Original Article

Annual Report to the Nation on the Status of Cancer, Part I: National Cancer Statistics

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BACKGROUND: The American Cancer Society (ACS), the Centers for Disease Control and Prevention (CDC), the National Cancer Institute (NCI), and the North American Association of Central Cancer Registries (NAACCR) collaborate to provide annual updates on cancer occurrence and trends in the United States. **METHODS:** Incidence data were obtained from the CDC-funded and NCI-funded population-based cancer registry programs and compiled by NAACCR. Data on cancer deaths were obtained from the National Center for Health Statistics National Vital Statistics System. Trends in age-standardized incidence and death rates for all cancers combined and for the leading cancer types by sex, race, and ethnicity were estimated by joinpoint analysis and expressed as the annual percent change. Stage distribution and 5-year survival by stage at diagnosis were calculated for breast cancer, colon and rectum (colorectal) cancer, lung and bronchus cancer, and melanoma of the skin. **RESULTS:** Overall cancer incidence rates from 2008 to 2014 decreased by 2.2% per year among men but were stable among women. Overall cancer death rates from 1999 to 2015 decreased by 1.8% per year among men and by 1.4% per year among women. Among men, incidence rates during the most recent 5-year period (2010-2014) decreased for 7 of the 17 most common cancer types, and death rates (2011-2015) decreased for 11 of the 18 most common types. Among women, incidence rates declined for 7 of the 18 most common cancers, and death rates declined for 14 of the 20 most common cancers. Death rates decreased for cancer sites, including lung and bronchus (men and women), colorectal (men and women), female breast, and prostate. Death rates increased for cancers of the liver (men and women); pancreas (men and women); brain and other nervous system (men and women); oral cavity and pharynx (men only); soft tissue, including heart (men only); nonmelanoma skin (men only); and uterus. Incidence and death rates were higher among men than among women for all racial and ethnic groups. For all cancer sites combined, black men and white women had the highest incidence rates compared with other racial groups, and black men and black women had the highest death rates compared with other racial groups. Non-Hispanic men and women had higher incidence and mortality rates than those of Hispanic ethnicity. Five-year survival for cases diagnosed from 2007 through 2013 ranged from 100% (stage I) to 26.5% (stage IV) for female breast cancer, from 88.1% (stage I) to 12.6% (stage IV) for colorectal cancer, from 55.1% (stage I) to 4.2% (stage IV) for lung and bronchus cancer, and from 99.5% (stage I) to 16% (stage IV) for melanoma of the skin. Among children, overall cancer incidence rates increased by 0.8% per year from 2010 to 2014, and overall cancer death rates decreased by 1.5% per year from 2011 to 2015. **CONCLUSIONS:** For all cancer sites combined, cancer incidence rates decreased among men but were stable among women. Overall, there continue to be significant declines in cancer death rates among both men and women. Differences in rates and trends by race and ethnic group remain. Progress in reducing cancer mortality has not occurred for all sites. Examining stage distribution and 5-year survival by stage highlights the potential benefits associated with early detection and treatment. ***Cancer* 2018;124:2785-800**. © *2018* The Authors. *Cancer* published by Wiley Periodicals, Inc. on behalf of American Cancer Society. This is an open access article under the terms of the Creative Commons Attribution-NonCommercial License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

KEYWORDS: Annual Report to the Nation, cancer, incidence, mortality, National Program of Cancer Registries (NPCR), National Vital Statistics System (NVSS), North American Association of Central Cancer Registries (NAACCR), Surveillance, Epidemiology, and End Results (SEER), survival, trends.

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See companion article on pages 2801-14, this issue.

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INTRODUCTION

The American Cancer Society (ACS), Centers for Disease Control and Prevention (CDC), National Cancer Institute (NCI), and North American Association of Central Cancer Registries (NAACCR) have collaborated annually since 1998 to provide updates on cancer incidence and mortality patterns in the United States.[1-19] This report uses a single database to estimate delay-adjusted incidence to monitor population-based cancer trends. In addition to reporting on incidence and mortality trends overall and for common cancer sites, this year's report highlights 4 cancer sites (female breast, colon and rectum [colorectal], lung and bronchus, and melanoma of the skin) by presenting the percentage of cases by stage at diagnosis and 5-year survival estimates by stage at diagnosis.

MATERIALS AND METHODS

Data Sources

Cancer incidence data

Population-based cancer incidence data by age, sex, and race/ethnicity were obtained from 42 state registries that participate in the CDC's National Program of Cancer Registries (NPCR) and/or the NCI's Surveillance, Epidemiology, and End Results (SEER) Program. The data satisfied the NAACCR's data quality criteria and represented cases diagnosed from 1999 through 2014,[20] covering 89% of the US population. Information on incident cases came primarily from the abstracts of inpatient and outpatient medical records but also from a variety of other sources, including pathology reports and death certificates. This database of 42 registries was used to derive all incidence statistics presented in this report.

Anatomic site and histology were coded according to the International Classification of Diseases for Oncology (ICD-O) edition in use at the time of diagnosis and were converted to the third edition (ICD-O-3) coding[21] and categorized according to SEER site groups.[22] Only cases defined as malignant under ICD-O-2 and ICD-O-3 were included in this report, with the exception of bladder cancer. In situ and malignant cancers were combined when reporting bladder cancer incidence rates. All case counts and rates were adjusted for delay in reporting.[23] After adjusting for reporting delay, the 5-year fixed interval incidence rates are based on 3.6 million male cases and 3.5 million female cases diagnosed between 2010 and 2014.

Cancer mortality data

Although cancer incidence data were available through 2014, an additional year of data was available for analysis of mortality. Cause of death by age, sex, and race/ethnicity (1999-2015) came from the National Vital Statistics System and was based on death certificate information reported to state vital statistics offices and compiled into a national file covering all states in the United States by the National Center for Health Statistics (NCHS).[24] Categorization methods for cause of death have been described in previous reports.[19]

Race/ethnicity data

In this report, information on race and ethnicity was based on medical records for incidence or death certificates from the NCHS for mortality. Race was categorized as white, black, Asian/Pacific Islander (API), and American Indian/Alaska Native (AI/AN). Race information for AI/AN, however, was considered reliable only for geographic areas covered by the Indian Health Service Contract Health Service Delivery Areas (CHSDA)[10,25,26]; therefore, incidence and mortality data for AI/AN were based only on these areas. Overall, 83% of the AI/AN population lived in CHSDA areas between the years 2010 and 2014. This percentage varied by geographic area, with 100% or close to 100% of the AI/AN population living in CHSDA areas in Alaska, the Pacific Coast, the Southern Plains, and the East; 67% living in the Northern Plains; and 60% living in the Southwest. Hispanic ethnicity included individuals from all races identified as Hispanic. Although the accuracy of race and ethnicity reporting has improved over time, recent studies have demonstrated that reporting of race in medical records remains less accurate for API, Hispanic, and AIs/ANs than for whites and blacks.[27,28] We present incidence and mortality data separately by race and by Hispanic ethnicity. The number of cases included in the 5-year incidence rate calculation ranged from 12,000 male and 13,500 female AIs/ANs residing in CHSDA areas to almost 3 million white men and women.

Population data

The population estimates used as the denominators to calculate incidence and death rates were a modification of the intercensal and Vintage 2015 annual times series of July 1, county population estimates by age, sex, race, and Hispanic origin produced by the US Census Bureau's Population Estimates Program in collaboration with the NCHS and with support from the NCI.[29] The estimates incorporate intercensal (for July 1, 2000-2009) and Vintage 2015 (for July 1, 2010-2015) bridged, single-race estimates that are derived from the original multiple-race categories in the 2000 and 2010 Censuses, as specified in

the 1997 Office of Management and Budget standards for the collection of data on race and ethnicity.[30,31] Some additional adjustments were made to refine the July 1 population estimates, as with previous reports.[19]

Survival data

Estimates for 5-year relative survival were calculated for cases diagnosed from 2007 through 2013. We used 34 central cancer registries (33 states and 1 metropolitan area, referenced hereafter as states) compiled by the NAACCR (covering 70% of the US population) to examine survival differences by sex and cancer stage at diagnosis for cancers of the lung and bronchus, breast, colon and rectum, and melanoma of the skin.[32] These 34 states were considered to have sufficient vital status follow-up to conduct survival analyses, because they either conducted recent National Death Index linkages or they routinely conduct active vital status follow-up of all cases.[33] Cancers that were identified by death certificate or autopsy only were excluded from the survival analysis, as were patients who died so soon after diagnosis that their survival time was not measurable. The first site-specific cancer of the analysis period (2007-2013) was used in the analysis. Patients were followed for vital status through December 31, 2013, because not all registries had complete information on vital status through December 31, 2014.

Statistical Methods

Cancer incidence and death rates and trends

Cross-sectional incidence (2010-2014) and death (2011-2015) rates for all ages combined were calculated for all cancer sites combined and for the most common cancer sites by sex, race, and ethnicity. These rates were calculated with their 95% confidence intervals using SEER*-Stat software, version 8.3.4.[34,35] Incidence rates were adjusted for delay in reporting.[36] Similarly, we calculated overall cancer incidence and death rates for children (ages 0-14 years). All rates were age-standardized to the 2000 US standard population and were expressed per 100,000 persons.[34] Rates based on fewer than 16 cases were deemed to be statistically unstable and were suppressed.

Temporal trends in age-standardized, delay-adjusted cancer incidence (1999-2014) and death (1999-2015) rates were estimated using joinpoint regression,[37,38] with a maximum of 2 joinpoints (3 line segments) allowed in each model for incidence and 3 joinpoints (4 line segments) allowed in each model for mortality. The maximum number of joinpoints is based on the number of data points in the series.[39] The resultant trends were described by the annual percent change (APC). The 5-year average APCs (AAPCs) for 2010 through 2014 (incidence) and for 2011 through 2015 (mortality) were calculated using a weighted average of the slope coefficients of the underlying joinpoint regression line, with the weights equal to the length of each segment over the interval. The AAPC was equal to the APC when the AAPC was entirely within the last joinpoint segment.[40] Two-sided statistical significance ($P < .05$) for the APC and the AAPC was determined using a t test for the APC and for the AAPC when it lay entirely within the last joinpoint segment; and a Z test was used when the AAPC extended beyond the last joinpoint segment.[39]

In describing trends, the terms *increase* and *decrease* are used when the slope of the trend (APC or AAPC) was statistically significant; otherwise, the term *stable* is used. Trends based on fewer than 10 cases in any of the data years (1999-2014 for incidence and 1999-2015 for mortality) were considered statistically unstable and were suppressed.

RESULTS

Cancer Incidence Rates for All Sites Combined and for the Most Common Cancers

Figure 1 illustrates trends from 1999 to 2014 in age-standardized, delay-adjusted incidence rates for all cancer sites combined among men and among women. Incidence rates among men decreased throughout the study period, with the decrease accelerating from 0.6% (on average) per year during 1999 to 2008 to 2.2% (on average) per year during 2008 to 2014. In contrast, over the same 15-year period, incidence rates among women were stable.

Figure 2 presents average annual incidence rates and 5-year AAPCs (2010-2014) for the 17 most common cancers among men and the 18 most common cancers among women. Among men, incidence rates decreased for 7 of the 17 most common cancers: prostate (5-year AAPC, −7.6%), lung and bronchus (−2.4%), colon and rectum (colorectal) (−1.9%), urinary bladder (bladder) (−0.8%), esophagus (−1.6%), brain and other nervous system (−0.2%), and larynx (−2.3%) (Table 1 and Fig. 2). In contrast, incidence rates among men increased for 8 cancers: melanoma of the skin (5-year AAPC, 2.3%), kidney and renal pelvis (kidney) (1.1%), leukemia (1.6%), oral cavity and pharynx (1.3%), pancreas (1.0%), liver and intrahepatic bile duct (liver) (2.8%), myeloma (2.5%), and thyroid (2.4%). Incidence rates were stable for non-Hodgkin lymphoma (NHL) and stomach cancer.

Among women, incidence rates decreased for 7 of the 18 most common cancers: lung and bronchus (5-year

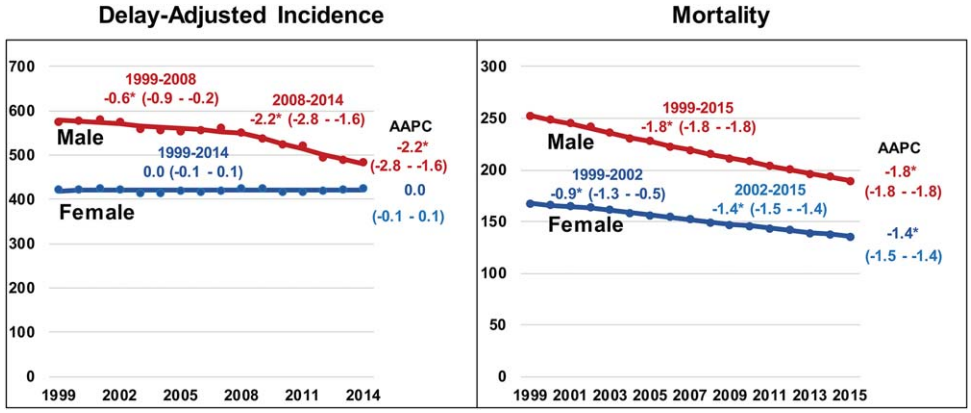

Figure 1. Trends in age-standardized incidence (1999-2014) and mortality rates (1999-2015) are illustrated for all cancer sites combined, all races/ethnicities combined, and by sex. An asterisk indicates that the annual percent change (APC) or the average APC (AAPC) is statistically significantly different from zero (2-sided *t* test; $P<.05$). UNK indicates unknown. Rates were age-standardized to the 2000 US standard population (19 age groups; Bureau of the Census. Current Population Reports, Publication 25-1130. Washington, DC: US Government Printing Office; 2000 [Census 25-1130]). Scattered points indicate observed rates, and lines are fitted rates according to joinpoint regression. Incidence rates were delay-adjusted and covered 89% of the US population, and mortality covered the entire United States. The following registries were included for incidence: Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Vermont, Washington, West Virginia, Wisconsin, and Wyoming. The AAPC is a weighted average of the APCs over the fixed interval (2010-2014 for incidence; 2011-2015 for mortality) using the underlying Joinpoint model for the period from 1999 to 2014 for incidence and the period from 1999 to 2015 for mortality. Joinpoint models with up to 2 joinpoints for incidence and up to 3 joinpoints for mortality are based on rates per 100,000 persons age standardized to the 2000 US standard population (19 age groups; Census P25-1130). For joinpoint analysis, the Joinpoint Regression Program was used (version 4.5.01; Bethesda, MD: Statistical Research and Applications Branch, National Cancer Institute; June 2017).

AAPC, −1.2%), colorectal (−1.7%), NHL (−0.4%), ovary (−1.6%), bladder (−0.8%), cervix uteri (cervix) (−1.0%), and brain and other nervous system (−0.7%). However, incidence rates increased for 10 cancers: breast (0.4%), corpus and uterus not otherwise specified (uterus) (1.2%), thyroid (1.9%), melanoma of the skin (1.2%), leukemia (1.4%), kidney (0.4%), pancreas (1.1%), oral cavity and pharynx (0.8%), myeloma (1.6%), and liver (3.8%). Incidence rates remained unchanged for stomach cancer (Table 1 and Fig. 2). Liver cancer replaced thyroid cancer as the most rapidly increasing incident cancer among women. For most cancer sites, the increasing or decreasing trends from 2010 to 2014 among men and among women were continuations of past trends (Supporting Table 1).

At the end of this Results section, incidence and mortality trends for female breast cancer, colorectal cancer, lung and bronchus cancer, and melanoma of the skin are discussed in greater detail—along with stage at diagnosis and survival by stage. Prostate cancer incidence and mortality are examined in detail in Part II of this report.

Cancer Death Rates for All Sites Combined and for the Most Common Cancers

Figure 1 illustrates trends in death rates from 1999 to 2015 for all cancer sites combined, by sex. Death rates decreased during this period by 1.8% on average per year among men and by 1.4% on average per year among women.

Figure 3 presents average annual death rates and 5-year AAPCs (2011-2015) for the 18 most common cancers among men and the 20 most common cancers among women. Among men, death rates during this period decreased for 11 of the 18 cancers: lung and bronchus (5-year AAPC, −3.8%), prostate (−2.2%), colorectal (−2.5%), leukemia (−2.2%), NHL (−2.0%), esophagus (−1.1%), kidney (−0.5%), stomach (−1.6%), myeloma (−0.9%), melanoma of the skin (−3.0%), and larynx (−2.5%). In contrast, death rates among men increased for cancers of the pancreas (0.2%), liver (1.6%), brain and other nervous system (0.5%), oral cavity and pharynx (1.0%), nonmelanoma skin (2.8%), and soft tissue (including heart) (0.8%). The death rate among men was stable for bladder cancer (Fig. 3 and Table 2).

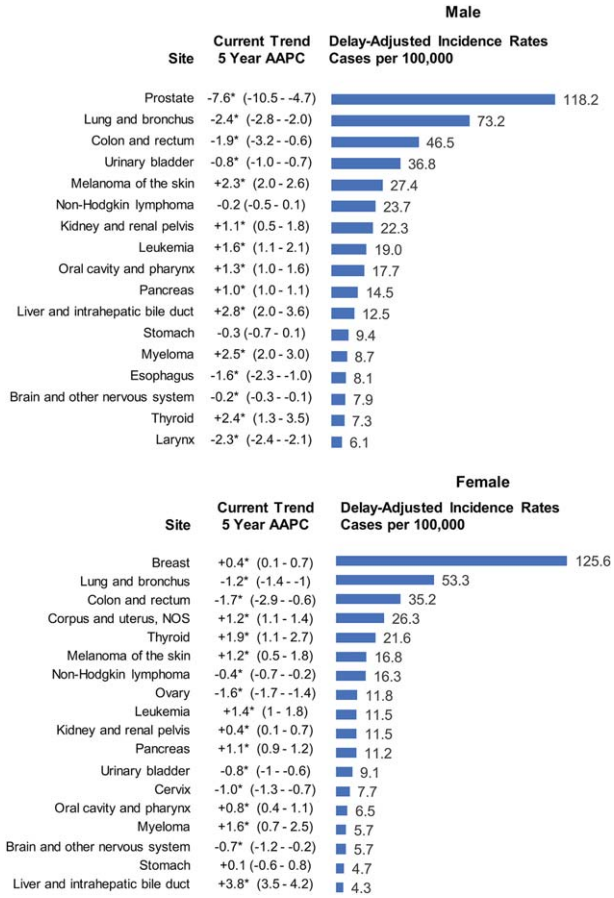

Figure 2. Age-standardized, delay-adjusted incidence rates and recent trends (2010-2014) are illustrated for the 17 most common cancers in men and the 18 most common cancers in women for all races/ethnicities combined and by sex. The 5-year average annual percent change (AAPC) is based on the joinpoint trend from 1999 to 2014. An asterisk indicates that the AAPC is statistically significantly different from zero (2-sided *t* test or *Z* test; $P < .05$). Rates were age-standardized to the 2000 US standard population (19 age groups; Census P25-1130), were delay-adjusted, and covered 89% of the US population. The following registries were included in the analyses: Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Vermont, Washington, West Virginia, Wisconsin, and Wyoming. The AAPC is a weighted average of the annual percent changes (APCs) over the fixed interval (2010-2014) using the underlying joinpoint model for the period from 1999 to 2014. Joinpoint models with up to 2 joinpoints are based on rates per 100,000 persons age standardized to the 2000 US standard population (19 age groups; Census P25-1130). For joinpoint analysis, the Joinpoint Regression Program was used (version 4.5.0.1; Bethesda, MD: Statistical Research and Applications Branch, National Cancer Institute; June 2017).

Among women, during the same time period, death rates decreased for 14 of the 20 most common cancer types: lung and bronchus (5-year AAPC, −2.4%), breast (−1.6%), colorectal (−2.7%), ovary (−2.3%), leukemia (−2.3%), NHL (−2.7%), kidney (−1.4%), stomach (−1.8%), cervix (−0.7%), bladder (−0.5%), melanoma of the skin (−2.6%), esophagus (−1.6%), oral cavity and pharynx (−1.3%), and gallbladder (−1.3%) (Fig. 3 and Table 2). In contrast, death rates among women increased for cancers of the pancreas (0.2%), uterus (1.9%), liver (2.7%), and brain and other nervous system (0.5%). Death rates among women were stable for myeloma and soft tissue (including heart). Like the incidence trends, increases or decreases in death rates for most cancers among men and women were continuations of past trends (Supporting Table 2).

Current Cancer Incidence Rates and Trends by Sex, Race, and Ethnicity

Table 1 lists average annual age-standardized, delay-adjusted incidence rates and trends for the most recent 5-year period (2010-2014) by cancer site, sex, race, and ethnicity. For all cancer sites combined, rates were higher among men than among women overall (all races/ethnicities combined; 502.0 vs 420.6 per 100,000 persons) and among persons in every racial/ethnic group. Black men and white women had higher overall cancer incidence rates than other racial groups. Non-Hispanic men and women had higher incidence rates than those of Hispanic ethnicity. API men and API women had the lowest rates relative to other racial and ethnic groups. In every racial and ethnic group, prostate cancer among men and breast cancer among women were the most frequent incident cancers, followed by lung and bronchus cancer, and colorectal cancer, except among Hispanics. Among Hispanic men and Hispanic women, colorectal cancer was more frequent than lung and bronchus cancer. Rankings for several other cancers varied substantially by race and ethnicity among both men and women. Among men, for example, melanoma of the skin ranked fifth in whites and 19th in blacks; and liver cancer ranked 11th in whites, sixth in blacks, and fourth in APIs.

Among men in each racial/ethnic group, incidence trends during 2010 to 2014 for all cancer sites combined and for each of the 17 most common cancers were generally similar in direction (decrease or increase) to those for all races/ethnicities combined (Table 1). Incidence rates among men in each racial and ethnic group decreased for all cancers combined and for each of the 3 most common cancers (prostate, lung and bronchus, colorectal), except that the rate was stable for lung and bronchus cancer among AIs/ANs. Rates also decreased among men in each racial/ethnic group for cancers of the bladder, stomach,

TABLE 1. Age-Standardized, Delay-Adjusted Incidence Rates and Fixed-Interval Trends (2010-2014) for the Most Common Cancers by Sex, Race, and Ethnicity for Areas in the United States With High-Quality Incidence Data[a,b]

	All Races[c]				White[c]				Black[c]				API[c]				AI/AN (CHSDA)[c]				Hispanic[c]				Non-Hispanic[c]			
Sex/Cancer Site or Type[d]	2010-2014 Rank	Rate[e]	AAPC[f]	*P*	2010-2014 Rank	Rate[e]	AAPC[f]	*P*	2010-2014 Rank	Rate[e]	AAPC[f]	*P*	2010-2014 Rank	Rate[e]	AAPC[f]	*P*	2010-2014 Rank	Rate[e]	AAPC[f]	*P*	2010-2014 Rank	Rate[e]	AAPC[f]	*P*	2010-2014 Rank	Rate[e]	AAPC[f]	*P*
All sites[g]																												
Both sexes		453.8	−1.0[h]	.001		457.3	−1.0[h]	.001		467.5	−1.4[h]	<.001		299.1	−0.4[h]	<.001		423.4	0.1	.43		356.2	−1.2[h]	<.001		465.7	−0.9[h]	.002
Males		502.0	−2.2[h]	<.001		500.1	−2.1[h]	<.001		558.2	−3.0[h]	<.001		309.0	−2.6[h]	<.001		446.8	−0.5[h]	.04		392.6	−2.8[h]	<.001		514.7	−2.1[h]	<.001
Females		420.6	0.0	.96		428.7	0.0	.59		406.8	0.3[h]	<.001		295.8	0.7[h]	<.001		409.9	0.6[h]	<.001		335.3	0.6	.14		431.5	0.1	.07
Males																												
Prostate	1	118.2	−7.6[h]	<.001	1	110.1	−7.0[h]	<.001	1	193.5	−6.0[h]	<.001	1	62.5	−9.5[h]	<.001	1	86.6	−9.0[h]	<.001	1	101.6	−7.8[h]	<.001	1	120.2	−7.6[h]	<.001
Lung and bronchus	2	73.2	−2.4[h]	<.001	2	73.1	−2.3[h]	<.001	2	85.8	−3.0[h]	<.001	2	46.4	−1.5[h]	<.001	2	74.4	−0.5	.16	3	41.4	−2.6[h]	<.001	2	76.3	−2.2[h]	<.001
Colon and rectum	3	46.5	−1.9[h]	.004	3	45.5	−1.9[h]	.005	3	56.1	−2.8[h]	<.001	3	38.2	−2.2[h]	<.001	3	53.2	−1.8[h]	.01	2	43.0	−2.7[h]	<.001	3	47.0	−1.8[h]	.003
Urinary bladder	4	36.8	−0.8[h]	<.001	4	39.3	−0.7[h]	<.001	5	20.3	0.7[h]	<.001	6	15.6	−0.4[h]	.03	5	21.5	0.4	.38	7	20.2	−1.9[h]	<.001	4	38.3	−0.6[h]	<.001
Melanoma of the skin	5	27.4	2.3[h]	<.001	5	31.1	2.5[h]	<.001	19	1.2	−0.3	.52	18	1.6	0.2	.72	12	10.1	11.7	.12	15	5.1	3.1	.10	5	30.0	2.6[h]	<.001
Non-Hodgkin lymphoma	6	23.7	−0.2	.11	6	24.4	−0.4[h]	.02	7	17.6	0.2	.12	5	16.4	0.4	.14	7	18.1	0.1	.94	5	20.6	−0.2	.32	6	24.1	−0.2	.85
Kidney and renal pelvis	7	22.3	1.1[h]	.001	7	22.5	0.7[h]	.001	4	24.7	1.0[h]	.03	9	11.4	2.3[h]	<.001	4	31.9	2.1[h]	.002	4	21.5	1.0	.21	7	22.5	1.2[h]	.001
Leukemia	8	19.0	1.6[h]	<.001	8	19.8	1.6[h]	<.001	11	14.7	1.0[h]	<.001	10	10.4	0.8[h]	.03	9	14.0	0.5	.55	8	14.1	0.5[h]	.03	8	19.3	1.7[h]	<.001
Oral cavity and pharynx	9	17.7	1.3[h]	<.001	9	18.3	1.6[h]	<.001	10	14.8	−1.9[h]	<.001	8	11.7	0.5	.13	8	17.1	1.3	.07	11	10.9	−0.9[h]	.003	9	18.6	1.6[h]	<.001
Pancreas	10	14.5	1.0[h]	<.001	10	14.4	1.1[h]	<.001	8	17.0	0.6[h]	.003	11	10.3	0.5[h]	.04	10	12.6	1.3	.19	10	12.3	0.5[h]	.03	10	14.7	1.1[h]	<.001
Liver and intrahepatic bile duct	11	12.5	2.8[h]	<.001	11	11.3	3.3[h]	<.001	6	17.7	2.6[h]	.002	4	20.6	−1.7[h]	.003	6	20.7	4.6[h]	<.001	6	20.4	1.1	.18	11	11.7	2.9[h]	<.001
Stomach	12	9.4	−0.3	.13	12	8.6	0.0	.95	12	14.3	−1.8[h]	<.001	7	14.3	−2.8[h]	<.001	11	11.9	−2.2[h]	.01	9	13.1	−2.1[h]	<.001	12	9.0	−0.1	.70
Myeloma	13	8.7	2.5[h]	<.001	15	8.0	2.3[h]	<.001	9	16.9	2.2[h]	<.001	13	5.2	2.6[h]	<.001	13	8.7	1.8	.11	12	8.5	1.5[h]	<.001	13	8.7	2.5[h]	<.001
Esophagus	14	8.1	−1.6[h]	<.001	14	8.4	−1.3[h]	.002	14	7.0	−4.7[h]	<.001	15	3.8	−1.0	.10	14	8.1	−0.8	.50	17	4.9	−3.6[h]	<.001	14	8.4	−0.9	.21
Brain and other nervous system	15	7.9	−0.2[h]	.003	13	8.5	−0.1	.08	15	5.0	0.3	.24	14	4.4	0.3	.32	15	6.1	1.0	.34	13	6.1	−0.5[h]	.003	15	8.3	0.0	.95
Thyroid	16	7.3	2.4[h]	<.001	16	7.8	2.3[h]	.001	16	3.9	4.9[h]	<.001	12	7.1	5.6[h]	<.001	18	4.8	4.2[h]	.01	14	5.5	4.5[h]	<.001	16	7.7	2.3[h]	<.001
Larynx	17	6.1	−2.3[h]	<.001	18	6.0	−2.1[h]	<.001	13	8.5	−3.2[h]	<.001	16	2.2	−2.9[h]	.001	17	5.1	−1.9[h]	.04	16	5.0	−3.0[h]	<.001	17	6.2	−2.2[h]	<.001
Females																												
Breast	1	125.6	0.4[h]	.008	1	126.9	0.4[h]	.03	1	125.6	0.7[h]	.03	1	94.9	1.7[h]	<.001	1	108.8	1.9[h]	.001	1	95.3	0.4[h]	.03	1	129.5	0.5[h]	.002
Lung and bronchus	2	53.3	−1.2[h]	<.001	2	55.1	−1.1[h]	<.001	2	49.8	−0.9[h]	.001	2	28.6	0.2	.07	2	58.1	−2.0[h]	.02	3	25.6	−0.8[h]	<.001	2	56.2	−1.0[h]	<.001
Colon and rectum	3	35.2	−1.7[h]	.004	3	34.5	−1.7[h]	.02	3	41.5	−2.0[h]	.01	3	27.8	−3.5[h]	<.001	3	44.1	−0.8[h]	.04	2	30.0	−1.1	.11	3	35.9	−1.7[h]	.01
Corpus and uterus, NOS	4	26.3	1.2[h]	<.001	4	26.8	1.1[h]	<.001	4	25.9	2.4[h]	<.001	5	18.9	2.2[h]	<.001	4	23.5	1.5[h]	.005	4	22.7	2.7[h]	<.001	4	26.7	1.2[h]	<.001
Thyroid	5	21.6	1.9[h]	<.001	5	22.7	1.6[h]	<.001	6	14.1	2.7[h]	.05	4	21.8	1.5	.22	6	16.2	5.9[h]	<.001	5	20.5	2.5[h]	.002	5	21.9	1.8[h]	.001
Melanoma of the skin	6	16.8	1.2[h]	.002	6	19.6	1.4[h]	<.001	21	1.0	0.4	.38	18	1.3	−0.3	.66	16	6.5	1.7[h]	.04	17	4.4	0.2	.51	6	18.7	1.4[h]	.001
Non-Hodgkin lymphoma	7	16.3	−0.4[h]	.002	7	16.9	−0.5[h]	.001	8	12.5	0.7[h]	<.001	6	11.1	0.2	.44	7	14.7	0.2	.80	6	15.7	0.1	.42	7	16.4	−0.4[h]	.002
Ovary	8	11.8	−1.6[h]	<.001	8	12.2	−1.6[h]	<.001	10	9.5	−0.6[h]	.002	7	9.6	−0.2	.30	8	11.5	−0.5	.58	8	10.6	−1.3[h]	<.001	8	11.9	−1.6[h]	<.001
Leukemia	9	11.5	1.4[h]	<.001	9	12.0	1.1[h]	<.001	11	9.4	2.1[h]	<.001	11	6.7	1.1[h]	.002	10	9.8	0.6	.53	11	9.7	0.5[h]	.02	9	11.6	1.4[h]	<.001
Kidney and renal pelvis	10	11.5	0.4[h]	.03	10	11.7	0.4[h]	.03	7	12.7	−0.1	.89	14	5.1	−0.2	.79	5	18.9	1.7[h]	.01	7	12.4	2.0[h]	<.001	10	11.4	0.3	.09
Pancreas	11	11.2	1.1[h]	<.001	11	10.9	1.1[h]	<.001	5	14.6	0.8[h]	<.001	8	9.0	0.8[h]	.003	9	11.1	0.8	.32	9	10.6	0.6[h]	<.001	11	11.3	1.1[h]	<.001
Urinary bladder	12	9.1	−0.8[h]	<.001	12	9.6	−0.7[h]	<.001	14	6.8	−0.3	.19	15	4.0	−0.4	.42	15	6.6	1.8[h]	.05	15	5.2	−1.3[h]	.001	12	9.5	−0.6[h]	<.001
Cervix uteri	13	7.7	−1.0[h]	<.001	13	7.5	−0.7[h]	.004	12	9.4	−3.7[h]	.001	12	6.2	−2.8[h]	<.001	11	9.4	−6.3[h]	.03	10	9.9	−1.6	.10	13	7.4	−0.8[h]	.001
Oral cavity and pharynx	14	6.5	0.8[h]	<.001	14	6.7	1.0[h]	<.001	15	5.2	−0.8[h]	.001	13	5.3	−0.7	.09	14	6.6	0.7	.53	18	4.3	−0.2	.60	14	6.8	0.9[h]	<.001

TABLE 1. *Continued*

Sex/Cancer Site or Type[d]	All Races[c]				White[c]				Black[c]				API[c]				AI/AN (CHSDA)[c]				Hispanic[c]				Non-Hispanic[c]			
	2010-2014				2010-2014				2010-2014				2010-2014				2010-2014				2010-2014				2010-2014			
	Rank	Rate[e]	AAPC[f]	*P*	Rank	Rate[e]	AAPC[f]	*P*	Rank	Rate[e]	AAPC[f]	*P*	Rank	Rate[e]	AAPC[f]	*P*	Rank	Rate[e]	AAPC[f]	*P*	Rank	Rate[e]	AAPC[f]	*P*	Rank	Rate[e]	AAPC[f]	*P*
Myeloma	15	5.7	1.6[h]	.003	16	5.0	2.3[h]	<.001	9	12.5	2.0[h]	<.001	16	3.4	1.0	.06	17	5.8	−1.0	.35	14	5.7	2.0[h]	.003	16	5.7	1.6[h]	.004
Brain and other nervous system	16	5.7	−0.7[h]	.008	15	6.1	−0.7[h]	.01	17	3.6	0.1	.71	17	3.4	3.7[h]	.001	18	3.9	0.1	.95	16	4.6	−1.1[h]	<.001	15	5.9	−0.6[h]	.03
Stomach	17	4.7	0.1[h]	.77	17	4.1	0.5	.32	13	8.0	−1.3[h]	<.001	9	8.3	−2.5[h]	<.001	13	6.7	−1.5	.09	12	7.9	−1.5[h]	<.001	17	4.4	−0.8[h]	<.001
Liver and intrahepatic bile duct	18	4.3	3.8[h]	<.001	18	4.0	4.5[h]	<.001	16	5.2	3.6[h]	<.001	10	7.8	−0.5	.05	12	9.2	3.9[h]	.002	13	7.8	2.3[h]	<.001	18	4.0	4.1[h]	<.001

Abbreviations: AAPC, average annual percent change; AI/AN, American Indian/Alaska Native; APC, annual percent change; API, Asian/Pacific Islander; CHSDA, Indian Health Service Contract Health Services Delivery Area; NOS, not otherwise specified.

[a] Source: National Program of Cancer Registries and Surveillance, Epidemiology, and End Results areas reported by the North American Association of Central Cancer Registries as meeting high-quality incidence data standards for the specified time periods.

[b] The following registries were included in the incidence rates (2010-2014) and Joinpoint models (1999-2014) for all races/ethnicities, white, black, AI/AN, API, Hispanic, and non-Hispanic (42 states): Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Vermont, Washington, West Virginia, Wisconsin, and Wyoming.

[c] White, black, API, and AI/AN (CHSDA 2012 counties) include Hispanic and non-Hispanic; the race and ethnicity categories are not mutually exclusive. AI/AN (CHSDA 2012) statistics exclude data from Kansas.

[d] Cancers are sorted in descending order according to sex-specific rates for all races/ethnicities. More than 15 cancers may appear under males and females to include the top 15 cancers in every race/ethnicity group.

[e] Rates are per 100,000 persons and were age standardized to the 2000 US standard population (19 age groups; US Bureau of the Census, Current Population Reports, Publication 25-1130. Washington, DC: US Government Printing Office; 2000 [Census P25-1130]).

[f] The AAPC is the average APC and is a weighted average of the APCs over the fixed interval from 2010 to 2014 using the underlying Joinpoint model for the period from 1999 to 2014. Joinpoint models with up to 2 joinpoints are based on rates per 100,000 persons and age standardized to the 2000 US standard population (19 age groups; Census P25-1130). For joinpoint analysis, the Joinpoint Regression Program was used (version 4.5.0.1; Bethesda, MD: Statistical Research and Applications Branch, National Cancer Institute; June 2017).

[g] For all sites, myelodysplastic syndromes are included for the rate calculations but not for the APC calculations; they are excluded from cancer-specific analysis. Ovary excludes borderline tumors.

[h] The AAPC is statistically significantly different from zero (two-sided $P < .05$).

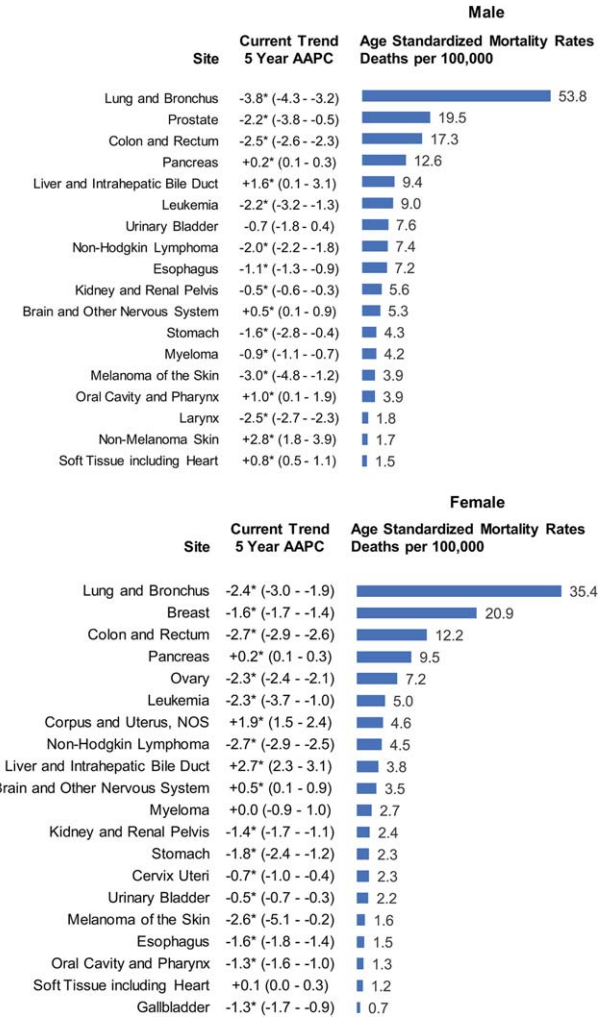

Figure 3. Age-standardized death rates and recent fixed-interval trends (2011-2015) are illustrated for the 18 most common cancers in men and the 20 most common cancers in women, for all races/ethnicities combined, and by sex. The 5-year average annual percent change (AAPC) is based on the joinpoint trend from 1999 to 2015. An asterisk indicates that the AAPC is statistically significantly different from zero (2-sided *t* test or *Z* test; $P<.05$). Rates were age-standardized to the 2000 US standard population (19 age groups; Bureau of the Census. Current Population Reports, Publication 25-1130. Washington, DC: US Government Printing Office; 2000 [Census P25-1130]). The AAPC is a weighted average of the annual percent changes over the fixed interval (2011-2015) using the underlying joinpoint model for the period from 1999 to 2015. Joinpoint models with up to 3 joinpoints are based on rates per 100,000 persons age standardized to the 2000 US standard population (19 age groups; Census P25-1130). For joinpoint analysis, the Joinpoint Regression Program was used (version 4.5.0.1; Bethesda, MD: Statistical Research and Applications Branch, National Cancer Institute; June 2017).

TABLE 2. US Cancer Death Rates and Fixed-Interval Trends (2011-2015) for the Most Common Cancers by Sex, Race, and Ethnicity[a]

Sex/Cancer Site or Type[c]	All Races[b]				White[b]				Black[b]				API[b]				AI/AN (CHSDA)[b]				Hispanic[b]				Non-Hispanic[b]			
	2010-2015				2011-2015				2011-2015				2011-2015				2011-2015				2011-2015				2011-2015			
	Rank Rate[d]	AAPC[e]	*P*		Rank Rate[d]	AAPC[e]	*P*		Rank Rate[d]	AAPC[e]	*P*		Rank Rate[d]	AAPC[e]	*P*		Rank Rate[d]	AAPC[e]	*P*		Rank Rate[d]	AAPC[e]	*P*		Rank Rate[d]	AAPC[e]	*P*	
All sites[f]																												
Both sexes	163.5	−1.5[f]	<.001		163.8	−1.4[f]	<.001		189.8	−2.1[f]	<.001		101.3	−1.3[f]	<.001		150.4	−0.7[f]	.001		114.6	−1.3[f]	<.001		167.7	−1.5[f]	<.001	
Males	196.7	−1.8[f]	<.001		196.4	−1.6[f]	<.001		239.9	−2.7[f]	<.001		120.4	−1.6[f]	<.001		181.4	−0.6[f]	.009		140.0	−1.6[f]	<.001		201.4	−1.7[f]	<.001	
Females	139.5	−1.4[f]	<.001		140.0	−1.3[f]	<.001		159.0	−1.6[f]	<.001		87.7	−1.0[f]	<.001		127.6	−1.4[f]	<.001		96.7	−1.0[f]	<.001		143.4	−1.4[f]	<.001	
Males																												
Lung and bronchus	1 53.8	−3.8[f]	<.001	1	53.9	−3.7[f]	<.001	1	65.1	−4.4[f]	<.001	1	31.0	−2.9[f]	<.001	1	45.0	−1.1[f]	.009	1	26.4	−3.0[f]	<.001	1	56.2	−3.7[f]	<.001	
Prostate	2 19.5	−2.2[f]	.01	2	18.2	−1.9[f]	.02	2	39.9	−4.1[f]	<.001	4	8.7	−2.8[f]	<.001	3	19.7	−1.2	.06	2	16.1	−2.8[f]	<.001	2	19.7	−2.1[f]	.01	
Colon and rectum	3 17.3	−2.5[f]	<.001	3	16.8	−2.0[f]	<.001	3	24.4	−2.6[f]	<.001	3	12.0	−2.0[f]	<.001	2	20.2	−0.4	.48	3	14.6	−1.6[f]	<.001	3	17.5	−2.5[f]	<.001	
Pancreas	4 12.6	0.2[f]	<.001	4	12.6	0.4[f]	<.001	4	14.8	−0.5[f]	.001	5	8.3	0.1	.64	5	9.6	−1.2	.31	5	9.5	0.1	.66	4	12.8	0.3[f]	<.001	
Liver and intrahepatic bile duct	5 9.4	1.6[f]	.03	6	8.7	1.8[f]	.03	5	13.2	0.8[f]	.41	2	14.0	−1.9[f]	.05	4	14.8	3.0[f]	<.001	4	13.0	−0.7	.45	6	9.1	1.8[f]	.02	
Leukemia	6 9.0	−2.2[f]	<.001	5	9.3	−2.1[f]	<.001	8	7.4	−1.5[f]	<.001	8	4.9	−0.6	.12	10	5.5	0.0	.96	8	6.0	−0.8[f]	.004	5	9.1	−2.2[f]	<.001	
Urinary bladder	7 7.6	−0.7	.21	7	8.0	0.1	.28	12	5.3	−0.4	.16	10	2.9	−0.2	.74	12	3.6	—[g]		10	3.9	−0.7[f]	.05	7	7.9	0.1	.23	
Non-Hodgkin lymphoma	8 7.4	−2.0[f]	<.001	8	7.7	−2.0[f]	<.001	11	5.4	−2.0[f]	<.001	7	5.0	−1.7[f]	<.001	9	5.6	−0.7	.43	7	6.1	−1.4[f]	<.001	8	7.5	−2.0[f]	<.001	
Esophagus	9 7.2	−1.1[f]	<.001	9	7.6	−0.6[f]	<.001	9	5.8	−4.8[f]	<.001	11	2.8	−1.3[f]	.03	8	5.9	−0.7	.44	11	3.9	−1.2[f]	.003	9	7.5	−1.0[f]	<.001	
Kidney and renal pelvis	10 5.6	−0.5[f]	<.001	10	5.8	−0.3[f]	.01	10	5.5	−0.9[f]	<.001	12	2.6	0.4	.52	6	8.4	−1.0	.17	9	5.0	−0.7[f]	.03	10	5.7	−0.4[f]	.002	
Brain and other nervous system	11 5.3	0.5[f]	.01	11	5.8	0.6[f]	.003	15	3.2	−0.1	.83	13	2.5	0.1	.82	14	3.0	2.0	.07	12	3.4	0.2	.56	11	5.6	0.6[f]	.003	
Stomach	12 4.3	−1.6[f]	.01	15	3.7	−2.0[f]	<.001	6	8.3	−3.3[f]	<.001	6	6.8	−4.0[f]	<.001	7	7.3	−3.0[f]	.008	6	6.7	−2.8[f]	<.001	14	4.0	−1.8[f]	.003	

and larynx, except that rates were stable for bladder cancer among AIs/ANs, were stable for stomach cancer among whites and non-Hispanics, and increased for bladder

TABLE 2. *Continued*

Sex/Cancer Site or Type[c]	All Races[b]				White[b]				Black[b]				API[b]				AI/AN (CHSDA)[b]				Hispanic[b]				Non-Hispanic[b]			
	2010-2015				2011-2015				2011-2015				2011-2015				2011-2015				2011-2015				2011-2015			
	Rank	Rate[d]	AAPC[e]	*P*	Rank	Rate[d]	AAPC[e]	*P*	Rank	Rate[d]	AAPC[e]	*P*	Rank	Rate[d]	AAPC[e]	*P*	Rank	Rate[d]	AAPC[e]	*P*	Rank	Rate[d]	AAPC[e]	*P*	Rank	Rate[d]	AAPC[e]	*P*
Myeloma	13	4.2	−0.9[f]	<.001	13	4.0	−0.8[f]	<.001	7	7.5	−1.2[f]	<.001	14	2.0	0.2	.78	13	3.4	−2.1[f]	.04	13	3.4	−0.9[f]	.03	12	4.3	−0.8[f]	<.001
Melanoma of the skin	14	3.9	−3.0[f]	.001	12	4.5	−2.8[f]	.003	25	0.5	−0.5	.45	21	0.4	—[g]		19	1.1	—[g]		17	1.0	−0.2	.71	13	4.2	−2.9[f]	.002
Oral cavity and pharynx	15	3.9	1.0[f]	.04	14	3.8	1.4[f]	.01	13	4.8	−3.2[f]	<.001	9	3.0	4.3	.20	11	3.7	−0.8	.41	14	2.4	2.5	.24	15	4.0	1.1[f]	.03
Larynx	16	1.8	−2.5[f]	<.001	17	1.7	−2.2[f]	<.001	14	3.3	−3.6[f]	<.001	17	0.7	−1.9[f]	.05	16	1.4	—[g]		15	1.5	−2.6[f]	<.001	16	1.8	−2.4[f]	<.001
Nonmelanoma skin	17	1.7	2.8[f]	<.001	16	1.8	3.3[f]	<.001	19	0.7	−2.4[f]	<.001	23	0.3	—[g]		18	1.1	—[g]		18	0.8	0.8	.23	17	1.8	3.7[f]	<.001
Soft tissue including heart	18	1.5	0.8[f]	<.001	18	1.6	0.9[f]	<.001	16	1.5	0.0	.93	16	1.0	1.0	.28	15	1.5	—[g]		16	1.2	0.9	.08	18	1.6	0.8[f]	<.001
Females																												
Lung and bronchus	1	35.4	−2.4[f]	<.001	1	36.6	−2.1[f]	<.001	1	33.5	−3.3[f]	<.001	1	17.7	−0.6[f]	.001	1	30.6	−1.6[f]	.002	2	13.3	−1.3[f]	<.001	1	37.4	−2.4[f]	<.001
Breast	2	20.9	−1.6[f]	<.001	2	20.3	−1.5[f]	<.001	2	28.6	−1.5[f]	<.001	2	11.3	1.1	.57	2	14.3	−1.1	.44	1	14.2	−1.2[f]	<.001	2	21.5	−1.6[f]	<.001
Colon and rectum	3	12.2	−2.7[f]	<.001	3	11.9	−1.5[f]	.01	3	16.0	−3.2[f]	<.001	3	8.6	−1.7[f]	<.001	3	13.6	−0.6	.39	3	9.0	−2.1[f]	<.001	3	12.5	−1.7[f]	.006
Pancreas	4	9.5	0.2[f]	<.001	4	9.4	0.3[f]	<.001	4	12.2	−0.2[f]	.01	4	7.3	0.3	.13	4	8.0	0.0	.96	4	7.7	0.1	.43	4	9.7	0.3[f]	<.001
Ovary	5	7.2	−2.3[f]	<.001	5	7.5	−2.5[f]	<.001	6	6.3	−1.4[f]	<.001	6	4.3	−1.1[f]	<.001	6	6.3	−0.8	.41	6	5.3	−1.2[f]	<.001	5	7.3	−2.4[f]	<.001
Leukemia	6	5.0	−2.3[f]	.001	6	5.2	−1.2[f]	<.001	9	4.5	−1.5[f]	<.001	10	2.9	−7.1[f]	.004	11	3.3	—[g]		9	3.9	−3.1[f]	.05	6	5.0	−1.3[f]	<.001
Corpus and uterus, NOS	7	4.6	1.9[f]	<.001	8	4.3	1.8[f]	<.001	5	8.3	2.5[f]	<.001	9	2.9	2.1[f]	<.001	8	3.6	—[g]		10	3.8	1.6[f]	<.001	7	4.7	1.9[f]	<.001
Non-Hodgkin lymphoma	8	4.5	−2.7[f]	<.001	7	4.6	−2.7[f]	<.001	12	3.4	−2.1[f]	<.001	8	3.2	−1.8[f]	<.001	10	3.4	−3.0[f]	.007	8	3.9	−2.3[f]	<.001	8	4.5	−2.7[f]	<.001
Liver and intrahepatic bile duct	9	3.8	2.7[f]	<.001	10	3.6	2.9[f]	<.001	8	4.6	1.5[f]	<.001	5	6.0	−1.1[f]	.007	5	7.0	0.8	.43	5	5.9	1.3[f]	<.001	10	3.7	2.7[f]	<.001
Brain and other nervous system	10	3.5	0.5[f]	.03	9	3.9	0.5[f]	.04	15	2.1	−0.1	.82	11	1.8	1.9[f]	.003	14	2.0	—[g]		12	2.5	0.0	.98	9	3.7	0.6[f]	.007
Myeloma	11	2.7	0.0	.92	12	2.4	−1.1	.26	7	5.5	1.0	.27	13	1.3	−1.7[f]	.03	12	2.7	−2.1	.14	13	2.3	−1.6[f]	<.001	11	2.7	−0.8	.46
Kidney and renal pelvis	12	2.4	−1.4[f]	<.001	11	2.5	−1.1[f]	<.001	14	2.4	−1.3[f]	<.001	15	1.1	−0.7	.24	7	4.1	−0.6	.52	14	2.3	−0.3	.36	12	2.4	−1.4[f]	<.001
Stomach	13	2.3	−1.8[f]	<.001	15	2.0	−1.6[f]	.001	10	3.9	−3.6[f]	<.001	7	4.2	−3.7[f]	<.001	9	3.5	−3.6[f]	.001	7	4.0	−2.2[f]	<.001	15	2.1	−2.3[f]	<.001
Cervix uteri	14	2.3	−0.7[f]	.001	14	2.2	0.6	.28	11	3.7	−2.6[f]	<.001	12	1.8	−2.8[f]	<.001	13	2.6	−2.2	.07	11	2.6	−2.4[f]	<.001	13	2.3	−0.6[f]	.003
Urinary bladder	15	2.2	−0.5[f]	<.001	13	2.2	−0.3[f]	.008	13	2.4	−1.5[f]	<.001	16	0.9	−0.9	.17	17	1.4	—[g]		15	1.3	−1.3[f]	.03	14	2.2	−0.4[f]	.001
Melanoma of the skin	16	1.6	−2.6[f]	.04	16	1.9	−0.5[f]	.005	24	0.3	−1.8[f]	.03	22	0.3	—[g]		20	0.5	—[g]		21	0.6	−0.8	.23	16	1.7	−0.5[f]	.005
Esophagus	17	1.5	−1.6[f]	<.001	17	1.5	−1.0[f]	<.001	16	1.8	−4.4[f]	<.001	19	0.7	−2.1[f]	.02	16	1.6	—[g]		19	0.8	−2.2[f]	<.001	17	1.5	−1.4[f]	<.001
Oral cavity and pharynx	18	1.3	−1.3[f]	<.001	18	1.3	−1.1[f]	<.001	18	1.3	−2.5[f]	<.001	14	1.1	−1.5[f]	.03	18	1.0	—[g]		18	0.8	−0.6	.24	18	1.4	−1.2[f]	<.001
Soft tissue, including heart	19	1.2	0.1	.11	19	1.1	−0.1	.17	17	1.5	0.4	.15	17	0.8	1.1	.15	19	0.9	—[g]		17	0.9	−0.2	.69	19	1.2	0.3[f]	.02
Gallbladder	20	0.7	−1.3[f]	<.001	20	0.7	−1.6[f]	<.001	19	1.0	0.1	.74	18	0.8	−1.0	.12	15	1.7	−3.8[f]	.001	16	1.2	−0.6	.41	20	0.7	−1.4[f]	<.001

Abbreviations: AAPC, average annual percent change; AI/AN, American Indian/Alaska Native; APC, annual percent change; API, Asian/Pacific Islander; CHSDA, Indian Health Service Contract Health Services Delivery Area; NOS, not otherwise specified.

[a] Source: National Center for Health Statistics public-use data file for the total United States, 1975 to 2015.

[b] White, black, API, and AI/AN (CHSDA 2012 counties) include Hispanic and non-Hispanic; the race and ethnicity categories are not mutually exclusive.

[c] Cancers are sorted in descending order according to sex-specific rates for all races/ethnicities. More than 15 cancers may appear under males and females to include the top 15 cancers in every race/ethnicity group.

[d] Rates are per 100,000 persons and are age standardized to the 2000 US standard population (19 age groups: ages < 1 year, 1-4 years, 5-9 years, . . ., 80-84 years, ≥ 85 years; US Bureau of the Census. Current Population Reports, Publication 25-1130. Washington, DC: US Government Printing Office; 2000 [Census P25-1130]).

[e] The AAPC is the average APC and is a weighted average of the APCs over the fixed interval from 2011 to 2015 using the underlying Joinpoint model for the period from 1999 to 2015. Joinpoint models with up to 3 joinpoints are based on rates per 100,000 persons and are age standardized to the 2000 US standard population (19 age groups; Census P25-1130). For joinpoint analyses, the Joinpoint Regression Program was used (version 4.5.0.1; Bethesda, MD; Statistical Research and Applications Branch, National Cancer Institute; June 2017).

[f] The APC is statistically significantly different from zero (1-sided $P < .05$).

[g] The statistic could not be calculated. The APC change is based on <10 cases for at least 1 year within the time interval.

cancer among blacks. Incidence rates among men increased in each racial and ethnic group for leukemia, myeloma, and cancers of the kidney, thyroid, pancreas, and liver, except that rates were stable for kidney and liver cancers among Hispanics and for leukemia, myeloma, and pancreas cancer among AIs/ANs.

Among women, overall cancer incidence rates increased during 2010 to 2014 among blacks, APIs, and AIs/ANs but remained stable in whites, Hispanics, and non-Hispanics. Incidence rates increased for female breast cancer in each racial and ethnic group (Table 1). Incidence rates among women also increased for cancers of the thyroid, liver, and uterus in each racial and ethnic group, except that rates remained stable for thyroid cancer and liver cancer among APIs. Incidence rates among women decreased for lung and bronchus cancer and colorectal cancer in each racial and ethnic group, except that rates were stable for lung and bronchus cancer among APIs and for colorectal cancer among Hispanics. As with men, for most cancer sites incidence trends for women in each racial and ethnic group were similar in direction to those for all women combined.

Current Cancer Death Rates and Trends by Sex, Race, and Ethnicity

Average annual death rates and trends from 2011 to 2015 are presented by cancer site, sex, race, and ethnicity in Table 2. For all cancer sites combined, similar to incidence rates, death rates (per 100,000 persons) were higher among men than among women overall (196.7 vs 139.5 for all races/ethnicities combined) and in every racial and ethnic group. Black men and black women had the highest cancer death rates of any racial group for all cancer sites combined, for 8 of the most common cancers in men, and for 9 of the most common cancers in women. Non-Hispanic men and women had higher overall cancer death rates than those of Hispanic ethnicity. Among men, lung and bronchus cancer was the leading cause of cancer death in every racial and ethnic group, followed by prostate and colorectal cancer in black, white, and Hispanic men; liver and colorectal cancer in API men; and colorectal and prostate cancer in AI/AN men. Among women, lung and bronchus, breast, and colorectal cancers were the leading causes of cancer death in every racial and ethnic group except Hispanics, in whom breast cancer replaced lung and bronchus cancer as the leading cause.

During 2011 to 2015, death rates declined overall and for the most common cancers (lung and bronchus, prostate, colorectal, breast) among men and women in all racial and ethnic groups, except that breast cancer death rates were stable among API and AI/AN women, colorectal cancer death rates were stable among AI/AN men and women, and prostate cancer death rates were stable among AI/AN men (Table 2). Death rates for most of the other cancer sites declined or were stable among men and women in each racial and ethnic group. However, death rates increased for some cancers in some racial and ethnic groups: liver cancer in white men and women, black women, AI/AN men, Hispanic women, and non-Hispanic men and women; pancreas cancer in white men and women and non-Hispanic men and women; uterus cancer in white, black, API, Hispanic, and non-Hispanic women; brain cancer in white men and women, non-Hispanic men and women, and API women; oral cavity and pharynx cancer in white men and non-Hispanic men; nonmelanoma skin cancer in white men and non-Hispanic men; and soft tissue (including heart) cancer in white men and non-Hispanic men and women.

Incidence and Mortality Trends, Survival by Stage, and Stage at Diagnosis for Female Breast Cancer, Colorectal Cancer, Lung and Bronchus Cancer, and Melanoma of the Skin

Figure 4 illustrates delay-adjusted incidence (1999-2014) and mortality (1999-2015) trends, 5-year survival estimates by stage (2007-2013), and the stage distribution at diagnosis for female breast cancer, colorectal cancer, lung and bronchus cancer, and melanoma of the skin. We focus on these 4 cancer sites because they are among the 5 sites that have the highest number of expected cases in 2017.[41] In addition to these 4 cancer sites, prostate cancer is among the top 5 sites based on the number of expected cases, but we do not include prostate cancer here because it is examined in detail in Part II of this report.

Female breast cancer incidence had been declining before 2004 but has increased since then at an average rate of 0.4% per year (Supporting Table 1). Female breast cancer mortality decreased during 1999 to 2015 (Supporting Table 2). Seventy-eight percent of cases were diagnosed at stage I or II, for which 5-year survival was high (100% and 92%, respectively) (Fig. 4). Approximately 6% of cases were diagnosed at stage IV, for which 5-year survival was 26.5%.

Colorectal cancer incidence rates decreased during 1999 to 2012 among men and women, although rates have been stable since 2012 (Supporting Table 1). Colorectal cancer mortality decreased during 1999 to 2015 among men and women (Supporting Table 2). Five-year survival for colorectal cancer (men and women combined) varied from 88.1% for cases diagnosed at stage I (23% of

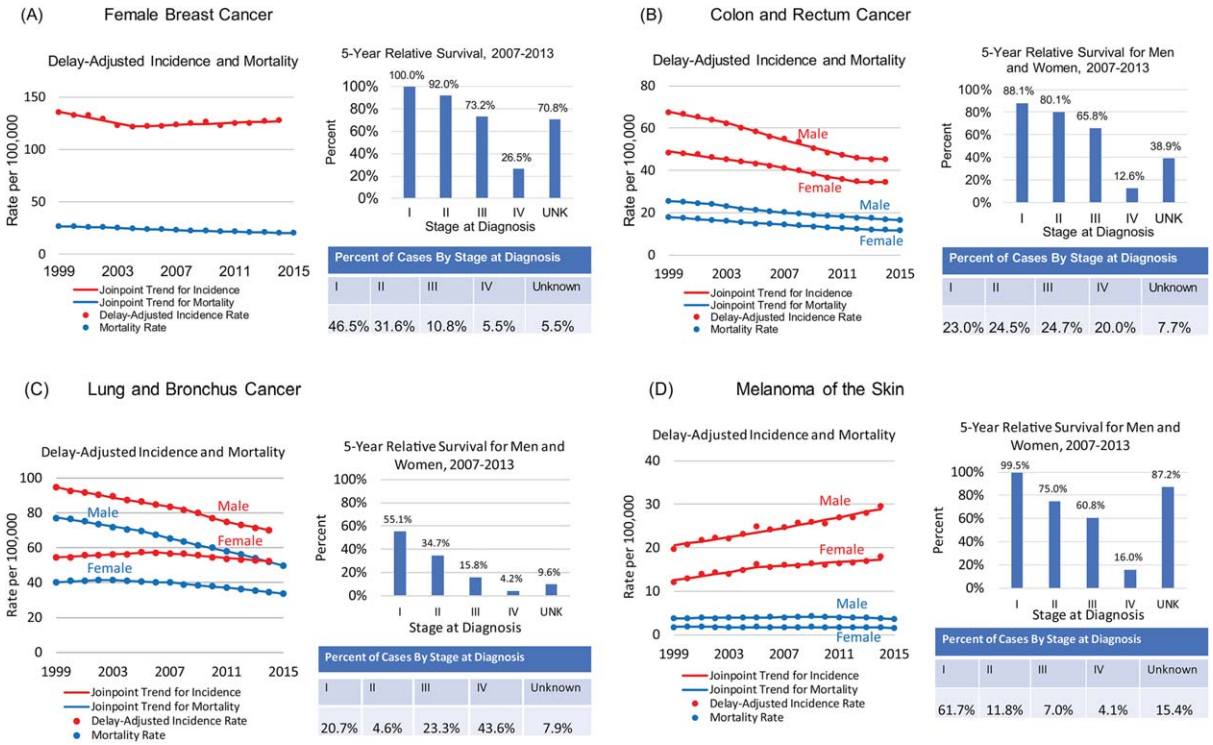

Figure 4. Delay-adjusted incidence (1999-2014) and mortality (1999-2015) trends, 5-year survival estimates by stage (2007-2013), and stage distribution at diagnosis are illustrated for (A) female breast cancer, (B) colon and rectum cancer, (C) lung and bronchus cancer, and (D) melanoma of the skin. Rates were age-standardized to the 2000 US standard population (19 age groups; Bureau of the Census. Current Population Reports, Publication 25-1130. Washington, DC: US Government Printing Office; 2000 [Census P25-1130]). Scattered points indicate observed rates, and lines are fitted rates according to joinpoint regression. Incidence rates were delay-adjusted and covered 89% of the US population, and mortality covered the entire United States. The following registries were included for incidence: Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Vermont, Washington, West Virginia, Wisconsin, and Wyoming. Joinpoint models with up to 2 joinpoints for incidence and up to 3 joinpoints for mortality are based on rates per 100,000 persons age standardized to the 2000 US standard population (19 age groups; Census P25-1130). For joinpoint analysis, the Joinpoint Regression Program was used (version 4.5.0.1; Bethesda, MD: Statistical Research and Applications Branch, National Cancer Institute; June 2017). Five-year relative survival rates covered 69.5% of the US population. The following registries were included for survival: Alabama, Alaska, Arizona, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Michigan, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island, South Carolina, Utah, Vermont, Seattle, West Virginia, Wisconsin, and Wyoming.

cases) to 12.6% for cases diagnosed at stage IV (20% of cases) (Fig. 4).

Lung and bronchus cancer incidence and mortality rates remain higher among men than among women, but men have experienced a longer and more pronounced decrease in both rates over time (Fig. 4, Supporting Tables 1 and 2). Among women, lung and bronchus cancer incidence decreased during 2006 to 2014, and lung and bronchus cancer mortality decreased during 2002 to 2015 (Supporting Tables 1 and 2). Lung and bronchus cancer survival (men and women combined) was low, ranging from 55.1% for stage I (21% of cases) to 4.2% for cases diagnosed at stage IV (44% of cases) (Fig. 4).

The incidence of melanoma of the skin increased substantially since 1999 among men and among women, although the rates of increase among women began slowing in 2005 (Fig. 4 and Supporting Table 1). Melanoma mortality was stable during 1999 to 2015 in women; in men, it was stable during 2009 to 2013 and decreased during 2013 to 2015 (Supporting Table 2). Sixty-two percent of cases were diagnosed with stage I disease and 12% were diagnosed with stage II disease, for which the 5-year survival rates were 99.5% and 75%, respectively. Four percent were diagnosed at stage IV, for which the 5-year survival rate was 16% (Fig. 4).

TABLE 3. Delay-Adjusted Childhood Cancer Incidence Rates for Areas With High-Quality Data and US Childhood Cancer Death Rates by Race/Ethnicity, Both Sexes Combined, and Their Fixed-Interval Trends[a,b]

	Children: Ages 0-14 Years[c]							
	Incidence (2010-2014)				Mortality (2011-2015)			
Race/Ethnicity[d]	Rate[e]	AAPC[f]	95% CI	*P*	Rate[e]	AAPC[f]	95% CI	*P*
All races	16.6	0.8[g]	0.6, 1.0	<.001	2.1	−1.5[g]	−1.8, −1.2	<.001
White	17.3	0.7[g]	0.5, 0.9	<.001	2.2	−1.4[g]	−1.7, −1.0	<.001
Black	12.9	−1.1	−3.7, 1.3	.30	2.0	−1.6[g]	−2.1, −1.0	<.001
API	13.7	1.1[g]	0.4, 1.7	.004	1.7	−2.4[g]	−3.9, −1.0	.003
AI/AN CHSDA	12.6	−0.1	−1.4, 1.2	.84	1.9	—[h]		
Hispanic	16.1	0.4[g]	0.1, 0.6	.02	2.1	−2.0[g]	−2.5, −1.5	<.001
Non-Hispanic	16.8	1.0[g]	0.8, 1.1	<.001	2.1	−1.4[g]	−1.7, −1.0	<.001

Abbreviations: AAPC, average annual percent change; AI/AN, American Indian/Alaska Native; API, Asian/Pacific Islander; CHSDA, Indian Health Service Contract Health Services Delivery Area; CI, confidence interval.

[a] Source: National Program of Cancer Registries and Surveillance, Epidemiology, and End Results areas reported by the North American Association of Central Cancer Registries as meeting high-quality incidence data standards for the specified time periods.

[b] The following registries were included in the incidence rates (2010-2014) and Joinpoint models (1999-2014) for all race/ethnicities, white, black, AI/AN, API, Hispanic, and non-Hispanic (42 states): Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Vermont, Washington, West Virginia, Wisconsin, and Wyoming.

[c] For incidence, AI/AN (CHSDA 2012) statistics exclude data from Kansas.

[d] White, black, API, and AI/AN (CHSDA 2012 counties) include Hispanic and non-Hispanic; the race and ethnicity categories are not mutually exclusive.

[e] Rates are per 100,000 persons and were age standardized to the 2000 US standard population (19 age groups US Bureau of the Census. Current Population Reports, Publication 25-1130. Washington, DC: US Government Printing Office; 2000 [Census P25-1130]).

[f] The AAPC is the average APC and is a weighted average of the APCs over the fixed interval (2009-2013 for incidence; 2010-2014 for mortality) using the underlying Joinpoint model for the period from 1999 to 2014 for incidence and the period from 1999 to 2015 for mortality. Joinpoint models with up to 2 joinpoints for incidence and up to 3 joinpoints for mortality were based on rates per 100,000 persons that were age standardized to the 2000 US standard population (19 age groups; Census P25-1130). For joinpoint analysis, the Joinpoint Regression Program was used (version 4.5.0.1; Bethesda, MD: Statistical Research and Applications Branch, National Cancer Institute; June 2017).

[g] The AAPC is statistically significantly different from zero (2-sided $P < .05$).

[h] The statistic could not be calculated. The average APC is based on <10 cases for at least 1 year within the time interval.

Cancer Incidence and Mortality Among Children

The most common cancer sites for children vary by age. Overall, the most common sites are leukemia, brain and other nervous system, soft tissue, NHL, and kidney and renal pelvis. Bone and joint cancer and Hodgkin lymphoma are more common in older children. Among children ages birth to 14 years, the average annual, age-standardized, delay-adjusted incidence rates (all cancer types combined; per 100,000 persons) during 2010 to 2014 ranged from 12.6 among AIs/ANs to 17.3 among whites (both sexes combined) (Table 3). The average, annual age-standardized death rates during 2011 to 2015 ranged from 1.7 among APIs to 2.2 among whites. Incidence rates increased during 2010 to 2014 for all racial/ethnic groups combined (0.8% per year) and among children in 4 racial/ethnic groups (APIs, 1.1% per year; non-Hispanics, 1.0% per year; whites, 0.7% per year; and Hispanics, 0.4% per year). Among AI/AN and black children, incidence rates were stable. In contrast, death rates among children during 2011 to 2015 decreased overall (−1.5% per year; all races/ethnicities combined) and among children in every racial and ethnic group, except that the AAPC for AIs/ANs could not be calculated because of sparse data (Table 3). The greatest decrease in cancer mortality was observed among API children (−2.4%), and the smallest decreases were among white children and non-Hispanic children (−1.4% in each group).

DISCUSSION

Cancer incidence rates for all races/ethnicities combined continued to decline among men and were stable among women. Incidence rates from 2010 to 2014 decreased for 7 of the 17 most common cancers among men and for 7 of the 18 most common cancers among women, and rates increased for 8 cancer sites among men and 10 sites among women.

The largest increases in incidence rates were observed for liver cancer, myeloma, melanoma of the skin, thyroid cancer, and leukemia. Additional cancers with rising incidence trends during the most recent years include kidney and female breast. The increase in thyroid cancer incidence rates is largely thought to be caused by increased detection of small and indolent tumors through imaging[42,43]; however, the rates increased for both small and large tumors, suggesting a role for unidentified risk factors

in the rising trend.[44,45] It is believed that the increase in kidney cancer incidence rates in part reflects increased detection resulting from wider application of imaging techniques[46] as well as the obesity epidemic.[14] For all cancer sites combined, men had higher incidence rates than women within every racial and ethnic group. Overall, black men and white women had higher rates than other racial groups, and non-Hispanic men and women had higher rates than Hispanic individuals. These racial and ethnic differences were driven largely by the incidence of prostate cancer, female breast cancer, and lung cancer.

The increase in the breast cancer incidence rate continues the 0.4% increase observed in last year's report.[19] After decreasing in the early 2000s after cessation of hormone-replacement therapy,[47,48] the increase from 2004 to 2014 may in part reflect the obesity epidemic.[17] Increased detection through mammography is unlikely to have contributed to the recent trend, because mammography rates remained unchanged during the corresponding period.[49] The continued increase in melanoma incidence rates is thought to reflect increased harmful recreational sun exposure and tanning bed use, as well as increased detection.[50] The survival rates for early stage breast cancer and melanoma of the skin are extremely high (100% and 99.5% for stage I breast cancer and melanoma, respectively), suggesting the influence of screening on survival. These high survival rates may result from a combination of better prognosis because of early detection, some level of overdiagnosis associated with screening, and individuals with screen-detected disease being healthier than the general population.[51]

Overall cancer death rates have continued to decrease among both men and women for all major racial and ethnic groups, with the greatest decrease among black men and the smallest among AI/AN men. From 2011 to 2015, death rates for all races/ethnicities combined decreased for 11 of the 18 most common cancers among men and for 14 of the 20 most common cancers among women, including lung and bronchus (men and women), colorectal (men and women), female breast, and prostate. In contrast, cancer death rates increased for liver, pancreas, and brain and other nervous system among men and women; for oral cavity and pharynx, nonmelanoma skin, and soft tissue (including heart) among men; and for uterus among women. Black men and black women had the highest cancer death rates of any racial group during the most recent 5-year period. Except for female lung cancer, black men and black women had the highest death rates for cancer sites with the highest mortality in the overall population: lung, prostate, female breast, colorectal, and pancreas. Non-Hispanic men and women had higher overall cancer death rates than men and women of Hispanic ethnicity.

Factors that have contributed to the continued decreases in cancer death rates for the 4 most common cancers have been discussed in previous reports.[14-19] Briefly, the sustained decrease in lung and bronchus cancer death rates since the early 1990s among men and since the early 2000s among women has been attributed to the reduction in cigarette smoking over the past 5 decades.[11] Between 1964 and 2012, cigarette smoking decreased by about 50% because of public health policies against tobacco use (eg, increased excise taxes on cigarette smoking, smoke-free air laws) and increased awareness about the health hazards of smoking.[52] However, cigarette smoking still accounts for over one-quarter of cancer deaths in the United States.[53-55]

The continued decreases in death rates for female breast cancer, prostate cancer, and colorectal cancer largely reflect improved early detection and more effective treatments.[14-19] Because mammography use has been stable since the early 2000s,[48] the recent decrease in breast cancer death rates may largely reflect improvement in treatments, such as targeted therapies.[56] The use of prostate-specific antigen testing has substantially decreased following the US Preventive Services Task Force recommendations against routine testing for men aged 75 and older in 2008 and for all ages in 2012,[57,58] which may have contributed to the less rapid decline in prostate cancer death rates during the most recent years compared with the previous period. See Part II of this report for details on prostate cancer rates and prostate-specific antigen testing patterns. In contrast, it is believed that the rapid decrease in colorectal cancer death rates over the past decades is because of increased colonoscopy use[59,60] after reimbursement of the procedure was granted by Medicare for high-risk individuals in 1998 and for all eligible persons in 2001.[61] Unlike increases in breast cancer screening, which resulted in a large percentage of cases being diagnosed with stage I disease, increased colorectal cancer screening—because it detects precancerous polyps so they can be removed before becoming cancer—has instead resulted in decreases in incidence.

In addition to the decreases for the 4 most common cancers, death rates decreased for many other cancers. These include larynx (men), bladder (women), and esophagus (men and women)—mainly because of reductions in cigarette smoking and other tobacco use—and leukemia (men and women) and NHL (men and women) because of improved treatments.[19]

We have observed that death rates continued to increase for several cancers, including liver (both sexes), pancreas (both sexes), uterus, and oral cavity and pharynx cancer (men only). The increase in liver cancer death rates has been associated with the high prevalence of hepatitis C virus infection among Baby Boomers caused by sharing of contaminated needles for intravenous drug use from the 1960s through the 1980s, as well as the obesity epidemic.[18] It is also believed that the obesity epidemic has contributed to the increase in endometrial (uterus lining) and pancreas cancer death rates.[14] It is estimated that obesity accounts for 25% and 68% of pancreas and uterus cancer deaths, respectively, in the United States.[62] The recent increase in oral cavity and pharynx cancer death rates among men, confined to whites, is thought to be associated with an increase in human papillomavirus infection.[63] A recent study estimated that approximately 11 million men and 3.2 million women have oral human papillomavirus infection in the United States.[64]

The incidence of childhood cancers continues to increase, whereas mortality is decreasing. The cancers occurring in children represent a heterogeneous group of cancer sites that vary by age. To better understand the factors influencing the rates, a careful examination of specific cancer sites within this age group would be necessary.

Limitations

A limitation of this report is misclassification of race/ethnicity information in medical records (incidence), death certificates, and the Census. Since 2000, the Census has given respondents the option to self-select multiple race/ethnicity categories; this has created incompatibility with race/ethnicity information in medical records and death certificates, which often have single race/ethnicity categories. To address this problem, the US Census Bureau, in collaboration with the CDC's NCHS and the NCI, have developed methods to generate single-race population estimates—but with some uncertainties about the population estimates and resultant rates.[65] Furthermore, race/ethnicity information on death certificates is underascertained for AI/AN, API, and Hispanic populations,[27,28] leading to an underestimation of cancer rates. In addition, cancer rates for broad racial and ethnic groups (eg, Hispanics and APIs) may mask important variations in cancer burden by country of origin.

Conclusions

For all cancer sites combined, cancer incidence rates decreased among men but were stable among women. Overall, there continue to be significant declines in cancer death rates among both men and women. Differences in rates and trends by race and ethnic group remain. Progress in reducing cancer mortality has not occurred for all sites, the most notable exceptions being liver cancer and uterus cancer. Examining stage distribution and 5-year survival by stage highlights the potential benefits associated with early detection and treatment. The continued monitoring of national statistics identifies areas for potential intervention and control to reduce the burden of cancer in the US population.

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CONFLICT OF INTEREST DISCLOSURES

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AUTHOR CONTRIBUTIONS

Kathleen A. Cronin: Conceptualization, supervision, visualization, writing–original draft, and writing–review and editing. **Andrew J. Lake**: Software, validation, formal analysis, data curation, writing–original draft, writing–review and editing, and visualization. **Susan Scott**: Writing–original draft and project administration. **Recinda L. Sherman**: Conceptualization, methodology, writing–original draft, writing–review and editing, and visualization. **Anne-Michelle Noone**: Conceptualization, methodology, writing–original draft, and writing–review and editing. **Nadia Howlader**: Conceptualization, methodology, writing–original draft, and writing–review and editing. **S. Jane Henley**: Writing–review and editing. **Robert N. Anderson**: Writing–review and editing. **Albert U. Firth**: Software, validation, formal analysis, data curation, writing–original draft, writing–review and editing, and visualization. **Jiemin Ma**: Writing–review and editing. **Betsy A. Kohler**: Conceptualization, data curation, resources, and writing–review and editing. **Ahmedin Jemal**: Conceptualization, writing–original draft, and writing–review and editing.

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