




ARTICLE

Cancer statistics, 2023

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Abstract

Each year, the American Cancer Society estimates the numbers of new cancer cases and deaths in the United States and compiles the most recent data on population-based cancer occurrence and outcomes using incidence data collected by central cancer registries and mortality data collected by the National Center for Health Statistics. In 2023, 1,958,310 new cancer cases and 609,820 cancer deaths are projected to occur in the United States. Cancer incidence increased for prostate cancer by 3% annually from 2014 through 2019 after two decades of decline, translating to an additional 99,000 new cases; otherwise, however, incidence trends were more favorable in men compared to women. For example, lung cancer in women decreased at one half the pace of men (1.1% vs. 2.6% annually) from 2015 through 2019, and breast and uterine corpus cancers continued to increase, as did liver cancer and melanoma, both of which stabilized in men aged 50 years and older and declined in younger men. However, a 65% drop in cervical cancer incidence during 2012 through 2019 among women in their early 20s, the first cohort to receive the human papillomavirus vaccine, foreshadows steep reductions in the burden of human papillomavirus-associated cancers, the majority of which occur in women. Despite the pandemic, and in contrast with other leading causes of death, the cancer death rate continued to decline from 2019 to 2020 (by 1.5%), contributing to a 33% overall reduction since 1991 and an estimated 3.8 million deaths averted. This progress increasingly reflects advances in treatment, which are particularly evident in the rapid declines in mortality (approximately 2% annually during 2016 through 2020) for leukemia, melanoma, and kidney cancer, despite stable/increasing incidence, and accelerated declines for lung cancer. In summary, although cancer mortality rates continue to decline, future progress may be attenuated by rising incidence for breast, prostate, and uterine corpus cancers, which also happen to have the largest racial disparities in mortality.

KEYWORDS

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

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INTRODUCTION

Cancer is a major public health problem worldwide and is the second leading cause of death in the United States. The coronavirus disease 2019 (COVID-19) pandemic caused delays in the diagnosis and treatment of cancer because of health care setting closures, disruptions in employment and health insurance, and fear of COVID-19 exposure. Although the impact was largest during the COVID-19 peak in mid-2020, the provision of health care has not fully rebounded. For example, surgical oncology procedures at Massachusetts General Hospital were 72% of 2019 levels during the last one half of 2020 and were only 84% in 2021, the lowest recovery of any surgical specialty.¹ Delays in diagnosis and treatment may lead to an uptick in advanced-stage disease and mortality.² These and other secondary consequences of the pandemic will occur gradually over time and will require many years to quantify at the population level because of the 2-year to 3-year lag in population-based cancer incidence and mortality data. However, what is already well established is the disproportionate direct and indirect impact of the pandemic on communities of color.^{3,4}

In this article, we provide the estimated numbers of new cancer cases and deaths in 2023 in the United States nationally and for each state, as well as a comprehensive overview of cancer occurrence based on up-to-date population-based data for cancer incidence and mortality. We also estimate the total number of cancer deaths averted through 2020 because of the continuous decline in cancer death rates since the early 1990s.

MATERIALS AND METHODS

Data sources

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 National Program of Cancer Registries (NPCR) since 1995. The SEER program is the only source for historic, population-based cancer incidence (1975–2019), which is currently based on data from the eight oldest SEER areas (Connecticut, Hawaii, Iowa, New Mexico, Utah, and the metropolitan areas of Atlanta, San Francisco–Oakland, and Seattle–Puget Sound) and represent approximately 8% of the US population.⁵ Historic survival data (1975–1977 and 1995–1997) are based on the SEER 8 areas plus the Detroit metropolitan area,⁶ as published previously. Contemporary survival statistics (2012–2018) were based on data from the 17 SEER registries (SEER 8 plus the Alaska Native Tumor Registry and the California, Georgia, Kentucky, Louisiana, and New Jersey registries), representing 27% of the US population.^{7,8} All 22 SEER registries (SEER 17 plus Idaho, Illinois, Massachusetts, New York, and Texas), covering 48% of the United States, were the source for the probability of developing

cancer, which was obtained using the NCI's DevCan software, version 6.8.0.⁹

The North American Association of Central Cancer Registries (NAACCR) compiles and reports incidence data from 1995 forward for registries that participate in the SEER program and/or the NPCR and achieve high-quality data standards. 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 2023, contemporary incidence trends (1998–2019) and cross-sectional incidence rates (2015–2019), and stage distribution (2015–2019).¹⁰ The incidence rates presented herein differ slightly from those published in *Cancer in North America: 2015–2019* because of the use of 19 versus 20 age groups, respectively, for age adjustment.^{11,12}

Mortality data from 1930 to 2020 were provided by the National Center for Health Statistics (NCHS).^{13,14} 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.^{14,15} Contemporary 5-year mortality rates for Puerto Rico were obtained from the NCI and the Centers for Disease Control and Prevention joint website, State Cancer Profiles (statecancerprofiles.cancer.gov).

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*.^{16–18} Causes of death were classified according to the *International Classification of Diseases*.¹⁹

Statistical analysis

All incidence and death rates were age standardized to the 2000 US standard population (19 age groups) and expressed per 100,000 persons (or per million for childhood cancer incidence), as calculated using the NCI's SEER*Stat software, version 8.4.0.²⁰ The annual percent change in rates was quantified using the NCI's Joinpoint Regression software program (version 4.9.1.0).²¹ Trends were described as increasing or decreasing when the annual percent change was statistically significant based on a 2-sided p value $< .05$ and otherwise were described as stable. All statistics presented herein by race, including those for Asian American/Pacific Islander (AAPI) and American Indian/Alaska Native (AIAN) individuals, are exclusive of Hispanic ethnicity for improved accuracy of classification. Racial misclassification for AIAN individuals has been further reduced by restricting incidence rates to Purchased/Referred Care Delivery Area counties and adjusting mortality rates (for the entire United States) using classification ratios previously published by the NCHS.²² Life tables by Hispanic ethnicity were published in 2018 and were used for relative survival comparisons between White and Black individuals.²³

Whenever possible, cancer incidence rates were adjusted for delays in reporting, which occur because of lags in case capture and

data corrections. Delay adjustment provides the most accurate portrayal of contemporary cancer rates and thus is particularly important in trend analysis.²⁴ It has the largest effect on the most recent data years for cancers that are frequently diagnosed in outpatient settings (e.g., melanoma, leukemia, and prostate cancer). For example, the leukemia incidence rate for 2019 was 13% higher after adjusting for reporting delays (14.9 vs. 13.2 per 100,000 persons).²⁵

Projected cancer cases and deaths in 2023

The most recent year for which incidence and mortality data are available lags 2–4 years behind the current year because of the time required for data collection, compilation, quality control, and dissemination. Therefore, we project the numbers of new cancer cases and deaths in the United States in 2023 to estimate the contemporary cancer burden using two-step statistical modeling, as described in detail elsewhere.^{26,27} Briefly, complete cancer diagnoses were estimated for every state from 2005 through 2019 based on delay-adjusted, high-quality incidence data from 50 states and the District of Columbia (99.7% population coverage; recent data were unavailable for Nevada) and state-level variations in sociodemographic and lifestyle factors, medical settings, and cancer screening behaviors.²⁸ Modeled state and national counts were then projected forward to 2023 using a novel, data-driven joinpoint algorithm.²⁷ Ductal carcinoma in situ of the female breast and in situ melanoma of the skin were estimated by approximating annual case counts from 2010 through 2019 based on NAACCR age-specific incidence rates, delay factors for invasive disease (delay factors are unavailable for in situ cases),²⁹ and US population estimates obtained using SEER*Stat software.^{10,30} Counts were then projected four years ahead based on the average annual percent change generated by the joinpoint regression model.

The number of cancer deaths expected to occur in 2023 was estimated by applying the previously described data-driven joinpoint algorithm to reported cancer deaths from 2006 through 2020 at the state and national levels as reported by the NCHS.²⁷ Please note that the estimated cases for 2023 reported herein are based on currently available incidence data through 2019 and do not account for the impact of the COVID-19 pandemic on cancer diagnoses, whereas the projected cancer deaths in 2023 are based on data through 2020 and only account for the first year. In addition, basal cell and squamous cell skin cancers cannot be estimated because diagnoses are not recorded by most cancer registries.

Other statistics

The number of cancer deaths averted in men and women because of the reduction in cancer death rates since the early 1990s was estimated by summing the annual difference between the number of cancer deaths recorded and 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-specific and sex-specific cancer death rates in the peak year for age-standardized cancer death rates (1990 in men, 1991 in women) to the corresponding age-specific and sex-specific populations in subsequent years through 2020.

SELECTED FINDINGS

Expected number of new cancer cases

Table 1 presents the estimated numbers of new invasive cancer cases in the United States in 2023 by sex and cancer type. In total, there will be approximately 1,958,310 new cancer cases, the equivalent of about 5370 cases each day. In addition, there will be about 55,720 new cases of ductal carcinoma in situ in women and 89,070 new cases of melanoma in situ of the skin. The estimated numbers of new cases for selected cancers by state are shown in Table 2.

The lifetime probability of being diagnosed with invasive cancer is slightly higher for men (40.9%) than for women (39.1%; Table 3). Higher risk in men for most cancer types is thought to largely reflect greater exposure to carcinogenic environmental and behavioral factors, such as smoking, although a recent study suggests that other differences also play a large role.³¹ These may include height,^{32,33} endogenous hormone exposure, and immune function and response.³⁴

Figure 1 depicts the most common cancers diagnosed in men and women in 2023. Prostate, lung and bronchus (hereinafter lung), and colorectal cancers (CRCs) account for almost one half (48%) of all incident cases in men, with prostate cancer alone accounting for 29% of diagnoses. For women, breast cancer, lung cancer, and CRC account for 52% of all new diagnoses, with breast cancer alone accounting for 31% of female cancers.

Expected number of cancer deaths

An estimated 609,820 people in the United States will die from cancer in 2023, corresponding to 1670 deaths per day (Table 1). The greatest number of deaths are from cancers of the lung, prostate, and colorectum in men and cancers of the lung, breast, and colorectum in women (Figure 1). Table 4 provides the estimated number of deaths for these and other common cancers by state.

Approximately 350 people die each day from lung cancer—nearly 2.5 times more than the number of people who die from CRC, which is the second leading cause of cancer death overall. Approximately 103,000 of the 127,070 lung cancer deaths (81%) in 2023 will be caused by cigarette smoking directly, with an additional 3560 caused by second-hand smoke.³⁵ The remaining balance of approximately 20,500 nonsmoking-related lung cancer deaths would rank as the eighth leading cause of cancer death among the sexes combined if it was classified separately.

TABLE 1 Estimated new cancer cases and deaths by sex, United States, 2023^a

| Cancer site | Estimated new cases | | | Estimated deaths | | |
|--|---------------------|-----------|---------|------------------|---------|---------|
| | Both sexes | Male | Female | Both sexes | Male | Female |
| All sites | 1,958,310 | 1,010,310 | 948,000 | 609,820 | 322,080 | 287,740 |
| Oral cavity & pharynx | 54,540 | 39,290 | 15,250 | 11,580 | 8140 | 3440 |
| Tongue | 18,040 | 13,180 | 4860 | 2940 | 1950 | 990 |
| Mouth | 14,820 | 8680 | 6140 | 3090 | 1870 | 1220 |
| Pharynx | 20,070 | 16,340 | 3730 | 4140 | 3260 | 880 |
| Other oral cavity | 1610 | 1090 | 520 | 1410 | 1060 | 350 |
| Digestive system | 348,840 | 194,980 | 153,860 | 172,010 | 99,350 | 72,660 |
| Esophagus | 21,560 | 17,030 | 4530 | 16,120 | 12,920 | 3200 |
| Stomach | 26,500 | 15,930 | 10,570 | 11,130 | 6690 | 4440 |
| Small intestine | 12,070 | 6580 | 5490 | 2070 | 1170 | 900 |
| Colon & rectum ^b | 153,020 | 81,860 | 71,160 | 52,550 | 28,470 | 24,080 |
| Colon | 106,970 | 54,420 | 52,550 | | | |
| Rectum | 46,050 | 27,440 | 18,610 | | | |
| Anus, anal canal, & anorectum | 9760 | 3180 | 6580 | 1870 | 860 | 1010 |
| Liver & intrahepatic bile duct | 41,210 | 27,980 | 13,230 | 29,380 | 19,000 | 10,380 |
| Gallbladder & other biliary | 12,220 | 5750 | 6470 | 4510 | 1900 | 2610 |
| Pancreas | 64,050 | 33,130 | 30,920 | 50,550 | 26,620 | 23,930 |
| Other digestive organs | 8450 | 3540 | 4910 | 3830 | 1720 | 2110 |
| Respiratory system | 256,290 | 131,150 | 125,140 | 132,330 | 71,170 | 61,160 |
| Larynx | 12,380 | 9900 | 2480 | 3820 | 3070 | 750 |
| Lung & bronchus | 238,340 | 117,550 | 120,790 | 127,070 | 67,160 | 59,910 |
| Other respiratory organs | 5570 | 3700 | 1870 | 1440 | 940 | 500 |
| Bones & joints | 3970 | 2160 | 1810 | 2140 | 1200 | 940 |
| Soft tissue (including heart) | 13,400 | 7400 | 6000 | 5140 | 2720 | 2420 |
| Skin (excluding basal & squamous) | 104,930 | 62,810 | 42,120 | 12,470 | 8480 | 3990 |
| Melanoma of the skin | 97,610 | 58,120 | 39,490 | 7990 | 5420 | 2570 |
| Other nonepithelial skin | 7320 | 4690 | 2630 | 4480 | 3060 | 1420 |
| Breast | 300,590 | 2800 | 297,790 | 43,700 | 530 | 43,170 |
| Genital system | 414,350 | 299,540 | 114,810 | 69,660 | 35,640 | 34,020 |
| Uterine cervix | 13,960 | | 13,960 | 4310 | | 4310 |
| Uterine corpus | 66,200 | | 66,200 | 13,030 | | 13,030 |
| Ovary | 19,710 | | 19,710 | 13,270 | | 13,270 |
| Vulva | 6470 | | 6470 | 1670 | | 1670 |
| Vagina & other female genital | 8470 | | 8470 | 1740 | | 1740 |
| Prostate | 288,300 | 288,300 | | 34,700 | 34,700 | |
| Testis | 9190 | 9190 | | 470 | 470 | |
| Penis & other male genital | 2050 | 2050 | | 470 | 470 | |
| Urinary system | 168,560 | 117,590 | 50,970 | 32,590 | 22,680 | 9910 |
| Urinary bladder | 82,290 | 62,420 | 19,870 | 16,710 | 12,160 | 4550 |
| Kidney & renal pelvis | 81,800 | 52,360 | 29,440 | 14,890 | 9920 | 4970 |
| Ureter & other urinary organs | 4470 | 2810 | 1660 | 990 | 600 | 390 |
| Eye & orbit | 3490 | 1900 | 1590 | 430 | 240 | 190 |

TABLE 1 (Continued)

| Cancer site | Estimated new cases | | | Estimated deaths | | |
|--|---------------------|--------|--------|------------------|--------|--------|
| | Both sexes | Male | Female | Both sexes | Male | Female |
| Brain & other nervous system | 24,810 | 14,280 | 10,530 | 18,990 | 11,020 | 7970 |
| Endocrine system | 47,230 | 14,340 | 32,890 | 3240 | 1560 | 1680 |
| Thyroid | 43,720 | 12,540 | 31,180 | 2120 | 970 | 1150 |
| Other endocrine | 3510 | 1800 | 1710 | 1120 | 590 | 530 |
| Lymphoma | 89,380 | 49,730 | 39,650 | 21,080 | 12,320 | 8760 |
| Hodgkin lymphoma | 8830 | 4850 | 3980 | 900 | 540 | 360 |
| Non-Hodgkin lymphoma | 80,550 | 44,880 | 35,670 | 20,180 | 11,780 | 8400 |
| Myeloma | 35,730 | 19,860 | 15,870 | 12,590 | 7000 | 5590 |
| Leukemia | 59,610 | 35,670 | 23,940 | 23,710 | 13,900 | 9810 |
| Acute lymphocytic leukemia | 6540 | 3660 | 2880 | 1390 | 700 | 690 |
| Chronic lymphocytic leukemia | 18,740 | 12,130 | 6610 | 4490 | 2830 | 1660 |
| Acute myeloid leukemia | 20,380 | 11,410 | 8970 | 11,310 | 6440 | 4870 |
| Chronic myeloid leukemia | 8930 | 5190 | 3740 | 1310 | 780 | 530 |
| Other leukemia ^c | 5020 | 3280 | 1740 | 5210 | 3150 | 2060 |
| Other & unspecified primary sites^c | 32,590 | 16,810 | 15,780 | 48,160 | 26,130 | 22,030 |

Note: These are model-based estimates that should be interpreted with caution and not compared with those for previous years.

Source: Estimated new cases are based on 2005–2019 incidence data reported by the North American Association of Central Cancer Registries. Estimated deaths are based on 2006–2020 US mortality data reported by the National Center for Health Statistics, Centers for Disease Control and Prevention.

^aRounded to the nearest 10; cases exclude basal cell and squamous cell skin cancer and in situ carcinoma except urinary bladder. Approximately 55,720 cases of female breast ductal carcinoma in situ and 89,070 cases of melanoma in situ will be diagnosed in 2023.

^bIncludes appendiceal cancer; deaths for colon and rectal cancers are combined because a large number of deaths from rectal cancer are misclassified as colon cancer.

^cMore deaths than cases may reflect a lack of specificity in recording underlying cause of death on death certificates and/or an undercount in the case estimate.

Trends in cancer incidence

Figure 2 illustrates long-term trends in overall cancer incidence rates, which reflect both patterns 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 a surge in the detection of asymptomatic prostate cancer as a result of widespread rapid uptake of prostate-specific antigen (PSA) testing among previously unscreened men.³⁶ Thereafter, cancer incidence in men generally decreased until around 2013, then stabilized through 2019. In women, the rate was fairly stable until the mid-1980s but has since increased slowly by <0.5% per year.^{5,37} Consequently, the sex gap is slowly narrowing, with the male-to-female incidence rate ratio declining from 1.59 (95% confidence interval [CI], 1.57–1.61) in 1992⁶ to 1.14 (95% CI, 1.14–1.15) in 2019.²⁵ However, differences in risk vary widely by age. For example, rates among individuals aged 20–49 years are about 80% higher in females than in males, whereas, among those aged 75 years and older, they are nearly 50% higher in men.

The incidence rate for prostate cancer dropped by about 40% from 2007 to 2014 (Figure 3) because of declines in the diagnosis of localized tumors through PSA testing, the prevalence of which

decreased after the United States Preventive Services Task Force (USPSTF) recommended against screening for men aged 75 years and older in 2008 and for all men in 2012.^{38,39} However, the prostate cancer incidence rate has risen by 3% per year from 2014 through 2019, translating to 99,000 more cases than would have occurred if rates had remained stable, approximately half of which were advanced. This uptick is driven by increases of about 4.5% annually for regional-stage and distant-stage diagnoses that began as early as 2011 and are being watched closely.³⁷ Localized-stage disease has also begun to tick up, although the trend is not yet statistically significant. These patterns are consistent with continued reports of a shift toward higher grade and stage at prostate cancer diagnosis since circa 2010.⁴⁰ Efforts to recoup the benefit of early prostate cancer detection while mitigating overdiagnosis and overtreatment include a USPSTF upgrade to informed decision making in men aged 55–69 in 2018^{41,42} and more targeted screening for clinically significant tumors using molecular markers and magnetic resonance imaging-targeted biopsy.^{43,44} Black men benefit more from screening in general^{45,46} and from the integration of personalized biomarkers because they are more likely to harbor genomically aggressive cancer, even with clinically low-risk disease.⁴⁷ Prostate cancer mortality rates in

TABLE 2 Estimated new cases for selected cancers by state, 2023^a

| 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 | 30,730 | 4500 | 2570 | 780 | 4280 | 1510 | 1030 | 5320 | 1180 | 240 | 830 |
| Alaska | 3390 | 520 | 330 | 90 | 450 | 100 | 140 | 470 | 160 | — ^b | 110 |
| Arizona | 41,120 | 6240 | 3220 | 1190 | 4450 | 2800 | 1710 | 5060 | 1960 | 280 | 1260 |
| Arkansas | 18,670 | 2510 | 1630 | 520 | 2950 | 1080 | 720 | 2500 | 750 | 160 | 520 |
| California | 192,770 | 32,020 | 16,420 | 5510 | 17,040 | 10,950 | 8280 | 26,970 | 7250 | 1610 | 7050 |
| Colorado | 28,920 | 4910 | 2120 | 870 | 2600 | 2000 | 1150 | 4220 | 1220 | 200 | 920 |
| Connecticut | 23,480 | 3620 | 1560 | 810 | 2750 | 830 | 1020 | 3990 | 1160 | 120 | 800 |
| Delaware | 7240 | 1050 | 500 | 200 | 920 | 350 | 310 | 1330 | 350 | 50 | 250 |
| District of Columbia | 3520 | 570 | 240 | 60 | 350 | 80 | 120 | 540 | 110 | — ^b | 130 |
| Florida | 162,410 | 22,670 | 11,750 | 6080 | 19,340 | 9640 | 8200 | 24,000 | 7210 | 1200 | 5050 |
| Georgia | 61,170 | 9440 | 4880 | 1700 | 7610 | 3310 | 2090 | 9140 | 2160 | 470 | 1760 |
| Hawaii | 8460 | 1480 | 770 | 210 | 930 | 520 | 330 | 1190 | 300 | 50 | 340 |
| Idaho | 10,810 | 1560 | 810 | 380 | 1080 | 760 | 440 | 1700 | 540 | 70 | 350 |
| Illinois | 74,580 | 11,530 | 6200 | 2090 | 9670 | 3380 | 2990 | 10,580 | 3160 | 520 | 2770 |
| Indiana | 40,270 | 5810 | 3430 | 1230 | 6020 | 2180 | 1580 | 5580 | 1780 | 280 | 1340 |
| Iowa | 20,460 | 2810 | 1630 | 740 | 2680 | 1310 | 860 | 2970 | 940 | 120 | 690 |
| Kansas | 16,840 | 2470 | 1430 | 500 | 2240 | 640 | 680 | 2680 | 720 | 120 | 550 |
| Kentucky | 30,270 | 4030 | 2640 | 850 | 5170 | 1490 | 1120 | 3520 | 1240 | 230 | 830 |
| Louisiana | 28,580 | 4050 | 2560 | 820 | 3850 | 1260 | 1040 | 4970 | 1060 | 230 | 820 |
| Maine | 10,490 | 1450 | 690 | 340 | 1550 | 490 | 450 | 1210 | 580 | — ^b | 390 |
| Maryland | 35,200 | 5760 | 2560 | 1050 | 4290 | 1840 | 1380 | 5980 | 1340 | 230 | 1320 |
| Massachusetts | 42,880 | 6770 | 2880 | 1280 | 5790 | 1540 | 1750 | 6430 | 1890 | 210 | 1470 |
| Michigan | 61,910 | 8980 | 4630 | 1820 | 8690 | 2680 | 2580 | 8360 | 2980 | 380 | 2420 |
| Minnesota | 34,380 | 5220 | 2430 | 1200 | 3970 | 1140 | 1510 | 4880 | 1530 | 150 | 1190 |
| Mississippi | 18,210 | 2610 | 1750 | 460 | 2830 | 720 | 600 | 2790 | 620 | 150 | 530 |
| Missouri | 37,910 | 5700 | 3030 | 1190 | 5760 | 1610 | 1500 | 5000 | 1570 | 280 | 1320 |
| Montana | 7100 | 1030 | 540 | 220 | 720 | 550 | 290 | 1370 | 350 | — ^b | 220 |
| Nebraska | 11,530 | 1670 | 950 | 380 | 1340 | 640 | 470 | 2180 | 470 | 60 | 370 |
| Nevada | 17,370 | 2620 | 1490 | 540 | 2030 | 800 | 720 | 2180 | 820 | 150 | 550 |
| New Hampshire | 9580 | 1390 | 650 | 290 | 1280 | 560 | 410 | 1410 | 520 | — ^b | 360 |
| New Jersey | 56,150 | 8580 | 4220 | 1790 | 5920 | 2250 | 2420 | 9460 | 2540 | 350 | 2120 |
| New Mexico | 11,280 | 1730 | 940 | 350 | 960 | 610 | 470 | 1680 | 410 | 100 | 360 |
| New York | 123,810 | 18,780 | 8970 | 3560 | 14,150 | 4000 | 5150 | 20,390 | 5440 | 850 | 4620 |
| North Carolina | 67,690 | 10,730 | 4,740 | 2100 | 8810 | 3950 | 2560 | 10,040 | 2760 | 420 | 2180 |
| North Dakota | 4370 | 610 | 370 | 160 | 530 | 290 | 170 | 740 | 200 | — ^b | 120 |
| Ohio | 74,140 | 11,200 | 5910 | 1980 | 10,680 | 3880 | 2900 | 10,980 | 3400 | 510 | 2570 |
| Oklahoma | 23,420 | 3330 | 1950 | 710 | 3390 | 1220 | 890 | 3100 | 920 | 200 | 700 |
| Oregon | 26,030 | 4220 | 1840 | 680 | 3030 | 1540 | 1090 | 3400 | 1210 | 140 | 830 |
| Pennsylvania | 88,450 | 12,830 | 6610 | 2600 | 11,320 | 3630 | 3690 | 13,210 | 4270 | 510 | 3330 |
| Rhode Island | 7030 | 1050 | 470 | 220 | 940 | 290 | 310 | 1030 | 340 | — ^b | 260 |
| South Carolina | 33,890 | 5430 | 2550 | 890 | 4650 | 1800 | 1230 | 5770 | 1390 | 240 | 1040 |

TABLE 2 (Continued)

| State | All sites | Female breast | Colon & rectum | Leukemia | Lung & bronchus | Melanoma of the skin | Non-Hodgkin lymphoma | Prostate | Urinary bladder | Uterine cervix | Uterine corpus |
|---------------|-----------|---------------|----------------|----------|-----------------|----------------------|----------------------|----------|-----------------|----------------|----------------|
| South Dakota | 5340 | 760 | 440 | 190 | 690 | 310 | 220 | 1040 | 240 | — ^b | 170 |
| Tennessee | 43,790 | 6210 | 3450 | 1200 | 6580 | 1990 | 1600 | 6280 | 1730 | 320 | 1320 |
| Texas | 139,100 | 22,280 | 12,220 | 4780 | 14,510 | 5530 | 5540 | 17,230 | 4490 | 1510 | 4460 |
| Utah | 13,840 | 2030 | 940 | 440 | 800 | 1550 | 510 | 2500 | 500 | 90 | 470 |
| Vermont | 4370 | 630 | 300 | 130 | 590 | 230 | 210 | 630 | 200 | — ^b | 150 |
| Virginia | 47,100 | 7810 | 3630 | 1230 | 6010 | 2360 | 1910 | 7580 | 1830 | 310 | 1590 |
| Washington | 44,630 | 7050 | 3160 | 1360 | 5030 | 2680 | 1900 | 6450 | 1940 | 270 | 1430 |
| West Virginia | 12,840 | 1620 | 1120 | 390 | 2170 | 560 | 550 | 1780 | 620 | 90 | 450 |
| Wisconsin | 37,640 | 5460 | 2650 | 1320 | 4630 | 1970 | 1630 | 5800 | 1780 | 180 | 1390 |
| Wyoming | 3170 | 460 | 260 | 90 | 330 | 210 | 110 | 690 | 170 | — ^b | 110 |
| United States | 1,958,310 | 297,790 | 153,020 | 59,610 | 238,340 | 97,610 | 80,550 | 288,300 | 82,290 | 13,960 | 66,200 |

Note: These are model-based estimates that should be interpreted with caution. State estimates may not add to US totals because of rounding and the exclusion of states with fewer than 50 cases.

^aRounded to the nearest 10; excludes basal cell and squamous cell skin cancers and in situ carcinomas except urinary bladder. Estimates for Puerto Rico are unavailable.

^bThe estimate is fewer than 50 cases.

TABLE 3 Probability (%) of developing invasive cancer within selected age intervals by sex, United States, 2017–2019^a


| Cancer site | Sex | Probability, % | | | | Birth to death |
|-----------------------------------|--------|-------------------|----------------|----------------|--------------------|----------------|
| | | Birth to 49 years | 50–59 years | 60–69 years | 70 years and older | |
| All sites ^b | Male | 3.5 (1 in 29) | 6.2 (1 in 16) | 13.8 (1 in 7) | 34.0 (1 in 3) | 40.9 (1 in 2) |
| | Female | 5.8 (1 in 17) | 6.4 (1 in 16) | 10.4 (1 in 10) | 27.2 (1 in 4) | 39.1 (1 in 3) |
| Breast | Female | 2.1 (1 in 48) | 2.4 (1 in 41) | 3.5 (1 in 28) | 7.0 (1 in 14) | 12.9 (1 in 8) |
| Colon & rectum | Male | 0.4 (1 in 241) | 0.7 (1 in 138) | 1.1 (1 in 90) | 3.1 (1 in 33) | 4.3 (1 in 23) |
| | Female | 0.4 (1 in 267) | 0.5 (1 in 191) | 0.8 (1 in 130) | 2.8 (1 in 36) | 3.9 (1 in 26) |
| Kidney & renal pelvis | Male | 0.3 (1 in 389) | 0.4 (1 in 250) | 0.7 (1 in 144) | 1.4 (1 in 69) | 2.3 (1 in 44) |
| | Female | 0.2 (1 in 609) | 0.2 (1 in 504) | 0.3 (1 in 292) | 0.8 (1 in 124) | 1.3 (1 in 75) |
| Leukemia | Male | 0.3 (1 in 380) | 0.2 (1 in 538) | 0.4 (1 in 263) | 1.4 (1 in 69) | 1.8 (1 in 55) |
| | Female | 0.2 (1 in 495) | 0.1 (1 in 820) | 0.2 (1 in 425) | 0.9 (1 in 111) | 1.3 (1 in 78) |
| Lung & bronchus | Male | 0.1 (1 in 848) | 0.6 (1 in 178) | 1.7 (1 in 59) | 5.6 (1 in 18) | 6.2 (1 in 16) |
| | Female | 0.1 (1 in 746) | 0.5 (1 in 183) | 1.4 (1 in 72) | 4.7 (1 in 21) | 5.8 (1 in 17) |
| Melanoma of the skin ^c | Male | 0.4 (1 in 246) | 0.5 (1 in 205) | 0.9 (1 in 114) | 2.6 (1 in 38) | 3.5 (1 in 28) |
| | Female | 0.6 (1 in 162) | 0.4 (1 in 247) | 0.5 (1 in 191) | 1.1 (1 in 88) | 2.4 (1 in 41) |
| Non-Hodgkin lymphoma | Male | 0.3 (1 in 400) | 0.3 (1 in 354) | 0.6 (1 in 181) | 1.8 (1 in 55) | 2.3 (1 in 43) |
| | Female | 0.2 (1 in 535) | 0.2 (1 in 473) | 0.4 (1 in 250) | 1.3 (1 in 74) | 1.9 (1 in 53) |
| Prostate | Male | 0.2 (1 in 457) | 1.8 (1 in 55) | 5.2 (1 in 19) | 9.2 (1 in 11) | 12.6 (1 in 8) |
| Thyroid | Male | 0.2 (1 in 487) | 0.1 (1 in 767) | 0.2 (1 in 599) | 0.2 (1 in 416) | 0.6 (1 in 155) |
| | Female | 0.8 (1 in 125) | 0.3 (1 in 290) | 0.3 (1 in 318) | 0.4 (1 in 276) | 1.7 (1 in 59) |
| Uterine cervix | Female | 0.3 (1 in 340) | 0.1 (1 in 803) | 0.1 (1 in 934) | 0.2 (1 in 593) | 0.7 (1 in 153) |
| Uterine corpus | Female | 0.3 (1 in 305) | 0.6 (1 in 161) | 1.0 (1 in 97) | 1.5 (1 in 68) | 3.1 (1 in 33) |

^aFor people free of cancer at beginning of age interval.

^bAll sites exclude basal cell and squamous cell skin cancers and in situ cancers except urinary bladder.

^cProbability for non-Hispanic White individuals.

Estimated New Cases

| | | Males | | Females | | |
|-----------------------|------------------|-------------|---|-----------------------|-------------|-----|
| Prostate | 288,300 | 29% |  | Breast | 297,790 | 31% |
| Lung & bronchus | 117,550 | 12% | | Lung & bronchus | 120,790 | 13% |
| Colon & rectum | 81,860 | 8% | | Colon & rectum | 71,160 | 8% |
| Urinary bladder | 62,420 | 6% | | Uterine corpus | 66,200 | 7% |
| Melanoma of the skin | 58,120 | 6% | | Melanoma of the skin | 39,490 | 4% |
| Kidney & renal pelvis | 52,360 | 5% | | Non-Hodgkin lymphoma | 35,670 | 4% |
| Non-Hodgkin lymphoma | 44,880 | 4% | | Thyroid | 31,180 | 3% |
| Oral cavity & pharynx | 39,290 | 4% | | Pancreas | 30,920 | 3% |
| Leukemia | 35,670 | 4% | | Kidney & renal pelvis | 29,440 | 3% |
| Pancreas | 33,130 | 3% | | Leukemia | 23,940 | 3% |
| All Sites | 1,010,310 | 100% | All Sites | 948,000 | 100% | |

Estimated Deaths


| | | Males | | Females | | |
|--------------------------------|----------------|-------------|--|--------------------------------|-------------|-----|
| Lung & bronchus | 67,160 | 21% |  | Lung & bronchus | 59,910 | 21% |
| Prostate | 34,700 | 11% | | Breast | 43,170 | 15% |
| Colon & rectum | 28,470 | 9% | | Colon & rectum | 24,080 | 8% |
| Pancreas | 26,620 | 8% | | Pancreas | 23,930 | 8% |
| Liver & intrahepatic bile duct | 19,000 | 6% | | Ovary | 13,270 | 5% |
| Leukemia | 13,900 | 4% | | Uterine corpus | 13,030 | 5% |
| Esophagus | 12,920 | 4% | | Liver & intrahepatic bile duct | 10,380 | 4% |
| Urinary bladder | 12,160 | 4% | | Leukemia | 9,810 | 3% |
| Non-Hodgkin lymphoma | 11,780 | 4% | | Non-Hodgkin lymphoma | 8,400 | 3% |
| Brain & other nervous system | 11,020 | 3% | | Brain & other nervous system | 7,970 | 3% |
| All Sites | 322,080 | 100% | All Sites | 287,740 | 100% | |

FIGURE 1 Ten leading cancer types for the estimated new cancer cases and deaths by sex, United States, 2023. Estimates are rounded to the nearest 10, and cases 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.

Black men are approximately two to four times higher than those in every other racial and ethnic group (Table 5).

Female breast cancer incidence rates have been slowly increasing by about 0.5% per year since the mid-2000s, largely driven by diagnoses of localized-stage and hormone receptor-positive disease.⁴⁸ This trend has been attributed at least in part to continued declines in the fertility rate and increases in excess body weight,⁴⁹ which may also contribute to increased uterine corpus cancer incidence of about 1% per year since the mid-2000s among women aged 50 years and older and nearly 2% per year since at least the mid-1990s in younger women.^{37,50} After decades of increase, thyroid cancer incidence rates have declined since 2014 by about 2% per year because of changes in clinical practice designed to mitigate over detection, including recommendations against thyroid cancer screening by the USPSTF, and for more restrictive criteria for performing and interpreting biopsies by professional societies.^{51,52} Data from autopsy studies indicate that the occurrence of clinically relevant thyroid tumors has remained stable since 1970 and is generally similar in men and women, despite three-fold higher overall incidence rates in women.^{53,54}

Lung cancer incidence has declined at a steady pace since 2006–2007 by 2.6% annually in men and by 1.1% annually in women.³⁷ Declines in lung cancer incidence began later and have been slower in women than in men because women took up cigarette smoking in large numbers later and were also slower to quit, including upturns in smoking prevalence in some birth cohorts.^{55,56} In contrast, CRC incidence patterns have been similar by sex since at least the mid-1970s, with rates declining by 1.4%–1.5% per year since 2012 in both men and women.³⁷ However, these rates are driven by cancer occurrence in older age groups, for whom screening has been recommended, and mask increasing trends in young adults. Compared with declines of 2% per year in people aged 50 years and older during that time period, rates increased by almost 2% per year in adults younger than 50 years. Rising incidence in the United States and several other high-income countries since the mid-1990s⁵⁷ remains unexplained but likely reflects changes in lifestyle exposures that began with generations born circa 1950.⁵⁸

After a long history of increase, incidence of non-Hodgkin lymphoma decreased by about 1% per year during 2015 through 2019, and melanoma and liver cancer have stabilized. However, progress

TABLE 4 Estimated deaths for selected cancers by state, 2023^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 | 10,640 | 330 | 720 | 900 | 370 | 520 | 2610 | 290 | 200 | 840 | 540 |
| Alaska | 1,150 | — ^b | 60 | 110 | — ^b | 70 | 220 | — ^b | — ^b | 90 | 60 |
| Arizona | 13,460 | 420 | 920 | 1300 | 530 | 690 | 2290 | 430 | 320 | 1140 | 850 |
| Arkansas | 6340 | 190 | 390 | 550 | 200 | 310 | 1680 | 190 | 120 | 460 | 340 |
| California | 59,830 | 2180 | 4680 | 5530 | 2290 | 3450 | 9380 | 2180 | 1450 | 4970 | 4090 |
| Colorado | 8650 | 310 | 690 | 740 | 340 | 430 | 1450 | 280 | 210 | 790 | 740 |
| Connecticut | 6440 | 230 | 480 | 550 | 290 | 320 | 1320 | 230 | 160 | 540 | 400 |
| Delaware | 2230 | 60 | 160 | 170 | 90 | 90 | 500 | 80 | 50 | 210 | 100 |
| District of Columbia | 990 | — ^b | 60 | 90 | — ^b | 80 | 160 | — ^b | — ^b | 100 | 70 |
| Florida | 47,410 | 1450 | 3170 | 3810 | 1970 | 2230 | 10,230 | 1580 | 1060 | 3910 | 2650 |
| Georgia | 18,510 | 590 | 1400 | 1640 | 660 | 820 | 4060 | 500 | 430 | 1520 | 1020 |
| Hawaii | 2620 | 60 | 180 | 240 | 90 | 170 | 480 | 90 | 50 | 240 | 150 |
| Idaho | 3120 | 100 | 160 | 270 | 140 | 170 | 580 | 120 | 80 | 280 | 200 |
| Illinois | 23,380 | 680 | 1720 | 2110 | 910 | 1080 | 5000 | 780 | 550 | 2080 | 1270 |
| Indiana | 13,660 | 330 | 930 | 1170 | 510 | 650 | 3250 | 460 | 260 | 1170 | 760 |
| Iowa | 6310 | 190 | 380 | 540 | 260 | 230 | 1410 | 200 | 140 | 460 | 370 |
| Kansas | 5690 | 190 | 370 | 500 | 240 | 250 | 1330 | 190 | 120 | 410 | 280 |
| Kentucky | 10,090 | 280 | 790 | 890 | 400 | 380 | 2710 | 320 | 160 | 740 | 410 |
| Louisiana | 9420 | 250 | 690 | 870 | 390 | 530 | 2240 | 290 | 170 | 730 | 470 |
| Maine | 3500 | 110 | 190 | 270 | 120 | 120 | 870 | 120 | 70 | 270 | 170 |
| Maryland | 11,090 | 320 | 850 | 980 | 420 | 510 | 1950 | 350 | 260 | 910 | 680 |
| Massachusetts | 12,420 | 450 | 760 | 880 | 490 | 530 | 2570 | 350 | 300 | 1120 | 680 |
| Michigan | 21,380 | 620 | 1370 | 1740 | 800 | 920 | 4930 | 760 | 460 | 1810 | 1210 |
| Minnesota | 10,280 | 320 | 640 | 830 | 450 | 380 | 2090 | 400 | 210 | 870 | 630 |
| Mississippi | 6690 | 190 | 470 | 640 | 230 | 300 | 1740 | 170 | 110 | 440 | 370 |
| Missouri | 13,090 | 370 | 810 | 940 | 470 | 590 | 3210 | 420 | 250 | 1010 | 650 |
| Montana | 2200 | 80 | 150 | 170 | 80 | 160 | 380 | 70 | — ^b | 170 | 140 |
| Nebraska | 3540 | 130 | 270 | 320 | 160 | 100 | 630 | 110 | 70 | 300 | 170 |
| Nevada | 5850 | 190 | 440 | 470 | 200 | 300 | 1260 | 220 | 120 | 450 | 440 |
| New Hampshire | 2910 | 100 | 180 | 190 | 100 | 140 | 560 | 100 | — ^b | 320 | 170 |
| New Jersey | 15,230 | 520 | 1200 | 1360 | 640 | 600 | 2800 | 530 | 350 | 1410 | 730 |
| New Mexico | 3840 | 120 | 300 | 290 | 130 | 300 | 560 | 130 | 70 | 310 | 280 |
| New York | 31,320 | 950 | 2440 | 2770 | 1200 | 1210 | 6330 | 1000 | 850 | 2940 | 1650 |
| North Carolina | 20,400 | 560 | 1450 | 1640 | 760 | 1010 | 4660 | 640 | 370 | 1630 | 1150 |
| North Dakota | 1320 | — ^b | 70 | 110 | 70 | 50 | 290 | 50 | — ^b | 110 | 70 |
| Ohio | 24,770 | 720 | 1670 | 2120 | 1060 | 1010 | 5730 | 830 | 470 | 2080 | 1310 |
| Oklahoma | 8660 | 250 | 580 | 800 | 340 | 460 | 2090 | 290 | 190 | 590 | 400 |
| Oregon | 8430 | 270 | 570 | 640 | 330 | 470 | 1650 | 310 | 150 | 710 | 500 |
| Pennsylvania | 27,460 | 740 | 1870 | 2280 | 1140 | 1260 | 5720 | 950 | 610 | 2340 | 1440 |

(Continues)

TABLE 4 (Continued)

| State | All sites | Brain & other nervous system | Female breast | Colon & rectum | Leukemia | Liver & intrahepatic bile duct | Lung & bronchus | Non-Hodgkin lymphoma | Ovary | Pancreas | Prostate |
|----------------|-----------|------------------------------|---------------|----------------|----------------|--------------------------------|-----------------|----------------------|----------------|----------|----------|
| Rhode Island | 2150 | 80 | 130 | 160 | 80 | 130 | 470 | 70 | — ^b | 190 | 110 |
| South Carolina | 11,250 | 360 | 800 | 910 | 410 | 500 | 2630 | 310 | 190 | 900 | 640 |
| South Dakota | 1760 | 60 | 110 | 170 | 130 | 90 | 380 | 60 | — ^b | 150 | 80 |
| Tennessee | 14,590 | 420 | 1030 | 1240 | 520 | 620 | 3700 | 460 | 330 | 1090 | 740 |
| Texas | 44,140 | 1330 | 3340 | 4350 | 1590 | 2750 | 8330 | 1440 | 950 | 3510 | 2290 |
| Utah | 3710 | 200 | 320 | 310 | 160 | 180 | 460 | 140 | 110 | 310 | 340 |
| Vermont | 1460 | 60 | 80 | 120 | 50 | 80 | 280 | 50 | — ^b | 110 | 90 |
| Virginia | 15,800 | 500 | 1150 | 1410 | 590 | 680 | 3320 | 510 | 350 | 1320 | 960 |
| Washington | 13,350 | 490 | 960 | 1050 | 510 | 680 | 2630 | 480 | 320 | 1100 | 840 |
| West Virginia | 4610 | 120 | 230 | 440 | 180 | 220 | 1290 | 150 | 90 | 330 | 190 |
| Wisconsin | 11,670 | 380 | 720 | 880 | 480 | 510 | 2460 | 410 | 220 | 1020 | 730 |
| Wyoming | 1020 | 50 | 70 | 110 | — ^b | 60 | 200 | — ^b | — ^b | 90 | 80 |
| United States | 609,820 | 18,990 | 43,170 | 52,550 | 23,710 | 29,380 | 127,070 | 20,180 | 13,270 | 50,550 | 34,700 |

Note: These are model-based estimates that should be interpreted with caution. State estimates may not add to US totals because of rounding and the exclusion of states with fewer than 50 deaths.

^aRounded to the nearest 10; estimates for Puerto Rico are not available.

^bThe estimate is <50 deaths.

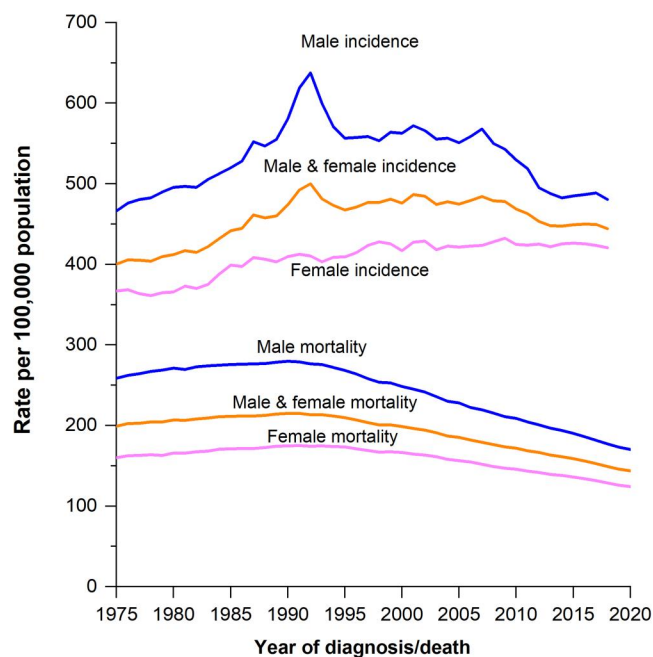


FIGURE 2 Trends in cancer incidence (1975–2019) and mortality (1975–2020) rates by sex, United States. Rates are age adjusted to the 2000 US standard population. Incidence rates are also adjusted for delays in reporting.

for the latter two cancers is mostly confined to men, among whom rates declined by about 1% per year for melanoma and by 2.6% per year for liver cancer in those younger than 50 years and were stable

in older men. In women, melanoma was stable in those younger than 50 years but continued to increase by about 1% per year in older women, whereas liver cancer increased by 1.6%–1.7% per year in both age groups.³⁷ The decline in urinary bladder cancer since the mid-2000s accelerated from 0.6% per year to 1.8% per year during 2015 through 2019 overall; however, trends vary widely by race and ethnicity, and incidence continues to increase by 1.3% per year in AIAN individuals. Incidence also continued to increase by about 1% annually in both men and women for cancers of the kidney and pancreas and by 2.8% and 1.3% per year, respectively, for human papillomavirus (HPV)-associated oral cavity cancers.

Cervical cancer incidence has decreased by more than one half since the mid-1970s because of the widespread uptake of screening. Although rates were stable during 2015 through 2019 overall, trends vary by age, race, and ethnicity. For example, rates continued to decline by about 2% annually in Black, Hispanic, and Asian American/Pacific Islander (AAPI) women 50 years and older and by 1% annually in younger Black and AAPI women; however, rates among younger Hispanic women increased by 2% per year from 2012 through 2019. This may at least in part reflect a change in the composition of the young Hispanic population in the United States through immigration and/or migration. For example, cervical cancer incidence rates among women in Puerto Rico are 30% higher than those among mainland Hispanic women⁵⁹ and were recently reported to be increasing in women younger than 65 years, perhaps due to increased HPV prevalence and suboptimal screening.⁶⁰

The first vaccine against the two strains of HPV that cause 70% of cervical cancers (HPV-16 and HPV-18) was approved in 2006 by

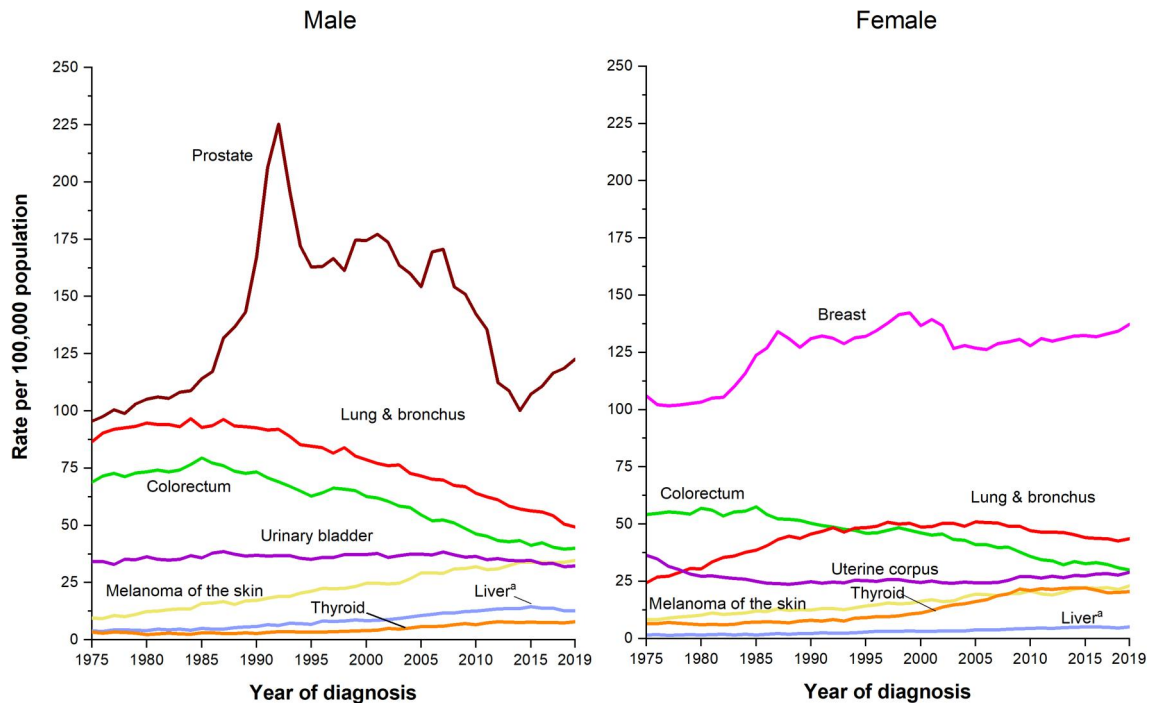


FIGURE 3 Trends in incidence rates for selected cancers by sex, United States, 1975–2019. Rates are age adjusted to the 2000 US standard population and adjusted for delays in reporting. ^aLiver includes intrahepatic bile duct.

the US Food and Drug Administration for use in females aged 9–26 years.^{61,62} Thus, the first cohort of vaccinated adolescents is now in their 20s. Among women aged 20–24 years, invasive cervical cancer incidence rates declined by 3% annually from 1998 (2.1 per 100,000 persons) through 2012 (1.3 per 100,000 persons), then by 11.4% annually from 2012 through 2019 (0.5 per 100,000 persons; Figure 4). The overall reduction during 2012 through 2019 was 65%, compared with 33% during the previous 7-year period (2005–2012). Although a new joinpoint is not yet evident among women of color because of sparse data, the decrease in rates during 2012 through 2019 was similar across race and ethnicity (White, 64%; Black, 69%; Hispanic, 70%). Data for AAPI and AIAN women were too sparse to analyze.

These findings are consistent with those of Mix et al., who reported declines in cervical squamous cell carcinoma of 22.5% per year from 2010 through 2017 among women aged 15–20 years.⁶³ Surprisingly large herd immunity has also been shown in the United States based on data from the National Health Examination Survey during 2003 through 2018, with reductions in HPV-16 and HPV-18 infection among sexually active females aged 14–24 years of 90% among those who were vaccinated and 74% among those who were unvaccinated.⁶⁴ Sweden was first to report a population-level reduction in invasive cervical cancer incidence of 78% among women who were vaccinated before age 17 years in 2020.⁶⁵ Shortly thereafter, an 87% reduction in cervical cancer and a 97% reduction in grade 3 cervical intraepithelial neoplasia was demonstrated among women aged 20–29 years who were vaccinated at ages 12 to 13 years in England.⁶⁶ Although up-to-date (three-dose) HPV vaccination coverage in the United States has lagged behind other countries, accumulating evidence suggests that a

single dose offers substantial protection^{67,68} and may even be preferable in low-income, high-burden populations.⁶⁹ In April, 2022, the World Health Organization's Strategic Advisory Group of Experts on Immunization endorsed single-dose vaccination among girls aged 9–14 years to address the global shortfall and optimize cancer prevention.⁷⁰ In 2021, 79% of adolescent girls in the United States had received at least one dose, and 64% were up to date.⁷¹

Cancer survival

The 5-year relative survival rate for all cancers combined has increased from 49% for diagnoses during the mid-1970s to 68% for diagnoses during 2012 through 2018 (Table 6).^{6,7} Current survival is highest for cancers of the thyroid (98%), prostate (97%), testis (95%) and for melanoma (94%), and lowest for cancers of the pancreas (12%), liver and esophagus (21%). Screening influences the interpretation of survival improvements for breast and prostate cancers because of lead-time bias and the detection of indolent cancers,⁷² which is likely also a factor for thyroid and other cancers that can be detected incidentally through imaging.⁷³

Gains in survival have been especially rapid for hematopoietic and lymphoid malignancies because of improvements in treatment protocols, including the development of targeted therapies. For example, the 5-year relative survival rate for chronic myeloid leukemia has increased from 22% in the mid-1970s to 70% for those diagnosed during 2012 through 2018, and most patients who were treated with tyrosine-kinase inhibitors are experiencing near normal life expectancy.⁷⁴ More recently, a cascade of new therapies has

TABLE 5 Incidence and mortality rates for selected cancers by race and ethnicity, United States, 2015–2020

| | All races and ethnicities | White | Black | American Indian/ Alaska Native ^b | Asian American/ Pacific Islander | Hispanic/Latino |
|--------------------------------|---------------------------|-------|-------|--|-------------------------------------|-----------------|
| Incidence, 2015–2019 | | | | | | |
| All sites | 449.4 | 466.6 | 453.7 | 456.8 | 295.5 | 352.2 |
| Male | 488.2 | 502.1 | 527.5 | 481.2 | 294.9 | 372.1 |
| Female | 423.3 | 442.8 | 404.2 | 443.6 | 300.1 | 344.8 |
| Breast (female) | 128.1 | 133.7 | 127.8 | 111.3 | 101.3 | 99.2 |
| Colon & rectum ^a | 35.9 | 35.7 | 41.7 | 48.6 | 28.6 | 32.5 |
| Male | 41.5 | 41.0 | 49.6 | 56.2 | 33.9 | 38.8 |
| Female | 31.2 | 30.9 | 35.9 | 42.5 | 24.3 | 27.4 |
| Kidney & renal pelvis | 17.3 | 17.5 | 19.1 | 31.0 | 8.1 | 17.5 |
| Male | 23.5 | 23.8 | 26.2 | 41.2 | 11.4 | 22.8 |
| Female | 12.0 | 11.9 | 13.6 | 22.5 | 5.5 | 13.1 |
| Liver & intrahepatic bile duct | 8.6 | 7.3 | 10.7 | 18.4 | 12.2 | 13.8 |
| Male | 13.1 | 11.0 | 17.4 | 26.8 | 18.9 | 20.3 |
| Female | 4.8 | 4.0 | 5.5 | 11.5 | 6.8 | 8.2 |
| Lung & bronchus | 56.3 | 60.6 | 58.2 | 61.6 | 34.2 | 29.1 |
| Male | 64.1 | 67.3 | 74.8 | 66.9 | 42.1 | 35.6 |
| Female | 50.3 | 55.5 | 46.9 | 57.9 | 28.3 | 24.4 |
| Prostate | 109.9 | 103.5 | 176.2 | 82.6 | 57.2 | 87.2 |
| Stomach | 6.4 | 5.2 | 9.7 | 9.6 | 9.4 | 9.4 |
| Male | 8.5 | 7.2 | 13.0 | 12.5 | 12.2 | 11.6 |
| Female | 4.6 | 3.4 | 7.4 | 7.5 | 7.2 | 7.8 |
| Uterine cervix | 7.7 | 7.2 | 8.8 | 10.9 | 6.1 | 9.7 |
| Uterine corpus | 27.7 | 27.9 | 28.4 | 29.4 | 21.2 | 25.5 |
| Mortality, 2016–2020 | | | | | | |
| All sites | 149.4 | 154.4 | 174.7 | 179.3 | 94.5 | 108.2 |
| Male | 177.5 | 182.5 | 216.0 | 216.5 | 110.4 | 129.6 |
| Female | 128.7 | 133.0 | 149.2 | 153.7 | 82.9 | 93.2 |
| Breast (female) | 19.6 | 19.7 | 27.6 | 20.5 | 11.7 | 13.7 |
| Colon & rectum | 13.1 | 13.1 | 17.6 | 18.6 | 9.1 | 10.7 |
| Male | 15.7 | 15.5 | 22.3 | 22.6 | 10.9 | 13.5 |
| Female | 11.0 | 11.1 | 14.3 | 15.6 | 7.7 | 8.5 |
| Kidney & renal pelvis | 3.5 | 3.6 | 3.4 | 6.5 | 1.6 | 3.3 |
| Male | 5.1 | 5.3 | 5.2 | 9.7 | 2.4 | 4.8 |
| Female | 2.2 | 2.3 | 2.1 | 4.1 | 1.0 | 2.1 |
| Liver & intrahepatic bile duct | 6.6 | 5.9 | 8.3 | 13.3 | 8.4 | 9.2 |
| Male | 9.6 | 8.4 | 12.9 | 19.5 | 12.5 | 13.1 |
| Female | 4.1 | 3.6 | 4.8 | 8.5 | 5.1 | 6.0 |
| Lung & bronchus | 35.0 | 38.0 | 37.2 | 42.3 | 19.8 | 15.4 |
| Male | 42.2 | 44.7 | 51.0 | 51.1 | 25.6 | 20.9 |
| Female | 29.3 | 32.8 | 27.8 | 36.0 | 15.4 | 11.4 |

TABLE 5 (Continued)

| | All races and ethnicities | White | Black | American Indian/ Alaska Native ^b | Asian American/ Pacific Islander | Hispanic/Latino |
|----------------|---------------------------|-------|-------|--|-------------------------------------|-----------------|
| Prostate | 18.8 | 17.8 | 37.5 | 21.9 | 8.6 | 15.3 |
| Stomach | 2.8 | 2.1 | 5.0 | 5.5 | 4.6 | 4.8 |
| Male | 3.8 | 2.9 | 7.2 | 7.5 | 5.9 | 5.9 |
| Female | 2.1 | 1.5 | 3.5 | 4.0 | 3.7 | 3.9 |
| Uterine cervix | 2.2 | 2.0 | 3.3 | 3.2 | 1.6 | 2.5 |
| Uterine corpus | 5.1 | 4.6 | 9.1 | 4.9 | 3.5 | 4.3 |

Note: Rates are per 100,000 population and age adjusted to the 2000 US standard population. All race groups are exclusive of Hispanic origin.

^aColorectal cancer incidence rates exclude appendix.

^bTo reduce racial misclassification, incidence rates are limited to Purchased/Referred Care Delivery Area counties and mortality rates (for the entire United States) are adjusted using factors published by the National Center for Health Statistics.²²

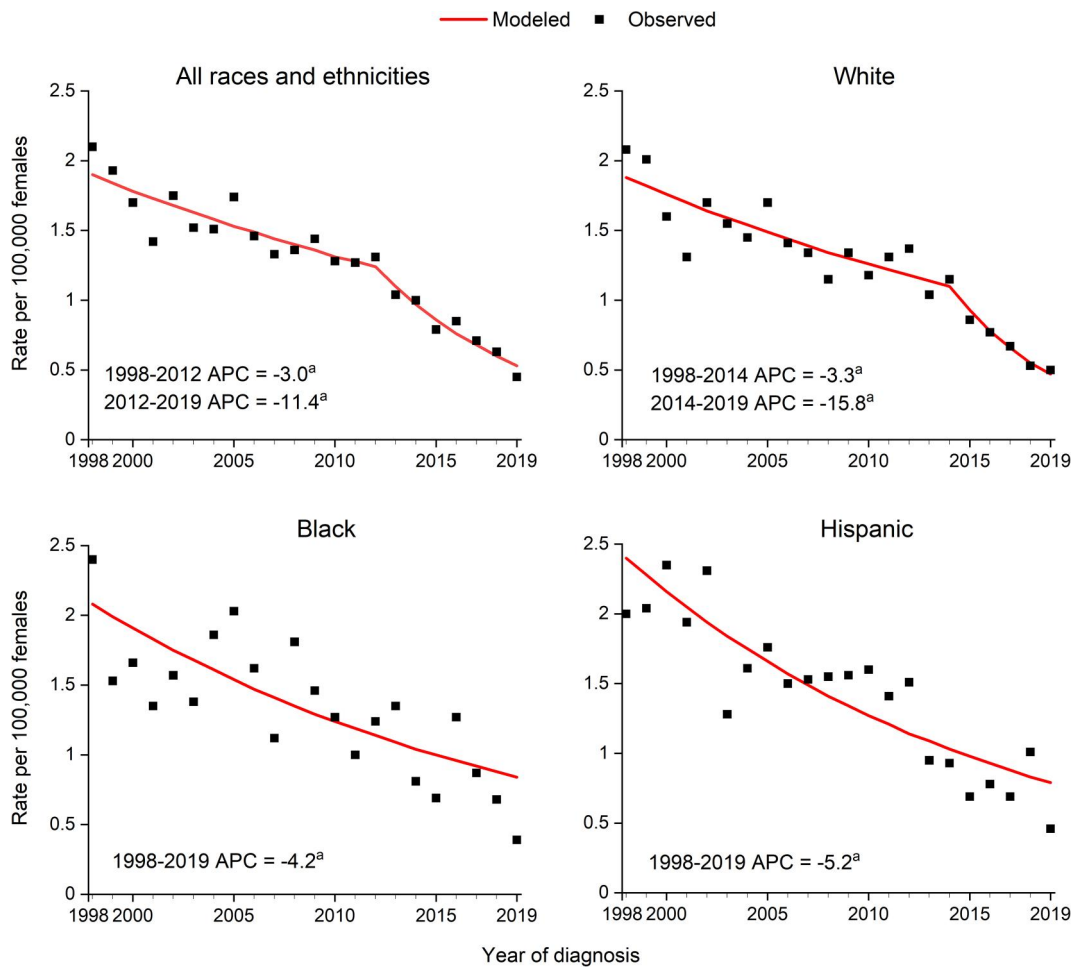


FIGURE 4 Trends in cervical cancer incidence rates among women aged 20–24 years by race and ethnicity, United States, 1998–2019. Rates are age adjusted to the 2000 US standard population and adjusted for reporting delays. White and Black race are exclusive of Hispanic ethnicity. ^aThe APC is statistically significant ($p < .05$). APC indicates annual percent change.

been game-changing in the treatment of metastatic melanoma, including first-generation and second-generation immunotherapies (anti-CTLA4 and anti-PD-1 checkpoint inhibition) and BRAF and

MEK inhibitors.^{75,76} As a result, 3-year relative survival for distant-stage melanoma has doubled over the past decade, from 20.6% for patients diagnosed during 2004 through 2006 to 39.3% during 2016

TABLE 6 Trends in 5-year relative survival rates (%) by race, United States, 1975–2019^a

| Cancer site | All races & ethnicities | | | White | | | Black | | |
|--------------------------------|-------------------------|-----------|-----------|-----------|-----------|-----------|-------------------|-----------------|-----------|
| | 1975–1977 | 1995–1997 | 2012–2018 | 1975–1977 | 1995–1997 | 2012–2018 | 1975–1977 | 1995–1997 | 2012–2018 |
| All sites | 49 | 63 | 68 | 50 | 64 | 69 | 39 | 54 | 64 |
| Brain & other nervous system | 23 | 32 | 33 | 22 | 31 | 29 | 25 | 39 | 40 |
| Breast (female) | 75 | 87 | 91 | 76 | 89 | 92 | 62 | 75 | 83 |
| Colon & rectum | 50 | 61 | 65 | 50 | 62 | 65 | 45 | 54 | 60 |
| Colon | 51 | 61 | 63 | 51 | 62 | 64 | 45 | 54 | 58 |
| Rectum | 48 | 62 | 68 | 48 | 62 | 67 | 44 | 55 | 65 |
| Esophagus | 5 | 13 | 21 | 6 | 14 | 22 | 4 | 9 | 15 |
| Hodgkin lymphoma | 72 | 84 | 89 | 72 | 85 | 90 | 70 | 82 | 87 |
| Kidney & renal pelvis | 50 | 62 | 77 | 50 | 62 | 76 | 49 | 62 | 77 |
| Larynx | 66 | 66 | 61 | 67 | 68 | 62 | 58 | 52 | 53 |
| Leukemia | 34 | 48 | 66 | 35 | 50 | 67 | 33 | 42 | 62 |
| Liver & intrahepatic bile duct | 3 | 7 | 21 | 3 | 7 | 20 | 2 | 4 | 19 |
| Lung & bronchus | 12 | 15 | 23 | 12 | 15 | 23 | 11 | 13 | 21 |
| Melanoma of the skin | 82 | 91 | 94 | 82 | 91 | 94 | 57 ^b | 76 ^b | 70 |
| Myeloma | 25 | 32 | 58 | 24 | 32 | 57 | 29 | 32 | 60 |
| Non-Hodgkin lymphoma | 47 | 56 | 74 | 47 | 57 | 75 | 49 | 49 | 70 |
| Oral cavity & pharynx | 53 | 58 | 68 | 54 | 60 | 70 | 36 | 38 | 52 |
| Ovary | 36 | 43 | 50 | 35 | 43 | 49 | 42 | 36 | 41 |
| Pancreas | 3 | 4 | 12 | 3 | 4 | 11 | 2 | 4 | 11 |
| Prostate | 68 | 97 | 97 | 69 | 97 | 97 | 61 | 94 | 97 |
| Stomach | 15 | 22 | 33 | 14 | 20 | 33 | 16 | 22 | 34 |
| Testis | 83 | 96 | 95 | 83 | 96 | 96 | 73 ^{b,c} | 86 ^b | 92 |
| Thyroid | 92 | 95 | 98 | 92 | 96 | 99 | 90 | 95 | 97 |
| Urinary bladder | 72 | 80 | 77 | 73 | 81 | 78 | 50 | 63 | 65 |
| Uterine cervix | 69 | 73 | 67 | 70 | 74 | 67 | 65 | 66 | 56 |
| Uterine corpus | 87 | 84 | 81 | 88 | 86 | 84 | 60 | 62 | 64 |

^aRates are age adjusted for normal life expectancy and are based on cases diagnosed in the Surveillance, Epidemiology, and End Results (SEER) 9 areas for 1975–1977 and 1995–1997 and in the SEER 17 areas for 2012–2018; all cases were followed through 2019. Rates for White and Black patients diagnosed during 2012 through 2018 are exclusive of Hispanic ethnicity.

^bThe standard error is between 5 and 10 percentage points.

^cThe survival rate is for cases diagnosed from 1978 to 1980.

through 2018.⁷ Investigators at the NCI recently reported that the number of individuals living with metastatic melanoma increased by 258% from 1990 to 2018, by far the largest increase among the six common cancers studied.⁷⁷

Immunotherapy has also shown promise in the neoadjuvant setting for resectable stage II–IV cutaneous squamous cell carcinoma⁷⁸ and nonsmall cell lung cancer. A phase 3 trial among patients with stage I–III nonsmall cell lung cancer reported a median progression-free survival of 20.8 months with standard chemotherapy versus 31.6 months with the addition of nivolumab, including

a pathologic complete response in one of four patients.⁷⁹ At the population level, 3-year relative survival for all stages of lung cancer combined increased from 22% for diagnoses during 2004 through 2006 to 33% for diagnoses during 2016 through 2018, with progress against nonsmall cell lung cancer (from 25% to 38%) far exceeding that for small cell lung cancer (from 9% to 12%). Gains not only reflect improved therapies^{80,81} but also earlier lung cancer detection^{82,83} and advances in staging⁸⁴ and surgical procedures.⁸⁵ Checkpoint inhibitors and targeted therapies are also showing promise in difficult-to-treat advanced renal cell carcinoma.⁸⁶

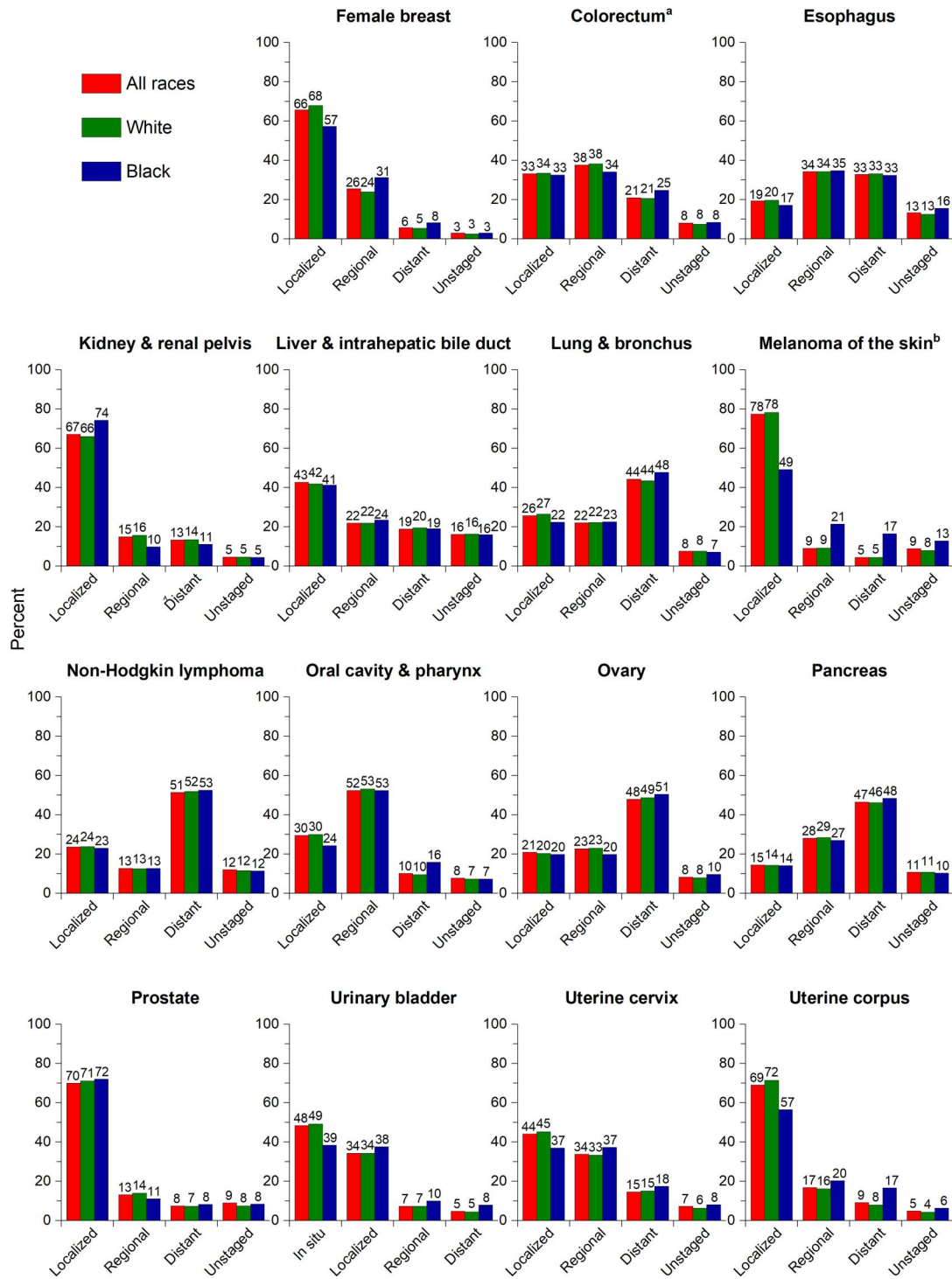


FIGURE 5 Stage distribution for selected cancers by race, United States, 2015 to 2019. White and Black race categories are exclusive of Hispanic ethnicity. ^aColorectum excludes appendiceal cancer. ^bThe proportion of melanoma patients with unknown stage increased after 2015 when collaborative staging rules were no longer in effect.

Unlike most common cancers, survival has not improved over the past 4 decades for women with uterine malignancies (Table 6), largely reflecting a lack of major treatment advances.^{87,88} Uterine corpus cancer is the fourth most commonly diagnosed cancer in women, yet there is a dearth of research activity⁸⁹ and it ranked 24th in NCI

research funding in 2018.⁹⁰ The lack of progress has disproportionately affected Black women, who are substantially less likely to be diagnosed with localized-stage disease (57% versus 72% of White women; Figure 5) and have lower survival for every stage (Figure 6). Black women have the highest mortality rate of all racial and ethnic

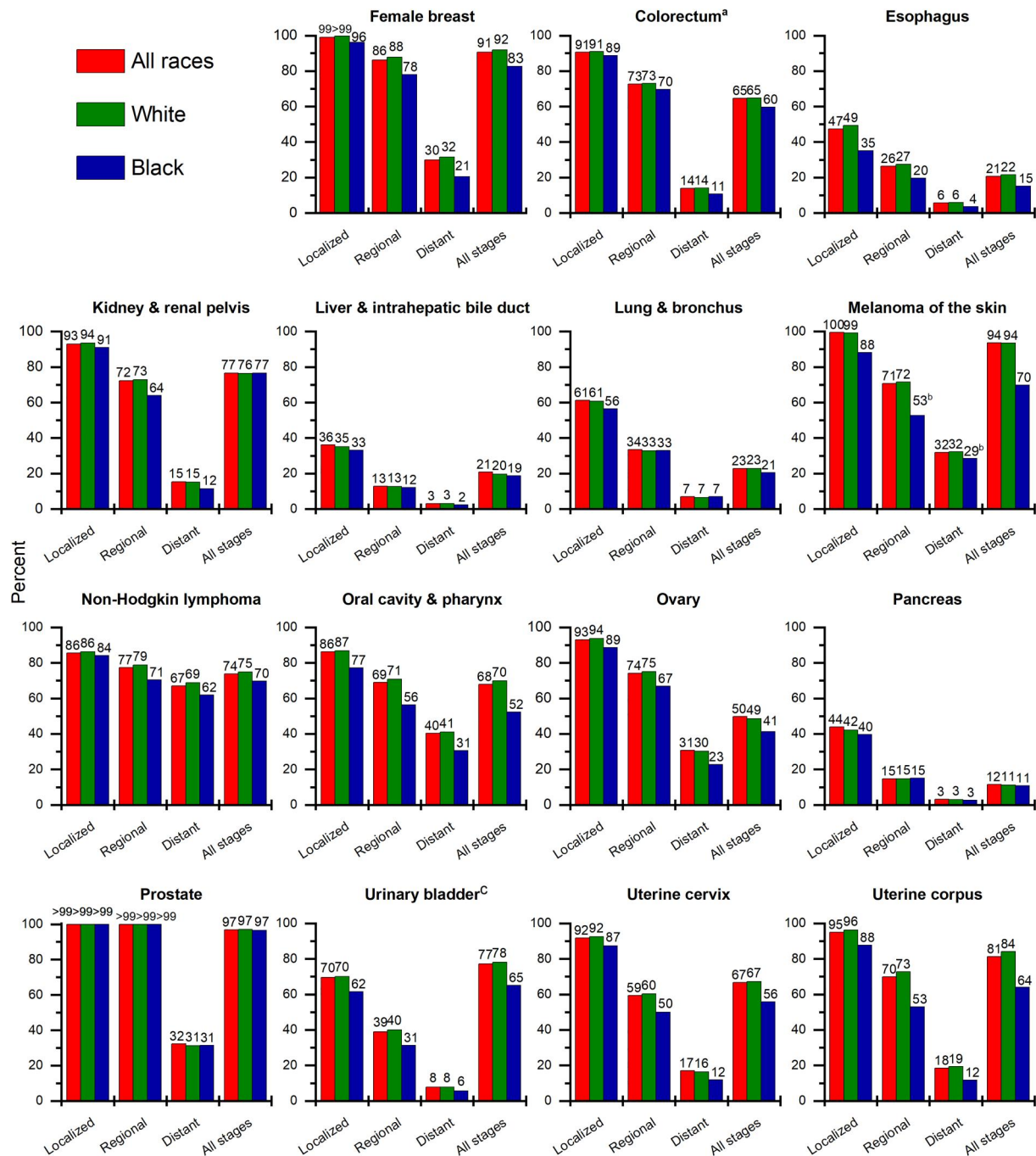


FIGURE 6 Five-year relative survival for selected cancers by race and stage at diagnosis, United States, 2012 to 2018. White and Black race categories are exclusive of Hispanic ethnicity. ^aColorectum excludes appendiceal cancer. ^bThe standard error of the survival rate is between 5 and 10 percentage points. ^cThe survival rate for carcinoma in situ of the urinary bladder is 96% in all races, 96% in White patients, and 94% in Black patients.

groups for every histologic subtype of uterine corpus cancer.⁹¹ The recent identification of distinct molecular subtypes offers opportunities for the development of targeted therapies, which could have a large impact because almost one half of early stage, recurrent endometrial cancers have targetable molecular alterations.^{92,93} However, equitable dissemination of future advances will be critical to avoid exacerbating the current disparity, which is already one of the largest of all cancers. Stagnant survival trends for cervical cancer likely reflect

in part an increased proportion of adenocarcinoma, which has poorer survival than squamous cell carcinoma,⁹⁴ because of the disproportionate detection of cervical intraepithelial neoplasia and early invasive squamous cell carcinoma during cytology screening.⁹⁵

Survival rates are lower for Black individuals than for White individuals for every cancer type shown in Figure 6 except pancreas and kidney cancers, for which they are similar. However, kidney cancer survival is lower in Black patients for every histologic subtype of the

disease and is only similar overall because of a higher proportion than Whites of papillary and chromophobe renal cell carcinoma (RCC), which have a better prognosis than other types of RCC.⁹⁶ The largest Black–White survival differences in absolute terms are for melanoma (24%) and cancers of the uterine corpus (20%), the oral cavity and pharynx (18%), and the urinary bladder (13%). Although these disparities partly reflect a later stage at diagnosis (Figure 5), Black individuals have lower stage-specific survival for most cancer types (Figure 6). After adjusting for stage, sex, and age, the risk of cancer death is 33% higher in Black people and 51% higher in AIAN people compared with White people.⁹⁷

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 that result from changes in detection practice.⁹⁸ The cancer death rate rose during most of the 20th century (Figure 7), largely because of a rapid increase in lung cancer deaths among men as a consequence of the tobacco epidemic. However, reductions in smoking as well as improvements in early detection and treatment for some cancers have resulted in a continuous decline in the cancer death rate since its peak in 1991 at 215.1 per 100,000 persons. The overall drop

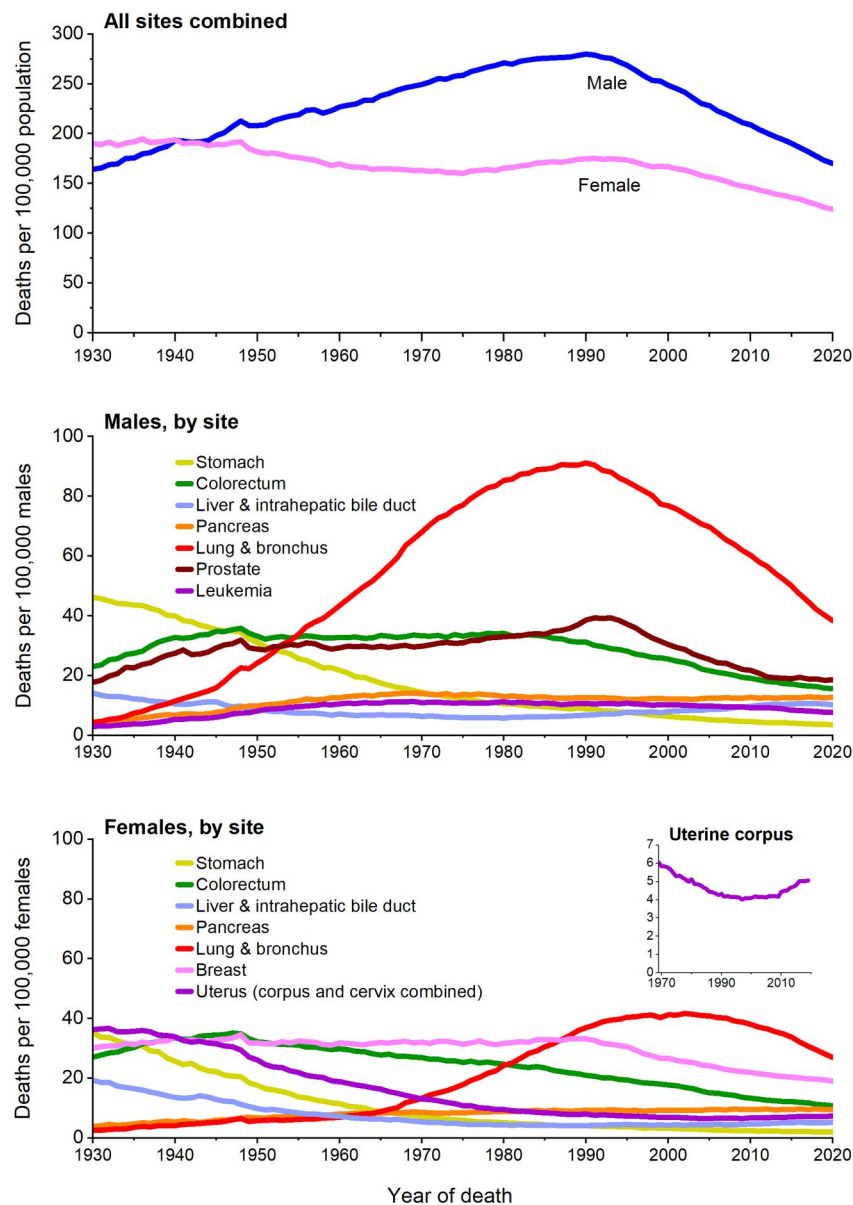


FIGURE 7 Trends in cancer mortality rates by sex overall and for selected cancers, United States, 1930–2020. Rates are age adjusted to the 2000 US standard population. Because of improvements in International Classification of Diseases coding over time, numerator data for cancers of the lung and bronchus, 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.

of 33% through 2020 (143.8 per 100,000 persons) translates to an estimated 3,820,800 fewer cancer deaths (2,582,800 in men and 1,238,000 in women) than if mortality had remained at its peak (Figure 8). The number of averted deaths is twice as large for men than for women because the death rate in men peaked higher and declined faster (Figure 7).

The pace of decline in cancer mortality has slowly accelerated from about 1% per year during the 1990s, to 1.5% per year during the 2000s, and to 2% per year from 2015 through 2020 (Table 7). Overall mortality trends are largely driven by lung cancer, for which declines steepened similarly in men and women in recent years because of treatment advances that have extended survival, as mentioned earlier, as well as earlier detection.⁸³ For example, the annual decrease in lung cancer mortality accelerated from 3.1% during 2005 through 2014 to 5.3% during 2014 through 2020 in men and from 1.8% to 4.3% in women (Table 7). Overall, the lung cancer death rate dropped by 58% from 1990 to 2020 in men and by 36% from 2002 to 2020 in women.

Long-term reductions in mortality for CRC—the second-most common cause of cancer death in men and women combined—also contribute to overall progress, with rates dropping by 55% among males since 1980 and by 61% among females since 1969. (CRC death rates were declining in women before 1969, but earlier data years are not exclusive of deaths from small intestine cancer.) The CRC mortality rate decreased during the most recent decade (2011–2020) by about 2% per year. However, similar to incidence, this trend

masks increasing mortality among young adults; the CRC death rate continued to rise by 1.2% per year in individuals younger than 50 years and by 0.6% per year in those aged 50–54 years from 2005 through 2020.

Female breast cancer mortality peaked in 1989 and has since decreased by 43% because of earlier diagnosis through mammography screening and increased awareness, coupled with improvements in treatment. Declines in breast cancer mortality have slowed in recent years, from 2% to 3% annually during the 1990s and 2000s to 1% annually from 2011 to 2020, perhaps reflecting the slight but steady increase in incidence and stagnant mammography uptake in recent years. Similarly, the slowing decline in prostate cancer mortality, from 3% to 4% annually during 1994 through 2013 to 0.6% during 2013 through 2020, likely reflects the uptick in advanced-stage diagnoses associated with reductions in PSA testing since 2008.^{99,100} Prostate cancer mortality has declined by 53% since the peak in 1993 because of earlier detection through widespread screening with the PSA test and advances in treatment.^{101,102}

The third leading cause of cancer death in men and women combined is pancreatic cancer, for which mortality has increased slowly in men, from 12.1 (per 100,000 men) in 2000 to 12.7 per 100,000 men in 2020, but remained relatively stable in women at 9.3–9.6 per 100,000 women. Liver cancer had the fastest increasing mortality for decades, but rates have stabilized in women and began a downturn in men (1.3% decline from 2017 to 2020; Table 7), mirroring patterns in incidence. Mortality declines of about 2% per year

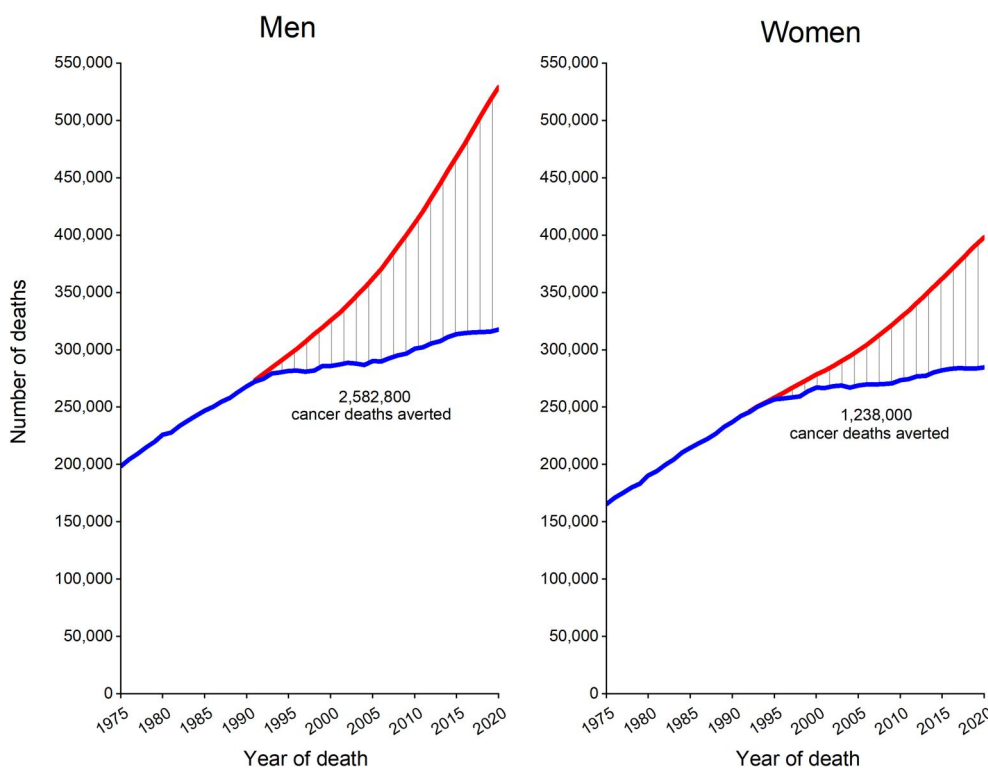


FIGURE 8 Total number of cancer deaths averted from 1991 through 2020 in men and from 1992 to 2020 in women, United States. The blue line represents the actual number of cancer deaths recorded in each year; the red line represents the number of cancer deaths that would have been expected if cancer death rates had remained at their peak.

TABLE 7 Trends in mortality rates for selected cancers by sex, United States, 1975–2020

| Cancer site | 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 | 2011–2015 | 2016–2020 | 2011–2020 |
| All sites | | | | | | | | | | | | | | | |
| Overall | 1975–1984 | 0.6 ^a | 1984–1992 | 0.3 ^a | 1992–2001 | −1.0 ^a | 2001–2015 | −1.5 ^a | 2015–2020 | −2.0 ^a | | | −1.5 ^a | −2.0 ^a | −1.8 ^a |
| Male | 1975–1979 | 1.0 ^a | 1979–1990 | 0.3 ^a | 1990–1993 | −0.5 | 1993–2001 | −1.5 ^a | 2001–2015 | −1.8 ^a | 2015–2020 | −2.2 ^a | −1.8 ^a | −2.2 ^a | −2.0 ^a |
| Female | 1975–1990 | 0.6 ^a | 1990–1995 | −0.2 | 1995–1998 | −1.2 ^a | 1998–2001 | −0.4 | 2001–2016 | −1.4 ^a | 2016–2020 | −1.9 ^a | −1.4 ^a | −1.9 ^a | −1.6 ^a |
| Female breast | 1975–1990 | 0.4 ^a | 1990–1995 | −1.8 ^a | 1995–1998 | −3.3 ^a | 1998–2011 | −1.9 ^a | 2011–2020 | −1.3 ^a | | | −1.3 ^a | −1.3 ^a | −1.3 ^a |
| Colon & rectum | | | | | | | | | | | | | | | |
| Overall | 1975–1978 | 0.2 | 1978–1985 | −0.8 ^a | 1985–2002 | −1.8 ^a | 2002–2005 | −3.8 ^a | 2005–2012 | −2.5 ^a | 2012–2020 | −1.9 ^a | −2.1 ^a | −1.9 ^a | −2.0 ^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 | 2012–2020 | −2.0 ^a | −2.1 ^a | −2.0 ^a | −2.0 ^a |
| Female | 1975–1984 | −1.0 ^a | 1984–2001 | −1.8 ^a | 2001–2010 | −2.9 ^a | 2010–2020 | −2.1 ^a | | | | | −2.1 ^a | −2.1 ^a | −2.1 ^a |
| Liver & intrahepatic bile duct | | | | | | | | | | | | | | | |
| Overall | 1975–1980 | 0.2 | 1980–1987 | 2.0 ^a | 1987–1996 | 3.8 ^a | 1996–2000 | 0.7 | 2000–2015 | 2.5 ^a | 2015–2020 | −0.5 ^a | 2.5 ^a | −0.5 ^a | 0.8 ^a |
| Male | 1975–1985 | 1.5 ^a | 1985–1996 | 3.8 ^a | 1996–1999 | 0.3 | 1999–2013 | 2.7 ^a | 2013–2017 | 0.7 | 2017–2020 | −1.3 ^a | 1.7 ^a | −0.8 | 0.4 |
| Female | 1975–1984 | 0.2 | 1984–1995 | 3.1 ^a | 1995–2008 | 1.2 ^a | 2008–2014 | 3.1 ^a | 2014–2020 | 0.5 | | | 2.5 ^a | 0.5 | 1.4 ^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 | 2014–2020 | −4.8 ^a | −3.0 ^a | −4.8 ^a | −4.0 ^a |
| Male | 1975–1982 | 1.8 ^a | 1982–1991 | 0.4 ^a | 1991–2005 | −1.9 ^a | 2005–2014 | −3.1 ^a | 2014–2020 | −5.3 ^a | | | −3.6 ^a | −5.3 ^a | −4.6 ^a |
| Female | 1975–1982 | 6.0 ^a | 1982–1990 | 4.2 ^a | 1990–1995 | 1.8 ^a | 1995–2005 | 0.2 ^a | 2005–2014 | −1.8 ^a | 2014–2020 | −4.3 ^a | −2.4 ^a | −4.3 ^a | −3.5 ^a |
| Melanoma of skin | | | | | | | | | | | | | | | |
| Overall | 1975–1988 | 1.6 ^a | 1988–2013 | 0.0 | 2013–2017 | −6.3 ^a | 2017–2020 | −1.3 | | | | | −3.2 ^a | −2.6 ^a | −3.3 ^a |
| Male | 1975–1989 | 2.3 ^a | 1989–2013 | 0.3 ^a | 2013–2017 | −6.8 ^a | 2017–2020 | −1.5 | | | | | −3.3 ^a | −2.9 ^a | −3.5 ^a |
| Female | 1975–1988 | 0.8 ^a | 1988–2012 | −0.5 ^a | 2012–2020 | −3.8 ^a | | | | | | | −3.0 ^a | −3.8 ^a | −4.0 ^a |
| Ovary | 1975–1982 | −1.2 ^a | 1982–1992 | 0.3 ^a | 1992–1998 | −1.2 ^a | 1998–2003 | 0.6 | 2003–2017 | −2.3 ^a | 2017–2020 | −3.8 ^a | −2.3 ^a | −3.4 ^a | −2.8 ^a |
| Oral cavity & pharynx | | | | | | | | | | | | | | | |
| Overall | 1975–1991 | −1.5 ^a | 1991–2000 | −2.6 ^a | 2000–2009 | −1.3 ^a | 2009–2020 | 0.4 ^a | | | | | 0.4 ^a | 0.4 ^a | 0.4 ^a |
| Male | 1975–1980 | −0.9 | 1980–2006 | −2.2 ^a | 2006–2020 | 0.4 ^a | | | | | | | 0.4 ^a | 0.4 ^a | 0.4 ^a |
| Female | 1975–1989 | −0.9 ^a | 1989–2009 | −2.2 ^a | 2009–2020 | 0.3 | | | | | | | 0.3 | 0.3 | 0.3 |
| Tongue, tonsil, oropharynx | 1975–2000 | −1.6 ^a | 2000–2009 | −0.1 | 2009–2020 | 1.8 ^a | | | | | | | 1.8 ^a | 1.8 ^a | 1.8 ^a |
| Other oral cavity | 1975–1992 | −1.6 ^a | 1992–2006 | −2.9 ^a | 2006–2020 | −0.8 ^a | | | | | | | −0.8 ^a | −0.8 ^a | −0.8 ^a |
| Pancreas | | | | | | | | | | | | | | | |
| Overall | 1975–2002 | −0.1 ^a | 2002–2005 | 1.0 | 2005–2020 | 0.1 ^a | | | | | | | 0.1 ^a | 0.1 ^a | 0.1 ^a |
| Male | 1975–1986 | −0.8 ^a | 1986–1998 | −0.3 ^a | 1998–2020 | 0.2 ^a | | | | | | | 0.2 ^a | 0.2 ^a | 0.2 ^a |
| Female | 1975–1984 | 0.8 ^a | 1984–2003 | 0.1 | 2003–2006 | 1.0 | 2006–2020 | 0.1 | | | | | 0.1 | 0.1 | 0.1 |
| Prostate | 1975–1987 | 0.9 ^a | 1987–1991 | 3.0 ^a | 1991–1994 | −0.5 | 1994–1998 | −4.3 ^a | 1998–2013 | −3.5 ^a | 2013–2020 | −0.6 ^a | −2.0 ^a | −0.6 ^a | −1.2 ^a |
| Uterine corpus | 1975–1989 | −1.6 ^a | 1989–1997 | −0.7 ^a | 1997–2009 | 0.4 ^a | 2009–2016 | 2.3 ^a | 2016–2020 | 0.7 ^a | | | 2.3 ^a | 0.7 ^a | 1.6 ^a |

Note: Trends were analyzed using the Joinpoint Regression Program, version 4.9.1.0, allowing up to five joinpoints.

Abbreviations: APC, annual percent change (based on mortality rates age adjusted to the 2000 US standard population); AAPC, average annual percent change.

^aThe APC or AAPC is significantly different from zero ($p < .05$).

during 2016 through 2020 for leukemia, melanoma, and kidney cancer, despite stable or increasing incidence, highlight the impact of improved treatment. In contrast, accelerated declines in ovarian

cancer mortality, from 2% per year to almost 4% per year from 2017 through 2020 (Table 7), likely reflect steeper incidence reductions, from 1.5% per year during the 2000s to 2.9% per year from 2015

through 2019.³⁷ Mortality rates continue to increase for uterine corpus cancer, by about 1% per year, and, for oral cavity cancers associated with HPV-infection (cancers of the tongue, tonsil, and oropharynx), by about 2% per year in men and 1% per year in women.

Recorded number of deaths in 2020

In total, 3,383,729 deaths were recorded in the United States in 2020, an increase of 528,891 deaths over 2019 (Table 8); this was 34 times larger than the increase from 2018 to 2019 (15,633 deaths). COVID-19 infection was the underlying cause of death for only two thirds of the increase, highlighting a substantial excess burden in 2020 for other causes. Most notably, the increase in heart disease deaths from 2019 to 2020 was 10-fold larger than the increase from 2018 to 2019. Among all leading causes, only chronic lower respiratory diseases had a drop in deaths from 2019 to 2020, with a decrease in the age-standardized death rate of 4.7%; cancer was the only other cause for which the death rate declined (by 1.5%). The impact of the pandemic on mortality will continue to unfold over many years and will likely parallel the disproportionate COVID-19 burden in the United States compared with other countries. For example, a recent study found that life expectancy continued to decline in the United States between 2020 and 2021 (based on provisional data) versus a slight recovery on average in 21 peer countries, widening the gap in life expectancy between the United States and peer countries to >5 years (76.4 vs. 81.9 years).¹⁰³

In 2020, cancer accounted for 18% of all deaths and remained the second leading cause of death after heart diseases. However, it is the leading cause of death among women aged 40–79 years and men aged 60–79 years (Table 9). Table 10 presents the number of deaths

in 2020 for the five leading cancer types by age and sex. Brain and other nervous system tumors are the leading cause of cancer death among children and adolescents younger than 20 years. However, CRC has surpassed brain tumors in men aged 20–39 years and is the leading cause of cancer death among men aged 20–49 years, whereas breast cancer leads among women in that age group. Despite being one of the most preventable cancers, cervical cancer is consistently the second leading cause of cancer death in women aged 20–39 years (Table 10). Lung cancer is the leading cause of cancer death in both men and women aged 50 years and older, causing far more deaths than breast cancer, prostate cancer, and CRC combined.

Cancer disparities by race and ethnicity

Overall cancer incidence is highest among White people, followed closely by AIAN and Black people (Table 5). However, sex-specific incidence is highest in Black men, among whom rates during 2015 through 2019 were 79% higher than those in AAPI men, who have the lowest rates, and 5% higher than those in White men, who rank second. High overall cancer incidence in Black men is largely because of prostate cancer, which is 70% higher than in White men, two times higher than in AIAN and Hispanic men, and three times higher than in AAPI men. Among women, AIAN and White women have the highest incidence, which is 10% higher than that in Black women, who rank third. However, AIAN and Black women have the highest cancer mortality rates—16% and 12% higher, respectively—than White women. Even more striking, Black women have 4% lower breast cancer incidence than White women but 40% higher breast cancer mortality, a disparity that has remained stagnant for the past decade.

TABLE 8 Leading causes of death in the United States in 2020 versus 2019

| Cause of death | 2020 | | | 2019 | | Absolute change in the no. of deaths |
|--|------------------|-------------------|------------|------------------|-------------------|--------------------------------------|
| | No. ^a | Rate ^b | Percentage | No. ^a | Rate ^b | |
| All causes | 3,383,729 | 835.2 | | 2,854,838 | 715.7 | 528,891 |
| 1. Heart diseases | 696,962 | 168.2 | 21 | 659,041 | 161.6 | 37,921 |
| 2. Cancer | 602,350 | 143.8 | 18 | 599,601 | 146.0 | 2749 |
| 3. COVID-19 | 350,831 | 85.0 | 10 | 0 | — | 350,831 |
| 4. Accidents (unintentional injuries) | 200,955 | 57.5 | 6 | 173,040 | 49.2 | 27,915 |
| 5. Cerebrovascular diseases | 160,264 | 38.9 | 5 | 150,005 | 37.0 | 10,259 |
| 6. Chronic lower respiratory diseases | 152,657 | 36.4 | 5 | 156,979 | 38.2 | −4322 |
| 7. Alzheimer disease | 134,242 | 32.6 | 4 | 121,499 | 29.9 | 12,743 |
| 8. Diabetes mellitus | 102,188 | 24.8 | 3 | 87,647 | 21.6 | 14,541 |
| 9. Influenza and pneumonia | 53,544 | 13.1 | 2 | 49,783 | 12.3 | 3761 |
| 10. Nephritis, nephrotic syndrome, & nephrosis | 52,547 | 12.7 | 2 | 51,565 | 12.7 | 982 |

Abbreviation: COVID-19, coronavirus disease 2019 (the respiratory disease caused by severe acute respiratory syndrome coronavirus 2).

^aCounts include unknown age. Rates for 2019 may differ from those published previously because of updated population denominators.

^bRates are per 100,000 and are age adjusted to the 2000 US standard population.

Source: National Center for Health Statistics, Centers for Disease Control and Prevention

TABLE 9 Ten leading causes of death in the United States by age and sex, 2020

| Ranking | All ages | Age 1–19 years | | Age 20–39 years | | Age 40–59 years | | Age 60–79 years | | Aged ≥ 80 years | | |
|------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|-------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| | | Male | Female | Male | Female | Male | Female | Male | Female | Male | Female | |
| All causes | 1,769,884 | 1,613,845 | 14,339 | 7091 | 101,431 | 43,674 | 269,932 | 160,847 | 765,217 | 564,802 | 608,027 | 828,671 |
| 1 | Heart diseases | Heart diseases | Accidents (unintentional injuries) | Accidents (unintentional injuries) | Accidents (unintentional injuries) | Accidents (unintentional injuries) | Heart diseases | Cancer | Cancer | Cancer | Heart diseases | Heart diseases |
| | 382,776 | 314,186 | 5061 | 2312 | 42,831 | 15,525 | 54,798 | 42,175 | 181,355 | 149,254 | 151,989 | 190,889 |
| 2 | Cancer | Cancer | Assault (homicide) | Cancer | Intentional self-harm (suicide) | Cancer | Cancer | Heart diseases | Heart diseases | Heart diseases | Cancer | Cancer |
| | 317,731 | 284,619 | 2714 | 738 | 13,061 | 4463 | 41,968 | 23,295 | 169,371 | 96,674 | 89,624 | 87,955 |
| 3 | COVID-19 | COVID-19 | Intentional self-harm (suicide) | Intentional self-harm (suicide) | Assault (homicide) | Intentional self-harm (suicide) | Accidents (unintentional injuries) | Accidents (unintentional injuries) | COVID-19 | COVID-19 | COVID-19 | COVID-19 |
| | 192,512 | 158,319 | 2079 | 738 | 11,584 | 3073 | 41,328 | 16,461 | 90,751 | 58,186 | 73,670 | 85,688 |
| 4 | Accidents (unintentional injuries) | Alzheimer disease | Cancer | Assault (homicide) | Heart diseases | Heart diseases | COVID-19 | COVID-19 | Chronic lower respiratory diseases | Chronic lower respiratory diseases | Cerebrovascular disease | Alzheimer disease |
| | 133,205 | 92,969 | 910 | 623 | 6150 | 2956 | 24,704 | 12,703 | 39,066 | 37,041 | 32,573 | 77,896 |
| 5 | Chronic lower respiratory diseases | Cerebrovascular diseases | Congenital anomalies | Congenital Anomalies | Cancer | Assault (homicide) | Chronic liver disease & cirrhosis | Chronic liver disease & cirrhosis | Diabetes mellitus | Cerebrovascular disease | Alzheimer disease | Cerebrovascular disease |
| | 72,942 | 90,627 | 465 | 422 | 3851 | 2039 | 13,050 | 7152 | 30,043 | 25,694 | 31,549 | 59,003 |
| 6 | Cerebrovascular diseases | Chronic lower respiratory diseases | Heart diseases | Heart diseases | COVID-19 | COVID-19 | Intentional self-harm (suicide) | Diabetes mellitus | Cerebrovascular disease | Diabetes mellitus | Chronic lower respiratory diseases | Chronic lower respiratory diseases |
| | 69,637 | 79,715 | 334 | 239 | 3263 | 1641 | 11,154 | 6010 | 28,677 | 20,860 | 28,121 | 36,721 |
| 7 | Diabetes mellitus | Accidents (unintentional injuries) | Chronic lower respiratory diseases | Influenza & pneumonia | Chronic liver disease & cirrhosis | Chronic liver disease & cirrhosis | Diabetes mellitus | Chronic lower respiratory diseases | Accidents (unintentional injuries) | Alzheimer disease | Accidents (unintentional injuries) | Accidents (unintentional injuries) |
| | 57,532 | 67,750 | 156 | 116 | 2417 | 1424 | 10,791 | 5489 | 27,169 | 14,780 | 16,111 | 19,359 |
| 8 | Alzheimer disease | Diabetes mellitus | Influenza & pneumonia | Cerebrovascular disease | Diabetes mellitus | Pregnancy, childbirth, & puerperium | Cerebrovascular disease | Cerebrovascular disease | Chronic liver disease & cirrhosis | Accidents (unintentional injuries) | Diabetes mellitus | Diabetes mellitus |
| | 41,273 | 44,656 | 137 | 109 | 1591 | 1051 | 7384 | 5145 | 15,028 | 13,581 | 15,022 | 16,752 |

(Continues)

TABLE 9 (Continued)

| Ranking | All ages | | Aged 1–19 years | | Aged 20–39 years | | Aged 40–59 years | | Aged 60–79 years | | Aged ≥80 years | |
|---------|-----------------------------------|--|-------------------------|------------------------------------|-------------------------|-------------------------|------------------------------------|---------------------------------|--|--|-----------------------|--|
| | Male | Female | Male | Female | Male | Female | Male | Female | Male | Female | Male | Female |
| 9 | Intentional self-harm (suicide) | Influenza & pneumonia | COVID-19 | Chronic lower respiratory diseases | Cerebrovascular disease | Diabetes mellitus | Chronic lower respiratory diseases | Intentional self-harm (suicide) | Nephritis, nephrotic syndrome, & nephrosis | Nephritis, nephrotic syndrome, & nephrosis | Parkinson disease | Hypertension & hypertensive renal disease ^a |
| | 36,551 | 25,799 | 98 | 100 | 849 | 964 | 5160 | 3402 | 12,127 | 10,054 | 14,778 | 14,384 |
| 10 | Chronic liver disease & cirrhosis | Nephritis, nephrotic syndrome, & nephrosis | Cerebrovascular disease | COVID-19 | Influenza & pneumonia | Cerebrovascular disease | Assault (homicide) | Septicemia | Influenza & pneumonia | Influenza & pneumonia | Influenza & pneumonia | Influenza & pneumonia |
| | 32,546 | 25,254 | 97 | 88 | 675 | 627 | 4258 | 2709 | 11,678 | 9066 | 11,931 | 13,641 |

Note: Deaths within each age group do not sum to all ages combined due to the inclusion of unknown ages and deaths occurring in individuals aged younger than 1 year. 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, and *assault* excludes legal intervention.

Abbreviations: COVID-19 coronavirus disease 2019 (the respiratory disease caused by severe acute respiratory syndrome coronavirus 2).

^aIncludes primary and secondary hypertension.

Source: US Final Mortality Data, 2020: National Center for Health Statistics, Centers for Disease Control and Prevention, 2022.

The highest mortality rate for both sexes combined is among AIAN people, followed closely by Black people. The death rate in AIAN and Black men is double that in AAPI men and 18% higher than that in White men. Among men and women combined, the Black–White disparity in overall cancer mortality has declined from a peak of 33% in 1993 (279.0 vs. 210.5 per 100,000 persons, respectively) to 12% in 2020 (166.8 vs. 149.3 per 100,000 persons). Notably, progress is driven by faster declines in smoking-related cancers because of the steep drop in smoking initiation among Black teens from the late 1970s to the early 1990s,¹⁰⁴ as opposed to targeted efforts to reduce inequalities.

Racial disparities are largely a consequence of less access to high-quality care across the cancer continuum. However, increasing access alone is insufficient to close these gaps. For example, even among individuals with a median annual household income of ≥\$75,000, 5-year relative cancer survival is lower among Black people (67%) than among White people (72%).¹⁰⁵ Similarly, a recent study based on information in the National Cancer Database found that Black individuals residing in neighborhoods with the highest socioeconomic status are more likely than White individuals residing in neighborhoods with the lowest socioeconomic status to be diagnosed with advanced-stage lung cancer.¹⁰⁶ Even for childhood cancer, Black children are 24% more likely to be diagnosed with distant-stage disease than White children, regardless of family insurance status.¹⁰⁷

Racial disparities in cancer occurrence and outcomes are largely the result of longstanding inequalities in wealth that lead to differences in both risk factor exposures and access to equitable cancer prevention, early detection, and treatment.^{108,109} Ultimately, disproportionate wealth stems from hundreds of years of structural racism, including segregationist and discriminatory policies in criminal justice, housing, education, and employment that have altered the balance of prosperity, security, and other social determinants of health.¹¹⁰ The social determinants of health are defined by the World Health Organization as the conditions in which individuals are born, grow, live, work, and age¹¹¹ because these influences are consistently and strongly associated with life expectancy and disease mortality.^{112,113} The most recent example is the disproportionate impact of the COVID-19 pandemic on people of color in the United States.^{3,4,114} A recent study by researchers at the NCI observed that Black, AIAN, and Hispanic individuals had double the rate of overall excess deaths in 2020 compared with White individuals and had two to four times the rate of non-COVID-19-related excess deaths.¹¹⁵ Furthermore, routine health care, such as mammography screening, that was suspended early in the pandemic has been slower to rebound among people of color.¹¹⁶

Geographic variation in cancer occurrence

Tables 11 and 12 show cancer incidence and mortality rates for selected cancers by state. State variation reflects differences in the prevalence of cancer risk factors, such as smoking and obesity; prevention and early detection practices, such as screening; and access

TABLE 10 Five leading causes of cancer death in the United States by age and sex, 2020

| Ranking | All ages | Birth to 19 years | Aged 20–39 years | Aged 40–49 years | Aged 50–64 years | Aged 65–79 years | Aged 80 years and older |
|---------------|------------------------------|-------------------------------------|-----------------------------|-------------------------|----------------------------|----------------------------|---------------------------|
| Male | | | | | | | |
| All sites | 317,731 | 932 | 3851 | 8655 | 70,248 | 144,420 | 89,624 |
| 1 | Lung & bronchus 72,949 | Brain & ONS 282 | Colon & rectum 562 | Colon & rectum 1574 | Lung & bronchus 16,517 | Lung & bronchus 37,860 | Lung & bronchus 17,329 |
| 2 | Prostate 32,707 | Leukemia 218 | Brain & ONS 541 | Lung & bronchus 1059 | Colon & rectum 7860 | Prostate 13,407 | Prostate 15,995 |
| 3 | Colon & rectum 28,043 | Bones & joints 107 | Leukemia 433 | Brain & ONS 813 | Pancreas 6024 | Pancreas 12,080 | Colon & rectum 7159 |
| 4 | Pancreas 24,279 | Soft tissue (including heart) 88 | Testis 212 | Pancreas 696 | Liver ^a 5650 | Colon & rectum 10,884 | Urinary bladder 5751 |
| 5 | Liver ^a 18,636 | Liver ^a 27 | Non-Hodgkin lymphoma 198 | Esophagus 405 | Esophagus 3614 | Liver ^a 9298 | Pancreas 5369 |
| Female | | | | | | | |
| All sites | 284,619 | 770 | 4463 | 10,241 | 62,434 | 118,754 | 87,955 |
| 1 | Lung & bronchus 63,135 | Brain & ONS 240 | Breast 1062 | Breast 2823 | Lung & bronchus 13,771 | Lung & bronchus 30,643 | Lung & bronchus 17,658 |
| 2 | Breast 42,275 | Leukemia 174 | Uterine cervix 487 | Colon & rectum 1158 | Breast 11,337 | Breast 15,461 | Breast 11,590 |
| 3 | Colon & rectum 23,826 | Bones & joints 89 | Colon & rectum 394 | Lung & bronchus 902 | Colon & rectum 5236 | Pancreas 10,375 | Colon & rectum 8862 |
| 4 | Pancreas 22,495 | Soft tissue (including heart) 66 | Brain & ONS 333 | Uterine cervix 709 | Pancreas 4322 | Colon & rectum 8173 | Pancreas 7285 |
| 5 | Ovary 13,438 | Kidney & renal pelvis 31 | Leukemia 314 | Ovary 553 | Ovary 3532 | Ovary 5898 | Leukemia 4108 |

Note: Ranking order excludes "other" categories.

Abbreviation: ONS, other nervous system.

^aIncludes intrahepatic bile duct.

to care. The largest geographic variation is for the most preventable cancers, such as lung cancer, cervical cancer, and melanoma of the skin. For example, lung cancer incidence and mortality rates in Kentucky, where smoking prevalence was historically highest, are three to four times higher than those in Utah and Puerto Rico, where it was lowest. These patterns are also consistent with contemporary smoking prevalence. In 2020, the highest smoking prevalence was in West Virginia (23%), Kentucky (21%), Mississippi (20%), and Arkansas (20%) compared with 8% in Utah and California and 10% in New Jersey, Maryland, and Puerto Rico.¹¹⁷

Despite being one of the most preventable cancers, cervical cancer incidence varies 2-fold by state, ranging from 5 or less per 100,000 women in Vermont, New Hampshire, Massachusetts, and Maine to 10 per 100,000 women in Kentucky, Oklahoma, and Alabama and 13 per 100,000 women in Puerto Rico (Table 11). Ironically, advances in cancer control typically exacerbate disparities because of the unequal dissemination of interventions across populations. Although HPV vaccination can virtually eliminate cervical cancer,⁶⁶ large state differences in coverage will likely widen existing disparities. In 2020, up-to-date HPV vaccination among boys and

TABLE 11 Incidence rates for selected cancers by state, United States, 2015–2019^a

| State | All sites | | Breast | Colon & rectum ^b | | Lung & bronchus | | Non-Hodgkin lymphoma | | Prostate | Uterine cervix | |
|----------------------|-----------|--------|--------|-----------------------------|--------|-----------------|--------|----------------------|--------|----------|----------------|--|
| | Male | Female | Female | Male | Female | Male | Female | Male | Female | Male | Female | |
| Alabama | 514.5 | 406.1 | 122.8 | 47.1 | 35.2 | 79.5 | 49.3 | 19.6 | 12.8 | 124.0 | 9.5 | |
| Alaska | 435.0 | 406.0 | 122.0 | 42.5 | 36.4 | 59.4 | 49.2 | 21.1 | 14.6 | 92.0 | 7.7 | |
| Arizona | 404.5 | 367.2 | 114.6 | 34.5 | 26.1 | 47.3 | 40.6 | 18.3 | 12.0 | 77.6 | 6.5 | |
| Arkansas | 547.3 | 436.3 | 122.3 | 49.8 | 36.1 | 91.8 | 62.4 | 22.9 | 15.0 | 118.5 | 9.5 | |
| California | 427.9 | 387.7 | 123.1 | 37.9 | 28.9 | 43.8 | 36.0 | 21.7 | 14.9 | 95.2 | 7.4 | |
| Colorado | 414.1 | 387.8 | 130.4 | 34.3 | 26.9 | 41.5 | 38.1 | 20.8 | 13.9 | 93.2 | 6.2 | |
| Connecticut | 511.0 | 445.6 | 141.1 | 38.0 | 28.0 | 61.9 | 54.2 | 25.9 | 17.6 | 123.2 | 5.6 | |
| Delaware | 520.0 | 442.0 | 136.1 | 40.7 | 30.2 | 68.8 | 56.2 | 22.6 | 15.2 | 125.9 | 7.7 | |
| District of Columbia | 447.7 | 400.6 | 136.3 | 37.4 | 30.6 | 48.6 | 40.8 | 17.8 | 11.8 | 131.3 | 7.8 | |
| Florida | 498.2 | 433.1 | 122.3 | 39.7 | 30.0 | 63.6 | 49.9 | 26.6 | 19.0 | 97.9 | 9.2 | |
| Georgia | 531.8 | 423.6 | 129.1 | 45.6 | 32.8 | 72.9 | 49.8 | 22.0 | 14.7 | 132.6 | 8.0 | |
| Hawaii | 442.2 | 402.2 | 140.2 | 43.9 | 32.0 | 52.9 | 35.5 | 18.4 | 12.4 | 100.3 | 6.8 | |
| Idaho | 487.0 | 418.2 | 129.4 | 38.0 | 28.9 | 51.6 | 45.2 | 23.0 | 15.9 | 115.5 | 7.4 | |
| Illinois | 501.4 | 443.0 | 134.0 | 46.0 | 33.9 | 69.1 | 55.6 | 23.2 | 16.2 | 113.3 | 7.5 | |
| Indiana | 497.8 | 430.3 | 124.3 | 45.4 | 34.1 | 80.5 | 60.7 | 22.1 | 15.1 | 99.9 | 8.4 | |
| Iowa | 535.8 | 460.2 | 135.1 | 45.5 | 35.1 | 72.2 | 54.8 | 25.8 | 17.4 | 119.0 | 7.7 | |
| Kansas | 496.1 | 435.5 | 133.1 | 43.4 | 32.7 | 61.5 | 49.5 | 23.6 | 15.5 | 114.0 | 8.1 | |
| Kentucky | 564.0 | 484.5 | 128.3 | 52.4 | 38.4 | 100.9 | 76.7 | 23.1 | 16.7 | 108.0 | 9.8 | |
| Louisiana | 557.3 | 429.7 | 128.4 | 51.1 | 36.7 | 78.2 | 51.9 | 22.6 | 15.6 | 138.5 | 9.2 | |
| Maine | 506.6 | 457.3 | 128.2 | 37.6 | 30.3 | 76.0 | 66.3 | 26.2 | 15.6 | 97.0 | 5.4 | |
| Maryland | 494.9 | 427.5 | 133.6 | 38.6 | 30.8 | 59.2 | 50.1 | 21.7 | 14.8 | 132.7 | 6.7 | |
| Massachusetts | 484.9 | 437.6 | 137.6 | 36.7 | 27.9 | 63.2 | 58.2 | 23.4 | 15.5 | 111.6 | 5.3 | |
| Michigan | 485.1 | 420.2 | 124.2 | 39.8 | 31.0 | 68.7 | 56.3 | 23.5 | 16.1 | 110.6 | 6.9 | |
| Minnesota | 508.2 | 447.2 | 135.6 | 39.8 | 30.2 | 60.2 | 52.1 | 26.5 | 17.1 | 113.2 | 5.6 | |
| Mississippi | 552.0 | 419.9 | 123.3 | 54.8 | 39.6 | 92.9 | 57.5 | 20.6 | 14.0 | 135.6 | 9.3 | |
| Missouri | 484.6 | 433.2 | 131.9 | 43.5 | 32.9 | 79.8 | 62.0 | 22.1 | 15.4 | 95.6 | 8.4 | |
| Montana | 503.9 | 435.7 | 136.8 | 42.0 | 28.9 | 50.4 | 49.9 | 21.3 | 14.7 | 130.7 | 7.0 | |
| Nebraska | 510.1 | 442.6 | 131.6 | 44.2 | 35.8 | 61.2 | 49.8 | 23.7 | 17.2 | 127.9 | 7.7 | |
| Nevada ^c | 394.4 | 367.2 | 109.4 | 38.6 | 29.8 | 46.9 | 46.2 | 17.5 | 11.9 | 86.4 | 8.5 | |
| New Hampshire | 517.1 | 459.9 | 142.1 | 38.9 | 28.9 | 65.4 | 60.8 | 25.0 | 17.8 | 114.1 | 5.3 | |
| New Jersey | 536.3 | 458.8 | 138.8 | 44.1 | 32.8 | 58.5 | 50.1 | 26.6 | 18.2 | 140.1 | 7.7 | |
| New Mexico | 389.7 | 365.2 | 114.4 | 36.4 | 27.9 | 40.5 | 32.5 | 17.0 | 12.5 | 84.2 | 8.4 | |
| New York | 529.4 | 456.6 | 135.7 | 41.7 | 31.1 | 63.7 | 53.4 | 25.8 | 18.1 | 130.7 | 7.7 | |
| North Carolina | 522.0 | 434.2 | 137.7 | 39.8 | 30.0 | 77.8 | 55.4 | 21.7 | 14.6 | 122.9 | 7.0 | |
| North Dakota | 487.0 | 433.2 | 135.2 | 44.7 | 33.8 | 61.6 | 53.5 | 22.1 | 15.1 | 121.6 | 5.9 | |
| Ohio | 510.8 | 446.2 | 130.6 | 44.6 | 33.6 | 77.1 | 58.8 | 23.5 | 15.9 | 112.5 | 7.9 | |
| Oklahoma | 490.4 | 423.7 | 124.2 | 45.9 | 34.1 | 76.5 | 57.2 | 20.3 | 15.0 | 100.4 | 9.7 | |
| Oregon | 449.2 | 415.8 | 130.6 | 36.2 | 28.2 | 54.7 | 48.7 | 22.1 | 14.8 | 96.4 | 6.8 | |
| Pennsylvania | 513.6 | 454.4 | 132.0 | 43.7 | 33.0 | 69.9 | 55.6 | 24.2 | 17.3 | 109.2 | 7.4 | |

TABLE 11 (Continued)

| State | All sites | | Breast | Colon & rectum ^b | | Lung & bronchus | | Non-Hodgkin lymphoma | | Prostate | Uterine cervix | |
|--------------------------|-----------|--------|--------|-----------------------------|--------|-----------------|--------|----------------------|--------|----------|----------------|--|
| | Male | Female | Female | Male | Female | Male | Female | Male | Female | Male | Female | |
| Rhode Island | 511.7 | 456.0 | 142.2 | 36.0 | 27.2 | 74.5 | 63.7 | 23.4 | 15.7 | 114.9 | 6.9 | |
| South Carolina | 494.0 | 407.1 | 130.9 | 41.5 | 30.4 | 74.6 | 50.7 | 20.0 | 12.9 | 113.3 | 7.9 | |
| South Dakota | 487.5 | 428.3 | 125.4 | 44.4 | 32.9 | 60.7 | 53.2 | 22.3 | 15.5 | 120.3 | 6.3 | |
| Tennessee | 524.2 | 424.7 | 123.8 | 44.6 | 32.8 | 87.3 | 61.9 | 21.7 | 14.5 | 117.2 | 8.1 | |
| Texas | 458.9 | 384.9 | 117.0 | 44.0 | 30.2 | 57.6 | 41.0 | 20.9 | 14.3 | 102.7 | 9.4 | |
| Utah | 445.9 | 378.3 | 115.8 | 30.2 | 24.1 | 30.2 | 23.0 | 22.2 | 14.8 | 117.2 | 5.5 | |
| Vermont | 479.1 | 444.6 | 132.6 | 37.8 | 27.9 | 64.2 | 54.2 | 22.7 | 16.1 | 98.6 | 4.8 | |
| Virginia | 437.9 | 391.3 | 126.1 | 37.6 | 28.9 | 61.3 | 47.7 | 20.0 | 13.9 | 100.3 | 6.0 | |
| Washington | 467.7 | 425.7 | 133.3 | 37.0 | 28.8 | 54.9 | 49.1 | 23.3 | 15.9 | 100.0 | 6.7 | |
| West Virginia | 517.7 | 467.5 | 121.7 | 49.8 | 38.0 | 89.1 | 69.2 | 23.4 | 16.9 | 98.3 | 9.4 | |
| Wisconsin | 512.2 | 441.9 | 135.1 | 38.6 | 29.9 | 65.3 | 53.4 | 25.6 | 17.3 | 118.3 | 6.5 | |
| Wyoming | 433.1 | 384.8 | 113.0 | 36.0 | 28.8 | 43.2 | 40.8 | 19.9 | 13.9 | 113.6 | 8.2 | |
| Puerto Rico ^d | 411.7 | 337.5 | 98.5 | 47.7 | 32.6 | 21.7 | 11.4 | 17.3 | 12.5 | 148.6 | 12.6 | |
| United States | 488.2 | 423.3 | 128.1 | 41.5 | 31.2 | 64.1 | 50.3 | 22.9 | 15.7 | 109.9 | 7.7 | |

^aRates are per 100,000, age adjusted to the 2000 US standard population.

^bRates exclude appendix except for Nevada.

^cData for this state are not included in US combined rates because it did not meet high-quality standards for all years during 2015 through 2019 according to the North American Association of Central Cancer Registries (NAACCR). Rates for this state are based on data published in the NAACCR's *Cancer in North America*, Volume II.

^dData for Puerto Rico are not included in US combined rates for comparability with previously published US rates. Puerto Rico incidence data for 2017 reflect diagnoses from January through June due to disruptions caused by hurricane Irma.

girls aged 13–17 years ranged from 32% in Mississippi and 43% in West Virginia to 73% in Massachusetts, 74% in Hawaii, and 83% in Rhode Island.¹¹⁸ State/territory differences in initiatives to improve health, such as Medicaid expansion, may also contribute to future geographic disparities.^{119,120}

Cancer in children and adolescents

Cancer is the second most common cause of death among children aged 1–14 years in the United States, surpassed only by accidents, and is the fourth most common cause of death among adolescents (aged 15–19 years). In 2023, an estimated 9910 children (from birth to age 14 years) and 5280 adolescents (aged 15–19 years) will be diagnosed with cancer, and 1040 and 550, respectively, will die from the disease. About 1 in 260 children and adolescents will be diagnosed with cancer before age 20 years.⁹

Leukemia is the most common childhood cancer, accounting for 28% of cases, followed by brain and other nervous system tumors (26%), nearly one third of which are benign or borderline malignant (Table 13). Cancer types and their distribution in adolescents differ from those in children; for example, brain and other nervous system tumors, more than one half of which are benign or borderline malignant, are the most common cancer (21%), followed closely by

lymphoma (19%). In addition, there are one half as many cases of non-Hodgkin lymphoma as Hodgkin lymphoma among adolescents; whereas, among children, the reverse is true. Thyroid carcinoma and melanoma of the skin account for 12% and 3% of cancers, respectively, in adolescents but for only 2% and 1% of cancers in children.

The overall cancer incidence rate stabilized in children during 2010 through 2019 after increasing since at least 1975, but continued to rise in adolescents by 1% per year. In contrast, death rates per 100,000 persons declined from 1970 through 2020 continuously from 6.3 to 1.9 per 100,000 persons in children and from 7.2 to 2.6 per 100,000 persons in adolescents, for overall reductions of 70% and 64%, respectively. Much of this progress reflects the dramatic declines in mortality for leukemia of 84% in children and 75% in adolescents. Remission rates of 90%–100% have been achieved for childhood acute lymphocytic leukemia over the past 4 decades, primarily through the optimization of established chemotherapeutic regimens as opposed to the development of new therapies.¹²¹ However, progress among adolescents has lagged behind that in children, partly because of differences in tumor biology, clinical trial enrollment, treatment protocols, and tolerance and compliance with treatment.¹²² Mortality reductions from 1970 to 2020 are also lower in adolescents for other common cancers, including non-Hodgkin lymphoma (94% in children and 88% in adolescents) and brain and other nervous system

TABLE 12 Mortality rates for selected cancers by state, United States, 2016–2020^a

| State | All sites | | Breast | Colorectum | | Lung & bronchus | | Non-Hodgkin lymphoma | | Pancreas | | Prostate |
|----------------------|-----------|--------|--------|------------|--------|-----------------|--------|----------------------|--------|----------|--------|----------|
| | Male | Female | Female | Male | Female | Male | Female | Male | Female | Male | Female | Male |
| Alabama | 207.4 | 137.2 | 20.9 | 18.1 | 12.0 | 59.6 | 33.1 | 6.7 | 3.5 | 14.0 | 10.1 | 20.2 |
| Alaska | 170.3 | 127.2 | 17.1 | 16.0 | 13.8 | 36.8 | 29.1 | 6.3 | 4.6 | 12.2 | 8.8 | 19.6 |
| Arizona | 154.8 | 113.6 | 18.0 | 14.6 | 10.0 | 31.9 | 24.2 | 5.8 | 3.3 | 11.8 | 8.8 | 17.1 |
| Arkansas | 206.5 | 141.7 | 19.5 | 17.9 | 12.4 | 61.0 | 38.5 | 6.8 | 3.8 | 13.0 | 9.5 | 18.6 |
| California | 158.3 | 118.2 | 18.8 | 14.2 | 10.3 | 29.8 | 21.6 | 6.4 | 3.8 | 11.7 | 9.1 | 19.8 |
| Colorado | 152.8 | 113.1 | 18.7 | 13.1 | 9.8 | 27.0 | 22.0 | 6.0 | 3.3 | 10.9 | 8.6 | 21.9 |
| Connecticut | 162.2 | 118.2 | 17.5 | 12.6 | 8.5 | 34.9 | 26.9 | 6.5 | 3.7 | 12.4 | 9.6 | 18.1 |
| Delaware | 190.4 | 133.8 | 20.8 | 15.6 | 10.8 | 45.8 | 33.1 | 7.5 | 3.9 | 14.7 | 10.4 | 17.7 |
| District of Columbia | 171.5 | 136.3 | 23.5 | 15.9 | 12.4 | 33.2 | 22.4 | 5.3 | 3.3 | 14.0 | 12.2 | 26.9 |
| Florida | 166.5 | 121.2 | 18.5 | 14.8 | 10.3 | 40.6 | 28.4 | 6.1 | 3.7 | 12.2 | 8.9 | 16.1 |
| Georgia | 186.7 | 129.5 | 20.8 | 17.1 | 11.6 | 48.2 | 28.9 | 6.1 | 3.6 | 12.7 | 9.5 | 21.2 |
| Hawaii | 151.4 | 105.5 | 15.9 | 14.1 | 9.8 | 33.6 | 20.8 | 5.8 | 3.5 | 12.2 | 9.4 | 14.9 |
| Idaho | 169.7 | 126.7 | 20.0 | 14.4 | 10.9 | 32.4 | 25.5 | 6.6 | 4.7 | 12.6 | 9.3 | 21.1 |
| Illinois | 183.3 | 135.7 | 20.5 | 16.8 | 11.7 | 44.7 | 31.8 | 6.8 | 4.0 | 13.5 | 10.1 | 19.5 |
| Indiana | 201.3 | 142.2 | 20.4 | 17.4 | 12.4 | 55.3 | 36.9 | 7.6 | 4.5 | 13.9 | 10.3 | 19.5 |
| Iowa | 185.3 | 131.4 | 18.1 | 16.2 | 11.4 | 45.8 | 31.8 | 7.5 | 4.2 | 12.6 | 9.7 | 20.3 |
| Kansas | 183.7 | 134.9 | 19.8 | 16.8 | 11.9 | 44.7 | 32.9 | 7.1 | 4.4 | 13.0 | 9.4 | 18.1 |
| Kentucky | 220.3 | 155.3 | 21.6 | 19.2 | 13.6 | 67.0 | 45.3 | 7.7 | 4.6 | 13.0 | 10.2 | 18.3 |
| Louisiana | 205.6 | 140.6 | 22.4 | 19.2 | 12.8 | 56.4 | 33.5 | 7.0 | 4.0 | 13.8 | 10.8 | 19.9 |
| Maine | 196.4 | 140.8 | 17.7 | 14.6 | 11.5 | 50.0 | 38.8 | 7.4 | 4.1 | 12.9 | 10.0 | 19.0 |
| Maryland | 175.4 | 130.6 | 21.0 | 15.7 | 11.3 | 39.1 | 29.3 | 6.6 | 3.5 | 13.1 | 9.8 | 20.1 |
| Massachusetts | 172.6 | 123.1 | 16.5 | 13.1 | 9.3 | 38.4 | 30.2 | 6.5 | 3.8 | 13.5 | 9.9 | 18.2 |
| Michigan | 189.4 | 139.6 | 20.2 | 15.7 | 11.5 | 48.0 | 35.0 | 7.6 | 4.6 | 14.1 | 10.9 | 18.6 |
| Minnesota | 169.9 | 125.0 | 17.4 | 14.0 | 9.9 | 36.1 | 28.7 | 7.8 | 4.0 | 12.6 | 9.7 | 19.6 |
| Mississippi | 225.9 | 148.5 | 23.5 | 21.9 | 14.0 | 67.0 | 36.3 | 6.5 | 3.6 | 14.3 | 11.0 | 24.3 |
| Missouri | 195.7 | 139.0 | 19.8 | 16.7 | 11.3 | 53.8 | 37.3 | 7.0 | 4.1 | 13.7 | 9.5 | 17.8 |
| Montana | 167.9 | 125.6 | 18.3 | 14.4 | 9.8 | 32.8 | 28.8 | 6.4 | 3.5 | 11.4 | 9.2 | 22.3 |
| Nebraska | 175.6 | 132.2 | 20.4 | 16.8 | 12.2 | 39.6 | 29.3 | 7.1 | 3.7 | 13.9 | 10.1 | 18.1 |
| Nevada | 171.1 | 133.6 | 21.8 | 17.1 | 12.4 | 37.3 | 32.8 | 6.5 | 3.9 | 11.8 | 9.3 | 19.4 |
| New Hampshire | 178.5 | 130.0 | 18.0 | 14.7 | 10.1 | 41.2 | 34.0 | 6.4 | 4.1 | 12.6 | 9.7 | 19.2 |
| New Jersey | 162.7 | 126.4 | 20.3 | 15.3 | 11.1 | 35.0 | 26.8 | 6.4 | 3.7 | 12.8 | 10.1 | 16.7 |
| New Mexico | 159.1 | 116.2 | 19.9 | 15.3 | 10.2 | 28.4 | 19.8 | 5.6 | 3.4 | 11.4 | 8.2 | 19.3 |
| New York | 159.8 | 121.7 | 18.6 | 14.0 | 10.2 | 35.7 | 26.0 | 6.4 | 3.7 | 12.6 | 9.7 | 16.8 |
| North Carolina | 187.5 | 131.0 | 20.0 | 14.9 | 10.7 | 50.7 | 31.9 | 6.7 | 3.6 | 12.5 | 9.6 | 19.7 |
| North Dakota | 167.8 | 122.8 | 17.2 | 16.3 | 10.4 | 39.4 | 28.1 | 6.5 | 3.5 | 12.1 | 9.0 | 17.7 |
| Ohio | 199.6 | 142.0 | 21.0 | 17.4 | 12.2 | 53.1 | 35.2 | 7.5 | 4.3 | 14.0 | 10.6 | 19.3 |
| Oklahoma | 209.2 | 149.6 | 22.4 | 19.6 | 13.5 | 57.0 | 38.2 | 7.7 | 4.7 | 12.8 | 9.7 | 20.0 |
| Oregon | 174.0 | 132.6 | 19.3 | 14.2 | 10.6 | 36.7 | 30.4 | 7.3 | 4.3 | 12.9 | 10.0 | 20.3 |
| Pennsylvania | 187.7 | 135.9 | 20.3 | 16.5 | 11.5 | 45.3 | 31.2 | 7.3 | 4.4 | 14.0 | 10.4 | 18.4 |
| Rhode Island | 182.6 | 130.9 | 17.3 | 12.6 | 10.9 | 43.3 | 33.5 | 7.1 | 3.9 | 14.7 | 9.4 | 18.4 |

TABLE 12 (Continued)

| State | All sites | | Breast | Colorectum | | Lung & bronchus | | Non-Hodgkin lymphoma | | Pancreas | | Prostate |
|--------------------------|-----------|--------|--------|------------|--------|-----------------|--------|----------------------|--------|----------|--------|----------|
| | Male | Female | Female | Male | Female | Male | Female | Male | Female | Male | Female | Male |
| South Carolina | 193.7 | 132.4 | 21.5 | 16.8 | 10.7 | 50.7 | 30.3 | 6.0 | 3.9 | 13.5 | 9.8 | 20.8 |
| South Dakota | 181.4 | 132.4 | 18.9 | 16.9 | 12.2 | 41.4 | 32.6 | 7.5 | 4.3 | 12.9 | 9.9 | 19.1 |
| Tennessee | 207.7 | 142.7 | 21.6 | 17.9 | 12.2 | 59.5 | 37.3 | 7.4 | 4.2 | 12.8 | 9.8 | 19.5 |
| Texas | 173.8 | 122.5 | 19.7 | 17.1 | 11.0 | 39.1 | 25.1 | 6.6 | 3.8 | 12.0 | 9.1 | 17.6 |
| Utah | 140.5 | 104.7 | 19.8 | 11.9 | 9.4 | 19.8 | 13.8 | 6.5 | 3.5 | 11.1 | 8.2 | 21.8 |
| Vermont | 185.0 | 134.3 | 16.4 | 15.9 | 12.7 | 41.5 | 32.2 | 7.5 | 4.4 | 11.9 | 10.3 | 21.1 |
| Virginia | 179.8 | 127.9 | 20.6 | 15.9 | 10.9 | 44.0 | 28.7 | 6.6 | 3.8 | 13.0 | 9.6 | 20.0 |
| Washington | 170.0 | 127.5 | 19.2 | 14.0 | 9.9 | 35.8 | 28.7 | 6.9 | 4.1 | 12.2 | 9.7 | 20.0 |
| West Virginia | 211.3 | 151.4 | 21.2 | 20.0 | 13.7 | 60.6 | 41.0 | 7.9 | 4.3 | 12.6 | 9.6 | 17.0 |
| Wisconsin | 181.5 | 131.2 | 18.4 | 14.2 | 10.4 | 41.1 | 31.2 | 7.5 | 4.2 | 13.7 | 10.0 | 20.8 |
| Wyoming | 159.8 | 120.3 | 18.6 | 13.6 | 10.9 | 32.4 | 26.2 | 6.2 | 4.0 | 12.6 | 8.6 | 18.4 |
| Puerto Rico ^b | 132.1 | 86.4 | 19.6 | 17.7 | 10.7 | 14.8 | 7.2 | 4.3 | 2.6 | 7.9 | 5.2 | 21.4 |
| United States | 177.5 | 128.7 | 19.6 | 15.7 | 11.0 | 42.2 | 29.3 | 6.7 | 3.9 | 12.7 | 9.6 | 18.8 |

^aRates are per 100,000 and age adjusted to the 2000 US standard population.

^bRates for Puerto Rico are not included in US combined rates.

tumors (39% and 25%, respectively). The 5-year relative survival rate for all cancers combined improved from 58% during the mid-1970s to 85% during 2012 through 2018 in children and from 68% to 86% in adolescents, but varies substantially by cancer type and age at diagnosis (Table 13).

LIMITATIONS

The estimated numbers of new cancer cases and deaths in 2023 provide a reasonably accurate portrayal of the contemporary cancer burden. However, they are model-based, 3-year (mortality) and 4-year (incidence) ahead projections that should not be used to track trends over time for several reasons. First, new methodologies are adopted regularly, most recently as of the 2021 estimates,^{26,27} to take advantage of improved 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, 2019 for incidence and 2020 for mortality) and thus do not reflect reduced access to cancer care because of the COVID-19 pandemic. Similarly, the models cannot anticipate abrupt fluctuations for cancers affected by changes in detection practice, such as those that occur for prostate cancer because of changes in PSA testing. Third, the model can be oversensitive to sudden or steep changes in observed data. The most informative metrics for tracking cancer trends are age-standardized or age-specific cancer incidence rates from the SEER Program, the NPCR, and/or the NAACCR and cancer death rates from the NCHS.

Errors in reporting race and ethnicity in medical records and on death certificates result in underestimated cancer incidence and

mortality in persons who are not White, particularly Native American populations. Although racial misclassification in mortality data among Native Americans is somewhat mitigated because of newly available adjustment factors published by researchers at the NCHS, these are currently only available for all cancers combined.²² 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, although lung cancer incidence is approximately 50% lower in AAPI men than in White men overall, it is equivalent in Native Hawaiian men, who are classified within this broad category.¹²³

CONCLUSION

The cancer mortality rate has decreased continuously since 1991, resulting in an overall drop of 33% and approximately 3.8 million cancer deaths averted. This steady progress is because of reductions in smoking; uptake of screening for breast, colorectal, and prostate cancers; and improvements in treatment, such as adjuvant chemotherapies for colon and breast cancers. More recently, advances in the development of targeted treatment and immunotherapy have accelerated progress in lung cancer mortality well beyond reductions in incidence and are reflected in large mortality reductions for cancers with increasing or stable incidence (leukemia, melanoma, and kidney cancer). Treatment breakthroughs have particularly improved the management of some difficult-to-treat cancers, such as nonsmall cell lung cancer and metastatic melanoma. Of concern are rising incidence for breast, prostate, and

TABLE 13 Incidence rates, case distribution, and 5-year relative survival by age and International Classification of Childhood Cancer type, ages birth to 19 years, United States^a

| Cancer site | Birth to 14 years | | | Aged 15–19 years | | |
|--|---|-----------------|--------------------------|---|-----------------|--------------------------|
| | Incidence rate per million ^b | Distribution, % | Survival, ^c % | Incidence rate per million ^b | Distribution, % | Survival, ^c % |
| All ICCC groups combined (malignant only) | 173.4 | 100 | 85 | 242.3 | 100 | 86 |
| Leukemias, myeloproliferative & myelodysplastic diseases | 53.1 | 28 | 88 | 35.6 | 13 | 76 |
| Lymphoid leukemia | 40.3 | 21 | 92 | 18.6 | 7 | 77 |
| Acute myeloid leukemia | 7.8 | 4 | 68 | 9.1 | 3 | 68 |
| Lymphomas and reticuloendothelial neoplasms | 22.2 | 12 | 95 | 53.0 | 19 | 94 |
| Hodgkin lymphoma | 5.8 | 3 | 99 | 31.8 | 11 | 98 |
| Non-Hodgkin lymphoma (including Burkitt) | 10.3 | 5 | 91 | 19.3 | 7 | 89 |
| Central nervous system neoplasms | 48.6 | 26 | 74 | 59.4 | 21 | 75 |
| Benign/borderline malignant tumors | 15.2 | 8 | 97 | 37.7 | 13 | 98 |
| Neuroblastoma & other peripheral nervous cell tumors | 11.6 | 6 | 82 | 1.1 | <1 | 78 ^d |
| Retinoblastoma | 4.2 | 2 | 97 | <0.1 | <1 | — ^e |
| Nephroblastoma & other nonepithelial renal tumors | 8.2 | 4 | 93 | 0.3 | <1 | — ^e |
| Hepatic tumors | 3.1 | 2 | 79 | 1.4 | <1 | 46 ^d |
| Hepatoblastoma | 2.7 | 1 | 82 | <0.1 | <1 | — ^e |
| Malignant bone tumors | 7.8 | 4 | 74 | 14.6 | 5 | 69 |
| Osteosarcoma | 4.3 | 2 | 69 | 8.0 | 3 | 67 |
| Ewing tumor & related bone sarcomas | 2.7 | 1 | 78 | 4.6 | 2 | 64 |
| Rhabdomyosarcoma | 5.2 | 3 | 71 | 3.7 | 1 | 54 ^d |
| Germ cell & gonadal tumors | 5.7 | 3 | 91 | 27.0 | 10 | 94 |
| Thyroid carcinoma | 3.6 | 2 | >99 | 33.8 | 12 | >99 |
| Malignant melanoma | 1.8 | 1 | 96 | 8.7 | 3 | 96 |

Abbreviation: ICCC, International Classification of Childhood Cancer.

^aBenign and borderline brain tumors were excluded from survival rates but included in incidence rates for central nervous system neoplasms and denominators for case distribution.

^bIncidence rates are based on diagnoses during 2015–2019 and age-adjusted to the US standard population.

^cSurvival rates are adjusted for normal life expectancy and are based on diagnoses during 2012–2018 and follow-up of all patients through 2019.

^dThe standard error of the survival rate is between 5 and 10 percentage points.

^eThe statistic could not be calculated because there were <25 cases during 2012 through 2018.

uterine corpus cancers, all of which have a wide racial disparity in mortality and are amenable to early detection. Expanding access to care and increasing investment for the broad application of existing cancer control interventions and for research to advance treatment options and develop successful interventions to reduce inequalities would help mitigate disparities and accelerate progress against cancer.

ACKNOWLEDGMENTS

The authors gratefully acknowledge all cancer registries and their staff for their hard work and diligence in collecting cancer information, without which this research could not have been accomplished.

CONFLICTS OF INTEREST

All authors are employed by the American Cancer Society, which receives grants from private and corporate foundations, including foundations associated with companies in the health sector for research outside of the submitted work. The authors are not funded by or key personnel for any of these grants, and their salaries are solely funded through American Cancer Society funds.

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How to cite this article: Siegel RL, Miller KD, Wagle NS, Jemal A. Cancer statistics, 2023. *CA Cancer J Clin.* 2023;73(1):17-48. doi:10.3322/caac.21763