, 117] One recent study found that compared to cisgender and heterosexual people, LGBTQ+ patients were more likely to experience delays between symptom onset and breast cancer diagnosis and to decline oncologist-recommended treatment, and are three times as likely to experience breast cancer recurrence.[118] Reasons for this could include patient distrust of the health care system due to discrimination, as well as failure on the part of health care professionals to fully evaluate symptoms in LGBTQ+ individuals.[119]

Gynecologic Cancers

Transgender men may remain at risk for gynecologic cancers after gender-affirming surgery, and cases of endometrial, ovarian, and cervical cancers have all been documented.[120] Testosterone therapy has been hypothesized to increase the risk of hormone-responsive endometrial and ovarian cancers because it can be converted to estrogen in the body.[120, 121] Epidemiologic evidence offers only conflicting evidence of this association,[120] and population-based incidence data which include transgender individuals are unavailable. Lower cervical cancer screening prevalence among transgender as compared to cisgender individuals (59% versus 87%, Figure S6) leaves transgender individuals at an elevated risk for cervical cancer. In addition to health care discrimination faced by many LGBTQ+ individuals, transgender men face further barriers to gynecologic oncology care, including discomfort with female sex organs that likely contribute to discrimination based on their transgender identity,[122] having to inform their provider about transgender health care needs, and fear of receiving a gynecologic exam, although epidemiologic evidence is conflicting.[120, 121, 123] These valid fears of disclosure and mistreatment lead to delayed diagnosis and worse health outcomes and can be addressed, in part, by increasing provider awareness and normalizing a broad range of patient backgrounds.[120]

Prostate Cancer

Several case-control studies have investigated prostate cancer risk among gay or bisexual men, with mixed results.[124] Some studies find that a history of sexually transmitted infections and many sexual partners increases the risk of prostate cancer.[124] More research is needed to determine if these factors contribute to prostate cancer risk among gay and bisexual men.

Prostate cancer screening using the prostate-specific antigen (PSA) test can detect asymptomatic disease that would otherwise never be detected. Prior to 1992 and the introduction of PSA screening, HIV-positive men appeared to be at an increased risk for prostate cancer.[125, 126] Following the introduction of PSA testing, this association has reversed, likely due to an increase in asymptomatic case detection among HIV-negative men and lower prevalence of PSA screening among low-income HIV-positive men.[127] Gay men are more likely to be screened for prostate cancer using PSA testing compared to heterosexual men (44% versus 37%, Figure S5), and to be screened at younger ages.[128]

Transgender women remain at risk of developing prostate cancer even after gender-affirming surgery.[129] Although women receiving gender-affirming hormone therapy are at lower risk for prostate cancer than cisgender men, there is some evidence of a higher prevalence of aggressive disease.[129, 130] Cancer may also have begun developing prior to gender-affirming hormone therapy onset.[131] Compared to cisgender men, transgender women have lower prevalence of PSA screening (Figure S6), likely due to lack of awareness of prostate cancer risk, stigma, and a lack of inclusion of this population in screening guidelines.[110]

Cancer Survivorship

The National LGBT Cancer Network estimates that there are 1 million LGBTQ+ cancer survivors in the US.[132] Compared to the general public, LGBTQ+ cancer survivors are more likely to have poor physical and mental health,[133] have higher prevalence of cigarette smoking and heavy alcohol use, and frequently experience homophobia and discomfort expressed by health care providers.[94, 134] Transgender patients also face discrimination in palliative care, including deliberately discourteous treatment, refusal to acknowledge gender identity or use preferred name, and privacy violations.[135] These circumstances and experiences reduce quality of life for cancer survivors, especially for those with high minority stress and/or low social support.[136, 137] For example, LGBTQ+ individuals with cancer are 3-6 times more likely to report high or very high distress levels.[136]

The American Cancer Society Cancer Action Network℠ (ACS CAN), the advocacy affiliate of the American Cancer Society, recently invited a group of LGBTQ+ individuals with cancer and their families to participate in the Survivor Views research panel.[138] Key findings of the survey were that half of LGBTQ+ participants have concerns about facing discrimination in a health care setting, with 20% very concerned. Over half of those surveyed have concerns that legislation will impact their ability to receive care without discrimination. These negative outcomes were more common for Black and Hispanic LGBTQ+ individuals with cancer, as well as those living in the South. These survey data highlight the barriers preventing access to nondiscriminatory care faced by LGBTQ+ individuals with cancer. Improving this access is a necessary step toward equitable cancer care for all individuals with cancer, regardless of their identity.

Call for Increased Data Collection

Sexual orientation and gender identity (SOGI) influence the social determinants of health, including discrimination, social and community relationships, and access to health care, which is why the National Institutes of Health designated sexual and gender minority persons as a health disparity population for research in 2016.[139] Although the majority of oncologists believe SOGI data are important, as of 2020 fewer than half collected this information at their health care center.[140] Institutional collection of SOGI data is significantly associated with a provider's belief that knowledge of a patient's SOGI information is an important part of providing quality care.[140] Challenges in data collection include a lack of institutional guidelines, lack of awareness about specific information to collect, and fear or discomfort on the part of the patient or provider.[141] Interestingly, provider perceptions are not in alignment with patient preferences; 80% of clinicians in a national study believed their patients would refuse to disclose their SOGI data, while only 10% of patients reported such refusal.[142] In fact, LGBTQ+ patients are most likely to understand the value of this information,[142] suggesting that lacking data collection can be largely solved by provider education.

The lack of SOGI data collection at most health care facilities prevents population-based cancer registries and other entities that utilize electronic health records from accurately reporting this information to help inform cancer control efforts. Even when SOGI data are collected, sex or gender variables are often characterized inappropriately, leading to misinformation.[143] For example, when population-based cancer registries report on gender identity, it is recorded as a single data item for "sex" (e.g., "Male," or "Transsexual, natal male"), which can be misinterpreted.[144, 145] Successful reporting of SOGI information in cancer occurrence data will require more complete collection at the facility level and reevaluation of current reporting algorithms, such as implementation of a two-step method for collecting sex at birth and gender identity.[146] Additionally, SOGI data are not reported on death certificates.[147] Further, oncology clinical trials often fail to include LGBTQ+ individuals[148] or distinguish between sex and gender,[149] both of which can undermine equitable outcomes among LGBTQ+ individuals with cancer. The routine collection and reporting of SOGI data at all levels of health care and the inclusion of LGBTQ+ individuals by all governmental and nongovernmental entities engaged in research grant funding will facilitate health equity, inform targeted cancer control efforts, and ultimately improve health outcomes in this underserved population.

Summary

LGBTQ+ individuals are vulnerable to cancer disparities due to higher prevalence of cancer risk factors, such as smoking, likely in part because of stress caused by systemic discrimination. Programs to reduce risk factor prevalence among youth, such as the This Free Life anti-smoking campaign, are critical to reducing the future cancer burden because younger generations are more likely to identify as LGBTQ+. Insufficient access to high-quality care, limited provider knowledge of LGBTQ+ patient needs, discrimination in the health care setting, and a lack of population-based cancer occurrence data are all barriers to health equity that need to be addressed. Additionally, further research building on findings reported herein is warranted.

What Is the American Cancer Society Doing to Address Cancer Disparities in LGBTQ+ Communities?

Advocacy

Our advocacy affiliate, ACS CAN, engages in advocacy efforts at the federal, state, and local levels that reduce cancer disparities in LGBTQ+ communities. Following are some of the ways the organization is fighting to reduce cancer-related disparities, remove barriers to care, and improve health outcomes for LGBTQ+ communities:

- ACS CAN opposes legislation and regulations that include "conscience clauses."
- ACS CAN advocates to maintain the provision of the Affordable Care Act (ACA) that ensures broad protections against discrimination of LGBTQ+ individuals in health care services.
- ACS CAN advocates to ensure that all eligible individuals can access affordable, comprehensive health insurance through Medicaid expansion, which LGBTQ+ communities are more likely to depend on.
- ACS CAN pursues evidence-based policies that reduce the impact of tobacco, including for LGBTQ+ communities, such as comprehensive smoke-free policies, increased taxation of tobacco products, and adequate funding for prevention and cessation programs.
- ACS CAN supported the passage of the Respect for Marriage Act, which ensures marriage equality for same-sex couples and their families and protects their ability to access employer health insurance.

Outreach

- The American Cancer Society and CenterLink work together to educate LGBTQ+ individuals on cancer

prevention and early detection, with a focus on colorectal cancer screening and tobacco cessation.

- The American Cancer Society collaborates with the National LGBT Cancer Network to improve the lives of LGBTQ+ cancer survivors and those at risk by educating, training, and advocating for the LGBTQ+ community through cancer outreach, education, and tobacco use reduction.
- The National Black Justice Coalition collaborates with the American Cancer Society and ACS CAN to reach Black LGBTQ+ communities and other constituents with important messages relating to cancer prevention and early detection.
- The American Cancer Society participates in Pride events across the country to engage LGBTQ+ community members around cancer prevention, early detection, and mission support information. In 2023, 80,000 people were reached at 65 Pride events.

Resources for LGBTQ+ Individuals With Cancer and Their Families

American Cancer Society Cancer Survivors Network®

The Cancer Survivors Network℠ (CSN, csn.cancer.org) is a safe online community where survivors and caregivers can connect with others who have had similar experiences to share their stories, ask questions, and support each other.

Gay Men Talk About Cancer: csn.cancer.org/forum/180

Lesbians Talk About Cancer: csn.cancer.org/forum/181

Cancer*Care*

cancercare.org/tagged/lgbtq+

Cancer*Care* provides free, professional support services for the LGBTQ+ community affected by cancer, as well as practical information and additional resources.

National LGBT Cancer Network

cancer-network.org/

The National LGBT Cancer Network is an education, training, and advocacy organization that works to improve the lives of LGBTQ+ cancer survivors and those at risk. The services they offer LGBTQ+ individuals affected by cancer include free virtual LGBTQ+ support groups three times a week and directories of LGBTQ+-friendly providers. Their advocacy and research efforts include:

- Research on community impact, including collecting stories about how legislative attacks are affecting individuals with cancer
- Improving inclusiveness in cancer centers, including creating LGBTQ+ welcoming environments and developing an 8-part online enduring provider training called Welcoming Spaces
- Running the CDC-funded cancer and tobacco control LGBTQI+ disparity network, and offering technical assistance with cancer and tobacco control entities
- Advocating for increased data collection and elimination of menthol and other flavors in tobacco
- A pipeline diversity initiative for incoming professionals
- A series of patient educational campaigns, such as the Queer Health is Power screening campaign in New York state

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Cancer Disparities

A critical component of the American Cancer Society's mission is the elimination of cancer disparities. Cancer disparities occur when health care access and quality of cancer prevention, screening, and treatment differ based on non-medical factors like skin color, sexual orientation, and the social determinants of health. The social determinants of health are the conditions in which people are born, live, grow, and age. Inequalities in these social determinants among people of color stem from long-standing structural racism that limits opportunities for education, the accumulation of wealth, and other opportunities for upward mobility and advancement.[1] In contrast, inherited biological differences contribute only minimally to overall cancer disparities, although they do help explain some differences. For example, Black women are about twice as likely as any other racial or ethnic group to be diagnosed with triple negative breast cancer, which has much lower survival than other subtypes.[2] Geographic disparities can also be large, with overall cancer mortality rates ranging from 120 per 100,000 persons living in Utah to 180 per 100,000 in Kentucky because of variations in the distribution of social and demographic characteristics (e.g., poverty and race); the prevalence of cancer risk factors and screening; access to high-quality health care (e.g., Medicaid expansion, extent of rurality, density of specialists); and medical practice, including physician bias.

Socioeconomic Status

One of the most important influences on cancer occurrence and outcomes is socioeconomic status (SES), which influences every aspect of the cancer continuum from prevention to survivorship in part because of its influence on access to high-quality health care. Lower SES, which is often approximated in research by income, education, and/or health insurance, is associated with higher cancer incidence and mortality, and this gap is widening.[3] For example, lung cancer mortality rates were 4.6 times higher among men with 12 or fewer years of education than among men with 4-year college degrees in 2015-2019, up from 3 times higher in 2001.[4, 5] That is because people with lower SES have much higher smoking prevalence (24% among men without a high school education versus 6% among college graduates),[6] in part due to targeted marketing by tobacco companies and lagging tobacco control efforts in low-income communities.

People with lower SES also have a higher prevalence of other cancer risk factors, largely because of economic and structural barriers that limit life choices. For example, people of lower SES are more likely to live and work in areas with limited resources that have fewer health care providers and opportunities for physical activity; less availability of fresh fruits and vegetables; and higher exposure to health harms (e.g., air pollutants and excessive heat).[7, 8] People with fewer resources are also more likely to have jobs without employer-provided health insurance and paid time off from work. People without health insurance are more likely to be diagnosed with advanced cancer and less likely to survive.[9] After a cancer diagnosis, approximately one-half of individuals face personal economic burdens associated with the disease and its treatment (financial toxicity)[10] that disproportionately affect those with fewer resources.[11]

Race and Ethnicity

Although race and ethnicity are social constructs that aggregate extremely heterogeneous population groups, they are useful for examining the influence of injustice and discrimination on health disparities. For example, racial and ethnic disparities in the cancer burden largely reflect long-standing inequities in SES and access to high-quality health care, which can be attributed to historical and persistent structural racism in the US experienced by all people of color.[1] According to official estimates from the US Census Bureau, in 2022, 25% of American Indian/Alaska Native (AIAN), 17% of Black, and 17% of Hispanic/Latino populations lived below the poverty line, compared to 9% of non-

Hispanic White (White) and Asian American/Pacific Islander (AAPI) populations. Even after accounting for government assistance, non-White people have 3% to 14% higher poverty in absolute terms than White people.[12] According to estimates from the National Health Interview Survey, adults ages 18-64 years of age who were most likely to be uninsured for at least part of 2021 included Hispanic (34%), Native Hawaiian or Pacific Islander (31%), AIAN (29%), and Black (19%) individuals, compared to 15% of White individuals and 10% of Asian Americans.[13] Existing cancer disparities will likely be further exacerbated by the COVID-19 pandemic, which disproportionately affected Black, AIAN, Hispanic, and AAPI individuals in terms of both illness and secondary consequences.[14]

Disparities by race and ethnicity persist even when SES is similar. For example, people of color are less likely than White people to receive high-quality health care even when health insurance status, age, severity of disease, and health status are comparable.[15] When treatment is equivalent, such as in a clinical trial or equal access care setting, cancer outcomes are more similar.[16-19] However, disparities persist even in these settings due to other obstacles, such as reliable transportation, access to supportive care, language barriers, and provider conscious or unconscious bias.[20] In addition, diverse groups are extremely underrepresented in clinical trials, reducing the generalizability of treatment advances. Reasons for the lack of diversity include restrictive inclusion criteria, limited recruitment sites that favor White patients, and medical mistrust due to historical research misconduct and human rights violations.[21, 22]

Racial and ethnic variation in cancer occurrence also reflect differences in risk factor prevalence for cultural or other reasons. For example, persons who are Hispanic or Asian American have lower rates of lung cancer than other groups (Table 9) because as a whole these populations are historically less likely to smoke, although smoking behavior varies substantially within these broadly defined categories.[1] Conversely, because a relatively large proportion of persons who are Hispanic or Asian American are recent immigrants, these populations often have higher incidence of infection-related cancers (e.g., stomach), reflecting a higher prevalence of infectious agents (e.g., *Helicobacter pylori*) in their native countries (Table 9). Acculturation also has a complex influence on the health of immigrant populations, creating large differences in cancer rates by nativity.

The following sections highlight prominent cancer disparities in each of the four broad racial and ethnic groups that are masked in overall US data, although with some caveats. First, cancer rates for Hispanic and AIAN individuals are known to be underestimated due to substantial racial misclassification on medical and death records. Second, as mentioned earlier, there is substantial variation within these diverse populations by country of origin, duration of residence in the US, geographic location, tribal affiliation (for AIAN individuals), etc. Unfortunately, health data for smaller subgroups are very limited because information on such detailed demographic characteristics is usually not collected. All statistics for the racial groups presented in this and subsection sections are exclusive of Hispanic/Latino ethnicity.

Black individuals: Black men (alongside AIAN men) have the highest overall cancer mortality rate (217 per 100,000), 19% higher than White men (183 per 100,000) (Table 9). In particular, prostate cancer mortality among Black men is approximately double that of men in most other groups and more than four times higher than AAPI men combined (Table 9). Black women have 40% higher breast cancer death rates than White women despite lower incidence rates, a disparity that peaked in 2011 and has since remained largely unchanged. Larger gaps in mortality compared to incidence reflect substantial disparities in survival for Black individuals (Table 7) due to systemic racism that has perpetuated disproportionate poverty and reduced access to equitable care.[1] For example, more than one-third of the Black-White breast cancer survival disparity in women <65 years of age can be explained by less access to high-quality health insurance coverage among Black women.[23] (See *Cancer Facts & Figures for African American/Black People*, available online at cancer.org/statistics, for more information.)

Table 9. Incidence and Mortality Rates for Selected Cancers by Race and Ethnicity, US

Incidence, 2016-2020	All races & ethnicities	White	Black	American Indian/ Alaskan Native†	Asian American/ Pacific Islander	Hispanic/ Latino
All sites	453.2	474.3	459.7	478.8	301.3	358.1
Male	492.5	511.2	533.9	504.1	299.0	377.2
Female	426.6	449.3	409.9	465.5	307.3	351.3
Breast (female)	129.0	134.9	129.6	115.5	104.6	100.7
Colon & rectum*	35.3	35.2	40.8	50	28.1	32.2
Male	40.7	40.4	48.8	57.8	33.4	38.2
Female	30.6	30.5	35.0	43.7	23.7	27.2
Kidney & renal pelvis	17.6	17.8	19.3	33.0	8.2	17.9
Male	23.9	24.3	26.4	43.9	11.6	23.5
Female	12.1	12.1	13.7	23.9	5.5	13.3
Liver & intrahepatic bile duct	8.8	7.5	10.5	19.1	11.9	13.9
Male	13.2	11.2	17.0	27.3	18.4	20.4
Female	4.9	4.2	5.5	12.3	6.7	8.4
Lung & bronchus	55.0	59.5	56.7	62.2	33.6	28.3
Male	62.2	65.7	72.4	67.2	40.8	34.3
Female	49.4	54.8	45.8	58.6	28.1	24.0
Prostate	115.0	110.7	186.1	91.9	60.9	90.9
Stomach	6.3	5.1	9.7	10.1	9.0	9.3
Male	8.4	7.1	13.0	13.1	11.8	11.4
Female	4.6	3.4	7.4	7.8	6.9	7.7
Uterine cervix	7.7	7.2	8.6	11.4	6.0	9.7
Mortality, 2016-2020						
All sites	149.8	155.0	175.8	183.8	95.4	108.6
Male	178.0	183.3	217.4	221.6	111.6	130.2
Female	129.1	133.6	150.2	157.9	83.7	93.5
Breast (female)	19.7	19.7	27.8	21.1	11.8	13.7
Colon & rectum	13.2	13.1	17.7	19.0	9.2	10.7
Male	15.7	15.5	22.4	23.1	11.0	13.6
Female	11.0	11.1	14.4	16.0	7.8	8.5
Kidney & renal pelvis	3.5	3.6	3.4	6.7	1.6	3.3
Male	5.1	5.3	5.2	9.9	2.4	4.8
Female	2.2	2.3	2.2	4.2	1.0	2.1
Liver & intrahepatic bile duct	6.6	5.9	8.3	13.6	8.5	9.3
Male	9.6	8.5	13.0	19.9	12.6	13.1
Female	4.1	3.7	4.8	8.8	5.2	6.0
Lung & bronchus	35.0	38.2	37.5	43.4	20.0	15.5
Male	42.3	44.9	51.3	52.3	25.9	21.0
Female	29.4	32.9	28.0	37.0	15.6	11.4
Prostate	18.9	17.9	37.9	22.5	8.7	15.4
Stomach	2.9	2.1	5.0	5.6	4.7	4.8
Male	3.8	2.9	7.2	7.7	6.0	5.9
Female	2.1	1.5	3.5	4.1	3.7	3.9
Uterine cervix	2.2	2.0	3.3	3.3	1.7	2.5

Rates are per 100,000 population and age adjusted to the 2000 US standard population; incidence is adjusted for delays in reporting. More information on state exclusion can be found in the Sources of Statistics, page 79. All race groups are exclusive of Hispanic origin (see Sources of Statistics, page 79). *Colorectal cancer incidence rates exclude appendix. †To reduce racial misclassification for American Indians and Alaska Native (AIAN) individuals, incidence rates are limited to Purchased/Referred Care Delivery Area counties. Mortality rates for AIAN individuals are for the entire US and are adjusted for racial misclassification on death certificates using factors from the National Center for Health Statistics (see Sources of Statistics, page 79).

Source: Incidence – North American Association of Central Cancer Registries (NAACCR), 2023. Mortality – National Center for Health Statistics, Centers for Disease Control and Prevention, 2023.

American Indian and Alaska Native (AIAN) individuals: AIAN people have the highest incidence of any population in Table 9 for cancers of the kidney, liver, lung and bronchus, cervix, and colorectum. The colorectal cancer disparity is partly driven by the extraordinary burden among Alaska Native individuals, who have the highest incidence in the world,[24] double or more than in American Indian, Black, or White individuals (Table 9). Like other broadly defined groups, however, the cultural and geographic diversity within

the AIAN population is reflected in wide variation in cancer rates because of differences in risk factor prevalence, such as smoking and excess body weight. For example, lung cancer incidence among AIAN men in the Northern Plains is nearly double that in White men, but in AIAN men in the Southwest it is less than half that in White men.[25] See *Cancer Facts & Figures 2022* Special Section on Cancer in the American Indian and Alaska Native population, available online at cancer.org/statistics, for more information.

Asian American and Pacific Islander (AAPI) individuals: Cancer statistics for Asian American, Native Hawaiian, and Pacific Islander individuals are usually presented in aggregate because of limited data availability, including accurate population estimates for smaller more homogenous groups (e.g., by nativity). Thus, statistics for AAPI individuals combined mask wide variation and potential disparities by geographic origin, language, acculturation, and socioeconomic status.[26] For example, lung cancer incidence in the AAPI population overall is about half that in White individuals (Table 9), but in Native Hawaiian people specifically is similar to Whites because of historically high smoking prevalence.[27] AAPI people have liver and stomach cancer rates that are about double those in White individuals (Table 9), and even higher for some high-risk groups, such as Korean individuals; however, rates are lower than Whites among Asian Indian/Pakistani individuals.[14] See *Cancer Facts & Figures 2016* Special Section on Cancer in Asian Americans, Native Hawaiians, and Pacific Islanders, available online at cancer.org/statistics, for more information.

Hispanic/Latino individuals: The Hispanic population is the second-largest racial and ethnic group in the US (19%) and the second-fastest growing after AAPI individuals. The Hispanic population within the US is comprised of more than 20 heritage groups, with the majority of individuals identifying as having Mexican heritage (62%), followed by Puerto Rican (10%), Cuban (4%), Salvadoran (4%), and Guatemalan (3%). Among Hispanic individuals in the US, cancer was the leading cause of death prior to 2020, but was displaced by COVID-19 because of its disproportionate burden on this population. Compared to (non-Hispanic) White people, Hispanic individuals have lower rates for most common cancers (female breast, colorectum, lung, and prostate), but among the highest rates for cancers associated with infectious agents. For example, cervical cancer incidence is 35% higher in Hispanic women than in White women, and liver and stomach cancer rates in Hispanic persons are double those of Whites (Table 9). However, cancer incidence rates vary substantially by country of origin, generation, birthplace, and duration of residence in the US due to acculturation and other factors.[28] For example, prostate cancer incidence is 18% lower in Hispanic men than in White men nationally (Table 9), but 44% higher in men residing in Puerto Rico, which is 99% Hispanic (Table 4). Although emerging studies are untangling differences between Hispanic heritage groups, the diversity that constitutes this population remains poorly understood and more research and focused attention are needed. See *Cancer Facts & Figures for Hispanic/Latino People*, available online at cancer.org/statistics, for more information.

Conclusion

Disparities are pervasive within the US cancer landscape, stemming mostly from socioeconomic inequalities caused by systemic racism and its influence on social class, but also reflecting the differences in nativity and culture of a diverse population. Closing these gaps is a moral imperative that begins with increasing access to high-quality equitable health care, but also requires targeted interventions across the cancer continuum to address the unique needs of all populations and communities, paying particular attention to the social determinants of health. For example, lung and colorectal cancer rates are disproportionately high in Black people but not in Hispanic and AAPI individuals, among whom liver and stomach cancer rates are a concern. AIAN people have elevated rates for all four of these cancers in addition to kidney. An opportunity for reducing these disparities is the expansion of internet infrastructure and increased utilization of modern solutions like digital health. This includes health information technology like electronic health records, which can facilitate more timely

coordinated care, mobile health apps that collect and share data with providers, and telehealth, which enables long-distance care for individuals living in remote rural areas, like much of the AIAN population. Even small strides in mitigating these disparities would save thousands of lives and accelerate overall progress against cancer. For information about American Cancer Society efforts to reduce the cancer burden among historically excluded populations, see the Advocacy section on page 71.

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Tobacco Use

Despite well-established health hazards, tobacco use remains the most preventable cause of cancer occurrence and death in the US.[1] Cigarette smoking still causes about 30% of all cancer deaths[2, 3] and as much as 40% in parts of the South and Appalachia, despite decades of declining smoking rates.[4] Current smoking and use of other combustible tobacco products is especially high among persons with lower socioeconomic status, those who live in rural areas, gay/lesbian/bisexual persons, those with a disability, and those who report serious psychological distress.[5, 6] In 2022, about 49 million US adults (20%) used a commercial tobacco product.[7]

Cigarette Smoking

Cigarette smoking increases the risk of at least 12 cancers, including acute myeloid leukemia, and cancers of the oral cavity and pharynx, larynx, lung, esophagus, pancreas, uterine cervix, kidney, bladder, stomach, colorectum, and liver (Figure 4).[8, 9] Smoking may also increase the risk of fatal prostate cancer and a rare type of ovarian cancer.[8, 9]

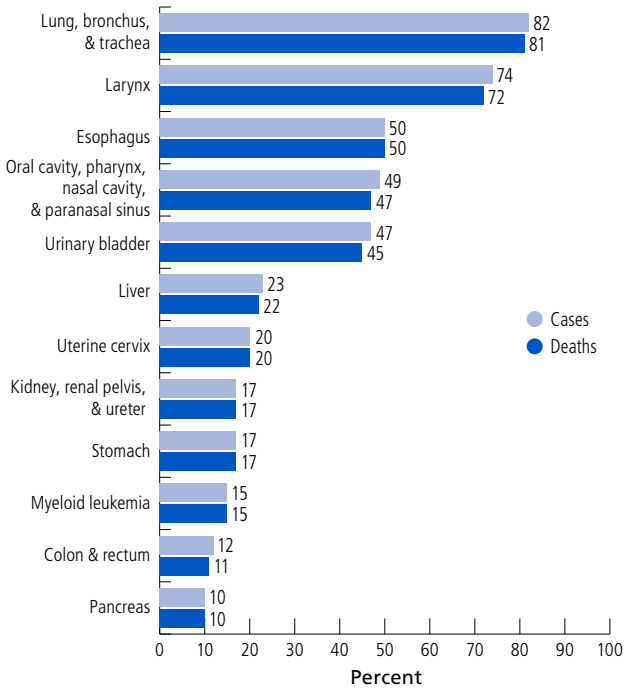
- The prevalence of current (every day or some days) cigarette smoking among US adults ages 18 and older has declined from 42% in 1965 to 12% in 2022.[5, 7, 10] However, almost 29 million adults still currently smoke cigarettes.[7]
- In 2022, there continued to be a wide variation in smoking prevalence by racial/ethnic group, ranging from 4% among Asian adults to 20% among American Indian/Alaska Native adults.[7]
- Cigarette smoking prevalence remains high among those with low levels of education; for example, among adults 25 years of age and older, 23% of those with no high school diploma and 31% of those with a GED (General Educational Development) smoked in 2022, compared to 3% of those with graduate degrees.[7]
- Adult cigarette smoking is much higher in areas of the US that are rural (18%) versus urban (11%).[5]
- At the state level, adult cigarette smoking prevalence in 2021 ranged from 7% in Utah to 24% in West Virginia.[10]
- Among US high school students, the prevalence of current cigarette smoking (past 30 days) in 2022 was 2% overall in both males and females.[11]

Other Combustible Tobacco Products

In addition to cigarettes, other forms of combustible tobacco include cigars, pipes, waterpipes (also known as hookahs or shishas), and roll-your-own products. Persons who regularly smoke cigars have an increased risk of cancers of the lung, oral cavity, larynx, and esophagus, and probably cancer of the pancreas.[12] Waterpipe smoking is often perceived to be less harmful than cigarettes but delivers the same or higher levels of toxins and probably has the same adverse health effects as cigarettes.[13-15]

- In 2022, 4% of adults (men: 7%, women: 1%) reported currently smoking cigars.[7]
- Cigar smoking was more common among Black (6%) and White persons (4%) than among Hispanic (3%) or Asian (1%) persons.[7]
- Among high school students, 3% (girls: 2%, boys: 4%) had smoked cigars at least once in the past 30 days in 2022.[11]
- Cigar smoking was higher among Black high school students (4%) compared to White (3%) or Hispanic (2%) students.[11]
- In 2022, waterpipe smoking (hookah specifically) in the past 30 days was reported by 2% of high school students.[11]

Figure 4. Proportion of Cancer Cases and Deaths Attributable to Cigarette Smoking in Adults 30 Years and Older, US, 2014



Source: Islami F, et al. *CA Cancer J Clin* 2018; 68(1):31.

E-cigarettes

Electronic cigarettes, or e-cigarettes, are devices that aerosolize a liquid that typically contains nicotine, propylene glycol and/or vegetable glycerin flavoring, and other ingredients that are then inhaled by users. Potentially harmful substances include metals and other hazardous chemicals that can seep into the inhaled aerosol, as well as some flavoring components or additives. There is accumulating evidence that e-cigarette use causes short-term adverse effects on cardiovascular and lung health,[16] but long-term risks are not yet known.[17] E-cigarettes are additionally concerning because they are addictive and may be a gateway to combustible tobacco use among some individuals who would otherwise not have smoked. Adolescents and young adults who use e-cigarettes are more likely than nonusers to begin using combustible tobacco products.[18-20] E-cigarette use is particularly worrisome among youth because nicotine can impair adolescent brain development.[21]

The American Cancer Society's position is that no youth or young adults should begin using any tobacco product, including e-cigarettes. To date, no e-cigarette has been FDA-approved as a cessation aid. Visit American Cancer Society Position Statement on Electronic Cigarettes for more information about our position statement on e-cigarettes.

- About 7% of adults were current e-cigarette users in 2022 (7% of males and 6% of females), with prevalence higher in younger people (ages 18-24 years: 15%, 25-44 years: 9%) than older people (ages ≥65 years: 1%).[7]
- In 2022, e-cigarettes were the most commonly used tobacco product among high school students (current use: 14%; 2.14 million users) and middle school students (3%; 0.38 million).[11]
- In 2022, e-cigarette use was similar in high school girls (15%) and boys (13%) but was higher among White students (17%) compared to Hispanic (12%) and Black (11%) students.[11]

Smokeless Tobacco Products

The major smokeless tobacco products marketed in the US are chewing tobacco and snuff, including snus (a "spitless," moist powder tobacco, often in a pouch). These products can cause oral, esophageal, and pancreatic cancers and are not a safe alternative to cigarettes.[22] Switching from combustible to spit tobacco has been shown to result in a higher risk of tobacco-related death than complete tobacco cessation.[23]

- In 2022, 4% of men and <1% of women were current users of smokeless tobacco.[7]
- Among US states and territories, adult smokeless tobacco use in 2021 ranged from 0.5% in Puerto Rico to 9% in West Virginia.[24]
- In 2022, 2% of high school boys and 1% of girls were current smokeless tobacco users.[11] However, use of newer products such as oral nicotine pouches and lozenges was substantially higher (13% pouch use in one sample from fall of 2020 of youth ages 15-24 years).[25]

Secondhand Smoke

Secondhand smoke (SHS) contains more than 7,000 chemicals, including hundreds that are toxic and at least 69 that can cause cancer.[26] There is no safe level of exposure to SHS. People who don't smoke who are exposed to SHS are at increased risk of lung cancer, other respiratory diseases, and heart disease.[27-29] Approximately 6,600 cases of lung cancer diagnosed in the US in 2024 will be the result of SHS exposure.[2] Comprehensive smoke-free laws are effective in reducing SHS exposure by modifying smoking behavior and reducing smoking-related disease.[29]

- Nationwide, SHS exposure (measured by testing a person's blood for cotinine, a by-product of nicotine) among people who don't smoke cigarettes declined from 88% in 1988-1991 to 28% in 2009-2010 and 19.5% in 2017-2020, but remains substantially higher among Black (35%) persons than other racial/ethnic groups (Hispanic: 18%, White: 17%, Asian: 21%) and those with lower family income.[30]
- SHS exposure is highest among youth ages 3-17 years (31%), especially among Black (58%) youth compared to White (29%), Hispanic (20%), or Asian (10%) youth.[30]

Tobacco Cessation

People who quit smoking increase their longevity regardless of age; however, those who quit by age 30 live an average of 10 years longer than if they had continued to smoke.[31] Smoking cessation reduces the risk of all cancers caused by smoking, as well as heart disease and many other smoking-related diseases, and also improves outcomes for cancer survivors.[31] The 2020 US Surgeon General's report 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.[31]

- In 2022, 2 out of 3 persons (66%, 56 million) who had ever smoked at least 100 cigarettes had quit (a population metric known as the "quit ratio"), up from 52% in 2009.[7, 32]
- However, the quit ratio in 2022 was <50% in persons with no high school diploma (49%), those with a GED (48%), those at <100% of the federal poverty level (44%), Medicaid/public/dual insured (46%), and among uninsured persons (44%).[7]
- Over half (53%) of people who smoked in 2022 attempted to quit smoking in the past year, but just 1 in 10 (9%) quit successfully for ≥6 months.[7]
- Although use of effective cessation treatments (i.e., counseling; FDA-approved nicotine replacement therapy or medications, such as varenicline [Chantix] or bupropion [Zyban]) can double or triple the likelihood of successfully quitting long term, less than 40% of people who smoke used these aids in 2022.[7, 33]

Reducing Tobacco Use and Exposure

Numerous federal, state, and local tobacco control policies have been enacted since the release of the landmark 1964 Surgeon General's Report on Smoking and Health, including increasing cigarette taxes, improving access to cessation treatment, implementing smoke-free air laws, improving health warnings, and regulating tobacco marketing.[8] These policies have helped reduce smoking prevalence and avert approximately 2 million smoking-related deaths.[34]

Expanding federal initiatives in tobacco control holds promise for further reducing tobacco use. The Family Smoking Prevention and Tobacco Control Act of 2009 granted the FDA authority to regulate the manufacture, sale, and marketing of tobacco products. In April 2022, after substantial public health advocacy, including from our advocacy affiliate, the American Cancer Society Cancer Action Network℠ (ACS CAN), the FDA proposed product standards to prohibit menthol and other flavoring in cigarettes and cigars.[35-37] This regulation has the potential to reduce smoking initiation and encourage cessation, especially among Black persons, sexual and gender minority persons, and those with lower socioeconomic status who have disproportionately high use of menthol and flavored products because of targeted advertising by the tobacco industry.[35, 37-39] Other federal efforts include the FDA's

highly successful mass media educational campaigns (e.g. "The Real Cost" targeting youth and "Every Try Counts" targeting adults who smoke), and the recent increase in the federal minimum age required to purchase tobacco from 18 to 21 years. Additionally, provisions in the Affordable Care Act require most private and some public health insurance plans to provide at least minimum coverage of evidence-based cessation treatments (i.e., counseling, nicotine replacement therapy, medications), although for many people, minimum coverage falls short of what is needed for long-term cessation.[31]

State initiatives have been at the forefront of effective tobacco control. Since 2000, all but two states – Missouri and North Dakota[40] – have raised their cigarette taxes and about 63% of the US population is covered by a comprehensive smoke-free law.[41] The Centers for Disease Control and Prevention (CDC) recommends best practices and funding levels for state tobacco control programs.[42] However, for fiscal year 2023, state tobacco prevention program funding was less than 2% of the CDC recommended level for Michigan, West Virginia, and Texas and less than 50% for all other states except Alaska, California, Hawaii, Delaware, Maine, North Dakota, Oklahoma, Oregon, and Utah.[43]

State and local level flavored tobacco sales restrictions have been successful in protecting youth and other vulnerable populations.[44] As of March 31, 2023, 15 states had at least one jurisdiction with flavored tobacco sale restrictions and 8 states had state level restrictions (California, Maine, Maryland, Massachusetts, New Jersey, New York, Rhode Island, and Utah).[45] In addition, the Oglala Sioux, Saint Regis Mohawk, and the Turtle Mountain Band of Chippewa Indians Tribes have flavored tobacco sale restrictions.[45]

Conclusion

Since the 1964 Surgeon General's report, smoking prevalence has declined by about two-thirds and millions of premature deaths have been averted. Nevertheless, almost 29 million people still smoke cigarettes, a disproportionate number of whom have lower socioeconomic status. Numerous studies confirm that adequately funded comprehensive tobacco control programs and evidence-based polices can improve health and save lives, including higher taxes, 100% smoke-free laws, barrier-free tobacco cessation treatment coverage, graphic cigarette package warnings, and regulations to reduce the appeal and addictiveness of tobacco products, including menthol and flavor sales restrictions.

See *Cancer Prevention & Early Detection Facts & Figures* at cancer.org/statistics for more information about tobacco control in the US. Visit the ACS CAN website at fightcancer.org/what-we-do/tobacco-control for information on US tobacco control advocacy. See *The Tobacco Atlas* at tobaccoatlas.org for a comprehensive presentation of tobacco-related problems and solutions on a global scale.

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Nutrition and Physical Activity

Aside from avoiding tobacco use, maintaining a healthy body weight, being physically active, consuming a healthy diet, and avoiding or limiting alcohol intake are the most effective strategies for reducing cancer risk. An estimated 18% of cancer cases and 16% of cancer deaths in the United States are attributable to the combined effects of excess body weight, alcohol consumption, physical inactivity, and an unhealthy diet.[1] In 2020, the American Cancer Society released new diet and physical activity guidelines for reducing cancer risk.[2] These guidelines include community action recommendations because of the strong influence of environment on individual diet and physical activity choices. Research has shown that adults who most closely followed our recommendations are 10%-20% less likely to be diagnosed with cancer and 25% less likely to die from the disease.[3]

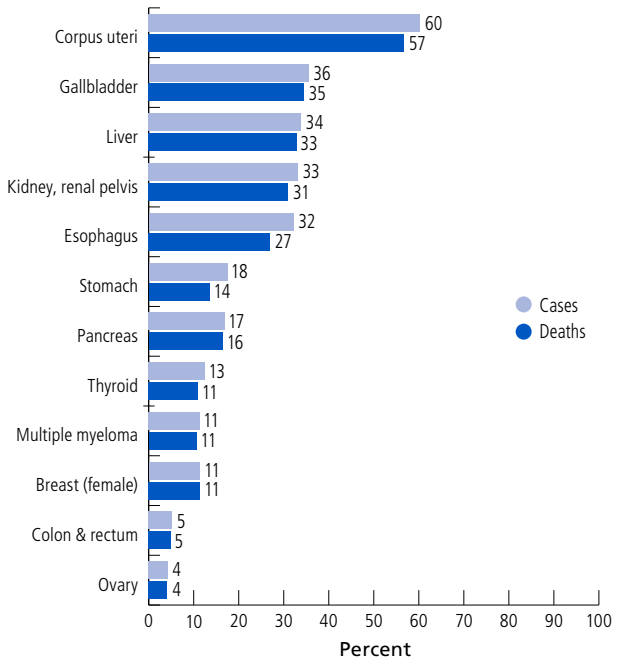
Excess Body Weight

Excess body weight (i.e., overweight or obesity) is convincingly associated with an increased risk of developing several types of cancer: uterine corpus (endometrium), esophagus (adenocarcinoma), liver, stomach (cardia), kidney (renal cell), meningioma, multiple myeloma, pancreas, colorectum, gallbladder, ovary, female breast (postmenopausal), and thyroid (Figure 5).[4] There is some evidence that excess body weight may also increase the risk for cancers of the mouth, pharynx, larynx, and male breast, as well as fatal prostate cancer and non-Hodgkin lymphoma (diffuse large B-cell lymphoma).[5]

Excess body weight is associated with several female cancers, and thus accounts for a larger proportion of cancer in women (10%, ranging from 7% in Hawaii to 11% in the District of Columbia) than in men (5%, ranging from 4% in Montana to 6% in Texas).[6] The cancer burden is also influenced by the strength of the association with excess body weight, which is often estimated in terms of by body mass index (BMI), defined as weight in kilograms divided by the square of height in meters. For example, 60% of uterine corpus cancers are attributed to excess weight compared to only 4% of ovarian cancers (Figure 5). This is because each 5 kg/m^2 increase in individuals' BMI raises uterine corpus risk by almost 50% compared to 3% increased risk for ovarian cancer. Evidence is growing about the adverse health consequences of cumulative exposure to excess body fat over the life course as a result of childhood obesity.[7, 8] However, emerging research suggests that even modest sustained weight loss can help mitigate risk of some cancers.[9]

- The prevalence of overweight (defined as BMI 25.0 to 29.9 kg/m^2) has remained relatively stable among US adults (ages 20-74 years) since the early 1960s at about 40% in men and 25%-30% in women.[10, 11]
- In contrast, obesity (BMI ≥30 kg/m2) prevalence among adults has markedly increased from 11% of men and 16% of women during 1960-1962 to 42% of both men and women during 2017-March 2020.[10, 11]
- During 2017-March 2020, obesity prevalence among men was highest in Hispanic adults (46%), followed by White (44%), Black (41%), and Asian adults (19%); among women, obesity was highest among Black adults (59%), followed by those who were Hispanic (46%), White (40%), and Asian (15%).[11]
- Among youth (ages 2-19 years), overweight (BMI-for-age from 85th to <95th percentile) prevalence increased from 10% in the early 1970s to 17% during 2017-March 2020, whereas obesity (BMI-for-age ≥95th percentile) prevalence rose four-fold, from 5% in the early 1970s to 20% during 2017-March 2020.[11, 12]
- Between 1999-2000 and 2017-March 2020, obesity prevalence increased among adolescents (ages 12-19 years) who were Mexican American (22% to 33%), Black (21% to 29%), and White (14% to 19%).[11, 13]

Figure 5. Proportion of Cancer Cases and Deaths Attributable to Excess Body Weight in Adults 30 Years and Older, US, 2014



Source: Islami F, et al. *CA Cancer J Clin* 2018; 68(1):31.

- During 2017-March 2020, the prevalence of overweight/obesity combined was 29% among children ages 2-5 years, 37% among children ages 6-11 years, and 40% among adolescents ages 12-19 years.[11]
- Studies indicate that weight gain, BMI, and obesity prevalence increased during 2020, but more years of data are needed to assess whether this is related to the COVID-19 pandemic or a continuation of the established trend.[14]

Physical Activity

Physical activity decreases the risk of cancers of the colon (but not rectum), female breast, endometrium, kidney, bladder, esophagus (adenocarcinoma), stomach (cardia), and possibly lung.[5, 15, 16] Approximately 3% of cancer cases are attributed to physical inactivity, ranging from 2% in Utah to 4% in Kentucky, although this is likely an underestimate because it excludes lung and other cancer sites that might be associated with physical inactivity.[17] Cancer patients who are physically active are less likely to have adverse effects from treatment and to die from their cancer than those who are inactive.[18] Extended leisure-time sitting has also been associated with increased risk of cancer death,[19] whereas replacing sedentary time with even short durations of moderate- to vigorous-intensity aerobic physical activity appears to reduce cancer mortality.[20]

- The prevalence of adults who met recommended aerobic activity levels in 2022 was 49% (men: 54%, women: 44%). Conversely, 27% of adults reported no leisure-time physical activity (men: 25%, women: 29%).[21]
- In 2022, a higher proportion of Black (33%) and Hispanic (35%) persons reported physical inactivity than White (23%) or Asian (24%) persons.[21]
- In 2021, only 24% of US high school students (males: 32%, females: 16%) engaged in the recommended minimum of 60 minutes of daily physical activity on all 7 days in the previous week.[22]

Diet

Approximately 5% of all cancer cases are attributed to poor diet.[1] Following an overall healthy dietary pattern is associated with lower risk of several cancers.[23] For example, whole grains, dietary calcium, and dairy products are associated with lower risk of colorectal cancer, and higher intake of fruits and vegetables may lower the risk of pharyngeal, oral, and liver cancers, respectively.[24] In addition, processed and red meat are designated definite and probable carcinogens, respectively, by the International Agency for Research on Cancer based on their association with colorectal cancer risk.[25] Meanwhile, sugar-sweetened beverages and highly processed foods are convincingly associated with obesity, itself an established cancer risk factor.[5] A Mediterranean diet rich in vegetables, legumes, fruit, whole grains, nuts, fish, and olive oil, and low in red and processed meat is associated with lower risk of breast, colorectal, gastric and head and neck cancer.[26, 27]

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

Recommendations for individuals

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

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

2. Be physically active.

Adults should engage in 150-300 minutes of moderate-intensity physical activity per week, or 75-150 minutes of vigorous-intensity physical activity, or an equivalent combination; achieving or exceeding the upper limit of 300 minutes is optimal.

Children and adolescents should engage in at least 1 hour of moderate- or vigorous-intensity activity each day.

Limit sedentary behavior, such as sitting, lying down, and watching television, and other forms of screen-based entertainment.

3. Follow a healthy eating pattern at all ages.

A healthy eating pattern includes:

- Foods that are high in nutrients in amounts that help achieve and maintain a healthy body weight
- A variety of vegetables – dark green, red, and orange, fiber-rich legumes (beans and peas), and others
- Fruits, especially whole fruits with a variety of colors
- Whole grains

A healthy eating pattern limits or does not include:

- Red and processed meats
- Sugar-sweetened beverages
- Highly processed foods and refined-grain products

4. It is best not to drink alcohol.

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

Recommendation for community action

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

For more information:

Visit cancer.org/health-care-professionals/american-cancer-society-prevention-early-detection-guidelines/nupa-for-prevention-guidelines.html for the diet and physical activity guideline for cancer prevention.

Visit cancer.org/health-care-professionals/american-cancer-society-survivorship-guidelines/nupa-guidelines-for-cancer-survivors.html for the nutrition and physical activity guideline for cancer survivors.

Moreover, cancer survivors who follow a healthy diet pattern have a 17%-18% lower risk of dying from cancer or other causes.[26] The American Cancer Society recommends consuming an overall dietary pattern rich in a variety of vegetables and legumes, whole fruit, and whole grains and limiting (or not eating) red and processed meats, highly processed foods, and refined grains and limiting (or not drinking) sugar-sweetened beverages for cancer prevention.[2]

- Among adults, a median of 24% reported eating two or more servings of fruit per day, and 11% reported eating vegetables three or more times per day in 2021.[28]
- Between 1999-2002 and 2015-2018, total energy intake (kcal) declined for carbohydrates (51% to 45%) but increased for saturated fat (11% to 12%) and protein (15% to 16%) among adults ages 20 years and older.[29]
- Between 1999 and 2018, total energy consumed from ultraprocessed foods (e.g. packaged snacks, sugar-sweetened beverages, candy, industrial breads/cereals, ready-to-eat dishes, reconstituted meat) among youth ages 2-19 years increased from 61% to 67%, with significantly larger increases in Black and Mexican American youth than among White youth.[30]

Alcohol

Alcohol consumption increases risk for cancers of the mouth, pharynx, larynx, esophagus (squamous cell carcinoma), liver, colorectum, female breast, and stomach.[5] An estimated 5% of cancer cases are attributed to alcohol consumption, ranging from 3% in Utah to 7% in Delaware.[31] Cancer risk increases with alcohol volume, and consumption at any level appears to increase risk for some cancers.[32, 33] Alcohol consumption combined with tobacco use synergistically increases the risk of cancers of the mouth, pharynx, larynx, and esophagus far more than the additive effect of these exposures individually.[34]

- In 2022, 70% of adults reported current alcohol consumption (≥12 drinks in lifetime and ≥1 drink in the past year).[21]
- About 6% reported heavy drinking (>14 or >7 drinks/week in the past year for men or women, respectively) in 2022, ranging from 2% in Asian persons to 8% in White persons.[21]
- In 2021, 23% of US high school students reported current (past month) use of alcohol, with substantially higher levels among females (27%) compared to males (19%).[35]

Type 2 Diabetes

Type 2 diabetes, a chronic condition characterized by high blood sugar in which the body loses its ability to respond to insulin, shares several modifiable risk factors with cancer, including excess body weight, poor diet, and physical inactivity. Evidence also suggests that type 2 diabetes independently increases risk for several cancers, including liver, endometrium, pancreas, colorectum, kidney, bladder, breast, and perhaps ovary.[36-38] More than 90% of US adults with diabetes have type 2 disease.[39]

- From 2001-2004 to 2017-March 2020, diagnosed diabetes prevalence among adults ≥18 years of age increased from 7% to 11%.[40]
- In 2017-March 2020, the prevalence of diagnosed diabetes was higher among Black (13%) persons than those who were Asian (11%), Hispanic (11%), or White (11%).[40]

Conclusion

Almost 1 in 5 cancers is caused by excess body weight, alcohol consumption, unhealthy diet, and/or physical inactivity. Many Americans encounter substantial barriers to consuming a healthy diet and engaging in regular physical activity. To facilitate healthier lifestyles and curtail the future cancer burden, policy and environmental interventions across national, state, and local levels are needed. Efforts should include creative new strategies that are culturally appropriate and equitable to increase access to affordable, nutritious foods (e.g., healthy checkout aisles) and safe, enjoyable opportunities for physical activity (e.g., quality school physical education programs).[2]

Visit cancer.org/healthy/eat-healthy-get-active/acs-guidelines-nutrition-physical-activity-cancer-prevention.html for more information on the American Cancer Society's nutrition and physical activity guidelines, and review *Cancer Prevention & Early Detection Facts & Figures* at cancer.org/statistics for additional information about how healthy behaviors influence cancer risk.

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The Global Cancer Burden

The American Cancer Society is working to end cancer as we know it, for everyone. In 2022, there were an estimated 20.0 million new cancer cases (18.7 million, excluding nonmelanoma skin cancer) and 9.7 million cancer deaths globally.[1] The most commonly diagnosed cancers are female breast, lung, colorectal, prostate, and stomach, which account for about half of all cases. Lung cancer is by far the most common cause of cancer death, followed by cancers of the colorectum, liver, stomach, and female breast. Substantial variation exists in cancer incidence and mortality rates across countries, reflecting differences in the prevalence of cancer risk factors and the availability of preventive services and high-quality care. Although cancer incidence rates increase with a country's socioeconomic development, cancer mortality rates vary less due to poorer survival in countries with fewer resources. Emerging economies are seeing a sharp rise in the prevalence of cancer risk factors, such as smoking, alcohol use, unhealthy diet, and excess body weight, leading to an increase in the incidence of associated cancers, such as lung, colorectum, and breast. If these trends are not addressed, they could overwhelm the health care systems of many lower-income countries, which already have a disproportionate burden of infection-related cancers, such as cervical and stomach. Given that close to 42% of all cancers are preventable, integration of effective and resource-sensitive prevention measures into existing health care systems is essential for global cancer control.[2, 3]

Tobacco Use

Tobacco use is the largest avoidable cause of cancer mortality worldwide, responsible for 26% of total cancer deaths in 2019 (36% in men and 12% in women). Currently, only 19% of tobacco-attributable cancer deaths occur in low- and middle-income countries (LMICs), reflecting much lower historical smoking prevalence compared to higher-income countries. However, tobacco use has increased significantly in many LMICs in recent years, foreshadowing a substantial tobacco-related cancer burden. In 2019, over 80% of the 1.1 billion current smokers worldwide ages 15 and over resided in LMICs and more than 35% of individuals in upper middle-income countries smoked cigarettes in 2018, substantially higher than any other income group.[4]

The world's first international public health treaty, the World Health Organization's Framework Convention on Tobacco Control, came into effect in 2005 and is legally binding in 182 countries that have ratified the convention, covering more than 90% of the world population.[5] However, several nations, including major tobacco-producing nations such as the United States, Argentina, and Indonesia, have not yet become parties to the convention. In 2022, more than 5.6 billion people (71% of the world's population) were covered by at least one significant tobacco control measure at the highest level recommended by the convention, up from 1.1 billion in 2007.[6] The WHO estimates that 2.1 billion people living in 74 countries are covered by complete smoke-free indoor public places, workplaces, and public transport, representing a seven-fold increase since 2007.[6] Graphic health warnings have made the most progress, covering 57% of the world's population – up from 5% in 2007,[6] and tobacco taxation the slowest progress, with coverage of the world's population increasing from 7% in 2007 to only 12%. Despite remarkable gains in the implementation of tobacco control measures, the emergence and expansion of electronic nicotine delivery systems introduces new challenges. According to the latest WHO report published in July 2023, 2 billion people are still unprotected by any regulatory restrictions on electronic nicotine delivery systems.

Infection

Many cancers, including stomach, liver, cervical, oropharyngeal, anogenital, non-Hodgkin and Hodgkin lymphoma, and Kaposi sarcoma, are caused by infectious agents. In 2018, about 2.2 million cancer

cases, or 13% of global cancer cases, were attributable to infection. However, the proportion of cancer associated with infection varies substantially across countries, ranging from less than 5% in the US to more than 50% in several countries in sub-Saharan Africa.[7] The most prominent cancer-causing infectious agents are *Helicobacter pylori (H. pylori)*, human papillomavirus (HPV), hepatitis B virus (HBV), and hepatitis C virus (HCV), which together are responsible for more than 90% of all infection-related cancers. Most of these cancers are preventable through vaccination (HPV and HBV), screening (HPV), treatment (*H. pylori* and HCV), and behavioral changes. East Asia has the highest burden of infection-attributable cancer worldwide because of the large population size and high prevalence of *H pylori* (stomach cancer) and HBV infection (liver cancer), whereas sub-Saharan Africa has the highest proportion of infection-attributable cancers, largely driven by HPV (cervical cancer) and HBV (liver cancer).

Excess Body Weight

Excess body weight (body mass index ≥25kg/m^2) increases the risk of at least 13 cancer types and accounted for more than 4% of all cancer cases among adults worldwide in 2019, ranging from an estimated 2.6% in low-income countries to 5.7% in high-income countries. The prevalence of excess body weight continues to increase rapidly across the globe. Over 4 billion people, or over 50% of the world population, are projected to have excess body weight by 2035, up from 2.6 billion, or 38%, in 2020.[8] Many LMICs have experienced the steepest increases due to changes in the food environment, such as increased availability of energy-dense, nutrient-poor foods alongside reduced opportunities for physical activity. Globally, 28% of adults and 81% of adolescents were not sufficiently physically active (less than 150 minutes of moderate-intensity physical activity per week, or less than 75 minutes of vigorous-intensity physical activity per week, or equivalent) in 2016.[9]

Alcohol consumption

Alcohol consumption increases the risk of cancers of the oral cavity, larynx, esophagus, colorectum, liver, and female breast. Globally, an estimated 741,300 cases, or 4% of all new cancers, in 2020 were attributable to alcohol consumption, with the lowest proportion in northern Africa (0.3%) and western Asia (0.7%) and the highest in central and eastern Europe (5.6%) and eastern Asia (5.7%).

The Role of the American Cancer Society

With more than a century of experience in cancer control, the American Cancer Society is uniquely positioned to help save lives from cancer globally by assisting and empowering health professionals, health institutions, and cancer organizations in LMICs to implement evidence-based cancer control practices.

Increase HPV vaccination worldwide. The Global HPV Cancer Free initiative works to normalize HPV vaccination as cancer prevention in LMICs. The American Cancer Society envisions all clinicians recommending the vaccine routinely and confidently to age-appropriate adolescents; parents demanding their adolescents be vaccinated; community members advocating for HPV vaccine access and uptake; and policymakers including and funding the vaccine in national and sub-national programs. Currently engaged in Kenya, Colombia, and India, we are implementing multicomponent action led by in-country cancer organizations to increase the uptake of HPV vaccination among clinicians and parents using behavioral interventions that are locally tested for effectiveness and engineered for scale-up through health systems and communities.

Improve global patient support. Through our Building Expertise, Advocacy, and Capacity for Oncology Navigation (BEACON) Initiative, the American Cancer Society supports health institutions and cancer organizations in LMICs to design, implement, and sustain cancer patient navigation programs to remove barriers to care. We also support the integration of

patient navigation into cancer control planning and cancer care delivery in LMICs. Our organization has created a dynamic and self-service global oncology navigation toolkit supported by a global virtual community of practice to help stakeholders interested in providing more patient-centered care build and deliver programs suited to their local context utilizing available resources. The toolkit also provides resources to facilitate the delivery of high-quality cancer education for patients, caregivers, and their families, including two new global cancer education materials in easy-to-understand English designed for use by cancer patients and health workers in a variety of LMIC settings around the world. These materials have been translated into French, Portuguese, and Indonesian, with more language translations in development. The BEACON Initiative completed an 8-country pilot in May 2023, and now reaches users in more than 25 countries.

Make effective treatment available to all in need. The American Cancer Society Global Cancer Treatment team works to reduce cancer mortality by addressing disparities in access to affordable, high-quality treatment. Along with collaborators in the Allied Against Cancer alliance, the National Comprehensive Cancer Network, the Clinton Health Access Initiative (CHAI), and the African Cancer Coalition, we have developed more than 50 cancer treatment guidelines adapted for use in sub-Saharan Africa covering more than 90% of people with cancer in the region. The American Cancer Society and CHAI have brokered agreements with four pharmaceutical companies to reduce the cost of 44 lifesaving cancer treatments by 50%. Additionally, the ChemoSafe project supports African Health Ministries and cancer treatment centers to improve the safe handling and administration of chemotherapy through the implementation of safety standards, training, and access to personal protective equipment.

More than 3.2 billion people worldwide lack access to adequate pain relief. Improved access to essential pain medicines is arguably the easiest and least expensive unmet need to improve cancer care in LMICs. The American Cancer Society leads projects to improve access to essential pain medicines and supports national morphine production programs that have dramatically reduced cost and increased access. The Pain-Free Hospital Initiative is a one-year hospital-wide quality improvement initiative designed to integrate pain treatment into service delivery by providing education, raising motivation and awareness, documenting pain levels, improving medicine supply, and communicating impact.

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The American Cancer Society

The American Cancer Society is a leading cancer-fighting organization with a vision of ending cancer as we know it, for everyone. We are improving the lives of people with cancer and their families as the only organization combating cancer through advocacy, research, and patient support, and ensuring that everyone has an opportunity to prevent, detect, treat, and survive cancer. Thanks in part to our contributions, 4.1 million cancer deaths have been averted in the US since 1991, when cancer death rates were at their peak.

This work could not be accomplished without the strength of our dedicated volunteers, who drive every part of our mission. With the support of our employees, volunteers raise funds to fuel research breakthroughs, advocate for important issues like health equity and more affordable care, provide patient and caregiver support, and support transportation and lodging programs to increase access to cancer care, just to name a few.

Patient Support

At the American Cancer Society, we continue to refine our approach and deepen our commitment to ending cancer as we know it, for everyone. We work to touch as many lives as possible and ensure no one faces cancer alone, understanding that people have different circumstances and needs throughout their cancer journey. We also work to establish and enhance collaborative partnerships with shared goals to eliminate cancer disparities, improve the lives of people with cancer and their families, assist cancer professionals in providing the highest quality care, and provide anyone impacted by cancer with the support, information, and resources they need – from prevention to detection and diagnosis, through treatment and survivorship, and for some, the end of life.

American Cancer Society patient support programs and services touch more than 55 million lives each year. We provide trusted information and support where and when people need it most, helping them live their best and longest lives. Evidence-based health equity principles are the foundation of everything we do as we work to eliminate barriers and ensure everyone has the same opportunity to prevent, detect, treat, and survive cancer.

Cancer Helpline. Our caring, trained cancer helpline specialists are available 24/7 to answer questions about cancer and connect people with resources to help meet needs that emerge throughout the cancer continuum. Services are provided 365 days a year via our toll-free helpline (1-800-227-2345) in English, Spanish, and more than 200 other languages through a translation service. Additionally, online live chat sessions and video calls are available in English on weekdays. Visit cancer.org/about-us/online-help/contact-us for more information.

Cancer.org and patient education materials. Our website, cancer.org, and educational materials offer evidence-based, understandable, and actionable health information curated by oncology physicians and nurses. Our cancer information includes print materials, downloadable PDFs, videos, quizzes, image galleries, and 3-D animations to help people understand and manage issues related to cancer risk, prevention, screening, diagnosis, treatment and side effects, survivorship, and end of life. Visit cancer.org/materials to order patient education print materials. At cancer.org/cancer-information-in-other-languages, there are resources for people who speak languages other than English and Spanish. We also publish books to help people navigate their cancer journey. Visit cancer.org/bookstore to learn more.

Scientific journals. The American Cancer Society publishes three peer-reviewed scientific journals for health care professionals and researchers: *Cancer, Cancer Cytopathology,* and *CA: A Cancer Journal for Clinicians*. Visit cancer.org/health-care-professionals/acs-publications to learn more.

Cancer Survivors Network℠. We offer the Cancer Survivors Network (CSN, csn.cancer.org), a safe online community where survivors and caregivers can share their stories, ask questions, and support each other. With a chatroom and over 40 discussion boards, CSN allows survivors to connect with others who have a similar cancer experience.

Reach To Recovery®. The Reach To Recovery program connects people facing breast cancer with trained volunteers who are breast cancer survivors. These volunteers provide one-on-one support to help people cope with their breast cancer diagnosis, treatment, side effects, and more. Visit reach.cancer.org to learn more.

Road To Recovery®. Lack of transportation can be one of the greatest barriers to receiving timely treatment and quality cancer care. The American Cancer Society offers transportation solutions through our Road To Recovery program, where volunteers provide people with rides to and from cancer treatment. Other community transportation programs are available in certain geographic areas. Visit cancer.org/roadtorecovery to learn more.

Hope Lodge®. American Cancer Society Hope Lodge communities provide free, temporary lodging for people facing cancer and their caregivers when treatment is far from home. These facilities offer guests a nurturing, home-like environment where they can retreat to private rooms or safely connect with others facing a similar journey. Visit cancer.org/hopelodge to learn more.

Transportation and lodging grants. Through our patient transportation grant and patient lodging grant programs, the American Cancer Society awards funds to health systems or health system foundations. This funding provides direct assistance to people with cancer who need transportation assistance to and from cancer-related appointments or temporary lodging near treatment centers.

Patient navigation. The American Cancer Society recognizes the critical role navigation plays in achieving positive health outcomes for people with cancer. The Navigation Capacity-Building Initiative Grant Program is a component of our commitment to enhancing oncology patient navigation and addressing barriers to individualized, timely, and equitable access to care for people facing cancer and their families, particularly for those with limited incomes, people of color, and people who reside in areas with increased barriers. The goal of this multiyear competitive grant opportunity is to ensure that communities can provide the right type of access, support, and navigation for everyone facing cancer through capacity building and support for innovative, sustainable models of oncology patient navigation, and a technology-enabled navigation platform/volunteer community navigation network. The American Cancer Society has awarded multiyear grants for patient navigation programs to 14 health systems that will be part of a multi-institutional learning community convened to provide a platform for grantees to share navigation best practices and lessons learned, and access training and expertise.

ACS CARES™ (Community Access to Resources, Education, and Support) is a new non-clinical patient navigation support program for people with cancer and their caregivers. The ACS CARES app, available in iTunes and Google Play stores, provides access to high-quality, trusted resources and support digitally and over the phone with American Cancer Society employees and volunteers. The program is also piloting in-person volunteer support at cancer centers across the country. Visit cancer.org/support-programs-and-services/acs-cares.html to learn more.

"tlc" Tender Loving Care®. The American Cancer Society *"tlc" Tender Loving Care* program offers products for people coping with breast cancer or cancer treatment that causes hair loss. Products include wigs, hairpieces, hats, turbans, breast forms, mastectomy bras, post-

surgical support, and mastectomy swimwear. The "*tlc*"™ mission is to help people facing cancer treatment cope with the appearance-related side effects of cancer by making hard-to-find products affordable and readily available for purchase from the privacy of their own homes. To order products or catalogs, visit tlcdirect.org or call 1-800-850-9445.

Support for caregivers. The American Cancer Society recognizes that cancer is not isolated to the individuals diagnosed, but also impacts the entire network of family and close friends. We are committed to meeting the information, education, and support needs of the millions of people who are caregivers for people with cancer. One of the informational tools we offer is our *Caregiver Resource Guide*, which helps caregivers better understand what their loved one is going through, develop skills for coping and caring, and practice self-care to help protect their own health and well-being. Also, our *Caregiver Support Video Series*, which is available in English and Spanish, provides educational support to caregivers as they assist with the everyday needs of people with cancer.

Partners Engaged

Some of the barriers to our efforts to improve the lives of people with cancer and their families are too complex for any one organization to address on its own. To overcome these challenges, the American Cancer Society unites organizations in collaborative partnerships through our mission-critical national roundtables and other coalitions. More than 500 partner organizations join with us each year to develop solutions and take action to improve cancer outcomes for all people by bringing together key leaders and partners to share resources and expertise to drive progress on cancer priorities.

National roundtables. In 1997, in partnership with the Centers for Disease Control and Prevention, the American Cancer Society established our first roundtable, the National Colorectal Cancer Roundtable. This was followed by national roundtables focused on HPV vaccination (2014), patient navigation (2017), and lung cancer (2017). In 2022, we committed to further expansion by adding national roundtables on breast and cervical cancer.

Due to their established history and replicated success, these collaborative roundtables are a recommended and proven model for creating sustained partnerships across diverse sectors to tackle the most complex problems in cancer. Roundtables succeed by bringing together leading advocacy organizations, professional societies, government agencies, cancer centers, community organizations, academic institutions, industry leaders, and other key partners to share resources and expertise to drive progress on cancer priorities. Visit cancer.org/about-us/our-partners/american-cancer-society-roundtables to learn more about the American Cancer Society roundtables.

Cancer control coalitions. Since 1998, the American Cancer Society has partnered with the Centers for Disease Control and Prevention's National Comprehensive Cancer Control Program to provide support through training and technical assistance. These state Cancer Control Coalitions (CCC) include stakeholders across many sectors. Through interactive webinars, live workshops, virtual forums, and online resources, the program provides coalitions with subject matter expertise in science, research, and coalition health to directly inform the development and implementation of state cancer plans with over 200 state-level public health leaders in all 50 states and the District of Columbia, 7 US-associated Pacific islands/territories, and 8 tribes and tribal organizations. In addition, the American Cancer Society is a founding member of the Comprehensive Cancer Control National Partnership (CCCNP), a 19-member national coalition that works together to build and strengthen CCC efforts across the nation.

Health equity. Cancer is a disease that affects everyone, but it doesn't affect everyone equally. We are working to ensure everyone has an opportunity to prevent, detect, treat, and survive cancer. Our commitment to advance health equity involves national, state, and local partnerships.

Community health equity projects. With funding from the Robert Wood Johnson Foundation, 12 health equity pilot community projects are being supported to explore, identify, and implement community-driven solutions aimed at addressing medical mistrust related to colorectal cancer screening. Community health centers, in collaboration with their patient advisory councils and/or governing boards and community-based organizations, are working together to address the unique needs of their communities, and the American Cancer Society is providing funding, technical expertise, and a virtual environment to facilitate learning and best-practice sharing.

National Advisory Council on Health Equity. The National Advisory Council (NAC) on Health Equity is comprised of 16 thought leaders from racial, ethnic, and geographically diverse backgrounds, organizations, and sectors, and provides advice and recommendations on how the American Cancer Society can advance health equity in organizational policies, practices, programs, and research. The NAC provides recommendations on how to embed health equity more deeply into our work.

Project ECHO®. Project ECHO (Extension for Community Healthcare Outcomes) is a virtual hub-and-spoke telementoring and knowledge-sharing network. Since 2018, the American Cancer Society has engaged more than 3,700 unique health care professionals and caregivers in over 32 ECHO series focused on topics, including colorectal cancer treatment; increasing HPV vaccination, colorectal, and lung cancer screening rates; increasing access to smoking cessation resources; addressing the impact of COVID-19 on cancer care teams and caregivers; and increasing organizational capacity in cancer-fighting organizations in Kenya. The program is a proven educational intervention utilizing an all-teach, all-learn model to help build capacity of partners, aiming to efficiently disseminate evidence-based strategies to improve cancer outcomes across the continuum of care, increase prevention and early-detection efforts in health systems, and improve the overall quality of care.

Hospital Systems Capacity Building Initiative. The American Cancer Society Hospital System Capacity Building (HSCB) Initiative, funded by the Centers for Disease Control and Prevention, aims to decrease cancer morbidity by increasing cancer screening and prevention efforts across the US. The initiative engages representatives from hospital systems, health departments, the American Cancer Society, and selected community organizations to form Communities of Practice (COP) teams. The HSCB initiative uses the COP approach to offer tailored capacity-building assistance, foster peer-to-peer learning, and engage multisector partners in bidirectional learning.

Regional cancer support. The American Cancer Society regional cancer support teams establish state and local partnerships to amplify initiatives across the cancer continuum and extend our reach in communities. Regional employees provide technical assistance and networking in local communities to address challenges and opportunities across the cancer care continuum. Partnerships include cancer treatment centers, aiming to reduce barriers by ensuring patients and families have the information and resources they need after a cancer diagnosis, such as transportation and lodging. The cancer support teams also collaborate with partners to help people get the preventive care they need to help detect cancer at the earliest, most treatable stage. These partnerships include working with community clinics or federally qualified health centers (FQHCs) to reduce barriers to screening and help ensure patients have access to follow-up care.

Advocacy

Saving lives from cancer is as much a matter of public policy as scientific discovery. Lawmakers play a critical role in enacting policies that help save lives – from improving access to quality, affordable health care for all to increasing funding for cancer research and programs. The American Cancer Society Cancer Action Network℠ (ACS CAN) advocates for evidence-based policies to reduce the cancer burden for everyone. As the American Cancer Society's advocacy affiliate, ACS

CAN is making cancer a top national priority for public officials and candidates at the federal, state, and local levels. By engaging advocates across the country to make their voices heard, the organization influences legislative and regulatory solutions that will end cancer as we know it.

Since 2001, ACS CAN has successfully advocated for billions of dollars in cancer research funding, expanded access to quality health care, and advanced proven tobacco control measures. The organization's recent advocacy accomplishments are outlined in the following sections. Please note: Descriptions of federal laws and guidance were current as of July 2023 and do not reflect any potential changes to health care being considered by Congress, the administration, or the courts.

Access to Care

ACS CAN continues to advocate to improve access to affordable health care coverage, including improving the insurance market by banning short-term limited-duration plans, removing copays for key cancer prevention and early detection services, and actively working with states to expand eligibility for Medicaid programs and marketplace subsidies, allowing millions of individuals and families with limited incomes to gain access to comprehensive and affordable health care coverage. Additionally, ACS CAN urges policymakers to advance and support policies that protect and improve access to health care for individuals with limited incomes to improve health outcomes and reduce the burden of cancer for everyone.

ACS CAN is also advocating for other important patient protections, including:

- Coverage of patient navigation services for individuals with serious chronic conditions like cancer
- Prohibition of short-term limited-duration plans, association health plans, and other plans that do not cover comprehensive benefits or protect patients against high costs
- Removal of barriers to patient access to prescription drugs, including policies to improve affordability and ensure that the use of utilization management tools by health care payers does not delay cancer treatments
- Full federal funding for community health centers that provide community-oriented primary care in areas that have been historically marginalized
- Access to preventive services, including follow-up testing, without cost sharing
- Ensuring expansion of the Medicaid program, which provides much-needed health services to individuals with limited incomes
- Advocating for legislation that requires coverage of comprehensive biomarker testing in state-regulated insurance plans, including Medicaid

Research Funding and Drug Development

ACS CAN is a leader in the effort to ensure full funding for the nation's public cancer research institutions, including the National Institutes of Health and its National Cancer Institute (NCI). Thanks in no small part to the organization's work, Congress has steadily increased funding for the NCI over the past several years. Today, the NCI has a budget of more than $7.3 billion, most of which is awarded through grants to researchers in cancer centers, universities, and labs in every state of the country. Federal budget pressures threaten this funding every year.

ACS CAN recognizes the critical importance of federal research funding in the search for cures and works to protect that funding. The organization also supports the creation of the Advanced Research Projects Agency for Health (ARPA-H), which supports high-risk, high-reward biomedical research meant to catalyze major changes in research.

In addition to advocating for cancer research funding, the organization works to enhance access to innovative therapies by removing barriers to clinical trial enrollment. Clinical trials are the key step in advancing potential new cancer treatments from the research setting to the cancer clinic, and patient participation in trials is crucial to their success.

Approximately 20% of cancer clinical trials fail because of insufficient patient enrollment, despite a strong patient willingness to participate. To address this problem, ACS CAN, in collaboration with other stakeholders, has identified several barriers and is working on implementing a set of consensus recommendations to make it easier for interested patients to enroll in an appropriate clinical trial. The organization also works to ensure that traditionally underrepresented patient populations have an equal opportunity to enroll in clinical trials through efforts to expand eligibility screening and advocate for legislation that would make it easier for trial sponsors to pay for non-medical patient costs related to participating in a clinical trial (e.g., parking, transportation, or lodging).

Prevention and Early Detection

ACS CAN is supporting policies that focus on the prevention and early detection of cancer by:

- Advocating for coverage of cancer screenings and other recommended prevention and early-detection services without financial barriers across all health care payers
- Advocating for federal legislation to create a pathway for Medicare to consider covering new cancer early-detection blood tests once they are approved by the FDA, such as the Medicare Multi-Cancer Early Detection (MCED) Screening Coverage Act
- Advocating for legislation, such as the Prostate-Specific Antigen Screening for High-risk Insured Men (PSA Screening for HIM) Act, which requires coverage of evidence-based prostate cancer preventive care and screenings without cost sharing for men at high risk for prostate cancer
- Advocating for full funding for the National Breast and Cervical Cancer Early Detection Program, which provides women who are uninsured, underinsured, and have limited-income access to cancer screenings, as well as diagnostic, patient navigation, and treatment services
- Urging policymakers to invest federal and state funds in colorectal cancer control programs
- Working to expedite and defend the full implementation of the Family Smoking Prevention and Tobacco Control Act, including the regulation of new products and the prohibition of flavors in all tobacco products
- Leading efforts to pass comprehensive smoke-free laws requiring all workplaces, restaurants, bars, and gaming establishments to be smoke-free, such as ordinances in Irving, Texas, that closed loopholes for restaurants and bars making them smoke-free on March 25, 2023, and in Gluckstadt, Mississippi, and Bellevue, Kentucky, that made all workplaces, restaurants, and bars smoke-free on March 16, 2023, and May 9, 2023, respectively
- Working to increase the price of tobacco products via federal and state taxes on all tobacco products and defending against tax rollbacks. The average state tax rate for cigarettes rose to $1.91 per pack as of January 2023.
- Working to increase and protect state funding for tobacco control programs, such as protecting the $12 million appropriated to Connecticut's tobacco prevention and cessation program for fiscal year 2024 and advocating for Medicaid programs to cover a comprehensive tobacco cessation benefit that includes access to all three types of counseling and all five FDA-approved medications without cost sharing or other barriers for traditional enrollees
- Continuing as an intervener in the long-pending tobacco industry appeal of the federal government's lawsuit against the industry, in which specific manufacturers were found to be in violation of the Racketeer Influenced and Corrupt Organizations statute for engaging in decades of fraudulent practices aimed at addicting generations of people to their deadly products
- Addressing systemic racism in the enforcement of commercial tobacco control laws by advocating for public health or other non-police officers to be entrusted to hold tobacco retailers accountable for violations of these laws instead of targeting individuals who possess or use tobacco products

- Supporting efforts to help increase HPV vaccination uptake
- Advocating for evidence-based national standards for child nutrition programs
- Advocating for increased access to free school meals to address food insecurity and improve dietary quality
- Advocating that the federal Dietary Guidelines for Americans reflect the current science regarding diet, physical activity, and cancer risk

Quality of Life

ACS CAN supports balanced policies at the federal and state levels that ensure continued patient and survivor access to pain management treatments. The organization also supports the enactment of legislation to ensure that people with cancer have full access to palliative care services along with curative treatment – from the point of diagnosis through treatment and survivorship or end of life as needed. ACS CAN supports legislation, such as the Palliative Care and Hospice Education and Training Act (PCHETA), that provides for increased training and professional development in palliative care, a nationwide public and provider education campaign to disseminate information about the benefits of palliative care, and additional research on pain and symptom management with the intent of improving patient care.

Central to ACS CAN's success is their sophisticated and effective volunteer structure. Across the country, volunteers in every congressional district work closely with the organization to organize and execute advocacy campaigns. Together, these committed volunteers recruit and support other volunteers dedicated to the most critical components of successful advocacy campaigns: grassroots mobilization, media outreach, fundraising, and integrating advocacy into American Cancer Society Relay For Life® and Making Strides Against Breast Cancer® signature events, as well as the Coaches vs. Cancer® initiative, a collaboration between the American Cancer Society and the National Association of Basketball Coaches.

Health Equity

Cancer is a disease that affects everyone, but it doesn't affect everyone equally. The American Cancer Society and ACS CAN believe that everyone – regardless of race, ethnicity, gender, or sexual orientation – should have a fair and just opportunity to prevent, detect, treat, and survive cancer. ACS CAN's advocacy work – from increasing access to care, early detection and prevention, to increased funding for drug research and development – is committed to addressing cancer disparities through a health equity lens.

ACS CAN continues advocating for policies that advance health equity, including:

- Advocating to maintain the provision of the Affordable Care Act (ACA) that ensures broad protection against discrimination of LGBTQ+ individuals in health care services
- Supporting policies that expand federal insurance coverage eligibility for Deferred Action for Childhood Arrival (DACA) recipients
- Supporting funding and policies that promote timely collection and publication of demographic data to aid researchers and policymakers in identifying disparities to improve health equity in cancer prevention, detection, and treatment
- Supporting the use of telehealth services as an option for patients to improve access to care
- Advocating to increase diversity in clinical trials by reducing barriers to enrollment, such as non-medical costs (e.g., transportation and lodging), and allowing remote access to trials, particularly for people who are underrepresented, including people of color, older adults, rural residents, and those with limited incomes
- Advocating for legislative opportunities to reduce health disparities for American Indian, Alaska Native, and Indigenous communities

Research

Research is at the heart of the American Cancer Society's mission. We have invested more than $5 billion in research since 1946, all to find the causes of cancer, ways to detect the disease earlier, more effective treatments, and ways to help people thrive during and after treatment. The American Cancer Society is unique among nongovernmental, nonprofit organizations in having both intramural and extramural research programs, both of which will turn 78 years old in 2024. The top-tier research we fund and conduct covers the cancer continuum from cell biology to survivorship and is currently organized under four departments – Extramural Discovery Science, Population Science, Surveillance and Health Equity Science, and Early Cancer Detection Science – which are described below.

Extramural Discovery Science

The American Cancer Society's Extramural Discovery Science program supports a portfolio of highly innovative cancer research at top US academic research institutions. Since 1946, we have awarded more than 33,700 grants to academic research institutions across the US supporting over 25,000 investigators and made critical contributions to many of the most important discoveries in cancer. In 2022, Carolyn Bertozzi, PhD, at Stanford University was the latest addition to the list of 50 American Cancer Society grantees who have gone on to win the Nobel Prize. Current grantees publish over 1,600 scientific papers annually, detailing their discoveries across a wide range of cancers using a multitude of scientific approaches.

Extramural Discovery Science has three research programs – Biochemistry and Immunology of Cancer, Cell Biology and Preclinical Cancer Research, and Clinical and Cancer Control Research. The primary strategic goal for American Cancer Society-funded extramural research is to support innovation in cancer research, regardless of cancer type. Time and again, scientific history teaches us that novel discoveries occur in unexpected places, and we believe that a focus on innovation gives us the greatest chance to make advances to benefit cancer patients. Except for professorships, all grant applications must align with at least one of the six American Cancer Society research priority areas: causes of cancer; obesity/healthy eating and active living; diagnosis and screening; treatment; survivorship; and health equity across the continuum.

All extramurally funded projects are subjected to a rigorous, independent, and highly competitive two-stage peer review, with the primary review conducted by one of 14 peer review committees:

- Cancer Cell Biology
- Cancer Detection and Progression
- Cancer Prevention, Screening, and Health Promotion
- Cancer Treatment, Palliative Care, and Survivorship Research
- Clinical Studies and Clinical Trials
- DNA Mechanisms in Cancer
- Experimental Therapeutics
- Healthcare Outcomes, Policy, and Systems Research
- Immunology and Blood Cell Development
- Institutional Research Grants
- Metastasis and Microenvironment
- Mission Boost Grants
- RNA Mechanisms in Cancer
- Tumor Biochemistry and Endocrinology

Using the application ranking provided by the peer review committees, the Extramural Discovery Science Council recommends funding based on the relative merit of the applications, the amount of available funds, and American Cancer Society objectives. This independent and nationally competitive process ensures that the most innovative research is funded. Beginning in the late 1990s, Extramural Discovery Science began to focus on early-stage investigators, who continue to have a difficult time launching their cancer research programs. Today, about 70% of the

budget is committed to these scientists, giving the best and brightest minds in cancer research an opportunity to explore highly innovative ideas as they begin their careers in hopes that this early investment will pay dividends for decades to come.

The following competitive grants are offered by the American Cancer Society for extramural support:

- **Research Scholar Grant** – provides resources for investigator-initiated research projects in a variety of cancer-relevant areas. Applicants are independent, self-directed researchers within 8 to 10 years (depending on clinical service) of their first academic appointment.
- **Postdoctoral Fellowship** – funds mentored training for a career in cancer research
- **Clinician Scientist Development Grant** – supports protected time to allow junior faculty who see patients to be mentored and participate in research training
- **Institutional Research Grant** – awards seed money to institutions for new investigators to initiate cancer research projects
- **Cancer Health Equity Research Centers** – support the formation of these research centers, which are designed to target cancer health disparities that are unique to a local or regional community
- **Discovery Boost Grant** – funds exploratory research to develop research methodologies, establish feasibility, or pilot test high-risk/high-reward research across the research continuum
- **Mission Boost Grant** – provides opportunities for American Cancer Society grantees to seek additional ("boost") resources for innovative high-risk/high-reward projects nearing patient testing
- **TheoryLab™ Collaborative Grants** – provides pilot grant funding for collaborative research through participation in the American Cancer Society TheoryLab online research community to explore high-risk ideas
- **American Cancer Society Professor** – provides flexible funding for individuals who have made seminal contributions that have changed, and will continue to change, the direction of cancer

In addition, to amplify its impact, the Extramural Discovery Science department has partnered with several other organizations, including the Emerson Collective, Flatiron Health, the National Palliative Care Research Center, the Melanoma Research Alliance, and the St. Baldrick's Foundation. The department houses three scientific research portfolios that support innovative cancer research to meet critical needs in cancer:

A. Biochemistry and Immunology of Cancer

- Molecules involved in cancer
- Genes involved in cancer
- Potential targets for new treatments of cancer and mechanisms of signal transduction
- Immunology of cancer including immunotherapy

B. Cell Biology and Preclinical Cancer Research

- Fundamental controls that dictate cancer cell development and regulation of cell growth
- Mechanisms driving cancer progression
- Cancer biomarker discovery and development
- Discovery, synthesis, and delivery of cancer drugs

C. Clinical and Cancer Control Research

- Clinical research to test novel interventions, methods to prevent, detect, treat, or survive cancer
- Innovative methods to sustain behavioral change
- Access to care and palliative care research
- Health equity research to uncover root causes of inequities based on the social determinants of health and testing strategies to achieve health equity

As of July 2023, the American Cancer Society was funding a portfolio of 686 research grants totaling nearly $446.4 million, including $78.2 million for breast

cancer (162 grants), $33.3 million for lung cancer (77 grants), and $26.5 million for colorectal cancer (67 grants). In addition, extramural funding supports studies of some of the most lethal cancers, including pancreas ($14.7 million), brain ($15 million), ovarian ($16.9 million), and liver ($16.8 million). Since many cancers share biological characteristics, a significant portion of the funding portfolio is focused on these pan-cancer studies ($94.3 million), which investigate topics such as common cellular differences across cancer type that can result in simultaneous advances against multiple cancers. To encourage greater collaboration among American Cancer Society grantees, the Extramural Discovery Science department launched the TheoryLab online platform in 2018 to enable and encourage greater collaboration among our grantees. There are currently more than 1,500 members representing a wide range of cancer research.

Population Science

The Population Science program has two primary focus areas; a long-standing epidemiology program that increases knowledge of factors associated with cancer occurrence and survivorship, and more recent initiatives in behavioral interventions research. Contributions from Population Science ultimately inform our evidence-based programs and recommendations, which are focused on enhancing cancer prevention, improving outcomes, and reducing disparities.

The American Cancer Society's epidemiology work began in 1952, when biologist and epidemiologist E. Cuyler Hammond engaged our nationwide network of volunteers to initiate a large cohort of study participants to provide insights into the causes of cancer. The first cohort, the Hammond-Horn Study (followed from 1952 to 1955), included only men and provided the first US prospective evidence confirming the association between cigarette smoking and premature death from lung cancer and other diseases. This work established the foundation for a series of subsequent large cohort studies of men and women called the Cancer Prevention Studies (CPS). For approximately 70 years, results from these studies have contributed extensively to the science on cancer risk associated with modifiable and non-modifiable factors, and they have informed the American Cancer Society's and international guidelines for cancer prevention.

Today, Population Science team members focus their efforts on questions that leverage the strength of existing resources to address the following broad research objectives:

- **Epidemiology of modifiable risk factors:** Fill in gaps in knowledge about factors related to cancer etiology, survival, and long-term survivorship, including genetics; modifiable risk factors such as smoking, physical and sedentary activity, diet, alcohol, and excess body weight; medical conditions and common medications; and environmental exposures (e.g., circadian rhythm disruption, radon, and pollutants).
- **Molecular epidemiology:** Improve understanding of the molecular epidemiology of cancer, with a focus on breast, gastrointestinal, hematologic, ovary, and prostate cancers, through studies of circulating biomarkers; genetic factors and gene-environmental interactions; and tumor heterogeneity.
- **Survivorship and quality of life:** Identify factors associated with optimal physical, emotional, and social well-being among cancer patients, survivors, and caregivers to improve their quality of life; assist American Cancer Society program employees in the design and enhancement of interventions and services for cancer survivors and their loved ones.
- **Health behaviors:** Identify behaviors and related predictors associated with cancer prevention, with a primary focus on tobacco control, healthy eating, and active living, as well as their effects on cancer survivors' psychological adjustment and quality of life, in order enhance the efficacy of behavioral interventions and inform American Cancer Society programs, practices, and policies.
- **Cancer disparities and health equity:** Develop approaches and methods for cancer disparities/health equity research, examine exposures and outcomes in medically vulnerable populations, and

identify effective strategies to help eliminate cancer disparities from prevention to survivorship. To continue building on the legacy of population cohort studies, a new study called VOICES of Black Women will launch in 2024. Visit voices.cancer.org to learn more and get involved.

Surveillance and Health Equity Science

The Surveillance and Health Equity Science (SHES) department informs and promotes cancer prevention and control via five overlapping areas of research: cancer surveillance; risk factors and screening; health services; disparities; and tobacco control. Information is disseminated via peer-reviewed journal articles for scientific audiences and educational publications for a lay audience. For example, the program has produced this *Cancer Facts & Figures* report annually since 1951, and its accompanying Cancer Statistics article, published in *CA: A Cancer Journal for Clinicians*, since 1967. These publications, which are available on our website at cancer.org/statistics, are the most widely cited sources for cancer statistics in scientific literature. Visit our Cancer Statistics Center mobile-friendly interactive website at cancerstatisticscenter.cancer.org to generate customized data.

Since 1998, SHES team members have collaborated with leading cancer organizations, such as the National Cancer Institute and the Centers for Disease Control and Prevention, to produce the Annual Report to the Nation on the Status of Cancer, a highly cited, peer-reviewed journal article that reports cancer rates and trends in the US. International products include *The Cancer Atlas* (canceratlas.cancer.org), a one-stop resource for global cancer data, and *Global Cancer Facts & Figures* (cancer.org/research/cancer-facts-statistics/global.html).

With an overarching goal of reducing health inequalities, employees in the SHES department also generate scientific evidence to inform and support American Cancer Society priority areas for cancer prevention and control. For example, a series of high-profile studies conducted by our Surveillance Research group that demonstrated increasing rates of colorectal cancer in individuals under 55 years of age helped inform the decision to lower the recommended age to begin colorectal cancer screening from 50 to 45 by the American Cancer Society in 2018 and the US Preventive Services Task Force in 2021. Researchers also study barriers to receipt of screening and provide data to guide roundtable activities, such as evaluating the impact of the COVID-19 pandemic on screening test use. For example, a recent study found that receipt of cancer screening substantially declined during the first year of the pandemic, especially in historically marginalized populations.

SHES team members also study public policies, such as excise tax on tobacco products (including e-cigarettes) and tobacco industry activities on tobacco consumption, to inform or support advocacy for tobacco control policies at the federal, state, and local levels. For example, findings from the department informed the FDA's proposed rule to ban menthol as a characterizing flavor in cigarettes. Further, the department evaluates policies associated with access to and receipt of guideline-recommended care, economic burden, and health outcomes. In addition, findings from the department have been instrumental in understanding the effects of health insurance coverage and provisions of the Affordable Care Act (ACA) on cancer care and outcomes. A recent study found that newly diagnosed cancer patients living in states that had expanded Medicaid eligibility had better survival than those living in non-expansion states.

Early Cancer Detection Science

The Early Cancer Detection Science (ECDS) department is responsible for subject matter expertise on the continuum of screening, technical and quality issues related to existing and emerging cancer screening technology, and the development and regular update of the American Cancer Society's cancer screening guidelines (cancer.org/cancer/screening/american-cancer-society-guidelines-for-the-early-detection-of-cancer), most of which have been published in *CA: A Cancer Journal for Clinicians*. Employees in the ECDS department also advise and collaborate with other American Cancer Society regions and departments; cancer roundtables; our advocacy affiliate, the American Cancer Society

Cancer Action Network; and national and international external partners on research and publications, issues and policies related to early cancer detection, and technical issues in the evaluation of cancer screening, the conduct of systematic reviews, and the development of cancer screening guidelines.

The American Cancer Society has a long history in promoting and advancing the early detection of cancer to reduce cancer morbidity and mortality. By the mid-20th century, we had begun educating both health professionals and the general public about the importance of early cancer detection – including screening tests for cervical cancer and colorectal cancer. By 1980, the organization was one of the earliest pioneers of evidence-based medicine – requiring our screening guidelines to undergo external peer review. Since then, we have regularly updated screening guidelines for cancers of the breast, cervix, colon and rectum, lung, and prostate, with an emphasis on recommended screening tests, ages to start and stop screening, screening intervals, an evaluation of the balance of the benefits and harms of screening, and the content of informed and shared decision-making. New technology is subjected to the same rigorous scrutiny for efficacy and effectiveness as existing screening tests.

The ECDS department consists of the Guideline Development Team (GDT) and a Cancer-related Evidence Synthesis Team (CrEST). The CrEST is responsible for conducting systematic reviews and other evidence syntheses, most of which include identifying relevant studies, synthesizing literature, and assessing the certainty of evidence. These products are used to inform the updates of cancer screening guidelines or to create a new one. The GDT advises and oversees the process of guideline development, including oversight and management of the Guideline Development Group (GDG), which is a volunteer group of academic researchers and generalist clinicians. The GDG is charged with reviewing the evidence produced by the CrEST, along with other relevant information, and formulating the American Cancer Society's cancer screening guideline statements. In 2023, the ECDS department issued an update of the organization's lung cancer screening guideline and is working on updates to our guidelines for the early detection of prostate cancer and breast cancer.

Sources of Statistics

Estimated new cancer cases. The number of invasive cancer cases diagnosed in 2024 was calculated by estimating complete case counts during 2006 through 2020 in all 50 states and the District of Columbia using a spatiotemporal model that considers state variation in sociodemographic and lifestyle factors, medical settings, and cancer screening behaviors, and accounts for expected delays in case reporting. Counts for 2020 were adjusted for the deficit in cases during March through May due to health care closures during the first months of the COVID-19 pandemic using data from 2018 and 2019. Modeled counts were then projected forward 4 years based on the most recent 4-year average annual percent change (AAPC). The source for these data was cancer registries that consented to participate and met the North American Association of Central Cancer Registries' (NAACCR) high-quality data standards. The NAACCR is an umbrella organization that sets standards and collects and disseminates incidence data from cancer registries in the National Cancer Institute's (NCI) Surveillance, Epidemiology, and End Results (SEER) program and/or the Centers for Disease Control and Prevention's National Program of Cancer Registries. For more information on this method, see "A" and "B" under Additional information on page 81.

The number of new cases of melanoma in situ and ductal carcinoma in situ of the female breast in 2024 was estimated by first approximating the actual number of cases diagnosed each year during 2010 through 2019 by applying annual age-specific incidence rates to the

corresponding population estimates and then projecting 5 years ahead based on the overall AAPC. Incidence data for 2020 were excluded due to the impact of COVID-19 on cancer diagnoses (see "C" under Additional information on page 81 for more information). These projections were adjusted for delays in case reporting based on national delay factors for invasive cancer from the NAACCR.

Incidence rates. Incidence rates are defined as the number of people who are diagnosed with cancer divided by the number of people who are at risk for the disease in the population during a given time period. Incidence rates in this publication are presented per 100,000 people and are age adjusted to the 2000 US standard population (19 age groups) to allow comparisons across populations with different age distributions. Rates for all racial groups exclude persons of Hispanic ethnicity. National cancer incidence rates and trends are based on delay-adjusted incidence rates from NAACCR. Delay adjustment accounts for delays and error corrections that occur in the reporting of cancer cases, which is substantial for some sites, particularly those less often diagnosed in a hospital, such as leukemia. Incidence data for 2020 were excluded from trend analyses and the lifetime risk of developing cancer because these calculations were model-based and could not accommodate the significant deficit in diagnoses that occurred because of health care closures during the first year of the COVID-19 pandemic. For more information see "C" under Additional information on page 81.

National and state rates presented herein differ slightly from those published by NAACCR on their interactive web tool at naaccr.org/interactive-data-on-line/ for several reasons. Their rates are age adjusted using 20 age groups instead of 19 and are adjusted for reporting delays at the state level, which is publicly unavailable. Additionally, NAACCR national rates include Puerto Rico, which are presented separately here. Finally, colorectal cancer incidence rates include cancers of the appendix, which are excluded here.

Stage distribution. The proportion of cancer cases diagnosed at a local, regional, or distant stage (as well as in situ for urinary bladder) was based on the 2016-2020 NAACCR data described above for incidence rates using the SEER Summary Stage classification system.

Estimated cancer deaths. The number of cancer deaths in the US in 2024 was estimated by fitting the observed number of cancer deaths from 2007 to 2021 to the same log-linear regression model used to produce estimated cases and then similarly using the most recent 4-year AAPC to forecast the number of deaths expected in 2024. Data on the number of deaths were obtained from the National Center for Health Statistics (NCHS) at the Centers for Disease Control and Prevention. (For more information on this method, see "B" under Additional information on page 81.)

Mortality rates. Mortality rates, or death rates, are defined as the number of people who die from cancer divided by the number of people at risk in the population during a given time period. Mortality rates in this publication were based on cancer death counts compiled by the NCHS, presented per 100,000 people and age adjusted to the 2000 US standard population. Trends in cancer mortality rates provided in the text were based on mortality data from 1975 to 2021. Mortality rates for non-Hispanic AIAN individuals were adjusted for misclassification using factors provided by the NCHS (See "D" under Additional information on page 81 for a description of the complete methodology).

The 2020 Census influenced our mortality rates in two ways. First, rates for 2020 and 2021 were calculated using denominators based on new population estimates, and thus differ from previous reports, in which the 2020 rate was based on the 2010 census; these rates may also differ from those published later, particularly once the Census Bureau releases intercensal population estimates in fall 2024, which should smooth out the transition between the 2010 and 2020 population estimates. (See census.gov/programs-surveys/popest/guidance.html for more information on population estimates.) Second, because bridged-race population estimates were unavailable for 2021, mortality rates by race and ethnicity were presented for 2016-2020.

Important note about estimated cancer cases and deaths for the current year. The methodologies for predicting cancer cases and deaths in the current year were updated in 2022. While these estimates provide a reasonably accurate portrayal of the contemporary cancer burden in the absence of surveillance data, they should be interpreted with caution because they are model-based projections that may vary from year to year for reasons other than changes in cancer occurrence and methodology. As such, they are not informative for tracking cancer trends. Trends in cancer occurrence should be evaluated based on age-adjusted incidence rates reported by population-based cancer registries and mortality rates reported by the NCHS.

Survival. This report describes survival in terms of relative survival rates, which is a measure of life expectancy among cancer patients compared to that among the general population of the same age, race/ethnicity, and sex. Survival rates herein were based on data from all 22 National Cancer Institute's SEER registries; 5-year and 10-year relative survival were based on individuals diagnosed from 2013 through 2019 and 2005 through 2019, respectively, with all patients followed through 2020. Contemporary survival rates for White and Black individuals were exclusive of Hispanic ethnicity. All rates were generated using SEER*Stat software version 8.4.1. (See "E" under Additional information for full reference.) Some of these rates were originally published in the SEER explorer. (See "F" under Additional information for full reference.)

Probability of developing cancer. Probabilities of developing cancer were calculated using DevCan (Probability of Developing Cancer) software version 6.9.0, developed by the NCI, and were based on all 22 SEER registries. (See "G" under Additional information for full reference.) These probabilities reflect the average experience of people in the US and do not account for individual behaviors or risk factors. For example, the estimate of 1 in 16 men developing lung cancer in a lifetime underestimates the risk for smokers and overestimates the risk for nonsmokers. Due to the impact of the COVID-19 pandemic on cancer diagnoses in 2020, probabilities were based on incidence during 2017-2019. (For more information on how COVID-19 impacted data, See "C" under Additional Information.)

Additional information. More information on the methods used to generate the statistics for this report can be found in the following publications:

A. Lui B, Zhu L, Zou J, et al. Updated methodology for projecting US and state-level cancer counts for the current calendar year: Part I: Spatiotemporal small area modeling for cancer incidence. *Cancer Epidemiol Biomarkers Prev*. 2021; published online June 22.

B. Miller KD, Siegel RL, Lui B, et al. Updated methodology for projecting US and state-level cancer counts for the current calendar year: Part II: Evaluation of temporal projection methods for incidence and mortality. *Cancer Epidemiol Biomarkers Prev*. 2021; published online August 17.

C. Mariotto AB, Feuer EJ, Howlader N, Chen HS, Negoita S, Cronin K. Interpreting Cancer Incidence Trends: Challenges due to the COVID-19 Pandemic [published online ahead of print, 2023 May 23]. *J Natl Cancer Inst*. 2023;djad086. Doi:10.1093/jnci/djad086.

D. Arias E, Xu JQ, Curtis S, et al. Mortality profile of the non-Hispanic American Indian or Alaska Native population, 2019. National Vital Statistics Reports; vol 70 no 12. Hyattsville, MD: National Center for Health Statistics. 2021.

E. Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence – SEER Research Limited-Field Data, 22 Registries (excl IL and MA), Nov 2022 Sub (2000-2020) – Linked To County Attributes – Time Dependent (1990-2021) Income/Rurality, 1969-2021 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, released April 2023, based on the November 2022 submission.

F. SEER*Explorer: An interactive website for SEER cancer statistics [Internet]. Surveillance Research Program, National Cancer Institute. [Cited 2022 April 15]. Available from https://seer.cancer.gov/explorer/.

G. DevCan: Probability of Developing or Dying of Cancer Software, Version 6.9.0; Statistical Research and Applications Branch, National Cancer Institute, 2023. https://surveillance.cancer.gov/devcan/.

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

Cancer Site	Population	Test or Procedure	Recommendation
Breast	Women, ages 40-54	Mammography	Women should have the opportunity to begin annual screening between the ages of 40 and 44. Women should undergo regular screening mammography starting at age 45. Women ages 45 to 54 should be screened annually.
	Women, ages 55+		Transition to biennial screening, or have the opportunity to continue annual screening. Continue screening as long as overall health is good and life expectancy is 10+ years.
Cervix	Women, ages 25-65	HPV DNA test, **OR** Pap test & HPV DNA test	**Preferred:** Primary HPV test alone every 5 years with an FDA-approved test for primary HPV screening. **Acceptable:** Co-testing (HPV test and Pap test) every 5 years or Pap test alone every 3 years.
	Women, ages >65		Discontinue screening if results from regular screening in the past 10 years were negative, with the most recent test within the past 5 years.
	Women who have been vaccinated against HPV		Follow age-specific screening recommendations (same as unvaccinated individuals).
	Women who have had a total hysterectomy		Individuals without a cervix and without a history of cervical cancer or a history of CIN2 or a more severe diagnosis in the past 25 years should not be screened.
Colorectal†	Men and women, ages 45+	Guaiac-based fecal occult blood test (gFOBT) with at least 50% sensitivity or fecal immunochemical test (FIT) with at least 50% sensitivity, **OR**	Annual testing of spontaneously passed stool specimens. Single stool testing during a clinician office visit is not recommended, nor are "throw in the toilet bowl" tests. In comparison with guaiac-based tests for the detection of occult blood, immunochemical tests are more patient-friendly and are likely to be equal or better in sensitivity and specificity. There is no justification for repeating FOBT in response to an initial positive finding.
		Multi-target stool DNA test, **OR**	Every 3 years
		Flexible sigmoidoscopy (FSIG), **OR**	Every 5 years alone, or consideration can be given to combining FSIG performed every 5 years with a highly sensitive gFOBT or FIT performed annually
		Colonoscopy, **OR**	Every 10 years
		CT Colonography	Every 5 years
Endometrial	Women at menopause		Women should be informed about risks and symptoms of endometrial cancer and encouraged to report unexpected bleeding to a physician.
Lung	Men and women, ages 50-80 who have a 20+ pack-year smoking history	Low-dose helical CT (LDCT)	The American Cancer Society recommends annual LDCT screening in generally healthy adults who have a 20-pack year smoking history, regardless of time since quitting if applicable.
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.

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For more information, contact:
Angela Giaquinto, Rebecca Siegel, or Ahmedin Jemal
Surveillance and Health Equity Science Department

The American Cancer Society's mission is to improve the lives of people with cancer and their families through advocacy, research, and patient support, to ensure everyone has an opportunity to prevent, detect, treat, and survive cancer.

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