Cancer Statistics, 2016

Rebecca L. Siegel, MPH[1]; Kimberly D. Miller, MPH[2]; Ahmedin Jemal, DVM, PhD[3]

Each year, the American Cancer Society estimates the numbers of new cancer cases and deaths that will occur in the United States in the current year and compiles the most recent data on cancer incidence, mortality, and survival. Incidence data were collected by the National Cancer Institute (Surveillance, Epidemiology, and End Results [SEER] Program), the Centers for Disease Control and Prevention (National Program of Cancer Registries), and the North American Association of Central Cancer Registries. Mortality data were collected by the National Center for Health Statistics. In 2016, 1,685,210 new cancer cases and 595,690 cancer deaths are projected to occur in the United States. Overall cancer incidence trends (13 oldest SEER registries) are stable in women, but declining by 3.1% per year in men (from 2009-2012), much of which is because of recent rapid declines in prostate cancer diagnoses. The cancer death rate has dropped by 23% since 1991, translating to more than 1.7 million deaths averted through 2012. Despite this progress, death rates are increasing for cancers of the liver, pancreas, and uterine corpus, and cancer is now the leading cause of death in 21 states, primarily due to exceptionally large reductions in death from heart disease. Among children and adolescents (aged birth-19 years), brain cancer has surpassed leukemia as the leading cause of cancer death because of the dramatic therapeutic advances against leukemia. Accelerating progress against cancer requires both increased national investment in cancer research and the application of existing cancer control knowledge across all segments of the population. **CA Cancer J Clin 2016;66:7-30.** **© 2016 American Cancer Society.**

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Introduction

Cancer is a major public health problem worldwide and is the second leading cause of death in the United States. In this article, we provide the expected numbers of new cancer cases and deaths in 2016 in the United States nationally and for each state, as well as a comprehensive overview of cancer incidence, mortality, and survival rates and trends using the most current population-based data. In addition, we estimate the total number of deaths averted during the past 2 decades as a result of the continual decline in cancer death rates. We also present the actual number of deaths reported in 2012 by age for the 10 leading causes of death and for the 5 leading causes of cancer death.

Materials and Methods

Incidence and Mortality Data

Mortality data from 1930 to 2012 were provided by the National Center for Health Statistics (NCHS).[1,2] Forty-seven states and the District of Columbia met data quality requirements for reporting to the national vital statistics system in 1930. Texas, Alaska, and Hawaii began reporting mortality data in 1933, 1959, and 1960, respectively. The methods for abstraction and age adjustment of mortality data are described elsewhere.[2,3]

Population-based cancer incidence data in the United States have been collected by the National Cancer Institute's (NCI's) Surveillance, Epidemiology, and End Results (SEER) Program since 1973 and by the Centers for Disease Control and Prevention's National Program of Cancer Registries (NPCR) since 1995. The SEER program is the only source for long-term population-based incidence data. Long-term incidence and survival trends (1975-2012) were based on data from the 9 oldest SEER areas (Connecticut, Hawaii, Iowa, New Mexico, Utah, and the metropolitan areas of Atlanta, Detroit, San Francisco-Oakland, and Seattle-Puget Sound), representing approximately 9% of the US population.[4] As of 1992, SEER data have been available for 4 additional SEER registries (Alaska Natives, Los Angeles county, San Jose-Monterey, and rural Georgia) that increase coverage of minority groups, allowing for stratification by race and ethnicity.

[1]Director, Surveillance Information, Surveillance and Health Services Research, American Cancer Society, Atlanta, GA; [2]Epidemiologist, Surveillance and Health Services Research, American Cancer Society, Atlanta, GA; [3]Vice President, Surveillance and Health Services Research, American Cancer Society, Atlanta, GA

Corresponding author: Rebecca L. Siegel, MPH, Surveillance Information, Surveillance and Health Services Research, American Cancer Society, 250 Williams St, NW, Atlanta, GA 30303-1002; Rebecca.siegel@cancer.org

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Delay-adjusted data from these (SEER 13) registries, which represent 14% of the US population, were the source for the annual percent change in incidence from 1992 to 2012.[5] The SEER program added 5 additional catchment areas beginning with cases diagnosed in 2000 (greater California, greater Georgia, Kentucky, Louisiana, and New Jersey), achieving 28% population coverage. Data from all 18 SEER areas were the source for cancer stage distribution, stage-specific survival, and the lifetime probability of developing cancer.[6] The probability of developing cancer was calculated using NCI's DevCan software (version 6.7.3).[7] Much of the statistical information presented herein was adapted from data previously published in the *SEER Cancer Statistics Review 1975-2012*.[8]

The North American Association of Central Cancer Registries (NAACCR) compiles and reports incidence data from 1995 onward for cancer registries that participate in the SEER program and/or the NPCR. These data approach 100% coverage of the US population in the most recent time period and were the source for the projected new cancer cases in 2016 and incidence rates by state and race/ethnicity.[9,10] Some of the data presented herein were previously published in volumes 1 and 2 of *Cancer in North America: 2008-2012*.[11,12]

All cancer cases were classified according to the *International Classification of Diseases for Oncology* except childhood and adolescent cancers, which were classified according to the International Classification of Childhood Cancer (ICCC).[13] Causes of death were classified according to the *International Classification of Diseases*.[14] All incidence and death rates were age-standardized to the 2000 US standard population and expressed per 100,000 population, as calculated by NCI's SEER*Stat software (version 8.2.1).[15] The annual percent change in rates was quantified using NCI's Joinpoint Regression Program (version 4.2.0.2).[16]

Whenever possible, cancer incidence rates presented in this report were adjusted for delays in reporting, which occur because of a lag in case capture or data corrections. Delay adjustment has the largest effect on the most recent years of data for cancers that are frequently diagnosed in outpatient settings (eg, melanoma, leukemia, and prostate cancer) and provides a more accurate portrayal of the cancer burden in the most recent time period.[17] For example, the leukemia incidence rate for 2012 is 16% higher after adjusting for reporting delays.[6,18]

Projected Cancer Cases and Deaths in 2016

The most recent year for which incidence and mortality data are available lags 2 to 4 years behind the current year due to the time required for data collection, compilation, quality control, and dissemination. Therefore, we projected the numbers of new cancer cases and deaths in the United States in 2016 to provide an estimate of the contemporary cancer burden. The number of invasive cancer cases was estimated using a 3-step spatio-temporal model based on high-quality incidence data from 49 states and the District of Columbia representing approximately 94% population coverage (data were lacking for all years for Minnesota and for some years for other states). First, complete incidence counts were estimated for each county from 1998 through 2012 using geographic variations in sociodemographic and lifestyle factors, medical settings, and cancer screening behaviors as predictors of incidence.[19] Then these counts were adjusted for delays in cancer reporting and aggregated to obtain national- and state-level estimates. Finally, a temporal projection method (the vector autoregressive model) was applied to the last 15 years of data to estimate counts for 2016. This method cannot estimate numbers of basal cell or squamous cell skin cancers because data on the occurrence of these cancers are not required to be reported to cancer registries. For complete details of the case projection methodology, please refer to Zhu et al.[20]

New cases of female breast carcinoma in situ and melanoma in situ diagnosed in 2016 were calculated by first approximating the number of cases occurring annually from 2003 through 2012 based on age-specific NAACCR incidence rates (data from 44 states and the District of Columbia with high-quality data every year) and US population estimates provided in SEER*Stat. The average annual percent change in case counts from 2003 through 2012 generated by the joinpoint regression model was then used to project cases to 2016. In contrast to previous years, the estimate for breast carcinoma in situ was not adjusted for reporting delays because delay-adjustment factors were not available.

The number of cancer deaths expected to occur in 2016 was estimated based on the annual percent change in reported numbers of cancer deaths from 1998 through 2012 at the state and national levels as reported to the NCHS. For the complete details of this methodology, please refer to Chen et al.[21]

Other Statistics

The number of cancer deaths averted in men and women due to the reduction in overall cancer death rates was estimated by subtracting the number of recorded deaths from the number that would have been expected if cancer death rates had remained at their peak. The expected number of deaths was estimated by applying the 5-year age-specific cancer death rates in the peak year for age-standardized cancer death rates (1990 in men and 1991 in women) to the corresponding age-specific populations in subsequent years through 2012. The difference between the number of expected and recorded cancer deaths in each age group and calendar year was then summed.

TABLE 1. Estimated New Cancer Cases and Deaths by Sex, United States, 2016*

	ESTIMATED NEW CASES			ESTIMATED DEATHS		
	BOTH SEXES	MALE	FEMALE	BOTH SEXES	MALE	FEMALE
All sites	**1,685,210**	**841,390**	**843,820**	**595,690**	**314,290**	**281,400**
Oral cavity & pharynx	**48,330**	**34,780**	**13,550**	**9,570**	**6,910**	**2,660**
Tongue	16,100	11,700	4,400	2,290	1,570	720
Mouth	12,910	7,600	5,310	2,520	1,630	890
Pharynx	16,420	13,350	3,070	3,080	2,400	680
Other oral cavity	2,900	2,130	770	1,680	1,310	370
Digestive system	**304,930**	**172,530**	**132,400**	**153,030**	**88,700**	**64,330**
Esophagus	16,910	13,460	3,450	15,690	12,720	2,970
Stomach	26,370	16,480	9,890	10,730	6,540	4,190
Small intestine	10,090	5,390	4,700	1,330	710	620
Colon†	95,270	47,710	47,560	49,190	26,020	23,170
Rectum	39,220	23,110	16,110			
Anus, anal canal, & anorectum	8,080	2,920	5,160	1,080	440	640
Liver & intrahepatic bile duct	39,230	28,410	10,820	27,170	18,280	8,890
Gallbladder & other biliary	11,420	5,270	6,150	3,710	1,630	2,080
Pancreas	53,070	27,670	25,400	41,780	21,450	20,330
Other digestive organs	5,270	2,110	3,160	2,350	910	1,440
Respiratory system	**243,820**	**132,620**	**111,200**	**162,510**	**89,320**	**73,190**
Larynx	13,430	10,550	2,880	3,620	2,890	730
Lung & bronchus	224,390	117,920	106,470	158,080	85,920	72,160
Other respiratory organs	6,000	4,150	1,850	810	510	300
Bones & joints	**3,300**	**1,850**	**1,450**	**1,490**	**860**	**630**
Soft tissue (including heart)	**12,310**	**6,980**	**5,330**	**4,990**	**2,680**	**2,310**
Skin (excluding basal & squamous)	**83,510**	**51,650**	**31,860**	**13,650**	**9,330**	**4,320**
Melanoma of the skin	76,380	46,870	29,510	10,130	6,750	3,380
Other nonepithelial skin	7,130	4,780	2,350	3,520	2,580	940
Breast	**249,260**	**2,600**	**246,660**	**40,890**	**440**	**40,450**
Genital system	**297,530**	**191,640**	**105,890**	**57,730**	**26,840**	**30,890**
Uterine cervix	12,990		12,990	4,120		4,120
Uterine corpus	60,050		60,050	10,470		10,470
Ovary	22,280		22,280	14,240		14,240
Vulva	5,950		5,950	1,110		1,110
Vagina & other genital, female	4,620		4,620	950		950
Prostate	180,890	180,890		26,120	26,120	
Testis	8,720	8,720		380	380	
Penis & other genital, male	2,030	2,030		340	340	
Urinary system	**143,190**	**100,920**	**42,270**	**31,540**	**21,600**	**9,940**
Urinary bladder	76,960	58,950	18,010	16,390	11,820	4,570
Kidney & renal pelvis	62,700	39,650	23,050	14,240	9,240	5,000
Ureter & other urinary organs	3,530	2,320	1,210	910	540	370
Eye & orbit	**2,810**	**1,510**	**1,300**	**280**	**150**	**130**
Brain & other nervous system	**23,770**	**13,350**	**10,420**	**16,050**	**9,440**	**6,610**
Endocrine system	**66,730**	**16,200**	**50,530**	**2,940**	**1,400**	**1,540**
Thyroid	64,300	14,950	49,350	1,980	910	1,070
Other endocrine	2,430	1,250	1,180	960	490	470
Lymphoma	**81,080**	**44,960**	**36,120**	**21,270**	**12,160**	**9,110**
Hodgkin lymphoma	8,500	4,790	3,710	1,120	640	480
Non-Hodgkin lymphoma	72,580	40,170	32,410	20,150	11,520	8,630
Myeloma	**30,330**	**17,900**	**12,430**	**12,650**	**6,430**	**6,220**
Leukemia	**60,140**	**34,090**	**26,050**	**24,400**	**14,130**	**10,270**
Acute lymphocytic leukemia	6,590	3,590	3,000	1,430	800	630
Chronic lymphocytic leukemia	18,960	10,830	8,130	4,660	2,880	1,780
Acute myeloid leukemia	19,950	11,130	8,820	10,430	5,950	4,480
Chronic myeloid leukemia	8,220	4,610	3,610	1,070	570	500
Other leukemia‡	6,420	3,930	2,490	6,810	3,930	2,880
Other & unspecified primary sites‡	**34,170**	**17,810**	**16,360**	**42,700**	**23,900**	**18,800**

*Rounded to the nearest 10; cases exclude basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder.

About 61,000 cases of carcinoma in situ of the female breast and 68,480 cases of melanoma in situ will be diagnosed in 2016.

†Deaths for colon and rectum cancers are combined because a large number of deaths from rectal cancer are misclassified as colon.

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

TABLE 2. Estimated New Cases for Selected Cancers by State, 2016*

STATE	ALL CASES	FEMALE BREAST	UTERINE CERVIX	COLON & RECTUM	UTERINE CORPUS	LEUKEMIA	LUNG & BRONCHUS	MELANOMA OF THE SKIN	NON-HODGKIN LYMPHOMA	PROSTATE	URINARY BLADDER
Alabama	27,020	3,960	220	2,190	710	900	4,220	1,390	1,030	2,950	1,110
Alaska	3,330	500	†	270	110	120	440	100	140	330	150
Arizona	32,510	4,900	230	2,550	1,060	1,160	3,980	1,510	1,300	3,150	1,630
Arkansas	16,460	2,090	150	1,410	470	510	2,610	340	670	1,670	700
California	173,200	26,730	1,460	13,770	6,120	6,370	18,140	8,560	7,760	17,240	7,580
Colorado	24,730	4,110	180	1,790	860	1,020	2,520	1,460	1,110	3,060	1,080
Connecticut	21,700	3,290	120	1,610	880	790	2,770	680	920	2,460	1,130
Delaware	5,630	800	†	430	190	180	850	320	220	690	260
Dist. of Columbia	2,910	470	†	200	100	80	300	110	110	460	90
Florida	121,240	16,770	1,050	9,710	3,940	3,930	17,360	6,200	5,370	13,310	5,940
Georgia	48,670	7,160	430	3,980	1,450	1,490	6,670	2,540	1,830	5,570	1,830
Hawaii	6,850	1,130	60	650	280	220	740	410	300	610	250
Idaho	8,120	1,110	50	610	280	360	990	490	370	1,010	430
Illinois	65,090	10,160	550	5,580	2,690	2,370	8,820	2,500	2,860	7,250	3,040
Indiana	35,180	4,980	290	2,980	1,310	1,190	5,520	1,460	1,500	3,510	1,620
Iowa	17,100	2,310	110	1,500	700	730	2,420	1,000	790	1,670	840
Kansas	14,530	2,210	110	1,150	560	540	1,970	820	640	1,510	650
Kentucky	25,720	3,470	200	2,200	810	980	4,960	1,450	1,080	2,460	1,120
Louisiana	25,070	3,400	220	2,170	620	710	3,730	620	1,090	2,950	940
Maine	9,270	1,310	50	720	380	380	1,410	340	400	960	570
Maryland	30,990	4,880	230	2,390	1,170	1,000	4,100	1,590	1,230	3,840	1,330
Massachusetts	37,620	6,010	210	2,750	1,560	1,340	4,910	1,380	1,720	4,350	2,030
Michigan	56,530	8,150	380	4,570	2,290	1,890	8,440	2,560	2,520	6,000	3,000
Minnesota	29,130	4,300	140	2,180	1,070	1,280	3,660	1,220	1,370	2,930	1,300
Mississippi	16,680	2,330	150	1,530	430	520	2,550	490	570	1,770	600
Missouri	34,270	5,030	250	2,850	1,250	1,220	5,450	1,610	1,440	3,260	1,550
Montana	6,070	890	†	460	210	270	750	350	270	770	330
Nebraska	9,740	1,480	60	850	380	390	1,220	470	440	960	460
Nevada	14,390	2,010	110	1,140	390	520	1,700	440	550	1,320	670
New Hampshire	8,680	1,280	†	620	350	290	1,140	290	350	910	490
New Jersey	49,750	7,420	370	4,020	2,050	1,870	5,580	2,470	2,430	5,970	2,460
New Mexico	9,750	1,480	80	760	330	380	1,020	450	410	1,020	390
New York	110,280	16,360	790	8,730	4,360	4,490	13,200	4,250	4,860	12,010	5,220
North Carolina	54,450	7,830	400	4,280	1,780	1,870	7,870	2,850	2,210	5,990	2,280
North Dakota	3,930	530	†	310	130	150	480	190	160	400	180
Ohio	66,020	9,390	470	5,340	2,640	2,140	10,550	2,880	2,820	6,760	3,180
Oklahoma	19,650	2,760	180	1,630	590	720	3,150	570	860	2,080	840
Oregon	22,510	3,430	150	1,610	850	750	2,970	1,530	980	2,490	1,130
Pennsylvania	83,560	11,310	540	6,390	3,290	3,020	10,500	3,750	3,540	8,350	4,260
Rhode Island	6,190	940	†	490	250	210	890	210	260	640	350
South Carolina	27,980	4,010	210	2,220	860	920	4,280	1,540	1,080	3,190	1,210
South Dakota	4,690	680	†	390	170	180	590	210	210	470	230
Tennessee	37,650	5,420	300	3,130	1,100	1,350	6,010	1,850	1,510	3,370	1,590
Texas	116,690	16,800	1,330	9,680	3,700	4,210	14,620	2,920	5,120	13,210	4,150
Utah	11,030	1,420	70	720	400	470	890	840	510	1,310	430
Vermont	4,050	580	†	280	160	140	510	180	170	450	220
Virginia	43,190	6,620	300	3,240	1,490	1,310	5,690	2,340	1,660	4,820	1,910
Washington	37,770	5,820	230	2,700	1,390	1,490	4,670	2,440	1,750	4,430	1,830
West Virginia	11,770	1,490	90	1,010	450	410	2,020	640	490	1,030	600
Wisconsin	32,970	4,730	200	2,520	1,310	1,260	4,230	1,350	1,490	3,570	1,630
Wyoming	2,920	420	†	220	100	110	310	180	120	380	160
United States	**1,685,210**	**246,660**	**12,990**	**134,490**	**60,050**	**60,140**	**224,390**	**76,380**	**72,580**	**180,890**	**76,960**

*Rounded to the nearest 10; excludes basal cell and squamous cell skin cancers and in situ carcinomas except urinary bladder.

†Estimate is fewer than 50 cases.

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

Estimated New Cases

Males		
Prostate	180,890	21%
Lung & bronchus	117,920	14%
Colon & rectum	70,820	8%
Urinary bladder	58,950	7%
Melanoma of the skin	46,870	6%
Non-Hodgkin lymphoma	40,170	5%
Kidney & renal pelvis	39,650	5%
Oral cavity & pharynx	34,780	4%
Leukemia	34,090	4%
Liver & intrahepatic bile duct	28,410	3%
All Sites	**841,390**	**100%**

Females		
Breast	246,660	29%
Lung & bronchus	106,470	13%
Colon & rectum	63,670	8%
Uterine corpus	60,050	7%
Thyroid	49,350	6%
Non-Hodgkin lymphoma	32,410	4%
Melanoma of the skin	29,510	3%
Leukemia	26,050	3%
Pancreas	25,400	3%
Kidney & renal pelvis	23,050	3%
All Sites	**843,820**	**100%**

Estimated Deaths

Males		
Lung & bronchus	85,920	27%
Prostate	26,120	8%
Colon & rectum	26,020	8%
Pancreas	21,450	7%
Liver & intrahepatic bile duct	18,280	6%
Leukemia	14,130	4%
Esophagus	12,720	4%
Urinary bladder	11,820	4%
Non-Hodgkin lymphoma	11,520	4%
Brain & other nervous system	9,440	3%
All Sites	**314,290**	**100%**

Females		
Lung & bronchus	72,160	26%
Breast	40,450	14%
Colon & rectum	23,170	8%
Pancreas	20,330	7%
Ovary	14,240	5%
Uterine corpus	10,470	4%
Leukemia	10,270	4%
Liver & intrahepatic bile duct	8,890	3%
Non-Hodgkin lymphoma	8,630	3%
Brain & other nervous system	6,610	2%
All Sites	**281,400**	**100%**

FIGURE 1. Ten Leading Cancer Types for the Estimated New Cancer Cases and Deaths by Sex, United States, 2016.
Estimates are rounded to the nearest 10 and cases exclude basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder.

Selected Findings

Expected Numbers of New Cancer Cases

Table 1 presents the estimated numbers of new cases of invasive cancer expected in the United States in 2016 by sex. The overall estimate of 1,685,210 cases is the equivalent of more than 4,600 new cancer diagnoses each day. In addition, about 61,000 cases of female breast carcinoma in situ and 68,480 cases of melanoma in situ are expected to be diagnosed in 2016. The estimated numbers of new cases by state for selected cancer sites are shown in Table 2.

Figure 1 indicates the most common cancers expected to occur in men and women in 2016. Prostate, lung and bronchus, and colorectal cancers account for 44% of all cases in men, with prostate cancer alone accounting for 1 in 5 new diagnoses. For women, the 3 most commonly diagnosed cancers are breast, lung and bronchus, and colorectum, representing one-half of all cases; breast cancer alone is expected to account for 29% all new cancer diagnoses in women.

Expected Numbers of Cancer Deaths

Table 1 also shows the expected numbers of cancer deaths in 2016. It is estimated that 595,690 Americans will die from cancer this year, corresponding to about 1,600 deaths per day. The most common causes of cancer death are cancers of the lung and bronchus, prostate, and colorectum in men and lung and bronchus, breast, and colorectum in women. These 4 cancers account for 46% of all cancer deaths (Fig. 1), with more than one-quarter (27%) due to lung cancer. Table 3 provides the estimated numbers of cancer deaths in 2016 by state for selected cancer sites.

TABLE 3. Estimated Deaths for Selected Cancers by State, 2016*

STATE	ALL SITES	BRAIN & OTHER NERVOUS SYSTEM	FEMALE BREAST	COLON & RECTUM	LEUKEMIA	LIVER & INTRAHEPATIC BILE DUCT	LUNG & BRONCHUS	NON-HODGKIN LYMPHOMA	OVARY	PANCREAS	PROSTATE
Alabama	10,650	300	670	920	430	420	3,260	340	260	690	470
Alaska	1,070	†	70	90	†	50	290	†	†	70	†
Arizona	11,800	360	780	980	510	590	2,830	410	310	900	590
Arkansas	6,830	170	430	600	260	260	2,190	210	150	420	270
California	59,060	1,760	4,400	5,180	2,560	3,600	12,230	2,140	1,530	4,390	3,050
Colorado	7,760	270	560	650	330	370	1,690	260	240	560	430
Connecticut	6,780	190	450	450	310	300	1,690	220	170	540	320
Delaware	2,050	50	130	150	80	100	600	60	50	140	90
Dist. of Columbia	980	†	90	90	†	80	210	†	†	90	70
Florida	43,600	1,080	2,880	3,500	1,770	1,870	11,960	1,480	940	3,080	1,970
Georgia	16,840	460	1,260	1,500	620	730	4,700	490	420	1,090	730
Hawaii	2,480	†	130	230	90	150	570	100	50	230	100
Idaho	2,810	90	180	220	120	110	670	100	70	210	160
Illinois	24,080	600	1,660	2,030	1,010	930	6,540	800	570	1,640	1,020
Indiana	13,510	350	860	1,070	570	460	4,020	440	300	860	520
Iowa	6,470	190	380	570	260	230	1,770	250	160	430	280
Kansas	5,540	180	360	460	260	210	1,540	200	130	390	220
Kentucky	10,350	250	600	830	390	360	3,570	330	200	610	340
Louisiana	9,110	220	630	790	330	470	2,620	280	180	650	360
Maine	3,320	90	170	230	140	120	970	120	60	230	130
Maryland	10,560	270	820	850	390	510	2,670	310	260	800	480
Massachusetts	12,630	330	770	890	520	630	3,380	390	330	930	530
Michigan	21,100	610	1,410	1,640	850	800	6,030	780	480	1,520	790
Minnesota	9,850	280	610	750	480	410	2,430	500	240	660	470
Mississippi	6,480	150	420	630	240	280	1,930	170	110	440	280
Missouri	12,970	320	880	1,050	520	550	3,950	370	250	860	470
Montana	2,020	60	130	170	80	70	520	70	60	130	120
Nebraska	3,500	110	210	330	150	130	890	130	70	240	180
Nevada	4,970	150	380	480	180	210	1,390	160	110	360	240
New Hampshire	2,770	80	170	190	110	90	770	80	60	210	130
New Jersey	16,150	400	1,280	1,450	640	670	3,830	510	440	1,260	680
New Mexico	3,690	100	260	350	150	210	790	130	110	240	200
New York	34,910	880	2,410	2,830	1,460	1,650	8,770	1,200	920	2,660	1,550
North Carolina	19,620	600	1,360	1,480	750	830	5,820	610	450	1,240	820
North Dakota	1,270	†	80	120	50	†	330	†	†	90	60
Ohio	25,510	630	1,700	2,060	1,000	1,020	7,420	850	570	1,800	1,060
Oklahoma	8,260	220	530	690	340	330	2,470	280	190	500	340
Oregon	8,150	240	500	660	340	430	2,100	280	220	570	410
Pennsylvania	28,700	680	1,940	2,340	1,240	1,140	7,530	1,030	700	2,090	1,190
Rhode Island	2,090	50	120	160	90	100	580	60	†	120	90
South Carolina	10,330	250	690	830	360	420	3,010	310	240	730	450
South Dakota	1,640	50	110	130	70	60	460	50	†	110	80
Tennessee	14,560	360	900	1,230	550	630	4,610	450	300	870	540
Texas	39,450	1,050	2,780	3,520	1,660	2,470	9,620	1,320	950	2,650	1,520
Utah	2,970	120	270	240	140	130	460	120	90	250	200
Vermont	1,390	50	70	100	50	60	390	†	†	100	70
Virginia	14,910	390	1,080	1,160	580	640	4,080	490	390	1,050	630
Washington	12,770	410	820	970	510	660	3,170	440	350	920	630
West Virginia	4,750	120	270	400	180	140	1,460	170	90	270	160
Wisconsin	11,630	350	710	840	540	420	3,060	460	300	840	550
Wyoming	1,000	†	70	90	50	†	230	†	†	70	†
United States	**595,690**	**16,050**	**40,450**	**49,190**	**24,400**	**27,170**	**158,080**	**20,150**	**14,240**	**41,780**	**26,120**

*Rounded to the nearest 10.

†Estimate is fewer than 50 deaths.

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

TABLE 4. Probability (%) of Developing Invasive Cancer Within Selected Age Intervals by Sex, United States, 2010 to 2012*

		BIRTH TO 49	50 TO 59	60 TO 69	≥70	BIRTH TO DEATH
All sites†	Male	3.4 (1 in 29)	6.5 (1 in 15)	14.5 (1 in 7)	34.6 (1 in 3)	42.1 (1 in 2)
	Female	5.4 (1 in 19)	6.0 (1 in 17)	10.0 (1 in 10)	26.1 (1 in 4)	37.6 (1 in 3)
Breast	Female	1.9 (1 in 53)	2.3 (1 in 44)	3.5 (1 in 29)	6.7 (1 in 15)	12.3 (1 in 8)
Colorectum	Male	0.3 (1 in 300)	0.7 (1 in 149)	1.2 (1 in 82)	3.7 (1 in 27)	4.7 (1 in 21)
	Female	0.3 (1 in 318)	0.5 (1 in 195)	0.9 (1 in 117)	3.4 (1 in 30)	4.4 (1 in 23)
Kidney & renal pelvis	Male	0.2 (1 in 467)	0.3 (1 in 295)	0.6 (1 in 158)	1.3 (1 in 76)	2.0 (1 in 49)
	Female	0.1 (1 in 748)	0.2 (1 in 576)	0.3 (1 in 317)	0.7 (1 in 136)	1.2 (1 in 83)
Leukemia	Male	0.2 (1 in 415)	0.2 (1 in 591)	0.4 (1 in 261)	1.4 (1 in 72)	1.8 (1 in 57)
	Female	0.2 (1 in 508)	0.1 (1 in 939)	0.2 (1 in 458)	0.9 (1 in 115)	1.2 (1 in 82)
Lung & bronchus	Male	0.2 (1 in 608)	0.7 (1 in 145)	2.0 (1 in 51)	6.4 (1 in 16)	7.2 (1 in 14)
	Female	0.2 (1 in 572)	0.6 (1 in 177)	1.5 (1 in 67)	4.8 (1 in 21)	6.0 (1 in 17)
Melanoma of the skin‡	Male	0.3 (1 in 297)	0.4 (1 in 238)	0.8 (1 in 127)	2.2 (1 in 45)	3.0 (1 in 33)
	Female	0.5 (1 in 206)	0.3 (1 in 321)	0.4 (1 in 242)	0.9 (1 in 107)	1.9 (1 in 52)
Non-Hodgkin lymphoma	Male	0.3 (1 in 376)	0.3 (1 in 347)	0.6 (1 in 174)	1.8 (1 in 55)	2.4 (1 in 42)
	Female	0.2 (1 in 546)	0.2 (1 in 477)	0.4 (1 in 237)	1.4 (1 in 73)	1.9 (1 in 53)
Prostate	Male	0.3 (1 in 325)	2.1 (1 in 48)	5.8 (1 in 17)	10.0 (1 in 10)	14.0 (1 in 7)
Thyroid	Male	0.2 (1 in 560)	0.1 (1 in 821)	0.2 (1 in 635)	0.2 (1 in 451)	0.6 (1 in 169)
	Female	0.8 (1 in 131)	0.4 (1 in 281)	0.3 (1 in 306)	0.4 (1 in 258)	1.7 (1 in 58)
Uterine cervix	Female	0.3 (1 in 364)	0.1 (1 in 850)	0.1 (1 in 871)	0.2 (1 in 576)	0.6 (1 in 157)
Uterine corpus	Female	0.3 (1 in 355)	0.6 (1 in 170)	0.9 (1 in 107)	1.3 (1 in 76)	2.8 (1 in 36)

*For people free of cancer at beginning of age interval.

†All sites excludes basal cell and squamous cell skin cancers and in situ cancers except urinary bladder.

‡Probabilities are for whites.

Lifetime Probability of Developing Cancer

The lifetime probability of being diagnosed with an invasive cancer is higher for men (42%) than for women (38%) (Table 4). Reasons for increased susceptibility in men are not well understood, but to some extent reflect differences in environmental exposures, endogenous hormones, and probably complex interactions between these influences. Adult height, which is determined by genetics and childhood nutrition, is positively associated with cancer incidence and death in both men and women,[22] and has been estimated to account for one-third of the sex differences in cancer risk.[23] For adults aged younger than 50 years, however, cancer risk is higher for women (5.4%) than for men (3.4%) because of the relatively high burden of breast, genital, and thyroid cancers in young women. The estimated probability of developing cancer is based on the average experience of the general population and may over- or underestimate individual risk because of differences in exposure (eg, smoking history), medical history, and/or genetic susceptibility.

Trends in Cancer Incidence

Figures 2 and 3 illustrate long-term trends in cancer incidence rates for all cancers combined and for selected cancer sites by sex. Cancer incidence patterns in the United States reflect trends in behaviors associated with cancer risk, improvements in cancer prevention and control, and changes in medical practice. Trends in overall incidence are driven by the 4 major cancers (lung, breast, prostate, and colorectal). For example, the spike in incidence rates in men in the late 1980s and early 1990s (Fig. 2) is due to the surge in detection of asymptomatic prostate cancer (Fig. 3) as a result of widespread prostate-specific antigen (PSA) testing.[24] The increase in incidence in women during the

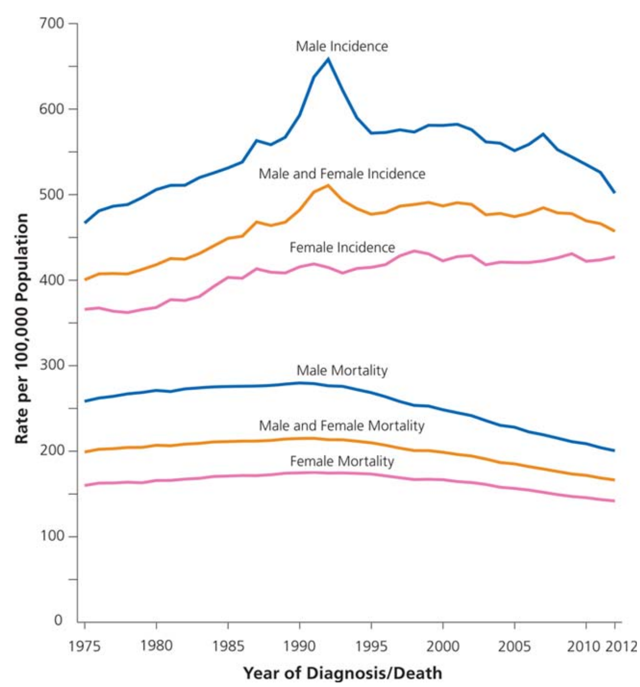

FIGURE 2. Trends in Cancer Incidence and Death Rates by Sex, United States, 1975 to 2012.
Rates are age adjusted to the 2000 US standard population. Incidence rates are adjusted for delays in reporting.

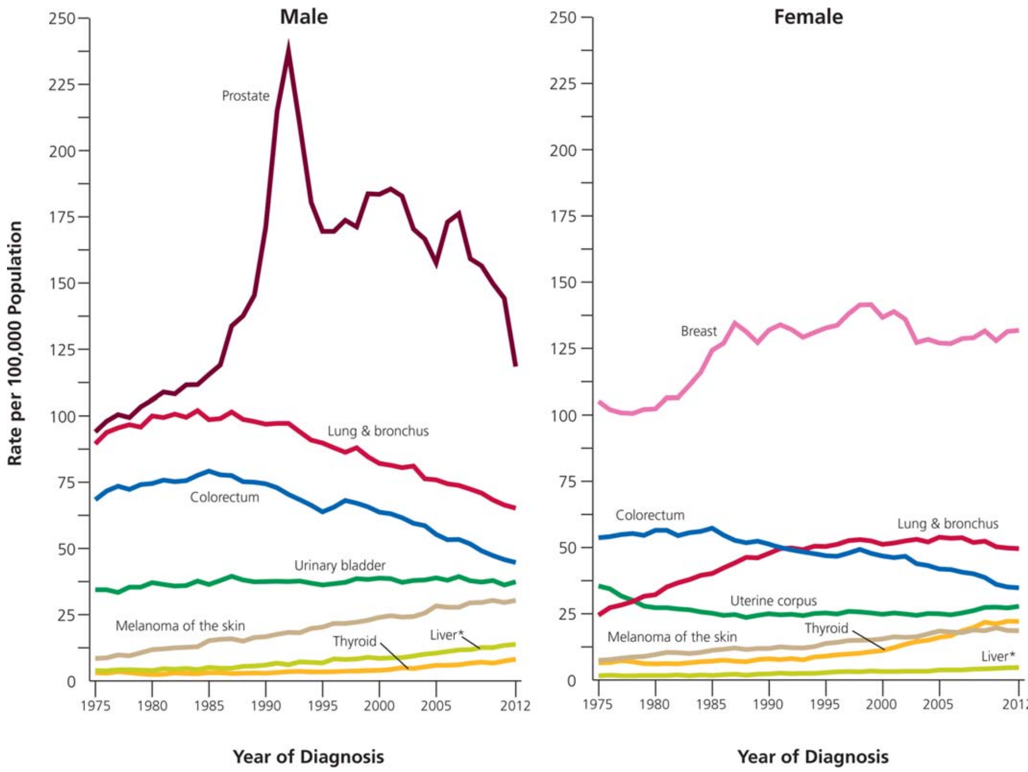

FIGURE 3. Trends in Incidence Rates for Selected Cancers by Sex, United States, 1975 to 2012.
Rates are age adjusted to the 2000 US standard population and adjusted for delays in reporting.
*Includes intrahepatic bile duct.

1980s reflects increases in both lung cancer, as a result of the tobacco epidemic, and breast cancer, because of changes in female reproductive patterns and the increased detection of asymptomatic disease during the rapid uptake of mammography screening.[25]

Table 5 presents the annual percent change in delay-adjusted incidence rates in the SEER 13 registries from 1992 through 2012 along with the average annual percent change over the past 5 and 10 years of data based on joinpoint regression analysis. Joinpoint is a tool used to describe and quantify trends by fitting observed rates to lines connected at "joinpoints" where trends change in direction or magnitude.[8,26] The overall incidence rate in women has remained stable since 1998, but has declined in men by 3.1% per year since 2009. The recent rapid decline in prostate cancer diagnoses accounts for about one-half of the total decline in men. Routine screening with the PSA test is no longer recommended because of growing concerns about high rates of overdiagnosis, estimated at 23% to 42% for screen-detected cancers.[27,28] Despite declines in the prevalence of PSA screening from 2010 to 2013, one-third of men aged 65 years and older with limited life expectancy were screened in 2013.[29]

Lung cancer incidence rates began declining in the mid-1980s in men and in the mid-2000s in women (Fig. 3) as a result of reductions in smoking prevalence that began decades earlier.[30] Contemporary differences in lung cancer incidence patterns between men and women reflect historical differences in tobacco use. Women took up smoking in large numbers later than men, first initiated smoking at older ages, and were slower to quit, including recent upturns in smoking prevalence in some birth cohorts.[31,32] Declines in lung cancer incidence and death rates continue to be larger in men than in women (Table 5).

The long-term declines in colorectal cancer incidence rates since the mid-1980s have been attributed to both changes in risk factors and the introduction of screening.[33] However, the recent rapid declines are likely driven by the increased uptake of screening with colonoscopy, which can prevent cancer by allowing for the removal of precancerous lesions.[34,35] Among adults aged 50 to 75 years, colonoscopy use increased from 19% in 2000 to 55% in 2013.[36] Colorectal cancer incidence and death rates declined by about 3% per year in both men and women from 2003 through 2012, with momentum gaining in the most recent years (Table 5). However, rates increased by 1.8% per year from 1992 through 2012 in men and women aged younger than 50 years, among whom screening is not recommended for those at average risk.[5]

In contrast to stable or declining trends for most cancers, incidence rates increased from 2003 to 2012 (SEER

TABLE 5. Trends in Cancer Incidence (Delay-Adjusted) and Death Rates for Selected Cancers by Sex, United States, 1992 to 2012

	TREND 1		TREND 2		TREND 3		TREND 4		2003-2012	2008-2012
	YEARS	APC	YEARS	APC	YEARS	APC	YEARS	APC	AAPC	AAPC
All sites										
Incidence										
Overall	1992-1994	−3.1*	1994-1998	0.4	1998-2009	−0.3*	2009-2012	−1.5*	−0.7*	−1.2*
Male	1992-1994	−5.8*	1994-2009	−0.5*	2009-2012	−3.1*			−1.4*	−2.5*
Female	1992-1998	0.8*	1998-2003	−0.6	2003-2012	0.0			0.0	0.0
Death										
Overall	1992-2001	−1.0*	2001-2012	−1.5*					−1.5*	−1.5*
Male	1992-2001	−1.4*	2001-2012	−1.8*					−1.8*	−1.8*
Female	1992-1995	−0.2	1995-1998	−1.2*	1998-2001	−0.4	2001-2012	−1.4*	−1.4*	−1.4*
Female breast										
Incidence	1992-1999	1.3*	1999-2004	−2.2*	2004-2012	0.3			0.0	0.3
Death	1992-1995	−1.3*	1995-1998	−3.5*	1998-2012	−1.9*			−1.9*	−1.9*
Colorectum										
Incidence										
Male	1992-1995	−2.6*	1995-1998	1.4	1998-2008	−2.5*	2008-2012	−3.6*	−3.0*	−3.6*
Female	1992-1995	−1.8*	1995-1998	1.8	1998-2008	−2.0*	2008-2012	−3.8*	−2.8*	−3.8*
Death										
Male	1992-2002	−2.0*	2002-2005	−3.9*	2005-2012	−2.6*			−2.9*	−2.6*
Female	1992-2001	−1.7*	2001-2012	−2.9*					−2.9*	−2.9*
Liver & intrahepatic bile duct										
Incidence										
Male	1992-2012	3.7*							3.7*	3.7*
Female	1992-2012	3.0*							3.0*	3.0*
Death										
Male	1992-2007	2.2*	2007-2012	3.3*					2.8*	3.3*
Female	1992-2008	1.3*	2008-2012	3.2*					2.1*	3.2*
Lung & bronchus										
Incidence										
Male	1992-2009	−1.9*	2009-2012	−3.3*					−2.4*	−3.0*
Female	1992-2007	0.0	2007-2012	−1.9*					−1.1*	−1.9*
Death										
Male	1992-2005	−1.9*	2005-2012	−3.0*					−2.7*	−3.0*
Female	1992-1995	1.4*	1995-2003	0.3*	2003-2007	−0.8	2007-2012	−1.9*	−1.4*	−1.9*
Melanoma of skin										
Incidence										
Male	1992-1996	5.0*	1996-2012	2.0*					2.0*	2.0*
Female	1992-2005	2.4*	2005-2012	0.5					0.9*	0.5
Death										
Male	1992-2012	0.3*							0.3*	0.3*
Female	1992-2012	−0.5*							−0.5*	−0.5*
Pancreas										
Incidence										
Male	1992-2001	0.0	2001-2012	1.2*					1.2*	1.2*
Female	1992-1999	−0.1	1999-2012	1.1*					1.1*	1.1*
Death										
Male	1992-1996	−1.0*	1996-2012	0.3*					0.3*	0.3*
Female	1992-1997	−0.4	1997-2012	0.4*					0.4*	0.4*
Prostate										
Incidence	1992-1995	−11.1*	1995-2000	2.1	2000-2010	−1.8*	2010-2012	−11.2*	−4.0*	−6.6*
Death	1992-1994	−1.5	1994-2012	−3.6*					−3.6*	−3.6*
Thyroid										
Incidence										
Male	1992-1995	−3.2	1995-2012	5.3*					5.3*	5.3*
Female	1992-1999	4.1*	1999-2009	6.9*	2009-2012	1.8			5.2*	3.0*
Death										
Male	1992-2012	1.5*							1.5*	1.5*
Female	1992-1994	−6.4	1994-2010	0.9*	2010-2012	−5.1			−0.5	−2.2
Uterine corpus										
Incidence	1992-2006	−0.1	2006-2012	2.3*					1.5*	2.3*
Death	1992-1997	−0.7*	1997-2009	0.3*	2009-2012	2.5*			1.1*	2.0*

APC indicates annual percent change based on incidence (delay adjusted) and mortality rates age adjusted to the 2000 US standard population; AAPC, average annual percent change.

*The APC or AAPC is significantly different from zero ($P < .05$).

Note: Trends analyzed by the Joinpoint Regression Program, version 4.2.0, allowing up to 3 joinpoints. Incidence trends based on Surveillance, Epidemiology, and End Results (SEER) 13 areas.

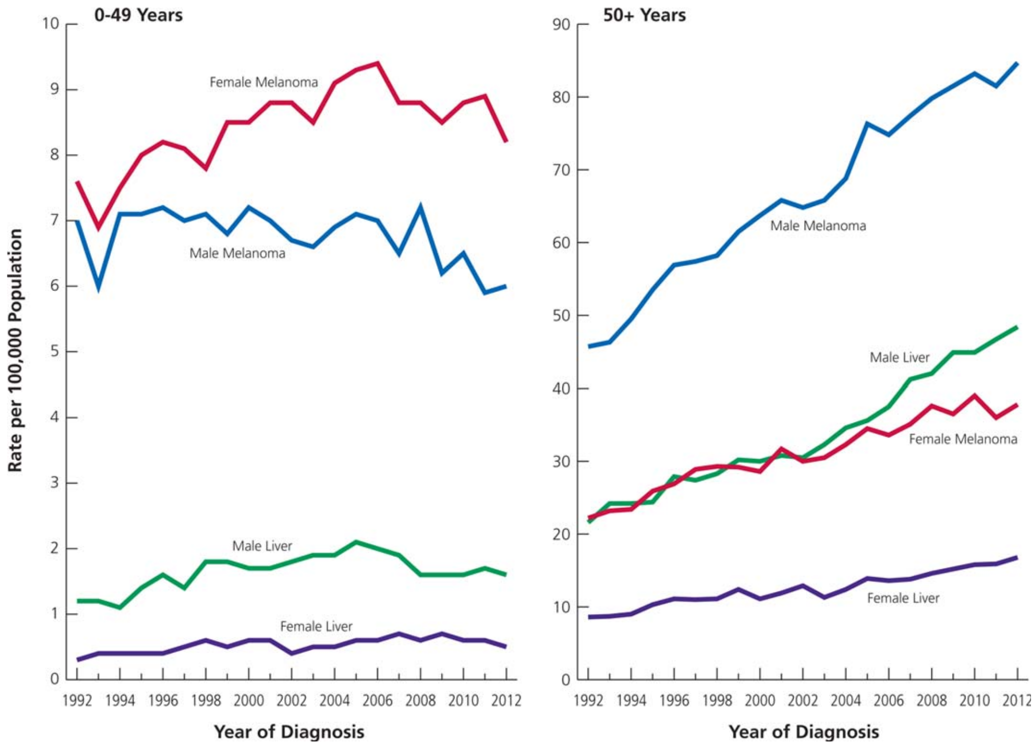

FIGURE 4. Incidence Trends for Melanoma and Liver Cancer by Age, United States, 1992 to 2012.
Rates are age adjusted to the 2000 US standard population and adjusted for delays in reporting.

TABLE 6. Trends in 5-Year Relative Survival Rates* (%) by Race and Year of Diagnosis, United States, 1975 to 2011

	ALL RACES			WHITE			BLACK		
	1975 TO 1977	1987 TO 1989	2005 TO 2011	1975 TO 1977	1987 TO 1989	2005 TO 2011	1975 TO 1977	1987 TO 1989	2005 TO 2011
All sites	49	55	69†	50	57	70†	39	43	62†
Brain & other nervous system	22	29	35†	22	28	33†	25	32	40†
Breast (female)	75	84	91†	76	85	92†	62	71	81†
Colorectum	50	60	66†	50	60	67†	45	52	59†
Esophagus	5	10	20†	6	11	21†	4	7	14†
Hodgkin lymphoma	72	79	88†	72	80	89†	70	72	86†
Kidney & renal pelvis	50	57	74†	50	57	74†	49	55	74†
Larynx	66	66	63†	67	67	65	58	56	51
Leukemia	34	43	62†	35	44	63†	33	35	55†
Liver & intrahepatic bile duct	3	5	18†	3	6	18†	2	3	13†
Lung & bronchus	12	13	18†	12	13	19†	11	11	16†
Melanoma of the skin	82	88	93†	82	88	93†	57‡	79‡	70
Myeloma	25	27	49†	24	27	48†	30	30	50†
Non-Hodgkin lymphoma	47	51	72†	47	51	73†	49	46	64†
Oral cavity & pharynx	53	54	66†	54	56	68†	36	34	45†
Ovary	36	38	46†	35	38	46†	42	34	38
Pancreas	3	4	8†	3	3	8†	2	6	7†
Prostate	68	83	99†	69	84	>99†	61	71	98†
Stomach	15	20	30†	14	18	29†	16	19	28†
Testis	83	95	97†	83	95	97†	73‡§	88‡	91
Thyroid	92	94	98†	92	94	99†	90	92	97†
Urinary bladder	72	79	79†	73	80	79†	50	63	67†
Uterine cervix	69	70	69	70	73	71	65	57	60†
Uterine corpus	87	82	83†	88	84	85†	60	57	66†

*Survival rates are adjusted for normal life expectancy and are based on cases diagnosed in the Surveillance, Epidemiology, and End Results (SEER) 9 areas from 1975 to 1977, 1987 to 1989, and 2005 to 2011, all followed through 2012.

†The difference in rates between 1975 to 1977 and 2005 to 2011 is statistically significant ($P < .05$).

‡The standard error of the survival rate is between 5 and 10 percentage points.

§Survival rate is for 1978 to 1980.

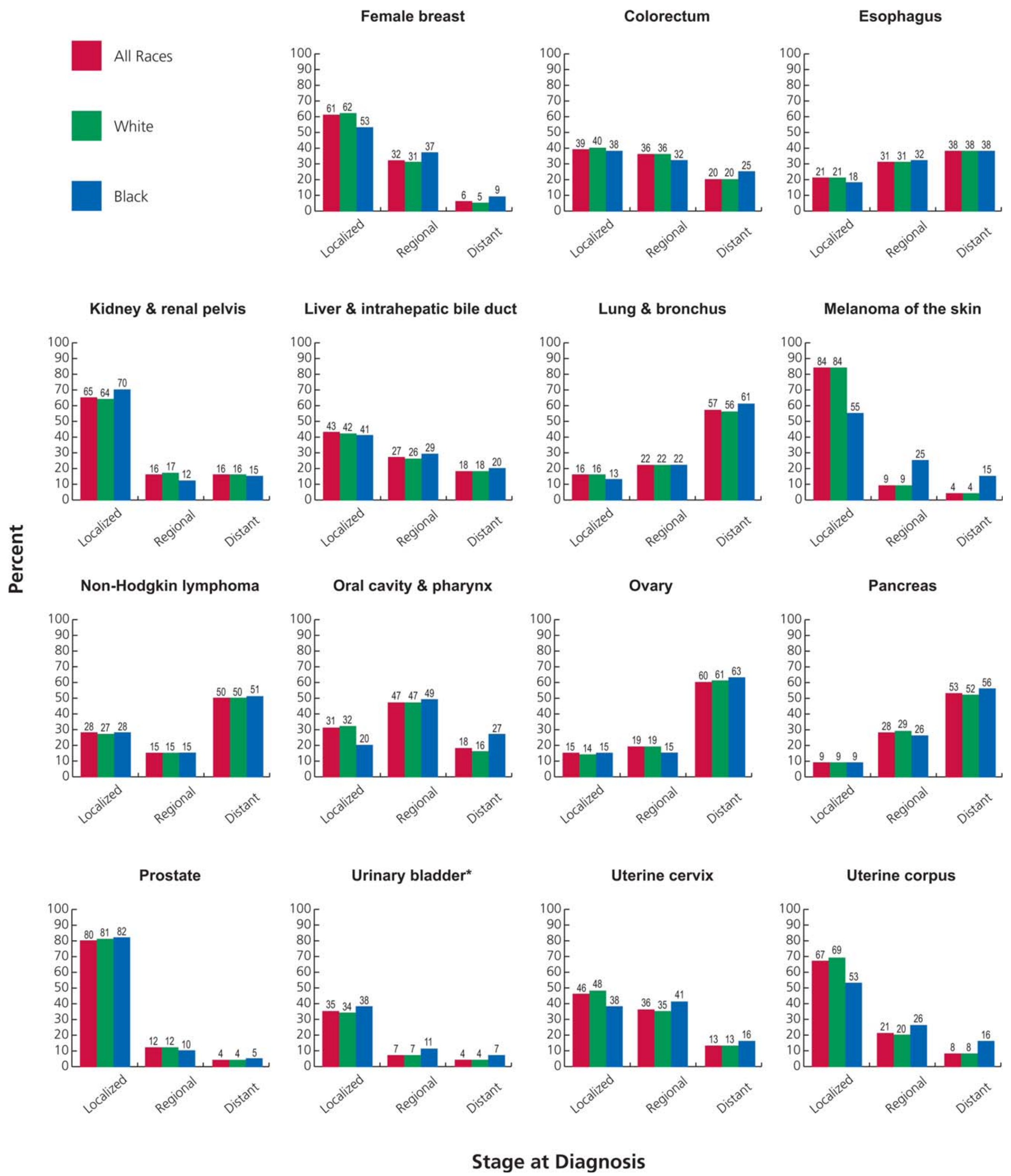

FIGURE 5. Stage Distribution of Selected Cancers by Race, United States, 2005 to 2011.
Stage categories do not sum to 100% because sufficient information is not available to stage all cases.
*The proportion of cases of carcinoma in situ of the urinary bladder is 51% in all races combined, 52% in whites, and 40% in blacks.

registries combined) among both men and women for some leukemia subtypes and for cancers of the tongue, tonsil, small intestine, liver, pancreas, kidney, renal pelvis, and thyroid.[8] In addition, incidence rates increased in men for melanoma; myeloma; and cancers of the breast, testis, and oropharynx. Recent declines in incidence for melanoma and liver cancer among young adults may portend a reduction in the burden of these cancers in future generations (Fig. 4). Among women, incidence rates increased for cancers of the anus, vulva, and uterine corpus. Uterine corpus

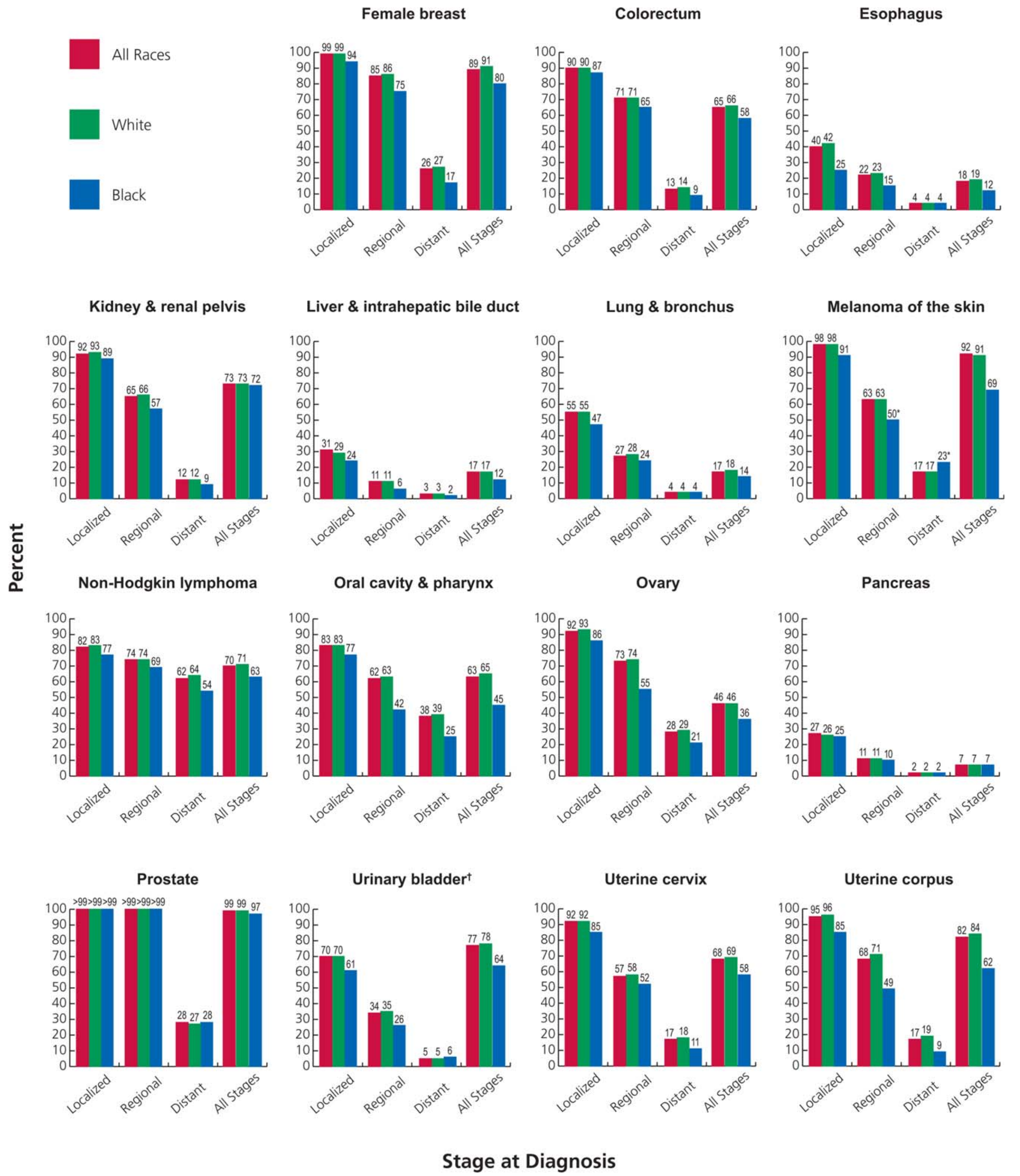

FIGURE 6. Five-Year Relative Survival Rates for Selected Cancers by Race and Stage at Diagnosis, United States, 2005 to 2011.
*The standard error of the survival rate is between 5 and 10 percentage points.
†The survival rate for carcinoma in situ of the urinary bladder is 96% in all races combined, 96% in whites, and 90% in blacks.

cancer incidence rates have been increasing since the early 1990s in black women, but only since the mid-2000s in white women, perhaps due to steeper temporal increases in obesity among black women.[37] Excess weight increases endometrial cancer risk by 50% for every 5 body mass index (BMI) units; although the highest risk occurs among the most obese women, some elevation in risk is apparent even within the normal BMI range.[38] It is important to note that rates of uterine corpus cancer typically do not account for hysterectomy prevalence, thus substantially

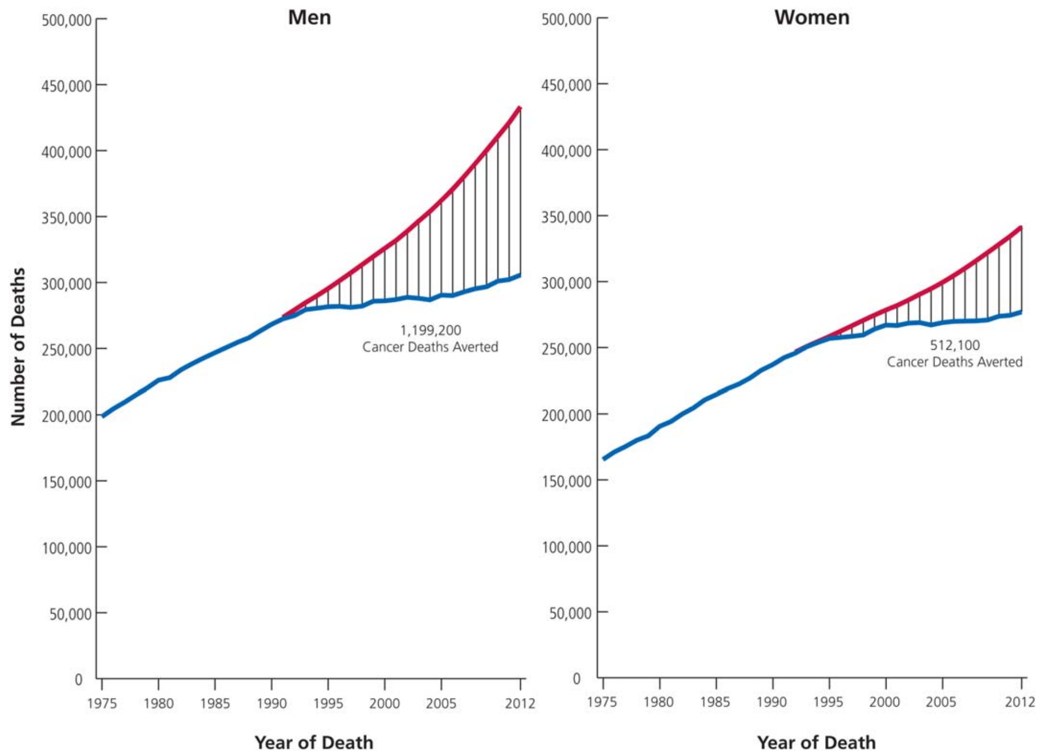

FIGURE 7. Total Number of Cancer Deaths Averted From 1991 to 2012 in Men and From 1992 to 2012 in Women.
The blue line represents the actual number of cancer deaths recorded in each year, and the red line represents the number of cancer deaths that would have been expected if cancer death rates had remained at their peak.

underestimating true disease risk. A recent study found that incidence rates corrected for hysterectomy prevalence were 73% higher among white women and 90% higher among black women compared with uncorrected rates.[39]

Thyroid cancer continues to be the most rapidly increasing cancer (>5% per year in both men and women), partially due to overdiagnosis because of increased use of advanced imaging techniques. A recent study estimated that over the past 2 decades, about one-half of all papillary thyroid cancers diagnosed in women, and 40% of those in men aged ≥50 years, were clinically irrelevant.[40] However, increases across tumor size and stage, as well as for follicular carcinoma (a more aggressive subtype), suggest that some of the rise may be due to changes in environmental risk factors, such as obesity.[41–43]

Trends in Cancer Survival

Over the past 3 decades, the 5-year relative survival rate for all cancers combined has increased 20 percentage points among whites and 23 percentage points among blacks (Table 6). Progress has been most rapid for hematopoietic and lymphoid malignancies due to improvements in treatment protocols, including the discovery of targeted therapies. For example, the 5-year survival for acute lymphocytic leukemia increased from 41% during the mid-1970s to 70% during 2005 to 2011. The use of BCR-ABL tyrosine kinase inhibitors (eg, imatinib) doubled survival for patients with chronic myeloid leukemia in less than 2 decades,[44] from 31% in the early 1990s to 63% during 2005 to 2011. A recent study found that improvements in survival since 1990 for the most common cancers have been much more pronounced among patients aged 50 to 64 years than among those aged older than 65 years.[45] This disparity may reflect differential care and/or lower efficacy or use of new therapies in the elderly population.

In contrast to the steady increase in survival for most cancers, advances have been slow for lung and pancreatic cancers, for which the 5-year relative survival is currently 18% and 8%, respectively (Table 6). These low rates are partly because more than one-half of cases are diagnosed at a distant stage (Fig. 5), for which 5-year survival is 4% and 2%, respectively (Fig. 6). There is promise for improving lung cancer survival rates because of earlier detection through screening with spiral computed tomography.[46] However, it is important to realize that screening, as well as other changes in detection practices, introduces lead time bias in survival rates, thereby reducing their usefulness in measuring progress against cancer.[47] For example, the jump in 5-year relative survival rates for prostate cancer from 83% in the late 1980s to 93% in the early 1990s to 99% since 2000 predominantly reflects lead time and overdetection. Thus, advances against cancer are best measured using age-standardized death rates.[48]

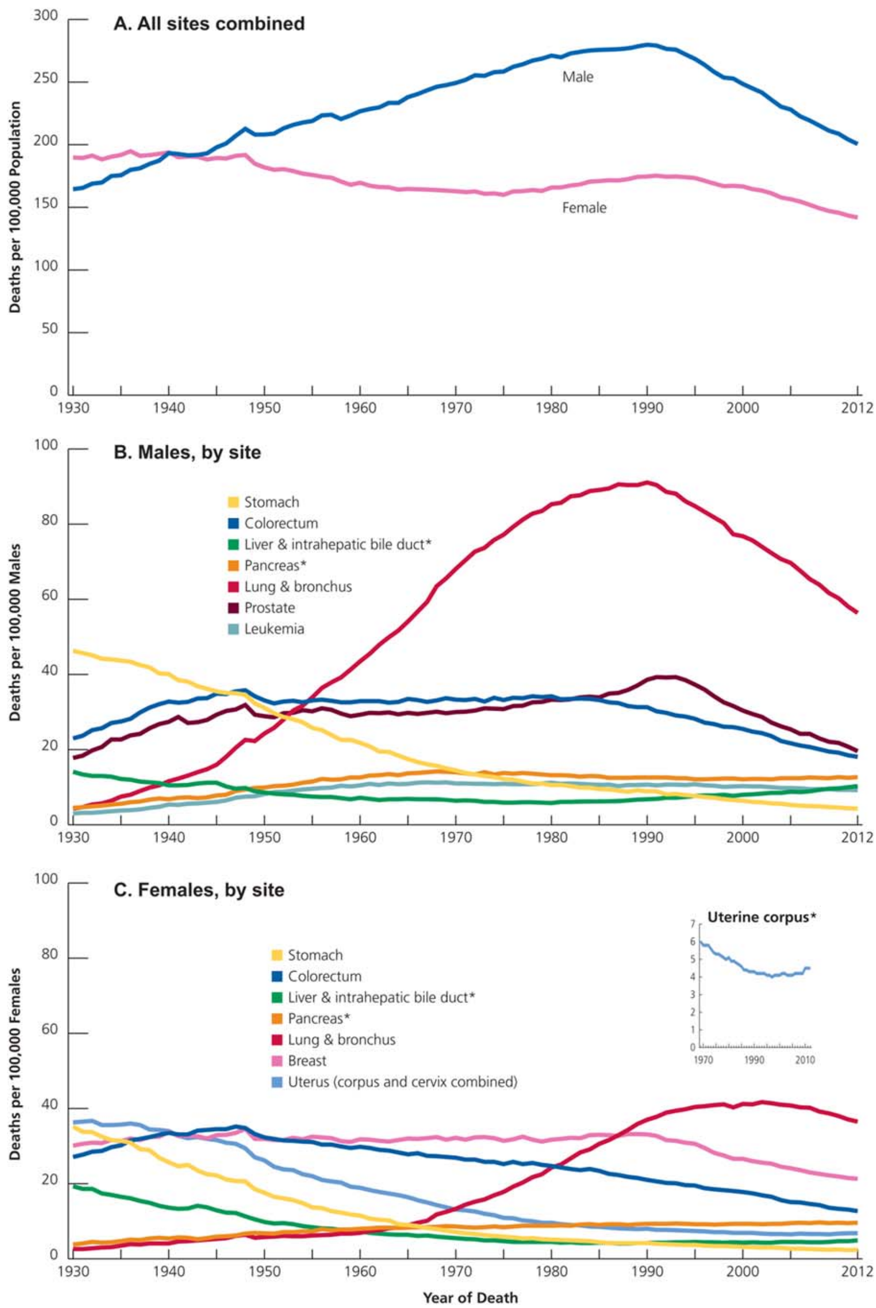

FIGURE 8. Trends in Death Rates Overall and for Selected Sites by Sex, United States, 1930 to 2012. Rates are age adjusted to the 2000 US standard population. Due to changes in International Classification of Diseases (ICD) coding, numerator information has changed over time. Rates for cancers of the lung and bronchus, colorectum, liver, and uterus are affected by these changes.
*Mortality rates for liver, pancreatic, and uterine corpus cancers are increasing.

Trends in Cancer Mortality

The overall cancer death rate rose during most of the 20th century, largely driven by rapid increases in lung cancer deaths among men as a consequence of the tobacco epidemic. Steady reductions in smoking, as well as advances in cancer prevention, early detection, and treatment, have resulted in a 23% drop in the cancer death rate, from a peak of 215.1 (per 100,000 population) in 1991 to 166.4 in 2012. The decline, which is larger in men (28% since 1990) than in women (19% since 1991), translates into the avoidance of approximately 1,711,300 cancer deaths (1,199,200 in men and 512,100 in women) that would have occurred if peak rates had persisted (Fig. 7).

Figure 8 depicts trends in cancer death rates since 1930 among men and women overall and for selected cancer sites by sex. In contrast to male cancer death rates, which rose continuously prior to 1990, female cancer death rates fell from the late 1940s to the mid-1970s (Fig. 8A). It is interesting to note that prior to 1941, death rates were higher in women than in men due to the high death rate for uterine cancer (uterine corpus and uterine cervix combined), which was the leading cause of cancer death among women in the

TABLE 7. Ten Leading Causes of Death by Age and Sex, United States, 2012

	ALL AGES		AGES 1 TO 19		AGES 20 TO 39		AGES 40 TO 59		AGES 60 TO 79		AGES ≥80	
	MALE All Causes 1,273,722	**FEMALE All Causes 1,269,557**	**MALE All Causes 12,655**	**FEMALE All Causes 6,837**	**MALE All Causes 62,383**	**FEMALE All Causes 28,688**	**MALE All Causes 226,518**	**FEMALE All Causes 143,713**	**MALE All Causes 496,567**	**FEMALE All Causes 388,343**	**MALE All Causes 462,360**	**FEMALE All Causes 691,439**
1	Heart diseases 312,491	Heart diseases 287,220	Accidents (unintentional injuries) 4,602	Accidents (unintentional injuries) 2,296	Accidents (unintentional injuries) 22,740	Accidents (unintentional injuries) 8,105	Cancer 54,140	Cancer 50,462	Cancer 161,254	Cancer 132,104	Heart diseases 133,654	Heart diseases 189,726
2	Cancer 305,670	Cancer 276,953	Assault (homicide) 1,781	Cancer 822	Intentional self-harm (suicide) 9,935	Cancer 4,407	Heart diseases 51,906	Heart diseases 21,666	Heart diseases 121,201	Heart diseases 73,030	Cancer 85,193	Cancer 89,122
3	Accidents (unintentional injuries) 80,010	Cerebrovascular diseases 75,908	Intentional self-harm (suicide) 1,598	Intentional self-harm (suicide) 495	Assault (homicide) 7,408	Intentional self-harm (suicide) 2,481	Accidents (unintentional injuries) 25,157	Accidents (unintentional injuries) 12,226	Chronic lower respiratory diseases 32,909	Chronic lower respiratory diseases 32,460	Chronic lower respiratory diseases 28,926	Cerebrovascular disease 51,133
4	Chronic lower respiratory diseases 67,673	Chronic lower respiratory diseases 75,816	Cancer 1,110	Assault (homicide) 483	Heart diseases 5,127	Heart diseases 2,397	Intentional self-harm (suicide) 12,475	Chronic lower respiratory diseases 5,591	Cerebrovascular disease 19,987	Cerebrovascular disease 19,040	Cerebrovascular disease 25,241	Alzheimer disease 50,416
5	Cerebrovascular diseases 52,638	Alzheimer disease 57,984	Congenital anomalies 562	Congenital anomalies 467	Cancer 3,930	Assault (homicide) 1,376	Chronic liver disease & cirrhosis 11,390	Chronic liver disease & cirrhosis 5,240	Diabetes mellitus 18,530	Diabetes mellitus 14,433	Alzheimer disease 20,408	Chronic lower respiratory diseases 37,399
6	Diabetes mellitus 38,584	Accidents (unintentional injuries) 47,782	Heart diseases 380	Heart diseases 251	Chronic liver disease & cirrhosis 890	Pregnancy, childbirth & puerperium 692	Diabetes mellitus 7,673	Cerebrovascular diseases 5,056	Accidents (unintentional injuries) 14,689	Accidents (unintentional injuries) 8,611	Influenza & pneumonia 13,682	Influenza & pneumonia 18,360
7	Intentional self-harm (suicide) 31,780	Diabetes mellitus 35,348	Chronic lower respiratory diseases 132	Influenza & pneumonia 104	Diabetes mellitus 843	Diabetes mellitus 616	Cerebrovascular disease 6,539	Diabetes mellitus 4,657	Chronic liver disease & cirrhosis 8,964	Nephritis, nephrotic syndrome & nephrosis 7,591	Accidents (unintentional injuries) 12,136	Accidents (unintentional injuries) 16,048
8	Alzheimer disease 25,653	Influenza & pneumonia 26,623	Influenza & pneumonia 121	Cerebrovascular disease 92	HIV disease 833	Cerebrovascular disease 536	Chronic lower respiratory diseases 5,357	Intentional self-harm (suicide) 4,120	Nephritis, nephrotic syndrome & nephrosis 8,803	Alzheimer disease 7,375	Diabetes mellitus 11,495	Diabetes mellitus 15,599
9	Influenza & pneumonia 24,013	Nephritis, nephrotic syndrome & nephrosis 22,891	Cerebrovascular disease 112	Chronic lower respiratory diseases 92	Cerebrovascular disease 704	Chronic liver disease & cirrhosis 491	HIV disease 3,283	Septicemia 2,300	Influenza & pneumonia 7,459	Septicemia 7,070	Nephritis, nephrotic syndrome & nephrosis 10,992	Nephritis, nephrotic syndrome & nephrosis 13,140
10	Nephritis, nephrotic syndrome & nephrosis 22,731	Septicemia 19,053	In situ, benign, and unknown neoplasms 84	In situ, benign, and unknown neoplasms 88	Congenital anomalies 477	HIV disease 444	Viral hepatitis 3,181	Nephritis, nephrotic syndrome & nephrosis 1,860	Septicemia 7,262	Influenza & pneumonia 6,042	Parkinson disease 9,242	Hypertension & hypertensive renal disease* 12,121

HIV indicates human immunodeficiency virus.

*Includes primary and secondary hypertension.

Note: Deaths within each age group do not sum to all ages combined due to the inclusion of unknown ages. In accordance with the National Center for Health Statistics' cause-of-death ranking, "Symptoms, signs, and abnormal clinical or laboratory findings" and categories that begin with "Other" and "All other" were not ranked.

Source: US Final Mortality Data, 2012, National Center for Health Statistics, Centers for Disease Control and Prevention, 2015.

TABLE 8. Five Leading Types of Cancer Death by Age and Sex, United States, 2012

ALL AGES	<20	20 TO 39	40 TO 59	60 TO 79	≥80
			MALE		
ALL SITES 305,670	**ALL SITES 1,144**	**ALL SITES 3,930**	**ALL SITES 54,140**	**ALL SITES 161,254**	**ALL SITES 85,193**
Lung & bronchus 86,690	Brain & ONS 323	Brain & ONS 543	Lung & bronchus 14,087	Lung & bronchus 51,816	Lung & bronchus 20,526
Prostate 27,245	Leukemia 310	Leukemia 504	Colorectum 5,714	Colorectum 13,344	Prostate 14,216
Colorectum 26,870	Bones & joints 105	Colorectum 458	Liver* 4,755	Prostate 11,666	Colorectum 7,340
Pancreas 19,718	Soft tissue (including heart) 103	Lung & bronchus 254	Pancreas 3,825	Pancreas 11,125	Urinary bladder 4,955
Liver* 15,563	NHL 33	NHL 253	Esophagus 2,809	Liver* 8,254	Pancreas 4,679
			FEMALE		
ALL SITES 276,953	**ALL SITES 851**	**ALL SITES 4,407**	**ALL SITES 50,462**	**ALL SITES 132,104**	**ALL SITES 89,122**
Lung & bronchus 70,736	Brain & ONS 252	Breast 984	Breast 11,356	Lung & bronchus 39,918	Lung & bronchus 19,481
Breast 41,152	Leukemia 224	Uterine cervix 446	Lung & bronchus 11,134	Breast 17,760	Breast 11,050
Colorectum 24,651	Soft tissue (including heart) 74	Colorectum 367	Colorectum 4,206	Colorectum 9,905	Colorectum 10,170
Pancreas 19,079	Bones & joints 73	Leukemia 345	Ovary 3,018	Pancreas 9,407	Pancreas 7,031
Ovary 14,404	NHL 27	Brain & ONS 336	Pancreas 2,571	Ovary 7,384	NHL 4,170

NHL indicates non-Hodgkin lymphoma; ONS, other nervous system.

*Liver includes intrahepatic bile duct.

Note: Ranking order excludes category titles that begin with the word "Other."

early 20th century. Uterine cancer death rates declined by more than 80% between 1930 and 2012 (Fig. 8C), largely due to the widespread uptake of the Papanicolaou test for the prevention and early detection of cervical cancer. However, in contrast to continuing declines for cancers of the uterine cervix, death rates for uterine corpus cancer began to increase around 2000 in the wake of rising incidence rates (Fig. 8C, inset) (Table 5).[8]

A similarly dramatic decline occurred for stomach cancer, which accounted for 30% and 20% of male and female cancer deaths, respectively, in the 1930s, but only about 2% for each in 2012. Although reasons for the decrease in stomach cancer occurrence in the United States and most other parts of the world are complex and not completely understood, contributors are thought to include a lower prevalence of *Helicobacter pylori* infection because of improved hygiene and lower salt intake and a higher consumption of fresh fruits and vegetables because of advances in food preservation techniques (eg, refrigeration).[49] However, studies indicate that incidence rates for certain subtypes of stomach cancer are increasing for some subsets of the US population for reasons that remain unknown.[50,51]

The decline in cancer death rates over the past 2 decades is driven by continued decreases in death rates for the 4 major cancer sites (lung, breast, prostate, and colorectum). Death rates for female breast cancer are down 36% from peak rates, and those for prostate and colorectal cancers are each down about 50% as a result of improvements in early detection and treatment.[8,33,52,53] Lung cancer death rates declined 38% between 1990 and 2012 among males and 13% between 2002 and 2012 among females[8] due to reduced tobacco use as a result of increased awareness of the health hazards of smoking and the implementation of comprehensive tobacco control.[54] Researchers recently estimated that tobacco control efforts adopted in the wake of the first Surgeon General's report on smoking and health in 1964 have resulted in 8 million fewer premature smoking-related deaths, one-third of which are due to cancer.[55,56] Despite this progress, 80% of deaths from lung cancer and one-half of all deaths from cancers of the oral cavity, esophagus, and urinary bladder are caused by smoking.[57]

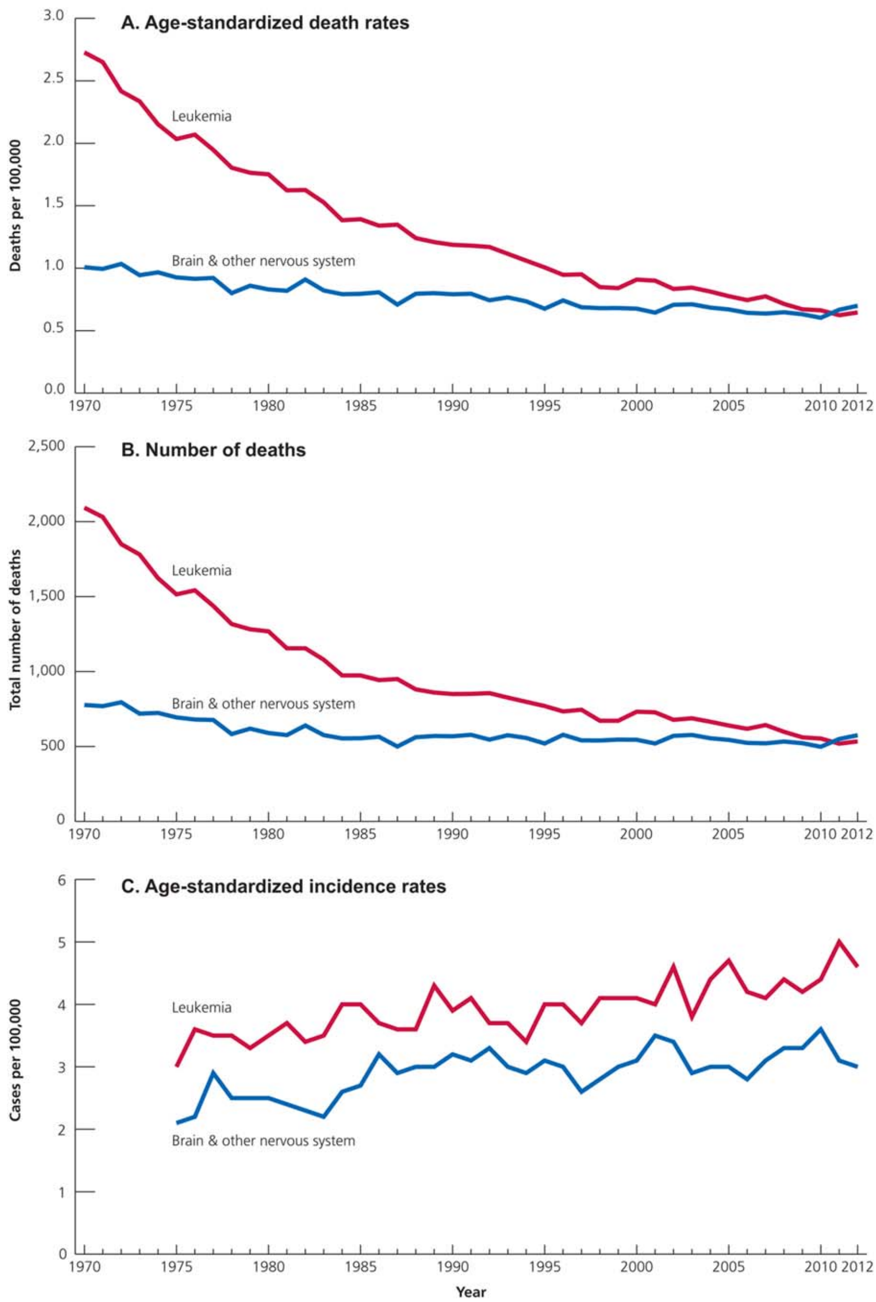

FIGURE 9. Trends in Leukemia and Brain Tumor Occurrence Among Children and Adolescents (Aged Birth to 19 Years), 1970 to 2012.
Rates are age adjusted to the 2000 US standard population. Incidence rates are adjusted for delays in reporting.
Underlying mortality data provided by the National Center for Health Statistics (cdc.gov/nchs).

In contrast to declining trends for the major cancers, joinpoint analysis indicates that from 2003 to 2012, death rates rose in both sexes for cancers of the anus, liver, and pancreas.[8] Death rates also increased in men for melanoma (slightly) and for cancers of the tonsil, oropharynx, and soft tissue (including the heart) and in women for uterine and vulvar cancers. Thyroid cancer death rates also increased slightly in men, from 0.43 (per 100,000 population) in 2003 to 0.51 in 2012.

Recorded Number of Deaths in 2012

A total of 2,543,279 deaths were recorded in the United States in 2012, of which 582,623 (23%) were from cancer. Overall, cancer is the second leading cause of death following heart disease, which accounted for 24% of total deaths. However, cancer is the leading cause of death among adults aged 40 to 79 years (Table 7). It is also the leading cause of death in 21 states (Alaska, Arizona, Colorado, Delaware, Florida, Georgia, Idaho, Kansas, Maine, Massachusetts, Minnesota, Montana, Nebraska, New Hampshire, New

TABLE 9. Incidence and Death Rates by Site, Race, and Ethnicity, United States, 2008 to 2012

	NON-HISPANIC WHITE	NON-HISPANIC BLACK	ASIAN/PACIFIC ISLANDER	AMERICAN INDIAN/ ALASKA NATIVE*	HISPANIC
Incidence					
All sites					
Male	528.9	592.3	316.8	423.3	408.5
Female	436.2	408.1	287.5	372.9	330.4
Breast (female)	128.1	124.3	88.3	91.9	91.9
Colorectum					
Male	47.4	60.3	39.0	50.4	44.6
Female	36.2	44.1	29.2	40.1	30.6
Kidney & renal pelvis					
Male	21.8	24.2	10.8	29.7	20.6
Female	11.3	13.0	4.9	18.3	11.8
Liver & intrahepatic bile duct					
Male	9.3	16.5	20.6	18.7	19.3
Female	3.2	4.8	7.9	8.9	7.2
Lung & bronchus					
Male	79.3	93.4	47.4	66.2	43.3
Female	58.7	51.4	28.3	52.7	26.0
Prostate	123.0	208.7	67.8	90.5	112.1
Stomach					
Male	7.8	15.1	14.5	12.0	13.5
Female	3.5	8.0	8.5	6.6	7.8
Uterine cervix	7.1	10.0	6.3	9.4	10.2
Mortality					
All sites					
Male	210.6	267.7	128.4	186.7	148.0
Female	149.2	170.4	91.2	133.9	99.4
Breast (female)	21.9	31.0	11.4	15.0	14.5
Colorectum					
Male	18.2	27.6	13.0	18.8	15.6
Female	12.9	18.2	9.4	15.6	9.6
Kidney & renal pelvis					
Male	5.9	5.7	2.9	8.7	5.0
Female	2.6	2.6	1.2	4.7	2.4
Liver & intrahepatic bile duct					
Male	7.6	12.8	14.5	13.9	12.9
Female	3.1	4.4	6.1	6.3	5.6
Lung & bronchus					
Male	62.2	74.9	34.0	49.1	29.5
Female	41.4	36.7	18.2	32.1	13.7
Prostate	19.9	47.2	9.4	20.2	17.8
Stomach					
Male	3.6	9.4	7.9	7.4	7.2
Female	1.8	4.5	4.7	3.6	4.2
Uterine cervix	2.0	4.1	1.8	3.5	2.7

Rates are per 100,000 population and age adjusted to the 2000 US standard population. Nonwhite and nonblack race categories are not mutually exclusive of Hispanic origin.

*Data based on Indian Health Service Contract Health Service Delivery Areas (CHSDA) counties. Incidence rates exclude data from Kansas.

Mexico, North Carolina, Oregon, South Carolina, Vermont, Virginia, and Washington), primarily due to exceptional gains made in the progress against heart disease. In Minnesota, for example, the death rate for heart disease is 30% below the national average (118 vs 170 per 100,000 population) compared with a 6% lower death rate for cancer. In addition, cancer is the leading cause of death among both Hispanics and Asian/Pacific Islanders (APIs), who combined comprise one-quarter of the US population.[58]

Table 8 presents the number of deaths from all cancers combined and from the 5 most common sites for each 20-year age group by sex. More cancer deaths occur in men than in women except for those aged 20 to 39 years and 80 years or older. Breast cancer is the leading cause of cancer death in women aged 20 to 59 years, but is replaced by lung cancer in women aged 60 years or older. Among men, lung cancer is the leading cause of cancer death for those aged 40 years or older.

Among children and adolescents (aged birth to 19 years), brain cancer has surpassed leukemia as the leading cause of cancer death (Table 8). Although treatment options have improved for both cancers based on collaborative efforts

TABLE 10. Incidence Rates for Selected Cancers by State, United States, 2008 to 2012

	ALL CANCERS		BREAST	COLORECTUM		LUNG & BRONCHUS		NON-HODGKIN LYMPHOMA		PROSTATE	URINARY BLADDER	
STATE	MALE	FEMALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	MALE	FEMALE
Alabama	560.8	398.0	119.5	54.2	38.2	99.2	54.2	19.6	13.7	146.1	33.6	7.5
Alaska	479.3	419.2	125.5	50.5	40.6	74.4	59.9	20.5	14.7	111.8	36.5	10.8
Arizona	420.4	373.9	111.0	40.5	30.9	59.2	47.0	18.3	13.3	89.8	31.9	8.3
Arkansas*†	550.2	383.7	107.7	54.3	39.4	103.6	59.9	21.5	15.5	148.1	32.9	7.7
California	485.6	394.8	122.1	46.0	35.1	55.8	42.1	22.8	15.5	126.9	32.6	7.8
Colorado	473.7	396.5	125.2	40.0	31.6	52.8	43.3	22.1	15.5	133.2	32.5	8.3
Connecticut	554.4	456.9	137.1	48.2	36.5	72.6	57.6	25.4	17.7	139.9	47.3	12.6
Delaware	578.7	446.3	126.5	45.6	34.9	83.7	63.3	23.4	17.0	156.3	42.3	11.2
Dist. of Columbia	564.1	436.0	141.7	48.6	40.9	74.5	48.7	21.5	12.8	184.1	25.6	8.9
Florida	502.1	400.2	115.2	45.0	34.2	75.8	55.5	21.7	14.9	118.9	34.9	8.4
Georgia	554.5	409.0	123.5	49.6	36.7	89.0	54.1	22.3	14.6	150.1	34.0	8.0
Hawaii	466.5	403.9	130.2	55.1	37.2	59.5	38.4	21.8	14.7	105.0	24.1	6.1
Idaho	510.4	410.9	118.9	42.8	33.8	59.1	47.4	22.1	16.7	142.7	39.2	8.9
Illinois	546.2	439.8	127.7	55.2	40.3	82.8	59.9	23.5	16.5	138.9	38.6	9.7
Indiana	513.0	425.1	119.0	51.0	40.2	93.2	61.9	23.5	16.5	108.9	36.4	8.9
Iowa	545.6	439.4	123.0	54.2	41.1	81.7	53.6	27.4	18.6	126.2	40.4	8.8
Kansas	541.9	427.3	123.2	50.5	37.8	75.5	53.4	23.4	16.7	143.1	39.1	9.1
Kentucky	598.2	466.6	121.3	60.5	44.1	120.4	80.7	25.4	17.3	122.6	40.8	9.8
Louisiana	595.5	417.9	121.9	59.6	42.7	95.2	56.0	24.6	16.7	161.1	33.7	8.1
Maine	546.3	452.8	124.4	46.5	36.7	85.8	66.9	24.6	17.7	120.2	47.8	12.5
Maryland	512.0	419.5	129.9	44.3	34.6	70.0	53.9	21.0	14.9	141.1	34.5	9.1
Massachusetts	539.2	458.6	136.5	45.7	36.0	75.4	62.9	24.0	16.4	135.6	42.2	11.8
Michigan	544.8	428.6	121.4	46.8	35.9	81.4	59.9	24.5	17.1	147.3	40.3	10.4
Minnesota‡	-	-	-	-	-	-	-	-	-	-	-	-
Mississippi	577.5	406.0	116.8	59.4	43.4	106.4	56.9	21.4	14.6	149.7	30.9	7.5
Missouri	511.4	427.0	124.7	51.7	38.7	92.1	64.4	22.2	15.6	113.6	33.5	8.6
Montana	508.4	424.5	124.2	46.6	36.3	66.0	52.8	22.3	15.9	133.5	37.8	10.4
Nebraska	501.8	417.2	122.7	52.0	41.1	70.7	50.0	23.4	17.7	125.7	34.8	8.2
Nevada*§	502.2	401.8	114.0	50.5	36.3	71.4	60.3	20.3	14.8	136.0	38.8	10.7
New Hampshire	558.1	458.4	135.1	43.1	36.3	75.7	63.8	25.8	17.8	140.7	50.2	12.9
New Jersey	564.7	450.5	130.2	51.0	39.4	69.3	53.7	25.4	17.9	157.3	42.1	11.3
New Mexico	431.2	367.2	112.1	41.2	31.3	49.7	37.4	18.0	13.8	110.4	26.1	6.0
New York	568.6	451.2	128.6	49.6	38.1	73.9	55.3	26.4	18.1	153.7	41.8	10.6
North Carolina	546.6	417.9	127.1	46.3	34.3	92.3	56.1	22.2	15.2	138.7	36.7	8.9
North Dakota	517.1	411.5	122.2	54.7	40.5	68.3	45.4	22.8	18.5	141.4	37.3	8.5
Ohio	522.1	421.7	120.5	50.3	37.3	87.5	59.8	22.8	15.6	127.1	38.5	9.4
Oklahoma	520.1	411.8	119.2	50.3	38.8	90.1	60.2	21.9	15.4	128.8	33.6	8.1
Oregon	489.5	427.9	128.4	43.3	34.0	66.9	56.6	22.5	15.6	122.8	37.4	9.5
Pennsylvania	559.2	458.3	128.1	52.6	39.7	81.3	56.8	26.1	17.9	133.6	44.2	10.9
Rhode Island	544.3	456.4	129.9	44.8	36.2	79.9	64.0	24.1	17.7	130.6	46.8	13.7
South Carolina	538.7	408.6	125.3	46.8	35.9	90.6	54.0	20.0	13.5	138.1	33.1	8.6
South Dakota	495.0	416.7	125.9	53.2	40.0	68.6	49.2	23.7	16.7	129.3	34.4	9.3
Tennessee	552.7	420.1	120.6	50.3	37.7	98.9	61.7	22.2	15.8	135.5	35.5	8.1
Texas	488.5	384.4	113.1	48.4	33.5	73.0	46.7	21.8	15.4	115.7	28.2	6.6
Utah	480.6	368.0	113.8	36.7	29.4	34.7	23.7	23.9	15.4	156.8	30.7	5.8
Vermont	514.7	439.8	128.0	43.4	34.7	75.4	62.5	24.7	17.2	121.6	39.9	11.0
Virginia	485.4	397.6	124.6	43.0	34.3	77.9	53.0	20.9	14.3	126.3	32.0	8.3
Washington	524.1	444.3	135.0	43.0	35.0	69.2	55.9	25.6	17.3	133.9	37.9	9.5
West Virginia	541.2	436.7	111.2	55.3	41.3	102.8	67.4	22.3	16.2	114.1	39.5	10.9
Wisconsin	524.4	430.7	125.6	46.1	35.7	71.8	54.4	24.9	17.5	129.6	40.1	9.8
Wyoming	472.4	387.6	111.2	44.8	33.3	55.7	45.8	18.8	13.8	127.1	37.1	11.8
United States	**522.6**	**419.0**	**123.1**	**48.3**	**36.6**	**76.7**	**54.1**	**23.1**	**16.0**	**131.5**	**36.4**	**9.0**

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

*This state's data are not included in the US combined rates because it did not meet high-quality standards for one or more years during 2008 to 2012 according to the North American Association of Central Cancer Registries (NAACCR).

†Rates are based on incidence data for 2008 to 2009.

‡This state's registry did not submit cancer incidence data to the NAACCR.

§Rates are based on incidence data for 2008 to 2010.

TABLE 11. Death Rates for Selected Cancers by State, United States, 2008 to 2012

	ALL SITES		BREAST	COLORECTUM		LUNG & BRONCHUS		NON-HODGKIN LYMPHOMA		PANCREAS		PROSTATE
STATE	MALE	FEMALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE
Alabama	246.8	152.4	22.6	21.2	14.1	82.6	40.1	7.9	5.1	13.3	9.9	26.4
Alaska	211.4	151.5	21.0	18.0	13.7	61.2	44.8	7.8	5.0	13.7	9.2	21.9
Arizona	180.0	128.1	19.7	15.9	11.3	46.6	31.9	7.2	4.6	11.5	8.9	19.4
Arkansas	246.5	156.6	22.3	22.7	15.3	88.0	44.2	8.2	5.5	13.2	9.4	22.7
California	183.4	135.3	21.2	16.8	12.2	43.7	30.5	7.4	4.6	11.8	9.3	21.1
Colorado	173.8	129.4	19.7	15.3	11.8	40.8	29.7	7.0	4.3	10.8	9.0	22.6
Connecticut	192.2	138.4	20.3	14.8	11.0	49.7	35.8	7.1	4.5	13.2	10.2	20.2
Delaware	218.1	156.3	22.1	17.5	12.2	66.4	45.2	6.9	4.8	13.6	9.5	22.6
Dist. of Columbia	227.1	161.6	29.0	18.7	16.6	54.6	33.9	7.1	3.7	15.7	12.2	34.9
Florida	197.1	136.9	21.0	17.2	12.1	58.1	37.3	7.5	4.5	12.1	9.0	18.7
Georgia	218.2	143.5	22.9	19.5	13.1	68.0	37.2	7.3	4.2	12.2	9.0	24.6
Hawaii	171.7	114.8	15.1	16.8	10.7	44.4	25.0	7.4	4.5	12.9	10.2	14.8
Idaho	189.3	134.9	20.7	16.0	11.8	45.9	33.6	8.0	4.9	12.3	8.9	24.7
Illinois	215.9	154.4	23.0	20.3	14.0	62.4	40.7	8.2	5.0	13.0	10.0	22.4
Indiana	232.4	157.8	22.7	20.3	14.0	75.3	44.7	8.6	5.3	12.8	9.5	22.0
Iowa	209.1	145.3	20.7	19.8	14.3	61.4	37.5	8.8	5.2	12.4	9.2	20.7
Kansas	206.1	144.7	21.3	18.7	12.8	61.7	39.1	8.7	4.8	12.7	9.7	19.2
Kentucky	253.6	170.0	22.6	21.8	15.2	92.2	55.2	8.8	5.7	12.8	9.4	21.5
Louisiana	247.4	161.0	25.0	22.7	15.1	77.4	42.8	8.6	5.0	14.9	11.4	24.2
Maine	223.8	154.6	19.4	18.4	12.8	66.5	44.1	8.8	5.3	12.0	10.6	21.1
Maryland	207.4	148.0	23.7	18.9	12.8	57.1	38.6	7.3	4.3	13.4	10.2	22.5
Massachusetts	205.5	147.1	20.3	17.1	12.2	56.2	40.3	7.4	4.5	12.6	10.2	20.5
Michigan	215.9	155.0	23.1	18.6	13.2	64.7	42.8	9.2	5.4	13.4	10.1	20.3
Minnesota	197.0	141.1	20.0	16.5	11.8	49.7	35.6	9.4	5.4	12.0	9.0	22.5
Mississippi	260.4	158.5	24.5	23.9	16.5	88.5	41.4	7.8	4.4	14.4	10.6	28.4
Missouri	222.7	156.8	23.4	20.5	13.9	72.8	45.2	7.8	5.0	12.7	9.8	19.9
Montana	188.5	138.6	20.3	16.1	12.5	49.7	37.2	8.0	4.3	11.2	8.2	23.4
Nebraska	200.9	140.8	19.8	19.8	14.6	55.5	35.5	7.9	5.0	12.0	9.4	22.0
Nevada	201.9	149.0	23.3	21.0	13.8	55.9	44.1	6.8	4.3	12.5	9.2	21.5
New Hampshire	208.3	147.6	20.4	16.2	13.0	57.7	42.1	7.2	4.3	13.6	9.4	20.8
New Jersey	199.0	147.4	23.9	19.6	13.8	52.0	35.3	7.4	4.7	13.3	10.3	20.3
New Mexico	181.0	128.1	20.4	18.0	12.2	40.9	27.2	6.0	4.3	11.1	8.0	21.9
New York	193.8	141.7	21.5	17.9	13.0	51.9	35.1	7.6	4.7	13.0	10.0	20.6
North Carolina	222.2	145.0	22.2	18.0	12.3	72.0	39.1	7.5	4.7	11.9	9.2	23.5
North Dakota	198.1	130.2	19.8	19.6	13.1	53.3	31.8	6.3	4.6	13.3	7.8	22.6
Ohio	228.2	158.5	23.8	20.9	14.1	70.9	43.8	9.0	5.3	13.4	10.1	22.0
Oklahoma	233.6	159.6	23.2	21.7	14.4	75.7	45.3	8.9	5.3	12.4	9.6	22.4
Oregon	203.6	149.8	20.9	17.3	12.8	55.2	41.2	8.3	5.0	12.3	9.7	23.2
Pennsylvania	218.5	153.3	23.2	20.2	14.1	62.4	38.7	8.7	5.2	13.3	10.1	21.1
Rhode Island	216.1	143.3	19.8	17.6	13.1	62.5	41.6	7.7	4.2	12.7	8.4	20.8
South Carolina	232.7	148.8	23.2	19.6	13.4	72.7	38.9	7.6	4.5	13.0	10.1	25.5
South Dakota	196.9	142.8	20.7	18.5	13.2	58.2	35.0	7.5	5.0	10.8	9.6	20.8
Tennessee	245.9	156.7	22.6	21.3	14.8	83.6	45.1	8.7	5.0	12.9	9.6	22.6
Texas	201.8	137.7	21.0	18.9	12.5	56.4	33.7	7.7	4.6	11.8	8.9	19.6
Utah	153.0	108.6	20.8	13.2	10.2	26.4	15.6	7.2	4.6	10.9	8.1	23.3
Vermont	206.2	149.9	18.7	16.2	13.3	57.2	43.8	8.2	4.6	13.4	10.2	22.4
Virginia	211.5	145.8	22.8	17.9	12.9	62.5	38.2	7.9	4.6	12.5	9.5	22.7
Washington	201.8	146.4	20.3	16.4	12.2	53.9	39.7	8.3	5.1	12.7	10.2	22.2
West Virginia	242.5	165.2	22.5	22.9	15.0	80.5	49.3	8.4	5.8	12.0	8.6	20.1
Wisconsin	208.9	146.8	21.0	17.4	12.3	56.3	38.1	8.6	5.2	13.1	10.1	23.1
Wyoming	187.0	140.3	19.5	18.3	12.2	46.5	33.7	6.3	4.8	10.9	8.3	20.3
United States	**207.9**	**145.4**	**21.9**	**18.6**	**13.1**	**59.8**	**37.8**	**7.9**	**4.8**	**12.6**	**9.6**	**21.4**

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

TABLE 12. Trends in 5-Year Relative Survival Rates* (%) for Children (Birth to 14 Years) by Year of Diagnosis, United States, 1975 to 2011

	1975 TO 1977	1978 TO 1980	1981 TO 1983	1984 TO 1986	1987 TO 1989	1990 TO 1992	1993 TO 1995	1996 TO 1998	1999 TO 2001	2002 TO 2004	2005 TO 2011
All sites	**58**	**62**	**67**	**68**	**72**	**76**	**77**	**79**	**81**	**83**	**83†**
Acute lymphocytic leukemia	57	66	71	72	78	83	84	87	89	92	91†
Acute myeloid leukemia	19	26	27‡	31‡	37‡	42	41‡	49	58	61	67†
Bones & joints	50‡	48	57‡	57‡	67‡	67	74	70	70	78	77†
Brain & other nervous system	57	58	57	62	64	64	71	75	74	75	74†
Hodgkin lymphoma	81	87	88	90	87	97	95	96	94	98	98†
Neuroblastoma	53	57	55	52	63	76	67	66	72	73	74†
Non-Hodgkin lymphoma	43	53	67	70	71	77	81	83	90	85	88†
Soft tissue	61	74	69	73	66	80	77	71	77	85	79†
Wilms tumor	73	79	87	91	92	92	92	92	94	89	94†

*Survival rates are adjusted for normal life expectancy and are based on follow-up of patients through 2012.

†The difference in rates between 1975 to 1977 and 2005 to 2011 is statistically significant ($P < .05$).

‡The standard error of the survival rate is between 5 and 10 percentage points.

and outcomes from randomized clinical trials,[59] therapeutic advances for leukemia have been particularly dramatic. From 1970 to 2012, the death rate in this age group declined by 76% for leukemia compared with 31% for tumors of the brain and other nervous system (Fig. 9A). This progress has occurred despite a slow increase in the incidence of both cancer types over this time period (in the 9 oldest SEER areas) (Fig. 9C). Since the mid-1970s, the 5-year relative survival rate has increased from 50% to 87% for leukemia and from 57% to 74% for brain and other nervous system tumors.[8]

Cancer Occurrence by Race/Ethnicity

Cancer incidence and death rates vary considerably between and within racial and ethnic groups. For example, among men in the 5 broadly defined population groups in Table 9, black men have the highest overall cancer incidence and death rates-about double those of API men, who have the lowest rates. Rates are higher among black than non-Hispanic white men for every site included in Table 9 with the exception of kidney cancer mortality, for which rates are similar. The largest disparities are for stomach and prostate cancers, for which death rates in black men are about 2.5 times those in white men.

Factors known to contribute to racial disparities vary by cancer site and include differences in risk factor prevalence and access to high-quality health care, including cancer prevention and early detection, timely diagnosis, and optimal treatment.[60,61] Even among Medicare-insured patients, blacks are less likely than whites to receive standard-cancer therapies for lung, breast, colorectal, and prostate cancers.[62] A major source of these inequalities is the disproportionately high burden of poverty in the black community. According to the US Census Bureau, 26% of blacks lived in poverty and 12% were without health insurance in 2014, compared with 10% and 8%, respectively, of non-Hispanic whites.

Higher mortality rates among blacks compared with whites partly reflect a later stage of disease at diagnosis. This disparity is particularly striking for cancers of the uterine corpus, oral cavity, female breast, and cervix (Fig. 5). Moreover, black patients have lower stage-specific survival for most cancer types (Fig. 6). As a result, although black women have a lower breast cancer incidence rate than white women, they have a higher breast cancer death rate (Table 9). The historically higher incidence rate among white women is thought to reflect a combination of factors that affect both diagnosis (more prevalent mammography) and underlying disease occurrence (such as later age at first birth and greater use of menopausal hormone therapy).[63] However, a recent study reported that breast cancer incidence rates in white and black women are converging because of a stable trend in whites but an increasing trend in blacks.[64] The higher risk of death from breast cancer among black women is thought to reflect a higher prevalence of comorbidities, a longer time to follow-up after an abnormal mammogram, less receipt of high-quality treatment, higher body mass index, and a higher prevalence of aggressive tumor characteristics.[65–68] However, an analysis of clinical trial data showed that black women were less likely than white women to survive their breast cancer despite uniform treatment, even after controlling for stage of disease, tumor characteristics, follow-up, and socioeconomic status.[69]

Cancer incidence and death rates are lower among APIs, American Indians/Alaska Natives (AI/ANs), and Hispanics than non-Hispanic whites for all cancer sites combined and for the 4 most common cancer sites. However, cancers associated with infectious agents (eg, those of the uterine cervix, stomach, and liver) are generally more common in nonwhite populations. For example, stomach and liver cancer incidence and death rates are twice as high in the API population as in whites, reflecting a higher prevalence of chronic infection with *Helicobacter pylori* and hepatitis B virus, respectively, in immigrant countries of origin.[70] Kidney cancer incidence and death rates are highest among AI/ANs, which may be due in part to high rates of obesity, smoking, and hypertension in this population. Regional variation in the prevalence of these risk factors likely contributes to the striking geographic differences in kidney cancer death rates among AI/AN men, which are highest in the Southern and Northern Plains and lowest in the East and Pacific Coast.[71]

Regional Variations in Cancer Rates

Tables 10 and 11 depict current cancer incidence and death rates for selected cancers by state. Geographic patterns in cancer occurrence reflect differences in risk factors, such as smoking and obesity, as well as disparities in the national distribution of poverty and access to health care, which have increased over time.[72,73] The largest geographic variation in cancer occurrence by far is for lung cancer, reflecting the large historical and continuing differences in smoking prevalence among states.[54] For example, lung cancer incidence rates in Kentucky, which has historically had the highest smoking prevalence, are 3.5 times higher than those in Utah, which has the lowest smoking prevalence. There is a 2-fold difference for prostate cancer incidence rates, which range from 89.8 (per 100,000 population) in Arizona to 184.1 in the District of Columbia, likely reflecting both state differences in PSA testing prevalence and population demographics.[24] In contrast, state variations for other cancer types are smaller in both absolute and relative terms. For example, breast cancer incidence rates range from 107.7 (per 100,000 population) in Arkansas to 141.7 in the District of Columbia, a relative difference of just 24%. Some of this variation is attributable to differences in mammography prevalence.[74]

Cancer in Children

Cancer is the second most common cause of death among children aged 1 to 14 years in the United States, surpassed only by accidents. In 2016, an estimated 10,380 children (birth to 14 years) will be diagnosed with cancer (excluding benign/borderline brain tumors) and 1,250 will die from the disease. Benign and borderline brain tumors are not included in the 2016 case estimates because the calculation method requires historical data and these tumors were not required to be reported until 2004.

Leukemia (76% of which are lymphoid leukemias) accounts for 30% of all childhood cancers (including benign brain tumors). Cancers of the brain and other nervous system are the second most common cancer type (26%), followed by soft tissue sarcomas (7%, almost one-half of which are rhabdomyosarcoma), neuroblastoma (6%), non-Hodgkin lymphomas, including Burkitt lymphoma (6%), renal (Wilms) tumors (5%), and Hodgkin lymphomas (3%).[8]

Cancers in adolescents (aged 15 to 19 years) differ somewhat from those in children in terms of type and distribution. For example, a smaller proportion of the cancers diagnosed in adolescents are leukemias and a larger proportion are lymphomas. Cancers of the brain and other nervous system are most common (20%), followed by leukemia (14%), Hodgkin lymphoma (13%), gonadal germ cell tumors (12%), and thyroid carcinoma (11%). Melanoma accounts for 4% of the cancers diagnosed in this age group.

Cancer incidence rates increased in children and adolescents by 0.6% per year from 1975 through 2012. In contrast, death rates have declined continuously, from 6.5 (per 100,000 population) in 1970 to 2.4 in 2012, an overall reduction of 63% (65% in children and 60% in adolescents). Table 12 provides trends in survival rates for the most common childhood cancers. The 5-year relative survival rate for all cancer sites combined improved from 58% for children diagnosed during 1975 to 1977 to 83% for those diagnosed during 2005 to 2011. The substantial progress for all of the major childhood cancers reflects both improvements in treatment and high levels of participation in clinical trials.[59]

Limitations

Although the numbers of cancer cases and deaths expected in 2016 provide a reasonably accurate portrayal of the contemporary cancer burden, they are model-based, 4-year-ahead projections that should be interpreted with caution and not be used to track trends over time. First, the estimates may be affected by changes in methodology, which are implemented regularly as modeling techniques improve and surveillance coverage becomes more complete. Second, although the model is robust, it can only account for trends through the most recent year of data (currently 2012) and cannot anticipate abrupt fluctuations for cancers affected by changes in detection practice, such as prostate cancer. Third, the model can be oversensitive to sudden or large changes in observed data. The most informative indicators of cancer trends are age-standardized or age-specific cancer death rates from the NCHS and cancer incidence rates from SEER, NPCR, and/or NAACCR.

Errors in reporting race/ethnicity in medical records and on death certificates may result in underestimates of cancer incidence and mortality rates in nonwhite and nonblack populations. This is particularly relevant for AI/AN populations.

It is also important to note that cancer data in the United States are primarily reported for broad, heterogeneous racial and ethnic groups, masking important differences in the cancer burden within these subpopulations.

Conclusions

The continuous decline in cancer death rates over 2 decades has resulted in an overall drop of 23%, resulting in more than 1.7 million cancer deaths averted. Despite this progress, cancer is now the leading cause of death for much of the US population. Moreover, incidence and death rates are increasing for several cancer types, including liver and pancreas—2 of the most fatal cancers. Advancing the fight against cancer will require continued clinical and basic research, which is dependent on funding, as well as the application of existing cancer control knowledge across all segments of the population, with an emphasis on disadvantaged groups. ■

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