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## Annual report to the nation on the status of cancer, Part 1: National cancer statistics

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### Abstract

**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

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#### CONFLICT OF INTEREST DISCLOSURES

The authors have no conflicts of interest related to this work to disclose.

Central Cancer Registries (NAACCR) collaborate to provide annual updates on cancer occurrence and trends in the United States.

**Methods:** Data on new cancer diagnoses during 2001 to 2016 were obtained from the CDC-funded and NCI-funded population-based cancer registry programs and compiled by NAACCR. Data on cancer deaths during 2001 to 2017 were obtained from the National Center for Health Statistics' National Vital Statistics System. Trends in incidence and death rates for all cancers combined and for the leading cancer types by sex, racial/ethnic group, and age were estimated by joinpoint analysis and characterized by average annual percent change during the most recent 5 years (2012–2016 for incidence and 2013–2017 for mortality).

**Results:** Overall, cancer incidence rates decreased 0.6% on average per year during 2012–2016, but trends differed by sex, racial/ethnic group, and cancer type. Among males, cancer incidence rates were stable overall and among non-Hispanic white males but decreased in other racial/ethnic groups; rates increased for 5 of the 17 most common cancers, were stable for 7 cancers (including prostate), and decreased for 5 cancers (including lung and bronchus [lung] and colorectal). Among females, cancer incidence rates increased during 2012–2016 in all racial/ethnic groups, increasing on average 0.2% per year; rates increased for 8 of the 18 most common cancers (including breast), were stable for 6 cancers (including colorectal), and decreased for 4 cancers (including lung). Overall, cancer death rates decreased 1.5% on average per year during 2013–2017, decreasing 1.8% per year among males and 1.4% per year among females. During 2013–2017, cancer death rates decreased for all cancers combined among both males and females in each racial/ethnic group, for 11 of the 19 most common cancers among males (including lung and colorectal), and for 14 of the 20 most common cancers among females (including lung, colorectal, and breast). The largest declines in death rates were observed for melanoma of the skin (decreasing 6.1% per year among males and 6.3% among females) and lung (decreasing 4.8% per year among males and 3.7% among females). Among children younger than age 15 years, cancer incidence rates increased an average of 0.8% per year during 2012–2016, and cancer death rates decreased an average of 1.4% per year during 2013–2017. Among adolescents and young adults aged 15–39 years, cancer incidence rates increased an average of 0.9% per year during 2012–2016, and cancer death rates decreased an average of 1.0% per year during 2013–2017.

**Conclusions:** While overall cancer death rates continue to decline, incidence rates are leveling off among males and increasing slightly among females. These trends reflect population changes in cancer risk factors, screening test use, diagnostic practices, and treatment advances. Many cancers can be prevented or treated effectively if found early. Population-based cancer incidence and mortality data can be used to inform efforts to decrease the cancer burden in the United States and regularly monitor progress towards goals.

## Precis

The Centers for Disease Control and Prevention, the American Cancer Society, the National Cancer Institute, and the North American Association of Central Cancer Registries collaborate to provide annual updates on cancer occurrence and trends in the United States and to address a special topic of interest. Part 1 of this report focuses on national cancer statistics and Part 2 characterizes progress in achieving select *Healthy People 2020* objectives related to four common cancers.

## Keywords

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

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## INTRODUCTION

Each year, the Centers for Disease Control and Prevention (CDC), the American Cancer Society (ACS), the National Cancer Institute (NCI), and the North American Association of Central Cancer Registries (NAACCR) collaborate to provide updated information about cancer occurrence and trends in the United States and to address a special topic of interest.<sup>1</sup> Part 1 of this report focuses on national cancer statistics and Part 2 characterizes progress in achieving *Healthy People 2020* objectives related to four common cancers.<sup>2</sup>

## MATERIALS AND METHODS

### Data sources

**Cancer incidence data**—Population-based cancer incidence data by age, sex, and race/ethnicity were obtained from 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.<sup>3</sup> Data from registries that satisfied NAACCR's criteria for data quality and completeness were included in analyses; an exception was that data from New Mexico did not meet NAACCR completeness criteria but after review were included in this report.<sup>4</sup> For rate analyses, 49 states and 1 territory (Puerto Rico) met data criteria for every year during 2012–2016, while for trend analyses, 46 states met data criteria for every year during 2001–2016, representing 99% and 93% of the population of the United States and Puerto Rico, respectively.

Anatomic site and histology were coded according to *International Classification of Diseases for Oncology 3<sup>rd</sup> edition* (ICD-O-3)<sup>5</sup> and categorized according to SEER site groups.<sup>6</sup> Only cases defined as malignant were included in this report, except that *in situ* and malignant bladder cancers were combined when reporting bladder cancer incidence rates.

**Cancer mortality data**—Cause of death was based on death certificate information reported to state vital statistics offices and compiled into a national file through CDC's National Center for Health Statistics' (NCHS) National Vital Statistics System.<sup>7</sup> The underlying causes of death were selected according to ICD-10, then categorized according to SEER site groups to maximize comparability with ICD-O classifications.<sup>6</sup>

**Population data**—Population estimates used as rate denominators were a modification of intercensal (for July 1, 2001–2009) and Vintage 2017 (for July 1, 2010–2017) annual county population estimates by age, sex, bridged-race, and Hispanic origin produced by the US Census Bureau's Population Estimates Program, in collaboration with NCHS, and with support from the NCI.<sup>8</sup> The estimates incorporate bridged single-race estimates derived from

the original multiple-race categories in the 2000 and 2010 Censuses and permit estimation of race-specific statistics.<sup>9</sup>

**Demographic characteristics**—Rates and trends are presented by sex, racial/ethnic group, and age (all ages, children aged 0–14 years and adolescents and young adults [AYA] aged 15–39 years). Information about race and ethnicity was collected separately and was based on information abstracted from medical records or death certificates. In this report, information about race and ethnicity was combined to create five mutually exclusive racial/ethnic groups: non-Hispanic white, non-Hispanic black, non-Hispanic American Indian/Alaska Native (AI/AN), non-Hispanic Asian/Pacific Islander (API), and Hispanic (any race). For purposes of brevity, in this report, the non-Hispanic groups will be referred to by race only. To minimize racial misclassification for AI/AN, this group was restricted to residents in Indian Health Service Purchased/Referred Care Delivery Areas (PRCDA)<sup>10</sup> in states that provided county-level information (i.e., excluding Minnesota). Persons with other or unknown race or unknown ethnicity were included in overall rates but were not included as separate categories.

For males and females of all ages, rates and trends are presented for each cancer site that was one of the fifteen most common sites for incidence or death in any racial/ethnic group. For children and AYA, rates and trends are presented for each cancer site that was one of the three most common sites for incidence or death in any racial/ethnic group.

## Statistical Methods

Cross-sectional incidence (2012–2016) and death (2013–2017) rates for all ages combined, children, and AYA by cancer site and racial/ethnic group were calculated using SEER\*Stat software, version 8.3.5.<sup>11</sup> All rates were age-standardized to the 2000 U.S. standard population and were expressed per 100,000 standard population. Incidence rates were adjusted for potential delays in case reporting.<sup>12</sup> Corresponding 95% confidence intervals (CIs) were calculated as modified gamma intervals and allow for informal comparisons between groups, without specifying a referent group. Rates based on fewer than 16 cases were deemed to be statistically unreliable and were suppressed.

Temporal trends in delay-adjusted cancer incidence (2001–2016) and death (2001–2017) rates were estimated using joinpoint regression.<sup>13</sup> The maximum number of joinpoints was based on the length of the period, with two joinpoints (three line segments) allowed for the 16-year period for incidence and a maximum of three joinpoints (four line segments) allowed for the 17-year period for deaths. Trends were characterized by annual percent change (APC), the slope of a single segment, and average APC (AAPC), a summary measure over a fixed interval.<sup>13</sup> To determine whether APCs were significantly different from zero, a t-test was used; to determine whether AAPCs were significantly different from zero, a t-test was used for 0 joinpoints, and a z-test was used for  $\geq 1$  joinpoint. Rates were considered to increase if the slope of the trends (APC or AAPC)  $> 0$  ( $p < 0.05$ ) and to decrease if  $< 0$  ( $p < 0.05$ ); otherwise rates were considered stable. Trends based on fewer than 10 cases in any of the data years were considered statistically unreliable and were suppressed. All statistical tests were two sided. Corresponding 95% CIs for trends were calculated using the

parametric method and allow for informal comparisons between groups, without specifying a referent group.

## RESULTS

### Cancer Incidence Rates and Trends

Overall, cancer incidence rates decreased 0.6% on average per year during the most recent 5 years (2012–2016) but trends differed by sex, being stable among males (AAPC = -1.0%,  $p=0.14$ ) and increasing slightly among females (AAPC = 0.2%,  $p=0.007$ ) (Table 1). The overall incidence rate of cancer among males decreased during 2001–2013 but was stable during 2013–2016, which resulted in a stable trend for the most recent 5 years (Figure 1, Table 2). Among females, overall cancer incidence rates were stable during 2001–2003 and increased slightly during 2003–2016 (APC = 0.2%) (Figure 1).

By racial/ethnic group, overall cancer incidence rates in the most recent 5 years were stable only among white males and decreased among black, API, AI/AN, and Hispanic males (Table 1). Overall cancer incidence rates in the most recent 5 years increased among females in every racial/ethnic group (Table 1). The overall cancer incidence rate was similar among white persons and black persons but higher among black males than white males and higher among white females than black females (Figure 2). The overall cancer incidence rate was higher among males than females in every racial/ethnic group, except API, where the rates were similar.

The stable trend in overall cancer incidence among males was largely driven by stable trends for 7 of the 17 most common cancers: myeloma, thyroid, leukemia, esophagus, non-Hodgkin lymphoma (NHL), stomach, and prostate (Figure 3A, Table 1). Incidence rates decreased for 5 cancers among males: lung and bronchus (lung; AAPC = -2.6%); larynx (-2.3%); urinary bladder (bladder; -1.6%); colon and rectum (colorectal; -1.1%); and brain and other nervous systems (ONS; -0.3%). However, incidence rates increased for 5 cancers: liver and intrahepatic bile duct (liver; 2.5%); melanoma of the skin (melanoma; 2.2%); kidney and renal pelvis (kidney; 1.5%); oral cavity and pharynx (1.2%); and pancreas (1.1%). Trends for the 3 most common cancers differed by racial/ethnic group: prostate cancer incidence rates decreased among Hispanic males but were stable among white, black, API, and AI/AN males, and lung and colorectal cancer incidence rates decreased among white, black, API, and Hispanic males but were stable among AI/AN males (Table 1).

The slight increase in overall incidence among females was in part because incidence rates increased for 8 of the 18 most common cancers (liver [AAPC = 3.7%], melanoma [1.9%], corpus and uterus, not otherwise specified [uterus, 1.3%], myeloma [1.2%], pancreas [1.0%], kidney [0.6%], breast [0.5%], and oral cavity and pharynx [0.5%]) but decreased for only 4 cancers (ovary [-1.6%], lung [-1.1%], bladder [-0.9%], and brain and ONS [-0.5%]) and were stable for 6 cancers (cervix, stomach, leukemia, NHL, thyroid, and colorectum) (Figure 3B, Table 1). Breast cancer incidence rates increased among females in every racial/ethnic group, while lung cancer incidence rates decreased among white, black, and Hispanic females but were stable among API and AI/AN females. Colorectal cancer incidence rates

decreased among white, API, and AI/AN females but were stable among black and Hispanic females (Table 1).

Overall cancer incidence rates in 2012–2016 ranged from 363 to 517 cases per 100,000 persons (Figure 4A). During 2012–2016, cancer incidence rates decreased in 31 states and were stable in 15 states; trends could not be calculated for 4 states, the District of Columbia, or Puerto Rico because data were not available for the entire period (Figure 4B).

### Cancer Death Rates and Trends

Overall, cancer death rates decreased 1.5% on average per year during 2001–2017, decreasing more rapidly among males (APC =  $-1.8\%$ ) than among females (APC =  $-1.4\%$ ) (Figure 1). Overall cancer death rates decreased during 2013–2017 in every racial/ethnic group, decreasing the most among black persons (AAPC =  $-2.0\%$ ) and the least among AI/AN persons (AAPC =  $-0.6\%$ ) (Table 3). The overall cancer death rate was highest among black persons, next highest among AI/AN and white persons, and lowest among API persons (Figure 5).

During 2013–2017, death rates among males decreased for 11 of the 19 most common cancers, were stable for 4 cancers (including prostate), and increased for 4 cancers (oral cavity and pharynx, soft tissue including heart, brain and ONS, and pancreas) (Figure 6A, Table 3). Death rates among females increased for cancers of the uterus, liver, brain and ONS, soft tissue including heart, and pancreas; rates were stable for oral cavity and pharynx cancer and decreased for 14 of the 20 most common cancers (Figure 6B, Table 3). The largest declines in death rates were observed for melanoma (AAPC =  $-6.1\%$  among males and  $-6.3\%$  among females) and lung cancer ( $-4.8\%$  among males and  $-3.7\%$  among females) (Figure 6).

The 3 most common cancer deaths among males were from lung, prostate, and colorectal cancer in most racial/ethnic groups except API males. Among API males, lung cancer was the most common cancer death, followed by cancer of the liver, colorectum, and prostate (Table 3). Lung cancer death rates among males decreased during 2013–2017 in each racial/ethnic group, decreasing the most among black males (AAPC =  $-5.7\%$ ) and Hispanic males ( $-5.4\%$ ). Prostate cancer death rates were stable among white and Hispanic males but decreased among black, API, and AI/AN males. Colorectal cancer death rates were stable among AI/AN males but decreased in all other racial/ethnic groups. Pancreas cancer was the 4<sup>th</sup> most common cancer death among white and black males, and death rates increased among white males but were stable in other racial/ethnic groups. Liver cancer was the 4<sup>th</sup> most common cancer death among AI/AN and Hispanic males (and 2<sup>nd</sup> among API males); death rates increased among white, AI/AN, and Hispanic males, were stable among black males, and decreased among API males.

Among females, the 3 most common cancer deaths were lung, breast, and colorectal, except among Hispanic females in whom breast cancer was the most common and lung cancer was the 2<sup>nd</sup> (Table 3). Lung cancer death rates among females decreased in every racial/ethnic group, decreasing the most among black females ( $-4.6\%$ ). Breast and colorectal cancer death rates decreased among white, black, API, and Hispanic females but were stable among



AI/AN females. Pancreas cancer was the 4<sup>th</sup> most common cancer death among females in each racial/ethnic group, and death rates increased among white females, decreased among black females, and were stable in other racial/ethnic groups. Uterine cancer death rates increased among white, black, API, and Hispanic females, and could not be calculated among AI/AN females.

Notable changes in trend were observed for melanoma and lung cancer. Melanoma death rates among males were stable during 2009–2014 then decreased 7.6% per year during 2014–2017, and melanoma death rates among females were stable during 2001–2013 then decreased 6.3% per year during 2013–2017 (Table 4). In contrast, incidence rates of melanoma increased 2.2% per year among males and 1.9% per year among females during 2001–2016 (Table 2). Declines in lung cancer death rates accelerated over the time period studied (Table 4). Among males, lung cancer death rates decreased 2.0% per year during 2001–2005, 2.9% during 2005–2012, 4.0% during 2012–2015 and 5.5% during 2015–2017. Among females, lung cancer death rates decreased 0.5% per year during 2001–2007, 2.0% during 2007–2014 and 4.2% during 2014–2017. Lung incidence rates also decreased, but at a slower pace: lung cancer incidence rates among males decreased 2.6% per year during 2007–2016 and 1.1% per year among females during 2006–2016 (Table 2).

Overall cancer death rates ranged from 125 to 195 deaths per 100,000 standard population (Figure 7A). During 2013–2017, cancer death rates decreased in all states, decreasing 4.3% in Alaska and  $\geq 2\%$  per year in 6 additional states and the District of Columbia (Figure 7B).

### Cancer Among Children

Among children aged 0–14 years, the incidence rate for all cancer sites combined was 16.8 cases per 100,000 standard population, ranging from 12.4 among AI/AN children to 17.8 among white children (Table 1). Overall cancer incidence rates increased an average of 0.8% per year during 2012–2016 (Table 1). The most common cancer types among children included leukemia, brain and ONS, and lymphoma, with increasing trends for each of these cancers during 2001–2016 (Table 2). Leukemia rates showed the most variability among racial/ethnic groups, ranging from 3.3 cases per 100,000 standard population among black children to 6.2 among Hispanic children. The cancer death rate among children was 2.1 deaths per 100,000 standard population and was highest among AI/AN children (2.6) and lowest among API children (1.8) (Table 3). Overall cancer death rates among children decreased an average of 1.4% per year during 2013–2017. The most common cancer deaths among children were from brain and ONS (0.7 deaths per 100,000) and leukemia (0.5 deaths per 100,000). During 2001–2017, death rates among children for brain and ONS cancer were stable while death rates from leukemia declined 2.8% per year (Table 4).

### Cancer Among Adolescents and Young Adults

Among AYA aged 15–39 years, the incidence rate for all cancer sites combined was 75.5 cases per 100,000 standard population, ranging from 54.8 among API AYA to 84.1 among white AYA (Table 1). The most common cancer among AYA was female breast cancer, which was highest among black AYA. Incidence rates of thyroid cancer and testicular cancer among AYA varied by racial/ethnic group and were lowest among black AYA and highest

among white AYA. Overall cancer incidence rates among AYA increased an average of 0.9% per year during 2012–2016 (Table 1). Three of the four most common cancer types among AYA (female breast, thyroid, and testis) increased during 2012–2016 but the fourth (lymphoma) decreased. AYA female breast cancer incidence rates were stable during 2001–2010 then increased 1.2% per year during 2010–2016 (Table 2). Increasing trends for AYA thyroid cancer slowed from 5.8% per year during 2001–2010 to 1.7% per year during 2010–2016 (Table 2).

The cancer death rate among AYA was 8.9 deaths per 100,000 standard population and was highest among black AYA (11.4) and AI/AN AYA (11.0) and lowest among API AYA (6.9) (Table 3). The most common cancer deaths among AYA were from female breast (2.2 deaths per 100,000 standard population), brain and ONS (1.0), leukemia (0.9), and colorectal (0.9). Death rates from breast cancer among black AYA (3.9) were nearly twice as high compared to white AYA (2.0) and more than twice as high compared to API (1.3), AI/AN (1.6), and Hispanic AYA (1.8). Declining trends in overall death rates among AYA slowed from –3.0% per year during 2001–2005 to –1.0% per year during 2005–2017 (Table 4). The only notable change in trend in cancer death rates for common sites occurred for AYA female breast cancer, which declined (–3.2% per year) during 2001–2010 and then stabilized during 2010–2017.

## DISCUSSION

While overall cancer death rates continued to decline among both males and females, incidence rates leveled off among males and increased slightly among females. These trends reflect population changes in cancer risk factors, screening test use, diagnostic practices, and treatment advances.<sup>2</sup> Part 2 of this report showed that *Healthy People 2020* objectives were not yet met overall for major cancer risk factors such as excess body weight, excessive alcohol use, and cigarette smoking.<sup>2</sup> Historical declines in cigarette smoking have been reflected by declines in incidence of and mortality from several tobacco-related cancers, including lung, larynx, and bladder, which have greatly impacted the overall incidence and death rates.<sup>14,15</sup> While the decrease in lung cancer was substantial, it continues to be the leading cause of cancer death, accounting for about a quarter of all cancer deaths. Furthermore, these gains are being offset by increasing incidence trends for cancers related to excess body weight and physical inactivity, including those for female breast, uterus, kidney, liver, and pancreas.<sup>16,17</sup>

Through early detection of cancer and subsequent timely and effective treatment, the use of cancer screening tests can reduce mortality.<sup>18–23</sup> However, the effects on incidence are more complex, because screening can lead to either increases or decreases in the number of diagnosed cases.<sup>24</sup> For example, the number of cases may increase through the detection of indolent, slow growing, or inconsequential tumors, or the number of malignant colorectal and cervical cases may decrease when screening tests detect precancerous lesions that are treated before progressing to cancer. Part 2 of this report showed that the current use of recommended screening tests is suboptimal, ranging from <10% for lung cancer to 60% for colorectal cancer, 72% for breast cancer, and 81% for cervical cancer.<sup>2,25</sup> Furthermore, breast and cervical cancer screening use has declined.<sup>2,25</sup> This report shows that rates of



cervical cancer incidence have leveled off after over a decade of sustained declines, which may coincide with declines in screening rates.

For the first time, the *Annual Report* provided rates and trends for the most common cancers among children and AYA. As noted in last year's report, cancers among these age groups are of particular significance because many young patients experience long-term sequelae of their cancer and its treatment, affecting their health and quality of life for the remainder of their lifetimes.<sup>1</sup> Reasons for increasing incidence rates for cancer overall and for the most common types among children are largely unknown.<sup>26</sup> Factors potentially influencing childhood cancer incidence trends include changes over time in diagnostic technology, disease classification, and registry completeness,<sup>26</sup> as well as changes in risk factors, such as increasing maternal age.<sup>27</sup> Continued declines in cancer death rates among children likely result from improved treatment. As part of an effort to provide data faster for pediatric cancer research and more quickly identify young patients eligible for clinical trial enrollment, CDC created a cooperative program to help cancer registries improve rapid reporting of pediatric and young adult cases.<sup>28</sup> NCI is launching an initiative to enhance data collection for childhood cancers.<sup>29</sup>

Among AYAs, the increase in female breast cancer incidence rates during 2010–2016 after a period of stability is concerning—particularly since death rates, which had declined during 2001–2010, also began to stabilize in 2010. As noted in last year's report, opportunities for primary prevention of breast cancer among younger and premenopausal women are limited.<sup>1</sup> More detailed studies may help evaluate potential reasons for these adverse trends.

During the most recent 5-year period in this report, colorectal cancer death rates declined among both males and females overall, most likely due, in part, to increases in the utilization of guideline-concordant colorectal cancer screening,<sup>30</sup> which rose from 39% in 2000 to 55% in 2008 and continued to increase, but at a slower pace, to 61% in 2015.<sup>31</sup> The relatively rapid declines in colorectal cancer incidence rates during 2001–2012 observed in this report correspond with this timeline of increased use of colorectal cancer screening. However, during 2012–2016, colorectal cancer incidence rates stabilized among women and the decline in rates slowed among men, consistent with the slowing pace in colorectal cancer screening use and increasing prevalence of risk factors such as excess body weight, adult weight gain, and diabetes.<sup>30</sup> This year's report observed a continued increase in colorectal cancer death rates among AYA, which has been noted previously.<sup>32,33</sup>

Excess body weight may have contributed to increasing trends in uterine cancer incidence and death rates.<sup>34</sup> This report shows that as death rates from leukemia and non-Hodgkin lymphoma continue to decrease, uterine cancer is now ranked as the 6<sup>th</sup> most common cause of cancer death among women (slightly higher than leukemia). Excess body weight is also a risk factor for liver cancer.<sup>35,36</sup> Liver cancer death rates continued to increase among females overall but stabilized among males, reflecting differing trends by racial/ethnic group. Liver cancer death rates have decreased among API due largely to improvements in hepatitis B virus vaccination coverage and treatment.<sup>37</sup> However, prevalent risk factors for liver cancer, including excess body weight, diabetes, non-alcoholic fatty liver disease, alcohol use, and hepatitis C virus infection, may contribute to increases in liver cancer death

rates observed in other groups.<sup>37</sup> Incident rates for cancers of the oral cavity and pharynx increased among non-Hispanic white men and women and API men. Since tobacco use, a prominent risk factor, has declined, researchers suggest that the increase in this group of cancers may be due to increases in sites associated with human papillomavirus, such as tonsil, base of tongue, and oropharynx.<sup>38</sup>

Changing trends in prostate cancer incidence and mortality largely reflect changes in the US Preventive Services Task Force (USPSTF) recommendations for prostate-specific antigen (PSA) screening.<sup>39,40</sup> In 2008, the USPSTF considered evidence to be insufficient for recommending routine PSA screening in men aged 50–74 years and recommended against PSA screening in men aged  $\geq 75$  years,<sup>41</sup> and, in 2012, subsequently recommended against routine PSA screening in men of any age.<sup>42</sup> Subsequent declines in PSA test use have been associated with declines in prostate cancer incidence during 2009–2014.<sup>39</sup> Recent stabilization in prostate cancer mortality trends may be related to increasing incidence of distant stage disease since 2008.<sup>39,43</sup> The USPSTF issued new prostate cancer screening recommendations in 2018 which recommend that men aged 55–69 years talk with their clinician about the benefits and harms of prostate cancer screening with the PSA test.<sup>44</sup>

There are some trends in the positive direction. For the first time in decades, incidence rates for thyroid cancer in the most recent 5-year period stabilized among both males and females overall. Increasing trends in thyroid cancer incidence over the past several decades have been attributed in part to increasing use of ultrasound-guided fine needle aspiration biopsy,<sup>45</sup> and a slowing of these trends, beginning in 2009, has been attributed to revisions in American Thyroid Association management guidelines for thyroid nodules, which recommended against biopsy of nodules less than 1 cm in the absence of certain high-risk characteristics.<sup>46</sup> Recent changes in thyroid cancer guidelines are intended to reduce overdiagnosis and overtreatment of relatively low-risk tumors, which can result in long term decrement in health-related quality of life and financial burden.<sup>47,48</sup> While thyroid cancer incidence rates stabilized among males and females of all ages, rates continued to increase among AYA. An analysis of differentiated thyroid cancer incidence among children and AYA found increasing trends for large as well as small tumors.<sup>49</sup> Changes in prevalence of several risk factors for thyroid cancer, including low dose radiation exposure<sup>50</sup> and excess body weight,<sup>51</sup> may contribute to increasing incidence rates in more recent birth cohorts.

Recent rapid declines in death rates from melanoma of the skin, first noted in last year's report,<sup>1</sup> likely have resulted from the introduction of new therapies that have improved survival rates for advanced melanoma.<sup>52</sup> New therapies, including targeted and immune checkpoint inhibitors, have increased the median survival for advanced-stage melanoma from approximately 9 months to at least 2 years, based on clinical trials. Early indications of the new therapies' effect on population-level survival were observed in a study using the SEER-18 database. The study found that 2-year survival among patients diagnosed with metastatic melanoma in the post-targeted era (2011–2014) was 28.3%, a statistically significant improvement over the 23.5% observed in the pre-targeted era (2004–2010).<sup>53</sup>

Accelerating rates of declines in death rates from lung cancer, the most common cause of cancer death in both men and women, may reflect increases in survival related to improved

treatments, improved access to diagnostic and treatment services, and possibly earlier diagnosis due to implementation of low-dose CT screening in high risk populations.<sup>54</sup> Selection of individualized lung cancer treatment can be based on characteristics such as stage of disease, histologic features, and presence of treatable oncogenic alterations.<sup>55–58</sup>

Due to the growth and aging of the U.S. population, the number of cases and deaths for many cancers continue to increase even while the age-standardized incidence and death rates decrease.<sup>59,60</sup> For example, during 2001–2017, the number of cancer deaths increased from 553,760 to 599,108, despite death rates decreasing from 196 to 153 deaths per 100,000 persons.<sup>7</sup> Similarly, the number of malignant cancers reported increased from 1.4 million in 2001 to 1.7 million in 2016, despite the incidence rate declining 0.6% per year.<sup>61</sup> Future trends in cancer incidence and mortality will be impacted by changes in the demographics of the U.S. population, which is projected to be older and more racially and ethnically diverse.<sup>62</sup> Tailored approaches for proven evidence-based interventions may help maintain progress in decreasing the cancer burden in the United States.<sup>2</sup>

### Strengths and Limitations

The major strength of this study is the high population coverage of cancer incidence data for the United States and Puerto Rico (99% for incidence rates during 2012–2016 and 92% for incidence trends during 2001–2016). Data from some cancer registries did not meet criteria for data quality or completeness for some years; however, because of the high population coverage, these exclusions likely do not materially impact national trends. Another strength is that this is the first *Annual Report* that has examined race and ethnicity in mutually exclusive groups. Previous reports categorized race as four non-overlapping groups, regardless of ethnicity, and ethnicity as two non-overlapping groups, regardless of race. Mutually exclusive groups allow more direct comparison between categories. Additionally, this report restricts the analysis of incidence data to cases categorized by the 3<sup>rd</sup> edition of the ICD-O and so rates and trends may not be comparable to previous reports. Many of this study's limitations, including potential lack of representativeness of cancer incidence data to the US population, have been described in previous reports.<sup>37,63–65</sup> In some instances, this report groups cancers that are anatomically close to each other but may have different etiologies (such as cancers of the oral cavity and pharynx) or cancers at one site with different histologic types (such as small cell and non-small cell lung cancer) or molecular types (such as breast cancer); more detailed examinations of these cancers are beyond the scope of this report.

### Conclusions

While overall cancer death rates continue to decline, incidence rates are leveling off among males and increasing slightly among females. These trends reflect population changes in cancer risk factors, screening test use, diagnostic practices, and treatment advances. Many cancers can be prevented or treated effectively if found early. Population-based cancer incidence and mortality data can be used to inform efforts to decrease the cancer burden in the United States and regularly monitor progress towards goals.

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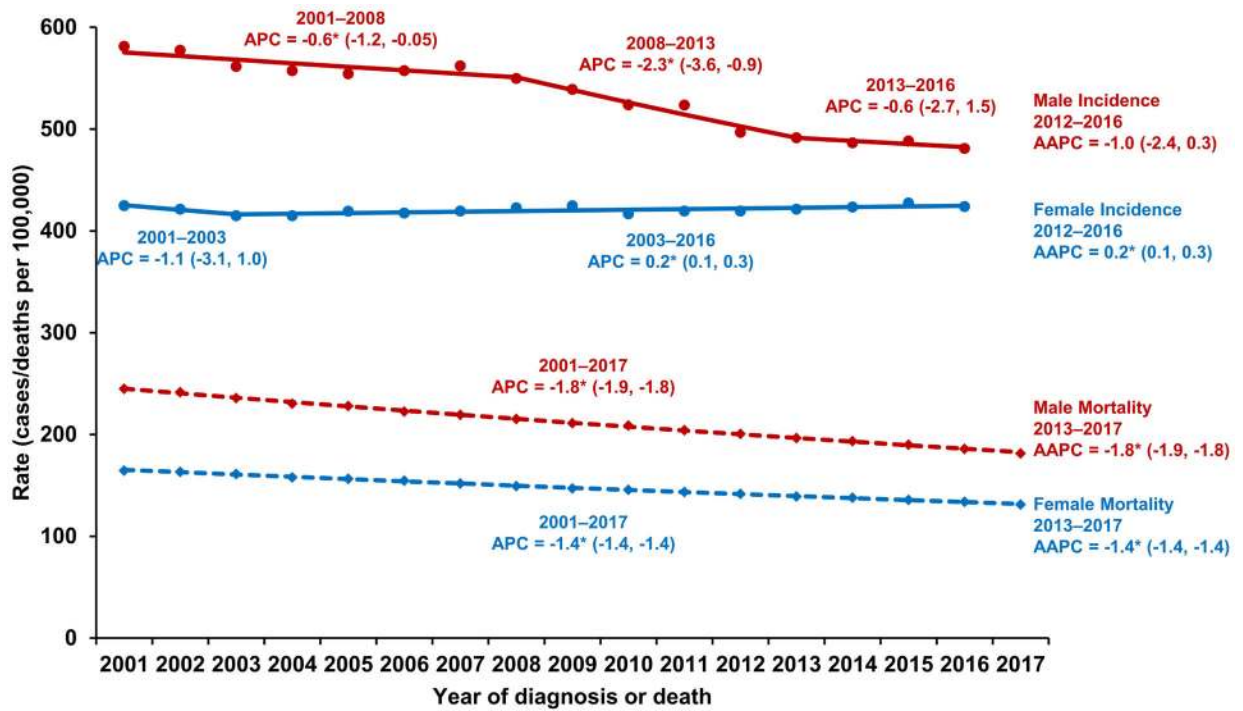
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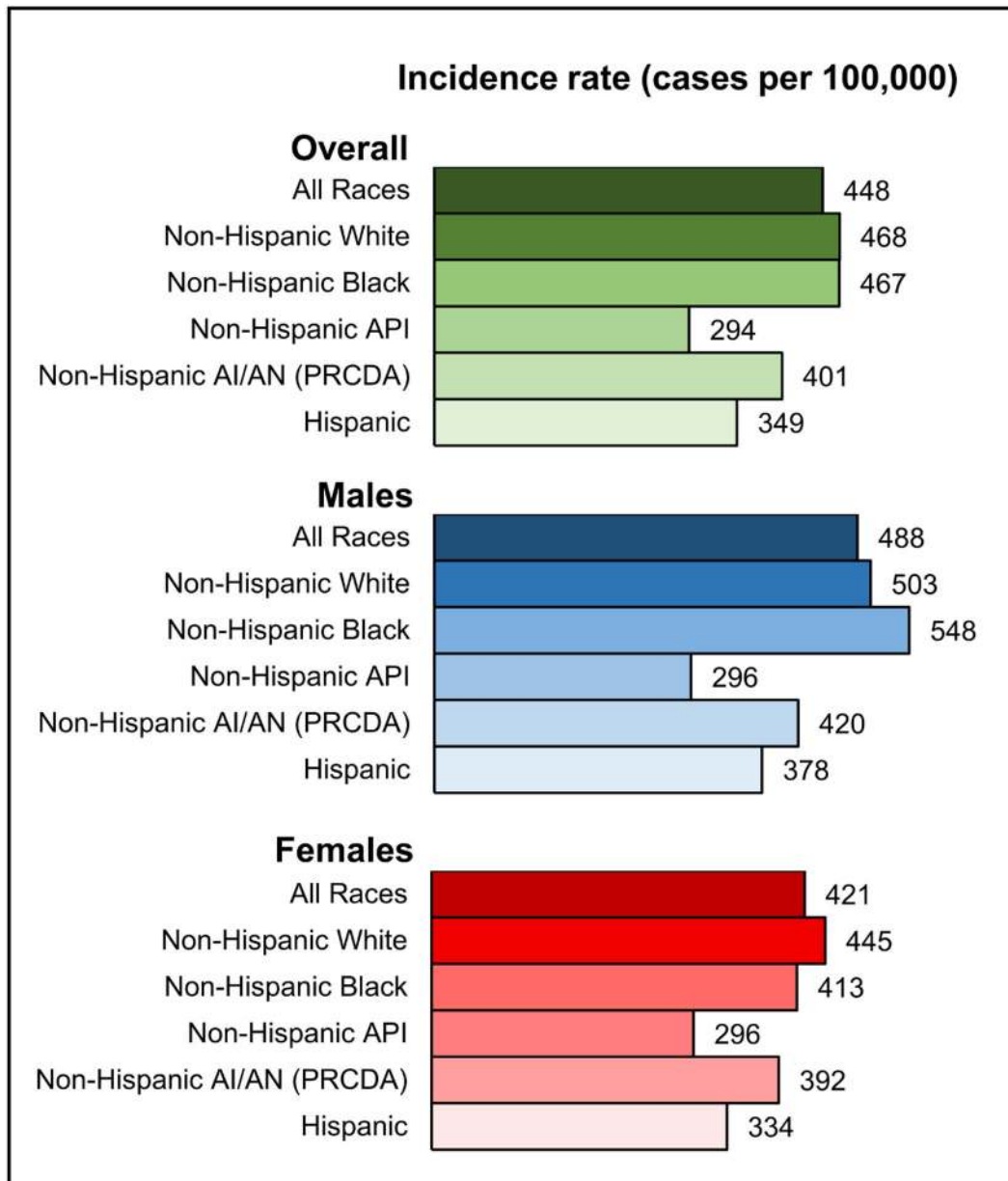
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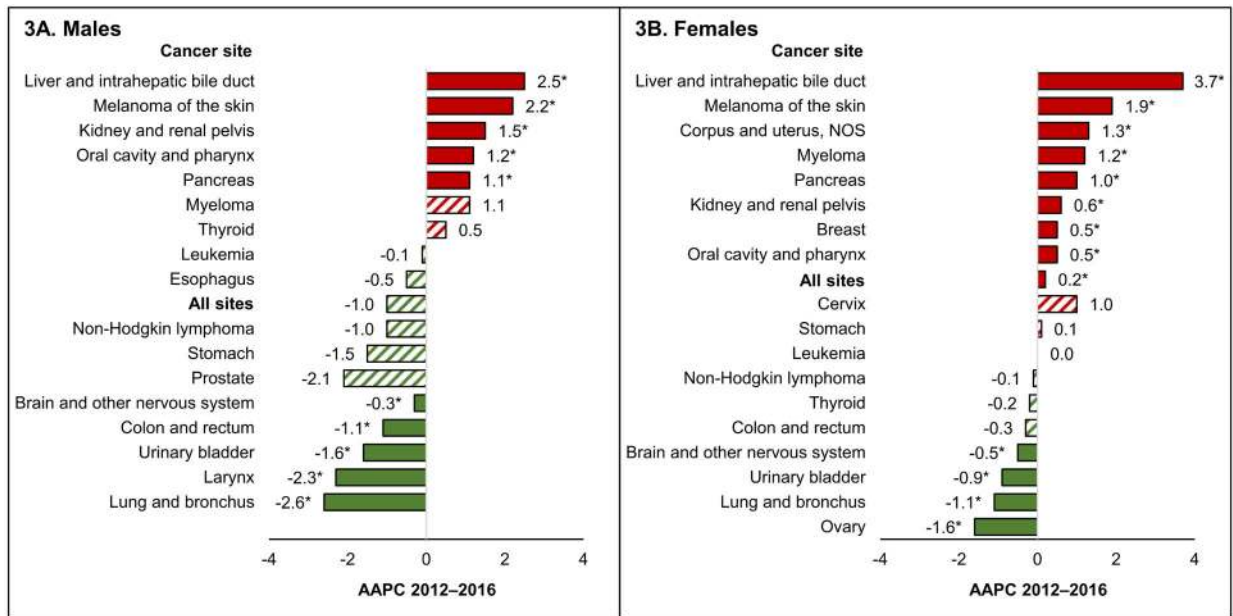
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**Figure 1.** Trends in age-standardized incidence rates (2001–2016) and death rates (2001–2017) for all cancer sites combined, all races and ethnicities combined, by sex. Incidence rates were delay-adjusted and covered 93% of the US population and death rates covered the entire US population. Trends were estimated using joinpoint regression and characterized by annual percent change (APC), the slope of a single segment, and average APC (AAPC), a summary measure of the APCs over a fixed 5-year interval. The 16-year period for incidence allowed up to 3 different APCs, and the 17-year period for mortality allowed up to 4 different APCs. An asterisk (\*) indicates that the APC or AAPC was statistically significantly different from 0 ( $p < .05$ ). 95% confidence limits are given in parentheses.

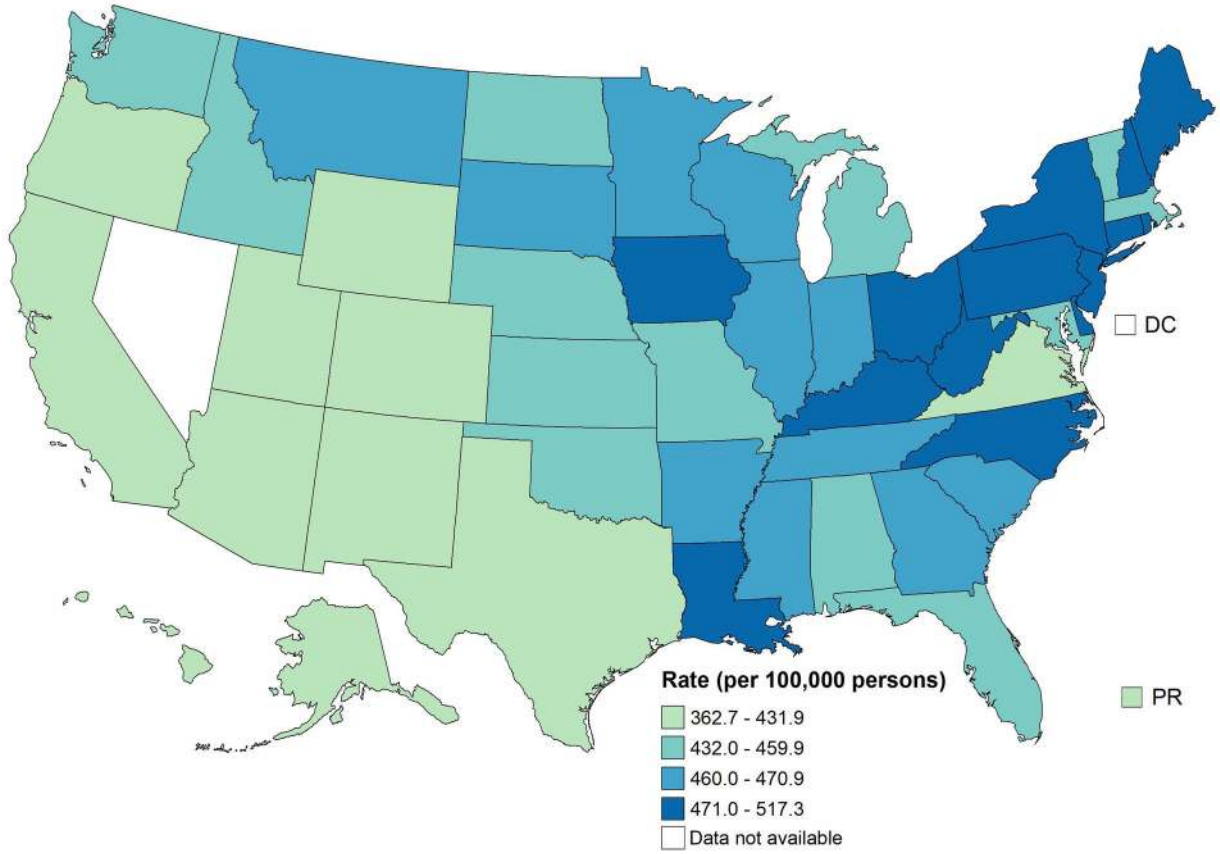


**Figure 2.** Age-standardized, delay-adjusted overall cancer incidence rates for 2012–2016 among males and females by racial/ethnic group. Racial/ethnic groups are mutually exclusive. Data for non-Hispanic AI/AN are restricted to PRCDA counties. Abbreviations: AI/AN, American Indian/Alaska Native; API, Asian/Pacific Islander; PRCDA, Indian Health Service Purchased/Referred Care Delivery Areas.

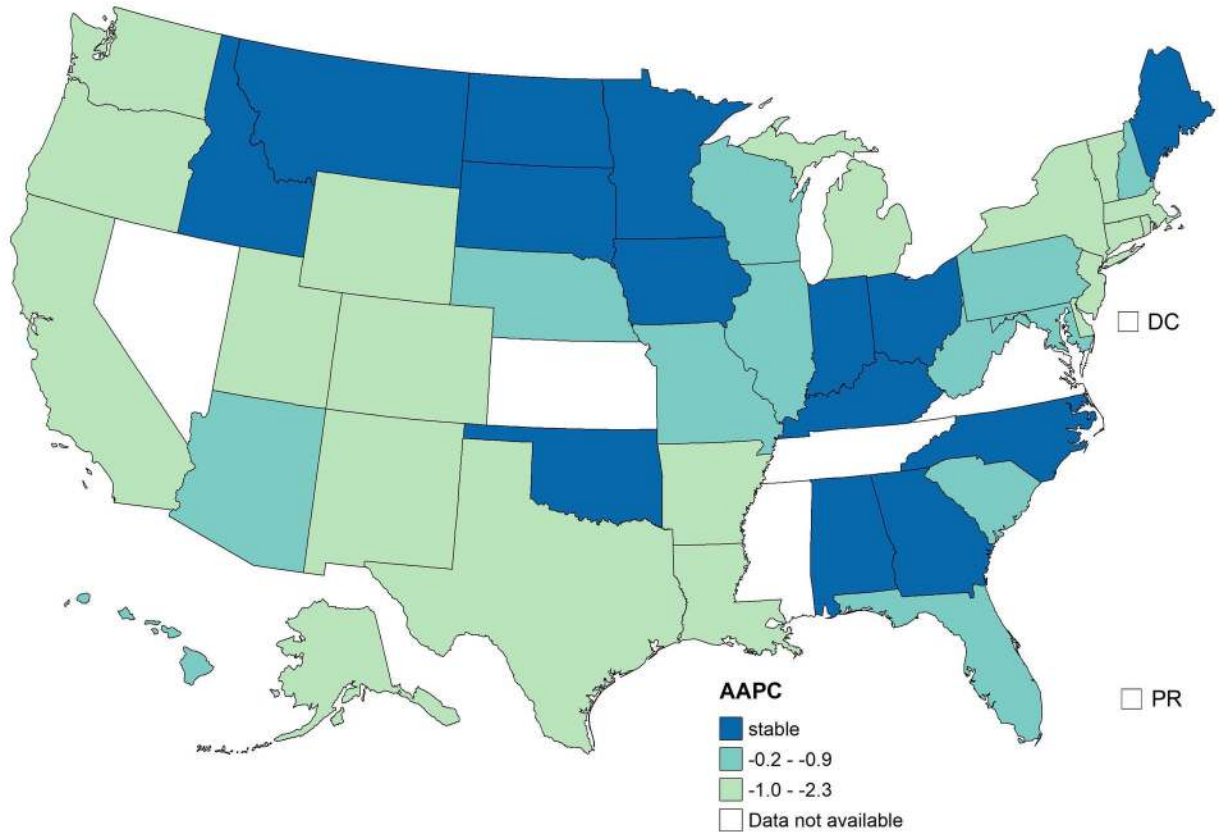


**Figure 3.** Average annual percent change (AAPC) in age-standardized, delay-adjusted incidence rates for 2012–2016 for all sites and the 17 most common cancers in men and the 18 most common cancers in women, all ages, all races/ethnicities combined, among A) males and B) females. The AAPC was a weighted average of the annual percent change (APCs) over the fixed 5-year interval 2012–2016 using the underlying joinpoint regression model, which allowed up to 3 different APCs, for the 16-year period 2001–2016. AAPCs with an asterisk (\*) were statistically significantly different from zero ( $P < 0.05$ ) and are depicted as solid-colored bars; AAPCs with hash marks were not statistically significantly different from zero (stable). Abbreviations: NOS, not otherwise specified.

4a

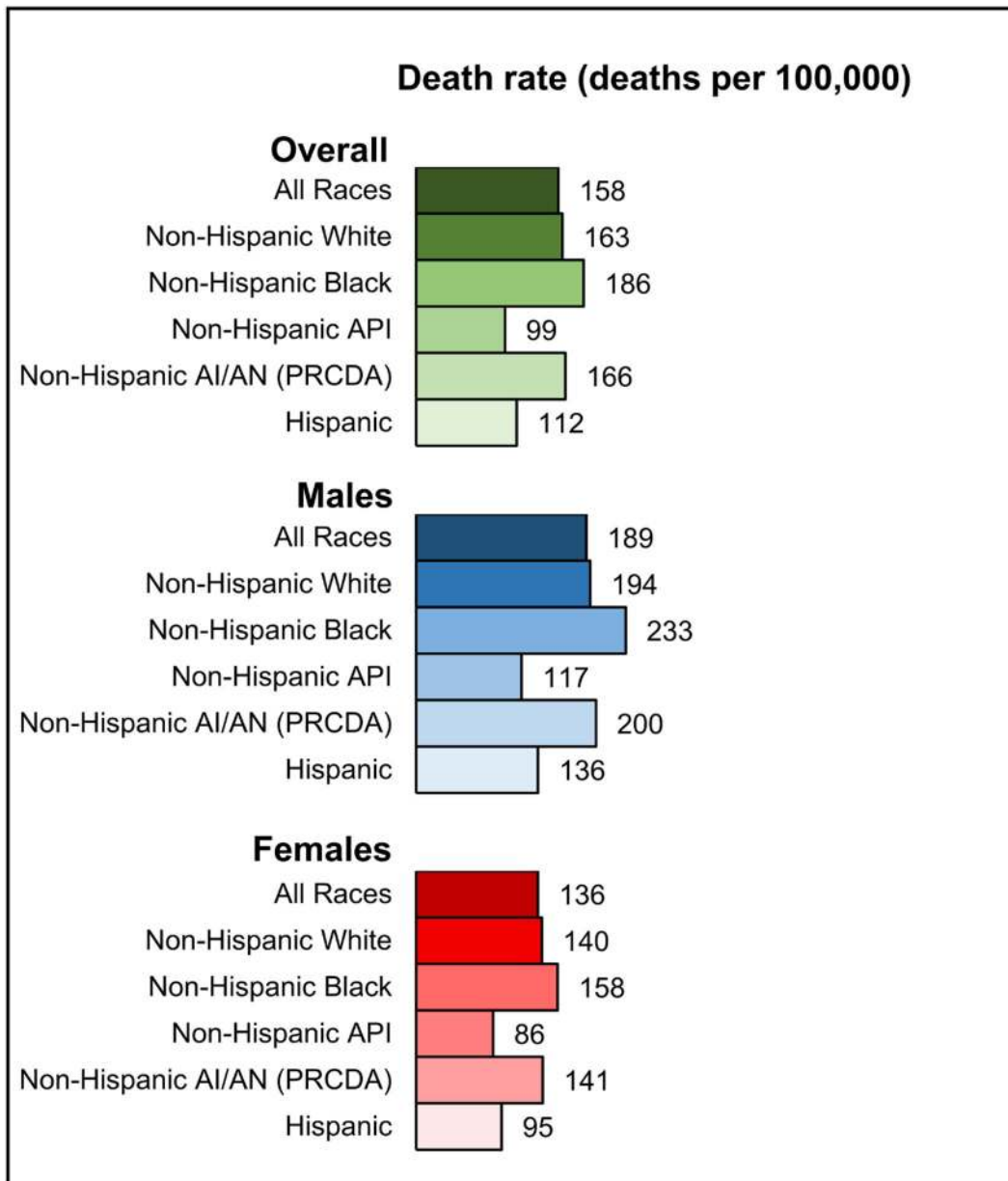


4b

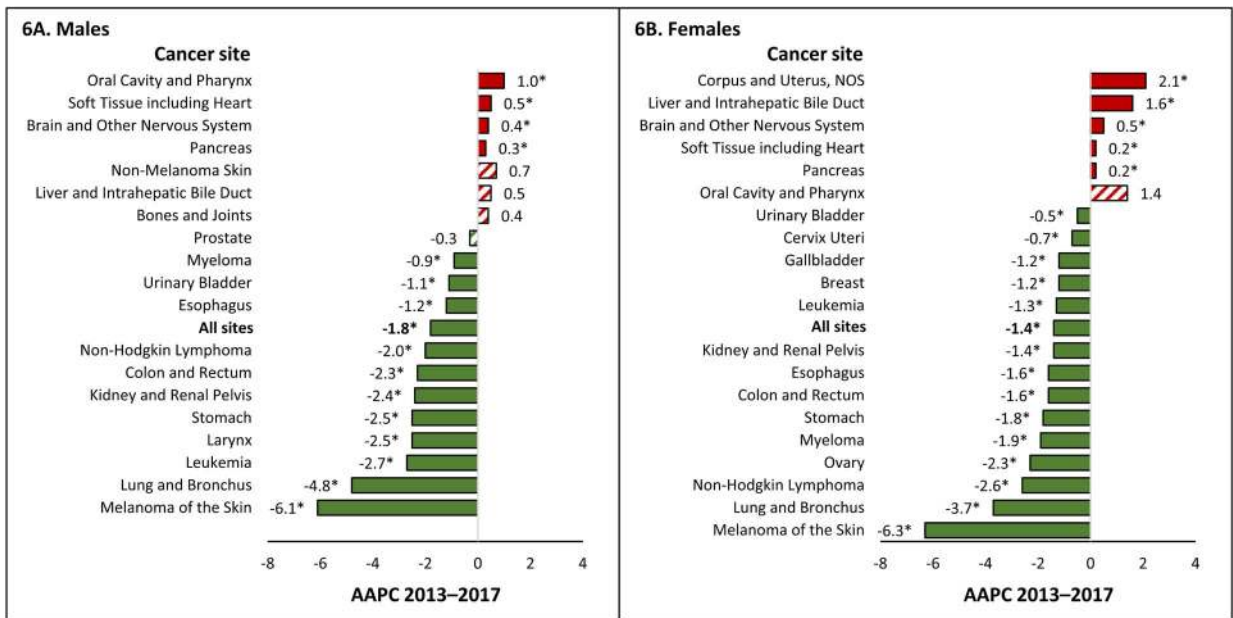


**Figure 4.** Age-standardized, delay-adjusted overall cancer incidence rates for 2012–2016 (A) and average annual percent change (AAPC) in rates for 2012–2016 (B) by state. The AAPC was a weighted average of the annual percent change (APCs) over the fixed 5-year interval 2012–2016 using the underlying joinpoint regression model, which allowed up to 3 different APCs, for the 16-year period 2001–2016. Stable AAPCs were not statistically significantly different from zero ( $P < 0.05$ ).



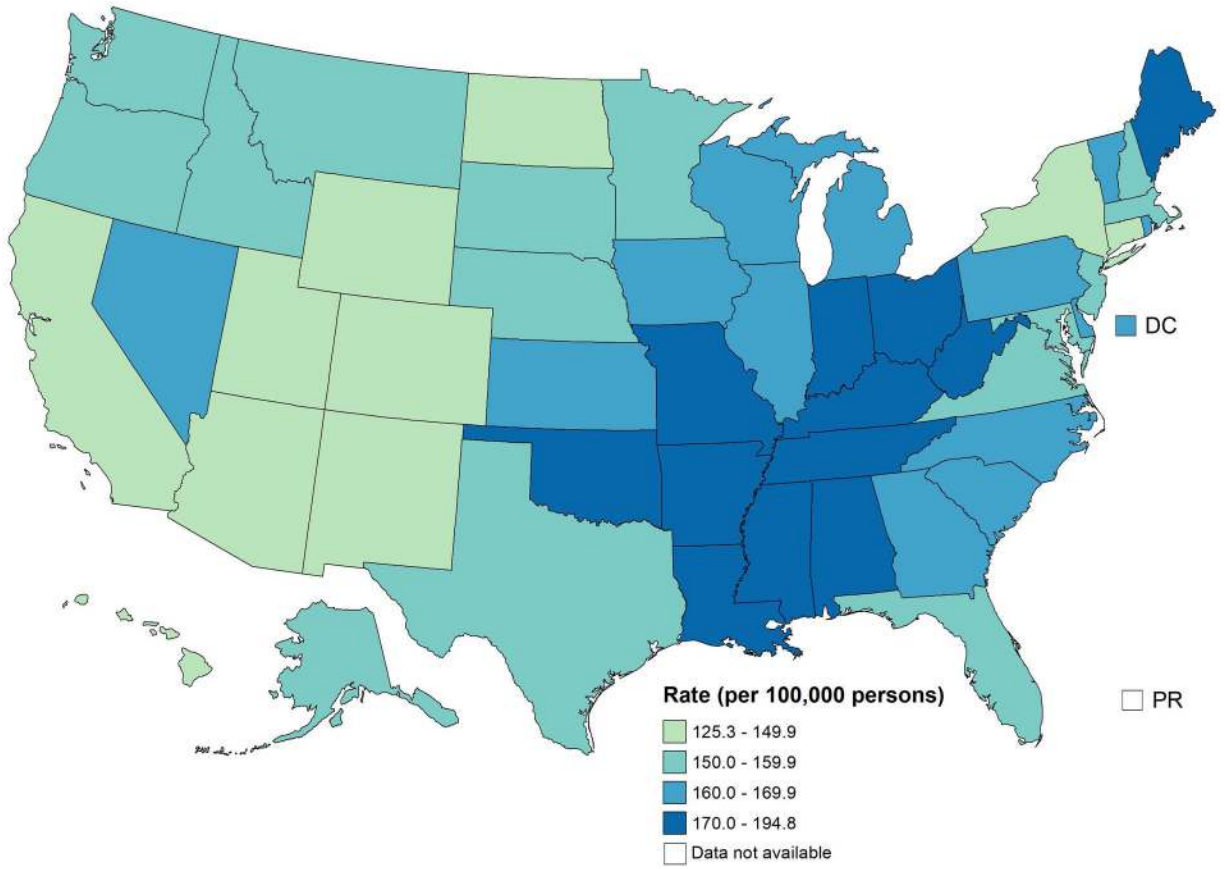


**Figure 5.** Age-standardized, overall cancer death rates for 2013–2017 among males and females by racial/ethnic group. Racial/ethnic groups are mutually exclusive. Data for non-Hispanic AI/AN are restricted to PRCDA counties. Abbreviations: AI/AN, American Indian/Alaska Native; API, Asian/Pacific Islander; PRCDA, Indian Health Service Purchased/Referred Care Delivery Areas.

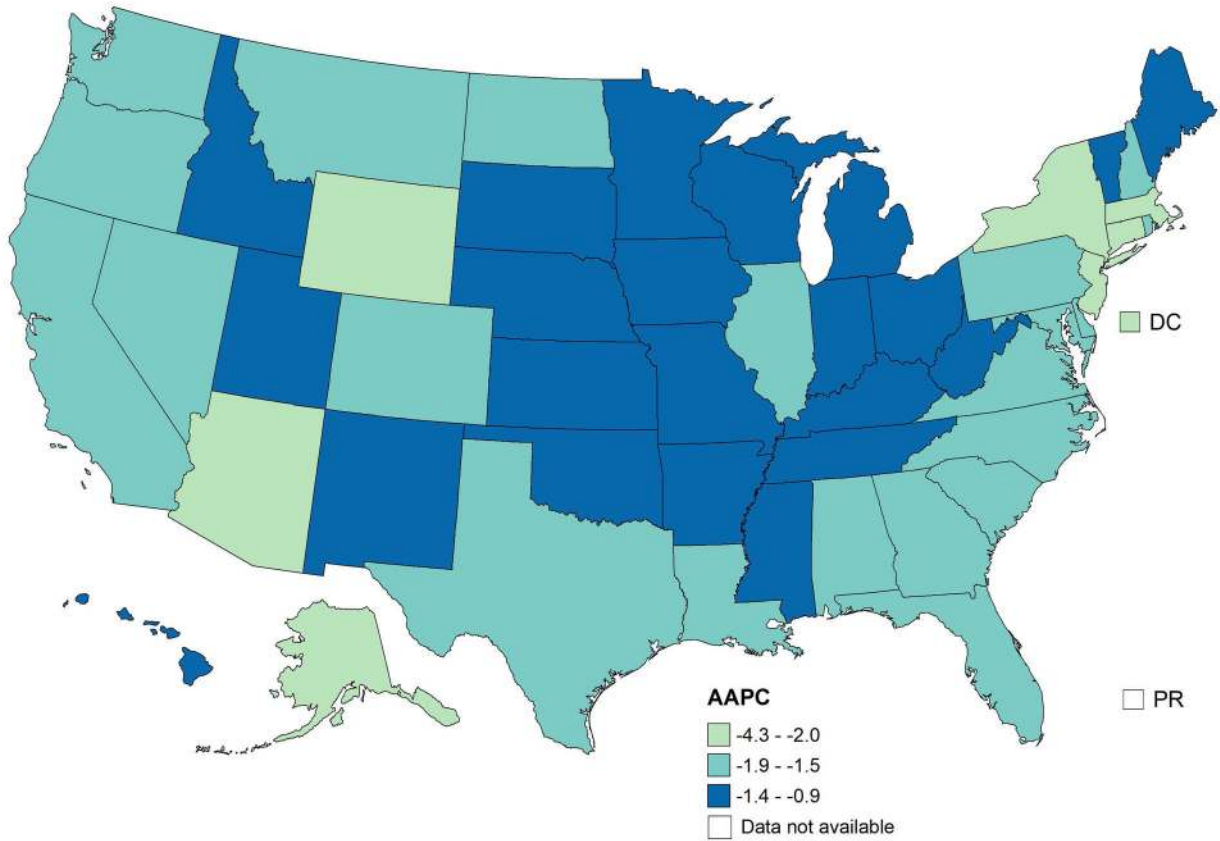


**Figure 6.** Average annual percent change (AAPC) in age-standardized death rates for 2013–2017 for all sites and the 19 most common cancer deaths in men and the 20 most common cancer deaths in women, all ages, all races/ethnicities combined, among A) males and B) females. The AAPC was a weighted average of the annual percent change (APCs) over the fixed 5-year interval 2013–2017 using the underlying joinpoint regression model, which allowed up to 4 different APCs, for the 17-year period 2001–2017. AAPCs with an asterisk (\*) were statistically significantly different from zero ( $P < 0.05$ ) and are depicted as solid-colored bars; AAPCs with hash marks were not statistically significantly different from zero (stable). Abbreviations: NOS, not otherwise specified.

7a



7b



**Figure 7.** Age-standardized overall cancer death rates for 2013–2017 (A) and average annual percent change (AAPC) in rates for 2013–2017 (B) by state. The AAPC was a weighted average of the annual percent change (APCs) over the fixed 5-year interval 2013–2017 using the underlying joinpoint regression model, which allowed up to 4 different APCs, for the 17-year period 2001–2017. Stable AAPCs were not statistically significantly different from zero ( $P < 0.05$ ).

**Table 1.**

Age-standardized, delay-adjusted incidence rates<sup>a</sup> and fixed-interval trends (2012–2016)<sup>b</sup> for the most common cancers, <sup>c</sup> all ages, by sex, age group, and racial/ethnic group<sup>d</sup> for areas in the United States with high-quality incidence data<sup>e</sup>

Sex/cancer site or type	Rank	All Races			Non-Hispanic White			Non-Hispanic Black			Non-Hispanic API			Non-Hispanic AI/AN (PRCDA)			Hispanic		
		Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P
<b>All sites</b>																			
Both sexes		447.9 (447.6, 448.2)	-0.6 (-0.7, -0.5)	<.01	467.5 (467.1, 467.9)	-0.4 (-0.5, -0.3)	<.001	466.9 (465.8, 467.9)	-1.1 (-1.4, -0.8)	<.01	293.6 (292.5, 294.8)	-0.5 (-0.6, -0.4)	<.01	401.4 (396.7, 406.1)	-0.1 (-0.3, 0.1)	.40	348.9 (348.0, 349.7)	-0.8 (-0.9, -0.7)	<.01
Males		487.9 (487.4, 488.4)	-1.0 (-2.4, 0.3)	.14	503.0 (502.4, 503.6)	-0.8 (-2.2, 0.7)	.31	547.6 (545.8, 549.3)	-1.7 (-2.8, -0.6)	<.003	296.5 (294.7, 298.3)	-1.5 (-1.7, -1.3)	<.01	420.0 (412.6, 427.5)	-0.7 (-1.1, -0.3)	.001	377.8 (376.4, 379.2)	-1.4 (-2.1, -0.7)	.001
Females		421.4 (421.0, 421.8)	0.2 (0.1, 0.3)	.007	444.5 (444.0, 445.0)	0.3 (0.2, 0.4)	<.001	412.8 (411.6, 414.1)	0.3 (0.2, 0.4)	<.001	295.7 (294.1, 297.3)	0.4 (0.3, 0.6)	<.001	391.9 (385.8, 398.2)	0.5 (0.3, 0.7)	<.001	333.6 (332.5, 334.8)	0.6 (0.3, 0.9)	.002
Children (ages 00–14 years)		16.8 (16.7, 17.0)	0.8 (0.7, 1.0)	<.01	17.8 (17.6, 18.1)	0.9 (0.7, 1.0)	<.001	13.5 (13.1, 13.8)	1.2 (0.8, 1.6)	<.001	14.7 (14.1, 15.3)	1.8 (1.1, 2.5)	<.001	12.4 (11.2, 13.8)	-0.2 (-1.6, 1.3)	.81	16.3 (16.0, 16.6)	0.5 (0.2, 0.8)	.004
AYA (ages 15–39 years)		75.5 (75.2, 75.7)	0.9 (0.8, 1.0)	<.01	84.1 (83.8, 84.5)	1.1 (1.0, 1.2)	<.001	63.5 (62.9, 64.1)	0.7 (0.6, 0.9)	<.001	54.8 (54.0, 55.6)	1.8 (1.5, 2.0)	<.001	61.9 (59.4, 64.6)	0.8 (0.1, 1.4)	.02	62.0 (61.5, 62.5)	2.4 (1.6, 3.2)	<.01
<b>Males</b>																			
Prostate	1	108.1 (107.9, 108.3)	-2.1 (-9.2, 5.5)	.58	101.7 (101.5, 102.0)	-1.9 (-10.0, 6.9)	.66	182.3 (181.3, 183.3)	-2.1 (-6.3, 2.4)	.36	56.3 (55.5, 57.1)	-3.0 (-9.1, 3.6)	.37	75.7 (72.5, 79.0)	-2.3 (-7.8, 3.4)	.42	98.2 (97.5, 99.0)	-4.0 (-7.6, -0.3)	.04
Lung and bronchus	2	69.5 (69.3, 69.7)	-2.6 (-2.7, -2.4)	<.01	73.4 (73.2, 73.6)	-2.3 (-2.5, -2.2)	<.001	83.9 (83.2, 84.6)	-3.2 (-3.6, -2.7)	<.001	44.4 (43.7, 45.1)	-1.6 (-1.8, -1.3)	<.001	62.9 (60.0, 65.9)	-5.7 (-12.1, 1.3)	.11	36.2 (35.7, 36.6)	-2.8 (-3.0, -2.5)	<.01
Colon and rectum	3	45.1 (45.0, 45.3)	-1.1 (-2.1, -0.2)	.03	44.7 (44.5, 44.9)	-1.2 (-1.9, -0.6)	.002	55.0 (54.4, 55.6)	-2.7 (-3.0, -2.4)	<.001	36.2 (35.5, 36.8)	-2.3 (-2.5, -2.0)	<.001	51.9 (49.3, 54.6)	-0.6 (-1.2, 0.0)	.06	42.9 (42.4, 43.4)	-2.2 (-2.5, -1.9)	<.01
Urinary bladder	4	35.5 (35.4, 35.7)	-1.6 (-2.3, -0.8)	<.01	40.1 (40.0, 40.3)	-1.4 (-2.3, -0.5)	.003	20.4 (20.1, 20.8)	-1.2 (-2.9, 0.7)	.21	15.3 (14.9, 15.8)	-0.6 (-1.0, -0.3)	.001	20.7 (18.9, 22.6)	0.9 (-0.1, 2.0)	.08	19.0 (18.7, 19.4)	-1.5 (-1.8, -1.2)	<.01
Melanoma of the skin	5	28.5 (28.3, 28.6)	2.2 (2.0, 2.4)	<.01	36.4 (36.2, 36.5)	2.6 (2.4, 2.8)	<.001	1.2 (1.1, 1.3)	0.0 (-1.0, 1.1)	.93	1.6 (1.4, 1.7)	-0.5 (-1.2, 0.3)	.18	10.8 (9.6, 12.1)	7.9 (4.9, 11.0)	<.001	5.1 (5.0, 5.3)	0.5 (0.0, 1.1)	.052

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Sex/cancer site or type	All Races			Non-Hispanic White			Non-Hispanic Black			Non-Hispanic API			Non-Hispanic AI/AN (PRCDA)			Hispanic			
	Rank	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P
Non-Hodgkin lymphoma	6	23.8 (23.6, 23.9)	-1.0 (-2.3, 0.2)	.11	25.1 (25.0, 25.2)	-0.9 (-2.1, 0.3)	.14	17.9 (17.5, 18.2)	0.3 (0.0, 0.5)	<i>f</i>	16.4 (16.0, 16.8)	0.4 (0.0, 0.9)	<i>f</i>	16.6 (15.2, 18.2)	-0.8 (-2.2, 0.6)	.24	20.1 (19.8, 20.4)	0.0 (-0.4, 0.4)	.91
Kidney and renal pelvis	7	22.9 (22.8, 23.0)	1.5 (1.3, 1.7)	<i>f</i>	23.4 (23.3, 23.5)	1.6 (1.3, 2.0)	<.001	26.6 (26.2, 26.9)	1.3 (0.7, 1.8)	<i>f</i>	11.4 (11.1, 11.8)	0.7 (-0.6, 2.0)	.28	31.8 (29.9, 33.8)	0.7 (-0.4, 1.9)	.19	20.8 (20.5, 21.2)	2.2 (1.4, 3.1)	<.001
Leukemia	8	19.4 (19.3, 19.5)	-0.1 (-1.5, 1.4)	.94	20.7 (20.6, 20.9)	0.2 (-1.6, 1.9)	.86	15.1 (14.8, 15.5)	1.1 (0.6, 1.6)	<i>f</i>	10.3 (9.9, 10.6)	0.8 (0.2, 1.4)	.02	14.2 (12.8, 15.6)	1.0 (-0.4, 2.4)	.15	14.2 (13.9, 14.5)	0.7 (0.2, 1.2)	.005
Oral cavity and pharynx	9	18.1 (18.0, 18.2)	1.2 (1.0, 1.4)	<i>f</i>	20.0 (19.9, 20.1)	1.9 (1.6, 2.1)	<.001	14.6 (14.4, 14.9)	-1.8 (-2.2, -1.5)	<i>f</i>	11.6 (11.3, 12.0)	0.7 (0.2, 1.2)	.006	15.2 (13.9, 16.5)	1.3 (-0.1, 2.7)	.06	11.3 (11.0, 11.5)	-0.6 (-1.0, -0.1)	.02
Pancreas	10	14.7 (14.6, 14.8)	1.1 (1.0, 1.1)	<i>f</i>	14.9 (14.8, 15.0)	1.2 (1.1, 1.4)	<.001	17.8 (17.4, 18.1)	0.6 (0.3, 1.0)	<i>f</i>	10.3 (10.0, 10.7)	0.6 (0.2, 1.0)	.01	13.2 (11.9, 14.6)	2.2 (0.4, 4.0)	.02	11.9 (11.7, 12.2)	0.5 (0.1, 0.8)	.01
Liver and intrahepatic bile duct	11	13.0 (12.9, 13.0)	2.5 (1.9, 3.1)	<i>f</i>	10.8 (10.7, 10.9)	2.1 (0.8, 3.5)	.005	18.4 (18.1, 18.7)	1.9 (0.7, 3.1)	<i>f</i>	20.0 (19.6, 20.5)	-0.9 (-1.3, -0.6)	<.001	22.6 (21.1, 24.2)	4.7 (3.4, 6.1)	<i>f</i>	19.6 (19.3, 19.9)	0.4 (-0.6, 1.4)	.44
Stomach	12	9.1 (9.0, 9.1)	-1.5 (-3.0, 0.1)	.06	7.7 (7.7, 7.8)	-1.6 (-2.5, -0.8)	.002	14.1 (13.8, 14.4)	-1.9 (-2.1, -1.6)	<i>f</i>	13.6 (13.2, 14.0)	-2.8 (-3.3, -2.4)	<.001	12.0 (10.7, 13.3)	-3 (-4.0, -1.9)	<i>f</i>	12.1 (11.8, 12.3)	-2.0 (-2.4, -1.7)	<.001
Myeloma	13	9.0 (9.0, 9.1)	1.1 (-0.1, 2.4)	.07	8.3 (8.2, 8.3)	1.1 (-0.1, 2.4)	.07	17.7 (17.4, 18.1)	2.1 (1.8, 2.5)	<i>f</i>	5.2 (4.9, 5.4)	-1.5 (-4.0, 1.1)	.27	9.2 (8.0, 10.4)	2.3 (-0.9, 4.9)	.71	8.4 (8.2, 8.6)	-0.6 (-3.2, 2.1)	.62
Esophagus	14	7.9 (7.9, 8.0)	-0.5 (-1.3, 0.3)	.20	8.7 (8.7, 8.8)	-0.6 (-1.0, -0.2)	.005	6.6 (6.5, 6.8)	-4.6 (-5.0, -4.3)	<i>f</i>	3.6 (3.4, 3.8)	-0.9 (-2.0, 0.1)	.08	7.9 (7.0, 9.0)	-0.2 (-2.3, 2.0)	.86	5.0 (4.8, 5.1)	-1.7 (-2.3, -1.2)	<.001
Brain and other nervous system	15	7.8 (7.7, 7.8)	-0.3 (-0.4, -0.2)	<i>f</i>	8.9 (8.8, 8.9)	0.0 (-0.1, 0.1)	.78	5.0 (4.9, 5.2)	0.3 (-0.3, 0.8)	<i>f</i>	4.4 (4.2, 4.6)	-0.5 (-1.7, 0.8)	.40	5.1 (4.4, 5.9)	-0.3 (-2.4, 1.8)	.74	5.7 (5.6, 5.9)	-0.9 (-1.1, -0.7)	<.001
Thyroid	16	7.5 (7.5, 7.6)	0.5 (-1.6, 2.6)	.65	8.4 (8.3, 8.4)	0.6 (-1.5, 2.6)	.58	4.0 (3.9, 4.2)	1.8 (-0.5, 4.1)	<i>f</i>	7.4 (7.1, 7.7)	0.5 (-3.4, 4.5)	.82	5.0 (4.3, 5.8)	4.8 (2.3, 7.3)	<i>f</i>	6.2 (6.1, 6.4)	2.4 (0.8, 4.0)	.007
Larynx	17	5.8 (5.7, 5.8)	-2.3 (-2.5, -2.2)	<i>f</i>	5.9 (5.8, 5.9)	-1.9 (-2.1, -1.8)	<.001	8.4 (8.1, 8.6)	-3.1 (-3.5, -2.8)	<i>f</i>	2.0 (1.9, 2.2)	-2.7 (-4.1, -1.3)	.001	5.3 (4.5, 6.1)	-1.5 (-3.1, 0.1)	.07	4.8 (4.6, 4.9)	-3.2 (-3.7, -2.8)	<.001

Females



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Sex/cancer site or type	All Races			Non-Hispanic White			Non-Hispanic Black			Non-Hispanic API			Non-Hispanic AI/AN (PRCDA)			Hispanic			
	Rank	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P
Breast	1	126.8 (126.5, 127.0)	0.5 (0.3, 0.6)	<.01	133.0 (132.7, 133.3)	0.6 (0.4, 0.7)	<.01	129.6 (128.9, 130.3)	0.6 (0.3, 0.9)	.00	96.5 (95.6, 97.4)	1.5 (1.2, 1.9)	<.01	102.5 (99.4, 105.6)	0.8 (0.3, 1.2)	.00	96.1 (95.5, 96.6)	0.3 (0.1, 0.6)	.01
Lung and bronchus	2	51.8 (51.7, 51.9)	-1.1 (-1.3, -1.0)	<.01	57.5 (57.3, 57.7)	-0.9 (-1.0, -0.7)	<.01	49.3 (48.9, 49.8)	-1.6 (-2.0, -1.1)	<.01	28.2 (27.7, 28.7)	-1.5 (-3.1, 0.2)	.08	51.2 (48.9, 53.5)	-0.3 (-0.8, 0.2)	.22	23.1 (22.8, 23.4)	-0.8 (-1.1, -0.6)	<.01
Colon and rectum	3	34.4 (34.3, 34.6)	-0.3 (-0.7, 0.1)	.15	34.4 (34.3, 34.6)	-0.5 (-0.7, -0.3)	.001	40.8 (40.4, 41.2)	-1.3 (-2.6, 0.0)	.06	26.3 (25.8, 26.8)	-2.4 (-2.7, -2.1)	<.01	41.8 (39.8, 43.9)	-0.7 (-1.2, -0.2)	.01	30.0 (29.7, 30.3)	0.3 (-0.9, 1.6)	.54
Corpus and uterus, NOS	4	26.9 (26.8, 27.1)	1.3 (1.2, 1.4)	<.01	27.6 (27.5, 27.8)	1.1 (1.0, 1.3)	<.01	27.1 (26.8, 27.4)	2.4 (2.2, 2.6)	<.01	19.4 (19.0, 19.8)	2.2 (1.9, 2.5)	<.01	24.5 (23.1, 26.0)	1.7 (0.7, 2.6)	.00	24.0 (23.8, 24.3)	2.9 (2.4, 3.4)	<.01
Thyroid	5	22.0 (21.9, 22.1)	-0.2 (-1.3, 0.8)	.65	23.3 (23.2, 23.5)	-0.3 (-1.3, 0.7)	.50	14.2 (14.0, 14.5)	-0.1 (-2.3, 2.2)	.94	22.4 (22.0, 22.8)	-1.8 (-4.0, 0.5)	.11	16.9 (15.7, 18.1)	5.0 (3.9, 6.1)	<.01	23.3 (23.1, 23.6)	1.7 (0.5, 2.9)	.01
Melanoma of the skin	6	17.6 (17.5, 17.6)	1.9 (1.5, 2.2)	<.01	23.8 (23.7, 23.9)	2.5 (2.1, 2.8)	<.01	0.9 (0.9, 1.0)	-0.5 (-1.5, 0.4)	.25	1.2 (1.1, 1.3)	-0.3 (-0.9, 0.9)	.58	6.9 (6.0, 7.7)	2.1 (0.6, 3.6)	.00	4.4 (4.3, 4.5)	0.5 (-0.2, 1.2)	.14
Non-Hodgkin lymphoma	7	16.4 (16.3, 16.5)	-0.1 (-0.2, 0.0)	.16	17.1 (17.0, 17.2)	-0.1 (-0.2, 0.1)	.23	12.7 (12.5, 13.0)	0.5 (0.3, 0.8)	.00	11.2 (10.9, 11.5)	0.3 (-0.2, 0.9)	.23	14.2 (13.0, 15.4)	-0.7 (-1.7, 0.3)	.14	15.4 (15.2, 15.7)	0.3 (0.0, 0.6)	.07
Kidney and renal pelvis	8	11.7 (11.7, 11.8)	0.6 (0.3, 0.9)	.00	11.8 (11.7, 11.9)	1.2 (0.1, 2.2)	.03	13.6 (13.3, 13.8)	0.5 (-0.3, 1.3)	.17	5.3 (5.1, 5.5)	1.1 (0.2, 2.0)	.02	18.8 (17.5, 20.1)	1.5 (0.4, 2.7)	.01	11.8 (11.6, 12.0)	1.6 (1.2, 1.9)	<.01
Leukemia	9	11.7 (11.6, 11.8)	0.0 (-1.3, 1.3)	.98	12.3 (12.3, 12.4)	0.0 (-1.5, 1.6)	.95	9.7 (9.5, 9.9)	0.4 (-1.8, 2.7)	.69	6.6 (6.4, 6.8)	1.0 (0.5, 1.6)	.00	8.7 (7.8, 9.7)	0.4 (-1.3, 2.1)	.65	10.0 (9.8, 10.2)	1.4 (0.9, 1.9)	<.01
Ovary	10	11.4 (11.3, 11.4)	-1.6 (-1.7, -1.4)	<.01	11.9 (11.8, 12.0)	-1.7 (-1.8, -1.5)	<.01	9.4 (9.2, 9.6)	-0.8 (-1.1, -0.4)	<.01	9.5 (9.2, 9.8)	-0.2 (-0.6, 0.2)	.36	11.2 (10.2, 12.3)	-1.2 (-2.9, 0.5)	.14	10.2 (10.0, 10.4)	-1.3 (-1.6, -1.0)	<.01
Pancreas	11	11.3 (11.2, 11.4)	1.0 (0.9, 1.2)	<.01	11.2 (11.1, 11.2)	1.2 (1.0, 1.3)	<.01	14.9 (14.6, 15.1)	0.6 (0.3, 1.0)	.00	8.8 (8.6, 9.1)	0.7 (0.2, 1.2)	.00	10.7 (9.7, 11.8)	0.5 (-0.9, 1.9)	.47	10.0 (9.8, 10.2)	0.6 (0.4, 0.9)	<.01
Urinary bladder	12	8.8 (8.7, 8.8)	-0.9 (-1.1, -0.7)	<.01	9.8 (9.8, 9.9)	-0.7 (-0.8, -0.5)	<.01	6.8 (6.6, 6.9)	-0.4 (-0.7, 0.0)	.03	3.7 (3.6, 3.9)	-0.8 (-1.7, 0.2)	.11	5.9 (5.1, 6.7)	1.3 (-0.5, 3.1)	.15	5.0 (4.8, 5.1)	-1.3 (-1.9, -0.8)	<.01
Cervix	13	7.7 (7.7, 7.8)	1.0 (-0.3, 2.4)	.15	7.2 (7.1, 7.3)	1.4 (-0.1, 3.0)	.07	9.3 (9.1, 9.5)	-2.3 (-2.7, -1.9)	<.01	6.2 (5.9, 6.4)	-1.9 (-2.5, -1.3)	<.01	9.4 (8.5, 10.3)	-0.2 (-1.2, 0.8)	.70	10.0 (9.8, 10.1)	1.1 (-0.4, 2.7)	.14

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Sex/cancer site or type	Rank	All Races			Non-Hispanic White			Non-Hispanic Black			Non-Hispanic API			Non-Hispanic AI/AN (PRCDA)			Hispanic		
		Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P
Oral cavity and pharynx	14	6.5 (6.5, 6.6)	0.5 (0.3, 0.7)	<.01	7.1 (7.0, 7.2)	0.9 (0.7, 1.1)	<.01	5.3 (5.1, 5.4)	-0.7 (-0.9, -0.4)	<.01	5.4 (5.2, 5.6)	0.2 (-0.6, 1.0)	.68	5.9 (5.2, 6.7)	-0.3 (-2.2, 1.7)	.75	4.3 (4.2, 4.5)	0.3 (-0.3, 1.0)	.25
Myeloma	15	5.9 (5.8, 5.9)	1.2 (0.4, 2.0)	<.01	5.0 (4.9, 5.0)	1.0 (0.0, 2.0)	.049	13.1 (12.9, 13.4)	2.3 (2.0, 2.7)	<.01	3.2 (3.0, 3.4)	0.9 (0.0, 1.7)	.04	6.3 (5.5, 7.1)	0.2 (-1.8, 2.2)	.87	5.8 (5.7, 6.0)	2.0 (1.0, 2.9)	.00
Brain and other nervous system	16	5.6 (5.6, 5.7)	-0.5 (-0.8, -0.3)	.00	6.4 (6.3, 6.5)	-0.3 (-0.6, 0.0)	.07	3.6 (3.5, 3.8)	-0.2 (-0.6, 0.3)	.48	3.3 (3.1, 3.5)	-1.7 (-6.3, 3.1)	.47	3.3 (2.8, 3.9)	-4.4 (-6.9, -1.8)	.00	4.5 (4.4, 4.6)	-0.7 (-1.1, -0.3)	.00
Stomach	17	4.7 (4.7, 4.7)	0.1 (-0.4, 0.6)	.61	3.5 (3.5, 3.6)	0.0 (-0.6, 0.6)	.98	7.6 (7.4, 7.8)	-1.2 (-1.6, -0.9)	<.01	8.0 (7.8, 8.3)	-2.5 (-3.1, -2.0)	<.01	6.9 (6.1, 7.7)	-1.5 (-3.2, 0.3)	.09	7.7 (7.5, 7.8)	-1.3 (-1.7, -0.9)	<.01
Liver and intrahepatic bile duct	18	4.5 (4.5, 4.6)	3.7 (3.4, 4.0)	<.01	3.8 (3.7, 3.8)	4.0 (3.7, 4.2)	<.01	5.6 (5.4, 5.7)	3.7 (3.1, 4.2)	<.01	7.5 (7.3, 7.8)	-1.0 (-1.5, -0.4)	.00	9.8 (8.9, 10.8)	2.9 (1.3, 4.5)	.00	7.5 (7.3, 7.7)	2.3 (1.8, 2.8)	<.01
<b>Children</b>																			
Leukemia	1	5.2 (5.1, 5.3)	0.9 (0.5, 1.2)	<.01	5.3 (5.2, 5.4)	0.8 (0.5, 1.1)	<.01	3.3 (3.1, 3.5)	1.6 (1.0, 2.3)	<.01	5.2 (4.9, 5.6)	0.6 (-0.2, 1.5)	.15	4.7 (3.9, 5.6)	15.3 (0.6, 32.0)	.04	6.2 (6.0, 6.4)	0.8 (0.2, 1.4)	.01
Brain and other nervous system	2	3.8 (3.7, 3.8)	0.8 (0.5, 1.1)	<.01	4.3 (4.2, 4.4)	1.0 (0.6, 1.4)	<.01	3.0 (2.8, 3.1)	1.5 (0.7, 2.3)	.00	2.8 (2.5, 3.0)	1.1 (-0.1, 2.4)	.07	2.4 (1.9, 3.1)	— <sup>g</sup>	.00	3.0 (2.9, 3.1)	0.0 (-0.4, 0.4)	.99
Lymphoma	3	1.6 (1.6, 1.7)	0.9 (0.4, 1.4)	.00	1.7 (1.6, 1.8)	5.2 (0.7, 9.8)	.03	1.6 (1.5, 1.7)	1.6 (0.5, 2.6)	.00	1.4 (1.3, 1.6)	0.5 (-1.0, 2.1)	.50	1.2 (0.8, 1.6)	— <sup>g</sup>	.38	1.5 (1.4, 1.6)	0.3 (-0.4, 0.9)	.00
<b>AYA</b>																			
Female breast	1	22.4 (22.2, 22.6)	1.2 (0.5, 1.8)	.00	23.1 (22.8, 23.3)	0.6 (0.4, 0.8)	<.00	27.1 (26.6, 27.7)	0.5 (0.2, 0.7)	.00	19.8 (19.2, 20.5)	0.9 (0.4, 1.5)	.00	16.6 (14.6, 18.7)	0.3 (-1.4, 2.2)	.69	17.6 (17.2, 18.0)	2.0 (-0.1, 4.2)	.06
Thyroid	2	12.2 (12.1, 12.3)	1.7 (0.6, 2.8)	.00	14.0 (13.8, 14.1)	1.4 (0.3, 2.5)	.02	5.8 (5.6, 6.0)	-0.1 (-5.5, 5.5)	.96	12.1 (11.7, 12.5)	0.0 (-3.1, 3.1)	.99	8.6 (7.7, 9.6)	3.7 (2.4, 4.9)	<.01	10.5 (10.3, 10.7)	4.7 (4.2, 5.3)	<.01
Testis	3	10.9 (10.8, 11.1)	0.8 (0.6, 0.9)	<.01	13.5 (13.3, 13.6)	0.6 (0.4, 0.8)	<.00	2.5 (2.4, 2.7)	0.5 (-0.7, 1.8)	.36	4.0 (3.7, 4.3)	3.3 (2.1, 4.5)	<.01	10.8 (9.5, 12.3)	0.6 (-0.7, 2.0)	.32	10.8 (10.5, 11.1)	2.9 (2.4, 3.4)	<.01

Sex/cancer site or type	All Races			Non-Hispanic White			Non-Hispanic Black			Non-Hispanic API			Non-Hispanic AI/AN (PRCDA)			Hispanic				
	Rank	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	
Lymphoma	4	7.7 (7.6, 7.8)	-0.4 (-0.5, -0.3)	<.01	8.3 (8.2, 8.4)	-0.4 (-0.5, -0.2)	<i>f</i>	<.01	8.4 (8.2, 8.6)	-0.3 (-0.6, 0.0)	.06	5.2 (5.0, 5.5)	2.1 (1.4, 2.7)	<i>f</i>	<.01	4.0 (3.3, 4.6)	-0.4 (-2.6, 2.0)	6.1 (6.0, 6.3)	-0.1 (-0.4, 0.2)	.43

Abbreviations: AAPC, average annual percent change; AI/AN, American Indian/Alaska Native; API, Asian/Pacific Islander; AYA, adolescents and young adults; CI, confidence interval; NAACCR, North American Association of Central Cancer Registries; NOS, not otherwise specified; NPCR, National Program of Cancer Registries; PRCDA, Indian Health Services Purchased/Referred Care Delivery Area; SEER, Surveillance, Epidemiology, and End Results.

<sup>a</sup>Rates are per 100,000 persons, adjusted for potential delays in reporting, and age standardized to the 2000 US standard population (19 age groups - Census P25-1130).

<sup>b</sup>Fixed interval trends are characterized as the average annual percent change (AAPC), the weighted average of the annual percent changes over the fixed interval 2012–2016, using the underlying Joinpoint model (with up to two joinpoints) for the period of 2001–2016. Joinpoint Regression Program, Version 4.7.0.0 February 2019, Statistical Research and Applications Branch, National Cancer Institute.

<sup>c</sup>Cancers are listed in descending rank order of sex-specific, age-adjusted incidence rates for 2012–2016 for all racial/ethnic groups combined. More than 15 cancers may appear males and females to include the top 15 cancers in each racial/ethnic group.

<sup>d</sup>Racial/ethnic groups are mutually exclusive. Data for non-Hispanic AI/AN are restricted to PRCDA counties (excluding Minnesota).

<sup>e</sup>NPCR and SEER areas reported by NAACCR as meeting high-quality incidence data standards for the specified time periods. Registries included in the incidence rate analysis (49 states and 1 Territory): Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Puerto Rico, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming. Registries included in the Joinpoint regression analysis (46 states): Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Texas, Utah, Vermont, Washington, West Virginia, Wisconsin, Wyoming.

<sup>f</sup>The AAPC is statistically significantly different from zero ( $P < .05$ ). Two-sided statistical significance for AAPC was determined using a *t*-test when the AAPC lay entirely within the last joinpoint segment or a *z*-test when the AAPC extended beyond the last joinpoint segment.

<sup>g</sup>The statistic could not be calculated. The average annual percent change is based on <10 cases for at least 1 year within the time interval

Joinpoint trends<sup>a</sup> in age-standardized, delay-adjusted incidence rates for the most common cancers,<sup>b</sup> all races/ethnicities combined by sex and age group, for areas in the United States with high-quality incidence data,<sup>c</sup> 2001–2016

**Table 2.**

Sex/Cancer Site or Type	Trend 1			Trend 2			Trend 3			Fixed Interval 2012–2016		
	Years	APC (95% CI)	P	Years	APC (95% CI)	P	Years	APC (95% CI)	P	Years	APC (95% CI) <sup>d</sup>	P
<b>All sites</b>			1									
Both sexes	2001–2016	-0.6 (-0.7, -0.5)	e <.001									
Males	2001–2008	-0.6 (-1.2, 0.0)	e .04	2008–2013	-2.3 (-3.6, -0.9)	e .004	2013–2016	-0.6 (-2.7, 1.5)	.52		-1.0 (-2.4, 0.3)	.14
Females	2001–2003	-1.1 (-3.1, 1.0)	e .28	2003–2016	0.2 (0.1, 0.3)	e .007					0.2 (0.1, 0.3)	e .007
Children (ages 0–14 years)	2001–2016	0.8 (0.7, 1.0)	<.001								0.8 (0.7, 1.0)	e <.001
AYA (ages 15–39 years)	2001–2016	0.9 (0.8, 1.0)	e <.001								0.9 (0.8, 1.0)	e <.001
<b>Males</b>			e									
Prostate	2001–2009	-1.6 (-3.2, 0.1)	.06	2009–2014	-7.5 (-12.2, -2.6)	e .008	2014–2016	3.7 (-12.4, 22.8)	.64		-2.1 (-9.2, 5.5)	.58
Lung and bronchus	2001–2007	-1.6 (-1.8, -1.3)	<.001	2007–2016	-2.6 (-2.7, -2.4)	e <.001					-2.6 (-2.7, -2.4)	e <.001
Colon and rectum	2001–2012	-3.2 (-3.4, -3.0)	e <.001	2012–2016	-1.1 (-2.1, -0.2)	e .03					-1.1 (-2.1, -0.2)	e .03
Urinary bladder	2001–2005	0.1 (-0.5, 0.7)	e .72	2005–2014	-0.9 (-1.1, -0.7)	e <.001	2014–2016	-2.3 (-4.0, -0.5)	e .02		-1.6 (-2.3, -0.8)	e <.001
Melanoma of the skin	2001–2016	2.2 (2.0, 2.4)	<.001								2.2 (2.0, 2.4)	e <.001
Non-Hodgkin lymphoma	2001–2014	0.3 (0.1, 0.4)	e .003	2014–2016	-2.3 (-5.1, 0.5)	.10					-1.0 (-2.3, 0.2)	.11
Kidney and renal pelvis	2001–2007	3.0 (2.8, 3.2)	e <.001	2007–2011	0.0 (-0.5, 0.5)	.88	2011–2016	1.5 (1.3, 1.7)	e <.001		1.5 (1.3, 1.7)	e <.001
Leukemia	2001–2007	-0.2 (-0.8, 0.4)	e .43	2007–2014	2.1 (1.5, 2.7)	e <.001	2014–2016	-2.1 (-5.3, 1.1)	.17		-0.1 (-1.5, 1.4)	.94
Oral cavity and pharynx	2001–2005	-0.1 (-1.3, 1.1)	.87	2005–2016	1.2 (1.0, 1.4)	e <.001					1.2 (1.0, 1.4)	e <.001
Pancreas	2001–2016	1.1 (1.0, 1.1)	<.001								1.1 (1.0, 1.1)	e <.001
Liver and intrahepatic bile duct	2001–2009	4.7 (4.1, 5.3)	e <.001	2009–2016	2.5 (1.9, 3.1)	e <.001					2.5 (1.9, 3.1)	e <.001

Sex/Cancer Site or Type	Trend 1			Trend 2			Trend 3			Fixed Interval 2012–2016		
	Years	APC (95% CI)	P	Years	APC (95% CI)	P	Years	APC (95% CI)	P	Years	APC (95% CI) <sup>d</sup>	P
Stomach	2001–2006	-2.1 (-3.0, -1.3)	e <.001	2006–2014	-0.4 (-0.9, 0.1)	.07	2014–2016	-2.5 (-6.0, 1.1)	.14	2014–2016	-1.5 (-3.0, 0.1)	.06
Myeloma	2001–2007	0.7 (0.2, 1.3)	e .02	2007–2014	2.8 (2.3, 3.4)	e <.001	2014–2016	-0.5 (-3.3, 2.3)	.67	2014–2016	1.1 (-0.1, 2.4)	.07
Esophagus	2001–2008	0.3 (-0.2, 0.8)	.27	2008–2011	-2.9 (-6.4, 0.7)	.10	2011–2016	-0.5 (-1.3, 0.3)	.20	2011–2016	-0.5 (-1.3, 0.3)	.20
Brain and other nervous system	2001–2016	-0.3 (-0.4, -0.2)	<.001								-0.3 (-0.4, -0.2)	e <.001
Thyroid	2001–2009	7.0 (6.3, 7.7)	e <.001	2009–2014	2.2 (0.6, 3.8)	e .01	2014–2016	-1.2 (-5.7, 3.5)	.56	2014–2016	0.5 (-1.6, 2.6)	.65
Larynx	2001–2016	-2.3 (-2.5, -2.2)	e <.001								-2.3 (-2.5, -2.2)	e <.001
<b>Females</b>			e									
Breast	2001–2004	-2.8 (-4.3, -1.3)	.002	2004–2016	0.5 (0.3, 0.6)	e <.001					0.5 (0.3, 0.6)	e <.001
Lung and bronchus	2001–2006	0.7 (0.2, 1.2)	e .01	2006–2016	-1.1 (-1.3, -1.0)	e <.001					-1.1 (-1.3, -1.0)	e <.001
Colon and rectum	2001–2007	-2.4 (-2.6, -2.2)	e <.001	2007–2012	-3.4 (-3.8, -3.0)	e <.001	2012–2016	-0.3 (-0.7, 0.1)	.15	2012–2016	-0.3 (-0.7, 0.1)	.15
Corpus and uterus, NOS	2001–2003	-2.1 (-4.4, 0.3)	e .09	2003–2016	1.3 (1.2, 1.4)	e <.001	2013–2016	-1.1 (-2.7, 0.5)	.15	2013–2016	1.3 (1.2, 1.4)	e <.001
Thyroid	2001–2009	7.3 (6.8, 7.8)	<.001	2009–2013	2.3 (0.7, 4.0)	e .01					-0.2 (-1.3, 0.8)	.65
Melanoma of the skin	2001–2016	1.9 (1.5, 2.2)	e <.001								1.9 (1.5, 2.2)	e <.001
Non-Hodgkin lymphoma	2001–2016	-0.1 (-0.2, 0.0)	e .16								-0.1 (-0.2, 0.0)	.16
Kidney and renal pelvis	2001–2006	3.8 (2.7, 4.9)	<.001	2006–2016	0.6 (0.3, 0.9)	e .002					0.6 (0.3, 0.9)	e .002
Leukemia	2001–2008	0.2 (-0.6, 1.1)	e .52	2008–2011	3.6 (-2.4, 10.1)	.21	2011–2016	0.0 (-1.3, 1.3)	.98	2011–2016	0.0 (-1.3, 1.3)	.98
Ovary	2001–2016	-1.6 (-1.7, -1.4)	<.001								-1.6 (-1.7, -1.4)	e <.001
Pancreas	2001–2016	1.0 (0.9, 1.2)	e <.001								1.0 (0.9, 1.2)	e <.001
Urinary bladder	2001–2016	-0.9 (-1.1, -0.7)	e <.001								-0.9 (-1.1, -0.7)	e <.001
Cervix	2001–2003	-3.8 (-7.6, 0.1)	e .06	2003–2013	-1.1 (-1.5, -0.7)	e <.001	2013–2016	1.7 (-0.4, 3.9)	.10	2013–2016	1.0 (-0.3, 2.4)	.15
Oral cavity and pharynx	2001–2016	0.5 (0.3, 0.7)	<.001								0.5 (0.3, 0.7)	e <.001

Sex/Cancer Site or Type	Trend 1			Trend 2			Trend 3			Fixed Interval 2012–2016		
	Years	APC (95% CI)	P	Years	APC (95% CI)	P	Years	APC (95% CI)	P	Years	APC (95% CI)	P
Myeloma	2001–2007	0.1 (−0.6, 0.8)	e	2007–2011	3.7 (1.7, 5.7)	e	2011–2016	1.2 (0.4, 2.0)	e		1.2 (0.4, 2.0)	e
Brain and other nervous system	2001–2005	0.8 (−0.4, 2.1)	.17	2005–2016	−0.5 (−0.8, −0.3)	e					−0.5 (−0.8, −0.3)	e
Stomach	2001–2008	−1.1 (−1.7, −0.5)	.002	2008–2016	0.1 (−0.4, 0.6)	.61					0.1 (−0.4, 0.6)	.61
Liver and intrahepatic bile duct	2001–2016	3.7 (3.4, 4.0)	e	<.001							3.7 (3.4, 4.0)	e
<b>Children</b>			e									
Leukemia	2001–2016	0.9 (0.5, 1.2)	<.001								0.9 (0.5, 1.2)	e
Brain and other nervous system	2001–2016	0.8 (0.5, 1.1)	e	<.001							0.8 (0.5, 1.1)	e
Lymphoma	2001–2016	0.9 (0.4, 1.4)	e	.001							0.9 (0.4, 1.4)	e
<b>AYA</b>			e									
Female breast	2001–2010	0.0 (−0.4, 0.3)	.95	2010–2016	1.2 (0.5, 1.8)	e					1.2 (0.5, 1.8)	e
Thyroid	2001–2010	5.8 (5.1, 6.6)	<.001	2010–2016	1.7 (0.6, 2.8)	e					1.7 (0.6, 2.8)	e
Testis	2001–2016	0.8 (0.6, 0.9)	e	<.001							0.8 (0.6, 0.9)	e
Lymphoma	2001–2016	−0.4 (−0.5, −0.3)	e	<.001							−0.4 (−0.5, −0.3)	e

Abbreviations: AAPC, average annual percent change; APC, annual percent change; AYA, adolescents and young adults; CI, confidence interval; NAACCR, North American Association of Central Cancer Registries; NOS, not otherwise specified; NPCR, National Program of Cancer Registries; SEER, Surveillance, Epidemiology, and End Results.

<sup>a</sup>Joinpoint models with up to two joinpoints are based on rates per 100,000 persons, adjusted for potential delays in reporting and age standardized to the 2000 US standard population (19 age groups - Census P25–1130). Joinpoint Regression Program, Version 4.7.0.0 February 2019, Statistical Research and Applications Branch, National Cancer Institute.

<sup>b</sup>Cancers are listed in descending rank order of sex-specific, age-adjusted incidence rates for 2012–2016 for all racial/ethnic groups combined. More than 15 cancers may appear males and females to include the top 15 cancers in each racial/ethnic group.

<sup>c</sup>NPCR and SEER areas reported by NAACCR as meeting high-quality incidence data standards for 2001–2016 (46 states): Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Texas, Utah, Vermont, Washington, West Virginia, Wisconsin, Wyoming.

<sup>d</sup>The AAPC is the weighted average of the APCs over the fixed interval 2012–2016 using the underlying joinpoint model for the period of 2001–2016.



The APC or AAPC is statistically significantly different from zero ( $P < .05$ ). Two-sided statistical significance for APC was determined using a t-test and for AAPC using a t-test when the AAPC lay entirely within the last joinpoint segment or a z-test when the AAPC extended beyond the last joinpoint segment.

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**Table 3.**

Age-standardized death rates<sup>a</sup> and fixed-interval trends (2013–2017)<sup>b</sup> for the most common causes of cancer death,<sup>c</sup> by sex and racial/ethnic group,<sup>d</sup> United States<sup>e</sup>

Sex/cancer site or type	All Races			Non-Hispanic White			Non-Hispanic Black			Non-Hispanic API			Non-Hispanic AI/AN (PRCDA)			Hispanic						
	Rank	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P			
All sites																						
Both sexes		158.2 (158.0, 158.3)	-1.5 (-1.6, -1.5)	<0	162.9 (162.7, 163.1)	-1.4 (-1.4, -1.3)	<0	186.4 (185.8, 187.1)	-2.0 (-2.1, -2.0)	<0	98.9 (98.3, 99.6)	-1.3 (-1.4, -1.2)	<0	166.0 (162.8, 169.3)	-0.6 (-0.9, -0.3)	<0	111.8 (111.3, 112.3)	-1.3 (-1.4, -1.2)	<0	111.8 (111.3, 112.3)	-1.3 (-1.4, -1.2)	<0
Males		189.3 (189.0, 189.6)	-1.8 (-1.9, -1.8)	<0	193.8 (193.4, 194.1)	-1.6 (-1.7, -1.6)	<0	233.2 (232.1, 234.4)	-2.6 (-2.7, -2.6)	<0	117.4 (116.2, 118.5)	-1.6 (-1.8, -1.5)	<0	200.3 (194.8, 205.8)	-0.5 (-1.0, 0.0)	<0	135.6 (134.7, 136.5)	-1.6 (-1.7, -1.6)	<0	135.6 (134.7, 136.5)	-1.6 (-1.7, -1.6)	<0
Females		135.5 (135.3, 135.7)	-1.4 (-1.4, -1.4)	<0	139.9 (139.6, 140.2)	-1.3 (-1.3, -1.3)	<0	157.5 (156.8, 158.3)	-1.6 (-1.6, -1.5)	<0	85.7 (84.8, 86.5)	-1.0 (-1.2, -0.9)	<0	141.0 (137.1, 144.9)	-0.9 (-1.1, -0.6)	<0	95.1 (94.4, 95.7)	-1.0 (-1.1, -0.9)	<0	95.1 (94.4, 95.7)	-1.0 (-1.1, -0.9)	<0
Children (ages 0–14 years)		2.1 (2.0, 2.1)	-1.4 (-1.8, -1.1)	<0	2.1 (2.0, 2.2)	-1.4 (-1.8, -1.1)	<0	2.1 (2.0, 2.3)	-1.2 (-0.6, -0.6)	<0	1.8 (1.6, 2.0)	-1.6 (-3.3, 0.2)	.07	2.6 (2.0, 3.4)	— <sup>g</sup>		2.1 (2.0, 2.2)	-1.6 (-2.2, -1.1)	<0	2.1 (2.0, 2.2)	-1.6 (-2.2, -1.1)	<0
AYA (ages 15–39 years)		8.9 (8.9, 9.0)	-1.0 (-1.2, -0.7)	<0	8.9 (8.8, 9.0)	-1.2 (-1.5, -0.9)	<0	11.4 (11.2, 11.7)	-1.6 (-1.8, -1.3)	<0	6.9 (6.7, 7.2)	-0.8 (-1.3, -0.4)	<0	11.0 (9.8, 12.4)	-0.5 (-2.2, 1.1)	.50	8.1 (7.9, 8.2)	1.1 (0.6, 1.6)	.00	8.1 (7.9, 8.2)	1.1 (0.6, 1.6)	.00
Males																						
Lung and Bronchus	1	49.3 (49.1, 49.4)	-4.8 (-5.4, -4.2)	<0	51.8 (51.7, 52.0)	-4.4 (-4.7, -4.1)	<0	60.4 (59.8, 61.0)	-5.7 (-6.3, -5.2)	<0	29.3 (28.7, 29.9)	-3.0 (-3.4, -2.5)	<0	46.5 (43.9, 49.2)	-1.5 (-2.4, -0.7)	.00	24.1 (23.7, 24.5)	-5.4 (-8.0, -2.6)	<0	24.1 (23.7, 24.5)	-5.4 (-8.0, -2.6)	<0
Prostate	2	19.1 (19.0, 19.2)	-0.3 (-1.6, 1.0)	.60	18.0 (17.9, 18.1)	0.1 (-1.2, 1.4)	.88	38.7 (38.2, 39.2)	-3.9 (-4.2, -3.6)	<0	8.6 (8.3, 9.0)	-2.3 (-2.8, -1.8)	<0	21.2 (19.3, 23.3)	-1.2 (-2.4, -0.1)	.04	15.7 (15.4, 16.0)	-0.7 (-2.2, 0.7)	.32	15.7 (15.4, 16.0)	-0.7 (-2.2, 0.7)	.32
Colon and Rectum	3	16.6 (16.5, 16.7)	-2.3 (-2.5, -2.1)	<0	16.3 (16.2, 16.4)	-1.8 (-2.3, -1.2)	<0	23.8 (23.5, 24.2)	-2.6 (-2.8, -2.4)	<0	11.5 (11.1, 11.9)	-2.1 (-2.5, -1.7)	<0	23.1 (21.3, 25.0)	0.2 (-1.0, 1.4)	.77	14.1 (13.9, 14.4)	-1.7 (-1.9, -1.5)	<0	14.1 (13.9, 14.4)	-1.7 (-1.9, -1.5)	<0
Pancreas	4	12.7 (12.6, 12.7)	0.3 (0.2, 0.4)	<0	13 (12.9, 13.1)	0.5 (0.4, 0.6)	<0	15.3 (15.0, 15.6)	-0.2 (-0.4, 0.0)	.06	8.2 (7.9, 8.5)	0.0 (-0.5, 0.4)	.98	11.9 (10.6, 13.3)	0.0 (-1.6, 1.7)	.95	9.3 (9.1, 9.5)	-0.1 (-0.5, 0.4)	.69	9.3 (9.1, 9.5)	-0.1 (-0.5, 0.4)	.69
Liver and Intrahepatic Bile Duct	5	9.6 (9.6, 9.7)	0.5 (-0.5, 1.5)	.28	8.4 (8.3, 8.4)	1.0 (0.4, 1.6)	.00	13.5 (13.3, 13.8)	-0.3 (-1.4, 0.9)	.65	13.5 (13.1, 13.9)	-3.7 (-4.9, -2.4)	<0	17 (15.5, 18.5)	2.8 (1.7, 4.0)	<0	13.2 (12.9, 13.5)	1.2 (0.9, 1.6)	<0	13.2 (12.9, 13.5)	1.2 (0.9, 1.6)	<0

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Sex/cancer site or type	Rank	All Races			Non-Hispanic White			Non-Hispanic Black			Non-Hispanic API			Non-Hispanic AI/AN (PRCDA)			Hispanic			
		Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	
Leukemia	6	8.6 (8.5, 8.6)	-2.7 (-3.5, -2.0)	<.01	9.1 (9.0, 9.2)	-2.2 (-2.8, -1.6)	<.01	7.2 (7.0, 7.4)	-1.8 (-2.2, -1.3)	<.01	4.8 (4.5, 5.0)	-0.6 (-1.4, 0.3)	.17	6.0 (5.1, 7.0)	-0.5 (-2.4, 1.4)	.56	5.8 (5.6, 6.0)	-1.0 (-1.5, -0.5)	<i>f</i>	.00
Urinary Bladder	7	7.5 (7.4, 7.6)	-1.1 (-2.0, -0.2)	<i>f</i>	8.3 (8.2, 8.4)	-0.8 (-1.9, 0.2)	.11	5.5 (5.3, 5.6)	-0.3 (-0.8, 0.2)	.27	2.8 (2.7, 3.0)	-0.4 (-0.8, 0.6)	.43	4.6 (3.8, 5.6)	— <i>g</i>	—	3.9 (3.7, 4.1)	-0.7 (-1.4, 0.0)	.06	.06
Non-Hodgkin Lymphoma	8	7.1 (7.1, 7.2)	-2.0 (-2.1, -1.8)	<i>f</i>	7.5 (7.4, 7.6)	-1.9 (-2.2, -1.7)	<.01	5.3 (5.1, 5.5)	-1.8 (-2.3, -1.2)	<.01	4.9 (4.7, 5.2)	-1.4 (-1.9, -0.8)	<.01	6.3 (5.3, 7.3)	0.2 (-1.7, 2.1)	.84	5.9 (5.7, 6.1)	-1.4 (-1.8, -1.0)	<i>f</i>	<.01
Esophagus	9	7.0 (6.9, 7.1)	-1.2 (-1.4, -1.0)	<i>f</i>	7.8 (7.8, 7.9)	-0.7 (-0.7, -0.3)	<.01	5.5 (5.3, 5.6)	-4.8 (-5.2, -4.5)	<.01	2.8 (2.6, 3.0)	-2.3 (-2.3, -0.5)	.00	7.1 (6.1, 8.2)	-0.7 (-2.3, 1.2)	.42	3.6 (3.5, 3.8)	-1.4 (-2.1, -0.6)	<i>f</i>	.00
Kidney and Renal Pelvis	10	5.4 (5.4, 5.5)	-2.4 (-3.0, -1.8)	<i>f</i>	5.6 (5.5, 5.7)	-2.3 (-4.2, -0.5)	.02	5.6 (5.4, 5.8)	-0.9 (-1.3, -0.5)	<.01	2.6 (2.4, 2.8)	-0.1 (-1.3, 1.1)	.85	9.7 (8.5, 10.9)	-0.7 (-2.1, 0.7)	.28	5.0 (4.8, 5.1)	-0.8 (-1.4, -0.3)	<i>f</i>	.00
Brain and Other Nervous System	11	5.4 (5.3, 5.4)	0.4 (0.1, 0.8)	<i>f</i>	6.1 (6.1, 6.2)	0.7 (0.4, 1.0)	<.01	3.3 (3.2, 3.4)	0.3 (-0.4, 0.9)	.40	2.6 (2.5, 2.8)	0.3 (-0.6, 1.2)	.48	3.2 (2.6, 4.0)	0.7 (-1.7, 3.2)	.53	3.5 (3.4, 3.6)	0.4 (-0.1, 0.9)	.13	.13
Myeloma	12	4.1 (4.1, 4.2)	-0.9 (-1.1, -0.7)	<i>f</i>	3.9 (3.9, 4.0)	-0.9 (-1.1, -0.6)	<.01	7.7 (7.4, 7.9)	-0.9 (-1.2, -0.6)	<.01	2.0 (1.9, 2.2)	0.1 (-0.9, 1.1)	.81	4.1 (3.3, 5.0)	-1.6 (-3.3, 0.1)	.06	3.4 (3.2, 3.5)	-0.4 (-1.1, 0.3)	.28	.28
Stomach	13	4.1 (4.1, 4.1)	-2.5 (-2.7, -2.2)	<i>f</i>	3.2 (3.1, 3.2)	-2.7 (-3.1, -2.2)	<.01	8.0 (7.8, 8.3)	-3.1 (-3.4, -2.8)	<.01	6.7 (6.4, 7.0)	-3.6 (-4.0, -3.1)	<.01	7.6 (6.5, 8.7)	-2.9 (-4.8, -1.0)	.00	6.4 (6.2, 6.6)	-2.8 (-3.2, -2.4)	<i>f</i>	<.01
Oral Cavity and Pharynx	14	3.9 (3.9, 4.0)	1.0 (0.5, 1.5)	<i>f</i>	4.0 (4.0, 4.1)	1.4 (0.9, 1.9)	<.01	4.6 (4.5, 4.8)	-2.9 (-3.5, -2.2)	<.01	3.1 (3.0, 3.3)	1.3 (-0.3, 2.9)	.10	4.0 (3.3, 4.8)	0.0 (-2.4, 2.4)	.98	2.4 (2.3, 2.5)	1.2 (-0.7, 3.0)	.20	.20
Melanoma of the Skin	15	3.5 (3.5, 3.6)	-6.1 (-7.6, -4.5)	<i>f</i>	4.5 (4.4, 4.5)	-5.7 (-7.2, -4.1)	<.01	0.4 (0.4, 0.5)	-1.4 (-3.4, 0.6)	.15	0.4 (0.3, 0.4)	— <i>g</i>	—	1.2 (0.8, 1.7)	— <i>g</i>	—	0.9 (0.8, 1.0)	-3.4 (-5.7, -1.1)	<i>f</i>	.00
Non-Melanoma	16	1.7 (1.7, 1.8)	0.7 (-3.1, 4.6)	.73	2.0 (2.0, 2.0)	1.5 (-2.3, 5.4)	.44	0.7 (0.6, 0.8)	-2.7 (-3.8, -1.6)	<.01	0.4 (0.3, 0.5)	— <i>g</i>	—	1.0 (0.7, 1.5)	— <i>g</i>	—	0.8 (0.7, 0.9)	0.6 (-0.7, 2.0)	.34	.34
Larynx	17	1.7 (1.7, 1.8)	-2.5 (-2.7, -2.3)	<i>f</i>	1.7 (1.6, 1.7)	-2.1 (-2.3, -1.9)	<.01	3.1 (3.0, 3.3)	-3.6 (-4.0, -3.2)	<.01	0.6 (0.5, 0.7)	-2.9 (-4.8, -0.9)	.00	1.9 (1.4, 2.5)	— <i>g</i>	—	1.4 (1.3, 1.5)	-4.4 (-6.5, -2.3)	<i>f</i>	.00
Soft Tissue including Heart	18	1.5 (1.5, 1.6)	0.5 (0.3, 0.8)	<i>f</i>	1.6 (1.6, 1.6)	0.6 (0.2, 0.9)	.00	1.6 (1.5, 1.7)	0.5 (-0.4, 1.4)	.24	1.0 (0.9, 1.1)	0.5 (-1.4, 2.4)	.58	1.7 (1.2, 2.2)	— <i>g</i>	—	1.2 (1.1, 1.3)	1.1 (0.0, 2.1)	<i>f</i>	.04

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Sex/cancer site or type	Rank	All Races			Non-Hispanic White			Non-Hispanic Black			Non-Hispanic API			Non-Hispanic AI/AN (PRCDA)			Hispanic		
		Rate (95% CI)	AAAPC (95% CI)	P	Rate (95% CI)	AAAPC (95% CI)	P	Rate (95% CI)	AAAPC (95% CI)	P	Rate (95% CI)	AAAPC (95% CI)	P	Rate (95% CI)	AAAPC (95% CI)	P	Rate (95% CI)	AAAPC (95% CI)	P
Bones and Joints	19	0.6 (0.5, 0.6)	0.4 (-0.1, 0.8)	.08	0.6 (0.6, 0.6)	0.4 (-0.1, 0.9)	.13	0.6 (0.5, 0.7)	0.5 (-0.5, 1.5)	.29	0.3 (0.3, 0.4)	2.4 (0.2, 4.8)	<i>f</i>	0.7 (0.4, 1.0)	— <sup>g</sup>	.04	0.5 (0.4, 0.5)	0.0 (-1.5, 1.6)	.97
Females																			
Lung and Bronchus	1	33.2 (33.1, 33.3)	-3.7 (-4.3, -3.1)	<i>f</i>	36.8 (36.7, 36.9)	-3.3 (-3.9, -2.7)	<i>f</i>	31.9 (31.6, 32.3)	-4.6 (-5.7, -3.4)	<i>f</i>	16.9 (16.6, 17.3)	-3.7 (-5.9, -1.4)	<i>f</i>	32.6 (30.7, 34.5)	-2.2 (-3.2, -1.3)	<i>f</i>	12.6 (12.4, 12.9)	-3.7 (-6.5, -0.9)	.01
Breast	2	20.3 (20.2, 20.4)	-1.2 (-1.4, -1.0)	<i>f</i>	20.3 (20.2, 20.4)	-1.1 (-1.4, -0.8)	<i>f</i>	28.4 (28.1, 28.8)	-1.5 (-1.6, -1.4)	<i>f</i>	11.5 (11.2, 11.8)	-0.7 (-1.2, -0.3)	<i>f</i>	16.6 (15.2, 17.9)	3.9 (-2.8, 11.0)	<i>f</i>	14.0 (13.7, 14.2)	-1.1 (-1.4, -0.9)	<.01
Colon and Rectum	3	11.7 (11.7, 11.8)	-1.6 (-2.3, -0.8)	<i>f</i>	11.7 (11.7, 11.8)	-1.6 (-2.1, -1.1)	<i>f</i>	15.6 (15.4, 15.9)	-3.1 (-3.3, -2.9)	<i>f</i>	8.1 (7.9, 8.4)	-2.0 (-2.6, -1.5)	<i>f</i>	15 (13.7, 16.3)	-0.6 (-2.0, 0.7)	<i>f</i>	8.7 (8.5, 8.9)	-2.1 (-2.4, -1.9)	<.01
Pancreas	4	9.6 (9.5, 9.6)	0.2 (0.1, 0.3)	<i>f</i>	9.6 (9.5, 9.6)	0.3 (0.2, 0.5)	<i>f</i>	12.3 (12.1, 12.5)	-0.2 (-0.4, 0.0)	<i>f</i>	7.1 (6.8, 7.3)	0.1 (-0.3, 0.5)	<i>f</i>	8.9 (7.9, 9.9)	0.3 (-1.4, 2.0)	<i>f</i>	7.8 (7.6, 7.9)	0.0 (-0.2, 0.3)	.95
Ovary	5	6.9 (6.8, 6.9)	-2.3 (-2.5, -2.2)	<i>f</i>	7.3 (7.2, 7.4)	-2.4 (-2.6, -2.2)	<i>f</i>	6.1 (6.0, 6.3)	-1.6 (-2.0, -1.3)	<i>f</i>	4.5 (4.3, 4.6)	-0.9 (-1.4, -0.4)	<i>f</i>	7.1 (6.3, 8.0)	-1.1 (-2.3, 0.2)	<i>f</i>	5.1 (5.0, 5.3)	-1.5 (-1.8, -1.1)	<.01
Corpus and Uterus, NOS	6	4.8 (4.8, 4.9)	2.1 (1.7, 2.4)	<i>f</i>	4.5 (4.4, 4.5)	1.9 (1.5, 2.4)	<i>f</i>	8.8 (8.6, 9.0)	2.3 (1.8, 2.9)	<i>f</i>	3.2 (3.0, 3.3)	2.6 (1.9, 3.4)	<i>f</i>	4.0 (3.4, 4.7)	— <sup>g</sup>	<i>f</i>	4.0 (3.9, 4.1)	2.6 (2.0, 3.3)	<.01
Leukemia	7	4.8 (4.8, 4.8)	-1.3 (-1.5, -1.2)	<i>f</i>	5.0 (5.0, 5.1)	-1.2 (-1.4, -1.1)	<i>f</i>	4.4 (4.3, 4.6)	-1.5 (-1.8, -1.1)	<i>f</i>	2.6 (2.5, 2.8)	-4.6 (-7.4, -1.6)	<i>f</i>	3.5 (2.9, 4.1)	-2.1 (-4.4, 0.3)	<i>f</i>	3.7 (3.6, 3.9)	-0.8 (-1.2, -0.3)	.00
Non-Hodgkin Lymphoma	8	4.2 (4.2, 4.3)	-2.6 (-2.8, -2.5)	<i>f</i>	4.5 (4.4, 4.5)	-2.2 (-2.8, -1.6)	<i>f</i>	3.3 (3.2, 3.4)	-2.2 (-2.5, -1.8)	<i>f</i>	3.0 (2.8, 3.1)	-2.1 (-2.7, -1.4)	<i>f</i>	3.7 (3.1, 4.4)	-3.4 (-5.3, -1.5)	<i>f</i>	3.7 (3.6, 3.8)	-2.0 (-2.6, -1.5)	<.01
Liver and Intrahepatic Bile Duct	9	4.0 (3.9, 4.0)	1.6 (1.0, 2.2)	<i>f</i>	3.5 (3.5, 3.5)	2.2 (2.0, 2.4)	<i>f</i>	4.9 (4.7, 5.0)	1.8 (1.3, 2.3)	<i>f</i>	5.6 (5.4, 5.8)	-1.3 (-2.1, -0.6)	<i>f</i>	8.1 (7.2, 9.1)	1.0 (-1.1, 3.1)	<i>f</i>	6.0 (5.8, 6.1)	1.2 (0.8, 1.5)	<.01
Brain and Other Nervous System	10	3.6 (3.6, 3.6)	0.5 (0.2, 0.8)	<i>f</i>	4.1 (4.1, 4.2)	0.7 (0.3, 1.1)	<i>f</i>	2.2 (2.1, 2.3)	0.4 (-0.3, 1.1)	.21	1.9 (1.8, 2.1)	2.1 (1.0, 3.2)	<i>f</i>	2.7 (2.2, 3.3)	— <sup>g</sup>	<i>f</i>	2.6 (2.5, 2.7)	0.6 (0.1, 1.1)	.02
Myeloma	11	2.6 (2.6, 2.6)	-1.9 (-3.0, -0.9)	<i>f</i>	2.3 (2.3, 2.4)	-1.7 (-2.7, -0.7)	<i>f</i>	5.4 (5.3, 5.6)	-1.0 (-1.6, -0.5)	<i>f</i>	1.2 (1.1, 1.3)	-1.2 (-2.7, 0.3)	<i>f</i>	3.3 (2.7, 4.0)	-1.1 (-3.9, 1.7)	<i>f</i>	2.2 (2.1, 2.3)	-1.4 (-2.0, -0.8)	<.01

Sex/cancer site or type	Rank	All Races			Non-Hispanic White			Non-Hispanic Black			Non-Hispanic API			Non-Hispanic AI/AN (PRCDA)			Hispanic		
		Rate (95% CI)	AAAPC (95% CI)	P	Rate (95% CI)	AAAPC (95% CI)	P	Rate (95% CI)	AAAPC (95% CI)	P	Rate (95% CI)	AAAPC (95% CI)	P	Rate (95% CI)	AAAPC (95% CI)	P	Rate (95% CI)	AAAPC (95% CI)	P
Kidney and Renal Pelvis	12	2.3 (2.3, 2.3)	-1.4 (-1.6, -1.3)	<0.01	2.4 (2.3, 2.4)	-1.4 (-1.6, -1.2)	<0.01	2.3 (2.2, 2.4)	-1.6 (-2.0, -1.1)	<0.01	1.1 (1.0, 1.2)	-1.0 (-2.1, 0.1)	.06	4.0 (3.3, 4.7)	-1.6 (-3.5, 0.3)	.09	2.2 (2.1, 2.3)	-0.7 (-1.2, -0.1)	.03
Cervix Uteri	13	2.3 (2.2, 2.3)	-0.7 (-0.9, -0.4)	<0.01	2.1 (2.0, 2.1)	-0.1 (-0.4, 0.2)	.43	3.6 (3.4, 3.7)	-2.4 (-2.8, -2.1)	<0.01	1.7 (1.6, 1.9)	-2.2 (-3.2, -1.1)	<0.01	3.1 (2.6, 3.7)	-1.7 (-3.6, 0.2)	.08	2.6 (2.5, 2.7)	-0.2 (-1.8, 1.4)	.75
Stomach	14	2.2 (2.2, 2.2)	-1.8 (-2.2, -1.4)	<0.01	1.6 (1.6, 1.6)	-3.0 (-3.2, -2.7)	<0.01	3.7 (3.6, 3.8)	-3.4 (-3.8, -3.1)	<0.01	4.1 (3.9, 4.3)	-3.1 (-3.6, -2.5)	<0.01	4.1 (3.4, 4.8)	-2.9 (-4.7, -1.1)	.005	4.0 (3.8, 4.1)	-1.9 (-2.4, -1.4)	<0.01
Urinary Bladder	15	2.1 (2.1, 2.2)	-0.5 (-0.7, -0.4)	<0.01	2.3 (2.2, 2.3)	-0.2 (-0.4, 0.0)	.02	2.4 (2.3, 2.5)	-1.4 (-1.9, -1.0)	<0.01	0.9 (0.8, 1.0)	-1.0 (-2.1, 0.0)	.06	1.9 (1.4, 2.4)	— <sup>g</sup>	— <sup>g</sup>	1.3 (1.2, 1.3)	-0.7 (-1.6, 0.1)	.08
Melanoma of the Skin	16	1.5 (1.4, 1.5)	-6.3 (-8.6, -3.8)	<0.01	1.9 (1.9, 1.9)	-5.9 (-8.5, -3.2)	.001	0.3 (0.3, 0.3)	-2.2 (-3.7, -0.7)	.009	0.3 (0.2, 0.3)	-0.4 (-3.3, 2.6)	.77	0.5 (0.3, 0.8)	— <sup>g</sup>	— <sup>g</sup>	0.5 (0.5, 0.6)	-1.6 (-2.9, -0.4)	.02
Esophagus	17	1.4 (1.4, 1.5)	-1.6 (-1.8, -1.4)	<0.01	1.5 (1.5, 1.5)	-0.9 (-1.1, -0.7)	<0.01	1.7 (1.6, 1.8)	-4.3 (-4.8, -3.8)	<0.01	0.6 (0.6, 0.7)	-2.3 (-3.9, -0.7)	.008	1.4 (1.1, 1.9)	— <sup>g</sup>	— <sup>g</sup>	0.7 (0.7, 0.8)	-2.2 (-3.0, -1.4)	<0.01
Oral Cavity and Pharynx	18	1.3 (1.3, 1.4)	1.4 (-1.4, 4.3)	.31	1.4 (1.4, 1.4)	2.0 (-0.5, 4.6)	.10	1.3 (1.3, 1.4)	-2.1 (-2.8, -1.4)	<0.01	1.1 (1.0, 1.2)	-1.5 (-2.9, -0.2)	.03	1.2 (0.9, 1.6)	— <sup>g</sup>	— <sup>g</sup>	0.8 (0.7, 0.9)	-0.2 (-1.2, 0.8)	.71
Soft Tissue including Heart	19	1.2 (1.1, 1.2)	0.2 (0.0, 0.3)	.02	1.2 (1.1, 1.2)	0.1 (-0.1, 0.3)	.45	1.5 (1.4, 1.6)	0.8 (0.5, 1.2)	<0.01	0.8 (0.7, 0.9)	0.8 (-0.7, 2.4)	.26	1.1 (0.8, 1.5)	— <sup>g</sup>	— <sup>g</sup>	0.9 (0.9, 1.0)	0.6 (-0.5, 1.6)	.27
Gallbladder	20	0.7 (0.7, 0.7)	-1.2 (-1.5, -0.8)	<0.01	0.6 (0.6, 0.6)	-1.7 (-2.1, -1.4)	<0.01	1.0 (1.0, 1.1)	0.0 (-0.8, 0.8)	.94	0.8 (0.7, 0.8)	-0.9 (-2.1, 0.4)	.17	1.8 (1.4, 2.3)	-2.6 (-4.6, -0.5)	.02	1.1 (1.1, 1.2)	-1.6 (-2.5, -0.6)	.003
Children																			
Brain and other nervous system		0.7 (0.7, 0.7)	-0.2 (-0.7, 0.2)	.27	0.7 (0.7, 0.8)	-0.4 (-1.0, 0.2)	.17	0.7 (0.7, 0.8)	0.5 (-0.9, 1.9)	.48	0.5 (0.4, 0.7)	-0.9 (-3.2, 1.4)	.41	0.9 (0.6, 1.4)	— <sup>g</sup>	— <sup>g</sup>	0.7 (0.6, 0.7)	0.2 (-0.6, 0.9)	.66
Leukemia		0.5 (0.5, 0.6)	-2.8 (-3.5, -2.2)	<0.01	0.5 (0.5, 0.5)	-3 (-3.8, -2.3)	<0.01	0.5 (0.4, 0.6)	-2.4 (-3.7, -1.2)	.001	0.5 (0.4, 0.6)	-3.7 (-5.6, -1.7)	.001	0.8 (0.5, 1.2)	— <sup>g</sup>	— <sup>g</sup>	0.7 (0.6, 0.7)	-3.3 (-4.4, -2.2)	<0.01
AYA																			
Female Breast		2.2 (2.1, 2.3)	0.6 (-0.8, 2.1)	.36	2.0 (2.0, 2.1)	0.9 (-1.3, 3.0)	.40	3.9 (3.7, 4.2)	-2.3 (-2.7, -2.0)	<0.01	1.3 (1.1, 1.5)	-0.7 (-2.7, 1.4)	.49	1.6 (1.0, 2.4)	— <sup>g</sup>	— <sup>g</sup>	1.8 (1.7, 1.9)	-0.8 (-2.1, 0.5)	.22

Sex/cancer site or type	All Races			Non-Hispanic White			Non-Hispanic Black			Non-Hispanic API			Non-Hispanic AI/AN (PRCDA)			Hispanic			
	Rank	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P	Rate (95% CI)	AAPC (95% CI)	P
Brain and other nervous system		1.0 (0.9, 1.0)	-0.2 (-0.7, 0.3)	.36	1.2 (1.2, 1.2)	-0.1 (-0.6, 0.5)	.78	0.6 (0.6, 0.7)	0.4 (-0.8, 1.6)	.51	0.6 (0.6, 0.7)	1.4 (-0.5, 3.3)	.14	0.8 (0.5, 1.2)	0.8 (0.6, 0.7)	.12	0.6 (0.6, 0.7)	0.8 (-0.2, 1.8)	
Leukemia		0.9 (0.9, 1.0)	-2.2 (-2.6, -1.8)	<.01	0.8 (0.8, 0.8)	-2.9 (-3.5, -2.4)	<.01	1.0 (0.9, 1.1)	-2.4 (-3.2, -1.5)	<.01	0.8 (0.7, 0.9)	-1.2 (-2.6, 0.3)	.10	1.1 (0.8, 1.5)	1.1 (0.8, 1.3)	.00	1.3 (1.2, 1.3)	-1.1 (-1.7, -0.5)	.2
Colon and rectum		0.9 (0.8, 0.9)	0.9 (0.5, 1.3)	<.01	0.9 (0.9, 0.9)	1.5 (0.8, 2.2)	<.01	1.2 (1.1, 1.3)	0.7 (-0.2, 1.5)	.11	0.7 (0.6, 0.8)	-0.3 (-2.2, 1.7)	.78	1.4 (1.0, 1.9)	1.4 (0.6, 0.7)	.01	0.6 (0.6, 0.7)	1.3 (0.3, 2.3)	

Abbreviations: AAPC, average annual percent change; AI/AN, American Indian/Alaska Native; API, Asian/Pacific Islander; AYA, adolescents and young adults; CI, confidence interval; NOS, not otherwise specified; PRCDA, Indian Health Service Purchased/Referred Care Delivery Area.

<sup>a</sup>Rates are per 100,000 persons and age standardized to the 2000 US standard population (19 age groups - Census P25-1130).

<sup>b</sup>Fixed interval trends are characterized as the average annual percent change (AAPC), the weighted average of the annual percent changes over the fixed interval 2013–2017, using the underlying Joinpoint model (with up to three joinpoints) for the period of 2001–2017. Joinpoint Regression Program, Version 4.7.0.0 February 2019, Statistical Research and Applications Branch.

<sup>c</sup>Cancers are listed in descending rank order of sex-specific, age-adjusted death rates for 2013–2017 for all racial/ethnic groups combined. More than 15 cancers may appear males and females to include the top 15 cancers in each racial/ethnic group.

<sup>d</sup>Racial/ethnic groups are mutually exclusive. Data for non-Hispanic AI/AN are restricted to PRCDA counties.

<sup>e</sup>Based on data from the National Center for Health Statistics public-use data file for the total United States, 2001–2017.

<sup>f</sup>The AAPC is statistically significantly different from zero ( $P < .05$ ). Two-sided statistical significance for AAPC was determined using a t-test when the AAPC lay entirely within the last joinpoint segment or a z-test when the AAPC extended beyond the last joinpoint segment.

<sup>g</sup>The statistic could not be calculated. The average annual percent change is based on <10 cases for at least 1 year within the time interval.



**Table 4.**

Joinpoint trends<sup>a</sup> for the most common causes of cancer death,<sup>b</sup> all races/ethnicities combined by sex and age group, United States,<sup>c</sup> 2001–2017

Sex/Cancer Site or Type	Trend 1			Trend 2			Trend 3			Trend 4			Fixed Interval 2013–2017		
	Years	APC (95% CI)	P	Years	APC (95% CI)	P	Years	APC (95% CI)	P	Years	APC (95% CI)	P	Years	APC (95% CI)	P
<b>All sites</b>															
Both sexes	2001–2017	-1.5 (-1.6, -1.5)	e <.001											-1.5 (-1.6, -1.5)	e <.001
Males	2001–2017	-1.8 (-1.9, -1.8)	e <.001											-1.8 (-1.9, -1.8)	e <.001
Females	2001–2017	-1.4 (-1.4, -1.4)	e <.001											-1.4 (-1.4, -1.4)	e <.001
Children (ages 0–14 years)	2001–2017	-1.4 (-1.8, -1.1)	e <.001											-1.4 (-1.8, -1.1)	e <.001
AYA (ages 15–39 years)	2001–2005	-3.0 (-4.0, -1.9)	e <.001	2005–2017	-1.0 (-1.2, -0.7)	e <.001								-1.0 (-1.2, -0.7)	e <.001
<b>Males</b>															
Lung and Bronchus	2001–2005	-2.0 (-2.3, -1.7)	e <.001	2005–2012	-2.9 (-3.1, -2.8)	e <.001	2012–2015	-4.0 (-5.1, -3.0)	e <.001	2015–2017	-5.5 (-6.6, -4.5)	e <.001		-4.8 (-5.4, -4.2)	e <.001
Prostate	2001–2013	-3.5 (-3.7, -3.2)	e <.001	2013–2017	-0.3 (-1.6, 1.0)	.60								-0.3 (-1.6, 1.0)	.60
Colon and Rectum	2001–200	-3.6 (-4.2, -2.9)	e <.001	2006–2017	-2.3 (-2.5, -2.1)	e <.001								-2.3 (-2.5, -2.1)	e <.001
Pancreas	2001–201	0.3 (0.2, 0.4)	e <.001											0.3 (0.2, 0.4)	e <.001
Liver and Intrahepatic Bile Duct	2001–2013	2.7 (2.5, 2.9)	e <.001	2013–2017	0.5 (-0.5, 1.5)	.28								0.5 (-0.5, 1.5)	.28
Leukemia	2001–2013	-1.0 (-1.1, -0.8)	e <.001	2013–2017	-2.7 (-3.5, -2.0)	e <.001								-2.7 (-3.5, -2.0)	e <.001
Urinary Bladder	2001–2013	0.0 (-0.2, 0.2)	.73	2013–2017	-1.1 (-2.0, -0.2)	e .02								-1.1 (-2.0, -0.2)	e .02

Sex/Cancer Site or Type	Trand 1			Trand 2			Trand 3			Trand 4			Fixed Interval 2013–2017		
	Years	APC (95% CI)	P	Years	APC (95% CI)	P	Years	APC (95% CI)	P	Years	APC (95% CI)	P	Years	APC (95% CI)	P
Non-Hodgkin Lymphoma	2001–2006	-3.0 (-3.7, -2.4)	e <.001	2006–2017	-2.0 (-2.1, -1.8)	e <.001								-2.0 (-2.1, -1.8)	e <.001
Esophagus	2001–2006	0.0 (-0.7, 0.7)	.96	2006–2017	-1.2 (-1.4, -1.0)	e <.001								-1.2 (-1.4, -1.0)	e <.001
Kidney and Renal Pelvis	2001–2006	-1.4 (-1.7, -1.0)	e <.001	2006–2015	-0.5 (-0.7, -0.3)	e <.001	2015–2017	-4.3 (-5.7, -3.0)	e <.001					-2.4 (-3.0, -1.8)	e <.001
Brain and Other Nervous System	2001–2006	-1.3 (-2.4, -0.1)	e .03	2006–2017	0.4 (0.1, 0.8)	e .01								0.4 (0.1, 0.8)	e .01
Myeloma	2001–2017	-0.9 (-1.1, -0.7)	e <.001											-0.9 (-1.1, -0.7)	e <.001
Stomach	2001–2006	-3.7 (-4.5, -2.9)	e <.001	2006–2017	-2.5 (-2.7, -2.2)	e <.001								-2.5 (-2.7, -2.2)	e <.001
Oral Cavity and Pharynx	2001–2009	-1.4 (-2.0, -0.8)	e <.001	2009–2017	1.0 (0.5, 1.5)	e .002								1.0 (0.5, 1.5)	e .002
Melanoma of the Skin	2001–2009	1.0 (0.5, 1.6)	e .002	2009–2014	-1.4 (-2.8, 0.0)	e .06	2014–2017	-7.6 (-9.8, -5.3)	e <.001					-6.1 (-7.6, -4.5)	e <.001
Non-Melanoma Skin	2001–2004	-1.4 (-5.6, 3.0)	.46	2004–2012	1.6 (0.5, 2.7)	e .01	2012–2015	4.2 (-2.8, 11.7)	.20	2015–2017	-2.8 (-9.0, 3.9)	.34		0.7 (-3.1, 4.6)	.73
Larynx	2001–2017	-2.5 (-2.7, -2.3)	e <.001											-2.5 (-2.7, -2.3)	e <.001
Soft Tissue including Heart	2001–2017	0.5 (0.3, 0.8)	e .001											0.5 (0.3, 0.8)	e .001
Bones and Joints	2001–2017	0.4 (-0.1, 0.8)	.08											0.4 (-0.1, 0.8)	.08
<b>Females</b>															
Lung and Bronchus	2001–2007	-0.5 (-0.9, -0.2)	e .004	2007–2014	-2.0 (-2.3, -1.7)	e <.001	2014–2017	-4.2 (-5.1, -3.3)	e <.001					-3.7 (-4.3, -3.1)	e <.001
Breast	2001–2003	-1.6 (-2.2, -0.9)	e .001	2003–2007	-2.3 (-2.6, -1.9)	e <.001	2007–2013	-1.6 (-1.8, -1.5)	e <.001	2013–2017	-1.2 (-1.4, -1.0)	e <.001		-1.2 (-1.4, -1.0)	e <.001

Sex/Cancer Site or Type	Trand 1			Trand 2			Trand 3			Trand 4			Fixed Interval 2013–2017		
	Years	APC (95% CI)	P	Years	APC (95% CI)	P	Years	APC (95% CI)	P	Years	APC (95% CI)	P	Years	APC (95% CI)	P
Colon and Rectum	2001–2012	-2.9 (-3.1, -2.7)	e <.001	2012–2017	-1.6 (-2.3, -0.8)	e .001								-1.6 (-2.3, -0.8)	e .001
Pancreas	2001–2017	0.2 (0.1, 0.3)	e .001											0.2 (0.1, 0.3)	e .001
Ovary	2001–2005	-1.1 (-1.9, -0.2)	e .02	2005–2017	-2.3 (-2.5, -2.2)	e <.001								-2.3 (-2.5, -2.2)	e <.001
Corpus and Uterus, NOS	2001–2008	0.1 (-0.4, 0.7)	.58	2008–2017	2.1 (1.7, 2.4)	e <.001								2.1 (1.7, 2.4)	e <.001
Leukemia	2001–2017	-1.3 (-1.5, -1.2)	e <.001											-1.3 (-1.5, -1.2)	e <.001
Non-Hodgkin Lymphoma	2001–2005	-3.6 (-4.5, -2.8)	e <.001	2005–2017	-2.6 (-2.8, -2.5)	e <.001								-2.6 (-2.8, -2.5)	e <.001
Liver and Intrahepatic Bile Duct	2001–2004	2.8 (1.0, 4.5)	e .008	2004–2008	0.5 (-1.1, 2.1)	.46	2008–2012	3.6 (2.1, 5.2)	e .001	2012–2017	1.6 (1.0, 2.2)	e .001		1.6 (1.0, 2.2)	e .001
Brain and Other Nervous System	2001–2006	-1.2 (-2.1, -0.2)	e .02	2006–2017	0.5 (0.2, 0.8)	e .003								0.5 (0.2, 0.8)	e .003
Myeloma	2001–2009	-2.5 (-3.0, -2.0)	e <.001	2009–2012	1.7 (-3.2, 6.8)	.46	2012–2017	-1.9 (-3.0, -0.9)	e .003					-1.9 (-3.0, -0.9)	e .003
Kidney and Renal Pelvis	2001–2017	-1.4 (-1.6, -1.3)	e <.001											-1.4 (-1.6, -1.3)	e <.001
Cervix Uteri	2001–2004	-3.0 (-5.1, -0.8)	e .01	2004–2017	-0.7 (-0.9, -0.4)	e <.001								-0.7 (-0.9, -0.4)	e <.001
Stomach	2001–2008	-3.0 (-3.5, -2.5)	e <.001	2008–2017	-1.8 (-2.2, -1.4)	e <.001								-1.8 (-2.2, -1.4)	e <.001
Urinary Bladder	2001–2017	-0.5 (-0.7, -0.4)	e <.001											-0.5 (-0.7, -0.4)	e <.001
Melanoma of the Skin	2001–2013	-0.4 (-0.9, 0.1)	.08	2013–2017	-6.3 (-8.6, -3.8)	e <.001								-6.3 (-8.6, -3.8)	e <.001
Esophagus	2001–2017	-1.6 (-1.8, -1.4)	e <.001											-1.6 (-1.8, -1.4)	e <.001

Sex/Cancer Site or Type	Trand 1			Trand 2			Trand 3			Trand 4			Fixed Interval 2013–2017		
	Years	APC (95% CI)	P	Years	APC (95% CI)	P	Years	APC (95% CI)	P	Years	APC (95% CI)	P	Years	APC (95% CI)	P
Oral Cavity and Pharynx	2001–2013	-1.4 (-1.9, -0.9)	e <.001	2013–2017	1.4 (-1.4, 4.3)	.31								1.4 (-1.4, 4.3)	.31
Soft Tissue including Heart	2001–2017	0.2 (0.0, 0.3)	e .02											0.2 (0.0, 0.3)	e .02
Gallbladder	2001–2017	-1.2 (-1.5, -0.8)	e <.001											-1.2 (-1.5, -0.8)	e <.001
<b>Children</b>															
Brain and other nervous system	2001–2017	-0.2 (-0.7, 0.2)	.27											-0.2 (-0.7, 0.2)	.27
Leukemia	2001–2017	-2.8 (-3.5, -2.2)	e <.001											-2.8 (-3.5, -2.2)	e <.001
<b>AYA</b>															
Female Breast	2001–2010	-3.2 (-4.1, -2.3)	e <.001	2010–2017	0.6 (-0.8, 2.1)	.36								0.6 (-0.8, 2.1)	.36
Brain and other nervous system	2001–2017	-0.2 (-0.7, 0.3)	.36											-0.2 (-0.7, 0.3)	.36
Leukemia	2001–2017	-2.2 (-2.6, -1.8)	e <.001											-2.2 (-2.6, -1.8)	e <.001
Colon and rectum	2001–2017	0.9 (0.5, 1.3)	e <.001											0.9 (0.5, 1.3)	e <.001

Abbreviations: AAPC, average annual percent change; APC, annual percent change; AYA, adolescents and young adults; CI, confidence interval; NCHS, National Center for Health Statistics; NOS, not otherwise specified.

<sup>a</sup>Joinpoint models with up to three joinpoints are based on rates per 100,000 persons, age standardized to the 2000 US standard population (19 age groups - Census P25–1130). Joinpoint Regression Program, Version 4.7.0.0. February 2019, Statistical Research and Applications Branch, National Cancer Institute.

<sup>b</sup>Cancers are listed in descending rank order of sex-specific, age-adjusted death rates for 2013–2017 for all racial/ethnic groups combined. More than 15 cancers may appear males and females to include the top 15 cancers in each racial/ethnic group.

<sup>c</sup>Based on data from the National Center for Health Statistics public-use data file for the total United States, 2001–2017.

<sup>d</sup>The AAPC is the weighted average of the APCs over the fixed interval 2013–2017 using the underlying joinpoint model for the period of 2001–2017.

<sup>e</sup>The APC or AAPC is statistically significantly different from zero (P < .05). Two-sided statistical significance for APC was determined using a t-test and for AAPC using a t-test when the AAPC lay entirely within the last joinpoint segment or a z-test when the AAPC extended beyond the last joinpoint segment.