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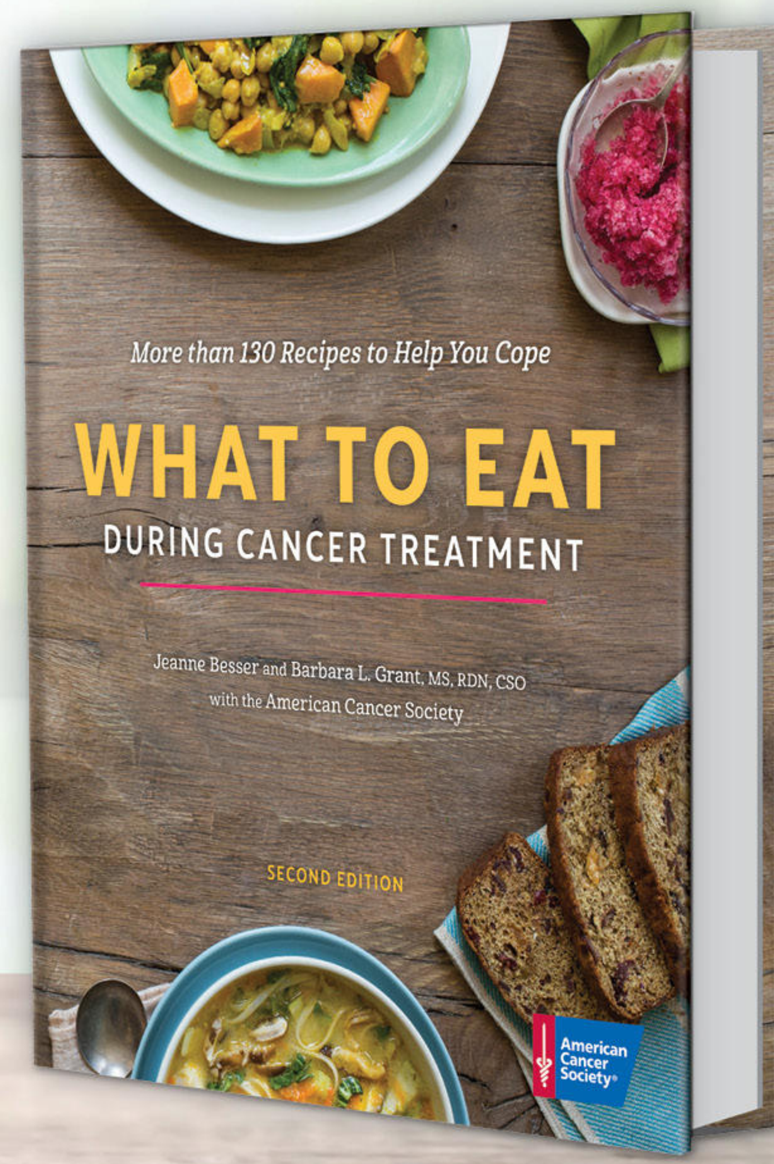

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Cancer Statistics, 2020

Rebecca L. Siegel, MPH [1]; Kimberly D. Miller, MPH [1]; Ahmedin Jemal, DVM, PhD[1]

[1]Surveillance and Health Services Research, American Cancer Society, Atlanta, Georgia.

Corresponding Author: Rebecca L. Siegel, MPH, Surveillance Research, American Cancer Society, 250 Williams St, NW, Atlanta, GA 30303-1002; (Rebecca.siegel@cancer.org).

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Abstract: Each year, the American Cancer Society estimates the numbers of new cancer cases and deaths that will occur in the United States and compiles the most recent data on population-based cancer occurrence. Incidence data (through 2016) were collected by the Surveillance, Epidemiology, and End Results Program; the National Program of Cancer Registries; and the North American Association of Central Cancer Registries. Mortality data (through 2017) were collected by the National Center for Health Statistics. In 2020, 1,806,590 new cancer cases and 606,520 cancer deaths are projected to occur in the United States. The cancer death rate rose until 1991, then fell continuously through 2017, resulting in an overall decline of 29% that translates into an estimated 2.9 million fewer cancer deaths than would have occurred if peak rates had persisted. This progress is driven by long-term declines in death rates for the 4 leading cancers (lung, colorectal, breast, prostate); however, over the past decade (2008-2017), reductions slowed for female breast and colorectal cancers, and halted for prostate cancer. In contrast, declines accelerated for lung cancer, from 3% annually during 2008 through 2013 to 5% during 2013 through 2017 in men and from 2% to almost 4% in women, spurring the largest ever single-year drop in overall cancer mortality of 2.2% from 2016 to 2017. Yet lung cancer still caused more deaths in 2017 than breast, prostate, colorectal, and brain cancers combined. Recent mortality declines were also dramatic for melanoma of the skin in the wake of US Food and Drug Administration approval of new therapies for metastatic disease, escalating to 7% annually during 2013 through 2017 from 1% during 2006 through 2010 in men and women aged 50 to 64 years and from 2% to 3% in those aged 20 to 49 years; annual declines of 5% to 6% in individuals aged 65 years and older are particularly striking because rates in this age group were increasing prior to 2013. It is also notable that long-term rapid increases in liver cancer mortality have attenuated in women and stabilized in men. In summary, slowing momentum for some cancers amenable to early detection is juxtaposed with notable gains for other common cancers. **CA Cancer J Clin 2020;0:1-24.**

Keywords: cancer cases, cancer statistics, death rates, incidence, mortality

Introduction

Cancer is a major public health problem worldwide and is the second leading cause of death in the United States. In this article, we provide the estimated numbers of new cancer cases and deaths in 2020 in the United States nationally and for each state, as well as a comprehensive overview of cancer occurrence based on the most current population-based data for cancer incidence through 2016 and for mortality through 2017. We also estimate the total number of cancer deaths averted because of the continuous decline in cancer death rates since the early 1990s.

Materials and Methods

Incidence and Mortality Data

Mortality data from 1930 to 2017 were provided by the National Center for Health Statistics (NCHS).[1,2] Forty-seven states and the District of Columbia met data quality requirements for reporting to the national vital statistics system in 1930, and Texas, Alaska, and Hawaii began reporting in 1933, 1959, and 1960, respectively. The methods for abstraction and age adjustment of historic mortality data are described elsewhere.[2,3] Five-year mortality rates (2012-2016) for Puerto Rico were previously published in volume 3 of the North American Association of Central Cancer Registries' (NAACCR's) *Cancer in North America: 2012-2016*.[4]

Population-based cancer incidence data in the United States have been collected by the National Cancer Institute's (NCI) Surveillance, Epidemiology, and End Results (SEER) Program since 1973 and by the Centers for Disease Control and Prevention's (CDC's) National Program of Cancer Registries (NPCR) since 1995. The SEER program is the only source for historic population-based incidence data. Long-term (1975-2016) incidence and survival trends were based on data from the 9 oldest SEER areas (Connecticut, Hawaii, Iowa, New Mexico, Utah, and the metropolitan areas of Atlanta, Detroit, San Francisco–Oakland, and Seattle–Puget Sound), representing approximately 9% of the US population.[5] Contemporary stage distribution and survival statistics were based on data from all 18 SEER registries (the SEER 9 registries plus Alaska Natives, California, Georgia, Kentucky, Louisiana, and New Jersey).[6] The probability of developing cancer was based on all 21 SEER registries (the SEER 18 registries plus Idaho, Massachusetts, and New York) and calculated using the NCI's DevCan software (version 6.7.7).[7] Some of the statistical information presented herein was adapted from data previously published in the *SEER Cancer Statistics Review 1975-2016*.[8]

The NAACCR compiles and reports incidence data from 1995 onward for registries that participate in the SEER program and/or the NPCR. These data approach 100% coverage of the US population for the most recent years and were the source for the projected new cancer cases in 2020 and cross-sectional incidence rates by state and race/ethnicity.[9,10] Some of the incidence data presented herein were previously published in volumes 1 and 2 of *Cancer in North America: 2012-2016*.[11,12]

All cancer cases were classified according to the *International Classification of Diseases for Oncology* except childhood and adolescent cancers, which were classified according to the International Classification of Childhood Cancer (ICCC).[13,14] Causes of death were classified according to the *International Classification of Diseases*.[15] All incidence and death rates were age standardized to the 2000 US standard population and expressed per 100,000 population, as calculated by the NCI's SEER*Stat software (version 8.3.6).[16] The annual percent change in rates was quantified using the NCI's Joinpoint Regression Program (version 4.7.0.0).[17]

Whenever possible, cancer incidence rates were adjusted for delays in reporting, which occur because of a lag in case capture or data corrections. Delay-adjustment has the largest effect on the most recent data years for cancers that are frequently diagnosed in outpatient settings (eg, melanoma, leukemia, and prostate cancer) and provides the most accurate portrayal of cancer occurrence in the most recent time period.[18] For example, the leukemia incidence rate for 2016 in the 9 oldest SEER registries was 10% higher after adjusting for reporting delays (15.2 vs 13.8 per 100,000 population).[8]

Projected Cancer Cases and Deaths in 2020

The most recent year for which reported incidence and mortality data are available lags 2 to 4 years behind the current year due to the time required for data collection, compilation, quality control, and dissemination. Therefore, we projected the numbers of new cancer cases and deaths in the United States in 2020 to provide an estimate of the contemporary cancer burden.

To calculate the number of invasive cancer cases, a generalized linear mixed model was used to estimate complete counts for each county (or health service area for rare cancers) from 2002 through 2016 using delay-adjusted, high-quality incidence data from 49 states and the District of Columbia (98% population coverage) and geographic variations in sociodemographic and lifestyle factors, medical settings, and cancer screening behaviors.[19] (Data were unavailable for all years for Kansas and for a few sporadic years for a limited number of other states.) Modeled counts were aggregated to the national and state level for each year, and a time series projection method (vector autoregression) was applied to all 15 years to estimate cases for 2020. Basal cell and squamous cell skin cancers cannot be estimated because incidence data are not collected by most cancer registries. For complete details of the case projection methodology, please refer to Zhu et al.[20]

New cases of ductal carcinoma in situ of the female breast and in situ melanoma of the skin diagnosed in 2020 were estimated by first approximating the number of cases occurring annually from 2007 through 2016 based on age-specific NAACCR incidence rates (data from 49 states with high-quality data for all 10 years) and US Census Bureau population estimates obtained via SEER*Stat.[9,21] Counts were then adjusted for delays in reporting using SEER delay factors for invasive disease (delay factors are unavailable for in situ cases) and projected to 2020 based on the average annual percent change generated by the joinpoint regression model.[22]

The number of cancer deaths expected to occur in 2020 was estimated based on the most recent joinpoint-generated annual percent change in reported cancer deaths from 2003 through 2017 at the state and national levels as reported to the NCHS. For the complete details of this methodology, please refer to Chen et al.[23]

TABLE 1. Estimated New Cancer Cases and Deaths by Sex, United States, 2020[a]

	ESTIMATED NEW CASES			ESTIMATED DEATHS		
	BOTH SEXES	MALE	FEMALE	BOTH SEXES	MALE	FEMALE
All sites	**1,806,590**	**893,660**	**912,930**	**606,520**	**321,160**	**285,360**
Oral cavity & pharynx	**53,260**	**38,380**	**14,880**	**10,750**	**7,760**	**2,990**
Tongue	17,660	12,960	4,700	2,830	1,980	850
Mouth	14,320	8,430	5,890	2,660	1,690	970
Pharynx	17,950	14,630	3,320	3,640	2,820	820
Other oral cavity	3,330	2,360	970	1,620	1,270	350
Digestive system	**333,680**	**187,620**	**146,060**	**167,790**	**97,560**	**70,230**
Esophagus	18,440	14,350	4,090	16,170	13,100	3,070
Stomach	27,600	16,980	10,620	11,010	6,650	4,360
Small intestine	11,110	6,000	5,110	1,700	940	760
Colon[b]	104,610	52,340	52,270	53,200	28,630	24,570
Rectum	43,340	25,960	17,380			
Anus, anal canal, & anorectum	8,590	2,690	5,900	1,350	540	810
Liver & intrahepatic bile duct	42,810	30,170	12,640	30,160	20,020	10,140
Gallbladder & other biliary	11,980	5,600	6,380	4,090	1,700	2,390
Pancreas	57,600	30,400	27,200	47,050	24,640	22,410
Other digestive organs	7,600	3,130	4,470	3,060	1,340	1,720
Respiratory system	**247,270**	**130,340**	**116,930**	**140,730**	**76,370**	**64,360**
Larynx	12,370	9,820	2,550	3,750	3,000	750
Lung & bronchus	228,820	116,300	112,520	135,720	72,500	63,220
Other respiratory organs	6,080	4,220	1,860	1,260	870	390
Bones & joints	**3,600**	**2,120**	**1,480**	**1,720**	**1,000**	**720**
Soft tissue (including heart)	**13,130**	**7,470**	**5,660**	**5,350**	**2,870**	**2,480**
Skin (excluding basal & squamous)	**108,420**	**65,350**	**43,070**	**11,480**	**8,030**	**3,450**
Melanoma of the skin	100,350	60,190	40,160	6,850	4,610	2,240
Other nonepithelial skin	8,070	5,160	2,910	4,630	3,420	1,210
Breast	**279,100**	**2,620**	**276,480**	**42,690**	**520**	**42,170**
Genital system	**317,260**	**203,740**	**113,520**	**67,830**	**34,210**	**33,620**
Uterine cervix	13,800		13,800	4,290		4,290
Uterine corpus	65,620		65,620	12,590		12,590
Ovary	21,750		21,750	13,940		13,940
Vulva	6,120		6,120	1,350		1,350
Vagina & other genital, female	6,230		6,230	1,450		1,450
Prostate	191,930	191,930		33,330	33,330	
Testis	9,610	9,610		440	440	
Penis & other genital, male	2,200	2,200		440	440	
Urinary system	**159,120**	**110,230**	**48,890**	**33,820**	**23,540**	**10,280**
Urinary bladder	81,400	62,100	19,300	17,980	13,050	4,930
Kidney & renal pelvis	73,750	45,520	28,230	14,830	9,860	4,970
Ureter & other urinary organs	3,970	2,610	1,360	1,010	630	380
Eye & orbit	**3,400**	**1,890**	**1,510**	**390**	**210**	**180**
Brain & other nervous system	**23,890**	**13,590**	**10,300**	**18,020**	**10,190**	**7,830**
Endocrine system	**55,670**	**14,160**	**41,510**	**3,260**	**1,600**	**1,660**
Thyroid	52,890	12,720	40,170	2,180	1,040	1,140
Other endocrine	2,780	1,440	1,340	1,080	560	520
Lymphoma	85,720	47,070	38,650	20,910	12,030	8,880
Hodgkin lymphoma	8,480	4,690	3,790	970	570	400
Non-Hodgkin lymphoma	77,240	42,380	34,860	19,940	11,460	8,480
Myeloma	**32,270**	**17,530**	**14,740**	**12,830**	**7,190**	**5,640**
Leukemia	**60,530**	**35,470**	**25,060**	**23,100**	**13,420**	**9,680**
Acute lymphocytic leukemia	6,150	3,470	2,680	1,520	860	660
Chronic lymphocytic leukemia	21,040	12,930	8,110	4,060	2,330	1,730
Acute myeloid leukemia	19,940	11,090	8,850	11,180	6,470	4,710
Chronic myeloid leukemia	8,450	4,970	3,480	1,130	670	460
Other leukemia[c]	4,950	3,010	1,940	5,210	3,090	2,120
Other & unspecified primary sites[c]	**30,270**	**16,080**	**14,190**	**45,850**	**24,660**	**21,190**

Note: These are model-based estimates that should be interpreted with caution and not compared with those for previous years.
[a]Rounded to the nearest 10; cases exclude basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder. Approximately 48,530 cases of ductal carcinoma in situ of the female breast and 95,710 cases of melanoma in situ will be newly diagnosed in 2020.
[b]Deaths for colon and rectal cancers are combined because a large number of deaths from rectal cancer are misclassified as colon.
[c]More deaths than cases may reflect a lack of specificity in recording the underlying cause of death on death certificates and/or an undercount in the case estimate.

Other Statistics

The number of cancer deaths averted in men and women due to the reduction in cancer death rates since the early 1990s was estimated by summing the difference between the annual number of recorded cancer deaths from the number that would have been expected if cancer death rates had remained at their peak. The expected number of deaths was estimated by applying the 5-year age- and sex-specific cancer death rates in the peak year for age-standardized cancer death rates (1990 in men and 1991 in women) to the corresponding age- and sex-specific populations in subsequent years through 2017.

Selected Findings

Expected Numbers of New Cancer Cases

Table 1 presents the estimated numbers of new invasive cancer cases in the United States in 2020 by sex and cancer type. In total, there will be approximately 1,806,590 cancer cases diagnosed, which is the equivalent of approximately 4,950 new cases each day. In addition, there will be approximately 48,530 new cases of ductal carcinoma in situ of the breast diagnosed in women and 95,710 new cases of melanoma in situ of the skin. The estimated numbers of new cases by state are shown in Table 2.

Figure 1 depicts the most common cancers expected to be diagnosed in men and women in 2020. Prostate, lung and bronchus (referred to as lung hereafter), and colorectal cancers (CRCs) account for 43% of all cases in men, with prostate cancer alone accounting for more than 1 in 5 new diagnoses. For women, the 3 most common cancers are breast, lung, and colorectal, accounting for 50% of all new diagnoses; breast cancer alone accounts for 30% of female cancers.

The lifetime probability of being diagnosed with invasive cancer is slightly higher for men (40.1%) than for women (38.7%) (Table 3). The reasons for the excess risk in men are not fully understood, but probably largely reflect differences in environmental exposures and endogenous hormones, as well as complex interactions between these influences. Recent research suggests that sex differences in immune function and response may also play a role.[24] Adult height, which is determined by genetics and childhood nutrition, is positively associated with cancer incidence and mortality in both men and women,[25] and has been estimated to account for one-third of the sex disparity.[26] Notably, the gender gap varies by age. For example, cancer incidence during childhood (ages birth-14 years) is approximately 10% higher in males than in females (18.2 vs 16.4 per 100,000 population),[27] whereas during early adulthood (ages 20-49 years) it is 77% higher in females (203.4 vs 114.9 per 100,000 population), largely because of breast cancer incidence in young women.[28]

Expected Number of Cancer Deaths

An estimated 606,520 Americans will die from cancer in 2020, corresponding to more than 1,600 deaths per day (Table 1). The greatest number of deaths are from cancers of the lung, prostate, and colorectum in men and the lung, breast, and colorectum in women (Fig. 1). Almost one-quarter of all cancer deaths are due to lung cancer. Table 4 provides the estimated numbers of cancer deaths in 2020 by state.

Trends in Cancer Incidence

Figure 2 illustrates long-term trends in cancer incidence rates for all cancers combined by sex. Cancer incidence patterns reflect trends in behaviors associated with cancer risk and changes in medical practice, such as the use of cancer screening tests. For example, the spike in incidence for males during the early 1990s reflects rapid changes in prostate cancer incidence rates due to a surge in the detection of asymptomatic disease as a result of widespread prostate-specific antigen (PSA) testing among previously unscreened men.[29]

The overall cancer incidence rate in men declined rapidly from 2007 to 2014, but stabilized through 2016, reflecting slowing declines for CRC and stabilizing rates for prostate cancer (Fig. 3). The sharp drop in prostate cancer incidence from 2007 to 2014 has been attributed to decreased PSA testing in the wake of US Preventive Services Task Force recommendations against the routine use of the test to screen for prostate cancer (Grade D) because of growing concerns about overdiagnosis and overtreatment.[30,31] However, Negoita et al recently reported that the overall decline in prostate cancer incidence masks an increase in distant stage diagnoses since around 2010 across age and race, although improved staging may have contributed.[32] In 2017, the Task Force revised their recommendation for men aged 55 to 69 years to informed decision making (Grade C) based on an updated evidence review, noting that "screening offers a small potential benefit" of reduced prostate cancer mortality "in some men."[33-35]

The overall cancer incidence rate in women has remained generally stable over the past few decades because lung cancer declines have been offset by a tapering decline for CRC and increasing or stable rates for other common cancers (Fig. 3). The slight rise in breast cancer incidence rates (by approximately 0.3% per year) since 2004 has been attributed at least in part to continued declines in the fertility rate as well as increased obesity,[36] factors that may also contribute to the continued increase in incidence for uterine corpus cancer (1.3% per year from 2007-2016).[37] However, a recent study indicated that the rise in uterine cancer is driven by nonendometrioid subtypes, which are less strongly associated with obesity than endometrioid carcinoma.[38] Thyroid cancer incidence has stabilized after the implementation of more conservative diagnostic practices in response to the sharp uptick in the diagnosis of largely indolent tumors in recent decades.[39,40]

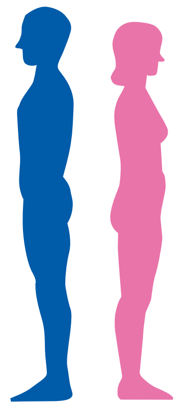
Lung cancer incidence continues to decline twice as fast in men as in women, reflecting historical differences in tobacco uptake and cessation, as well as upturns in female

TABLE 2. Estimated New Cases for Selected Cancers by State, 2020[a]

STATE	ALL CASES	FEMALE BREAST	UTERINE CERVIX	COLON & RECTUM	UTERINE CORPUS	LEUKEMIA	LUNG & BRONCHUS	MELANOMA OF THE SKIN	NON-HODGKIN LYMPHOMA	PROSTATE	URINARY BLADDER
Alabama	28,570	4,120	240	2,460	780	810	4,230	1,550	1,000	3,530	1,090
Alaska	2,960	510	b	320	120	90	400	120	120	340	160
Arizona	36,730	5,630	260	3,010	1,240	990	4,200	2,380	1,500	3,830	1,810
Arkansas	17,200	2,430	140	1,540	500	630	2,760	800	650	1,860	760
California	172,040	30,650	1,630	15,530	7,030	6,060	18,040	10,980	8,200	20,160	7,780
Colorado	27,290	4,530	190	2,040	920	910	2,550	1,920	1,150	3,140	1,250
Connecticut	20,300	3,590	130	1,520	910	400	2,650	1,110	930	2,320	1,080
Delaware	6,660	960	b	470	220	230	890	420	260	770	320
Dist. of Columbia	3,600	510	b	250	120	110	300	90	130	370	80
Florida	150,500	19,900	1,130	11,310	4,460	3,370	18,150	8,750	7,170	13,950	6,780
Georgia	55,190	8,340	440	4,660	1,710	1,550	7,240	3,190	2,280	6,840	2,110
Hawaii	6,800	1,300	60	730	330	230	870	520	290	700	300
Idaho	8,540	1,340	60	730	310	340	990	740	390	1,160	470
Illinois	71,990	11,020	540	6,240	2,850	2,400	9,210	3,700	2,920	8,000	3,310
Indiana	37,940	5,410	270	3,410	1,430	1,290	5,700	2,370	1,590	3,570	1,720
Iowa	18,460	2,710	110	1,600	700	840	2,440	1,150	800	1,920	870
Kansas	16,170	2,390	110	1,320	560	620	2,020	890	650	1,730	640
Kentucky	26,500	3,800	200	2,440	870	920	4,890	1,330	1,040	2,440	1,130
Louisiana	26,480	3,910	260	2,370	690	930	3,700	1,030	1,110	2,970	1,050
Maine	8,180	1,370	50	670	390	160	1,430	520	390	800	520
Maryland	34,710	5,500	250	2,570	1,300	820	3,930	1,780	1,330	4,410	1,360
Massachusetts	36,990	6,690	220	2,650	1,630	580	5,150	2,190	1,670	3,890	1,970
Michigan	61,770	8,800	360	4,620	2,380	2,060	8,140	3,290	2,450	6,820	2,890
Minnesota	33,210	4,670	140	2,320	1,200	1,600	3,580	1,750	1,350	2,880	1,460
Mississippi	17,190	2,390	160	1,730	450	500	2,510	620	570	2,050	630
Missouri	37,540	5,360	270	3,090	1,290	1,370	5,540	1,820	1,410	3,540	1,580
Montana	5,850	960	b	500	220	250	770	450	250	680	330
Nebraska	10,560	1,580	70	940	390	480	1,270	610	450	980	470
Nevada	16,540	2,310	130	1,480	480	520	1,850	840	650	1,780	780
New Hampshire	8,060	1,350	b	590	370	180	1,220	530	370	910	510
New Jersey	53,340	8,260	440	4,250	2,240	2,100	6,100	2,770	2,340	6,010	2,640
New Mexico	9,800	1,570	80	890	370	340	1,040	610	410	920	410
New York	117,910	17,540	930	8,910	4,840	4,600	13,370	4,980	5,120	11,470	5,590
North Carolina	59,620	9,340	430	4,540	2,030	1,640	8,470	3,680	2,480	7,200	2,510
North Dakota	4,060	590	b	360	140	190	460	230	170	400	200
Ohio	71,850	10,350	440	5,910	2,790	2,280	10,110	4,100	2,820	7,030	3,190
Oklahoma	20,530	3,130	170	1,870	620	860	3,200	940	860	2,130	920
Oregon	23,330	3,880	160	1,740	910	740	2,930	1,730	1,000	2,470	1,150
Pennsylvania	80,240	12,180	530	6,520	3,390	3,050	10,710	4,410	3,480	8,300	4,350
Rhode Island	5,930	1,020	b	430	260	100	920	340	270	650	320
South Carolina	31,710	4,790	230	2,550	970	1,220	4,460	1,900	1,300	3,390	1,270
South Dakota	4,960	720	b	430	170	230	590	270	200	520	240
Tennessee	39,360	5,760	330	3,540	1,220	1,280	6,300	2,110	1,580	3,990	1,700
Texas	129,770	19,590	1,410	11,430	4,120	5,260	14,830	4,530	5,650	12,110	4,590
Utah	11,900	1,780	80	840	450	500	730	1,230	550	1,380	460
Vermont	3,740	630	b	270	170	90	570	270	170	330	210
Virginia	47,550	7,410	320	3,530	1,660	1,370	5,960	2,920	1,940	6,200	2,010
Washington	36,290	6,690	250	2,970	1,480	1,430	4,790	2,800	1,740	4,040	1,930
West Virginia	12,380	1,680	80	1,040	440	480	2,030	680	500	1,110	620
Wisconsin	35,280	5,120	200	2,540	1,410	1,420	4,290	2,190	1,460	3,560	1,740
Wyoming	2,880	430	b	260	100	110	320	220	120	400	150
United States	**1,806,590**	**276,480**	**13,800**	**147,950**	**65,620**	**60,530**	**228,820**	**100,350**	**77,240**	**191,930**	**81,400**

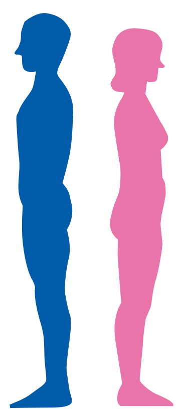
Note: These are model-based estimates that should be interpreted with caution and not compared with those for previous years. State estimates may not add to US total due to rounding and the exclusion of states with fewer than 50 cases.
[a]Rounded to the nearest 10; excludes basal cell and squamous cell skin cancers and in situ carcinomas except urinary bladder. Estimates for Puerto Rico are not available.
[b]Estimate is fewer than 50 cases.

Estimated New Cases



Males			Females		
Prostate	191,930	21%	Breast	276,480	30%
Lung & bronchus	116,300	13%	Lung & bronchus	112,520	12%
Colon & rectum	78,300	9%	Colon & rectum	69,650	8%
Urinary bladder	62,100	7%	Uterine corpus	65,620	7%
Melanoma of the skin	60,190	7%	Thyroid	40,170	4%
Kidney & renal pelvis	45,520	5%	Melanoma of the skin	40,160	4%
Non-Hodgkin lymphoma	42,380	5%	Non-Hodgkin lymphoma	34,860	4%
Oral cavity & pharynx	38,380	4%	Kidney & renal pelvis	28,230	3%
Leukemia	35,470	4%	Pancreas	27,200	3%
Pancreas	30,400	3%	Leukemia	25,060	3%
All Sites	**893,660**	**100%**	**All Sites**	**912,930**	**100%**

Estimated Deaths



Males			Females		
Lung & bronchus	72,500	23%	Lung & bronchus	63,220	22%
Prostate	33,330	10%	Breast	42,170	15%
Colon & rectum	28,630	9%	Colon & rectum	24,570	9%
Pancreas	24,640	8%	Pancreas	22,410	8%
Liver & intrahepatic bile duct	20,020	6%	Ovary	13,940	5%
Leukemia	13,420	4%	Uterine corpus	12,590	4%
Esophagus	13,100	4%	Liver & intrahepatic bile duct	10,140	4%
Urinary bladder	13,050	4%	Leukemia	9,680	3%
Non-Hodgkin lymphoma	11,460	4%	Non-Hodgkin lymphoma	8,480	3%
Brain & other nervous system	10,190	3%	Brain & other nervous system	7,830	3%
All Sites	**321,160**	**100%**	**All Sites**	**285,360**	**100%**

FIGURE 1. Ten Leading Cancer Types for the Estimated New Cancer Cases and Deaths by Sex, United States, 2020. Estimates are rounded to the nearest 10 and exclude basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder. Ranking is based on modeled projections and may differ from the most recent observed data.

smoking prevalence in some birth cohorts.[41,42] However, smoking patterns do not fully explain the higher lung cancer incidence rates recently reported in young women compared with men born around the 1960s.[43] In contrast, CRC incidence patterns are generally similar in men and women, with the rapid declines noted during the 2000s in the wake of widespread colonoscopy uptake appearing to taper in more recent years (Fig. 3). Notably, declines in the overall CRC incidence rate mask an increase in adults aged younger than 55 years of 2% per year since the mid-1990s.

Incidence also continues to increase for cancers of the kidney, pancreas, liver, and oral cavity and pharynx (among non-Hispanic whites) and melanoma of the skin, although melanoma has begun to decline in recent birth cohorts.[28,44] Liver cancer is increasing most rapidly, by 2% to 3% annually during 2007 through 2016, although the pace has slowed from previous years.[8] The majority of these cases (71%) are potentially preventable because most liver cancer risk factors are modifiable (eg, obesity, excess alcohol consumption, cigarette smoking, and hepatitis B and C viruses).[45] Chronic hepatitis C virus (HCV) infection, the most common chronic blood-borne infection in the United States, confers the largest relative risk and accounts for 1 in 4 cases.[46] Although well-tolerated antiviral therapies achieve cure rates of >90% and could potentially avert much of the future burden of HCV-associated disease,[47] most infected individuals are undiagnosed, and thus untreated. Only 14% of the more than 76 million individuals born during 1945 through 1965 (baby boomers) had received the recommended one-time HCV test in 2015.[48] Compounding the challenge is a greater than 3-fold spike in acute HCV infections reported to the CDC between 2010 and 2017 as a consequence of the opioid epidemic, of which 75% to 85% of cases will progress to chronic infection.[49]

TABLE 3. Probability (%) of Developing Invasive Cancer Within Selected Age Intervals by Sex, United States, 2014 to 2016[a]

	BIRTH TO 49	50 TO 59	60 TO 69	≥70	BIRTH TO DEATH
All sites[b]					
Male	3.5 (1 in 29)	6.2 (1 in 16)	13.3 (1 in 8)	32.7 (1 in 3)	40.1 (1 in 2)
Female	5.8 (1 in 17)	6.4 (1 in 16)	10.2 (1 in 10)	26.7 (1 in 4)	38.7 (1 in 3)
Breast					
Female	2.0 (1 in 49)	2.4 (1 in 42)	3.5 (1 in 28)	7.0 (1 in 14)	12.8 (1 in 8)
Colorectum					
Male	0.4 (1 in 262)	0.7 (1 in 143)	1.1 (1 in 90)	3.3 (1 in 30)	4.4 (1 in 23)
Female	0.4 (1 in 274)	0.5 (1 in 190)	0.8 (1 in 126)	3.0 (1 in 33)	4.1 (1 in 25)
Kidney & renal pelvis					
Male	0.2 (1 in 415)	0.4 (1 in 266)	0.7 (1 in 153)	1.4 (1 in 74)	2.2 (1 in 46)
Female	0.2 (1 in 661)	0.2 (1 in 551)	0.3 (1 in 317)	0.7 (1 in 136)	1.2 (1 in 82)
Leukemia					
Male	0.3 (1 in 391)	0.2 (1 in 550)	0.4 (1 in 249)	1.5 (1 in 69)	1.9 (1 in 54)
Female	0.2 (1 in 499)	0.1 (1 in 838)	0.2 (1 in 433)	0.9 (1 in 109)	1.3 (1 in 77)
Lung & bronchus					
Male	0.1 (1 in 730)	0.6 (1 in 158)	1.8 (1 in 57)	6.0 (1 in 17)	6.7 (1 in 15)
Female	0.2 (1 in 659)	0.6 (1 in 169)	1.4 (1 in 70)	4.8 (1 in 21)	6.0 (1 in 17)
Melanoma of the skin[c]					
Male	0.4 (1 in 228)	0.5 (1 in 197)	0.9 (1 in 109)	2.6 (1 in 38)	3.6 (1 in 28)
Female	0.6 (1 in 156)	0.4 (1 in 245)	0.5 (1 in 194)	1.2 (1 in 86)	2.5 (1 in 41)
Non-Hodgkin lymphoma					
Male	0.3 (1 in 367)	0.3 (1 in 340)	0.6 (1 in 176)	1.9 (1 in 53)	2.4 (1 in 41)
Female	0.2 (1 in 529)	0.2 (1 in 463)	0.4 (1 in 238)	1.4 (1 in 72)	1.9 (1 in 52)
Prostate					
Male	0.2 (1 in 441)	1.8 (1 in 57)	4.7 (1 in 21)	8.2 (1 in 12)	11.6 (1 in 9)
Thyroid					
Male	0.2 (1 in 449)	0.1 (1 in 694)	0.2 (1 in 558)	0.2 (1 in 405)	0.7 (1 in 144)
Female	0.9 (1 in 112)	0.4 (1 in 252)	0.4 (1 in 273)	0.4 (1 in 251)	1.9 (1 in 52)
Uterine cervix					
Female	0.3 (1 in 367)	0.1 (1 in 831)	0.1 (1 in 921)	0.2 (1 in 595)	0.6 (1 in 159)
Uterine corpus					
Female	0.3 (1 in 323)	0.6 (1 in 157)	1.0 (1 in 95)	1.5 (1 in 69)	3.1 (1 in 33)

[a]For people without a history of cancer at beginning of age interval.
[b]All sites excludes basal cell and squamous cell skin cancers and in situ cancers except urinary bladder.
[c]Probabilities for non-Hispanic whites only.

Cancer Survival

The 5-year relative survival rate for all cancers combined diagnosed during 2009 through 2015 was 67% overall, 68% in whites, and 62% in blacks.[8] Figure 4 shows 5-year relative survival rates by cancer type, stage at diagnosis, and race. For all stages combined, survival is highest for prostate cancer (98%), melanoma of the skin (92%), and female breast cancer (90%) and lowest for cancers of the pancreas (9%), liver (18%), lung (19%), and esophagus (20%). Survival rates are lower for black patients than for whites for every cancer type shown in Figure 4 except for cancers of the kidney and pancreas, for which they are the same. The largest black-white differences in absolute terms are for melanoma (25%) and cancers of the uterine corpus (22%), oral cavity and pharynx (19%), and urinary bladder (14%). Although these disparities partly reflect a later stage of disease at diagnosis in black patients (Fig. 5), blacks also have lower stage-specific survival for most cancer types (Fig. 4). After adjusting for sex, age, and stage at diagnosis, the relative risk of death after a cancer diagnosis is 33% higher in black patients than in white patients.[50] The disparity is even larger for American Indians/Alaska Natives, among whom the risk of cancer death is 51% higher than that for whites.

Cancer survival has improved since the mid-1970s for all of the most common cancers except uterine cervix and uterine corpus.[50] Stagnant survival rates for these cancers largely reflect a lack of major treatment advances for patients with recurrent and metastatic disease.[51,52] For cervical cancer, it may also reflect an increasing proportion of adenocarcinoma over time due to the removal of slow-growing squamous lesions through long-term widespread screening.[53] On the contrary, survival rates for breast and prostate cancer are likely to be artificially inflated in the screening era due to lead time bias and the detection of indolent cancers in the absence of the

TABLE 4. Estimated Deaths for Selected Cancers by State, 2020[a]

STATE	ALL SITES	BRAIN & OTHER NERVOUS SYSTEM	FEMALE BREAST	COLON & RECTUM	LEUKEMIA	LIVER & INTRAHEPATIC BILE DUCT	LUNG & BRONCHUS	NON-HODGKIN LYMPHOMA	OVARY	PANCREAS	PROSTATE
Alabama	10,530	340	690	960	370	520	2,790	290	230	790	520
Alaska	1,090	[b]	70	120	[b]	50	190	[b]	[b]	90	60
Arizona	12,580	400	900	1,120	520	680	2,590	410	310	1,070	760
Arkansas	6,730	190	410	610	240	290	1,890	190	140	450	280
California	60,660	1,980	4,620	5,480	2,400	3,880	10,210	2,140	1,590	4,840	3,890
Colorado	8,220	290	640	700	330	410	1,450	260	210	620	590
Connecticut	6,390	210	430	460	260	310	1,370	230	160	520	480
Delaware	2,130	60	150	160	90	120	510	80	50	190	90
Dist. of Columbia	1,020	[b]	100	100	[b]	80	180	[b]	[b]	90	70
Florida	45,300	1,290	3,040	3,930	1,800	2,200	10,580	1,500	1,000	3,570	2,800
Georgia	17,990	540	1,380	1,730	600	760	4,210	530	400	1,300	990
Hawaii	2,540	60	160	240	90	180	520	90	[b]	240	130
Idaho	3,100	100	230	260	110	160	590	120	90	260	210
Illinois	24,220	670	1,720	2,160	900	1,080	5,710	750	560	1,780	1,560
Indiana	13,630	370	880	1,170	510	550	3,570	450	290	990	640
Iowa	6,440	190	380	560	250	260	1,530	240	150	500	340
Kansas	5,520	170	350	500	240	250	1,300	180	120	410	290
Kentucky	10,540	290	630	870	370	440	2,910	330	180	670	430
Louisiana	9,300	240	640	880	320	580	2,330	280	160	750	450
Maine	3,350	100	180	240	120	120	870	110	70	240	180
Maryland	10,790	300	850	920	410	580	2,310	340	260	870	580
Massachusetts	12,430	410	780	910	480	640	2,810	390	310	1,020	660
Michigan	21,000	600	1,380	1,700	770	890	5,220	720	480	1,720	1,030
Minnesota	10,040	330	630	790	430	420	2,210	390	210	820	590
Mississippi	6,700	180	460	670	220	320	1,740	160	120	520	360
Missouri	13,010	340	850	1,090	480	570	3,250	390	250	940	570
Montana	2,140	70	140	190	70	100	460	70	50	160	150
Nebraska	3,520	120	240	320	150	120	800	120	80	280	190
Nevada	5,460	210	400	590	200	240	1,230	170	150	400	310
New Hampshire	2,830	90	170	290	110	120	700	90	70	200	150
New Jersey	15,710	480	1,230	1,440	620	700	3,230	560	390	1,340	810
New Mexico	3,730	110	280	360	120	250	670	120	110	280	230
New York	34,710	960	2,430	2,950	1,370	1,610	6,510	1,230	870	2,890	1,850
North Carolina	20,410	570	1,440	1,640	710	850	5,020	610	430	1,500	1,010
North Dakota	1,260	[b]	80	110	60	[b]	280	50	[b]	100	70
Ohio	25,380	700	1,710	2,170	930	1,090	6,460	850	550	1,930	1,200
Oklahoma	8,430	230	560	800	330	410	2,180	270	190	570	430
Oregon	8,280	260	550	660	310	480	1,750	270	240	680	500
Pennsylvania	27,860	780	1,910	2,440	1,070	1,270	6,460	950	640	2,270	1,390
Rhode Island	2,120	60	120	160	80	110	540	70	[b]	170	110
South Carolina	10,780	310	750	910	390	520	2,610	320	210	830	590
South Dakota	1,690	60	110	170	70	70	400	60	[b]	130	90
Tennessee	14,780	380	950	1,260	530	730	3,990	460	310	1,010	660
Texas	41,810	1,260	3,060	4,070	1,620	2,740	8,420	1,350	930	3,130	2,310
Utah	3,350	140	290	300	170	160	430	130	110	280	240
Vermont	1,450	60	70	130	50	50	350	50	[b]	110	70
Virginia	15,220	450	1,140	1,400	540	730	3,450	490	370	1,180	800
Washington	13,020	440	900	1,050	490	720	2,740	450	330	1,000	750
West Virginia	4,750	120	290	440	180	200	1,300	150	90	310	190
Wisconsin	11,610	380	720	920	470	450	2,690	400	250	950	660
Wyoming	960	[b]	60	80	50	60	190	[b]	[b]	70	50
United States	**606,520**	**18,020**	**42,170**	**53,200**	**23,100**	**30,160**	**135,720**	**19,940**	**13,940**	**47,050**	**33,330**

Note: These are model-based estimates that should be interpreted with caution and not compared with those for previous years. State estimates may not add to US total due to rounding and the exclusion of states with fewer than 50 deaths.
[a]Rounded to the nearest 10. Estimates for Puerto Rico are not available.
[b]Estimate is fewer than 50 deaths.

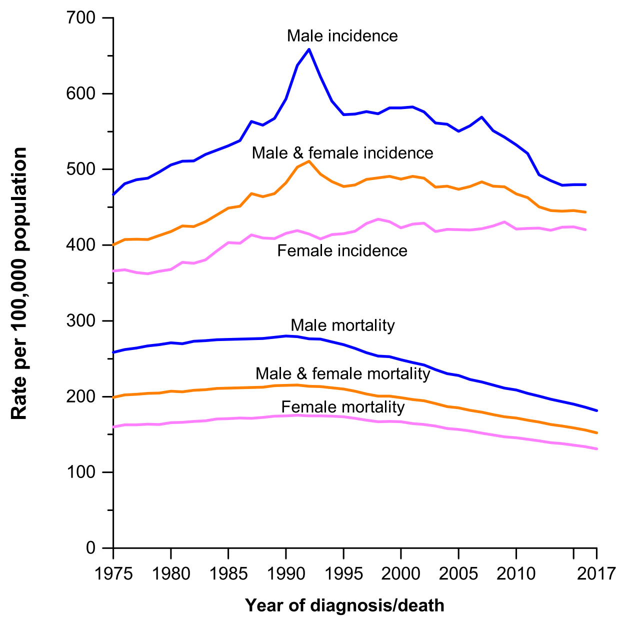


FIGURE 2. Trends in Cancer Incidence (1975 to 2016) and Mortality Rates (1975 to 2017) by Sex, United States. Rates are age adjusted to the 2000 US standard population. Incidence rates also are adjusted for delays in reporting.

capacity to detect and remove premalignant lesions.[54] Progress for hematopoietic and lymphoid malignancies has been especially rapid due to improvements in treatment protocols, including the development of targeted therapies. For example, the 5-year relative survival rate for chronic myeloid leukemia increased from 22% in the mid-1970s to 70% for those diagnosed during 2009 through 2015,[8] and most patients treated with tyrosine kinase inhibitors experience nearly normal life expectancy.[55]

Low lung cancer survival rates reflect the large proportion of patients (57%) diagnosed with metastatic disease, for which the 5-year relative survival rate is 5%.[8] However, the 5-year survival rate for localized stage disease is 57%, and there is potential for earlier diagnoses among those at high risk through screening with low-dose computed tomography. The National Lung Screening Trial, the largest trial to date, demonstrated a 20% reduction in lung cancer mortality in current/former smokers with a ≥30 pack-year history compared with chest radiography.[56] More recently, the Multicentric Italian Lung Detection (MILD) trial, which included more screening rounds, longer follow-up, and a more moderate risk pool (those with a smoking history of ≥20 pack-years) reported a 39% reduction in lung cancer mortality compared with no intervention.[57] Although the American Cancer Society and US Preventive Services Task Force recommend low-dose computed tomography lung cancer screening for select current/former heavy smokers, the translation of this benefit to the general population remains challenging. Recent studies have found that millions of individuals are inappropriately screened whereas fewer than 500,000 are screened according to guidelines.[58,59] Broad implementation of recommended lung cancer screening will require new systems to facilitate unique aspects of the process, including the identification of eligible patients and the

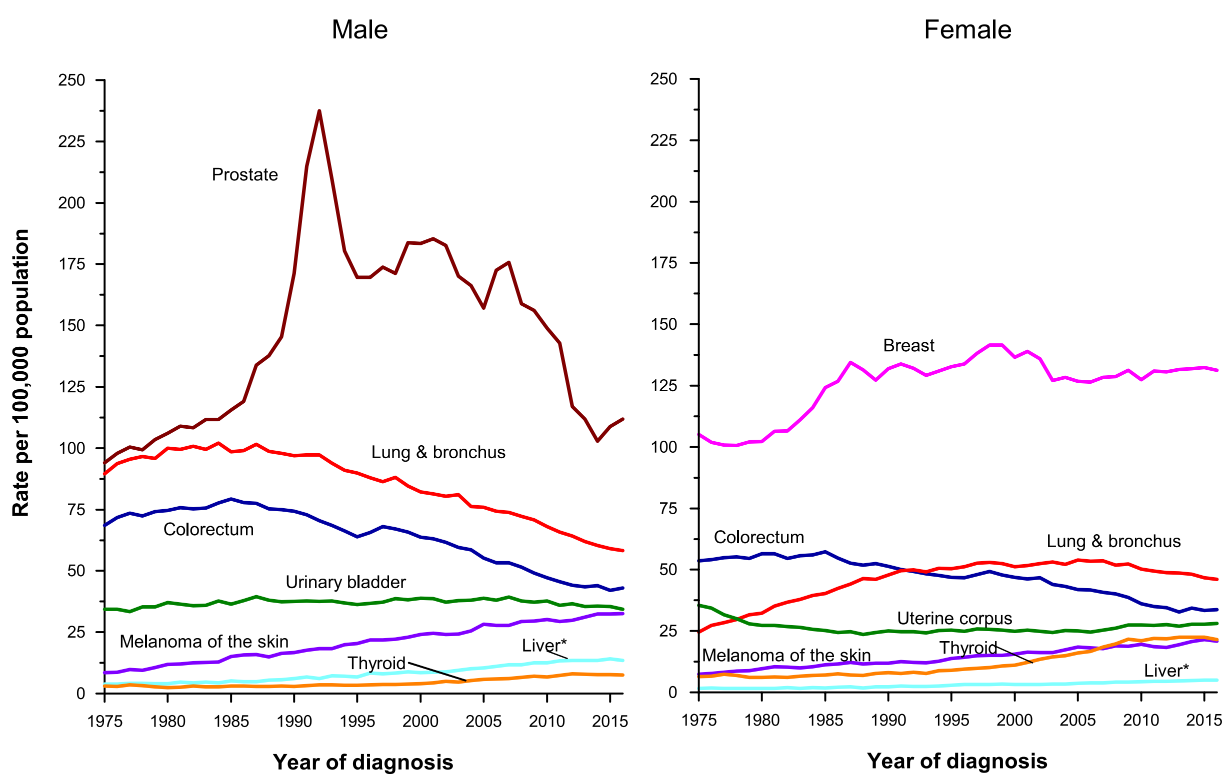


FIGURE 3. Trends in Incidence Rates for Selected Cancers by Sex, United States, 1975 to 2016. Rates are age adjusted to the 2000 US standard population and adjusted for delays in reporting. *Includes intrahepatic bile duct.

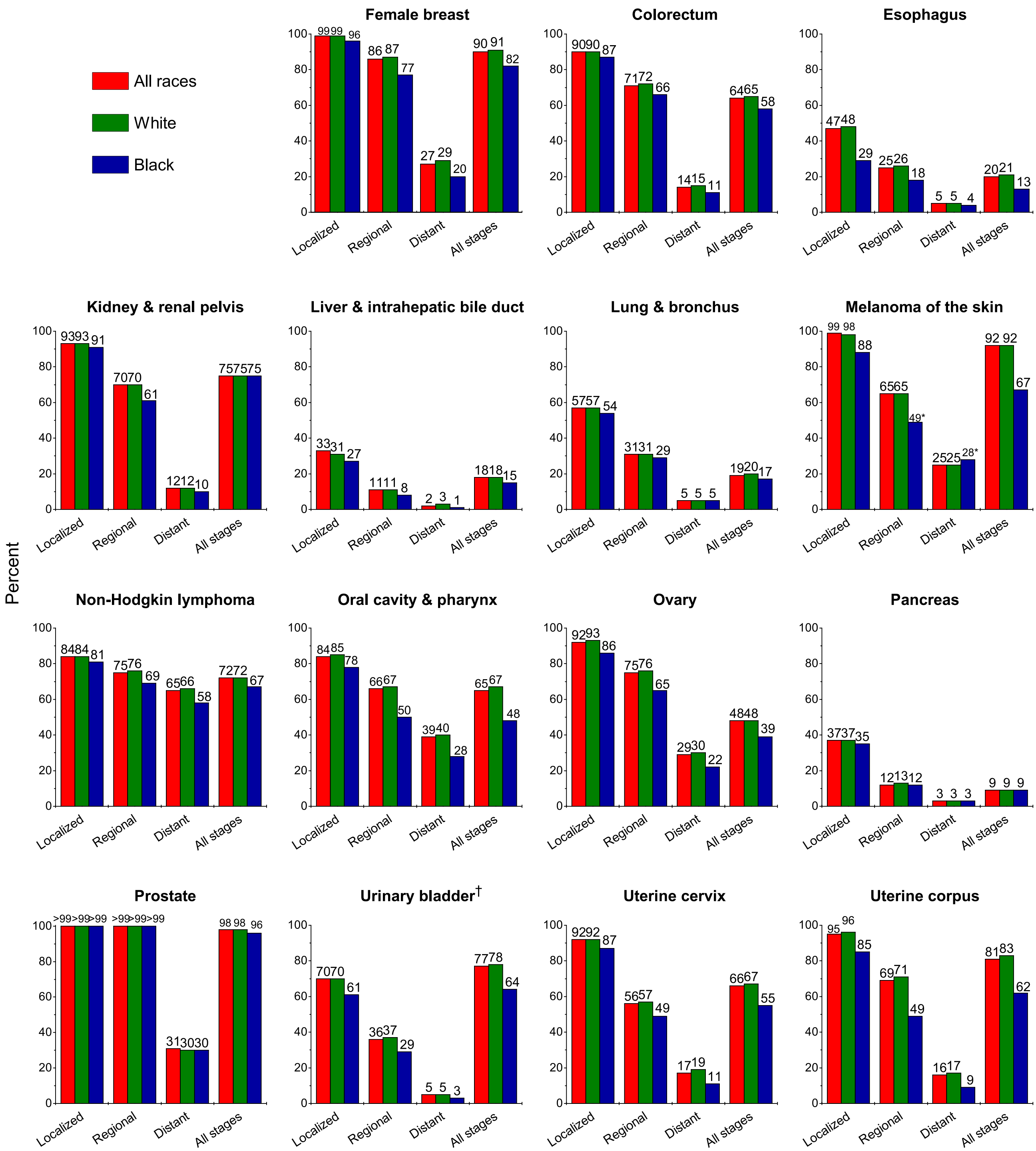


FIGURE 4. Five-Year Relative Survival Rates for Selected Cancers by Race and Stage at Diagnosis, United States, 2009 to 2015. *The standard error of the survival rate is between 5 and 10 percentage points. †The survival rate for carcinoma in situ of the urinary bladder is 95% in all races, 95% in whites, and 91% in blacks.

education of physicians regarding details of the shared decision-making conversation required by the Centers for Medicaid and Medicare Services.

Trends in Cancer Mortality

Mortality rates are a better indicator of progress against cancer than incidence or survival rates because they are less affected by biases resulting from changes in detection practices.[60] The cancer death rate rose during most of the 20th century, largely because of a rapid increase in lung cancer deaths among men as a consequence of the tobacco epidemic. However, declines in smoking, as well as improvements in early detection and treatment, have resulted in a continuous decline in the cancer death rate since its peak of 215.1 deaths (per 100,000 population) in 1991. The overall drop of 29% as of 2017 (152.4 per 100,000 population) translates into an

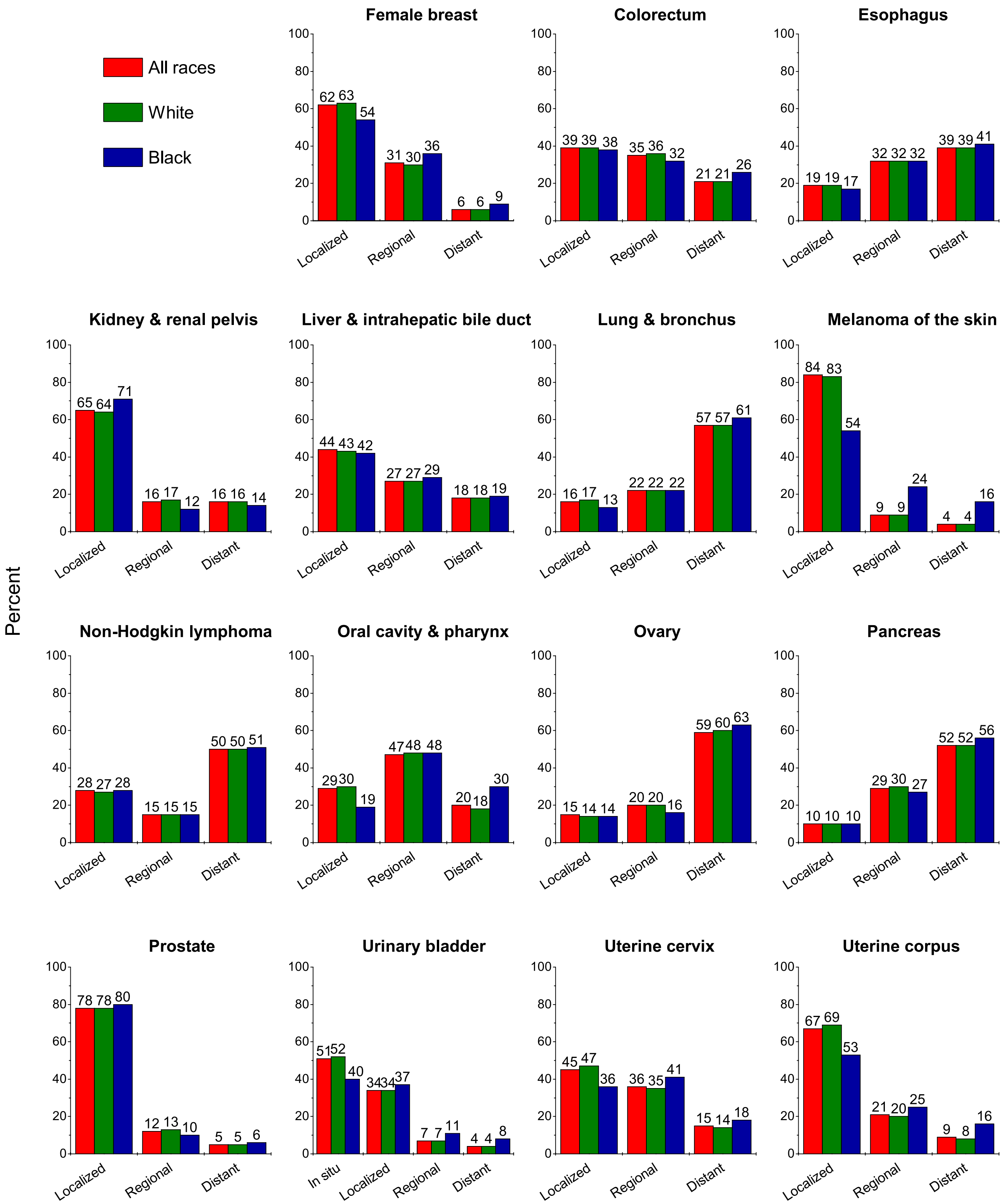


FIGURE 5. Stage Distribution for Selected Cancers by Race, United States, 2009 to 2015. Stage categories do not sum to 100% because sufficient information was not available to stage all cases.

estimated 2,902,200 fewer cancer deaths (1,983,000 in men and 919,200 in women) than what would have occurred if mortality rates had remained at their peak (Fig. 6). The number of averted deaths is larger for men than for women because the death rate in men peaked higher and declined faster. During the most recent decade of data (2008-2017), the death rate declined by 1.5% per year for cancer while remaining stable for all other causes of death combined, reflecting a slowing decline for heart disease, stabilizing rates for cerebrovascular disease, and an increasing trend for accidents (unintentional injuries; 2.6% per year) and Alzheimer disease (3.2% per year).

The progress against cancer reflects large declines in mortality for the 4 major cancers (lung, breast, prostate, and colorectum) (Fig. 7). Specifically, as of 2017, the death rate has dropped from its peak for lung cancer by 51% among males (since 1990) and by 26% among females (since 2002); for female breast cancer by 40% (since 1989); for prostate cancer by 52% (since 1993); and for CRC by 53% among males (since 1980) and by 57% among females (since 1969). The CRC death rate in women was declining prior to 1969, but that is the first year for which data exclusive of the small intestine are available. Two decades of steep (4% per year on average) declines for prostate cancer are attributed to an earlier stage at diagnosis through PSA testing, as well as advances in treatments.[61,62] However, prostate cancer death rates stabilized in recent years (Table 5), possibly related to declines in PSA testing and an uptick in the diagnosis of distant stage disease.[32] Declines in mortality have also slowed for female breast and CRC. In contrast, declines in lung cancer mortality have accelerated, from approximately 3% annually during 2008 through 2013 to 5% during 2013 through 2017 in men and from 2% to almost 4% in women.

Recent mortality declines are even more rapid for melanoma of the skin, most likely reflecting improved survival in the wake of promising new treatments for metastatic disease. In 2011, the US Food and Drug Administration approved ipilimumab, the first immune checkpoint inhibitor approved for cancer therapy,[63] and vemurafenib, a BRAF inhibitor, for the treatment of advanced melanoma.[64] Subsequently, the 1-year relative survival rate for metastatic melanoma escalated from 42% for patients diagnosed during 2008 through 2010 to 55% for those diagnosed during 2013 through 2015.[65] Likewise, the overall melanoma mortality rate dropped by 7% annually during 2013 through 2017 in men and women aged 20 to 64 years compared with declines during 2006 through 2010 of approximately 1% annually among individuals aged 50 to 64 years and 2% to 3% among those aged 20 to 49 years (Fig. 8). The impact was even more striking for individuals aged 65 years and older, among whom rates were increasing prior to 2013 but are now declining by 5% to 6% per year. We also examined melanoma

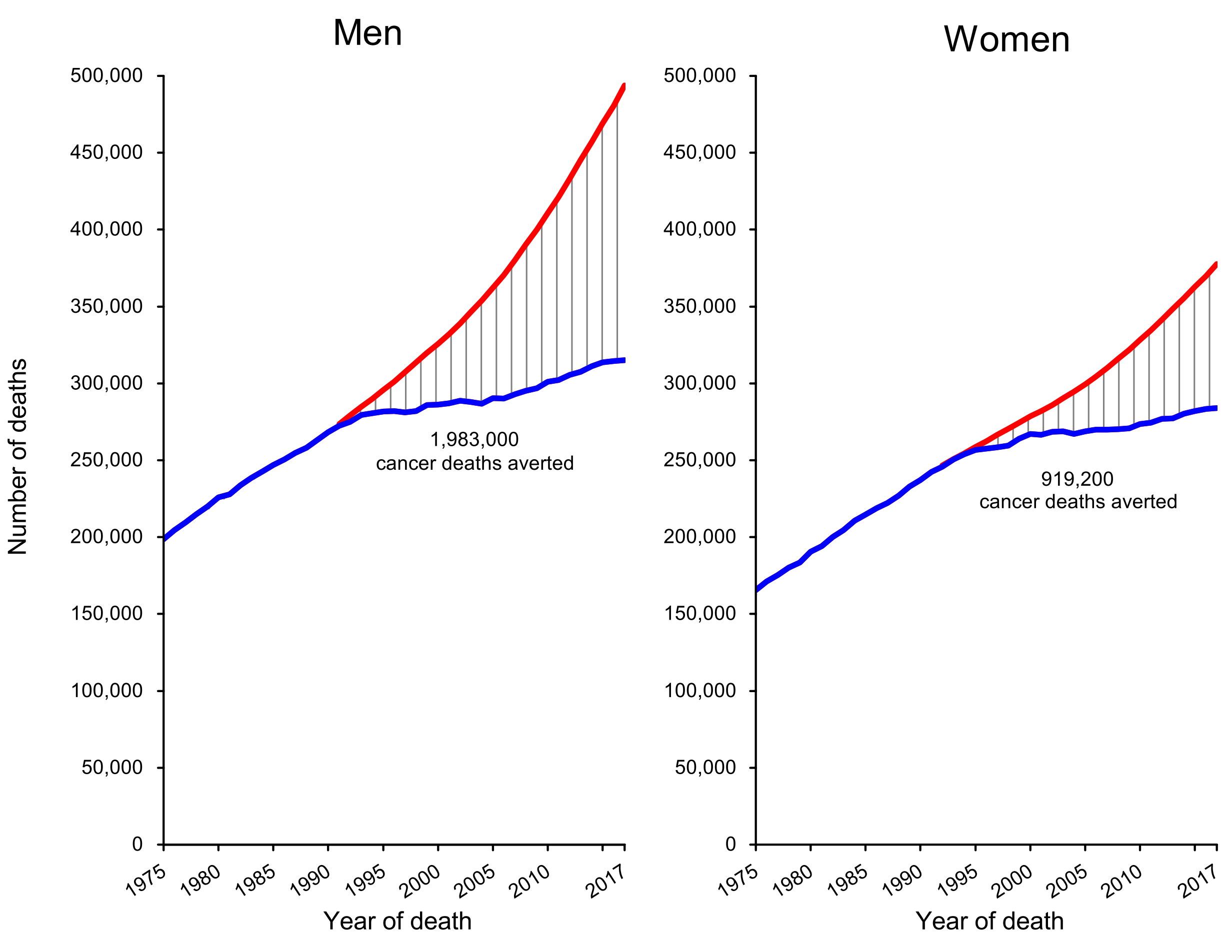


FIGURE 6. Total Number of Cancer Deaths Averted From 1991 to 2017 in Men and From 1992 to 2017 in Women, United States. The blue line represents the actual number of cancer deaths recorded in each year, and the red line represents the number of cancer deaths that would have been expected if cancer death rates had remained at their peak.

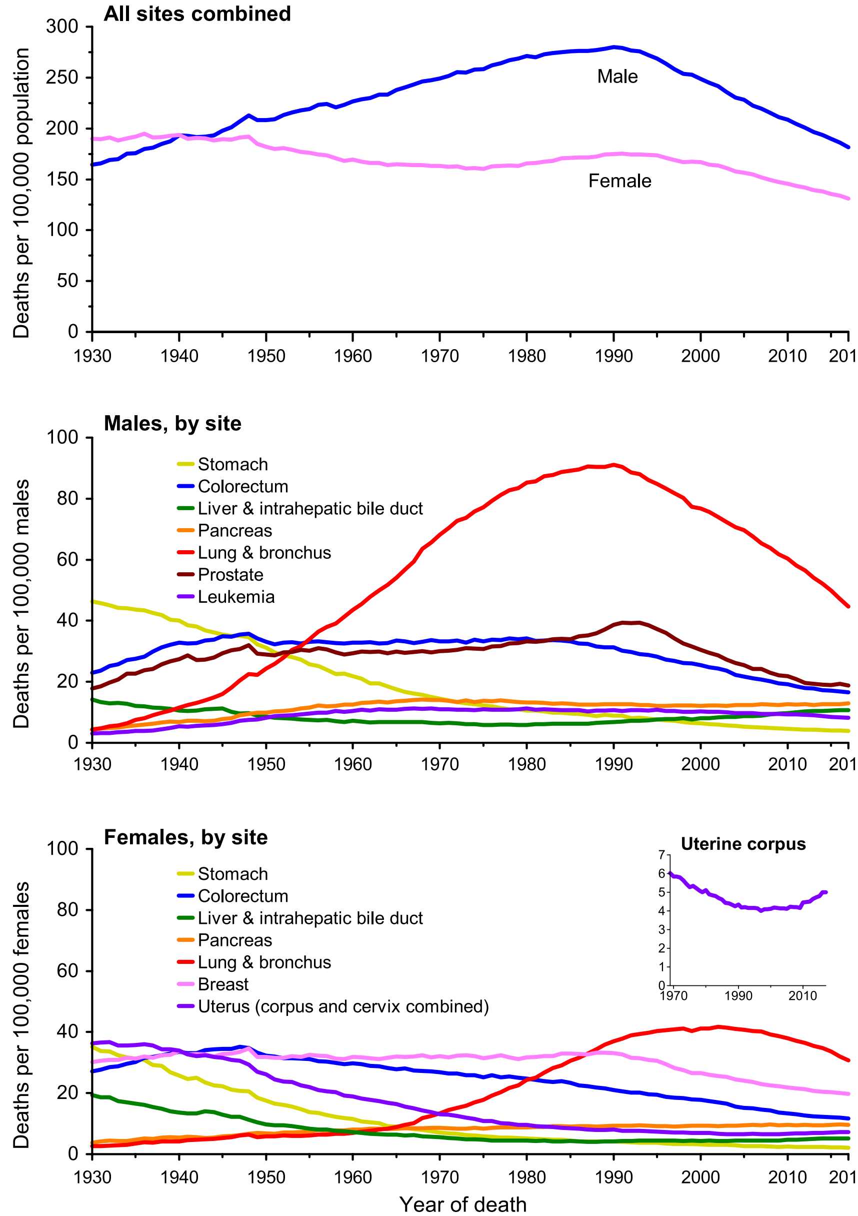


FIGURE 7. Trends in Cancer Mortality Rates by Sex Overall and for Selected Cancers, United States, 1930 to 2017. Rates are age adjusted to the 2000 US standard population. Due to improvements in International Classification of Diseases (ICD) coding over time, numerator data for cancers of the lung and bronchus, colon and rectum, liver, and uterus differ from the contemporary time period. For example, rates for lung and bronchus include pleura, trachea, mediastinum, and other respiratory organs.

mortality trends stratified by age and county-level poverty because dissemination of newly approved therapies has been slower among the uninsured, who are more likely to be of lower socioeconomic status.[64,66] Trends were similar in poor versus affluent counties among individuals aged 65 years and older, who are universally insured, as well as among women aged younger than 65 years. However, among men aged younger than 65 years residing in poor counties, there was no acceleration in the decline following drug approval (Fig. 8). Our inability to detect a difference in the trend by poverty status among women may reflect their melanoma survival advantage over men[67] and/or their higher prevalence of health insurance coverage.[68]

Death rates rose over the past decade for cancers of the liver, pancreas (among males), and uterine corpus (Table 5), as well as for cancers of the small intestine, anus, penis, brain and other nervous system, eye and orbit, and sites within the oral cavity and pharynx associated with the human papillomavirus (HPV).[8] However, the sustained rapid increases in liver cancer mortality appear to be slowing in women and stabilizing in men.

Recorded Number of Deaths in 2017

A total of 2,820,034 deaths were recorded in the United States in 2017, 21% of which were from cancer (Table 6). In contrast to stable or increasing trends for most leading causes of death,

TABLE 5. Trends in Mortality Rates for Selected Cancers by Sex, United States, 1975 to 2017

	TREND 1		TREND 2		TREND 3		TREND 4		TREND 5		TREND 6		AAPC		
	YEARS	APC	YEARS	APC	YEARS	APC	YEARS	APC	YEARS	APC	YEARS	APC	2008-2013	2013-2017	2008-2017
All sites															
Overall	1975-1984	0.5[a]	1984-1991	0.3[a]	1991-1994	−0.5	1994-1998	−1.3[a]	1998-2001	−0.8	2001-2017	−1.5[a]	−1.5[a]	−1.5[a]	−1.5[a]
Male	1975-1979	1.0[a]	1979-1990	0.3[a]	1990-1993	−0.5	1993-2002	−1.5[a]	2002-2017	−1.8[a]			−1.8[a]	−1.8[a]	−1.8[a]
Female	1975-1990	0.6[a]	1990-1994	−0.2	1994-2002	−0.8[a]	2002-2017	−1.4[a]					−1.4[a]	−1.4[a]	−1.4[a]
Female breast	1975-1990	0.4[a]	1990-1995	−1.8[a]	1995-1998	−3.3[a]	1998-2011	−1.9[a]	2011-2017	−1.3[a]			−1.7[a]	−1.3[a]	−1.5[a]
Colorectum															
Overall	1975-1978	0.2	1978-1985	−0.8[a]	1985-2002	−1.8[a]	2002-2005	−3.7[a]	2005-2012	−2.6[a]	2012-2017	−1.8[a]	−2.4[a]	−1.8[a]	−2.1[a]
Male	1975-1979	0.6	1979-1987	−0.6[a]	1987-2002	−1.9[a]	2002-2005	−4.0[a]	2005-2012	−2.6[a]	2012-2017	−2.0[a]	−2.5[a]	−2.0[a]	−2.3[a]
Female	1975-1984	−1.0[a]	1984-2001	−1.8[a]	2001-2012	−2.9[a]	2012-2017	−1.6[a]					−2.6[a]	−1.6[a]	−2.2[a]
Liver & intrahepatic bile duct															
Overall	1975-1980	0.2	1980-1987	2.0[a]	1987-1995	3.8[a]	1995-2007	1.9[a]	2007-2013	3.2[a]	2013-2017	0.6	3.2[a]	0.6	2.0[a]
Male	1975-1985	1.5[a]	1985-1996	3.8[a]	1996-1999	0.3	1999-2013	2.7[a]	2013-2017	0.6			2.7[a]	0.6	1.7[a]
Female	1975-1984	0.2	1984-1995	3.1[a]	1995-2008	1.2[a]	2008-2013	3.2[a]	2013-2017	1.3[a]			3.2[a]	1.3[a]	2.4[a]
Lung & bronchus															
Overall	1975-1980	3.0[a]	1980-1990	1.8[a]	1990-1995	−0.2	1995-2005	−0.9[a]	2005-2014	−2.4[a]	2014-2017	−4.9[a]	−2.4[a]	−4.3[a]	−3.3[a]
Male	1975-1978	2.4[a]	1978-1984	1.2[a]	1984-1991	0.3[a]	1991-2005	−1.9[a]	2005-2013	−3.0[a]	2013-2017	−4.9[a]	−3.0[a]	−4.9[a]	−3.8[a]
Female	1975-1983	5.9[a]	1983-1992	3.8[a]	1992-2002	0.5[a]	2002-2007	−0.7[a]	2007-2014	−2.0[a]	2014-2017	−4.2[a]	−2.0[a]	−3.7[a]	−2.7[a]
Melanoma of skin															
Overall	1975-1988	1.6[a]	1988-2013	0.0	2013-2017	−6.4[a]							0.0	−6.4[a]	−2.9[a]
Male	1975-1987	2.4[a]	1987-1997	0.9[a]	1997-2000	−1.7	2000-2009	1.0[a]	2009-2014	−1.4[a]	2014-2017	−7.6[a]	−0.9	−6.1[a]	−3.2[a]
Female	1975-1988	0.8[a]	1988-2013	−0.5[a]	2013-2017	−6.1[a]							−0.5[a]	−6.1[a]	−3.0[a]
Pancreas															
Overall	1975-1998	−0.1[a]	1998-2017	0.3[a]									0.3[a]	0.3[a]	0.3[a]
Male	1975-1986	−0.8[a]	1986-2000	−0.3[a]	2000-2017	0.3[a]							0.3[a]	0.3[a]	0.3[a]
Female	1975-1984	0.8[a]	1984-2003	0.1	2003-2006	1.0	2006-2017	0.0					0.0	0.0	0.0
Prostate	1975-1987	0.9[a]	1987-1991	3.0[a]	1991-1994	−0.5	1994-1998	−4.2[a]	1998-2013	−3.5[a]	2013-2017	−0.3	−3.5[a]	−0.3	−2.1[a]
Uterine corpus	1975-1993	−1.5[a]	1993-2008	0.2	2008-2017	2.1[a]							2.1[a]	2.1[a]	2.1[a]

Abbreviations: AAPC, average annual percent change; APC, annual percent change based on mortality rates age adjusted to the 2000 US standard population.
Note: Trends analyzed by the Joinpoint Regression Program, version 4.7, allowing up to 5 joinpoints.
[a]The APC or AAPC is significantly different from zero ($P < .05$).

the cancer death rate declined by 2.2% from 2016 to 2017, the largest single-year drop since rates began declining in 1992. This progress is largely driven by recent rapid declines in lung cancer mortality. Cancer is the second leading cause of death after heart disease in both men and women nationally, but is the leading cause of death in many states,[69] in Hispanic and Asian Americans,[70,71] and in individuals aged younger than 80 years. However, those aged 80 years and older are nearly 2 times more likely to die from heart disease than from cancer. Among females, cancer is the first or second leading cause of death for every age group shown in Table 7, whereas among males, accidents and suicide predominate before age 40 years.

Table 8 presents the number of deaths in 2017 for the 5 leading cancer types by age and sex. Brain and other nervous system tumors and leukemia are the first and second leading causes of cancer death among men aged younger than 40 years and women aged younger than 20 years, whereas breast cancer leads among women aged 20 to 59 years. Lung cancer leads in cancer deaths among men aged 40 years and older and women aged 60 years and older, causing 145,849 total deaths in 2017, more than breast, prostate, colorectal, and brain cancers combined. There were 17% more lung cancer deaths in men (78,694) than in women (67,155) in 2017, but this pattern is projected to reverse by 2045 if current smoking trends continue.[72]

Cervical cancer continues to be the second leading cause of cancer death in women aged 20 to 39 years, causing 10 premature deaths per week in this age group. This finding, coupled with increasing trends for distant stage diagnoses and cervical adenocarcinoma,[73] which is often undetected by cytology, underscores the need for increased HPV vaccination uptake and Papanicolaou/HPV DNA cotesting, which is the preferred screening method for women aged 30 to 65 years.[74] Approximately one-half of adolescent girls have not been fully vaccinated,[75] and only 43% of women in their 30s received recent Papanicolaou/HPV DNA screening tests in 2015.[76]

Cancer Disparities by Race/Ethnicity

Cancer occurrence and outcomes vary considerably between racial and ethnic groups, largely because of inequalities in wealth that lead to differences in risk factor exposures and barriers to high-quality cancer prevention, early detection, and treatment.[77,78] Overall cancer incidence rates are highest

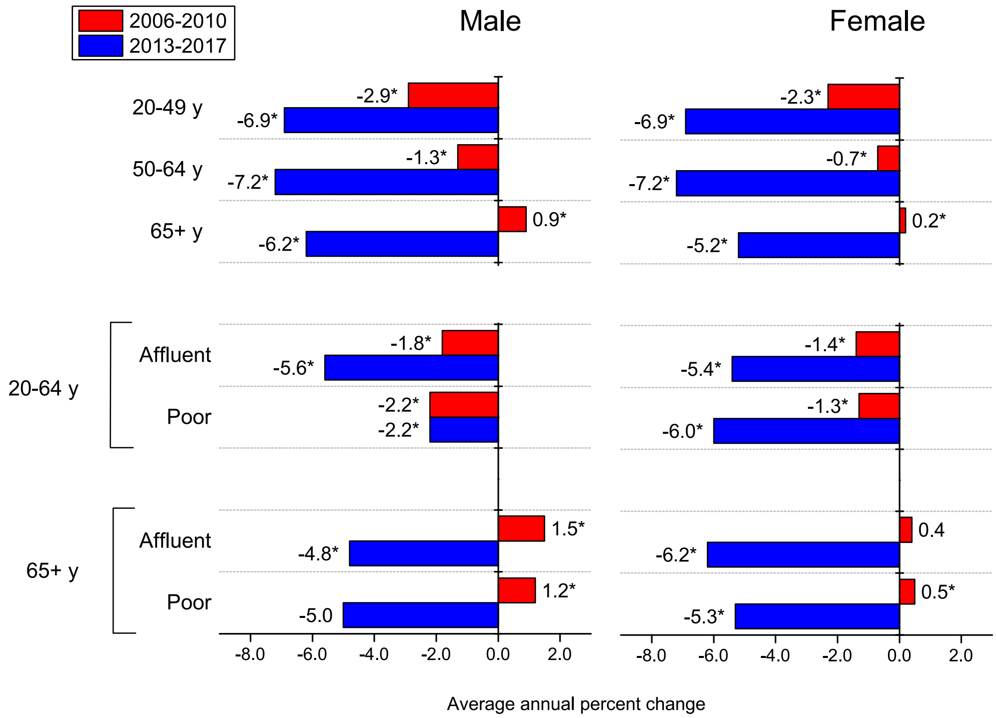


FIGURE 8. Average Annual Percent Change in Melanoma Mortality Rates Before (2006 to 2010) and After (2013 to 2017) US Food and Drug Administration Approval of Ipilimumab and Vemurafenib by Sex, Age, and County-Level Poverty in the United States. "Poor" and "affluent" refer to extreme county-level poverty categories based on the US Census Bureau's American Community Survey (21.18%-53.95% and 1.81%-10.84%, respectively). *The average annual percent change was statistically significant ($P < .05$).

TABLE 6. Ten Leading Causes of Death in the United States, 2016 and 2017

		2016			2017			
		NO.	PERCENT	RATE	NO.	PERCENT	RATE	RELATIVE CHANGE IN RATE
RANK (2016)	All causes	2,744,248		728.7	2,820,034		731.7	0.4%
1	Heart disease	635,260	23%	165.5	647,457	23%	165.0	−0.3%
2	Cancer	598,038	22%	155.9	599,108	21%	152.4	−2.2%
3	Accidents (unintentional injuries)	161,374	6%	47.3	169,936	6%	49.3	4.2%
4	Chronic lower respiratory diseases	154,596	6%	40.7	160,201	6%	41.0	0.7%
5	Cerebrovascular disease	142,142	5%	37.4	146,383	5%	37.6	0.5%
6	Alzheimer disease	116,103	4%	30.3	121,404	4%	31.1	2.6%
7	Diabetes mellitus	80,058	3%	21.0	83,564	3%	21.4	1.9%
8	Influenza and pneumonia	51,537	2%	13.5	55,672	2%	14.3	5.9%
9	Nephritis, nephrotic syndrome, & nephrosis	50,046	2%	13.2	50,633	2%	13.0	−1.5%
10	Intentional self-harm (suicide)	44,965	2%	13.4	47,173	2%	14.0	4.5%

Death counts include unknown age.
Rates are per 100,000 population and age adjusted to the 2000 US standard population. Rank is based on number of deaths.
Source: National Center for Health Statistics, Centers for Disease Control and Prevention.

among non-Hispanic whites (NHWs) because of their high rate of lung and female breast cancer (Table 9). However, sex-specific incidence is highest in non-Hispanic black (NHB) men, among whom rates during 2012 through 2016 were 85% higher than those in Asian/Pacific Islander men, who have the lowest rates, and 8% higher than those in NHW men, who rank second. Among women, NHWs have the highest incidence, 8% higher than NHBs (who rank second); however, NHB women have the highest cancer mortality rates–13% higher than those for NHW women. The mortality disparity among men is likewise larger, with the death rate in NHB men double that in Asian/Pacific Islander men and 20% higher than that in NHW men. However, the black-white disparity in overall cancer mortality among men and women combined

TABLE 7. Ten Leading Causes of Death in the United States by Age and Sex, 2017

	ALL AGES		AGES 1 TO 19		AGES 20 TO 39		AGES 40 TO 59		AGES 60 TO 79		AGES ≥80	
	MALE All Causes 1,439,111	FEMALE All Causes 1,374,392	MALE All Causes 13,350	FEMALE All Causes 6,987	MALE All Causes 81,908	FEMALE All Causes 36,347	MALE All Causes 228,878	FEMALE All Causes 146,257	MALE All Causes 594,384	FEMALE All Causes 454,632	MALE All Causes 508,032	FEMALE All Causes 720,264
1	Heart disease 347,879	Heart disease 299,578	Accidents (unintentional injuries) 4,510	Accidents (unintentional injuries) 2,283	Accidents (unintentional injuries) 34,903	Accidents (unintentional injuries) 12,610	Heart disease 51,071	Cancer 46,700	Cancer 174,590	Cancer 142,987	Heart disease 144,806	Heart disease 189,291
2	Cancer 315,147	Cancer 283,961	Intentional self-harm (suicide) 2,290	Cancer 769	Intentional self-harm (suicide) 12,324	Cancer 4,563	Cancer 47,008	Heart disease 22,307	Heart disease 145,974	Heart disease 84,855	Cancer 88,575	Cancer 88,908
3	Accidents (unintentional injuries) 109,722	Chronic lower respiratory diseases 85,196	Assault (homicide) 1,956	Intentional self-harm (suicide) 723	Assault (homicide) 8,832	Intentional self-harm (suicide) 3,107	Accidents (unintentional injuries) 33,368	Accidents (unintentional injuries) 14,712	Chronic lower respiratory diseases 38,540	Chronic lower respiratory diseases 38,153	Chronic lower respiratory diseases 30,543	Alzheimer disease 72,172
4	Chronic lower respiratory diseases 75,005	Cerebrovascular disease 84,738	Cancer 971	Assault (homicide) 514	Heart disease 5,474	Heart disease 2,722	Intentional self-harm (suicide) 12,367	Chronic lower respiratory diseases 6,025	Cerebrovascular disease 24,391	Cerebrovascular disease 22,389	Cerebrovascular disease 29,653	Cerebrovascular disease 56,685
5	Cerebrovascular disease 61,645	Alzheimer disease 84,079	Congenital anomalies 524	Congenital anomalies 447	Cancer 3,971	Assault (homicide) 1,710	Chronic liver disease & cirrhosis 11,063	Chronic liver disease & cirrhosis 5,873	Diabetes mellitus 23,780	Diabetes mellitus 16,711	Alzheimer disease 29,246	Chronic lower respiratory diseases 40,607
6	Diabetes mellitus 46,302	Accidents (unintentional injuries) 60,214	Heart disease 372	Heart disease 241	Chronic liver disease & cirrhosis 1,317	Pregnancy, childbirth, & puerperium 869	Diabetes mellitus 8,795	Diabetes mellitus 5,254	Accidents (unintentional injuries) 21,301	Alzheimer disease 11,660	Accidents (unintentional injuries) 14,865	Accidents (unintentional injuries) 18,479
7	Alzheimer disease 37,325	Diabetes mellitus 37,262	Influenza & pneumonia 148	Influenza & pneumonia 138	Diabetes mellitus 1,082	Chronic liver disease & cirrhosis 850	Cerebrovascular disease 6,627	Cerebrovascular disease 4,940	Chronic liver disease & cirrhosis 12,267	Accidents (unintentional injuries) 11,572	Influenza & pneumonia 13,764	Influenza & pneumonia 18,362
8	Intentional self-harm (suicide) 36,782	Influenza & pneumonia 29,114	Chronic lower respiratory diseases 144	Cerebrovascular disease 97	Cerebrovascular disease 783	Diabetes mellitus 747	Chronic lower respiratory diseases 5,377	Intentional self-harm (suicide) 4,226	Nephritis, nephrotic syndrome, & nephrosis 10,837	Nephritis, nephrotic syndrome, & nephrosis 9,254	Diabetes mellitus 12,581	Diabetes mellitus 14,496
9	Influenza & pneumonia 26,558	Nephritis, nephrotic syndrome, & nephrosis 24,889	Cerebrovascular disease 132	Chronic lower respiratory diseases 86	HIV disease 700	Cerebrovascular disease 584	Assault (homicide) 3,510	Septicemia 2,419	Influenza & pneumonia 9,585	Septicemia 8,816	Parkinson 12,258	Nephritis, nephrotic syndrome, & nephrosis 13,264
10	Chronic liver disease & cirrhosis 26,451	Septicemia 21,319	Septicemia 78	In situ/benign neoplasms 72	Congenital anomalies 504	Septicemia 410	Septicemia 2,924	Nephritis, nephrotic syndrome, & nephrosis 2,074	Septicemia 8,966	Influenza & pneumonia 8,117	Nephritis, nephrotic syndrome, & nephrosis 11,683	Hypertension & hypertensive renal disease[a] 12,861

Abbreviation: HIV, human immunodeficiency virus.
Source: US Final Mortality Data, 2017, National Center for Health Statistics, Centers for Disease Control and Prevention, 2019.
Note: Deaths within each age group do not sum to all ages combined due to the inclusion of unknown ages. In accordance with the National Center for Health Statistics' cause-of-death ranking, "Symptoms, signs, and abnormal clinical or laboratory findings" and categories that begin with "Other" and "All other" were not ranked.
[a]Includes primary and secondary hypertension.

TABLE 8. Five Leading Causes of Cancer Death by Age and Sex, United States, 2017

ALL AGES	<20	20 TO 39	40 TO 59	60 TO 79	≥80
			MALE		
ALL SITES	**ALL SITES**	**ALL SITES**	**ALL SITES**	**ALL SITES**	**ALL SITES**
315,147	**996**	**3,971**	**47,008**	**174,590**	**88,575**
Lung & bronchus	Brain & ONS	Brain & ONS	Lung & bronchus	Lung & bronchus	Lung & bronchus
78,694	270	546	10,498	49,230	18,750
Prostate	Leukemia	Leukemia	Colorectum	Colorectum	Prostate
30,488	266	469	5,939	14,156	15,298
Colorectum	Bones & joints	Colorectum	Liver[a]	Prostate	Colorectum
27,797	99	463	3,752	13,923	7,234
Pancreas	Soft tissue (including heart)	Soft tissue (including heart)	Pancreas	Pancreas	Urinary bladder
22,919	89	239	3,676	13,923	5,697
Liver[a]	Non-Hodgkin lymphoma	Non-Hodgkin lymphoma	Brain & ONS	Liver[a]	Pancreas
18,246	44	237	2,438	11,473	5,182
			FEMALE		
ALL SITES	**ALL SITES**	**ALL SITES**	**ALL SITES**	**ALL SITES**	**ALL SITES**
283,961	**801**	**4,563**	**46,700**	**142,987**	**88,908**
Lung & bronchus	Brain & ONS	Breast	Breast	Lung & bronchus	Lung & bronchus
67,155	249	1,063	10,283	39,115	18,800
Breast	Leukemia	Uterine cervix	Lung & bronchus	Breast	Breast
42,000	194	513	9,088	19,256	11,398
Colorectum	Soft tissue (including heart)	Colorectum	Colorectum	Pancreas	Colorectum
24,750	75	396	4,329	11,315	9,516
Pancreas	Bones & joints	Brain & ONS	Ovary	Colorectum	Pancreas
21,093	72	358	2,748	10,506	7,062
Ovary	Kidney & renal pelvis	Leukemia	Pancreas	Ovary	Leukemia
14,193	26	317	2,643	7,741	4,183

Abbreviation: ONS, other nervous system.
Note: Ranking order excludes category titles that begin with the word "Other."
[a]Includes intrahepatic bile duct.

has declined from a peak of 33% in 1993 (279.0 vs 210.5 per 100,000 population) to 13% in 2017 (178.5 vs 157.5 per 100,000 population). This progress is largely due to more rapid declines in deaths from smoking-related cancers among blacks because of the steep drop in smoking prevalence unique to black teens from the late 1970s to early 1990s.[79]

Geographic Variation in Cancer Occurrence

Tables 10 and 11 show cancer incidence and mortality rates for selected cancers by state. State variation in cancer incidence reflects differences in medical detection practices and the prevalence of risk factors, such as smoking, obesity, and other health behaviors. The largest geographic variation in cancer occurrence is for cancers that are potentially the most preventable,[45] such as lung cancer, cervical cancer, and melanoma of the skin.[44] For example, lung cancer incidence and mortality rates in Kentucky, where smoking prevalence was historically highest, are 3 to 4 times higher than those in Utah, where it was lowest. Even in 2018, 1 in 4 residents of Kentucky, Arkansas, and West Virginia were current smokers compared with 1 in 10 in Utah and California.[80]

Similarly, cervical cancer incidence and mortality currently vary by 2-fold to 3-fold between states, with incidence rates ranging from <5 per 100,000 population in Vermont and New Hampshire to 10 per 100,000 population in Arkansas (Table 10). Ironically, advances in cancer control often exacerbate disparities, and state gaps for cervical and other HPV-associated cancers may widen in the wake of unequal uptake of the HPV vaccine, which has already shown efficacy in reducing the burden of cervical intraepithelial neoplasia of grade 2 or higher.[81] In 2018, up-to-date HPV vaccination among adolescents (those aged 13-17 years) ranged from 38% in Kansas and Mississippi to >70% in North Dakota and Rhode Island among girls and from 27% in Mississippi to >70% in Massachusetts and Rhode Island among boys.[75] State/territory differences in other initiatives to improve health, including Medicaid expansion, may also contribute to future geographic disparities.[82,83]

Cancer in Children and Adolescents

Cancer is the second most common cause of death among children aged 1 to 14 years in the United States, surpassed only by accidents. In 2020, an estimated 11,050 children (aged birth to 14 years) and 5,800 adolescents (aged 15-19 years) will be diagnosed with cancer, and 1,190 and 540, respectively, will die from the disease. These estimates

TABLE 9. Incidence and Mortality Rates for Selected Cancers by Race and Ethnicity, United States, 2012 to 2017

	ALL RACES COMBINED	NON-HISPANIC WHITE	NON-HISPANIC BLACK	ASIAN/PACIFIC ISLANDER	AMERICAN INDIAN/ ALASKA NATIVE[a]	HISPANIC
Incidence, 2012-2016						
All sites	448.4	464.6	460.4	288.4	380.7	346.4
Male	489.4	501.2	540.0	292.3	399.2	372.9
Female	421.1	440.7	407.2	289.5	370.9	333.4
Breast (female)	125.2	130.8	126.7	93.3	94.7	93.9
Colon & rectum	38.7	38.6	45.7	30.0	43.3	34.1
Male	44.4	44.0	53.8	35.3	48.5	40.8
Female	33.9	33.9	39.9	25.7	39.1	28.7
Kidney & renal pelvis	16.6	16.8	18.7	7.7	23.1	16.4
Male	22.5	22.8	25.9	11.0	29.7	21.6
Female	11.5	11.5	13.2	5.1	17.5	12.2
Liver & intrahepatic bile duct	8.3	6.9	10.9	12.7	15.1	13.4
Male	12.7	10.5	17.9	19.4	21.6	20.0
Female	4.4	3.7	5.4	7.3	9.4	7.8
Lung & bronchus	59.3	63.5	62.4	34.4	53.6	30.2
Male	69.3	72.4	82.7	43.5	60.1	37.9
Female	51.7	56.7	48.6	27.6	48.8	24.6
Prostate	104.1	97.1	173.0	52.9	68.0	86.8
Stomach	6.6	5.4	10.1	10.3	8.8	9.6
Male	9.0	7.6	13.9	13.3	11.6	12.1
Female	4.6	3.5	7.5	7.9	6.7	7.7
Uterine cervix	7.6	7.1	9.1	6.0	8.7	9.6
Mortality, 2013-2017						
All sites	158.2	162.9	186.4	98.1	144.0	111.8
Male	189.3	193.8	233.2	116.4	172.6	135.6
Female	135.5	139.9	157.5	85.0	122.9	95.1
Breast (female)	20.3	20.3	28.4	11.4	14.6	14.0
Colon & rectum	13.9	13.8	19.0	9.5	15.8	11.1
Male	16.6	16.3	23.8	11.4	19.4	14.1
Female	11.7	11.7	15.6	8.1	13.0	8.7
Kidney & renal pelvis	3.7	3.8	3.7	1.7	5.5	3.4
Male	5.4	5.6	5.6	2.6	8.2	5.0
Female	2.3	2.4	2.3	1.1	3.4	2.2
Liver & intrahepatic bile duct	6.6	5.8	8.6	9.0	10.6	9.3
Male	9.6	8.4	13.5	13.4	14.8	13.2
Female	4.0	3.5	4.9	5.6	7.1	6.0
Lung & bronchus	40.2	43.4	43.5	22.0	33.3	17.5
Male	49.3	51.8	60.4	29.0	40.0	24.1
Female	33.2	36.8	31.9	16.8	28.3	12.6
Prostate	19.1	18.0	38.7	8.6	18.7	15.7
Stomach	3.1	2.3	5.4	5.1	4.8	5.0
Male	4.1	3.2	8.0	6.6	6.3	6.4
Female	2.2	1.6	3.7	4.0	3.6	4.0
Uterine cervix	2.3	2.1	3.6	1.7	2.5	2.6

Rates are per 100,000 population and age adjusted to the 2000 US standard population. Nonwhite and nonblack race categories are not mutually exclusive of Hispanic origin.
[a]Data based on Purchased/Referred Care Delivery Area (PRCDA) counties and exclude data from Kansas and Minnesota.

exclude benign and borderline malignant brain tumors, which were not required to be reported to cancer registries until 2004, because the projection methodology requires 15 years of historical data.

Leukemia is the most common childhood cancer, accounting for 28% of cases, followed by brain and other nervous system tumors (26%), greater than one-quarter of which are benign/borderline malignant (Table 12). The types of cancer that commonly occur in adolescents (those aged 15-19 years) and their distribution differ from that in children. In adolescents, for example, brain and other nervous system tumors are most common (21%), greater than one-half of which are benign/borderline malignant, followed closely by lymphoma (20%). In addition, there are almost twice as many cases of Hodgkin as non-Hodgkin lymphoma, whereas among children, the reverse is true. Thyroid carcinoma and melanoma of the skin account for 11% and 4%, respectively, of cancers in adolescents, but only 2% and 1%, respectively, in children.

The overall cancer incidence rate in children and adolescents has been increasing slightly (by 0.7% per year) since 1975 for reasons that remain unclear. In contrast, death rates have declined continuously for decades, from 6.3 (per 100,000 population) in children and 7.1 in adolescents in 1970 to 2.0

TABLE 10. Incidence Rates for Selected Cancers by State, United States, 2012 to 2016

	ALL SITES		BREAST	COLORECTUM		LUNG & BRONCHUS		NON-HODGKIN LYMPHOMA		PROSTATE	UTERINE CERVIX
STATE	MALE	FEMALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Alabama	520.6	402.7	122.1	50.9	38.3	87.3	50.5	19.5	13.6	119.5	9.3
Alaska	426.1	406.0	121.9	43.4	40.4	64.1	48.8	21.0	13.3	81.1	7.2
Arizona	407.7	373.4	114.5	38.0	28.7	53.1	44.0	18.2	13.1	77.2	6.6
Arkansas	532.9	419.3	117.5	50.8	37.8	97.8	62.6	21.8	15.0	111.4	9.8
California	435.0	386.4	121.0	40.4	31.3	47.4	38.1	22.4	15.2	93.9	7.3
Colorado	425.1	387.7	125.3	37.1	30.2	45.6	40.4	20.8	14.1	94.9	6.1
Connecticut	506.6	452.1	140.1	41.7	32.3	65.6	55.8	26.1	17.3	108.4	6.5
Delaware	552.3	460.6	136.1	43.1	32.9	78.9	62.6	24.9	17.6	128.7	8.1
Dist. of Columbia[a,b]	505.2	437.0	140.9	49.0	38.3	62.7	49.6	23.1	12.7	137.8	8.9
Florida	495.8	418.9	117.5	42.0	32.0	68.3	51.3	26.9	19.2	94.7	8.8
Georgia	533.1	420.2	125.8	49.2	35.9	81.2	51.3	22.4	14.9	122.3	7.8
Hawaii	434.5	405.3	137.5	48.1	35.5	57.2	36.4	20.2	13.5	84.9	7.3
Idaho	469.7	419.5	124.2	39.3	32.2	55.6	46.3	22.7	16.2	105.7	6.3
Illinois	506.8	441.4	131.9	50.4	37.2	75.3	57.0	23.5	16.3	109.5	7.7
Indiana	500.5	429.5	121.9	48.5	37.9	88.2	61.3	22.8	15.7	91.8	8.0
Iowa	521.0	444.9	124.2	50.2	39.3	75.0	54.0	26.0	17.6	104.7	7.3
Kansas[a]	499.1	429.8	126.4	45.5	34.9	61.0	57.0	23.9	17.0	108.2	7.6
Kentucky	578.4	482.4	126.3	57.6	42.4	111.3	77.8	25.1	16.7	104.9	9.2
Louisiana	559.6	422.8	124.2	54.3	39.2	84.8	54.2	23.6	16.1	131.8	8.8
Maine	504.4	458.7	125.7	41.8	33.6	83.3	66.3	24.1	17.2	87.5	5.5
Maryland	490.9	424.4	131.5	40.7	33.0	63.7	51.1	20.8	14.8	122.1	6.4
Massachusetts	470.8	439.5	137.7	39.8	31.6	66.1	59.0	21.8	15.2	99.3	5.2
Michigan	488.9	423.4	123.8	42.4	33.3	73.2	57.2	23.9	16.5	107.9	6.6
Minnesota	500.4	440.0	130.6	42.4	34.3	61.8	51.8	26.2	17.7	106.6	5.5
Mississippi	546.6	411.7	117.8	57.1	40.9	99.5	57.4	20.2	14.4	126.6	9.3
Missouri	492.1	431.0	129.2	47.9	35.5	85.3	63.5	22.7	15.6	92.8	8.4
Montana	486.7	429.0	124.0	43.7	32.9	55.6	54.8	22.0	16.3	113.0	7.1
Nebraska	495.0	422.5	124.6	49.2	37.5	67.5	50.4	23.8	16.2	111.2	7.3
Nevada[a]	408.8	382.0	111.1	42.1	32.1	57.6	53.4	17.5	12.9	84.8	8.5
New Hampshire	511.0	466.9	144.6	42.3	33.2	68.3	62.2	25.5	17.6	108.5	4.7
New Jersey	529.1	455.3	134.2	47.2	36.3	62.2	52.0	26.1	18.0	129.6	7.5
New Mexico	390.1	365.7	111.6	37.7	29.0	45.5	34.9	17.4	13.9	80.1	8.0
New York	531.6	452.4	130.7	45.0	34.0	67.0	53.2	26.2	17.9	125.0	7.7
North Carolina	521.3	428.3	132.3	42.8	32.5	84.9	56.7	21.4	14.5	115.9	7.2
North Dakota	495.4	424.9	127.3	52.3	37.6	65.7	51.1	20.6	16.7	115.7	5.2
Ohio	500.7	437.5	127.4	47.6	36.5	81.1	59.1	23.3	15.7	103.0	7.6
Oklahoma	497.8	422.2	121.1	48.8	36.9	83.4	58.0	21.5	15.4	95.2	9.1
Oregon	452.2	416.3	125.2	38.6	30.8	59.7	50.9	22.1	15.7	90.5	6.8
Pennsylvania	527.3	462.4	131.9	48.4	36.4	74.8	56.2	25.4	18.0	105.1	7.4
Rhode Island	500.8	468.5	138.1	38.9	31.5	78.0	65.7	26.1	17.8	97.8	7.3
South Carolina	515.4	415.9	129.2	44.6	33.6	81.8	52.9	20.4	14.1	115.4	7.7
South Dakota	493.2	431.1	131.3	47.1	37.3	67.9	52.9	23.4	15.7	111.7	6.9
Tennessee	519.9	422.1	122.6	46.3	35.6	93.1	61.5	21.7	14.2	110.4	8.5
Texas	450.9	378.2	111.9	44.9	31.6	63.4	43.1	21.0	14.5	92.4	9.2
Utah	440.2	375.5	114.8	33.4	26.5	31.5	23.1	22.4	15.0	113.1	5.0
Vermont	472.1	442.3	131.9	37.3	33.2	68.8	57.2	25.4	17.3	84.3	4.1
Virginia	447.6	401.0	128.3	40.0	32.1	69.0	50.6	20.6	14.1	98.3	6.3
Washington	479.7	433.6	135.1	39.6	32.2	61.3	51.7	24.4	16.2	100.6	6.6
West Virginia	511.9	452.8	117.5	51.9	41.3	95.2	67.0	22.0	16.6	91.3	8.9
Wisconsin	506.6	440.5	130.6	42.3	32.7	67.7	53.9	25.3	17.4	108.1	6.6
Wyoming	423.8	378.0	112.7	37.7	28.6	46.2	42.8	20.3	13.2	100.4	5.8
Puerto Rico[c]	409.6	329.8	93.7	51.7	34.7	23.9	12.0	17.1	13.0	143.9	12.6
United States	**489.4**	**421.1**	**125.2**	**44.4**	**33.9**	**69.3**	**51.7**	**23.2**	**16.0**	**104.1**	**7.6**

Rates are per 100,000 population and age adjusted to the 2000 US standard population.
[a]Data for these states are not included in the US combined rates because either the registry did not consent or high-quality incidence data were not available for all years during 2012 through 2016 according to the North American Association of Central Cancer Registries (NAACCR).
[b]Rates are based on cases diagnosed during 2012 through 2014.
[c]Data for Puerto Rico are not included in the US combined rates.

TABLE 11. Mortality Rates for Selected Cancers by State, United States, 2013 to 2017

STATE	ALL SITES MALE	ALL SITES FEMALE	BREAST FEMALE	COLORECTUM MALE	COLORECTUM FEMALE	LUNG & BRONCHUS MALE	LUNG & BRONCHUS FEMALE	NON-HODGKIN LYMPHOMA MALE	NON-HODGKIN LYMPHOMA FEMALE	PANCREAS MALE	PANCREAS FEMALE	PROSTATE MALE
Alabama	221.3	143.3	21.5	19.6	13.0	68.5	36.8	6.9	4.1	13.3	9.9	21.2
Alaska	181.5	140.2	19.4	17.0	14.3	45.7	34.2	6.3	4.2	11.2	10.1	18.0
Arizona	165.5	121.9	19.2	15.2	10.6	38.3	28.5	6.2	3.9	11.6	8.8	17.5
Arkansas	224.0	150.4	21.1	19.7	13.6	71.9	42.5	7.0	4.2	12.7	9.5	18.6
California	167.6	124.3	19.5	14.8	10.9	34.9	25.3	6.7	4.1	11.8	9.1	19.7
Colorado	160.8	118.7	18.9	13.9	10.5	31.0	25.7	6.4	3.4	10.7	7.9	21.5
Connecticut	170.0	125.3	17.8	13.0	9.4	39.6	31.0	7.0	4.1	12.2	9.4	17.9
Delaware	198.7	142.3	21.3	16.9	10.7	55.0	37.2	8.5	4.4	14.1	10.3	16.6
Dist. of Columbia	185.8	150.7	26.6	18.3	13.2	40.2	28.9	5.9	3.4	14.8	11.4	28.0
Florida	178.8	127.1	19.1	15.6	10.9	47.4	32.2	6.6	4.0	12.1	8.9	16.7
Georgia	201.3	135.6	22.0	18.9	12.1	56.7	32.1	6.8	4.0	12.3	9.3	22.0
Hawaii	159.9	110.8	16.1	14.8	10.3	39.0	23.5	5.7	3.3	12.4	9.8	14.1
Idaho	181.6	133.8	21.6	15.2	11.1	39.0	29.0	7.7	5.2	13.2	10.0	22.9
Illinois	196.9	143.2	21.3	18.1	12.7	52.3	36.0	7.2	4.3	13.1	9.5	20.1
Indiana	213.8	148.1	20.9	18.1	13.0	64.0	40.8	8.4	4.7	13.6	9.9	19.4
Iowa	198.5	138.2	18.7	17.1	12.5	54.0	34.9	8.3	4.7	13.0	9.6	19.5
Kansas	193.7	138.7	19.4	18.0	12.2	51.9	35.9	7.0	4.7	12.6	10.0	18.6
Kentucky	239.6	162.4	21.2	20.1	13.9	80.8	50.6	8.6	4.5	13.0	9.8	19.6
Louisiana	221.5	149.6	23.1	20.5	14.1	64.5	38.1	7.9	4.3	14.8	11.0	20.8
Maine	206.7	147.1	18.6	14.7	11.3	59.3	40.8	7.7	4.8	12.0	10.4	20.5
Maryland	186.7	137.5	21.7	16.4	11.7	46.2	33.3	6.9	4.0	13.6	9.7	20.0
Massachusetts	183.3	132.5	17.8	13.9	10.5	44.8	34.3	6.7	4.2	13.0	9.9	18.4
Michigan	198.4	145.7	20.7	16.5	12.1	54.3	38.8	7.8	4.8	13.9	10.7	18.7
Minnesota	179.0	131.7	17.9	14.2	10.8	42.6	32.6	7.8	4.6	12.8	9.7	19.9
Mississippi	240.7	154.3	23.5	22.6	15.0	75.6	39.1	7.0	3.9	15.4	11.0	24.7
Missouri	207.5	147.4	21.5	17.7	12.2	62.6	41.8	7.3	4.2	13.2	9.6	17.5
Montana	177.9	135.8	19.5	16.1	10.8	39.5	35.9	7.2	4.1	11.5	9.6	22.7
Nebraska	186.6	135.5	20.1	17.2	12.6	48.3	33.2	7.4	4.5	13.2	9.3	18.3
Nevada	182.6	141.9	21.8	19.3	14.0	45.8	38.2	6.8	3.5	11.7	9.4	19.7
New Hampshire	187.4	138.9	18.9	13.9	11.6	48.3	38.2	7.0	4.5	12.1	8.8	18.9
New Jersey	175.5	134.0	21.2	16.7	11.9	40.8	31.0	7.1	4.1	12.7	10.1	17.7
New Mexico	167.4	122.6	19.3	16.4	11.3	33.5	24.7	5.8	3.8	11.2	8.6	19.6
New York	174.0	129.5	19.2	15.4	11.1	42.4	30.0	7.0	4.1	12.7	9.7	18.0
North Carolina	202.0	137.5	20.9	16.2	11.2	60.0	35.6	6.9	4.0	12.9	9.4	19.9
North Dakota	176.3	127.0	18.0	16.3	11.0	45.6	29.7	6.6	4.7	12.2	8.3	17.8
Ohio	209.7	150.1	22.3	18.4	13.1	60.4	39.4	7.9	4.7	13.3	10.4	19.1
Oklahoma	219.4	152.4	22.4	20.9	13.9	65.0	41.9	7.9	4.7	12.6	9.6	20.4
Oregon	185.9	140.4	20.1	15.2	11.4	43.5	34.8	7.5	4.6	13.3	10.1	20.7
Pennsylvania	199.8	142.7	21.2	17.8	12.6	52.5	34.8	7.7	4.6	14.1	10.2	18.7
Rhode Island	197.1	140.4	18.0	14.8	10.8	53.2	39.9	6.6	4.4	13.9	9.9	18.7
South Carolina	209.2	139.2	21.5	17.5	11.8	58.9	34.0	6.6	4.3	13.2	9.9	21.8
South Dakota	192.7	134.4	19.1	19.8	13.0	49.9	33.9	7.0	4.3	12.2	10.0	19.0
Tennessee	224.1	149.4	21.8	18.5	13.0	70.0	41.1	8.0	4.7	12.9	9.8	19.8
Texas	183.4	127.4	19.8	17.6	11.2	45.2	28.4	6.8	4.1	11.6	9.0	17.8
Utah	146.0	108.9	20.1	12.9	9.7	22.3	15.4	6.8	4.1	10.8	8.3	20.0
Vermont	196.6	141.0	17.7	16.3	13.5	49.6	37.4	7.9	4.5	12.3	9.5	19.1
Virginia	190.5	135.1	21.5	16.6	11.3	50.5	32.6	6.8	4.1	13.1	9.4	19.8
Washington	180.9	134.6	19.9	14.5	10.5	43.0	32.8	7.6	4.4	12.3	9.3	20.2
West Virginia	223.0	160.0	21.8	20.4	15.7	69.5	43.7	7.7	4.8	11.6	9.4	17.4
Wisconsin	191.9	137.1	19.0	15.3	11.2	48.0	34.1	7.7	4.4	13.6	10.0	20.8
Wyoming	163.6	123.1	18.3	14.0	9.7	36.5	29.2	7.0	4.4	11.7	8.6	16.0
Puerto Rico[a]	148.0	93.2	17.8	19.5	12.1	18.7	8.7	4.7	2.5	7.9	5.5	25.9
United States	**189.3**	**135.5**	**20.3**	**16.6**	**11.7**	**49.3**	**33.2**	**7.1**	**4.2**	**12.7**	**9.6**	**19.1**

Rates are per 100,000 population and age adjusted to the 2000 US standard population.
[a]Rates for Puerto Rico are for 2012 through 2016 and are not included in the overall US combined rates.

TABLE 12. Case Distribution (2012 Through 2016) and 5-Year Relative Survival (2009 Through 2015)[a] by Age and ICCC Type, Ages Birth to 19 Years, United States

	BIRTH TO 14		15 TO 19	
	CASES, %	5-YEAR SURVIVAL, %	CASES, %	5-YEAR SURVIVAL, %
All ICCC groups combined		**84**		**85**
Leukemias, myeloproliferative & myelodysplastic diseases	28	87	13	73
Lymphoid leukemia	21	91	6	74
Acute myeloid leukemia	4	66	4	66
Lymphomas and reticuloendothelial neoplasms	12	94	20	94
Hodgkin lymphoma	3	98	12	97
Non-Hodgkin lymphoma (including Burkitt lymphoma)	5	91	7	88
Central nervous system neoplasms	26	74	21	77
Benign/borderline malignant tumors	8	97	13	98
Neuroblastoma & other peripheral nervous cell tumors	6	81	<1	57[c]
Retinoblastoma	2	96	<1	–[b]
Nephroblastoma & other nonepithelial renal tumors	5	93	<1	–[b]
Hepatic tumors	2	79	<1	44[c]
Hepatoblastoma	1	83	<1	–[b]
Malignant bone tumors	4	73	5	68
Osteosarcoma	2	69	3	67
Ewing tumor & related bone sarcomas	1	76	2	58
Rhabdomyosarcoma	3	71	1	45
Germ cell & gonadal tumors	3	91	11	93
Thyroid carcinoma	2	>99	11	99
Malignant melanoma	1	95	4	95

Abbreviation: ICCC, International Classification of Childhood Cancer.
Survival rates are adjusted for normal life expectancy and are based on follow-up of patients through 2016.
[a]Benign and borderline brain tumors were excluded from survival calculations except where specified, but were included in the denominator for case distribution.
[b]Statistic could not be calculated due to fewer than 25 cases during 2009 through 2015.
[c]The standard error of the survival rate is between 5 and 10 percentage points.

and 2.7, respectively, in 2017, for overall cancer mortality reductions of 68% in children and 63% in adolescents. Much of this progress reflects the dramatic declines in leukemia mortality of 83% in children and 68% in adolescents. Remission rates of 90% to 100% for childhood acute lymphocytic leukemia over the past 4 decades have been achieved primarily through the optimization of established chemotherapeutic agents as opposed to the development of new therapies.[84] Substantial mortality reductions also occurred from 1970 to 2017 for lymphoma (80% in children and 82% in adolescents) and brain and other nervous system tumors (36% and 38%, respectively). The 5-year relative survival rate for all cancers combined improved from 58% during the mid-1970s to 84% during 2009 through 2015 for children and from 68% to 85% for adolescents.[8] However, survival varies substantially by cancer type and age at diagnosis (Table 12).

Limitations

Although the estimated numbers of new cancer cases and deaths expected to occur in 2020 provide a reasonably accurate portrayal of the contemporary cancer burden, they are model-based, 3-year– and 4-year–ahead projections that should be interpreted with caution and not be used to track trends over time. First, the estimates may be affected by changes in methodology as we take advantage of improvements in modeling techniques and cancer surveillance coverage. Second, although the models are robust, they can only account for trends through the most recent data year (currently 2016 for incidence and 2017 for mortality) and cannot anticipate abrupt fluctuations for cancers affected by changes in detection practice (eg, PSA testing and prostate cancer). Third, the model can be oversensitive to sudden or large changes in observed data. The most informative metrics for tracking cancer trends are age-standardized or age-specific cancer incidence rates from SEER, NPCR, and/or NAACCR and cancer death rates from the NCHS.

Errors in reporting race/ethnicity in medical records and on death certificates may result in underestimates of cancer incidence and mortality in nonwhite and nonblack populations, particularly American Indian/Alaska Native populations. It is also important to note that cancer data in the United States are primarily reported for broad, heterogeneous racial and ethnic groups, masking important differences in the cancer burden within these populations. For example, lung cancer incidence is equivalent in Native Hawaiian and NHW men, but approximately 50% lower in Asians/Pacific Islanders overall.[71]

Conclusions

The continuous decline in the cancer mortality rate since 1991 has resulted in an overall drop of 29%, translating into approximately 2.9 million fewer cancer deaths. This steady progress is largely due to reductions in smoking and subsequent declines in lung cancer mortality, which have accelerated in recent years. However, treatment breakthroughs have also contributed, such as those for hematopoietic and lymphoid malignancies in both children and adults, and more recently checkpoint blockade immunotherapies and targeted therapies for metastatic melanoma. Nevertheless, progress is slowing for cancers that are amenable to early detection through screening (ie, breast cancer, prostate cancer, and CRC), and substantial racial and geographic disparities persist for highly preventable cancers, such as those of the cervix and lung. Increased investment in both the equitable application of existing cancer control interventions and basic and clinical research to further advance treatment options would undoubtedly accelerate progress against cancer. ■

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