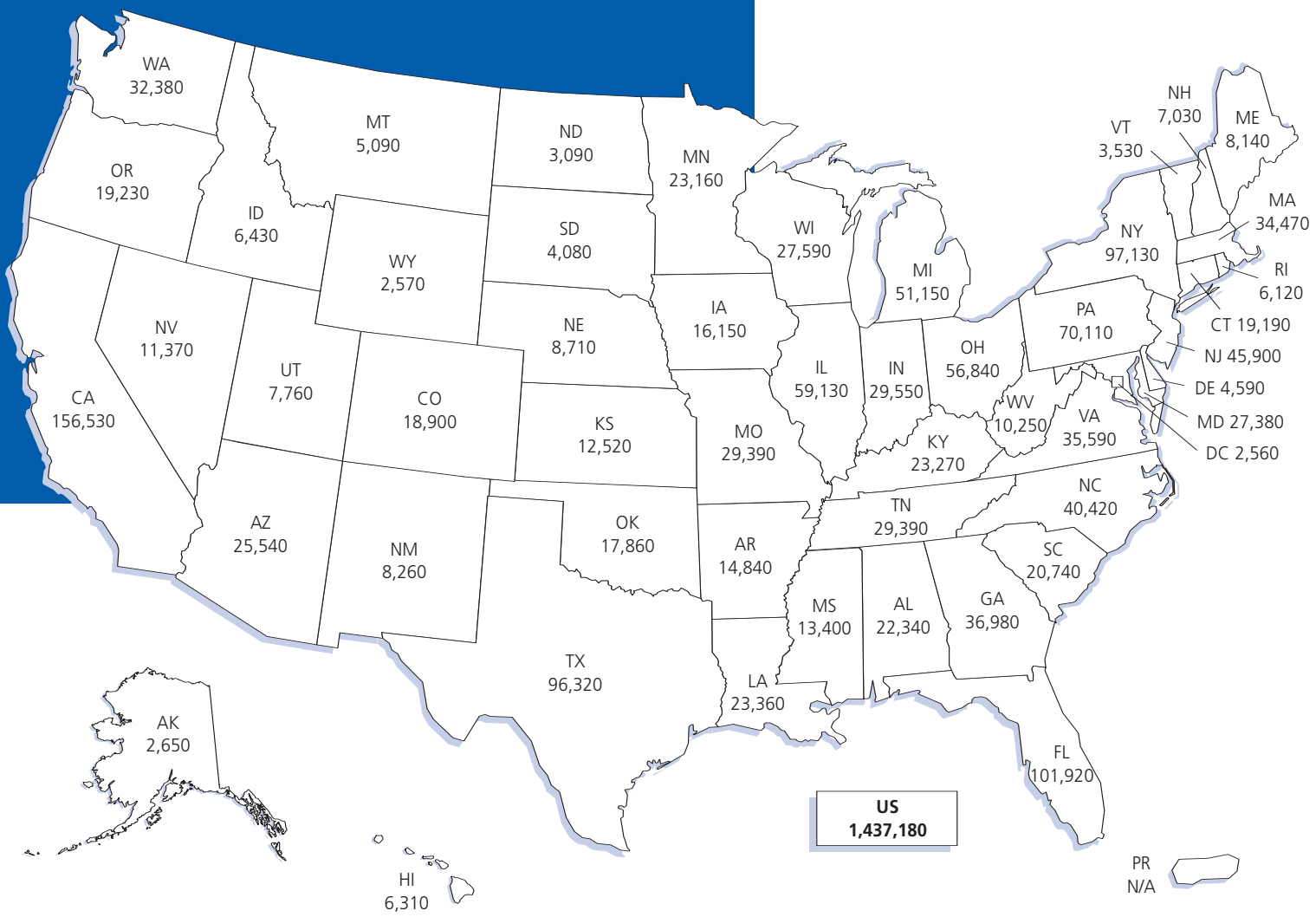
Cancer Facts & Figures 2008



Estimated number of new cancer cases for 2008, excluding basal and squamous cell skin cancers and in situ carcinomas except urinary bladder.
Note: State estimates are offered as a rough guide and should be interpreted with caution. State estimates may not add to US total due to rounding.

American Cancer Society®

Special Section:
Insurance and Cost-Related Barriers to Cancer Care
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This publication attempts to summarize current scientific information about cancer. Except when specified, it does not represent the official policy of the American Cancer Society.

Suggested citation: American Cancer Society. *Cancer Facts & Figures 2008*. Atlanta: American Cancer Society; 2008.

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Cancer: Basic Facts

What Is Cancer?

Cancer is a group of diseases characterized by uncontrolled growth and spread of abnormal cells. If the spread is not controlled, it can result in death. Cancer is caused by both external factors (tobacco, chemicals, radiation, and infectious organisms) and internal factors (inherited mutations, hormones, immune conditions, and mutations that occur from metabolism). These causal factors may act together or in sequence to initiate or promote carcinogenesis. Ten or more years often pass between exposure to external factors and detectable cancer. Cancer is treated with surgery, radiation, chemotherapy, hormone therapy, biological therapy, and targeted therapy.

Can Cancer Be Prevented?

All cancers caused by cigarette smoking and heavy use of alcohol could be prevented completely. The American Cancer Society estimates that in 2008 about 170,000 cancer deaths are expected to be caused by tobacco use. Scientific evidence suggests that about one-third of the 565,650 cancer deaths expected to occur in 2008 will be related to overweight or obesity, physical inactivity, and nutrition and thus could also be prevented. Certain cancers are related to infectious agents, such as hepatitis B virus (HBV), human papillomavirus (HPV), human immunodeficiency virus (HIV), *Helicobacter pylori (H. pylori)*, and others, and could be prevented through behavioral changes, vaccines, or antibiotics. In addition, many of the more than 1 million skin cancers that are expected to be diagnosed in 2008 could have been prevented by protection from the sun's rays and avoiding indoor tanning.

Regular screening examinations by a health care professional can result in the detection and removal of precancerous growths, as well as the diagnosis of cancers at an early stage when they are most treatable. Screening can prevent cancers of the cervix, colon, and rectum by allowing removal of precancerous tissue before it becomes malignant. Screening can detect cancers of the breast, colon, rectum, cervix, prostate, oral cavity, and skin at early stages. For most of these cancers, early detection has been proven to reduce mortality. A heightened awareness of breast changes or skin changes may also result in detection of these tumors at earlier stages. Cancers that can be prevented or detected earlier by screening account for at least half of all new cancer cases. The 5-year relative survival rate for these cancers is about 85%, a reflection of real reductions in mortality and earlier diagnosis because of screening.

Who Is at Risk of Developing Cancer?

Anyone can develop cancer. Since the risk of being diagnosed with cancer increases as individuals age, most cases occur in adults who are middle-aged or older. About 77% of all cancers are diagnosed in persons 55 and older. Cancer researchers use the word "risk" in different ways, most commonly expressing risk as lifetime risk or relative risk.

Lifetime risk refers to the probability that an individual, over the course of a lifetime, will develop or die from cancer. In the US, men have slightly less than a 1 in 2 lifetime risk of developing cancer; for women, the risk is a little more than 1 in 3.

Relative risk is a measure of the strength of the relationship between risk factors and a particular cancer. It compares the risk of developing cancer in persons with a certain exposure or trait to the risk in persons who do not have this characteristic. For example, male smokers are about 23 times more likely to develop lung cancer than nonsmokers, so their relative risk is 23. Most relative risks are not this large. For example, women who have a first-degree relative (mother, sister, or daughter) with a history of breast cancer have about twice the risk of developing breast cancer compared to women who do not have a family history.

All cancers involve the malfunction of genes that control cell growth and division. About 5% of all cancers are strongly hereditary, in that an inherited genetic alteration confers a very high risk of developing one or more specific types of cancer. However, most cancers do not result from inherited genes but from damage (mutation) to genes that occurs during one's lifetime. Mutations may result from internal factors such as hormones or the metabolism of nutrients within cells, or external factors such as tobacco, chemicals, and sunlight. (These nonhereditary mutations are called somatic mutations.)

How Many People Alive Today Have Ever Had Cancer?

The National Cancer Institute estimates that approximately 10.8 million Americans with a history of cancer were alive in January 2004. Some of these individuals were cancer-free, while others still had evidence of cancer and may have been undergoing treatment.

How Many New Cases Are Expected to Occur This Year?

About 1,437,180 new cancer cases are expected to be diagnosed in 2008. This estimate does not include carcinoma in situ (noninvasive cancer) of any site except urinary bladder, and does not include basal and

squamous cell skin cancers. More than 1 million cases of basal and squamous cell skin cancers are expected to be diagnosed this year.

How Many People Are Expected to Die of Cancer This Year?

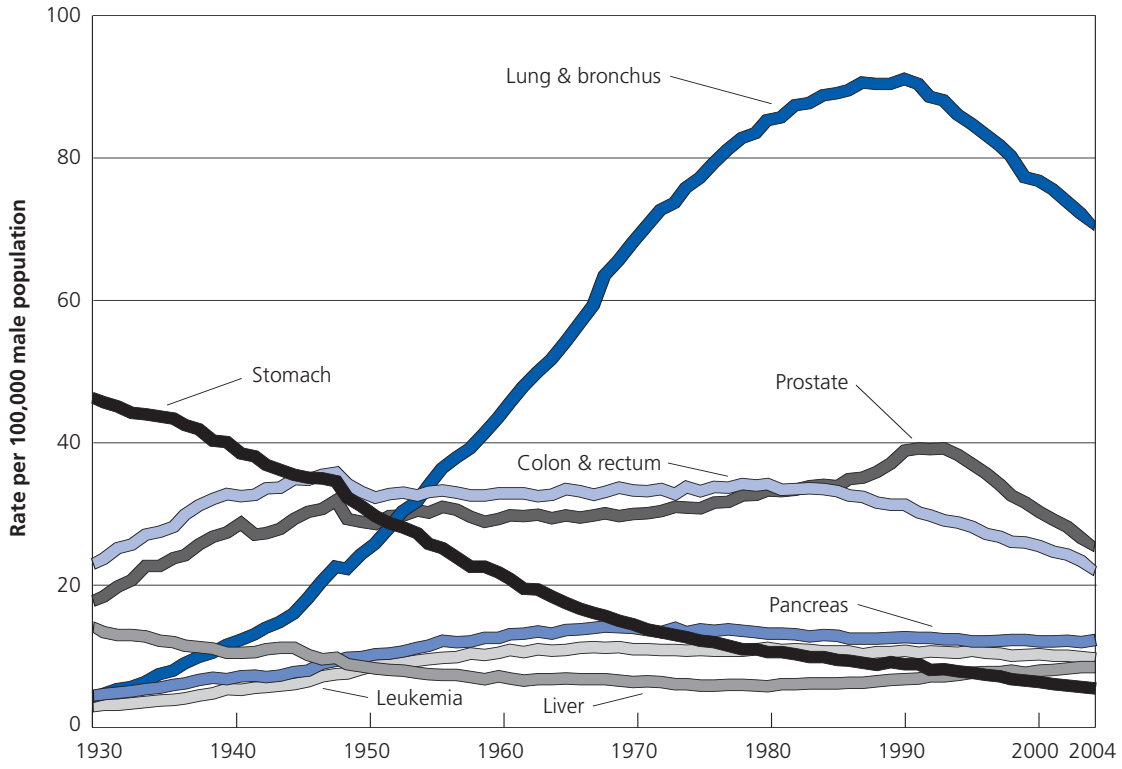
This year, about 565,650 Americans are expected to die of cancer, more than 1,500 people a day. Cancer is the second most common cause of death in the US, exceeded only by heart disease. In the US, cancer accounts for 1 of every 4 deaths.

What Percentage of People Survive Cancer?

The 5-year relative survival rate for all cancers diagnosed between 1996 and 2003 is 66%, up from 50% in 1975-1977 (see page 18). The improvement in survival reflects progress in diagnosing certain cancers at an earlier stage and improvements in treatment. Survival statistics vary greatly by cancer type and stage at diagnosis. Relative survival compares survival among cancer patients to that of people not diagnosed with cancer who are of the same age, race, and sex. It represents the percentage of cancer patients who are alive after some designated time period (usually 5 years) relative to persons without cancer. It does not distinguish between patients who have been cured and those who have relapsed or are still in treatment. While 5-year relative survival is useful in monitoring progress in the early detection and treatment of cancer, it does not represent the proportion of people who are cured permanently, since cancer deaths can occur beyond 5 years after diagnosis.

Although relative survival for specific cancer types provides some indication about the average survival experience of cancer patients in a given population, it is less informative to predict individual prognosis and should be interpreted with caution. First, 5-year relative survival rates are based on patients who were diagnosed from 1996-2003 and do not reflect recent advances in detection and treatment. Second, factors that influence survival, such as stage at diagnosis, treatment protocols, additional illnesses, and biological or behavioral differences of each individual, cannot be taken into account in the estimation of relative survival rates. (For more information about survival rates, see Sources of Statistics on page 65.)

Age-Adjusted Cancer Death Rates,* Males by Site, US, 1930-2004



*Per 100,000, age-adjusted to the 2000 US standard population.

Note: Due to changes in ICD coding, numerator information has changed over time. Rates for cancer of the liver, lung and bronchus, and colon and rectum are affected by these coding changes.

Source: US Mortality Data 1960 to 2004, US Mortality Volumes 1930 to 1959, National Center for Health Statistics, Centers for Disease Control and Prevention, 2006.

American Cancer Society, Surveillance Research, 2008

How Is Cancer Staged?

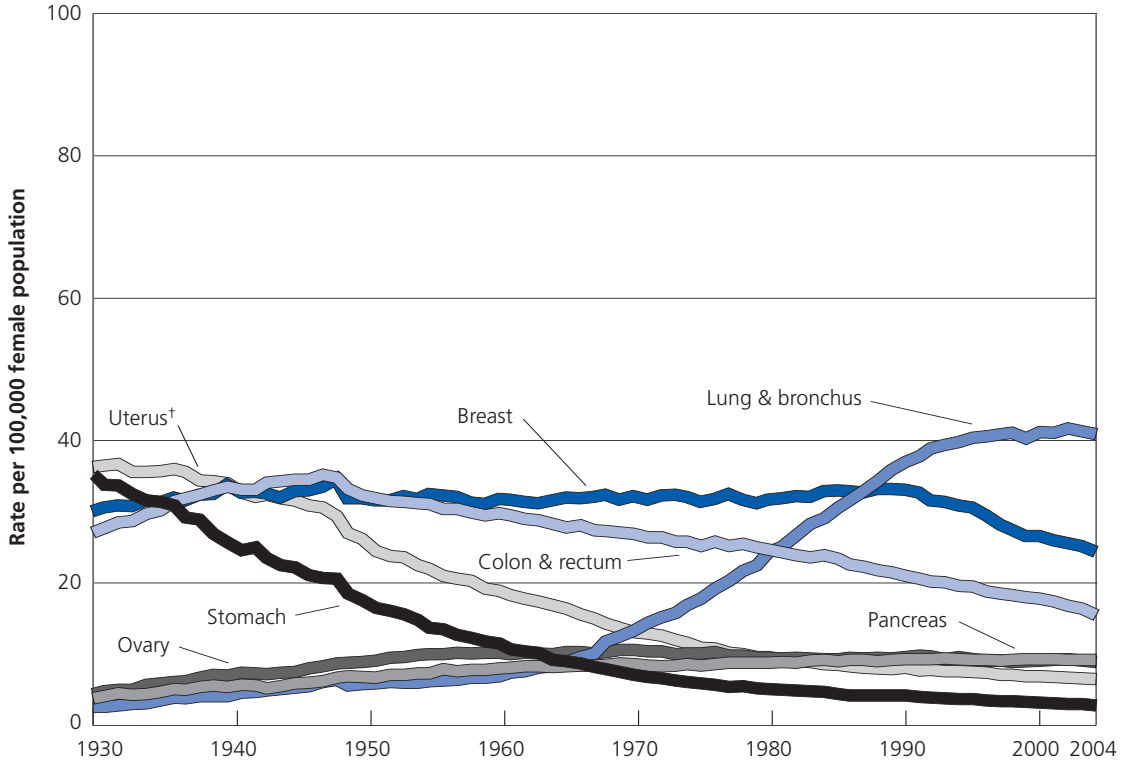
Staging describes the extent or spread of the disease at the time of diagnosis. It is essential in determining the choice of therapy and in assessing prognosis. A cancer's stage is based on the primary tumor's size and location and whether it has spread to other areas of the body. A number of different staging systems are used to classify tumors. The TNM staging system assesses tumors in three ways: extent of the primary tumor (T), absence or presence of regional lymph node involvement (N), and absence or presence of distant metastases (M). Once the T, N, and M are determined, a stage of I, II, III, or IV is assigned, with stage I being early and stage IV being advanced disease. A different system of summary staging (in situ, local, regional, and distant) is used for descriptive and statistical analysis of tumor registry data. If cancer cells are present only in the layer of cells where they developed and have not spread, the stage is in situ. If cancer cells have spread beyond the original layer of tissue, the cancer is invasive. (For a description of the other summary stage categories, see Five-Year Relative Survival Rates by Stage at Diagnosis, 1996-2003, page 17.)

What Are the Costs of Cancer?

The National Institutes of Health estimate overall costs of cancer in 2007 at $219.2 billion: $89.0 billion for direct medical costs (total of all health expenditures); $18.2 billion for indirect morbidity costs (cost of lost productivity due to illness); and $112.0 billion for indirect mortality costs (cost of lost productivity due to premature death).

Lack of health insurance and other barriers prevent many Americans from receiving optimal health care. According to early release estimates from the 2006 National Health Interview Survey, about 24% of Americans aged 18-64 and 13% of children had no health insurance coverage for at least part of the past year. Almost 34% of adults who lack a high school diploma were uninsured in the past year, compared to 23% of high school graduates and 15% of those with more than a high school education. (For information on the relationship between insurance status and cancer, see the special section on page 22.)

Age-Adjusted Cancer Death Rates,* Females by Site, US, 1930-2004



*Per 100,000, age-adjusted to the 2000 US standard population. †Uterus cancer death rates are for uterine cervix and uterine corpus combined.

Note: Due to changes in ICD coding, numerator information has changed over time. Rates for cancer of the lung and bronchus, colon and rectum, and ovary are affected by these coding changes.

Source: US Mortality Data 1960 to 2004, US Mortality Volumes 1930 to 1959, National Center for Health Statistics, Centers for Disease Control and Prevention, 2006.

American Cancer Society, Surveillance Research, 2008

Estimated New Cancer Cases and Deaths by Sex, US, 2008*

	Estimated New Cases			Estimated Deaths		
	Both Sexes	**Male**	**Female**	**Both Sexes**	**Male**	**Female**
All sites	1,437,180	745,180	692,000	565,650	294,120	271,530
Oral cavity & pharynx	35,310	25,310	10,000	7,590	5,210	2,380
Tongue	10,140	7,280	2,860	1,880	1,210	670
Mouth	10,820	6,590	4,230	1,840	1,120	720
Pharynx	12,410	10,060	2,350	2,200	1,620	580
Other oral cavity	1,940	1,380	560	1,670	1,260	410
Digestive system	271,290	148,560	122,730	135,130	74,850	60,280
Esophagus	16,470	12,970	3,500	14,280	11,250	3,030
Stomach	21,500	13,190	8,310	10,880	6,450	4,430
Small intestine	6,110	3,200	2,910	1,110	580	530
Colon†	108,070	53,760	54,310	49,960	24,260	25,700
Rectum	40,740	23,490	17,250			
Anus, anal canal, & anorectum	5,070	2,020	3,050	680	250	430
Liver & intrahepatic bile duct	21,370	15,190	6,180	18,410	12,570	5,840
Gallbladder & other biliary	9,520	4,500	5,020	3,340	1,250	2,090
Pancreas	37,680	18,770	18,910	34,290	17,500	16,790
Other digestive organs	4,760	1,470	3,290	2,180	740	1,440
Respiratory system	232,270	127,880	104,390	166,280	94,210	72,070
Larynx	12,250	9,680	2,570	3,670	2,910	760
Lung & bronchus	215,020	114,690	100,330	161,840	90,810	71,030
Other respiratory organs	5,000	3,510	1,490	770	490	280
Bones & joints	2,380	1,270	1,110	1,470	820	650
Soft tissue (including heart)	10,390	5,720	4,670	3,680	1,880	1,800
Skin (excluding basal & squamous)	67,720	38,150	29,570	11,200	7,360	3,840
Melanoma	62,480	34,950	27,530	8,420	5,400	3,020
Other non-epithelial skin	5,240	3,200	2,040	2,780	1,960	820
Breast	184,450	1,990	182,460	40,930	450	40,480
Genital system	274,150	195,660	78,490	57,820	29,330	28,490
Uterine cervix	11,070		11,070	3,870		3,870
Uterine corpus	40,100		40,100	7,470		7,470
Ovary	21,650		21,650	15,520		15,520
Vulva	3,460		3,460	870		870
Vagina & other genital, female	2,210		2,210	760		760
Prostate	186,320	186,320		28,660	28,660	
Testis	8,090	8,090		380	380	
Penis & other genital, male	1,250	1,250		290	290	
Urinary system	125,490	85,870	39,620	27,810	18,430	9,380
Urinary bladder	68,810	51,230	17,580	14,100	9,950	4,150
Kidney & renal pelvis	54,390	33,130	21,260	13,010	8,100	4,910
Ureter & other urinary organs	2,290	1,510	780	700	380	320
Eye & orbit	2,390	1,340	1,050	240	130	110
Brain & other nervous system	21,810	11,780	10,030	13,070	7,420	5,650
Endocrine system	39,510	10,030	29,480	2,430	1,110	1,320
Thyroid	37,340	8,930	28,410	1,590	680	910
Other endocrine	2,170	1,100	1,070	840	430	410
Lymphoma	74,340	39,850	34,490	20,510	10,490	10,020
Hodgkin lymphoma	8,220	4,400	3,820	1,350	700	650
Non-Hodgkin lymphoma	66,120	35,450	30,670	19,160	9,790	9,370
Myeloma	19,920	11,190	8,730	10,690	5,640	5,050
Leukemia	44,270	25,180	19,090	21,710	12,460	9,250
Acute lymphocytic leukemia	5,430	3,220	2,210	1,460	800	660
Chronic lymphocytic leukemia	15,110	8,750	6,360	4,390	2,600	1,790
Acute myeloid leukemia	13,290	7,200	6,090	8,820	5,100	3,720
Chronic myeloid leukemia	4,830	2,800	2,030	450	200	250
Other leukemia‡	5,610	3,210	2,400	6,590	3,760	2,830
Other & unspecified primary sites‡	31,490	15,400	16,090	45,090	24,330	20,760

*Rounded to the nearest 10; estimated new cases exclude basal and squamous cell skin cancers and in situ carcinomas except urinary bladder. About 67,770 female carcinoma in situ of the breast and 54,020 melanoma in situ will be newly diagnosed in 2008. †Estimated deaths for colon and rectum cancers are combined. ‡More deaths than cases suggests lack of specificity in recording underlying causes of death on death certificates.

Source: Estimated new cases are based on 1995-2004 incidence rates from 41 states and the District of Columbia as reported by the North American Association of Central Cancer Registries (NAACCR), representing about 85% of the US population. Estimated deaths are based on data from US Mortality Data, 1969 to 2005, National Center for Health Statistics, Centers for Disease Control and Prevention, 2008.

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Estimated New Cancer Cases for Selected Cancer Sites by State, US, 2008*

State	All Sites	Female Breast	Uterine Cervix	Colon & Rectum	Uterine Corpus	Leukemia	Lung & Bronchus	Melanoma of the Skin	Non-Hodgkin Lymphoma	Prostate	Urinary Bladder
Alabama	22,340	2,750	170	2,390	490	630	3,900	820	970	2,850	890
Alaska	2,650	350	†	250	60	70	340	80	120	450	120
Arizona	25,540	3,220	200	2,620	610	760	3,850	1,380	1,180	3,610	1,380
Arkansas	14,840	1,790	130	1,690	330	520	2,640	540	650	1,980	610
California	156,530	20,080	1,280	14,500	4,020	4,530	18,060	7,620	7,560	24,380	6,940
Colorado	18,900	2,520	140	1,840	510	720	2,210	1,180	920	3,210	890
Connecticut	19,190	2,640	120	2,090	660	570	2,680	1,060	910	2,280	1,080
Delaware	4,590	580	†	480	130	110	760	180	190	530	220
Dist. of Columbia	2,560	300	†	270	60	50	350	50	100	330	80
Florida	101,920	11,850	770	10,920	2,450	3,190	17,360	4,430	4,750	11,380	5,390
Georgia	36,980	4,910	340	3,760	840	1,030	5,980	1,600	1,550	4,700	1,380
Hawaii	6,310	840	50	700	180	170	710	300	250	930	210
Idaho	6,430	760	†	620	160	240	800	360	340	1,160	320
Illinois	59,130	7,190	500	6,570	1,790	1,890	9,340	1,930	2,870	7,790	2,840
Indiana	29,550	3,660	230	3,350	890	910	5,140	1,130	1,340	3,550	1,380
Iowa	16,150	1,990	100	1,810	510	630	2,590	790	730	1,910	830
Kansas	12,520	1,730	80	1,270	390	410	1,910	550	600	1,350	570
Kentucky	23,270	2,600	190	2,560	580	700	4,580	1,080	970	3,140	990
Louisiana	23,360	2,840	210	2,490	430	690	3,730	690	1,020	3,430	920
Maine	8,140	990	50	860	270	260	1,330	410	340	1,110	490
Maryland	27,380	3,670	210	2,920	810	640	4,100	1,110	1,080	3,420	1,120
Massachusetts	34,470	4,480	200	3,560	1,120	1,000	4,930	1,810	1,580	3,800	1,950
Michigan	51,150	6,120	330	5,150	1,620	1,630	8,020	2,140	2,360	7,180	2,510
Minnesota	23,160	3,090	140	2,430	750	910	3,330	830	1,110	3,400	1,110
Mississippi	13,400	1,630	130	1,470	230	380	2,290	310	540	2,010	500
Missouri	29,390	3,810	210	3,090	860	870	5,560	1,110	1,330	3,050	1,380
Montana	5,090	620	†	530	130	160	710	200	230	900	270
Nebraska	8,710	1,160	60	910	270	290	1,240	380	390	1,260	420
Nevada	11,370	1,270	90	1,160	240	370	1,850	430	480	1,710	570
New Hampshire	7,030	950	†	760	240	200	1,040	400	320	850	390
New Jersey	45,900	6,310	370	4,600	1,590	1,440	6,210	2,300	2,210	5,090	2,620
New Mexico	8,260	1,060	70	830	220	320	940	410	350	1,470	350
New York	97,130	13,310	830	10,060	3,340	3,140	13,500	3,440	4,460	10,500	5,460
North Carolina	40,420	5,000	340	4,380	1,050	1,110	6,510	1,830	1,610	5,050	1,740
North Dakota	3,090	410	†	350	90	100	390	110	140	480	170
Ohio	56,840	6,990	380	6,270	1,830	1,660	9,510	2,110	2,790	6,650	2,810
Oklahoma	17,860	2,270	150	1,860	390	570	3,150	700	840	2,530	750
Oregon	19,230	2,430	90	1,740	500	490	2,580	1,120	930	2,730	1,000
Pennsylvania	70,110	9,410	440	7,560	2,460	2,220	10,320	3,280	3,300	6,510	4,290
Rhode Island	6,120	770	†	650	200	170	880	310	250	650	370
South Carolina	20,740	2,510	180	2,170	500	590	3,550	940	780	2,520	850
South Dakota	4,080	520	†	430	120	130	500	160	170	580	210
Tennessee	29,390	3,720	250	3,290	680	880	5,070	1,150	1,320	3,980	1,250
Texas	96,320	12,210	970	9,570	2,100	3,330	13,840	3,940	4,650	12,960	3,610
Utah	7,760	1,010	60	750	240	320	580	500	420	1,510	340
Vermont	3,530	470	†	360	110	100	460	180	160	490	180
Virginia	35,590	4,680	260	3,690	1,000	850	5,340	1,620	1,410	4,430	1,460
Washington	32,380	4,140	170	2,850	850	970	4,110	1,900	1,590	4,990	1,580
West Virginia	10,250	1,150	80	1,200	320	290	2,000	440	410	1,180	530
Wisconsin	27,590	3,400	190	2,930	830	980	3,920	1,010	1,390	3,970	1,360
Wyoming	2,570	310	†	260	70	80	320	120	110	400	120
United States	1,437,180	182,460	11,070	148,810	40,100	44,270	215,020	62,480	66,120	186,320	68,810

*Rounded to nearest 10. Excludes basal and squamous cell skin cancers and in situ carcinomas except urinary bladder. †Estimate is fewer than 50 cases.

Note: These estimates are offered as a rough guide and should be interpreted with caution. State estimates may not sum to US total due to rounding and exclusion of state estimates fewer than 50 cases.

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Estimated Cancer Deaths for Selected Cancer Sites by State, US, 2008*

State	All Sites	Brain/ Nervous System	Female Breast	Colon & Rectum	Leukemia	Liver	Lung & Bronchus	Non-Hodgkin Lymphoma	Ovary	Pancreas	Prostate
Alabama	9,920	200	730	870	360	310	3,340	320	280	530	490
Alaska	810	†	50	70	†	†	230	†	†	50	†
Arizona	10,290	270	700	950	400	370	2,800	340	310	650	640
Arkansas	6,350	140	410	580	240	200	2,210	190	140	370	360
California	55,550	1,500	4,150	5,070	2,170	2,510	13,100	1,910	1,690	3,720	3,400
Colorado	6,700	200	530	660	290	220	1,670	200	240	420	350
Connecticut	6,970	150	480	560	270	210	1,850	230	180	520	400
Delaware	1,870	†	110	150	70	50	590	60	50	110	100
Dist. of Columbia	990	†	70	90	†	†	250	†	†	60	70
Florida	41,660	820	2,760	3,420	1,640	1,310	12,490	1,410	1,040	2,400	2,520
Georgia	15,040	300	1,110	1,330	540	400	4,570	480	430	850	730
Hawaii	2,260	†	140	210	80	120	570	80	50	170	130
Idaho	2,470	80	160	200	120	70	630	100	†	180	170
Illinois	23,660	470	1,750	2,250	980	720	6,600	800	650	1,530	1,100
Indiana	12,780	250	820	1,130	510	350	3,990	450	360	750	550
Iowa	6,480	160	400	570	310	150	1,810	290	190	380	340
Kansas	5,360	150	370	520	220	140	1,610	200	150	320	220
Kentucky	9,500	150	590	840	320	250	3,480	300	210	470	360
Louisiana	9,350	210	750	920	310	360	2,980	300	220	540	420
Maine	3,270	80	190	260	110	80	980	100	80	200	180
Maryland	10,360	220	830	940	390	300	2,920	350	280	660	550
Massachusetts	13,070	270	860	1,100	480	420	3,600	450	360	880	530
Michigan	21,210	490	1,310	1,700	790	560	5,890	740	550	1,190	850
Minnesota	9,100	240	630	760	390	270	2,380	320	260	560	450
Mississippi	6,010	170	440	590	220	180	2,030	180	150	330	290
Missouri	12,630	280	890	1,100	470	360	4,140	460	310	710	460
Montana	1,970	50	130	160	80	†	580	80	60	110	120
Nebraska	3,330	90	230	340	150	70	910	130	90	170	210
Nevada	4,690	110	340	490	160	160	1,340	110	130	270	240
New Hampshire	2,640	70	190	210	100	70	760	90	60	160	140
New Jersey	16,800	330	1,400	1,590	640	540	4,300	550	480	1,060	800
New Mexico	3,310	80	240	310	120	150	730	110	90	210	200
New York	34,870	800	2,650	3,140	1,370	1,210	8,990	1,110	1,040	2,340	1,590
North Carolina	17,450	350	1,300	1,400	600	460	5,470	500	460	1,020	750
North Dakota	1,220	†	80	120	†	†	330	†	†	80	100
Ohio	24,410	550	1,800	2,200	900	650	7,350	660	630	1,380	1,350
Oklahoma	7,420	180	510	710	290	200	2,400	200	180	370	290
Oregon	7,450	220	510	630	270	210	2,160	380	230	450	380
Pennsylvania	29,370	560	2,180	2,560	1,060	830	8,230	1,160	810	1,820	1,430
Rhode Island	2,310	60	140	190	90	60	600	50	60	130	120
South Carolina	8,860	190	620	730	320	260	2,860	270	210	520	420
South Dakota	1,620	50	100	160	70	50	450	70	50	100	100
Tennessee	13,260	350	920	1,130	470	360	4,490	430	360	720	560
Texas	34,960	850	2,520	3,020	1,420	1,680	9,890	1,320	930	2,060	1,730
Utah	2,730	90	240	240	130	80	480	130	90	180	140
Vermont	1,140	†	90	120	50	†	350	†	†	70	70
Virginia	13,990	310	1,140	1,260	500	390	4,600	420	390	840	630
Washington	11,370	380	780	940	460	410	3,180	400	360	720	700
West Virginia	4,580	100	310	450	150	120	1,450	170	130	210	150
Wisconsin	11,220	270	760	910	500	340	2,940	390	310	680	700
Wyoming	990	†	60	100	†	†	260	†	†	60	50
United States	565,650	13,070	40,480	49,960	21,710	18,410	161,840	19,160	15,520	34,290	28,660

*Rounded to nearest 10. †Estimate is fewer than 50 deaths. **Note:** State estimates may not sum to US total due to rounding and exclusion of state estimates fewer than 50 deaths.

Source: US Mortality Data, 1969-2005, National Center for Health Statistics, Centers for Disease Control and Prevention, 2008.

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Cancer Incidence Rates by Site and State, US, 2000-2004*

	All Sites		Breast	Colon & Rectum		Lung & Bronchus		Non-Hodgkin Lymphoma		Prostate	Urinary Bladder	
State	**Male**	**Female**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Male**	**Female**
Alabama†	540.4	370.1	113.9	61.3	42.1	109.7	51.6	19.9	13.7	146.3	30.1	7.4
Alaska†	556.1	416.8	132.0	63.9	50.0	87.0	59.2	24.0	14.6	166.2	41.4	7.8
Arizona	464.1	364.6	114.4	52.3	37.4	71.2	49.3	18.9	13.4	118.6	35.7	8.8
Arkansas	547.1	376.9	117.1	60.5	43.1	113.7	57.8	20.9	15.2	154.6	34.1	8.5
California†	517.3	393.5	126.5	55.0	40.4	69.0	47.9	22.4	15.4	156.9	34.6	8.4
Colorado†	510.2	400.1	129.3	53.1	41.4	65.1	45.9	21.6	16.6	160.1	35.3	9.1
Connecticut†	588.7	445.2	137.3	66.8	49.0	83.0	57.3	24.6	17.1	174.1	44.4	12.0
Delaware†	589.9	430.2	126.1	65.5	46.3	96.6	63.2	23.0	16.4	174.7	40.9	10.4
Dist. of Columbia†	611.5	421.2	134.8	64.0	50.4	90.4	48.8	21.8	12.5	215.0	25.9	8.8
Florida†	553.0	411.2	119.7	60.9	45.3	93.0	61.0	22.1	15.5	147.4	39.7	10.4
Georgia†	568.4	394.5	123.9	61.6	43.9	107.0	53.3	20.1	14.2	165.7	33.2	8.1
Hawaii†	482.0	372.1	124.2	64.7	41.6	67.8	37.6	17.9	13.2	131.8	24.5	5.5
Idaho†	533.6	393.4	123.1	51.9	39.7	71.4	45.8	21.4	17.7	172.3	38.1	8.4
Illinois†	578.2	423.1	126.2	70.0	49.4	94.3	57.0	23.6	16.3	163.4	40.7	10.4
Indiana†	551.7	414.5	121.0	66.6	47.6	106.1	61.8	22.6	16.3	140.0	36.6	9.4
Iowa†	551.6	422.3	125.9	69.0	51.5	89.5	50.8	22.8	17.1	151.1	39.3	9.9
Kansas‡	–	–	–	–	–	–	–	–	–	–	–	–
Kentucky†	611.2	441.6	122.1	71.3	52.8	137.9	74.9	22.1	16.9	149.2	38.0	9.8
Louisiana†	615.7	402.4	122.0	71.3	48.9	112.3	57.4	22.8	16.0	179.7	35.3	8.5
Maine†	612.4	451.9	130.8	67.2	50.4	100.5	64.5	23.7	17.5	172.0	48.9	13.2
Maryland‡	–	–	–	–	–	–	–	–	–	–	–	–
Massachusetts†	586.9	452.1	136.7	67.6	49.4	82.9	62.1	23.1	16.9	173.1	45.8	12.8
Michigan†	606.0	431.7	128.8	61.8	45.8	95.0	59.9	24.5	18.1	194.5	41.8	10.5
Minnesota‡	–	–	–	–	–	–	–	–	–	–	–	–
Mississippi (2002-2004)	546.7	359.8	105.4	63.1	45.2	109.3	49.9	20.1	12.9	158.7	28.5	7.0
Missouri†	535.4	408.9	124.2	65.9	47.5	104.3	60.0	22.0	16.0	132.8	36.1	8.9
Montana†	557.1	407.3	124.5	56.5	43.3	79.8	56.7	22.8	15.0	184.3	41.7	9.9
Nebraska†	550.3	413.9	130.4	69.1	48.6	84.0	47.8	23.8	17.2	160.4	37.9	9.8
Nevada†	555.6	425.8	121.5	59.8	44.6	88.8	71.4	22.0	15.5	158.4	44.7	11.4
New Hampshire†	575.8	440.8	133.9	62.3	47.4	82.1	59.8	25.0	16.5	166.1	46.9	13.2
New Jersey†	613.9	446.4	131.7	70.1	50.8	82.4	55.3	25.6	17.9	192.8	45.8	12.4
New Mexico†	485.4	359.4	112.2	51.5	35.7	59.5	37.7	18.1	13.9	150.7	28.7	7.1
New York†	570.3	427.0	126.0	66.0	49.0	82.0	53.7	23.9	16.7	170.1	41.9	11.2
North Carolina‡	–	–	–	–	–	–	–	–	–	–	–	–
North Dakota†	518.6	378.8	123.4	66.3	43.3	71.3	43.9	22.1	15.1	175.2	37.1	9.2
Ohio†	542.0	408.9	123.5	64.1	46.8	97.8	58.3	22.7	16.0	149.3	38.7	9.7
Oklahoma†	547.3	403.1	127.0	63.1	44.6	109.2	63.1	22.0	15.7	148.1	33.2	8.2
Oregon†	538.9	433.8	138.8	56.6	42.6	81.4	61.0	24.2	17.3	157.7	40.3	10.2
Pennsylvania†	588.5	436.3	127.1	70.1	50.0	91.8	54.7	24.7	17.1	166.7	44.3	11.5
Rhode Island†	620.2	443.0	129.9	71.1	46.9	97.4	59.5	23.4	16.2	170.6	51.6	14.5
South Carolina†	586.6	391.1	121.0	65.0	45.9	105.1	51.8	20.5	14.8	175.1	33.2	7.5
South Dakota (2001-2004)	577.0	400.9	126.6	66.4	47.5	82.0	43.3	22.5	17.1	191.4	40.7	9.0
Tennessee§	459.2	361.3	113.9	55.9	41.0	100.0	53.6	18.2	13.2	110.8	29.0	7.4
Texas†	535.9	385.1	117.2	59.7	41.0	91.0	51.0	21.7	15.9	147.9	30.4	7.4
Utah†	487.6	345.2	115.7	47.5	35.2	40.3	20.9	23.2	15.7	186.3	29.4	6.5
Vermont‡	–	–	–	–	–	–	–	–	–	–	–	–
Virginia	511.6	372.8	121.6	57.5	43.2	84.9	50.2	19.3	13.1	157.3	32.5	8.5
Washington†	567.1	444.1	142.2	55.9	42.5	82.0	60.5	26.6	18.3	172.6	41.7	10.3
West Virginia†	570.6	426.5	115.5	71.7	53.2	116.8	67.7	21.4	16.1	144.2	39.9	11.2
Wisconsin	543.4	413.4	129.0	62.3	45.4	81.3	51.5	22.3	16.5	163.9	36.5	10.2
Wyoming†	519.2	392.2	121.6	49.5	43.4	65.3	44.8	18.9	17.6	179.9	38.9	9.5
United States	557.8	413.1	125.3	62.9	45.8	89.0	55.2	22.8	16.2	160.8	38.4	9.8

*Per 100,000, age-adjusted to the 2000 US standard population. † This state's registry has submitted 5 years of data and passed rigorous criteria for each single year's data, including completeness of reporting, non-duplication of records, percent unknown in critical data fields, percent of cases registered with information from death certificates only, and internal consistency among data items. ‡This state's registry did not submit incidence data to the North American Association of Central Cancer Registries (NAACCR) for 2000-2004. §Case ascertainment for this state's registry is incomplete for the years 2000-2004.

Source: CINA+ Online and *Cancer in North America: 2000-2004, Volume One: Incidence*, NAACCR, 2007. Data are collected by cancer registries participating in the National Cancer Institute's SEER program and the Centers for Disease Control and Prevention's National Program of Cancer Registries.

American Cancer Society, Surveillance Research, 2008

Cancer Death Rates by Site and State, US, 2000-2004*

	All Sites		Breast	Colon & Rectum		Lung & Bronchus		Non-Hodgkin Lymphoma		Pancreas		Prostate
State	**Male**	**Female**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**
Alabama	279.0	164.8	26.0	24.4	15.4	96.3	40.9	9.2	6.3	12.6	9.3	35.6
Alaska	236.9	161.8	22.4	23.4	16.2	69.9	45.0	8.4	5.7	11.6	9.1	28.2
Arizona	208.2	145.9	23.4	20.4	14.1	59.4	37.7	8.7	6.0	10.8	8.1	25.3
Arkansas	271.3	167.9	24.4	26.1	17.6	99.7	46.5	9.9	6.0	11.9	9.0	30.5
California	209.1	152.4	24.2	20.2	14.7	56.4	36.8	9.0	5.6	11.4	9.1	25.4
Colorado	203.7	146.6	23.0	20.7	14.9	52.1	33.8	9.3	6.1	11.2	8.6	27.3
Connecticut	224.8	159.0	25.2	22.3	15.9	63.1	40.1	9.2	6.1	12.7	9.6	26.4
Delaware	252.6	172.2	26.6	24.5	16.8	79.9	47.7	10.9	6.0	11.8	9.5	28.1
Dist. of Columbia	289.7	181.9	32.1	29.3	20.4	78.3	38.6	8.3	5.0	14.5	11.2	46.5
Florida	226.0	152.8	23.5	21.2	14.7	71.5	42.3	9.2	5.6	11.6	8.6	23.7
Georgia	259.0	163.0	25.5	23.3	16.4	88.7	40.7	8.5	5.7	12.5	9.2	32.7
Hawaii	191.8	120.6	17.3	21.0	12.0	49.5	24.5	7.4	4.5	11.9	9.5	19.6
Idaho	210.8	149.0	23.7	18.9	13.2	56.2	34.7	9.1	6.8	10.9	9.3	30.1
Illinois	250.9	170.1	27.0	26.8	18.1	76.4	42.0	9.8	6.3	13.1	9.7	29.2
Indiana	262.0	173.8	26.2	26.4	17.4	88.8	47.4	10.6	7.0	12.8	9.5	29.1
Iowa	233.6	156.9	23.6	24.5	17.2	73.1	37.4	10.3	7.0	11.9	9.4	28.4
Kansas	231.7	157.9	25.2	22.5	16.1	73.7	39.9	10.7	7.0	12.1	8.5	25.9
Kentucky	291.8	182.1	26.2	27.7	19.5	113.2	55.5	10.2	6.4	11.8	9.0	28.6
Louisiana	291.0	179.5	29.8	29.2	18.8	97.1	46.0	9.7	6.6	14.2	10.6	33.5
Maine	255.6	175.6	23.7	23.4	18.2	79.6	48.5	10.0	6.5	13.4	9.4	28.5
Maryland	244.7	170.0	27.6	25.1	17.8	74.2	44.5	9.1	5.6	12.6	9.7	29.9
Massachusetts	242.0	169.5	25.6	24.6	17.0	68.7	44.7	9.3	6.5	13.0	10.1	27.4
Michigan	243.1	166.3	25.8	23.0	16.0	75.1	44.0	10.6	6.7	12.5	9.3	27.7
Minnesota	225.3	156.1	23.9	20.6	15.6	60.0	37.5	10.8	6.7	11.8	8.9	30.1
Mississippi	290.7	168.3	27.8	26.9	18.7	104.6	43.1	8.9	5.2	13.5	10.0	39.2
Missouri	254.2	170.2	26.6	25.2	17.3	87.4	46.1	10.3	6.8	12.5	8.9	25.6
Montana	227.3	161.7	24.0	21.6	14.1	65.4	43.4	9.9	5.8	11.2	8.6	29.0
Nebraska	223.0	153.8	23.6	24.4	17.5	67.1	35.6	9.3	6.4	11.4	8.4	25.7
Nevada	238.8	176.2	26.2	26.3	18.0	71.1	53.4	8.6	5.5	11.8	9.6	27.7
New Hampshire	241.0	165.9	24.8	24.2	16.4	67.2	44.7	10.3	6.5	11.5	10.5	29.2
New Jersey	236.7	171.9	28.5	25.9	18.3	66.5	40.7	10.2	6.3	12.6	10.1	27.0
New Mexico	207.4	140.8	22.6	21.5	13.8	50.1	29.4	8.3	5.4	11.0	8.6	27.7
New York	221.9	159.0	26.2	24.4	17.1	62.5	37.7	8.9	5.7	12.4	9.9	27.2
North Carolina	258.6	162.0	25.4	23.0	16.3	87.5	41.0	9.2	6.0	12.8	9.2	32.4
North Dakota	224.1	146.9	24.0	22.4	16.0	62.6	32.7	9.9	5.9	11.4	9.0	29.3
Ohio	257.4	173.2	28.0	25.7	18.0	83.4	45.0	10.4	6.7	12.1	9.1	28.4
Oklahoma	256.8	166.8	25.6	25.2	16.6	88.2	46.4	10.3	6.2	12.0	8.1	26.5
Oregon	231.4	169.2	25.2	21.4	15.0	67.8	47.7	10.6	7.0	12.3	9.3	28.3
Pennsylvania	247.7	169.2	27.5	26.0	17.9	73.9	40.4	10.3	6.7	12.8	9.3	27.7
Rhode Island	244.7	167.6	24.0	23.3	17.9	75.6	43.1	9.9	6.7	11.9	10.3	26.7
South Carolina	270.7	161.5	25.9	24.4	16.7	90.3	39.7	8.4	5.9	12.8	9.6	34.5
South Dakota	231.2	153.0	23.7	24.1	17.3	67.8	33.7	10.2	6.8	11.4	10.2	30.1
Tennessee	277.6	172.0	26.3	25.7	17.4	100.9	45.8	10.5	6.6	12.5	9.6	31.1
Texas	238.6	156.6	24.5	22.6	15.4	74.8	39.1	9.0	6.1	11.9	8.7	27.0
Utah	176.5	120.8	23.0	17.1	12.7	34.9	17.0	9.8	5.8	11.1	7.2	27.6
Vermont	228.5	160.1	25.8	22.9	17.6	66.2	38.9	11.0	6.3	10.9	8.0	28.1
Virginia	249.1	165.5	27.2	23.9	16.7	77.7	42.7	9.2	5.9	12.3	9.1	31.2
Washington	227.3	165.1	23.8	20.3	15.1	67.2	46.1	10.9	6.2	12.5	9.9	27.0
West Virginia	269.1	181.2	25.4	27.5	19.6	95.2	51.0	10.1	6.7	11.3	8.2	26.9
Wisconsin	233.6	157.5	24.5	23.0	15.6	65.4	37.4	9.8	6.2	12.4	9.7	29.6
Wyoming	218.4	159.0	23.2	20.7	18.5	61.0	36.9	7.8	7.1	11.4	8.6	30.4
United States	238.7	162.2	25.5	23.5	16.4	73.4	41.1	9.6	6.2	12.2	9.2	27.9

*Per 100,000, age-adjusted to the 2000 US standard population.

Source: US Mortality Data 1960-2004, National Center for Health Statistics, Centers for Disease Control and Prevention, 2006.

American Cancer Society, Surveillance Research, 2008

Selected Cancers

Breast

New cases: An estimated 182,460 new cases of invasive breast cancer are expected to occur among women in the US during 2008; about 1,990 new cases are expected in men. Excluding cancers of the skin, breast cancer is the most frequently diagnosed cancer in women. After continuously increasing for more than two decades, female breast cancer incidence rates decreased by 3.5% per year from 2001-2004. This decrease may reflect reduced use of hormone replacement therapy (HRT) following the publication of results from the Women's Health Initiative in 2002, which linked HRT use to increased risk of heart diseases and breast cancer. It may also reflect a slight drop in mammography utilization; according to the National Health Interview Survey, mammography rates in the past two years in women 40 and older decreased from 70.1% in 2000 to 66.4% in 2005.

In addition to invasive breast cancer, 67,770 new cases of in situ breast cancer are expected to occur among women in 2008. Of these, approximately 85% will be ductal carcinoma in situ (DCIS). In situ breast cancer incidence rates have stabilized since the late 1990s, which may reflect the recent decrease in mammography utilization.

Deaths: An estimated 40,930 breast cancer deaths (40,480 women, 450 men) are expected in 2008. Breast cancer ranks second as a cause of cancer death in women (after lung cancer). Death rates from breast cancer have steadily decreased in women since 1990, with larger decreases in women younger than 50 (a decrease of 3.3% per year) than in those 50 and older (2.0% per year). The decrease in breast cancer death rates represents progress in both earlier detection and improved treatment.

Signs and symptoms: The earliest sign of breast cancer is often an abnormality detected on a mammogram before it can be felt by the woman or a health care professional. Larger tumors may become evident as a painless mass. Less common symptoms include persistent changes to the breast, such as thickening, swelling, distortion, tenderness, skin irritation, redness, or scaliness, or nipple abnormalities such as ulceration, retraction, or spontaneous discharge. Typically, breast pain results from benign conditions and is not an early symptom of breast cancer.

Risk factors: Aside from being female, age is the most important factor affecting breast cancer risk. Risk is also increased by inherited genetic mutations in the BRCA1 and BRCA2 genes, a personal or family history of breast cancer, high breast tissue density (a mammographic measure of the amount of glandular tissue relative to fatty tissue in the breast), biopsy-confirmed hyperplasia (especially atypical hyperplasia), and high-dose radiation to the chest, typically related to a medical procedure. Reproductive factors that increase risk include a long menstrual history (menstrual periods that start early and/or end late in life), never having children, recent use of oral contraceptives, and having one's first child after age 30. Some potentially modifiable factors that increase risk include being overweight or obese after menopause, use of postmenopausal hormone therapy (especially combined estrogen and progestin therapy), physical inactivity, and consumption of one or more alcoholic beverages per day. Many studies have shown that being overweight also adversely affects survival for postmenopausal women with breast cancer.

Breastfeeding, moderate or vigorous physical activity, and maintaining a healthy body weight are all associated with a lower risk of breast cancer. Two medications, tamoxifen and raloxifene, are recommended to reduce breast cancer risk in women at high risk. Although both drugs are equally effective in reducing the risk of invasive breast cancer in postmenopausal women, only tamoxifen protects against in situ cancer. However, raloxifene appears to have a lower risk of certain side effects, such as uterine cancer and blood clots.

Cancer-causing mutations in the inherited susceptibility genes BRCA1 and BRCA2 account for approximately 5%-10% of all breast cancer cases. Some population groups, such as women of Ashkenazi Jewish descent, have an increased prevalence of BRCA1 and BRCA2 mutation carriers. However, widespread testing for these mutations is not recommended because they are present in far less than 1% of the general population. Nonetheless, women with a strong family history of breast and/or ovarian cancer should be offered counseling to determine if genetic testing is appropriate. Studies suggest that prophylactic removal of the breasts and/or ovaries in BRCA1 and BRCA2 mutation carriers decreases the risk of breast cancer considerably, although not all women who choose this surgery would have developed these cancers. Women who consider these options should undergo counseling before reaching a decision.

Leading Sites of New Cancer Cases and Deaths – 2008 Estimates

Estimated New Cases*		Estimated Deaths	
Male	**Female**	**Male**	**Female**
Prostate 186,320 (25%)	Breast 182,460 (26%)	Lung & bronchus 90,810 (31%)	Lung & bronchus 71,030 (26%)
Lung & bronchus 114,690 (15%)	Lung & bronchus 100,330 (14%)	Prostate 28,660 (10%)	Breast 40,480 (15%)
Colon & rectum 77,250 (10%)	Colon & rectum 71,560 (10%)	Colon & rectum 24,260 (8%)	Colon & rectum 25,700 (9%)
Urinary bladder 51,230 (7%)	Uterine corpus 40,100 (6%)	Pancreas 17,500 (6%)	Pancreas 16,790 (6%)
Non-Hodgkin lymphoma 35,450 (5%)	Non-Hodgkin lymphoma 30,670 (4%)	Liver & intrahepatic bile duct 12,570 (4%)	Ovary 15,520 (6%)
Melanoma of the skin 34,950 (5%)	Thyroid 28,410 (4%)	Leukemia 12,460 (4%)	Non-Hodgkin lymphoma 9,370 (3%)
Kidney & renal pelvis 33,130 (4%)	Melanoma of the skin 27,530 (4%)	Esophagus 11,250 (4%)	Leukemia 9,250 (3%)
Oral cavity & pharynx 25,310 (3%)	Ovary 21,650 (3%)	Urinary bladder 9,950 (3%)	Uterine corpus 7,470 (3%)
Leukemia 25,180 (3%)	Kidney & renal pelvis 21,260 (3%)	Non-Hodgkin lymphoma 9,790 (3%)	Liver & intrahepatic bile duct 5,840 (2%)
Pancreas 18,770 (3%)	Leukemia 19,090 (3%)	Kidney & renal pelvis 8,100 (3%)	Brain & other nervous system 5,650 (2%)
All sites 745,180 (100%)	All sites 692,000 (100%)	All sites 294,120 (100%)	All sites 271,530 (100%)

*Excludes basal and squamous cell skin cancers and in situ carcinoma except urinary bladder.

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Early detection: Mammography can detect breast cancer at an early stage, when treatment may be more effective and survival is more likely. Numerous studies have shown that early detection saves lives and increases treatment options. The recent declines in breast cancer mortality among women have been attributed to a combination of early detection and improvements in treatment. Mammography is highly accurate but like most medical tests, it is not perfect. On average, mammography will detect about 80%-90% of breast cancers in women without symptoms. All suspicious abnormalities should be biopsied for a definitive diagnosis. Several recent studies have shown that magnetic resonance imaging (MRI) appears to be more sensitive than mammography in detecting tumors in women with an inherited susceptibility to breast cancer. Annual screening using MRI in addition to mammography is recommended for women at high lifetime risk of the disease (See page 68 for the American Cancer Society's screening guidelines for the early detection of breast cancer.) Concerted efforts should be made to improve access to health care and to encourage all women to receive regular mammograms according to guidelines.

Treatment: Taking into account tumor size, stage, and other characteristics, as well as patient preference, treatment may involve lumpectomy (surgical removal of the tumor with clear margins) or mastectomy (surgical removal of the breast) with removal of some of the axillary (underarm) lymph nodes (to obtain accurate information on stage of disease). It may also involve radiation therapy, chemotherapy (before or after surgery), hormone therapy (tamoxifen, aromatase inhibitors), or targeted biologic therapy. Targeted therapy with trastuzumab (Herceptin®) or lapatinib (Tykerb®) is sometimes used in women whose cancer tests positive for HER2/neu. Two or more methods are often used in combination.

Numerous studies have shown that long-term survival rates after lumpectomy plus radiation therapy are similar to survival rates after mastectomy for women whose cancer has not spread to the skin, chest wall, or distant organs. To ascertain whether cancer has spread beyond breast tissue, a technique called sentinel lymph node biopsy is reducing the need for full axillary lymph node dissection in women with early stage breast cancer. Lymph nodes draining the tumor site are removed and examined under a microscope to determine if cancer cells are present. If cancer is found in any of the sentinel lymph nodes, additional (regional) lymph nodes are removed. Sentinel lymph node biopsy is preferable to axillary lymph node dissection (removal of lymph nodes

in the underarm area) because fewer lymph nodes are removed, so there is a lower risk for side effects such as lymphedema, a swelling of the arm that can be painful and disabling. Eligible women who elect to have sentinel lymph node biopsy should have their breast cancer surgery at a facility with a medical care team that is experienced with the technique. For women undergoing mastectomy, significant advances in reconstruction techniques provide several options for breast reconstruction, including the timing of the procedure (i.e., during mastectomy or in the time period following the procedure).

It is recommended that all patients with ductal carcinoma in situ (DCIS) be treated. Although the exact percentage of mammographically detected DCIS cases that would progress to invasive breast cancer without treatment is unknown, analysis of data from mammography screening trials suggests that the majority of such cancers will progress. Treatment options include lumpectomy with radiation therapy or mastectomy; either of these options may be followed by treatment with tamoxifen.

Survival: The 5-year relative survival for localized breast cancer (malignant cancer that has not spread to lymph nodes or other locations outside the breast) has increased from 80% in the 1950s to 98% today. If the cancer has spread regionally, the current 5-year survival is 84%. For women with distant spread (metastases), 5-year survival is 27%. Survival after a diagnosis of breast cancer continues to decline after 5 years. The survival rate at 10 years for all stages combined is 80%, compared to 89% at 5 years. Caution should be used when interpreting 10-year survival rates since they represent detection and treatment circumstances 5-17 years ago and may underestimate the expected survival based on current conditions.

(For more information about breast cancer, please see the American Cancer Society's *Breast Cancer Facts & Figures 2007-2008* (8610.07), available online at www.cancer.org.)

Childhood Cancer

New cases: An estimated 10,730 new cases are expected to occur among children aged 0-14 years in 2008. Childhood cancers are rare.

Deaths: An estimated 1,490 deaths are expected to occur among children aged 0-14 years in 2008, about one-third of these from leukemia. Although uncommon, cancer is the second leading cause of death in children, exceeded only by accidents. Mortality rates for childhood cancer have declined by almost 50% since 1975. The substantial progress in pediatric cancer survival rates is largely attributable to improved treatments and the high proportion of patient participation in clinical trials.

Early detection: Early symptoms are usually nonspecific. Parents should make sure their children have regular medical checkups and should be alert to any unusual symptoms that persist. These include an unusual mass or swelling; unexplained paleness or loss of energy; sudden tendency to bruise; a persistent, localized pain; prolonged, unexplained fever or illness; frequent headaches, often with vomiting; sudden eye or vision changes; and excessive, rapid weight loss.

According to the International Classification of Childhood Cancer, childhood cancers include:

- Leukemia (32.6% of all childhood cancers), which may be recognized by bone and joint pain, weakness, bleeding, and fever
- Brain and other nervous system (21.1%), which in early stages may cause headaches, nausea, vomiting, blurred or double vision, dizziness, and difficulty in walking or handling objects
- Neuroblastoma (6.7%), a cancer of the sympathetic nervous system that usually appears as a swelling in the abdomen
- Wilms tumor (4.9%), a kidney cancer that may be recognized by a swelling or lump in the abdomen
- Non-Hodgkin lymphoma (4.2%) and Hodgkin lymphoma (3.7%), which affect lymph nodes but may spread to bone marrow and other organs, and may cause swelling of lymph nodes in the neck, armpit, or groin; weakness; and fever
- Rhabdomyosarcoma (3.5%), a soft tissue sarcoma that can occur in the head and neck, genitourinary area, trunk, and extremities, and may cause pain and/or a mass or swelling
- Retinoblastoma (2.8%), an eye cancer that usually occurs in children younger than 4 years
- Osteosarcoma (2.7%), a bone cancer that often has no initial pain or symptoms until local swelling begins
- Ewing sarcoma (1.4%), another type of cancer that usually arises in bone

Treatment: Childhood cancers can be treated by a combination of therapies (surgery, radiation, and chemotherapy) chosen based on the type and stage of cancer. Treatment is coordinated by a team of experts including pediatric oncologists, pediatric nurses, social

workers, psychologists, and others who assist children and their families. Because these cancers are uncommon, outcomes are more successful when treatment is managed by a cancer center. If the patient is eligible, placement in a clinical trial should also be considered.

Survival: For all childhood cancers combined, 5-year relative survival has improved markedly over the past 30 years, from less than 50% before the 1970s to 80% today, due to new and improved treatments. Rates vary considerably, however, depending on cancer type. For the most recent time period (1996-2003), 5-year survival for neuroblastoma is 69%; bone and joint, 72%; brain and other nervous system, 74%; leukemia, 81%; non-Hodgkin lymphoma, 87%; Wilms tumor, 92%; and Hodgkin lymphoma, 95%. Survivors of childhood cancer may experience treatment-related side effects. Late treatment effects include organ malfunction, secondary cancers, and cognitive impairments. The Children's Oncology Group (COG) has developed long-term follow-up guidelines for screening and management of late effects in survivors of childhood cancer. For more on childhood cancer management, see the COG Web site at: www.survivorshipguidelines.org.

Colon and Rectum

New cases: An estimated 108,070 cases of colon and 40,740 cases of rectal cancer are expected to occur in 2008. Colorectal cancer is the third most common cancer in both men and women. Colorectal cancer incidence rates have been decreasing for most of the last 2 decades (from 66.3 cases per 100,000 population in 1985 to 48.2 in 2004). The decline has been more steep in the most recent time period (2.3% per year from 1998-2004), partly due to an increase in screening, which can result in the detection and removal of colorectal polyps before they progress to cancer.

Deaths: An estimated 49,960 deaths from colon and rectum cancer are expected to occur in 2008, accounting for 9% of all cancer deaths. Mortality rates from colorectal cancer have declined in both men and women over the past two decades with a steeper decline in the most recent time period (1.8% per year from 1985-2002 compared to 4.7% from 2002-2004). This decrease reflects declining incidence rates and improvements in early detection and treatment.

Signs and symptoms: Early stage colorectal cancer does not usually have symptoms; therefore, screening is necessary to detect colorectal cancer in its early stages. Advanced disease may cause rectal bleeding, blood in the stool, a change in bowel habits, and cramping pain in the lower abdomen.

Risk factors: The risk of colorectal cancer increases with age; more than 90% of cases are diagnosed in individuals aged 50 and older. Risk is also increased by certain inherited genetic mutations [familial adenomatous polyposis (FAP) and hereditary non-polyposis colorectal cancer (HNPCC)], a personal or family history of colorectal cancer and/or polyps, or a personal history of chronic inflammatory bowel disease. Several modifiable factors are associated with increased risk of colorectal cancer. Among these are obesity, physical inactivity, smoking, heavy alcohol consumption, a diet high in red or processed meat, and inadequate intake of fruits and vegetables. Studies indicate that men and women who are overweight are more likely to develop and die from colorectal cancer. Some studies suggest that regular use of nonsteroidal anti-inflammatory drugs such as aspirin or hormones such as estrogen and progestin may reduce colorectal cancer risk. However, these drugs are not currently recommended for the prevention of colorectal cancer because they can have other serious adverse health effects.

Early detection: Beginning at age 50, men and women who are at average risk for developing colorectal cancer should begin screening. Screening can result in the detection and removal of colorectal polyps before they become cancerous, as well as the detection of cancer that is at an early stage. Thus, screening reduces mortality both by decreasing incidence and by detecting a higher proportion of cancers at early, more treatable stages. (See page 68 for the American Cancer Society's screening guidelines for colorectal cancer.)

Treatment: Surgery is the most common treatment for colorectal cancer. For cancers that have not spread, surgical removal may be curative. A permanent colostomy (creation of an abdominal opening for elimination of body wastes) is very rarely needed for colon cancer and is infrequently required for rectal cancer. Chemotherapy alone, or in combination with radiation (for rectal cancer), is given before or after surgery to most patients whose cancer has penetrated the bowel wall deeply or spread to lymph nodes. Oxaliplatin in combination with 5-fluorouracil (5-FU) followed by leucovorin (LV) is one chemotherapeutic regimen for persons with metastatic carcinoma of the colon or rectum. Adjuvant chemotherapy (anticancer drugs in addition to surgery or radiation) for colon cancer is equally effective and no more toxic in

otherwise healthy patients aged 70 and older than in younger patients. Three new targeted monoclonal antibody therapies were recently approved by the US Food and Drug Administration (FDA) to treat metastatic colorectal cancer. Bevacizumab (Avastin®) blocks the growth of blood vessels to the tumor. Both cetuximab (Erbitux®) and panitumumab (Vectibix®) block the effects of hormone-like factors that promote cancer cell growth.

Survival: The 1- and 5-year relative survival for persons with colorectal cancer is 82% and 64%, respectively. Survival continues to decline beyond 5 years to 57% at 10 years after diagnosis. When colorectal cancers are detected at an early, localized stage, the 5-year survival is 90%; however, only 39% of colorectal cancers are diagnosed at this stage, mostly due to low rates of screening. After the cancer has spread regionally to involve adjacent organs or lymph nodes, the 5-year survival drops to 68%. For persons with distant metastases, 5-year survival is 10%.

Leukemia

New cases: An estimated 44,270 new cases are expected in 2008, with slightly more cases of chronic (19,940) than acute (18,720) disease. Leukemia is diagnosed 10 times more often in adults than in children, although it is often thought of as primarily a childhood disease. Acute lymphocytic leukemia accounts for approximately 72% (3,040/4,220) of the leukemia cases among children (ages 0-19 years). In adults, the most common types are acute myeloid leukemia and chronic lymphocytic leukemia. The incidence of acute myeloid leukemia increased by an average of 2.1% per year from 1988-2001, but decreased sharply by about 6% per year from 2001-2004. In contrast, the incidence of chronic lymphocytic leukemia has decreased gradually by less than 1% per year since 1990.

Deaths: An estimated 21,710 deaths are expected to occur in 2008. Death rates in males and females combined have decreased by about 0.8% per year since 1995.

Signs and symptoms: Symptoms may include fatigue, paleness, weight loss, repeated infections, fever, bruising easily, and nosebleeds or other hemorrhages. In children, these signs can appear suddenly. Chronic leukemia can progress slowly with few symptoms.

Risk factors: Leukemia more commonly occurs in males than in females. People with Down Syndrome and certain other genetic abnormalities have higher incidence rates of leukemia. Cigarette smoking and exposure to certain chemicals such as benzene, a component in gasoline and cigarette smoke, are risk factors for myeloid leukemia. Exposure to ionizing radiation is a risk factor for several types of leukemia. Leukemia also may occur as a side effect of cancer treatment. Certain leukemias and lymphomas are caused by a retrovirus – human T-cell leukemia/lymphoma virus-I (HTLV-I).

Early detection: Because symptoms often resemble those of other, less serious conditions, leukemia can be difficult to diagnose early. When a physician does suspect leukemia, diagnosis can be made using blood tests and a bone marrow biopsy.

Treatment: Chemotherapy is the most effective method of treating leukemia. Various anticancer drugs are used, either in combination or as single agents. Imatinib mesylate (Gleevec®) is a highly specific drug used for the treatment of chronic myeloid (or myelogenous) leukemia, which will be diagnosed in about 4,570 people this year. Recent studies have found that two related drugs, nilotinib (Tasigna®) and dasatinib (Sprycel®), are often effective when imatinib stops working. Imatinib is also sometimes used to treat acute lymphocytic leukemia. Gemtuzumab ozogamicin (Mylotarg®) is a targeted drug approved for treatment in older acute myeloid leukemia patients whose cancer has relapsed or who are not able to receive other chemotherapy. Antibiotics and transfusions of blood components are used as supportive treatments. Under appropriate conditions, bone marrow transplantation may be useful in treating certain leukemias.

Survival: Survival in leukemia varies by type, ranging from a 5-year relative survival of 21% for people with acute myeloid leukemia to 75% for people with chronic lymphocytic leukemia. Advances in treatment have resulted in a dramatic improvement in survival for people with acute lymphocytic leukemia, from a 5-year relative survival rate of 42% in 1975-1977 to 65% in 1996-2003. Survival rates for children with acute lymphocytic leukemia have increased from 58% to 87% over the same time period.

Lung and Bronchus

New cases: An estimated 215,020 new cases are expected in 2008, accounting for about 15% of cancer diagnoses. The incidence rate is declining significantly in men, from a high of 102 cases per 100,000 in 1984 to 73.6 in 2004. In women, the rate is approaching a plateau after a long period of increase. Lung cancer is classified clinically as small cell (13%) or non-small cell (87%) for the purposes of treatment.

Probability of Developing Invasive Cancers Over Selected Age Intervals by Sex, US, 2002-2004*

		Birth to 39 (%)	40 to 59 (%)	60 to 69 (%)	70 and Older (%)	Birth to Death (%)
All sites†	Male	1.42 (1 in 70)	8.58 (1 in 12)	16.25 (1 in 6)	38.96 (1 in 3)	44.94 (1 in 2)
	Female	2.04 (1 in 49)	8.97 (1 in 11)	10.36 (1 in 10)	26.31 (1 in 4)	37.52 (1 in 3)
Urinary bladder‡	Male	0.02 (1 in 4,477)	0.41 (1 in 244)	0.96 (1 in 104)	3.50 (1 in 29)	3.70 (1 in 27)
	Female	0.01 (1 in 9,462)	0.13 (1 in 790)	0.26 (1 in 384)	0.99 (1 in 101)	1.17 (1 in 85)
Breast	Female	0.48 (1 in 210)	3.86 (1 in 26)	3.51 (1 in 28)	6.95 (1 in 15)	12.28 (1 in 8)
Colon & rectum	Male	0.08 (1 in 1,329)	0.92 (1 in 109)	1.60 (1 in 63)	4.78 (1 in 21)	5.65 (1 in 18)
	Female	0.07 (1 in 1,394)	0.72 (1 in 138)	1.12 (1 in 89)	4.30 (1 in 23)	5.23 (1 in 19)
Leukemia	Male	0.16 (1 in 624)	0.21 (1 in 468)	0.35 (1 in 288)	1.18 (1 in 85)	1.50 (1 in 67)
	Female	0.12 (1 in 837)	0.14 (1 in 705)	0.20 (1 in 496)	0.76 (1 in 131)	1.06 (1 in 95)
Lung & bronchus	Male	0.03 (1 in 3,357)	1.03 (1 in 97)	2.52 (1 in 40)	6.74 (1 in 15)	7.91 (1 in 13)
	Female	0.03 (1 in 2,964)	0.82 (1 in 121)	1.81 (1 in 55)	4.61 (1 in 22)	6.18 (1 in 16)
Melanoma of the skin	Male	0.15 (1 in 656)	0.61 (1 in 164)	0.66 (1 in 151)	1.56 (1 in 64)	2.42 (1 in 41)
	Female	0.26 (1 in 389)	0.50 (1 in 200)	0.34 (1 in 297)	0.71 (1 in 140)	1.63 (1 in 61)
Non-Hodgkin lymphoma	Male	0.13 (1 in 760)	0.45 (1 in 222)	0.57 (1 in 174)	1.61 (1 in 62)	2.19 (1 in 46)
	Female	0.08 (1 in 1,212)	0.32 (1 in 312)	0.45 (1 in 221)	1.33 (1 in 75)	1.87 (1 in 53)
Prostate	Male	0.01 (1 in 10,553)	2.54 (1 in 39)	6.83 (1 in 15)	13.36 (1 in 7)	16.72 (1 in 6)
Uterine cervix	Female	0.16 (1 in 638)	0.28 (1 in 359)	0.13 (1 in 750)	0.19 (1 in 523)	0.70 (1 in 142)
Uterine corpus	Female	0.06 (1 in 1,569)	0.71 (1 in 142)	0.79 (1 in 126)	1.23 (1 in 81)	2.45 (1 in 41)

*For people free of cancer at beginning of age interval. †All sites exclude basal and squamous cell skin cancers and in situ cancers except urinary bladder. ‡Includes invasive and in situ cancer cases.

Source: DevCan: Probability of Developing or Dying of Cancer Software, Version 6.2.1. Statistical Research and Applications Branch, National Cancer Institute, 2007. www.srab.cancer.gov/devcan

American Cancer Society, Surveillance Research, 2008

Deaths: Lung cancer accounts for the most cancer-related deaths in both men and women. An estimated 161,840 deaths, accounting for about 29% of all cancer deaths, are expected to occur in 2008. Since 1987, more women have died each year from lung cancer than from breast cancer. Death rates among men decreased by 1.3% per year from 1990-1994 and by 2.0% per year from 1994-2004. Female lung cancer death rates are approaching a plateau after continuously increasing for several decades. These trends in lung cancer mortality reflect the decrease in smoking rates over the past 30 years.

Signs and symptoms: Symptoms may include persistent cough, sputum streaked with blood, chest pain, voice change, and recurrent pneumonia or bronchitis.

Risk factors: Cigarette smoking is by far the most important risk factor for lung cancer. Risk increases with quantity and duration of cigarette consumption. Other risk factors include occupational or environmental exposure to secondhand smoke, radon, asbestos (particularly among smokers), certain metals (chromium, cadmium, arsenic), some organic chemicals, radiation, air pollution, and a history of tuberculosis. Genetic susceptibility plays a contributing role in the development of lung cancer, especially in those who develop the disease at a younger age.

Early detection: Efforts at early detection have not yet been proven to reduce mortality. Chest x-ray, analysis of cells in sputum, and fiberoptic examination of the bronchial passages have shown limited effectiveness in reducing lung cancer deaths. Newer tests, such as low-dose spiral computed tomography (CT) scans and molecular markers in sputum, have produced promising results in detecting lung cancers at earlier, more operable stages in high-risk patients. However, there are considerable risks associated with lung biopsy and surgery that must be considered when evaluating the risks and benefits of screening. The National Lung Screening Trial is a clinical trial to assess whether screening individuals at high risk for lung cancer with spiral CT or standard chest x-ray can prevent lung cancer deaths. The study, launched in 2002, represents a collaboration of the National Cancer Institute (NCI), the American College of Radiology Imaging Network, and the American Cancer Society. Results from the study are expected by 2010.

Treatment: Treatment options are determined by the type (small cell or non-small cell) and stage of cancer and include surgery, radiation therapy, chemotherapy, and targeted biological therapies such as bevacizumab (Avastin®) and erlotinib (Tarceva®). For localized

cancers, surgery is usually the treatment of choice. Recent studies indicate that survival with early stage, non-small cell lung cancer is improved by chemotherapy following surgery. Because the disease has usually spread by the time it is discovered, radiation therapy and chemotherapy are often used, sometimes in combination with surgery. Chemotherapy alone or combined with radiation is the usual treatment of choice for small cell lung cancer; on this regimen, a large percentage of patients experience remission, which may be prolonged.

Survival: The 1-year relative survival for lung cancer has slightly increased from 35% in 1975-1979 to 41% in 2000-2003, largely due to improvements in surgical techniques and combined therapies. However, the 5-year survival rate for all stages combined is only 15%. The survival rate is 49% for cases detected when the disease is still localized, but only 16% of lung cancers are diagnosed at this early stage.

Lymphoma

New cases: An estimated 74,340 new cases of lymphoma will occur in 2008, including 8,220 cases of Hodgkin lymphoma and 66,120 cases of non-Hodgkin lymphoma (NHL). Since the early 1970s, incidence rates for NHL have nearly doubled. Although some of this increase is due to AIDS-related NHL, for the most part the rise is unexplained. Since 1991, increasing NHL incidence has been confined to women. Over the past 30 years, incidence rates for Hodgkin lymphoma have decreased in men (0.7% per year) while they slightly increased in women (0.4 % per year).

Deaths: An estimated 20,510 deaths will occur in 2008 (Hodgkin lymphoma, 1,350; non-Hodgkin lymphoma, 19,160).

Signs and symptoms: Symptoms may include swollen lymph nodes, itching, night sweats, fatigue, unexplained weight loss, and intermittent fever.

Risk factors: In most cases, the cause is unknown, even though various risk factors associated with severely reduced immune function have been identified. Non-Hodgkin lymphoma risk is elevated in persons with organ transplants who receive immune suppressants to prevent transplant rejection, in people with severe autoimmune conditions, and in people infected with human immunodeficiency virus (HIV), human T-cell leukemia/lymphoma virus-I (HTLV-I), and probably hepatitis C virus (HCV). Epstein- Barr virus (EBV) causes Burkitt lymphoma and some non-Hodgkin lymphomas. H. pylori infection increases the risk of gastric lymphoma. A family history of lymphoma and certain common genetic variations in immune response genes are associated with higher risk. Occupational exposures to herbicides, chlorinated organic compounds, and certain other chemicals are also associated with an increased risk.

Treatment: Hodgkin lymphoma: chemotherapy and/or radiotherapy is used for most patients, depending on stage and cell-type of the disease. Non-Hodgkin lymphoma: patients are usually treated with chemotherapy. Radiation, alone or with chemotherapy, is used less often. Highly specific monoclonal antibodies, such as rituximab (Rituxan®) and alemtuzumab (Campath®), directed at lymphoma cells are used for initial treatment and recurrence of some types of non-Hodgkin lymphoma, as are antibodies linked to a radioactive atom, such as ibritumomab tiuxetan (Zevalin®) and iodine I 131 tositumomab (Bexxar®). High-dose chemotherapy with stem cell transplantation or low-dose chemotherapy with stem cell transplantation (called non-myeloablative) are options if non-Hodgkin lymphoma persists or recurs after standard treatment.

Survival: Survival varies widely by cell type and stage of disease. The 1-year relative survival for Hodgkin and non-Hodgkin lymphoma is 92% and 79%, respectively; the 5-year survival is 85% and 63%. Ten years after diagnosis, survival for Hodgkin and non-Hodgkin lymphoma declines to 80% and 51%, respectively.

Oral Cavity and Pharynx

New cases: An estimated 35,310 new cases are expected in 2008. Incidence rates are more than twice as high in men as in women. Incidence has been declining in both men and women since the early 1980s.

Deaths: An estimated 7,590 deaths from oral cavity and pharynx cancer are expected in 2008. Death rates decreased from 1979-2000 in men and women combined, but have since remained stable.

Signs and symptoms: Symptoms may include a sore that bleeds easily and does not heal, a lump or thickening, ear pain, a neck mass, coughing up blood, and a red or white patch that persists. Difficulties in chewing, swallowing, or moving the tongue or jaws are often late symptoms.

Risk factors: Known risk factors include all forms of smoked and smokeless tobacco products and excessive consumption of alcohol. A synergism between smoking and alcohol use in combination increases relative risk by more than 30-fold in many studies.

Early detection: Cancer can affect any part of the oral cavity, including the lip, tongue, mouth, and throat. Dentists and primary care physicians can detect premalignant abnormalities and cancer at an early stage, when they are most curable.

Treatment: Radiation therapy and surgery, separately or in combination, are standard treatments. In advanced disease, chemotherapy is added to surgery and/or radiation. Targeted therapy with cetuximab (Erbitux®) may be combined with radiation in initial treatment or used alone to treat recurrent cancer.

Survival: For all stages combined, about 82% of persons with oral cavity and pharynx cancer survive 1 year after diagnosis. The 5-year and 10-year relative survival rates are 59% and 48%, respectively.

Ovary

New cases: An estimated 21,650 new cases are expected in the US in 2008. Ovarian cancer accounts for about 3% of all cancers among women and ranks second among gynecologic cancers, following cancer of the uterine corpus. During 1987-2004, ovarian cancer incidence declined at a rate of 0.9% per year.

Deaths: An estimated 15,520 deaths are expected in 2008. Ovarian cancer causes more deaths than any other cancer of the female reproductive system.

Signs and symptoms: The most common sign is enlargement of the abdomen, which is caused by accumulation of fluid. Early ovarian cancer usually has no obvious symptoms. However, recent studies indicate that some women may experience persistent, nonspecific symptoms, such as bloating, pelvic or abdominal pain, difficulty eating or feeling full quickly, or urinary urgency or frequency. Women who experience such symptoms daily for more than a few weeks should seek prompt medical evaluation. Abnormal vaginal bleeding is rarely a symptom of ovarian cancer.

Risk factors: Risk for ovarian cancer increases with age and peaks in the late 70s. Pregnancy and the long-term use of oral contraceptives reduce the risk of developing ovarian cancer. Tubal ligation and hysterectomy may also decrease risk. The use of estrogen alone as postmenopausal hormone therapy has been shown to increase risk in several large studies. Heavier body weight may be associated with increased risk of ovarian cancer. Women who have had breast cancer or who have a family history of breast or ovarian cancer are at increased risk. Inherited mutations in BRCA1 or BRCA2 genes increase risk. Studies suggest that preventive surgery to remove the ovaries and fallopian tubes can decrease the risk of ovarian cancers in women with BRCA1 and BRCA2 mutations. Another genetic syndrome, hereditary nonpolyposis colon cancer, has also been associated with endometrial and ovarian cancer. Ovarian cancer incidence rates are highest in Western industrialized countries.

Early detection: Routine screening for women at average risk is not recommended because no sufficiently accurate screening test is currently available. Pelvic examination only occasionally detects ovarian cancer, generally when the disease is advanced. However, the combination of a thorough pelvic exam, transvaginal ultrasound, and a blood test for the tumor marker CA125 may be offered to women who are at high risk of ovarian cancer and to women who have persistent, unexplained symptoms. For women at average risk, transvaginal ultrasound and testing for the tumor marker CA125 may help in diagnosis but are not used for routine screening.

Treatment: Treatment options include surgery, chemotherapy, and occasionally radiation therapy. Surgery usually involves removal of one or both ovaries, fallopian tubes (salpingoophorectomy), and the uterus (hysterectomy). In younger women with very early stage tumors who wish to have children, only the involved ovary may be removed. In advanced disease, all abdominal metastases may be removed surgically to enhance the effect of chemotherapy. For advanced ovarian cancer, studies have shown that chemotherapy administered both intravenously and directly into the abdomen improves survival.

Survival: Relative survival varies by age; women younger than 65 are about twice as likely to survive 5 years (56%) following diagnosis as women 65 and older (29%). Overall, the 1- and 5-year relative survival of ovarian cancer patients is 75% and 45%, respectively. If diagnosed at the localized stage, the 5-year survival rate is 92%; however, only about 19% of all cases are detected at this stage, usually fortuitously during another medical procedure. For women with regional and distant disease, 5-year survival rates are 71% and 30%, respectively. The 10-year relative survival rate for all stages combined is 38%.

Pancreas

New cases: An estimated 37,680 new cases are expected to occur in the US in 2008. Incidence rates of pancreatic cancer have been stable in men since 1993 and in women since 1983.

Five-Year Relative Survival Rates* by Stage at Diagnosis, 1996-2003

Site	All Stages %	Local %	Regional %	Distant %	Site	All Stages %	Local %	Regional %	Distant %
Breast (female)	88.6	98.0	83.5	26.7	Ovary§	44.9	92.4	71.4	29.8
Colon & rectum	64.0	89.8	67.7	10.3	Pancreas	5.0	20.3	8.0	1.7
Esophagus	15.6	33.7	16.9	2.9	Prostate¶	98.4	100.0	–	31.9
Kidney†	65.5	89.6	60.8	9.5	Stomach	24.3	61.1	23.7	3.4
Larynx	62.9	81.1	50.0	23.9	Testis	95.4	99.3	95.8	70.0
Liver‡	10.8	22.3	7.3	2.8	Thyroid	96.7	99.7	96.9	56.0
Lung & bronchus	15.0	49.1	15.2	3.0	Urinary bladder	79.5	92.1	44.6	6.4
Melanoma of the skin	91.1	98.5	65.2	15.3	Uterine cervix	71.6	92.0	55.7	16.5
Oral cavity & pharynx	59.1	81.8	52.1	26.5	Uterine corpus	82.9	95.3	67.4	23.1

*Rates are adjusted for normal life expectancy and are based on cases diagnosed in the SEER 17 areas from 1996-2003, followed through 2004. †Includes renal pelvis. ‡Includes intrahepatic bile duct. §Recent changes in classification of ovarian cancer, specifically excluding borderline tumors, has affected survival rates. ¶The rate for local stage represents local and regional stages combined.

Local: an invasive malignant cancer confined entirely to the organ of origin. **Regional:** a malignant cancer that 1) has extended beyond the limits of the organ of origin directly into surrounding organs or tissues; 2) involves regional lymph nodes by way of the lymphatic system; or 3) has both regional extension and involvement of regional lymph nodes. **Distant:** a malignant cancer that has spread to parts of the body remote from the primary tumor either by direct extension or by discontinuous metastasis to distant organs, tissues, or via the lymphatic system to distant lymph nodes.

Source: Ries LAG, Melbert D, Krapcho M, et al.(eds). SEER Cancer Statistics Review, 1975-2004, National Cancer Institute, Bethesda, MD, www.seer.cancer.gov/csr/1975_2004/, 2007.

American Cancer Society, Surveillance Research, 2008

Deaths: An estimated 34,290 deaths are expected to occur in 2008. The death rate for pancreatic cancer has continued to decline since 1975 in men, while it has leveled off in women after increasing from 1975-1984.

Signs and symptoms: Cancer of the pancreas often develops without early symptoms. Symptoms may include weight loss, discomfort in the abdomen, and occasionally glucose intolerance (high blood glucose levels). Tumors that develop near the common bile duct may cause a blockage that leads to jaundice (yellowing of the skin and eyes due to pigment accumulation). Sometimes this symptom allows the tumor to be diagnosed at an early stage.

Risk factors: Tobacco smoking increases the risk of pancreatic cancer; incidence rates are more than twice as high for cigarette smokers as for nonsmokers. Risk also appears to increase with obesity, chronic pancreatitis, diabetes, cirrhosis, and use of smokeless tobacco. Pancreatic cancer rates are slightly higher in men than in women. A family history of pancreatic cancer also increases risk. Countries whose populations eat a diet high in fat have higher rates of pancreatic cancer.

Early detection: At present, there is no method for the early detection of pancreatic cancer. The disease is usually asymptomatic; only about 7% of cases are diagnosed an early stage. Research is underway to identify better methods of early detection.

Treatment: Surgery, radiation therapy, and chemotherapy are treatment options that may extend survival and/or relieve symptoms in many patients, but seldom produce a cure. Clinical trials with several new agents, combined with radiation and surgery, may offer improved survival and should be considered an option.

Survival: For all stages combined, the 1- and 5-year relative survival rates are 24% and 5%, respectively. Even for those people diagnosed with local disease, the 5-year survival is only 20%.

Prostate

New cases: An estimated 186,320 new cases will occur in the US during 2008. Prostate cancer is the most frequently diagnosed cancer in men. For reasons that remain unclear, incidence rates are significantly higher in African American men than in white men. Incidence rates of prostate cancer have changed substantially over the last 20 years: rapidly increasing from 1988-1992, declining sharply from 1992-1995, and leveling off since 1995. These trends in large part reflect changes in prostate cancer screening with the prostate-specific antigen (PSA) blood test. Rates peaked in white men in 1992 (237.8 per 100,000 men) and in African American men in 1993 (343.1 per 100,000 men).

Deaths: With an estimated 28,660 deaths in 2008, prostate cancer is a leading cause of cancer death in men. Although death rates have decreased more rapidly among African American than among white men since the early 1990s, rates in African American men remain more than twice as high as those in white men.

Signs and symptoms: Early prostate cancer usually has no symptoms. With more advanced disease, individuals may experience weak or interrupted urine flow; inability

Trends in 5-Year Relative Survival Rates* (%) by Race and Year of Diagnosis, US, 1975-2003

Site	White			African American			All Races		
	1975-77	1984-86	1996-2003	1975-77	1984-86	1996-2003	1975-77	1984-86	1996-2003
All sites	51	55	67†	40	41	57†	50	54	66†
Brain	23	28	34†	27	33	37†	24	29	35†
Breast (female)	76	80	90†	62	65	78†	75	79	89†
Colon	52	60	66†	46	50	55†	51	59	65†
Esophagus	6	11	18†	3	8	11†	5	10	16†
Hodgkin lymphoma	74	80	87†	71	75	81†	74	79	86†
Kidney	51	56	66†	50	54	66†	51	56	66†
Larynx	67	68	66	59	53	50	67	66	64
Leukemia	36	43	51†	34	34	40	35	42	50†
Liver#	4	6	10†	2	5	7†	4	6	11†
Lung & bronchus	13	14	16†	12	11	13†	13	13	16†
Melanoma of the skin	82	87	92†	60‡	70§	77	82	87	92†
Myeloma	25	27	34†	31	32	32	26	29	34†
Non-Hodgkin lymphoma	48	54	65†	49	48	56	48	53	64†
Oral cavity	55	57	62†	36	36	41	53	55	60†
Ovary	37	39	45†	43	41	38	37	40	45†
Pancreas	3	3	5†	2	5	5†	2	3	5†
Prostate	70	77	99†	61	66	95†	69	76	99†
Rectum	49	58	66†	45	46	58†	49	57	66†
Stomach	15	18	22†	16	20	24†	16	18	24†
Testis	83	93	96†	82‡	87‡	88	83	93	96†
Thyroid	93	94	97†	91	90	94	93	94	97†
Urinary bladder	75	79	81†	51	61	65†	74	78	81†
Uterine cervix	71	70	74†	65	58	66	70	68	73†
Uterine corpus	89	85	86†	61	58	61	88	84	84†

*Survival is adjusted for normal life expectancy and based on cases diagnosed in the SEER 9 areas from 1975-1977, 1984-1986, and 1996-2003, and followed through 2004. †The difference in rates between 1975-1977 and 1996-2003 is statistically significant ($p < 0.05$). ‡The standard error of the survival rate is between 5 and 10 percentage points. §The standard error of the survival rate is greater than 10 percentage points. #Includes intrahepatic bile duct.

Source: Ries LAG, Melbert D, Krapcho M, et al (eds.). *SEER Cancer Statistics Review, 1975-2004*, National Cancer Institute, Bethesda, MD, www.seer.cancer.gov/csr/1975_2004/, 2007.

American Cancer Society, Surveillance Research, 2008

to urinate or difficulty starting or stopping the urine flow; the need to urinate frequently, especially at night; blood in the urine; or pain or burning with urination. Advanced prostate cancer commonly spreads to the bones, which can cause pain in the hips, spine, ribs, or other areas. Many of these symptoms are not specific to prostate cancer, however.

Risk factors: The only well-established risk factors for prostate cancer are age, ethnicity, and family history of the disease. About 64% of all prostate cancer cases are diagnosed in men aged 65 and older. African American men and Jamaican men of African descent have the highest prostate cancer incidence rates in the world. The disease is common in North America and northwestern Europe, but less common in Asia and South America. Recent genetic studies suggest that strong familial predisposition may be responsible for 5%-10% of prostate cancers. International studies suggest that a diet high in saturated fat may also be a risk factor. There is some evidence that the risk of dying from prostate cancer may increase with obesity.

Early detection: At this time, there are insufficient data to recommend for or against prostate cancer testing in men at average risk of developing the disease. The American Cancer Society recommends that the PSA blood test (which detects a protein made by the prostate called prostate-specific antigen) and the digital rectal examination should be offered to men at average risk beginning at age 50. Individuals at high risk of developing prostate cancer (African Americans or men with a strong family history) should begin screening at age 45. All men should be given information about the benefits and limitations of testing so they can make informed decisions. Two large clinical trials designed to determine the efficacy of PSA testing are underway in the US and Europe. (See page 68 for the American Cancer Society's screening guidelines for the early detection of prostate cancer.)

Treatment: Treatment options vary depending on age, stage of the cancer, and other medical conditions, and should be discussed with the individual's physician. Surgery, external beam radiation, or radioactive seed implants (brachytherapy) may be used to treat early stage disease; hormonal therapy may be added in some cases. Careful observation ("watchful waiting") rather than immediate treatment may be appropriate for some men with less aggressive tumors, especially men who are older or who have other health problems. Hormonal therapy, chemotherapy, radiation, or a combination of these treatments is used to treat more advanced disease. Hormone treatment may control prostate cancer for long periods by shrinking the size or limiting the growth of the cancer, thus helping to relieve pain and other symptoms.

Survival: More than 90% of all prostate cancers are discovered in the local and regional stages; the 5-year relative survival rate for patients whose tumors are diagnosed at these stages approaches 100%. Over the past 25 years, the 5-year survival rate for all stages combined has increased from 69% to almost 99%. According to the most recent data, relative 10-year survival is 91% and 15-year survival is 76%. The dramatic improvements in survival, particularly at 5 years, are partly attributable to earlier diagnosis and improvements in treatment.

Skin

New cases: Substantially more than 1 million unreported cases of basal cell or squamous cell cancers occur annually. Most, but not all, of these forms of skin cancer are highly curable. The most common serious form of skin cancer is melanoma, which is expected to be diagnosed in about 62,480 persons in 2008. During the 1970s, the incidence rate of melanoma increased rapidly by about 6% per year. However, from 1981-2000, the rate of increase slowed to 3% per year and since 2000 melanoma incidence has been stable. Melanoma is primarily a disease of whites; rates are more than 10 times higher in whites than in African Americans.

Deaths: An estimated 11,200 deaths (8,420 from melanoma and 2,780 from other nonepithelial skin cancers) will occur in 2008. The death rate for melanoma has been decreasing rapidly in whites younger than 50, by 3.0% per year since 1991 in men and by 2.3% per year since 1985 in women. In those older than 50, rates have been stable since 1998 in men and since 1990 in women.

Signs and symptoms: Important warning signs of melanoma include changes in size, shape, or color of a skin lesion or the appearance of a new growth on the skin. Changes that occur over a few days are generally innocuous, but changes that progress over a month or more should be evaluated by a doctor. Basal cell carcinomas may appear as growths that are flat, firm, pale areas or as small, raised, pink or red, translucent, shiny areas that may bleed following minor injury. Squamous cell cancer may appear as growing lumps, often with a rough surface, or as flat, reddish patches that grow slowly. Another sign of basal and squamous cell skin cancers is a sore that doesn't heal.

Risk factors: Risk factors vary for different types of skin cancer. For melanoma, major risk factors include a personal or family history of melanoma and the presence of atypical moles or a large quantity of moles (greater than 50). Other risk factors for all types of skin cancer include sun sensitivity (sunburning easily, difficulty tanning, natural blonde or red hair color); a history of excessive sun exposure, including sunburns; use of tanning booths; diseases that suppress the immune system; a past history of basal cell or squamous cell skin cancers; and occupational exposure to coal tar, pitch, creosote, arsenic compounds, or radiation.

Prevention: Limit exposure to the sun during the midday hours (10 a.m. to 4 p.m.). When outdoors, wear a hat that shades the face, neck, and ears, a long-sleeved shirt, and long pants. Wear sunglasses to protect the skin around the eyes. Use a sunscreen with a sun protection factor (SPF) of 15 or higher. Children in particular should be protected from the sun because severe sunburns in childhood may greatly increase risk of melanoma in later life. Avoid tanning beds and sun lamps, which provide an additional source of UV radiation.

Early detection: The best way to detect skin cancer early is to recognize changes in skin growths or the appearance of new growths. Adults should undergo regular dermatologic assessment and thoroughly examine their skin on a regular basis. Suspicious lesions or progressive change in a lesion's appearance (size, shape, color, etc.) should be evaluated promptly by a physician. Melanomas often start as small, mole-like growths that increase in size and may change color. A simple ABCD rule outlines the warning signals of the most common type of melanoma: **A** is for asymmetry (one half of the mole does not match the other half); **B** is for border irregularity (the edges are ragged, notched, or blurred); **C** is for color (the pigmentation is not uniform, with variable degrees of tan, brown, or black); **D** is for diameter greater than 6 millimeters (about the size of a pencil eraser). Other types of melanoma may not have

these signs, so be alert for any new or changing skin growths.

Treatment: Removal and microscopic examination of all suspicious skin lesions is essential. Early stage basal and squamous cell cancers can be removed in most cases by one of several methods: surgical excision, electrodessication and curettage (tissue destruction by electric current and removal by scraping with a curette), or cryosurgery (tissue destruction by freezing). Radiation therapy and certain topical medications may also be an option in some cases. For malignant melanoma, the primary growth and surrounding normal tissue is removed and sentinel lymph node biopsy is done to determine stage. More extensive lymph node surgery may be done if lymph node metastases are present. Melanomas with deep invasion or that have spread to lymph nodes may be treated with immunotherapy or radiation therapy. Advanced cases of melanoma are treated with palliative surgery, immunotherapy, and/or chemotherapy.

Survival: Most basal and squamous cell cancers can be cured if the cancer is detected and treated early. If detected in its earliest stages and treated properly, melanoma is also highly curable. However, melanoma is more likely than other skin tumors to spread to other parts of the body. The 5- and 10-year relative survival rates for persons with melanoma are 91% and 89%, respectively. For localized melanoma, the 5-year survival rate is 99%; 5-year survival rates for regional and distant stage diseases are 65% and 15%, respectively. About 80% of melanomas are diagnosed at a localized stage.

Urinary Bladder

New cases: An estimated 68,810 new cases are expected to occur in 2008. Bladder cancer incidence rates among men and women combined leveled off during 1987-2004, after increasing by 0.8% per year from 1975-1987. Bladder cancer incidence is nearly four times higher in men than in women and almost two times higher in whites than in African Americans.

Deaths: An estimated 14,100 deaths will occur in 2008. Mortality rates have continued to decrease since the late 1970s, although the rate of decrease slowed in the most recent time period (0.2% per year from 1987-2004 compared to 2.1% per year from 1977-1987).

Signs and symptoms: Symptoms may include blood in the urine and increased frequency of urination.

Risk factors: Smoking is the most important risk factor for bladder cancer. Smokers' risk of bladder cancer is twice that of nonsmokers. Smoking is estimated to cause about 48% of bladder cancer deaths among men and 28% among women. Workers in the dye, rubber, or leather industries and people who live in communities with high levels of arsenic in the drinking water also have increased risk. Drinking more fluids and eating more vegetables may lower the risk of bladder cancer.

Early detection: Bladder cancer is diagnosed by examination of cells in the urine under a microscope and examination of the bladder wall with a cystoscope, a slender tube fitted with a lens and light that can be inserted through the urethra. These tests are not recommended for screening people at average risk but are used for people at increased risk due to occupational exposure, or for follow up after bladder cancer treatment to detect recurrent or new tumors.

Treatment: Surgery, alone or in combination with other treatments, is used in more than 90% of cases. Superficial, localized cancers may also be treated by administering immunotherapy or chemotherapy directly into the bladder. Chemotherapy alone or with radiation before cystectomy (bladder removal) has improved treatment results.

Survival: For all stages combined, the 5-year relative survival rate is 80%. Survival declines to 75% at 10 years and 72% at 15 years after diagnosis. When diagnosed at a localized stage, the 5-year survival is 92%; 75% of cancers are detected at this early stage. For regional and distant stages, 5-year survival is 45% and 6%, respectively.

Uterine Cervix

New cases: An estimated 11,070 cases of invasive cervical cancer are expected to be diagnosed in 2008. Incidence rates have decreased steadily over the past several decades in both white and African American women. As Pap screening has become more common, pre-invasive lesions of the cervix are detected far more frequently than invasive cancer.

Deaths: An estimated 3,870 deaths from cervical cancer are expected in 2008. Mortality rates have declined steadily over the past several decades due to prevention and early detection as a result of screening.

Signs and symptoms: Symptoms usually do not appear until abnormal cervical cells become cancerous and invade nearby tissue. When this happens, the most common symptom is abnormal vaginal bleeding. Bleeding may start and stop between regular menstrual periods, or it may occur after sexual intercourse, douching, or a pelvic exam. Menstrual bleeding may last longer

and be heavier than usual. Bleeding after menopause or increased vaginal discharge may also be symptoms.

Risk factors: The primary cause of cervical cancer is infection with certain types of human papillomavirus (HPV). Women who begin having sex at an early age or who have many sexual partners are at increased risk for HPV and cervical cancer. However, a woman may be infected with HPV even if she has had only one sexual partner. Importantly, HPV infections are common in healthy women and only rarely result in cervical cancer. Persistence of the infection and progression to cancer may be influenced by many factors, such as immunosuppression, high parity, cigarette smoking, and nutritional factors. Long-term use of oral contraceptives is also associated with increased risk of cervical cancer.

Prevention: The US Food and Drug Administration (FDA) has approved Gardasil®, the first vaccine developed to prevent the most common HPV infections that cause cervical cancer, for use in females aged 9-26. Another vaccine (Cervarix) is currently awaiting approval by the European Agency for the Evaluation of Medicinal Products.

Early detection: The Pap test is a simple procedure in which a small sample of cells is collected from the cervix and examined under a microscope. Pap tests are effective but not perfect. Their results sometimes appear normal even when a woman has abnormal cells of the cervix, and likewise, sometimes appear abnormal when there are no abnormal lesions on the cervix. DNA tests to detect HPV strains associated with cervical cancer may be used in conjunction with the Pap test, particularly when results are equivocal. Fortunately, most cervical precancers develop slowly, so potentially nearly all cases can be prevented if a woman is screened regularly. (See page 68 for the American Cancer Society's screening guidelines for the early detection of cervical cancer.)

Treatment: Pre-invasive lesions may be treated by electrocoagulation (the destruction of tissue through intense heat by electric current), cryotherapy (the destruction of cells by extreme cold), laser ablation, or local surgery. Invasive cervical cancers are generally treated with surgery, radiation, or both, as well as chemotherapy in selected cases.

Survival: One- and 5-year relative survival for cervical cancer patients is 88% and 72%, respectively. The 5-year survival rate for patients diagnosed with localized cervical cancer is 92%. Cervical cancer is diagnosed at an early stage more often in whites (53%) than in African Americans (44%) and in women younger than 50 (62%) than in women 50 and older (37%).

Uterine Corpus (Endometrium)

New cases: An estimated 40,100 cases of cancer of the uterine corpus (body of the uterus), most often in the endometrium (lining of the uterus), are expected to be diagnosed in 2008. Incidence rates of endometrial cancer have been decreasing by about 0.8% per year since 1998 after a period of increase during the previous decade.

Deaths: An estimated 7,470 deaths are expected in 2008. Death rates from cancer of the uterine corpus have been stable since 1992 after decreasing an average of 1.5% per year from 1975-1992.

Signs and symptoms: Abnormal uterine bleeding or spotting is a frequent early sign. Pain during urination, intercourse, or in the pelvic area are also symptoms.

Risk factors: Estrogen is a strong risk factor for endometrial cancer, especially when not combined with progestin. Factors that dramatically increase estrogen exposure include estrogen replacement therapy (without use of progestin) and obesity. In addition, risk is increased slightly by tamoxifen use, early menarche (onset of menstruation), late menopause, never having children, and a history of polycystic ovary syndrome. Progesterone plus estrogen replacement therapy (called hormone replacement therapy, or HRT) does not appear to increase risk. Research has not implicated estrogen exposures in the development of other types of uterine corpus cancer that are more aggressive and have a poorer prognosis. Other risk factors for uterine corpus cancer include infertility and Lynch syndrome, also known as hereditary nonpolyposis colon cancer (HNPCC). Pregnancy and the use of oral contraceptives provide protection against endometrial cancer.

Early detection: Most endometrial cancer is diagnosed at an early stage because of postmenopausal bleeding. Women are encouraged to report any unexpected bleeding or spotting to their physicians. Annual screening for endometrial cancer with endometrial biopsy beginning at age 35 should be offered to women with or at risk for HNPCC.

Treatment: Uterine corpus cancers are usually treated with surgery, radiation, hormones, and/or chemotherapy, depending on the stage of disease.

Survival: The 1- and 5-year relative survival rates for uterine corpus cancer are 92% and 83%, respectively. The 5-year survival rate is 95%, 67%, and 23%, if the cancer is diagnosed at local, regional, or distant stages, respectively. Relative survival in whites exceeds that for African Americans by more than 10 percentage points at every stage.

Special Section: Insurance and Cost-Related Barriers to Cancer Care

Introduction

Paying for the costs of treatment is not usually the first concern that comes to mind when someone is diagnosed with cancer, but for many, it becomes an important one. Some individuals with modest incomes and no health insurance are able to obtain Medicaid or other forms of assistance after diagnosis, and most individuals with health insurance will have a substantial portion of their costs covered. Nonetheless, many individuals face cancer without adequate health insurance, and even those with standard private insurance policies may face high out-of-pocket costs associated with deductibles, co-pays, and annual or lifetime caps. For many cancer patients, health insurance status and other financial barriers delay or limit access to treatment and supportive services, and for almost all patients, cancer treatment presents a significant financial burden.

Since 2005, the American Cancer Society has documented the circumstances of more than 13,000 uninsured and underinsured cancer patients through the Health Insurance Assistance Service (HIAS), a program of the Society's National Cancer Information Center (NCIC).

- MaryAnn*, a patient with stage IV breast cancer, not only had to fight her cancer, but also had to grapple with inadequate insurance. In September, MaryAnn was halfway through her cancer treatment when she reached her policy's annual benefit maximum of $50,000. She couldn't afford to pay for the treatments on her own. MaryAnn had no other coverage options, and her treatment was delayed.
- Martin*, diagnosed with melanoma, is uninsured and unable to access cancer treatments. He has trouble working because of his cancer diagnosis and earns about $400 a month when he is able to work. Martin applied for Medicaid, but did not qualify for assistance under his state's Medicaid program. Without insurance coverage or a cash payment up front, the hospital will not provide the cancer treatment Martin needs. There are no insurance options for Martin, and he is unable to access treatment for his cancer.
- Linda*, a 17-year breast cancer survivor, had a catastrophic health insurance policy. Linda wanted a plan that was more comprehensive to cover her cancer screenings and regular check-ups. She applied for a policy in the individual market, but was denied because of her previous cancer diagnosis. With a pre-existing condition, it is unlikely Linda will find a comprehensive insurance policy in a market that allows medical underwriting and she is not eligible for any public programs.

While the HIAS can suggest options for dealing with the costs of cancer treatment to many callers, unfortunately, there are no options to address the needs of about 30% of people who seek help. Of those callers who had options suggested, 7 out of 10 found the options either unaffordable or inadequate. Lack of health insurance is an important barrier to cancer prevention and early detection; some of the patients who are struggling to pay for their cancer treatment could have prevented their cancers altogether or been diagnosed at an earlier stage had they had better access to health care.

Recognizing that reducing barriers to cancer care is critical in the fight to eliminate suffering and death due to cancer, the American Cancer Society and its sister advocacy organization, the American Cancer Society Cancer Action Network℠, are working together to bring the need for meaningful health care reform to the forefront of public and political debate. One important goal of this campaign is to educate Americans about the extent of the access to health care problem and to motivate them to take action in support of change. This Special Section of *Cancer Facts & Figures*, which provides an overview of systems of health insurance in the United States, describes the impact of being uninsured or underinsured on cancer prevention, diagnosis, treatment, and outcomes.

Although this section focuses on associations between health insurance and cancer care and outcomes, it is important to recognize that health insurance is not the only barrier that needs to be addressed to ensure that everyone receives the full benefit of high-quality care.[1] Other factors include level of education and knowledge about health, trust in the health care system, language and cultural barriers, and geographic and transportation barriers. These factors are particularly important in relation to addressing health disparities among racial and ethnic minorities and the poor. Although addressing insurance and cost-related barriers to high-quality prevention, early detection, and treatment is not the only

*Note: Actual call to NCIC from a cancer patient. All names have been changed.

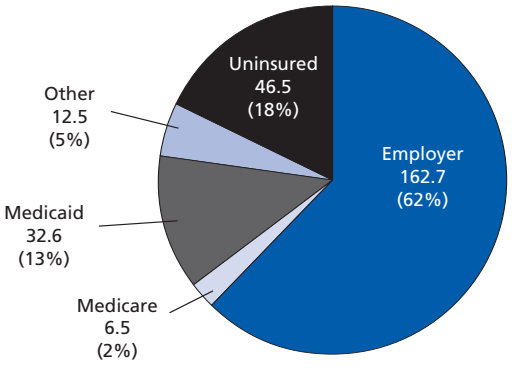
measure that will be needed to address these disparities, it is an important foundation that will support other efforts to promote equitable and high-quality care for racial and ethnic minorities and other medically underserved communities.

What Are the Major Systems of Health Insurance Coverage in the United States?

The major systems of health insurance coverage in the US are employer-sponsored health insurance, Medicare insurance, Medicaid and SCHIP insurance, and private non-group health insurance. In addition to these broad categories of health insurance, which cover 95% of the insured US population younger than 65, there are other forms of federal insurance, including coverage through the Veteran's Administration and Indian Health Service, as well as state insurance programs, including high-risk pools, which in total cover about 5% of the population.

Employer-sponsored health insurance: Most Americans younger than 65 receive their health insurance coverage through their own employer or the employer of a family member (Figure 1). Nearly all companies with more than 200 employees offer health insurance coverage.[2] The employer-based system of health insurance has several advantages, most notably the creation of work-based risk pools, in which healthy low-risk participants subsidize the health costs of sick and high-risk participants.[3] However, there are some serious disadvantages to this system. Not all companies offer health benefits, not all workers are eligible for coverage, and not all employees choose to participate or can afford their share of the health premium.[4] In 2007, the average costs to employers and employees respectively were $3,785 and $694 per year for individual coverage and $8,824 and $3,281 per year for family coverage.[5] Moreover, the cost of health insurance premiums has been rising much faster than the rate of overall inflation and workers' earnings (Figure 2).[5] Another important disadvantage of employer-sponsored health insurance is that people who develop a serious illness, such as cancer, may not be able to keep their employment and may lose access to their insurance. While the Consolidated Omnibus Budget Reconciliation Act (COBRA) allows employees to retain their health insurance benefits after they leave their job if they pay the full cost of the premium,[6] for many individuals the cost is prohibitive. Another disadvantage of employer-sponsored insurance is that it may not be possible to use the same health care providers when employment changes.

Figure 1. Health Insurance Coverage Among Individuals Younger than 65, 2006 (in millions)



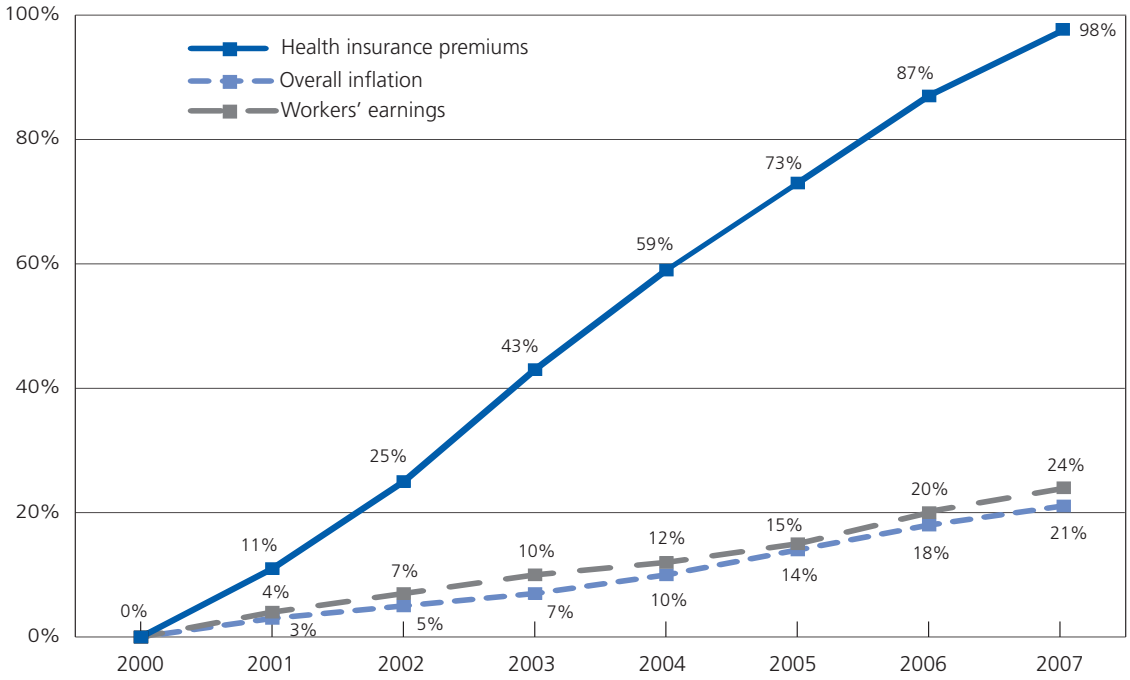
Reference: Collins SR, White C, Kriss JL. Whither Employer-Based Health Insurance? The Current and Future Role of US Companies in the Provision and Financing of Health Insurance. The Commonwealth Fund. September 2007.

Source: Current Population Survey, March 2007.

Medicare: Medicare is a form of publicly sponsored insurance which covers most Americans aged 65 and older. About 2% of those younger than 65 also qualify due to long-term disability and certain medical conditions. United States citizens and permanent residents are eligible for Medicare if they or their spouse paid into Social Security for 40 quarters (10 years). Individuals eligible for Social Security benefits are automatically enrolled in Medicare Part A (hospital insurance) when they turn 65. Medicare Part B provides other types of medical insurance coverage, including coverage for physician's services (inpatient or outpatient), administration of drugs that are not usually self-administered by the patient, outpatient hospital services, diagnostic tests, and specific preventive services including mammograms, Pap tests, and colorectal cancer screening. Beneficiaries must enroll in Medicare Part B and pay a monthly premium based on their income. Medicare Part A is financed primarily through payroll taxes while Part B is financed by beneficiary premiums and by federal general revenues. Medicare Part C, also known as Medicare advantage, was established in 1997 to allow beneficiaries to enroll in private health insurance plans, and Medicare Part D was enacted in 2003 to provide prescription drug coverage through private drug plans.[7]

Health care premiums and out-of-pocket costs that Medicare beneficiaries who do not have supplemental insurance are responsible for are set on an annual basis. In 2008, Medicare beneficiaries are responsible for paying a $1,024 deductable for the first 1-60 days of inpatient hospital care. For stays longer than 60 days, beneficiaries pay an increasing percentage of the cost. Part B premiums are set at $96.40 per month for most

Figure 2. Cumulative Changes in Health Insurance Premiums, Overall Inflation, and Workers' Earnings, 2000-2007



Note: Data on premium increases reflect the cost of health insurance for a family of four.
Reference: Adapted from Economic challenges facing middle class families: Hearing before the Committee on Ways and Means of the US House of Representatives, 110th Cong. (January 31, 2007). (Testimony of Diane Rowland: Health care: squeezing the middle class with more costs and less coverage.)
Source: Employer Health Benefits, 2007 Annual Survey. Kaiser Family Foundation and Health Research and Educational Trust. September 2007.

beneficiaries, with a sliding scale up to $238.40 for those with high incomes. Care at skilled nursing facilities is not covered by Medicare for the first 20 days; in days 21-100, Medicare will cover $256 per day. Medicare beneficiaries must also pay 20% of the Medicare allowable costs for services covered under Part B, which can be considerable in the case of a major illness such as cancer.[8]

Medicaid (Title XIX): Medicaid is a federally aided, state-operated and administered program that provides benefits for certain indigent or low-income persons in need of health and medical care. The program, authorized by Title XIX of the Social Security Act, does not cover all of the poor, however, but only persons who meet specified narrow eligibility criteria.[9] Eligible groups include low-income children, families, and pregnant women; elderly and disabled people who need long-term care services; and low-income elders who need assistance with the costs of Medicare coverage. Within broad federal guidelines, states establish their own eligibility standards; determine the type, amount, duration, and scope of services; set the payment rate for services; and administer their own programs. Thus, each state's Medicaid program is unique.[7]

In 1997, the State Children's Health Insurance Program (SCHIP) was established by Congress to expand coverage to uninsured low-income children. States were allowed to expand income-eligibility levels and receive enhanced matching funds for children by either expanding their Medicaid programs or creating new programs separate from Medicaid. All 50 states and the District of Columbia have implemented SCHIP programs, although the extent of coverage varies.[10] As a result of SCHIP and other programs, as of 2001, almost all children from families with incomes below 200% of the federal poverty level are eligible for either Medicaid or SCHIP. Medicaid and SCHIP insurance is an important source of coverage for children with cancer. Based on the National Cancer Database (NCDB), approximately 25% of children under 18 years of age diagnosed with cancer are covered by Medicaid and SCHIP programs (see Data Sources for more information on the NCDB).[11]

Consistent with the emphasis of the Medicaid program on providing health care to children and families with children, the probability of having Medicaid coverage is highest for children under age 18 and higher for women than for men (Figure 3). The proportion of adults aged 45-64 with Medicaid coverage ranges from 5% for white men to 15% among African American and Hispanic women.[12] A recent study found that only 8% of uninsured

childless adults were eligible for Medicaid or Medicare assistance.[12]

In most states, people who develop serious illnesses, including cancer, can qualify for Medicaid if, after medical expenses, their income falls below the state-established medically needy limit, which is typically well below the federal poverty level. To qualify for Medicaid as medically needy, individuals or families may be required to "spend down" to Medicaid eligibility by offsetting their excess income with medical and/or remedial care expenses.[7]

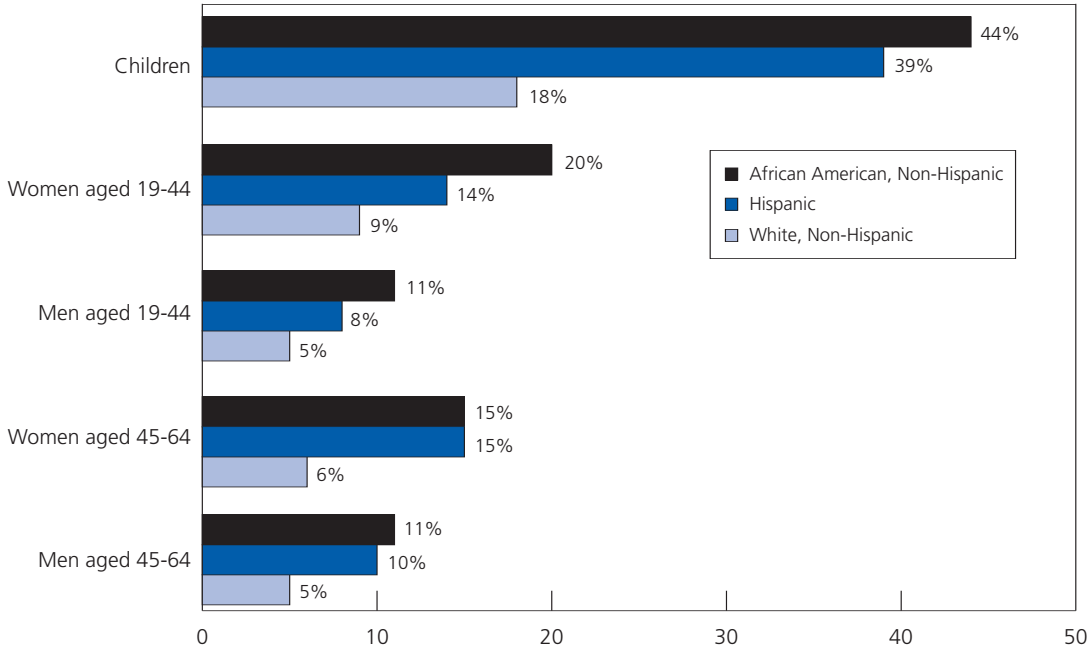
The Breast and Cervical Cancer Prevention and Treatment Act (BCCPTA), enacted in February 2000, permits states to provide medical assistance through Medicaid to eligible women who are screened through the National Breast and Cervical Cancer Early Detection Program (NBCCEDP). All of the states are participating in this program.[13] However, it is estimated that only 13.2% of eligible women received a mammogram in 2002-2003,[14] due in part to inadequate funding of the program. There are also differences in implementation of the BCCPTA between states, which may limit opportunities for some women to benefit from the program.[15]

Private, non-group health insurance: Individuals and families who do not have health insurance coverage through their employer or other public programs may seek coverage under the individual (non-group) insurance market. Less than 5% of US adults younger than 65 have this type of insurance, in part because the premiums are much higher than those for employer-sponsored insurance.[2] A survey of older adults (aged 50-70) in 2004 found that more than half (54%) of people with private, non-group insurance paid more than $3,600 per year for individual policies and 26% paid more than $6,000 per year.[16] Private, non-group insurance can be difficult to obtain and/or extremely costly, particularly for individuals with preexisting health conditions, and therefore is not a viable option for many Americans who lack employer-sponsored coverage.

Who Is at Risk of Being Uninsured?

Almost everyone is at some risk of being uninsured. However, the risk of being uninsured varies by age, gender, race/ethnicity, and poverty status, as well as other characteristics. Among individuals younger than 65, those under the age of 18 have the lowest probability and those aged 18-24 have the highest probability of being uninsured (Figure 4).[17] Fourteen percent of people age 45-64 are uninsured. The probability of being uninsured varies inversely according to income, but increased from 2001-2005 at all income levels (Figure 5).[18] African Americans, Hispanics, Asian Americans and Pacific

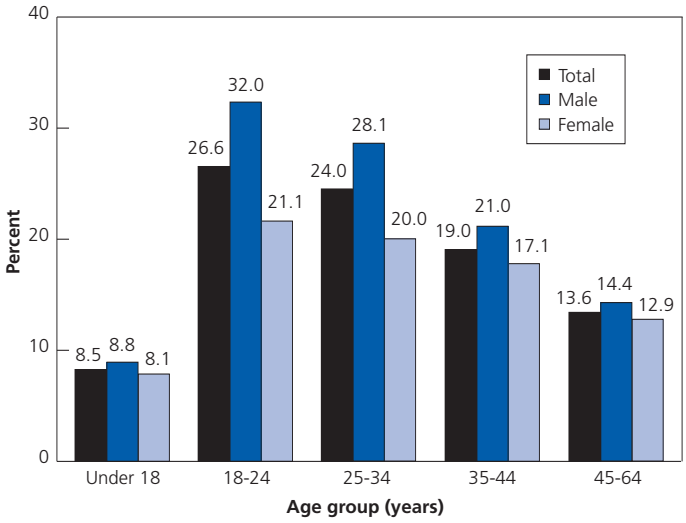
Figure 3. Medicaid Coverage of the Nonelderly by Age, Sex, and Race/Ethnicity, 2005



Reference: James C, Thomas M, Lillie-Blanton M, Garfield R. Key Facts: Race, Ethnicity & Medical Care. The Henry J. Kasier Family Foundation, January 2007.

Source: Current Population Survey, March 2005.

Figure 4. Percentage of Persons Younger than 65 Without Health Insurance Coverage at the Time of Interview by Age Group and Sex, January-March, 2007



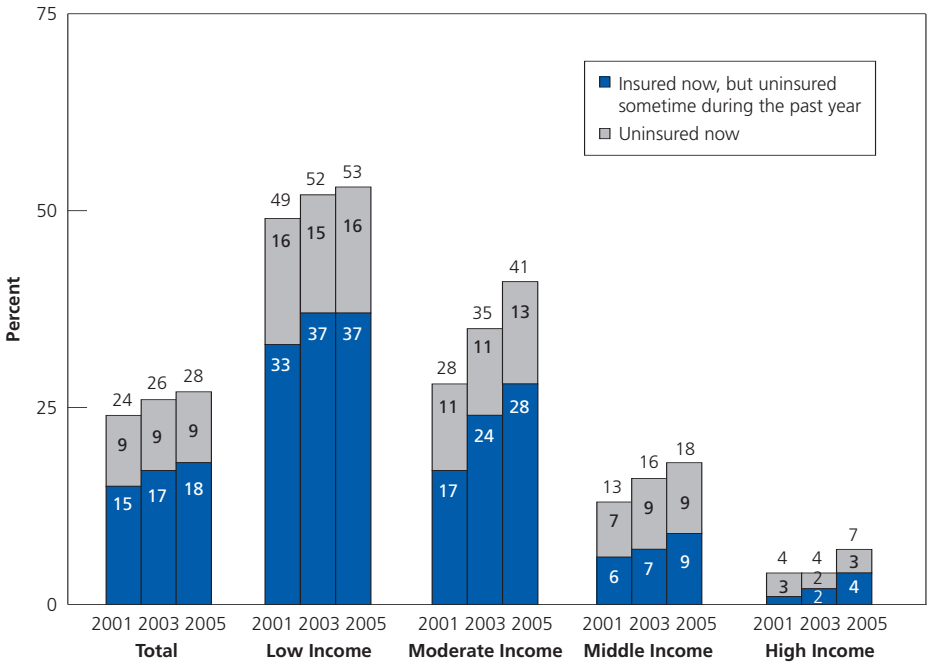
Reference: Cohen RA, Martinez ME. Health insurance coverage: Early release of estimates from the National Health Interview Survey, January-March 2007, September 2007.

Source: Family core component of the 2007 National Health Interview Survey. Data are based on household interviews of a sample of the civilian noninstitutionalized population.

Islanders, and American Indians/Alaska Natives are much more likely to be uninsured than non-Hispanic whites (Figure 6). The most common reason that working individuals are uninsured is that their employers do not offer health insurance benefits.[19] Lack of employer-based health insurance is common for workers in small companies, low-wage workers, and part-time workers, as well as the self-employed.[19] When employees are offered employer-sponsored health insurance, uptake rates are generally more than 80%.[19]

There are numerous ways in which individuals or families can lose their health insurance. For example, an individual may lose or leave a job where insurance was offered; lose Medicaid eligibility when they or their children grow up; lose insurance through their spouse due to separation, divorce, or death; or be priced out of the market when the cost of premiums becomes unaffordable.[4] Parental health insurance coverage of children who are not students ends at age 18, as does coverage for many children

Figure 5. Uninsured Rates Among Adults Aged 19-64 by Income Level, 2001-2005



Note: Income refers to annual income in 2001 and 2003. Low income is <$20,000, moderate income is $20,000-$34,999, middle income is $35,000-$59,999, and high income is $60,000 or more. In 2005, low income is <$20,000, moderate income is $20,000-$39,999, middle income is $40,000-$59,999, and high income is $60,000 or more.

Reference: Collins SR, Davis K, Dody MM, Kriss JL, Holmgren AL. Gaps in Health Insurance: An All-American Problem. The Commonwealth Fund. April 2006.

Source: The Commonwealth Fund Biennial Health Insurance Surveys (2001, 2003, and 2005).

insured under Medicaid/SCHIP. Employer-based coverage sometimes fails to protect families from large medical expenses because illness may lead to job loss and the consequent loss of coverage.[20]

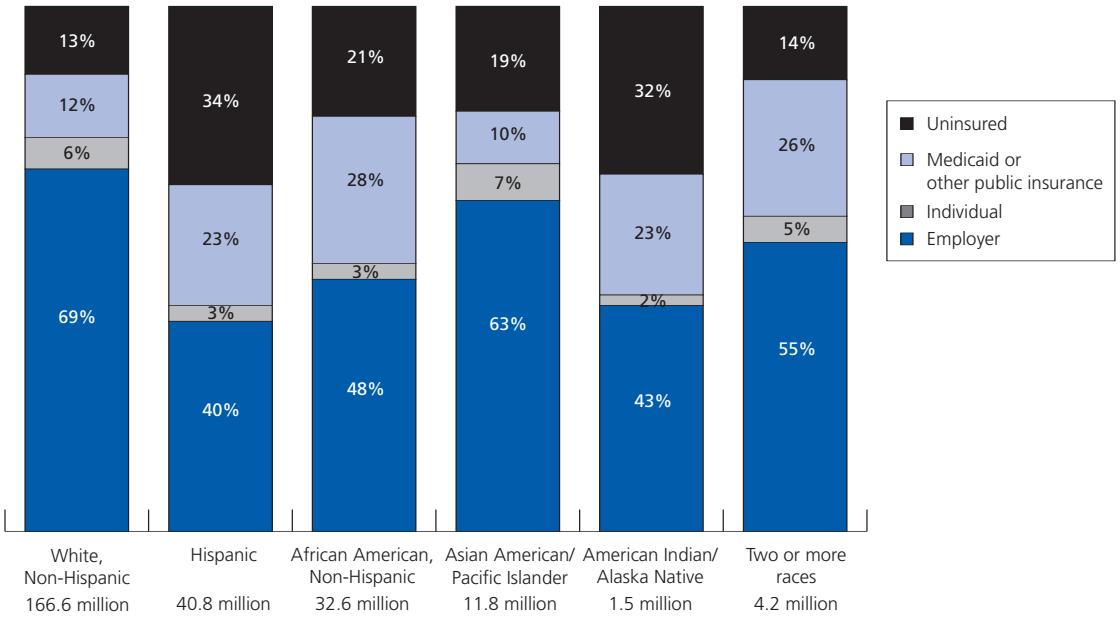
Who Is at Risk of Being Underinsured?

Health insurance generally does not provide total dollar coverage of health care costs. Covered services, deductibles, co-pays, and yearly or lifetime caps can vary considerably among the types of insurance that are available. Caps on total lifetime coverage or disease-specific coverage (e.g. $1,000,000) may be exceeded if prolonged, expensive medical care is needed. Almost everyone is at risk of being underinsured in the event of a major illness, but many individuals and families are underinsured even without experiencing a major illness. The term underinsured refers to people who have some form of health insurance, but who lack coverage for certain procedures or cannot afford the cost sharing associated with covered benefits, or both.[21] One common definition is that a person or family is underinsured if they would have to spend more than 10% of family income on out-of-pocket medical expenses in the event of a catastrophic illness.[22]

A recent study analyzed data from the Medical Expenditure Panel Surveys (MEPS), sponsored by the Agency for Health Care Research and Quality (AHRQ) for 1996 and 2003.[22] The MEPS household survey collects detailed information on health insurance coverage, health care utilization, and expenditures by sources of payment and additional data on health status, medical conditions, and other sociodemographic household characteristics.[22] According to this study, the percentage of non-elderly families who had out-of-pocket heath care expenditures (not including their insurance premiums) greater than 10% of after-tax family income increased from 6.7% in 1996 to 8.5% in 2003. When the cost of insurance premiums was included in calculating total expenses, the percent spending over 10% of after-tax income on health care rose from 15.8% in 1996 to 19.2% in 2003. Nearly one-quarter (24%) of the poor (family income <100% of federal poverty line) and 10% of the near-poor (family income 100% to <200% of the federal poverty line) reported total health care expenses exceeding 20% of family income. At all income levels, the burden was greatest for people with serious illness. Among people with cancer, 28.8% had total burdens exceeding 10% of family income, and 11.4% had total burdens exceeding 20% of family income.[22]

Even among the elderly population who have Medicare insurance, out-of-pocket health care costs can be considerable. In 2003, about 29.3% of all elderly persons had out-of-pocket spending on medical care in excess of

Figure 6. Health Insurance Coverage of the Nonelderly by Race/Ethnicity, 2005



Note: Nonelderly includes individuals up to age 65. "Other public insurance" includes Medicare and military-related coverage; SCHIP is included in Medicaid.
Reference: James C, Thomas M, Lillie-Blanton M, Garfield R. Key Facts: Race, Ethnicity & Medical Care. The Henry J. Kaiser Family Foundation, January 2007.
Source: Current Population Survey, March 2005.

$5,000, and 7.3% of all elderly persons had out-of-pocket spending on medical care in excess of $10,000.[23]

Medical debt is an important cause of bankruptcy filing in the US. A study of causes of bankruptcy among 931 people who filed for bankruptcy in the US in 2001 found that about half cited medical causes as an important reason for bankruptcy. Three-fourths of those with medical debt were insured at the onset of the bankrupting illness; 60.1% had private coverage, 5.7% had Medicare, 8.4% Medicaid, and 1.6% veterans/military coverage. About one-third of individuals who had private insurance at the onset of their illness lost coverage during the course of their illness. On average, the mean out-of-pocket expenditure for all debtors citing medical expenses for bankruptcy was $11,854. For debtors citing cancer as the medical condition associated with the bankruptcy, it was $35,878.[20] Compounding the financial consequences for individuals and families without health insurance are pricing policies in which uninsured patients are charged more for services. In 2004, a survey found that the rates charged to uninsured and other "self-pay" patients for hospital services were often 2.5 times what most health insurers actually paid and more than three times the hospital's Medicare-allowable costs.[24]

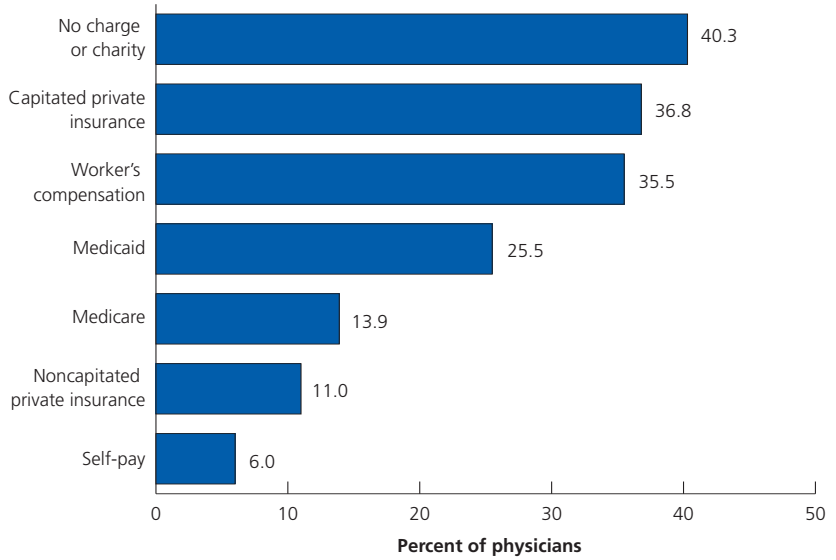
Even the very poor are at risk of medical debt and aggressive debt recovery practices. A cross-sectional study of patients being seen at 10 safety net provider sites in Baltimore, Maryland, found that 42% reported that they currently had a medical debt (average $3,409), and 39.4% reported ever having been referred to a collection agency for a medical debt. The mean annual income in the patients interviewed was $7,864, and 47.2% reported that they were homeless. Among individuals who had current medical debt or who had been referred to a collection agency in the past, 24.5% no longer went to that site for care, 18.6% delayed seeking care when needed, and 10.4 % reported "only going to emergency rooms now."[25]

How Does Health Insurance Impact Access to Health Care?

Individuals who are uninsured, underinsured, or insured by government programs may face significant barriers to obtaining health care. Some private physicians do not accept new patients unless they have private insurance or are able to pay the full cost at the time of the visit. For example, a recent national survey of office-based physicians found that, although 96% were accepting new patients, 40.3% did not accept "no charge" or charity patients, 25.5% did not accept Medicaid patients, and 13.9% did not accept patients covered by Medicare (Figure 7).[26] Patients who are unable to afford outpatient care in private practice settings often seek care in hospital emergency departments, which are required by law only to examine patients to determine if a medical emergency exists.[27] Consequently, many patients initially seen in emergency departments are referred to outpatient providers for follow-up care, but uninsured or Medicaid-insured patients may be excluded from care by the system.

A recent study employed scripted interviewers to contact clinics stating that they had been seen in a community emergency room the previous night and were seeking a follow-up appointment for a serious medical condition such as pneumonia or suspected ectopic pregnancy.[28] Callers claiming to have private insurance were almost twice as likely to receive prompt appointments as those stating that they had Medicaid insurance (63.6% versus 34.2%). Uninsured callers who said that they could pay cash for the entire charge at the time of the visit were equally likely to receive an appointment as those with private insurance, while only 25.1% of

Figure 7. Percentage of Office-based Physicians Not Accepting New Patients by Payment Method, 2003-2004



Source: Hing E, Burt CW. Characteristics of office-based physicians and their practices: United States, 2003-04. Series 13, No. 164. Hyattsville, MD: National Center for Health Statistics, 2007.

uninsured individuals who offered to pay $20 at the time of the visit were offered appointments.

As more Americans go without health insurance and as access to affordable health care decreases, millions of Americans turn to the health care "safety net" for their health care needs. At the core of the safety net are health centers, public hospital systems, and local health departments. In addition, some communities are served by school- and church-based health clinics, private physicians, and nonprofit hospitals committed to serving vulnerable patients. Although such programs provide lifesaving services, some are understaffed, have inadequate resources, and are unable to provide specialty care. Recent studies suggest that the resources available in the health care safety net are declining, even as the need is growing.[27] In addition, although poverty is increasing in both urban and surburban neighborhoods, particularly in Midwestern and Southern metropolitan areas, there has been a shift in location of the largest concentrations of poverty. The poor are increasingly moving to surburban and rural areas to find jobs and affordable housing as economic forces make cities less affordable. It is more difficult for those who are poor and live in suburban or rural areas to access safety-net health clinics and hospitals because these services are disproportionately concentrated in central-city neighborhoods.[29]

Impact of Health Insurance Status on Cancer

Lack of access to health care can adversely affect cancer incidence and mortality throughout the spectrum from cancer prevention and early detection to treatment, survivorship, and palliative care. Lack of health insurance, even for intermittent periods, is associated with lower likelihood of having a "medical home" or usual source of health care. Individuals without health insurance are less likely to have preventive care and to have adequate management for chronic conditions. Based on the 2006 National Health Interview Survey (NHIS), 53.6% of uninsured individuals aged 18-64 had no usual source of health care, compared with 9.9% of privately insured and 10.8% of Medicaid-insured individuals. Among individuals who had been uninsured for >12 months, 58.7% had no usual source of care (Table 1). Individuals who were uninsured at the time of the interview were more likely than insured individuals to report that they did not get care due to cost, delayed care due to cost, did not get prescription drugs due to cost, and had no health care visits in the past 12 months due to cost. Although patients with Medicaid were less likely than privately insured patients to report that they had no health care visits in the past 12 months, they were more likely to report that they did not get care due to cost, delayed care due to cost, or did not get prescription drugs due to cost. However, patients with Medicaid insurance reported much greater access to health care than those who were uninsured.

Cancer prevention: Smoking, poor nutrition, and physical inactivity are important risk factors for cancer. Health care encounters provide an opportunity to counsel individuals on tobacco cessation, nutrition, physical activity, and weight loss. Individuals who are uninsured are less likely to report that they had a health care encounter in the past year than those with either private or Medicaid insurance. Among individuals who had a health care encounter, the uninsured were less likely than privately or Medicaid-insured individuals to

Table 1. Access to Health Care and Preventive Services by Health Insurance Status in Adults Aged 18-64, 2006

Proportion (%)	All	Private	Medicaid	Uninsured (at time of interview)	Uninsured for >12 months
Have no usual source of care	18.9	9.9	10.8	53.6	58.7
Did not get care due to cost	8.4	3.8	10.3	22.8	24.4
Delayed care due to cost	10.7	6.1	11.1	25.8	27.1
Did not get prescription drugs due to cost	9.3	4.4	15.2	22.9	23.1
Had no health care visits in the past 12 months	21.6	16.6	12.5	43.2	49.0
Counseling by a health care provider*					
Smokers advised to quit†	58.2	58.1	67.0	50.4	48.2
Obese adults (BMI>30) advised to lose weight‡	51.7	53.9	51.2	40.3	35.6

*Among individuals with at least one health care visit in the past 12 months.

†Adults who reported that they were advised to quit using tobacco by a health care provider in the past 12 months; Information available only in NHIS 2005.

‡Adults who reported that they were advised to control or lose weight by a doctor or health professional in the past 12 months.

Source: National Health Interview Survey Public Use Data File 2005, 2006, National Center for Health Statistics, Centers for Disease Control and Prevention, 2006, 2007.

be advised to quit smoking or to lose weight (Table 1). An analysis of data from an earlier (2000) NHIS survey found that individuals with no insurance or with Medicaid insurance were less likely to use tobacco cessation aids in a quit attempt during the past year.[30]

Early detection and screening: Analyses of the NHIS and the Behavioral Risk Factor Surveillance Survey (BRFSS) have consistently found that individuals without health insurance have lower rates of cervical, breast, and colorectal cancer screening than individuals with health insurance.[31-34] A few studies reported screening rates for Medicaid insured patients that were lower than those for privately insured patients, but higher than for uninsured patients.[35,36] Studies of individuals aged 65 and older, using other suveys and data sources, found that individuals who were dually insured by Medicare and Medicaid or uninsured were less likely to receive cancer screening tests than comparison groups (those with Medicare alone or those with Medicare plus supplemental private insurance, depending on the study).[36-38]

Analyses of the NHIS 2005 survey also found that the likelihood of receiving recommended cancer screening tests varies markedly by insurance status (Table 2). About three-quarters (74.5%) of women aged 40-64 who had private health insurance had received a mammogram in the past 2 years, compared with 56.1% of women with Medicaid insurance and 38.1% of uninsured women. Similarly, 87.9% of women who had private health insurance had a Pap test in the past 3 years, compared with 82.5% of women with Medicaid insurance and 68.0% of uninsured women. Among men and women aged 50-64 with private insurance, 48.3% had had a recommended colorectal cancer screening test in the past 10 years, compared with 39.6% of individuals with Medicaid insurance and only 18.8% of those who were uninsured. The percent of men aged 50-64 who had a PSA test for prostate cancer followed a similar pattern; 37.1% among the privately insured, 20.8% among the Medicaid-insured, and 14.0% among the uninsured.

Given that health insurance status is associated with other characteristics, including income, race/ethnicity, immigration status/country of birth, and level of education, it is possible that differences in screening rates reflect differences in knowledge about cancer prevention, culture, or other barriers to care. However, when data from the NHIS 2005 are analyzed to estimate the likelihood of receiving mammography and colorectal cancer screening by race/ethnicity (non-Hispanic white, non-Hispanic black, and Hispanic), level of education, and insurance status (Figure 8 and Figure 9) it is apparent that having health insurance is an important predictor of screening across all major racial and ethnic populations. Moreover, at every level of education, individuals with health insurance are about twice as likely as those without health insurance to have had mammography or colorectal cancer screening.

Stage at diagnosis and survival: Information on the relationship between stage at diagnosis and insurance status is quite limited because population-based cancer incidence registries do not collect information on insurance status. Several studies have examined the relationship between Medicaid enrollment status and stage at diagnosis by matching cancer registry data with state-based Medicaid records. One such study, based on linkage of state of Michigan Medicaid and cancer registry records, found that Medicaid-insured patients younger than 65 who were diagnosed with cancer during 1996-1998 were more likely to be diagnosed with late stage cancer of the breast, uterus, cervix, lung, and prostate than patients without Medicaid coverage (including uninsured and privately insured).[39] However, this study could not differentiate among patients who were enrolled in Medicaid prior to their diagnosis from those

Table 2. Cancer Screening by Health Insurance Status in Adults Younger than Age 65, 2005

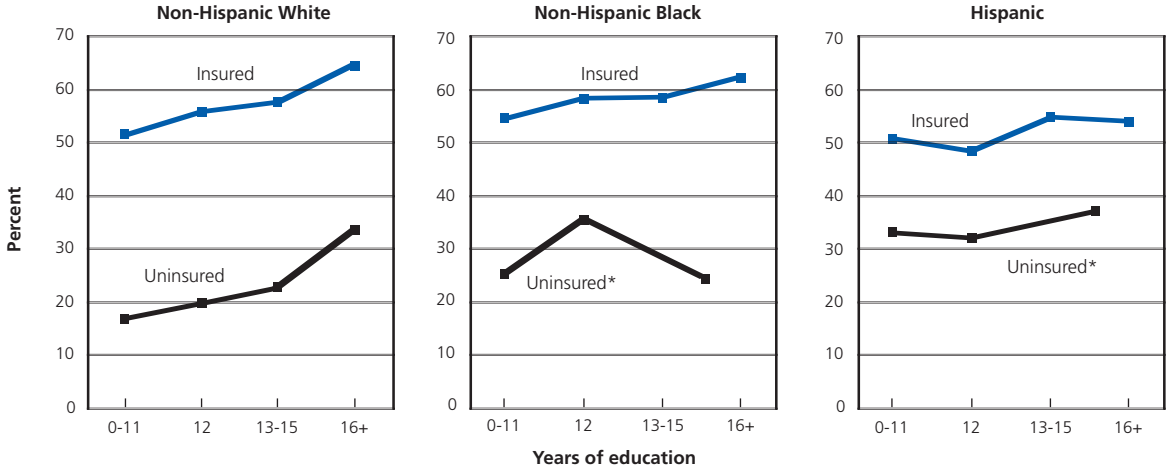
Proportion (%)	All	Private	Medicaid	Uninsured (at time of interview)	Uninsured for >12 months
Women 40-64 who had a mammogram in the past 2 years	67.9	74.5	56.1	38.1	32.9
Women 18-64 who had a Pap test in the past 3 years	83.6	87.9	82.5	68.0	62.7
Adults 50-64 who had a colorectal cancer screening test*	44.2	48.3	39.6	18.8	14.9
Men 50-64 who had a PSA test in the past year	33.5	37.1	20.8	14.0	11.5

*Had a fecal occult blood test in the past year or an endoscopy in the past 10 years.

Source: National Health Interview Survey Public Use Data File 2005, National Center for Health Statistics, Centers for Disease Control and Prevention, 2006.

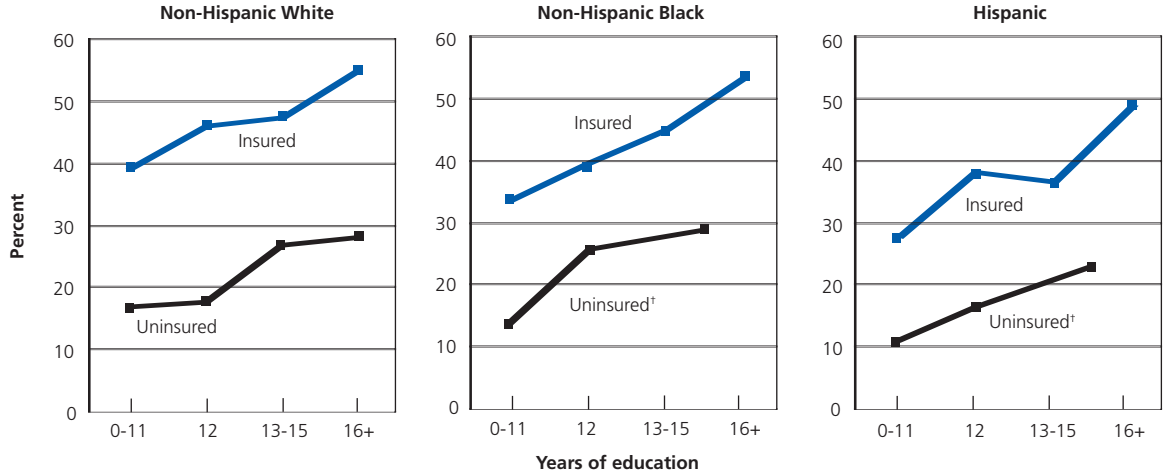
enrolled as a result of diagnosis. Later stage at diagnosis among patients enrolled as a result of diagnosis does not reflect the extent to which Medicaid insurance provides access to health care, including prevention and early detection. A subsequent study in the Michigan registry-Medicaid linked data found that for all cancer cases diagnosed in 1996 and 1997, 64% were enrolled before being diagnosed with cancer (pre-enrolled); just over one-third of the Medicaid sample enrolled in the month of diagnosis or after (late-enrolled). A greater proportion of colorectal and lung cancer patients were late-enrolled (46% and 42% respectively).[40] In this study, the odds of later stage at diagnosis was higher among individuals who were late-enrolled in Medicaid compared to those who were pre-enrolled; nonetheless, pre-enrolled Medicare beneficiaries were more likely to be diagnosed at a later stage than those without Medicaid insurance (the majority of whom would be expected to be privately insured).[40] A further study of the same population found that both pre-enrolled and late-enrolled Medicaid patients were at substantially increased risk of dying within 8 years of diagnosis compared to patients who

Figure 8. Mammogram Within the Last Year, Women Ages 40-64 Years, by Race/Ethnicity, Years of Education, and Insurance Status, 2003-2005



*Groups have been combined (years of education 13+) due to small sample sizes.
Source: National Health Interview Survey 2003 and 2005, National Center for Health Statistics, Centers for Disease Control and Prevention, 2006.

Figure 9. Colorectal Cancer Screening*, Ages 50-64 Years, by Race/Ethnicity, Years of Education, and Insurance Status, 2003-2005

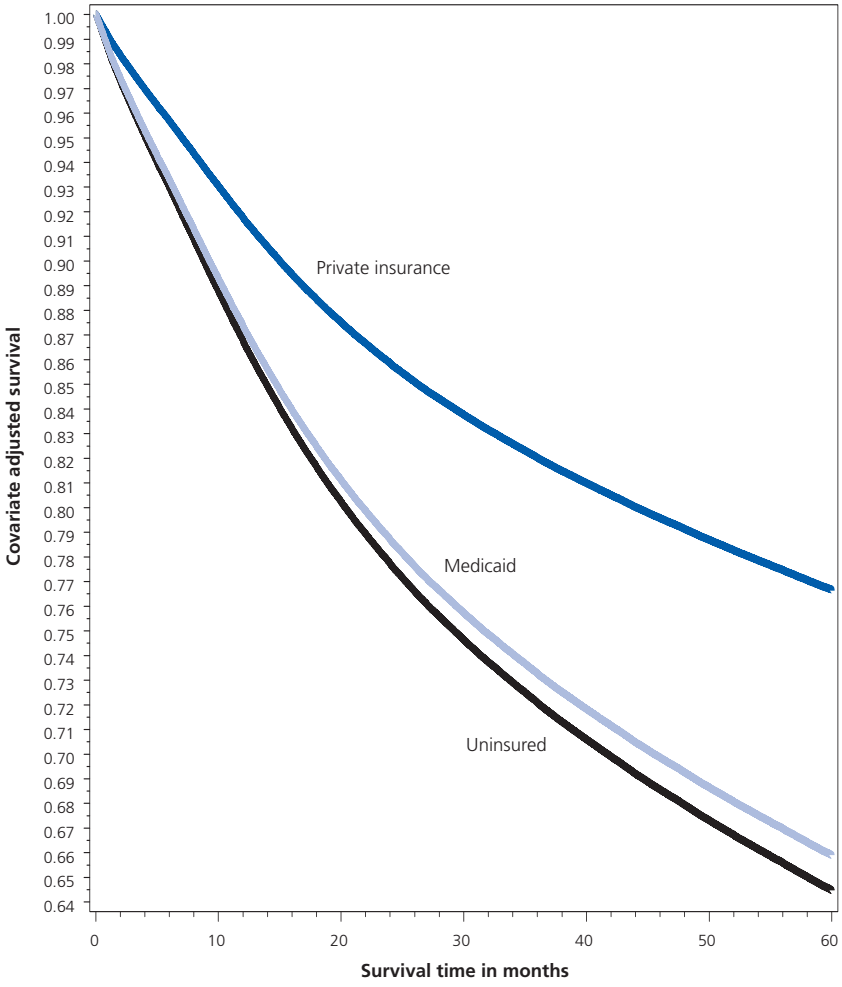


*Either a fecal occult blood test within the past year or an endoscopy within the past 10 years.
†Groups have been combined (years of education 13+) due to small sample sizes.
Source: National Health Interview Survey 2003 and 2005, National Center for Health Statistics, Centers for Disease Control and Prevention, 2006.

were not Medicaid-enrolled. Although survival was somewhat poorer in the late-enrolled compared to the pre-enrolled group, this difference was not statistically significant.[41] A study of stage at diagnosis for cervical cancer patients diagnosed in California in 1996-1999 found that women insured by Medicaid were significantly more likely than women without Medicaid coverage (including uninsured and privately insured) to be diagnosed at late stage.[42] However, when risks were analyzed by duration of Medicaid enrollment, increased risk of late stage diagnosis was confined to those enrolled at the time of, or less than 12 months before, diagnosis, and was not apparent for those who had been enrolled in Medicaid for 12 or more months. A study linking data from the Florida state cancer registry with inpatient and outpatient discharge abstracts to ascertain insurance status found that persons who were uninsured were more likely to be diagnosed with late stage breast, colorectal, and prostate cancer and melanoma and that patients who were Medicaid insured were more likely to be diagnosed with late stage breast cancer and melanoma. This study could not examine duration of Medicaid enrollment before diagnosis.[43]

The National Cancer Database (NCDB), a registry containing information about cancer patients treated at more than 1,500 Commission on Cancer-approved facilities in the US, has collected information on patient insurance status at the time of diagnosis since 1996.[44] Several recent studies have used this database to examine the relationship between insurance status and stage at diagnosis. Patients diagnosed with oropharyngeal and laryngeal cancer in 1996-2003 who were uninsured or covered by Medicaid were significantly more likely to be diagnosed with late stage and larger tumors.[45,46] A study of breast cancer patients diagnosed in 1998-2003 and included in the NCDB found that women who were uninsured or had Medicaid insurance were about 1.5 times more likely be diagnosed with stage II versus stage I disease and 2.5 times more likely to be diagnosed with stage III/IV versus stage I disease compared to those with private insurance.[47]

Figure 10. Cancer Survival Among Individuals Ages 18-64 Years by Insurance Status*

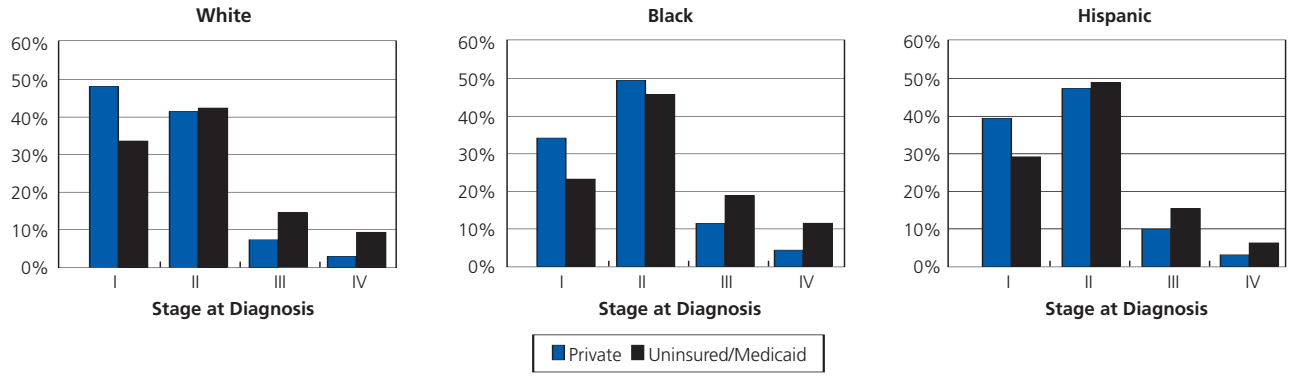


*Patients diagnosed from 1999-2000; excluded from the analysis: unknown stage; race/ethnicity other than white, black, or Hispanic; missing information on stage, age, race/ethnicity, or zip code.
Source: National Cancer Database.

Data from the NCDB were also used to investigate the relationship between insurance status, stage at diagnosis, and survival. These analyses were restricted to patients diagnosed in 1999-2000, the most recent years of diagnosis for which at least 5 years of follow up was available. Survival analyses controlled for age at diagnosis, race/ethnicity, sex, and zip code level income. In addition, analyses were performed with and without control for stage at diagnosis to better understand how much of the survival differences by insurance status could be explained by differences in stage at diagnosis.

In analyses of cancer survival for all cancer sites combined, patients who were uninsured and those who were Medicaid-insured at the time of diagnosis were 1.6 times as likely to die in 5 years as those with private insurance (Figure 10). About 76% of patients with private

Figure 11. Breast Cancer Stage Distribution Among Women Ages 18-64 by Race/Ethnicity and Insurance Status*

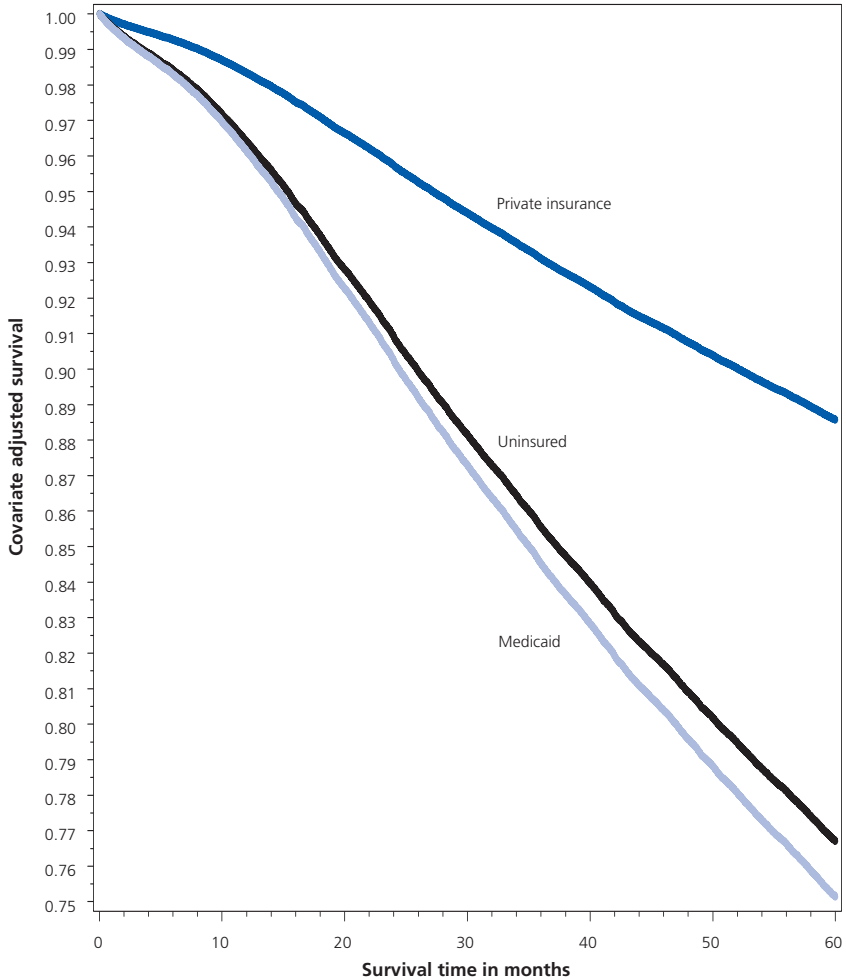


*Patients diagnosed from 1999-2000; excluded from the analysis: unknown stage; race/ethnicity other than white, black, or Hispanic; missing information or stage, age, race/ethnicity, or zip code.
Source: National Cancer Database.

insurance survived for 5 years after diagnosis, compared with 66% of those with Medicaid insurance and 65% of those who were uninsured at the time of diagnosis. More detailed analyses were done for breast and colorectal cancers, two important cancers for which both early detection and quality of treatment are known to influence survival.

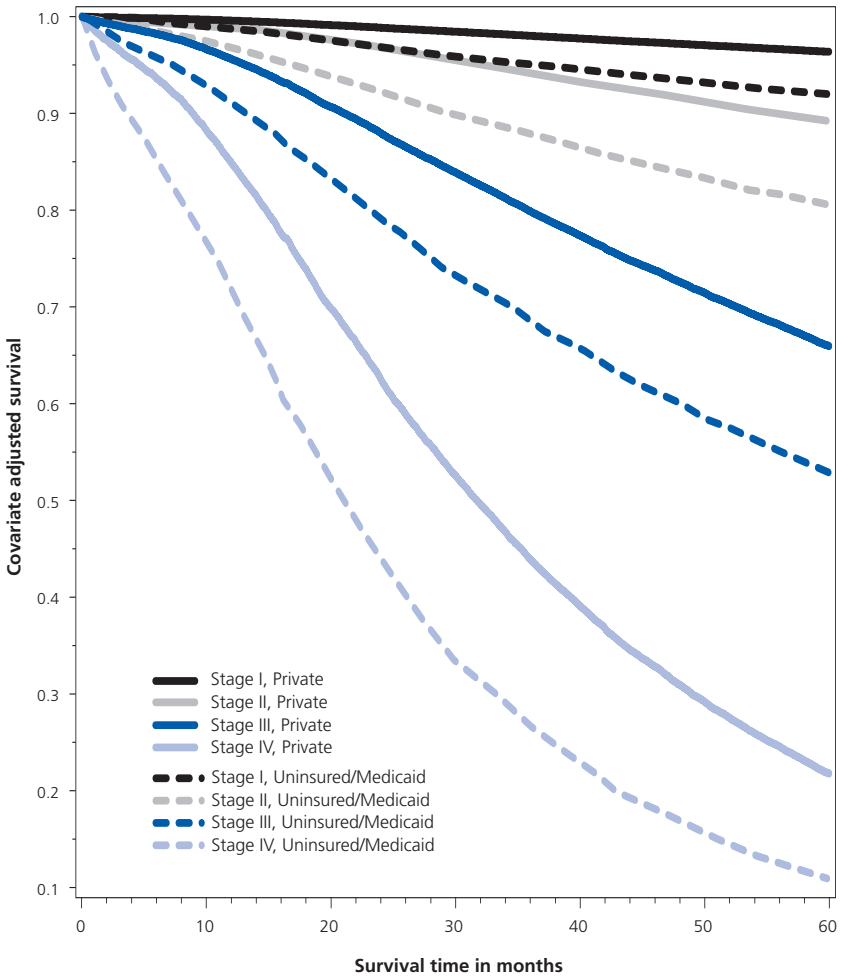
Figure 11 shows the stage distribution of breast cancer cases diagnosed among white, black, and Hispanic women in 1999-2000. In each racial/ethnic group, patients with private insurance were more likely to be diagnosed with stage I breast cancer and less likely to be diagnosed with stage III and IV cancer than those who were uninsured or who had Medicaid insurance. Breast cancer survival for all stages combined was also associated with insurance status (Figure 12). Among patients with private insurance, 89% survived 5 years, compared with 77% of patients who were uninsured and 75% of those who had Medicaid insurance; the difference in survival between uninsured patients and those with Medicaid insurance was not statistically significant. Patterns of survival by insurance type were similar for white, black, and Hispanic women, although black women had lower survival rates than white women or all women combined; among black women with private insurance, 81% survived 5 years, compared with 65% of uninsured

Figure 12. Breast Cancer Survival Among Women Ages 18-64 Years by Insurance Status*



*Patients diagnosed from 1999-2000; excluded from the analysis: unknown stage; race/ethnicity other than white, black, or Hispanic; missing information on stage, age, race/ethnicity, or zip code.
Source: National Cancer Database.

Figure 13. Breast Cancer Survival Among Women Ages 18-64 Years by Stage and Insurance Status*



*Patients diagnosed from 1999-2000; excluded from the analysis: unknown stage; race/ethnicity other than white, black, or Hispanic; missing information on stage, age, race/ethnicity, or zip code.
Source: National Cancer Database.

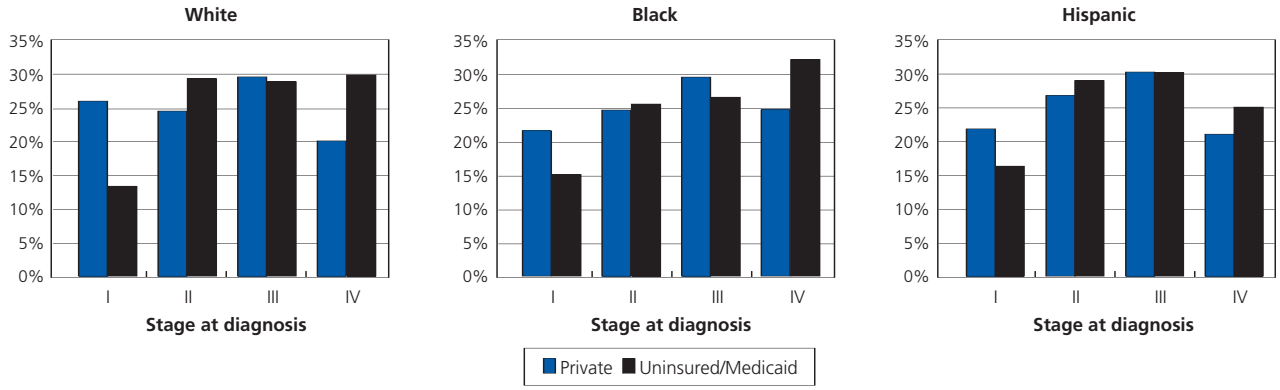
patients and 63% of Medicaid-insured patients (data not shown). When data were analyzed within each stage, survival was consistently lower for women who were uninsured or who had Medicaid insurance, compared to those who were privately insured (Figure 13).

Figure 14 shows the stage distribution of colorectal cancer cases diagnosed among white, black, and Hispanic patients in 1999-2000. In each racial/ethnic group, patients with private insurance were more likely to be diagnosed with stage I and less likely to be diagnosed with stage IV colorectal cancer than those who were uninsured or who had Medicaid insurance. Survival for all stages combined was also associated with insurance status (Figure 15). Among patients with private insurance, 65% survived 5 years, compared with 50% of patients who were uninsured and 46% of those with Medicaid insurance; the difference in survival between uninsured patients and those with Medicaid insurance was not statistically significant. Patterns of survival by insurance type were similar for white, black, and Hispanic men and women, although black men and women had lower survival rates than whites or all races/ethnicities combined; among black patients, 60% of those with private insurance survived 5 years, compared with 41% of uninsured patients and Medicaid-insured patients. When data were analyzed within each stage, survival was consistently lower for men and women who were uninsured or who had Medicaid insurance, compared to those who were privately insured (Figure 16). In fact, patients who were diagnosed with stage I cancer who were uninsured or Medicaid-insured were more likely to die within the first 5 years than privately insured patients diagnosed with stage II cancer, and privately insured patients with stage III disease had similar survival to Medicaid-insured or uninsured patients with stage II disease.

The results of the analysis of breast and colorectal cancer survival by insurance status among patients diagnosed in 1999 and 2000 and reported to the NCDB were similar to those of a previous study that examined 3-year cancer survival by insurance status among patients diagnosed in Kentucky in 1995-1998 and followed through 1999.[48] The latter study found that 3-year relative survival among breast cancer patients was 90.6% for privately insured patients, 75.5% for patients with Medicaid insurance, and 77.7% among the uninsured. For colorectal cancer patients, 3-year survival was 70.9% for those with private insurance, 53.0% for those with Medicaid insurance, and 52.8% for those who were uninsured.

Although neither the NCDB analyses nor the Kentucky Registry study was able to control for sociodemographic factors other than race/ethnicity, sex, and age, or for the presence of other health conditions that might impact survival, both studies were able to control for stage, and the NCDB analysis controlled for zip code level of income. In addition, when survival by insurance status was examined using the NCDB for a cancer with very high survival (stage I and II thyroid cancer), the largest

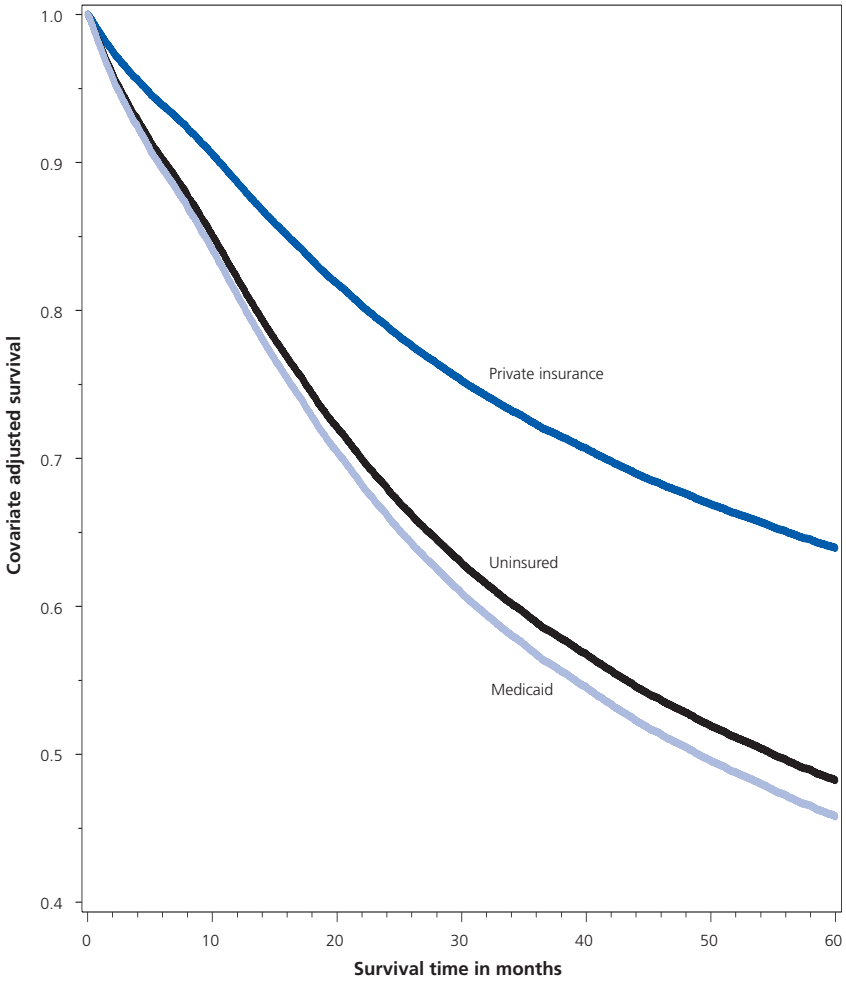
Figure 14. Colorectal Cancer Stage Distribution Among Patients Ages 18-64 by Race/Ethnicity and Insurance Status*



*Patients diagnosed from 1999-2000; excluded from the analysis: unknown stage; race/ethnicity other than white, black, or Hispanic; missing information on stage, age, race/ethnicity, or zip code.

Source: National Cancer Database.

Figure 15. Colorectal Cancer Survival Among Patients Ages 18-64 Years by Insurance Status*



*Patients diagnosed from 1999-2000; excluded from the analysis: unknown stage; race/ethnicity other than white, black, or Hispanic; missing information on stage, age, race/ethnicity, or zip code.

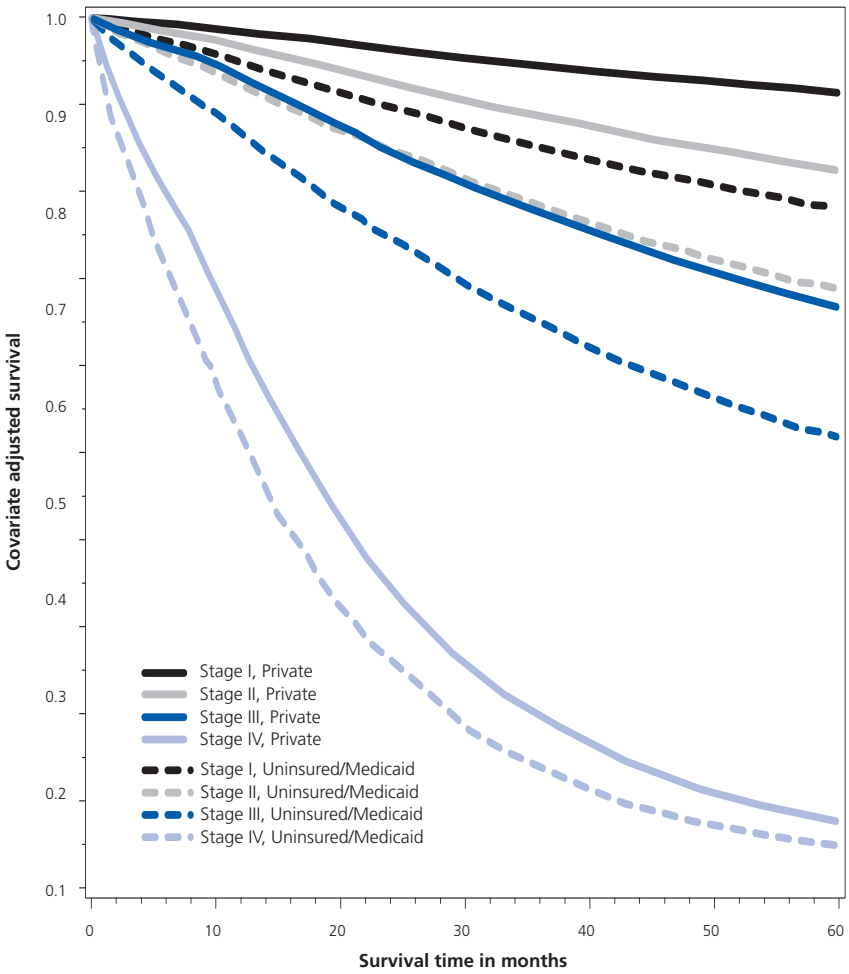
Source: National Cancer Database.

difference in predicted 5-year survival based on differences in insurance status was only 2%. Thus it does not appear likely that the large differences in survival between insurance groups are accounted for by factors other than those related to diagnosis and treatment of their cancer.

How Does Insurance Type Influence Stage at Diagnosis and Survival?

Later stage at diagnosis for cervical, breast, colorectal, and prostate cancer among patients who are uninsured or who have Medicaid insurance can be explained in part by lower access to and/or use of cancer screening services. Analyses of NHIS 2005 data presented in this report, as well as prior studies, found that screening rates were substantially lower among uninsured than among privately insured individuals, and that Medicaid-insured patients consistently had screening rates that were lower than those for the privately insured but substantially higher than those for the uninsured. Later stage at diagnosis may also be associated with lack of follow up or delay in follow up of abnormal screening test results. A review of studies evaluating follow-up care for an abnormal cancer screening result found that less than 75% of patients received such care, and identified barriers to follow up at the provider, patient, and health care system levels.[49] Appropriate follow up of an

Figure 16. Colorectal Cancer Survival Among Patients Ages 18-64 Years by Stage and Insurance Status*



*Patients diagnosed from 1999-2000; excluded from the analysis: unknown stage; race/ethnicity other than white, black, or Hispanic; missing information on stage, age, race/ethnicity, or zip code.
Source: National Cancer Database.

abnormal screening test requires a number of critical steps where the process can break down. The primary care provider and/or patient must be informed of the abnormal result, the appropriate follow-up diagnostic evaluation must be recommended, a provider and site for the diagnostic evaluation must be identified, and the patient must make and keep the appointment. Patients without health insurance and those whose health insurance is not widely accepted face additional cost and administrative and access barriers that may be insurmountable for many.

The finding that patients with Medicaid coverage experience later stage at diagnosis than do patients with private insurance does not mean that patients who are enrolled in Medicaid are not benefitting from being insured. Data from the NHIS found that patients enrolled in Medicaid had higher rates of mammography and colorectal cancer screening than do the uninsured. Patients coded as having Medicaid insurance in the NCDB and other cancer registries represent a mixture of those who were enrolled for a period of time before diagnoses and those who qualified for Medicaid when they were diagnosed with a serious medical condition such as cancer. There is no information on the percent of patients in each state who are enrolled in Medicaid after a cancer diagnosis. A study in Michigan found that 36% of cancer patients with Medicaid coverage were enrolled in Medicaid after being diagnosed with cancer,[40] but this proportion may vary by state or cancer site.

Patients with Medicaid insurance face additional barriers to care beyond those directly related to insurance or the health care system. Barriers such as lack of transportation, low literacy, and poor and unstable housing may also contribute to worse outcomes for Medicaid enrollees. Lack of non-emergency medical transportation to health care facilities is a frequent barrier for this population, which can cause delays in screening, diagnosis, and treatment.[50,51] Many Medicaid enrollees have difficulty with reading comprehension. One study found that Medicaid enrollees had a mean reading level of grade 5.4.[52,53] Such low literacy levels are associated with difficulty in enrollment, poor compliance due to difficulty comprehending prescriptions and other medical instructions, and low use of preventive services. In addition, Medicaid enrollees are more likely to experience housing instability, a factor that has been associated with postponing needed medical care and medications.[54]

Some characteristics of the Medicaid system may reduce its apparent effectiveness in improving health outcomes. A review of the impact of health insurance coverage on health by the Institute of Medicine in 2002 noted that Medicaid-insured patients may appear to have poorer outcomes because many patients become eligible for Medicaid as a result of poor health (i.e. because their illness interferes with employment or because the cost of treatment results in them being classified as medically needy). Some programmatic features of Medicaid also

contribute to poorer access to preventive services and treatment for Medicaid-insured compared to privately insured individuals. Medicaid reimbursements are generally less than reimbursements for Medicare or private insurance. In many states, payment rates below the cost of the care delivery result in low provider participation. When this occurs, Medicaid enrollees may find themselves limited to the same set of overtaxed safety-net providers as uninsured adults, with related delays in getting appointments and referrals to specialists. Medicaid's limited coverage periods also weaken the positive effects of insurance. One study based on a federal survey found that the median length of time that adults younger than 65 maintained Medicaid enrollment was just five months;[55] Medicaid requires eligibility certifications as frequently as monthly, and some people lose coverage simply because they did not meet administrative requirements. As a consequence of the intermittency of Medicaid coverage, adults identified as covered by Medicaid at one point in time may not achieve the benefits that continuous health coverage can provide such as repeated screenings and a regular source of medical care.

Health insurance status may be associated with cancer survival through a variety of mechanisms. Later stage at diagnosis observed for Medicaid-insured and uninsured patients would lead to lower overall survival even if quality and success of treatment were equivalent to that among the privately insured. However, analyses of NCDB data for breast and colorectal cancer find that even within stage at diagnosis, survival is poorer for patients with no health insurance or with Medicaid insurance. Lower survival within cancer stage may result from a variety of factors related to access to care and quality of care, including adequacy of staging (leading to under-staging); differences in tumor size, grade, or other prognostic factors within stage groupings; delays in initiation of treatment; differences in receipt of treatment consistent with recommended guidelines; quality and outcome of specific treatments (such as completeness of surgical resection); differences in provision of supportive care; and completion of (i.e., compliance with) the full course of therapy. As noted above, other factors that may contribute to choice and completion of treatment for some individuals who are uninsured or insured by Medicaid include low literacy, lack of transportation, language barriers, and other factors not directly related to insurance or health care barriers.

Limitations of Existing Data on Insurance Status and Cancer Treatment

Data are extremely limited on the relationship between insurance status and variations in cancer treatment. These limitations are due in part to the incompleteness of treatment information in cancer registry records, which makes it difficult to study treatment patterns or concordance with treatment guidelines using registry data alone. The most commonly used data resource for studying cancer treatment is the SEER-Medicare database, which by definition includes only Medicare insured patients. Among the limited number of studies conducted, one found that insurance status and poverty level were predictors of delays of greater than three months from initial diagnosis to start of treatment among women with invasive breast cancer.[56] Overall, studies of variations in treatment among patients with breast and colorectal cancer have not found consistent variations in treatment and concordance with treatment guidelines by insurance status.[57-61] However, there is considerable variation between studies in insurance groups included and treatments evaluated. One study reported that patients who are uninsured or who have Medicaid insurance are less likely to receive surgery for lung and pancreatic cancer at high-volume facilities;[62] another found that the likelihood of initial presentation of colon cancer as a surgical emergency due to bowel perforation, peritonitis, or obstruction was 2.1 times higher among Medicaid enrollees and 2.6 times higher among uninsured patients than among privately insured patients under the age of 65.[63]

Although variations in health insurance coverage likely contribute to racial and ethnic disparities in cancer outcomes, disparities persist for several outcomes even when accounting for differences in insurance status. Racial and ethnic disparities in health and healthcare occur in the context of broader historic and contemporary social and economic inequality, including persistent racial and ethnic discrimination in many sectors of American life.[64] Even in the absence of financial barriers to care, cultural and language differences between providers and racial and ethnic minority patients may result in poor communication, undermining informed decision-making and the patient's adherence to treatment regimens. Experiences of discrimination may directly affect health and access to care, and may also reduce trust in the health care system.[55] Even if health insurance and financial barriers can be overcome, further research and interventions will be needed to address these issues.

Although there is substantial evidence that insurance status is an important factor in access to and use of cancer care, there is little information on how economic issues impact treatment choices at the level of the individual patient. For example, to what extent do individuals forego treatment or select less than optimal treatment because they are unable to find a health care provider who is willing to provide it, or because they are afraid of the level of medical debt that they would incur? As the cost of some new cancer therapies can exceed $100,000 a year, to what extent will availability and type of insurance coverage, as well as individual financial resources, determine who has access to the most effective therapies?

Overcoming Barriers to Cancer Prevention, Early Detection, and Treatment

Expanding Access to Health Care

With more than 47 million Americans uninsured,[65] it is not surprising that much of the focus in the current health care reform debate is on increasing the number of individuals with health insurance coverage and reducing the costs of coverage. While reducing the number of uninsured is critical, the issue is more complex than that. Although availability and affordability are essential, adequacy of coverage must also be addressed in order to resolve the health care crisis. Inadequate insurance, with limited benefits or high cost sharing, leaves cancer patients without access to timely, lifesaving treatment. One in five insured persons diagnosed with cancer uses all or most of their savings because of the financial cost of dealing with cancer.[66] The problems are significantly worse for those without insurance. Those who are poor and uninsured are less likely to receive cancer prevention services, more likely to be diagnosed with cancer at late stages of disease, and less likely to survive five years after diagnosis.

Defining Meaningful Health Insurance

The American Cancer Society believes meaningful reform solutions must include adequate, available, affordable, and administratively simple health insurance coverage for all without regard to health status or previous medical claims.

Society Threshold Questions for Meaningful Health Insurance Reform

- Does the proposal contain the essential components?
- Is coverage available to all?
- Is there a benefit package that ensures adequate coverage for cancer patients and others with potentially serious medical problems?
- Is the provider's coverage affordable?
- Is the administrative process simple for patients and providers?
- Does the reform plan reduce or eliminate the ability of insurers to "cherry pick" among applicants?
- Is the overall proposed financing realistic and adequate to sustain the proposed reforms?

Adequate health insurance . . .

. . . ensures timely access to the full range of evidence-based health care services – including prevention and primary care – necessary to maintain health, avoid disease, overcome acute illness, and live with chronic illness. Coverage should be comprehensive, not run out, and fully cover catastrophic expenditures.

Available health insurance . . .

. . . is accessible, renewable, portable, and continuous. It must not be based on, or constrained by, actual or perceived health status or history of health care services use.

Affordable health insurance . . .

... provides everyone the ability to purchase meaningful private health insurance based on his or her ability to pay. Premium pricing should not be based on an individual's actual or perceived health status or history of health care services utilization. Annual total out-of-pocket costs (includes co-pays and deductibles) must be reasonable.

Administratively simple health insurance . . .

. . . requires transparency and simplicity in private health insurance products, both pre- and post-enrollment. Consumers must be able to compare and contrast different health insurance plans and easily navigate health insurance transactions and transitions.

Limiting "cherry picking" means . . .

. . . limiting "market segmentation" to prevent discrimination against individuals with health risks or perceived health risks.

Insurance risks must be pooled in a manner that assures cancer patients and others with serious medical conditions can continue to have access to adequate insurance at affordable rates without undoing vital consumer protections already in place.

Adequate financing means . . .

. . . proposals that seek to broaden and improve coverage significantly are likely to require additional funding.

There are many ways to fund proposals and at this time, the American Cancer Society does not endorse one over another. However, the funding must be realistically achievable.

In addition to addressing the issues surrounding insurance, the American Cancer Society is expanding and enhancing its commitment to quality health care with several crucial efforts that are already under way.

- Offering up-to-date cancer information that helps patients easily understand their disease and enables them to effectively work with their health care provider to make treatment decisions
- Helping those diagnosed with cancer find hope and inspiration by connecting them with others who have "been there"
- Making trained patient navigators available to help people get the care they need
- Offering a Health Insurance Assistance Service to callers from many states to help cancer patients and their loved ones who are struggling with state and federal insurance issues
- Increasing funding for the National Breast and Cervical Cancer Early Detection Program, which provides low-income, uninsured, and underinsured women access to mammograms and follow-up care, regardless of their ability to pay
- Supporting legislation that will provide free or low-cost colorectal cancer screening
- Working through awareness and advocacy to eliminate disparities in the cancer burden
- Fighting any bills that threaten existing coverage requirements
- Advocating for increased federal funding of cancer research

The American Cancer Society, along with its sister advocacy organization, the American Cancer Society Cancer Action Network (ACS CAN), is dedicated to ensuring that primary care, prevention, early detection, and quality care are available to all. Effective solutions to the current crisis must address adequacy in addition to availability and affordability of health insurance.

American Cancer Society Programs

The American Cancer Society is committed to reaching out to those individuals who are under- and uninsured to help increase access to quality medical care, including cancer screening, diagnostic, and treatment services. The Society has placed increased emphasis on working with collaborators at the national, state, and local levels on outreach activities, identifying a growing number of resources to assist individuals in need, and making services and information more accessible through adapting for literacy levels and language needs.

Information

National Cancer Information Center and www.cancer.org

The American Cancer Society is dedicated to making certain everyone can access quality health information. Anyone can call toll-free 1-800-227 (ACS)-2345 and speak with a person who can offer cancer information as well as refer callers to resources in their community, including transportation, support groups, or low-cost or free screenings if they are available. Cancer information specialists answer calls in both English and Spanish, and translation services are available for callers who speak other languages. This information is also available on the American Cancer Society Web site, www.cancer.org.

Health Insurance Assistance Service

The National Cancer Information Center (NCIC) Health Insurance Assistance Service helps individuals in 27 states with questions and concerns about insurance.

Cancer Resource Network

The Society also provides the Cancer Resource Network, a network that encompasses multiple delivery channels that allow cancer patients, survivors, and caregivers to reach the Society and receive help with managing their cancer experience at every point in the cancer continuum. Materials for the Cancer Resource Network were developed specifically to reach out to the medically underserved.

Services in the Cancer Resource Network provide information on diagnosis and treatment, support programs, and assistance in identifying needed services and resources.

A number of services provided through the Cancer Resource Network help individuals navigate their health care and increase access to care. Examples include:

- The Patient Navigator Program, in which trained Society staff members, patient navigators, work with patients, families, and caregivers to identify and prioritize needs and challenges they are facing in navigating their cancer care

- Hope Lodge®, which provides free lodging to patients and caregivers who must travel away from home to obtain cancer treatment
- The Personal Health Manager, which provides newly-diagnosed cancer patients and their caregivers with a tool to help manage and organize the multitude of information they receive from various sources related to their diagnosis and treatment (written for lower literate adults – reading levels of 6-9 – and available in English and Spanish)

Prevention and Detection

The Society works nationwide and at the local level to increase awareness of the importance of lifestyle factors in cancer risk, as well as the importance of early detection screening tests.

"Team Up" is a pilot project in which the American Cancer Society, the Centers for Disease Control and Prevention, the National Cancer Institute, and the US Department of Agriculture have joined forces to determine the effectiveness of adapting and using evidence-based outreach interventions to serve rarely or never screened populations with breast and cervical cancer screening. The pilot is finishing up its fourth and final year of work in six states. As of June 2007, all six states successfully implemented the intervention and reached more than 300 underserved, rarely screened, or never screened women with cancer prevention services.

The Centers for Disease Control and Prevention National Breast and Cervical Cancer Early Detection Program (NBCCEDP) provides breast and cervical cancer screening to underserved women. The Society works with the NBCCEDP to increase awareness of and enrollment in the program where there are opportunities for more women to be screened. In many states, programs are at capacity, meaning women eligible for these services are not able to access them.

The Access to Health Care Campaign

Information regarding the issue of access to health care was created for an awareness campaign in the fall of 2007. A booklet explaining the issue and the Society's activities was made available through the NCIC. In addition, a Web site was established to allow consumers to learn about the issue, speak up through message boards, or take action through the Society's sister advocacy organization, ACS CAN.

Data Sources

Information on insurance status and relationships with access to health care, preventive services, and cancer screening was obtained by analysis of data from the National Health Interview Survey (NHIS) conducted in 2005 and 2006. The NHIS is a survey of the CDC's National Center for Health Statistics (NCHS). The survey is designed to provide national prevalence estimates on personal, socioeconomic, demographic, and health characteristics of United States adults. Data are gathered through a computer-assisted personal interview of adults aged 18 and older living in households in the US.[67]

Data from the National Cancer Database (NCDB) was used to examine the relationship between insurance status at the time of diagnosis and cancer survival for all cancers combined and for breast and colorectal cancer. The NCDB is a joint project of the Commission on Cancer of the American College of Surgeons and the American Cancer Society that collects information on demographic and clinical characteristics and first course of treatment for cancer patients diagnosed at approximately 1500 Commission on Cancer approved hospitals, representing almost 70% of all cancer patients treated in the US.[44] We selected cancer patients aged 18-64 reported to the NCDB during 1999 and 2000, the most recent years for which 5-year follow up is available. Patients were further restricted to those with private insurance, Medicaid insurance, and no insurance. Among the 719,915 patients who met these criteria, 7,886 were excluded because the time variable could not be calculated and 113,394 were excluded because they had other or unknown race (only white, black, and Hispanic patients were included) or missing area socioeconomic status data. A total of 598,635 cases were available for analysis, including 129,644 female breast cancer patients and 44,898 male and female colorectal cancer cases. Cox regression analysis (proportional hazards analysis) was used to model 5-year survival by insurance status, controlling for age, race, sex, and zip code based income. The proportional hazards assumption was tested prior to analysis and none of the variables included in the model violated the proportional hazards assumption when analyses were stratified by age group and site. Results for overall and stage-specific survival were plotted by insurance status.

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Cancer Disparities

One of the overarching themes of the American Cancer Society's 2015 challenge goals is eliminating disparities in the cancer burden between different segments of the US population. The causes of these health disparities are complex and interrelated, but likely arise from socioeconomic disparities in work, wealth, income, education, housing and overall standard of living; economic and social barriers to high-quality cancer prevention, early detection, and treatment services; and the impact of racial and ethnic discrimination on all of these factors. Recent immigrants may also have unique risk factors related to their country of origin, as well as language and cultural barriers. Biologic or inherited differences associated with race are thought to make a minor contribution to the disparate cancer burden between different racial/ethnic groups.

Racial and Ethnic Minorities

African Americans: African Americans are more likely to develop and die from cancer than any other racial or ethnic goup. The death rate for cancer among African American males is about 37% higher than among white males; for African American females, it is about 17% higher. African Americans have higher incidence and mortality rates than whites for each of the cancer sites listed on page 44 with the exception of cancers of the breast (incidence) and lung (incidence and morality) in women and kidney (mortality) in both men and women.

Hispanics: Hispanics have lower incidence rates for all cancers combined and for most common types of cancer compared to whites, but have higher rates of cancers associated with infection, such as uterine cervix, liver, and stomach. For example, incidence rates of liver cancer are twice as high in Hispanic men and women as in non-Hispanic whites.

Asian Americans and Pacific Islanders: Similar to Hispanics, Asian Americans and Pacific Islanders have lower incidence rates than whites for the most common cancer sites but have a higher incidence of many of the cancers related to infection. Specifically, as seen in the table on page 44, they have the highest incidence and deaths rates from liver and stomach cancers of all racial and ethnic groups in both men and women, with the exception of a higher death rate for stomach cancer in African American men. (For more information on cancers related to infection, see *Cancer Facts & Figures 2005* (5008.05), Special Section, available online at www.cancer.org.)

American Indians and Alaska Natives: Incidence and death rates from kidney cancer in American Indian and Alaska Native men and women are higher than in any other racial or ethnic population. Cancer rates for American Indians and Alaska Natives are based on a linkage of cancer registry data and the Indian Health Service patient database in an attempt to improve the quality of the data.

In addition to the variation in cancer burden between different racial and ethnic groups, significant disparities exist among sub-populations. For example, incidence rates for cervical cancer are almost 3 times as high in Vietnamese women as in Chinese and Japanese women, partly because the Vietnamese, in general, immigrated more recently, are poorer, and have less access to cervical cancer screening.

Overall, racial and ethnic minorities face many obstacles to receiving health care services relating to cancer prevention, early detection, and high-quality treatment. These include low income; inadequate health insurance; geographic, cultural, and language barriers; racial bias; and stereotyping. Poverty influences both the prevalence of underlying risk factors for cancer (such as tobacco use and obesity) and access to health care services. Compared with 11% of whites, 25% of African Americans, and 22% of Hispanics/Latinos live below the poverty line. Moreover, 18% of African Americans and 33% of Hispanics/Latinos are uninsured, while only 12% of whites lack health insurance. Low-income and uninsured people in particular are more likely to be diagnosed with cancer at later stages of disease, receive substandard clinical care and services, and die from cancer. Consequently, the 5-year relative survival rate for all cancers combined is lower for African Americans (57%) than it is for whites (67%).

Racial and ethnic minorities tend to receive lower quality health care than whites even when insurance status, income, age, and severity of conditions are comparable. Social inequalities, such as racial discrimination, can affect interactions between patient and physician and contribute to miscommunication or delivery of substandard care. Opportunities to reduce cancer disparities exist across the entire cancer spectrum, from primary prevention to palliative care. (For more information about cancer disparities, please see *Cancer Facts & Figures 2004*, Special Section (5008.04), available online at www.cancer.org.)

Not all cancer disparities among population groups result from inequities in health care. Cancer risks and

Cancer Incidence and Mortality Rates* by Site, Race, and Ethnicity, US, 2000-2004

Incidence	White	African American	Asian American and Pacific Islander	American Indian and Alaska Native†	Hispanic/ Latino‡§
All sites					
Males	556.7	663.7	359.9	321.2	421.3
Females	423.9	396.9	285.8	282.4	314.2
Breast (female)	132.5	118.3	89.0	69.8	89.3
Colon & rectum					
Males	60.4	72.6	49.7	42.1	47.5
Females	44.0	55.0	35.3	39.6	32.9
Kidney & renal pelvis					
Males	18.3	20.4	8.9	18.5	16.5
Females	9.1	9.7	4.3	11.5	9.1
Liver & bile duct					
Males	7.9	12.7	21.3	14.8	14.4
Females	2.9	3.8	7.9	5.5	5.7
Lung & bronchus					
Males	81.0	110.6	55.1	53.7	44.7
Females	54.6	53.7	27.7	36.7	25.2
Prostate	161.4	255.5	96.5	68.2	140.8
Stomach					
Males	10.2	17.5	18.9	16.3	16.0
Females	4.7	9.1	10.8	7.9	9.6
Uterine cervix	8.5	11.4	8.0	6.6	13.8

Mortality	White	African American	Asian American and Pacific Islander	American Indian and Alaska Native†	Hispanic/ Latino‡¶
All sites					
Males	234.7	321.8	141.7	187.9	162.2
Females	161.4	189.3	96.7	141.2	106.7
Breast (female)	25.0	33.8	12.6	16.1	16.1
Colon & rectum					
Males	22.9	32.7	15.0	20.6	17.0
Females	15.9	22.9	10.3	14.3	11.1
Kidney & renal pelvis					
Males	6.2	6.1	2.4	9.3	5.4
Females	2.8	2.8	1.1	4.3	2.3
Liver & bile duct					
Males	6.5	10.0	15.5	10.7	10.8
Females	2.8	3.9	6.7	6.4	5.0
Lung & bronchus					
Males	72.6	95.8	38.3	49.6	36.0
Females	42.1	39.8	18.5	32.7	14.6
Prostate	25.6	62.3	11.3	21.5	21.2
Stomach					
Males	5.2	11.9	10.5	9.6	9.1
Females	2.6	5.8	6.2	5.5	5.1
Uterine cervix	2.3	4.9	2.4	4.0	3.3

*Per 100,000, age adjusted to the 2000 US standard population. †Data based on Contract Health Service Delivery Areas (CHSDA), 624 counties comprising 54% of the US American Indian/Alaska Native population; for more information, please see: Espey DK, Wu XC, Swan J, et al. Annual report to the nation on the status of cancer, 1975-2004, featuring cancer in American Indians and Alaska Natives. ‡Persons of Hispanic/Latino origin may be of any race. §Data unavailable from the Alaska Native Registry and Kentucky. ¶Data unavailable from Minnesota, New Hampshire, and North Dakota.

Source: Ries LAG, Melbert D, Krapcho M, Et al (eds.). *SEER Cancer Statistics Review, 1975-2004*, National Cancer Institute, Bethesda, MD, www.seer.cancer.gov/csr/1975_2004/, 2007.

American Cancer Society, Surveillance Research, 2008

rates may also be influenced by cultural and/or inherited factors that decrease or increase risk. For example, in cultures where early marriage is encouraged, women may have a lower risk of breast cancer because they begin having children at an earlier age, which decreases breast cancer risk. Higher rates of infection-related cancers in populations that include a large number of recent immigrants may reflect exposure

in the country of origin. Individuals who maintain a vegetarian diet or don't use tobacco because of cultural or religious beliefs have a lower risk of many cancers. Genetic factors may also explain some differences in cancer incidence. For example, women from population groups with an increased frequency of mutations in the BRCA1 and BRCA2 genes, such as women of Ashkenazi Jewish descent, have an increased risk of breast and ovarian cancer. Genetic factors may also play a role in the elevated risk of prostate cancer among African American men and the incidence of more aggressive forms of breast cancer in African American women.

Socioeconomic Status

Factors associated with socioeconomic status (SES) contribute to substantial differences in cancer incidence and mortality within, as well as among, racial and ethnic groups. For example, cancer mortality rates among both black and white men with 12 or fewer years of education are more than twice those in men with higher levels of education (see table below). Similarly, death rates for each of the four major cancer sites are higher in less educated black and white men and women than in those with more years of education. No single factor (such as education or income) fully captures all of the important characteristics that may influence the association between socioeconomic status and health, but for most cancers, the risk is inversely related to socioeconomic status, regardless of which measure is used.

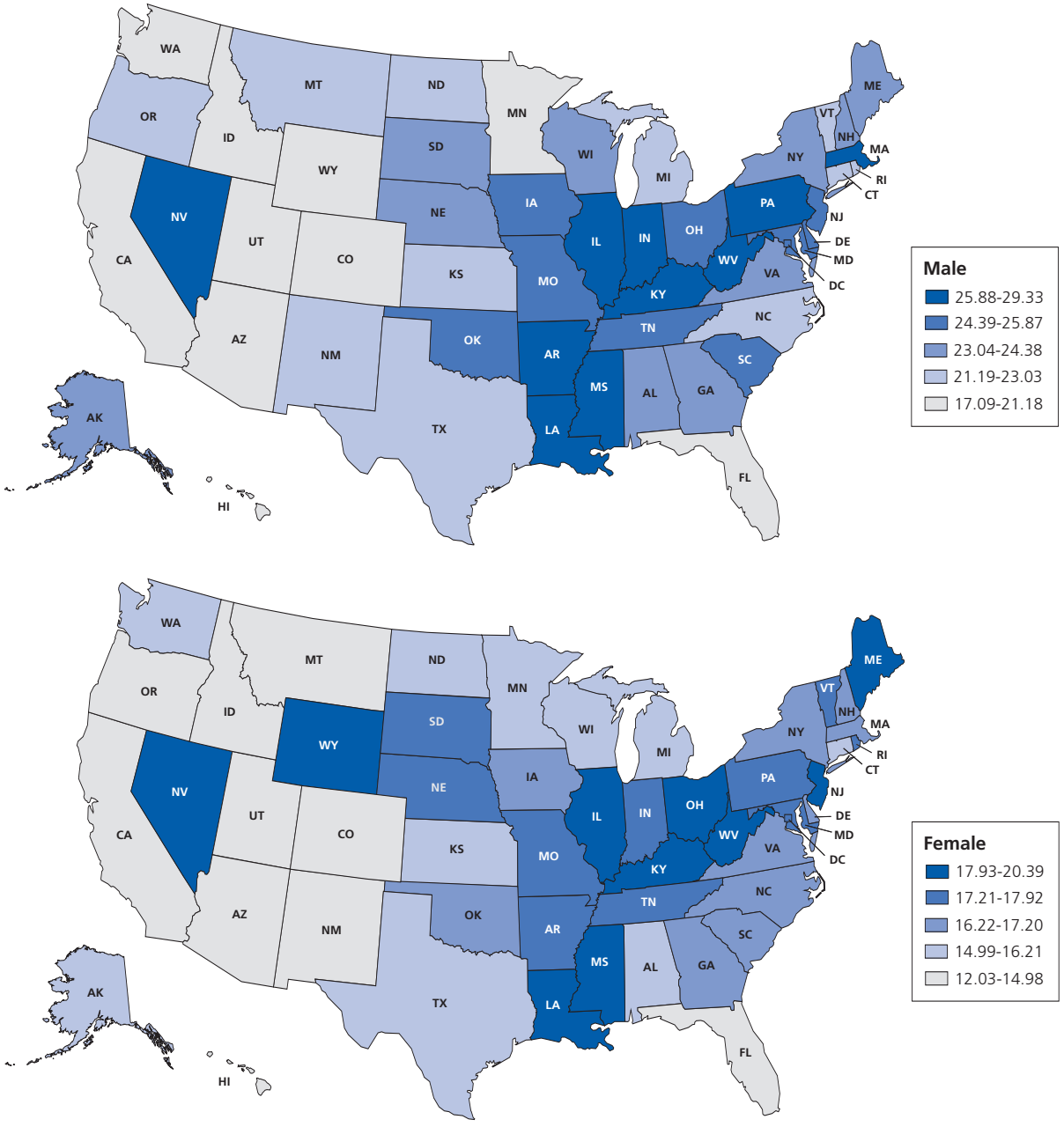
Socioeconomic status is highly correlated with cancer risk and outcomes across the continuum from prevention to palliative care. Persons with lower status are more likely to engage in behaviors that increase cancer risk, such as tobacco use and physical inactivity, in part because of marketing strategies that target these populations and in part because of environmental or community factors, such as fewer opportunities for physical activity and less access to fresh fruits and vegetables. Lower socioeconomic status is also associated with financial, structural, and personal barriers to health care, including lack of or inadequate health insurance, reduced access to recommended preventive care and treatment services, and lower literacy rates. Individuals with no health insurance and those with Medicaid insurance are more likely to be diagnosed with advanced cancer. (See special section, page 22.)

Cancer Death Rates* by Level of Education, Race, and Sex, US, 2001

	Men		Women	
	Black	**Non-Hispanic White**	**Black**	**Non-Hispanic White**
All sites				
≤12 years of education	214.4	163.8	148.1	128.8
>12 years of education	90.1	73.0	103.3	73.0
RR(95% CI)	2.38 (2.33-2.43)	2.24 (2.23-2.26)	1.43 (1.41-1.46)	1.76 (1.75-1.78)
Lung				
≤12 years of education	73.2	61.0	30.8	37.1
>12 years of education	25.8	18.1	17.9	14.2
RR (95% CI)	2.84 (2.69-3.00)	3.36 (3.30-3.43)	1.72 (1.61-1.84)	2.6 (2.53-2.67)
Colorectal				
≤12 years of education	20.6	14.2	14.1	9.4
>12 years of education	11.3	7.9	10.8	5.4
RR (95% CI)	1.81 (1.63-2.02)	1.81 (1.73-1.89)	1.31 (1.18-1.45)	1.72 (1.63-1.82)
Prostate				
≤2 years of education	10.5	3.3	–	–
> 12 years of education	4.8	2.2	–	–
RR (95% CI)	2.17 (1.82-2.58)	1.47 (1.34-1.62)	–	–
Breast				
≤12 years of education	–	–	36.1	25.2
>12 years of education	–	–	31.1	18.5
RR (95% CI)	–	–	1.16 (1.10-1.22)	1.36 (1.32-1.40)

*Rates are for individuals aged 25-64 at death, per 100,000, and age-adjusted to the 2000 US standard population.
RR=relative risk; CI=confidence interval.
Source: Albano JD, Ward E, Jemal A,et al. Cancer Mortality in the United States by Education Level and Race. JNCI.2007;99:1384-1394.
American Cancer Society, Surveillance Research, 2008

Geographic Patterns in Colorectal Cancer Death Rates*by State, US, 2000-2004



*Per 100,000, age adjusted to the 2000 US standard population.

Source: Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER* Stat Database: Mortality – All COD, Public-Use with State, Total US (1990-2004), National Cancer Institute, DCCPS, Surveillance Research Program, Cancer Statistics Branch, released April 2007. Underlying mortality data provided by NCHS (www.cdc.gov/nchs).

Geographic Variability

Cancer rates in the US vary widely by geographic area. The figure above depicts geographic variability in colorectal cancer mortality by state and sex in the US. Among both men and women, there is a 1.7 fold difference between those states with the highest and lowest colorectal cancer death rates. These differences may be related to area socioeconomic status, differences between rural and urban areas, variation in population characteristics, local differences in policies and public health initiatives, and geographic barriers to medical care.

Public Policy

While the causes of cancer disparities are multi-faceted, several policy initiatives seek to reduce cancer disparities. The National Breast and Cervical Cancer Early Detection Program, run by the Centers for Disease Control and Prevention (CDC), provides low-income, uninsured, and underinsured women community-based breast and cervical cancer screening and treatment through Medicaid. The Society and its sister advocacy organization, the American Cancer Society Cancer Action Network℠ (ACS CAN), work to maintain and increase funding for this program. Similarly, ACS CAN supports legislation to create a colorectal cancer screening and treatment program at CDC which will give uninsured and underinsured individuals access to lifesaving screenings for colorectal cancer. The program would focus on low-income, uninsured men and women, as well as those at highest risk, such as African Americans, who are more likely to die of colorectal cancer than any other racial or ethnic group. Efforts also continue to secure funding for the patient navigator demonstration program that will help patients navigate through the health care system, from screening to diagnosis and treatment, with culturally and linguistically competent providers and advocates. This program became law in 2005 but has yet to receive funding. Finally, ACS CAN seeks increased funding for the National Center on Minority Health and Health Disparities (NCMHD) at the National Institutes of Health, along with the Disparities Center at the National Cancer Institute. NCMHD is leading efforts to determine the causes and extent of cancer and other health disparities and is developing effective interventions to reduce these disparities, as well as exploring methods to facilitate delivery of those interventions. A long-term commitment of the Society is to ensure that all individuals have access to preventive cancer screenings and treatment. One consequence of inadequate access to preventive services and early detection is that diseases like cancer are more often diagnosed at later stages when the severity is likely to be greater and options for treatment, as well as the odds of survival, are decreased.

Tobacco Use

Smoking-related diseases remain the world's most preventable cause of death. Since the first US Surgeon General's report on smoking and health was published in 1964, there have been more than 12 million premature deaths attributable to smoking in the US.[1] Worldwide, about 4.8 million smoking-related premature deaths occurred in 2000 alone. The number of deaths was almost evenly divided between industrialized and developing nations, and was greater in men (80% of smoking attributable deaths) than in women. More men die from smoking in developing nations (2 million) than in industrialized nations (1.8 million).[2,3]

Health Consequences of Smoking

As many as half of all Americans who continue to smoke will die from smoking-related diseases.[4] In the US, tobacco use is responsible for nearly 1 in 5 deaths; this equaled an estimated 438,000 premature deaths each year between 1997-2001.[5,6] In addition, an estimated 8.6 million people suffer from chronic conditions related to smoking, such as chronic bronchitis, emphysema, and cardiovascular diseases.[7]

- Smoking accounts for at least 30% of all cancer deaths and 87% of lung cancer deaths.[8,9]
- The risk of developing lung cancer is about 23 times higher in male smokers and 13 times higher in female smokers compared to lifelong non-smokers.[1]
- Smoking is associated with increased risk of at least 15 types of cancer: nasopharynx, nasal cavity and paranasal sinuses, lip, oral cavity, pharynx, larynx, lung, esophagus, pancreas, uterine cervix, kidney, bladder, stomach, and acute myeloid leukemia.[1]
- Smoking is a major cause of heart disease, cerebrovascular disease, chronic bronchitis, and emphysema, and is associated with gastric ulcers.[1,9]
- The risk of lung cancer is no different in smokers of "light" or "low-tar" yield cigarettes.[10]

Reducing Tobacco Use and Exposure

A recent US Surgeon General's report outlined the goals and components of comprehensive statewide tobacco control programs.[11] The goal of comprehensive tobacco control programs is to reduce disease, disability, and death related to tobacco use by preventing the initiation of tobacco use among youth, promoting quitting among young people and adults, eliminating nonsmokers' exposure to secondhand smoke, and identifying and eliminating the disparities related to tobacco use and its effects among different population groups.[12] The Centers for Disease Control and Prevention have recommended funding guidelines for comprehensive tobacco use prevention and cessation programs for all 50 states and the District of Columbia. In 2007, only three states (Colorado, Delaware, and Maine) invested at least the minimum per capita amount recommended for tobacco control programs.[13] States that have invested in comprehensive tobacco control programs, such as California, Massachusetts, and Florida, have reduced smoking rates and saved millions of dollars in tobacco-related health care costs.[11,13] (For more information about tobacco control, please see the American Cancer Society's *Cancer Prevention and Early Detection Facts & Figures 2007*, available online at www.cancer.org.)

Trends in Smoking

- Cigarette smoking among adults aged 18 and older declined 50% from 1965-2004 from 42% to 21%. In 2005 and 2006, these rates remained unchanged at 21%. An estimated 45 million Americans currently smoke cigarettes.[14,15]
- Although cigarette smoking became prevalent among men before women, the gender gap narrowed in the mid-1980s and has since remained constant.[16] As of 2006, there was a 5% difference in smoking prevalence between white men and women, and an 8% difference between African American men and women.[15]
- Smoking prevalence generally decreases with increasing years of education. While the percentage of smokers has decreased at every level of educational attainment since 1983, college graduates had the greatest decline, from 21% to 8% in 2006. In contrast, among those with a high school diploma, prevalence decreased modestly from 34% to 27% during the same time period.[14,15]
- Annual cigarette consumption among US adults continues to decline, peaking in 1963 at 4,345 cigarettes per capita and decreasing to an estimated 1,654 in 2006 – a net reduction of 61%.[17,18]
- Although cigarette smoking among US high school students increased significantly from 1991-1997 (28% to 36%), it declined to 23% by 2005.[19-21]
- In 1997, nearly one-half (48%) of male high school students and more than one-third (36%) of female students reported using some form of tobacco – cigarettes, cigars, or smokeless tobacco – in the past month. The percentages declined to 32% for male students and to 25% for female students in 2005.[21,22]

Smokeless Tobacco Products

In response to the proliferation of smoke-free laws, tobacco companies have begun marketing smokeless tobacco products such as moist snuff, chewing tobacco, and snus (a 'spitless,' low-nitrosamine, moist powder tobacco pouch) as a supplemental source of nicotine in settings where smoking is prohibited. Use of any smokeless tobacco product, including snus, is not considered a safe substitute for quitting. In 1986, the US Surgeon General concluded that chewing tobacco and snuff are not safe substitutes for smoking cigarettes or cigars, as these products cause oral and pancreatic cancers, precancerous lesions of the mouth, gum recession, bone loss around the teeth, and tooth staining; they can also lead to nicotine addiction.[23]

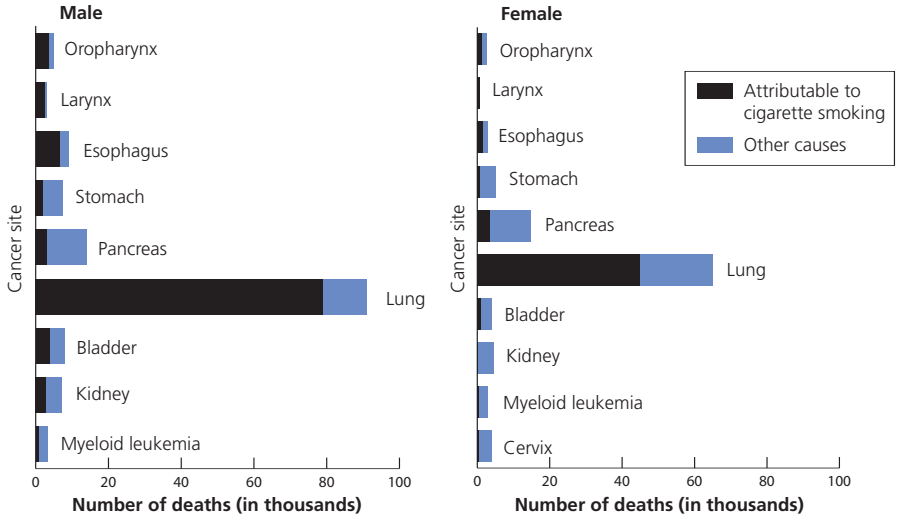
- There is no evidence that switching to snuff, chewing tobacco, or snus is more effective or as safe as conventional cessation therapies in helping smokers quit.[24] Smokers who use these products to postpone quitting will increase rather than decrease their risk of lung cancer.
- The risk of cancer of the cheek and gums may increase nearly 50-fold among long-term snuff users.[23]
- According to the US Department of Agriculture, manufactured output of moist snuff has increased more than 75% in the past decade, from 48 million pounds in 1991 to an estimated 84 million pounds in 2006.[17,18]
- When smokeless tobacco was aggressively marketed in the US in the 1970s, use of these products increased among adolescent males, not among older smokers trying to quit.[25-27] Nationwide, 14% of male high school students were currently using chewing tobacco, snuff, or dip in 2005.[21]

Cigars

Cigar smoking has health consequences similar to those of cigarette smoking and smokeless tobacco.[28]

- Regular cigar smoking is associated with an increased risk of cancers of the lung, oral cavity, larynx, esophagus, and probably pancreas. Cigar smokers have 4 to 10 times the risk of dying from laryngeal, oral, or esophageal cancer compared with nonsmokers.[28]

Annual Number of Cancer Deaths Attributable to Smoking, Males and Females, by Site, US, 1997-2001



Source: Centers for Disease Control and Prevention, Annual smoking-attributable mortality, years of potential life lost, and productivity losses – United States, 1997-2001. *MMWR Morb Mortal Wkly Rep.* 2005;54(25):625-628.

- The consumption of large cigars and cigarillos increased by an estimated 148% from 1993-2006.[18,29] An estimated 5.3 billion large cigars and cigarillos were consumed in 2006.[18] Manufactured output of small cigars increased from 1.5 billion cigars in 1997 to an estimated 5.1 billion in 2006.[18]
- In 2005, 6% of adults aged 18 and older had smoked cigars in the past month. American Indian/Alaska Natives (11%) had the highest prevalence of past month cigar use, followed by African Americans (7%), whites (6%), Hispanics (5%), and Asians (2%).[30]
- In 2005, 14% of US high school students had smoked cigars, cigarillos, or little cigars at least once in the past 30 days.[21]

In 2001, seven major cigar manufacturers began to provide five rotating health warnings on labels of cigars sold in the US. The companies agreed to the warnings in June 2000 to settle a lawsuit brought by the Federal Trade Commission for failure to warn consumers of the dangers of cigar smoking.[31]

Smoking Cessation

In 1990, the US Surgeon General outlined the benefits of smoking cessation:[32]

- People who quit, regardless of age, live longer than people who continue to smoke.
- Smokers who quit before age 50 cut their risk of dying in the next 15 years in half, compared with those who continue to smoke.

- Quitting smoking substantially decreases the risk of lung, laryngeal, esophageal, oral, pancreatic, bladder, and cervical cancers.
- Quitting lowers the risk for other major diseases, including heart disease and stroke.

Among adults aged 18 and older in 2006, national or state data showed:[15,33]

- An estimated 45.7 million adults were former smokers, representing 50.2% of persons who ever smoked.
- Among those who smoked, an estimated 19.9 million (or 44.2%) had stopped smoking at least one day during the preceding 12 months because they were trying to quit.[15]
- In 34 states, Puerto Rico, and the US Virgin Islands, the majority of adults (50% or more) who ever smoked have now quit smoking.[33]
- In 2005, among high school students who were current cigarette smokers, national data showed that more than one-half (54.6%) had tried to quit smoking cigarettes during the 12 months preceding the survey; female students (60.3%) were more likely to have made a quit attempt than male students (48.9%).[21]

Secondhand Smoke

Secondhand smoke (SHS) contains numerous human carcinogens for which there is no safe level of exposure. It is estimated that more than 126 million nonsmoking Americans are exposed to SHS in homes, vehicles, workplaces, and public places.[34] Numerous scientific consensus groups have reviewed data on the health effects of SHS.[34-39] In 2006, the US Surgeon General published a comprehensive report entitled *The Health Consequences of Involuntary Exposure to Tobacco Smoke*.[34] Public policies to protect people from SHS are based on the following detrimental effects:

- SHS contains more than 4,000 substances, more than 50 of which are known or suspected to cause cancer in humans and animals, and many of which are strong irritants.[36]
- Each year, about 3,000 nonsmoking adults die of lung cancer as a result of breathing SHS.[6]
- SHS causes an estimated 35,000 deaths from heart disease in people who are not current smokers.[6]
- SHS may cause coughing, wheezing, chest tightness, and reduced lung function in adult nonsmokers.[34]
- Exposure to SHS causes an estimated 150,000 to 300,000 lower respiratory tract infections (i.e., pneumonia and bronchitis) each year in US infants and children younger than 18 months of age. These infections result in 7,500 to 15,000 hospitalizations annually.[36]
- SHS increases the number and severity of asthma attacks in about 200,000 to 1 million asthmatic children.[36]
- Some studies report an association between SHS exposure and increased risk of breast cancer. According to the US Surgeon General's report, the evidence on the link between SHS and breast cancer is suggestive but not sufficient to infer a causal relationship.[34] While more research is necessary to resolve this issue, women should be aware of the possible link between SHS exposure and breast cancer, as it is yet another reason to avoid contact with SHS.

Implementing policies that establish smoke-free environments is the most effective approach to prevent exposure and harm from SHS. Momentum to regulate public smoking began to increase in 1990. Government and private business policies that limit smoking in public workplaces have become increasingly common and restrictive.[40]

- Exposure to SHS among non-smokers, as measured by detectable levels of cotinine (a metabolite of nicotine), declined from 88% in 1988-2001 to 43% in 2001-2002.[41]
- Presently in the US, more than 2,650 municipalities have passed smoke-free legislation and 28 states (Arizona, California, Colorado, Connecticut, Delaware, Florida, Hawaii, Idaho, Illinois, Louisiana, Maine, Maryland, Massachusetts, Minnesota, Montana, Nevada, New Hampshire, New Mexico, New Jersey, New York, North Dakota, Ohio, Oregon, Rhode Island, South Dakota, Utah, Vermont, and Washington), the District of Columbia, and Puerto Rico have either implemented or enacted statewide smoking bans that prohibit smoking in workplaces and/or restaurants and/or bars.[42]
- Currently, approximately 59% of the US population is covered by a smoke-free policy or provision in workplaces and/or restaurants and/or bars.[42]
- Nationally, coverage of all indoor workers by smoke-free policies increased substantially from 1993 to 2002; 71% of workers were covered in 2002, compared to 47% in 1993.[34]
- Workplace smoking restrictions vary by occupation: in 2002, more than 77% of employees in an office environment reported working under a smoke-free policy, compared to 60% of service occupation workers.[34]

Worldwide Tobacco Use

While the prevalence of smoking has been slowly declining in the US and many other high-income countries over the past 25 years, smoking prevalence rates have been increasing in many low- and middle-income nations where about 85% of the world population resides.

- Developing countries consume an increasing proportion of the world's tobacco. By 2010, developing countries are projected to consume 71% of the world's tobacco. About 80% of the projected increase will occur in East Asia, particularly China.[43]
- In 2003, the number of smokers in the world was estimated at about 1.3 billion (more than 1 billion men and 250 million women). This figure is expected to rise to at least 1.7 billion (1.2 billion men and 500 million women) by 2025, with the doubling in the number of female smokers making the greatest contribution to the increase.[2,44]
- Female smoking prevalence rates have peaked and are decreasing in a handful of economically developed countries, such as Australia, Canada, the United Kingdom, and the United States. However, in most countries female smoking rates are still increasing or show no evidence of decline.[45] Female smoking rates in both developing and developed nations are expected to converge at 20%-25% by 2030.[45,46]
- In 2000, there were about 4.8 million smoking-related premature deaths worldwide, almost evenly divided between developed (2.4 million deaths) and developing (2.4 million deaths) nations.[2,3]
- Based on current patterns, smoking-attributable diseases will kill as many as 650 million of the world's 1.3 billion smokers alive today.[47,48] Deaths from tobacco are projected to decline by 9% between 2002-2030 in high-income countries, but to double from 3.4 million to 6.8 million in low- and middle-income countries in the same time period.[49]
- In a series of surveys among youth aged 13-15 conducted in 93 countries and territories between 1999-2005, 11% of boys and 7% of girls reported smoking cigarettes, and 14% of boys and 9% of girls reported using other tobacco products.[50] In every region of the world, the ratio of male to female smoking among youth was lower than the ratio reported among adults, reflecting a global trend of increased smoking among female youth.[51]

To curtail the tobacco pandemic, the 192 Member States of the World Health Assembly unanimously adopted the first global public health treaty, the Framework Convention on Tobacco Control (FCTC) on May 21, 2003. The treaty was ratified by a requisite of 40 countries on November 30, 2004, and subsequently entered into force as a legally binding accord for all ratifying states on February 27, 2005.[52] The FCTC features specific provisions to control both the global supply and demand for tobacco, including regulation of tobacco product contents, packaging, labeling, advertising, promotion, sponsorship, taxation, smuggling, youth access, exposure to secondhand tobacco smoke, and environmental and agricultural impacts.[53] Parties to the treaty are expected to strengthen national legislation, enact effective tobacco control policies, and cooperate internationally to reduce global tobacco consumption.[54] As of August 29, 2007, 168 countries have signed the FCTC and 149 countries have ratified the treaty.[52]

Costs of Tobacco

The number of people who prematurely die or suffer illness from tobacco use results in substantial health-related economic costs to society. In the US, smoking causes 3.3 million years of potential life lost in men and 2.2 million years of potential life lost in women. Smoking, on average, reduces life expectancy by approximately 14 years.[6] In addition:

- Smoking resulted in more than $167 billion in annual health-related economic costs, including adult mortality-related productivity costs, adult medical expenditures, and medical expenditures for newborns.[6]
- Mortality-related productivity losses in the US amounted to $92 billion annually during 1997-2001, up about $10 billion from the $81.9 billion lost annually during 1995-1999.[6,55]
- Smoking-related medical costs totaled $75.5 billion in 1998 and accounted for 8% of personal health care medical expenditures. This translates to $1,623 in excess medical expenditures per adult smoker in 1999.[6]
- Smoking-attributable costs for newborns were $366 million in 1996, or $704 per maternal smoker.[55]
- Recent reviews of the cost of treating smoking attributable diseases in the US have shown that they range from 6%-14% of personal health expenditures.[56,57] In 2001, states spent an estimated $12 billion treating smoking-attributable diseases.[58]
- For each pack of cigarettes sold in 1999, $3.45 was spent on medical care due to smoking and $3.73 was lost in productivity, for a total cost to society of $7.18 per pack.[6]

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Nutrition and Physical Activity

Scientific evidence suggests that about one-third of the cancer deaths that occur in the US each year are due to nutrition and physical activity factors, including excess weight. For the majority of Americans who do not use tobacco, dietary choices and physical activity are the most important modifiable determinants of cancer risk.

Although inherited genes do influence cancer risk, heredity alone explains only a fraction of all cancers. Most of the variation in cancer risk across populations cannot currently be explained by inherited factors; behavioral factors such as cigarette smoking, certain dietary patterns, physical activity, and weight control can substantially affect the risk of developing cancer. These factors modify cancer at all phases of development.

The American Cancer Society reviews and updates its nutrition and physical activity guidelines every 5 years. The Society's most recent guidelines, published in 2006, emphasize the importance of weight control, physical activity, and dietary patterns in reducing cancer risk. Because it is clear that the social environment in which people live, work, play, and go to school is a powerful influence on diet and activity habits, the guidelines include an explicit Recommendation for Community Action to promote the availability of healthy food choices and opportunities for physical activity in schools, workplaces, and communities.

The following recommendations reflect the best nutrition and physical activity evidence available to help Americans reduce their risk not only of cancer, but also of heart disease and diabetes.

Recommendations for Individual Choices

1. Maintain a healthy weight throughout life.

- Balance caloric intake with physical activity.
- Avoid excessive weight gain throughout life.
- Achieve and maintain a healthy weight if currently overweight or obese.

In the US, overweight and obesity contribute to 14%-20% of all cancer-related mortality. Overweight and obesity are clearly associated with increased risk for developing many cancers, including cancers of the breast (in post-menopausal women), colon, endometrium, kidney, and adenocarcinoma of the esophagus. Evidence is highly suggestive that obesity also increases risk for cancers of the pancreas, gallbladder, thyroid, ovary, and cervix, as well as for myeloma, Hodgkin lymphoma, and aggressive prostate cancer. The best way to achieve a healthy body weight is to balance energy intake (food intake) with energy expenditure (metabolism and physical activity). Excess body fat can be reduced by restricting caloric intake and increasing physical activity. Caloric intake can be reduced by decreasing the size of food portions and limiting the intake of high-calorie foods (e.g., those high in fat and refined sugars such as fried foods, cookies, cakes, candy, ice cream, and soft drinks). Such foods should be replaced with more healthy vegetables and fruits, whole grains, and beans. Although knowledge about the relationship between weight loss and cancer risk is incomplete, weight loss is associated with reduced levels of circulating hormones, some of which are associated with increased cancer risk. Recent studies exploring intentional weight loss suggest that losing weight may reduce the risk of breast cancer. Therefore, individuals who are overweight should be encouraged and supported in their efforts to reduce weight.

Because overweight in youth tends to continue throughout life, efforts to establish healthy body weight patterns should begin in childhood. The increasing prevalence of overweight and obesity in pre-adolescents and adolescents may increase incidence of cancer in the future.

2. Adopt a physically active lifestyle.

- **Adults:** Engage in at least 30 minutes of moderate to vigorous physical activity, in addition to usual activities, on 5 or more days of the week. Forty-five to 60 minutes of intentional physical activity are preferable.
- **Children and adolescents:** Engage in at least 60 minutes per day of moderate to vigorous physical activity at least 5 days per week.

Scientific evidence indicates that physical activity may reduce the risk of certain cancers as well as provide other important health benefits. Regular physical activity contributes to the maintenance of a healthy body weight by balancing caloric intake with energy expenditure. Other mechanisms by which physical activity may help to prevent certain cancers may involve both direct and indirect effects. For colon cancer, physical activity accelerates the movement of food through the intestine, thereby reducing the length of

time that the bowel lining is exposed to potential carcinogens. For breast cancer, vigorous physical activity may decrease the exposure of breast tissue to circulating estrogen. Physical activity may also affect cancers of the colon, breast, and other sites by improving energy metabolism and reducing circulating concentrations of insulin and related growth factors. Physical activity helps to prevent type 2 diabetes, which is associated with increased risk of cancers of the colon, pancreas, and possibly other sites. The benefits of physical activity go far beyond reducing the risk of cancer. They include reducing the risk of heart disease, high blood pressure, diabetes, osteoporosis, falls, stress, and depression.

3. Consume a healthy diet with an emphasis on plant sources.

- Choose foods and beverages in amounts that help achieve and maintain a healthy weight.
- Eat 5 or more servings of a variety of vegetables and fruits each day.
- Choose whole grains in preference to processed (refined) grains.
- Limit consumption of processed and red meats.

There is strong scientific evidence that healthy dietary patterns, in combination with regular physical activity, are needed to maintain a healthy body weight and to reduce cancer risk. Many epidemiologic studies have shown that populations that eat diets high in vegetables and fruits and low in animal fat, meat, and/or calories have reduced risk of some of the most common cancers. The scientific study of nutrition and cancer is highly complex, and many important questions remain unanswered. It is not presently clear how single nutrients, combinations of nutrients, overnutrition and energy imbalance, or the amount and distribution of body fat at particular stages of life affect one's risk of specific cancers. Until more is known about the specific components of diet that influence cancer risk, the best advice is to consume wholesome foods following an overall healthy dietary pattern as outlined, with special emphasis placed on controlling total caloric intake to help achieve and maintain a healthy weight.

4. If you drink alcoholic beverages, limit consumption.

People who drink alcohol should limit their intake to no more than 2 drinks per day for men and 1 drink per day for women. Alcohol consumption is an established cause of cancers of the mouth, pharynx, larynx, esophagus, liver, and breast. For each of these cancers, risk increases substantially with intake of more than 2 drinks per day. Regular consumption of even a few drinks per week has been associated with an increased risk of breast cancer in women. The mechanism for how alcohol can affect breast cancer is not known with certainty, but it may be due to alcohol-induced increases in circulating estrogen or other hormones in the blood, reduction of folic acid levels, or a direct effect of alcohol or its metabolites on breast tissue. Alcohol consumption combined with tobacco use increases the risk of cancers of the mouth, larynx, and esophagus far more than either drinking or smoking alone.

The American Cancer Society Recommendation for Community Action

Because the Society recognizes that individual choices about diet and physical activity are strongly affected by the surrounding environment, the guidelines include an explicit Recommendation for Community Action. Public, private, and community organizations should work to create social and physical environments that support the adoption and maintenance of healthy nutrition and physical activity behaviors.

- Increase access to healthy foods in schools, workplaces, and communities.
- Provide safe, enjoyable, and accessible environments for physical activity in schools and for transportation and recreation in communities.

Achieving this recommendation will require multiple strategies and bold action, ranging from the implementation of community and workplace health promotion programs to policies that affect community planning, transportation, school-based physical education, and food services. The tobacco control experience has shown that policy and environmental changes at the national, state, and local levels are critical to achieving changes in individual behavior. Measures such as clean indoor air laws and increases in cigarette excise taxes are highly effective in deterring tobacco use. To avert an epidemic of obesity-related disease, similar purposeful changes in public policy and in the community environment will be required to help individuals maintain a healthy body weight and remain physically active throughout life.

Environmental Cancer Risks

Two major classes of factors influence the incidence of cancer: hereditary factors and acquired (environmental) factors. Hereditary factors come from our parents and cannot be modified. Environmental factors are potentially modifiable. They include tobacco use, poor nutrition, inactivity, obesity, certain infectious agents, certain medical treatments, sunlight, cancer-causing agents that occur naturally in food, cancer-causing agents in the workplace, and cancer-causing agents that exist as pollutants in our air, water, and soil.

Environmental (as opposed to hereditary) factors account for an estimated 75%-80% of cancer cases and deaths in the US. Exposure to carcinogenic agents in occupational, community, and other settings is thought to account for a relatively small percentage of cancer deaths, about 4% from occupational exposures and 2% from environmental pollutants (man-made and naturally occurring). Although the estimated percentage of cancers related to occupational and environmental carcinogens is small compared to the cancer burden from tobacco smoking (30%) and the combination of nutrition, physical activity, and obesity (35%), the relationship between such agents and cancer is important for several reasons.

First, even a small percentage of cancers can represent many deaths: 6% of cancer deaths in the United States each year corresponds to approximately 33,600 deaths. Second, the burden of exposure to occupational and environmental carcinogens is borne disproportionately by lower-income workers and communities, contributing to disparities in the cancer burden across the population. Third, although much is known about the relationship between occupational and environmental exposure and cancer, some important research questions remain. These include the role of exposures to certain classes of chemicals (such as hormonally active agents) during critical periods of human development and the potential for pollutants to interact with each other, as well as with genetic and acquired factors.

How Carcinogens Are Identified

The term carcinogen refers to exposures that can increase the incidence of malignant tumors (cancer). The term can apply to a single chemical such as benzene; fibrous minerals such as asbestos; metals and physical agents such as x-rays or ultraviolet light; or exposures linked to specific occupations or industries (e.g., nickel refining). Carcinogens are usually identified on the basis of epidemiological studies or by testing in animals. Studies of occupational groups (cohorts) have played an important role in understanding many chemical carcinogens – as well as radiation – because exposures are often higher among workers, who can be followed for long periods of time. Some information has also come from studies of persons exposed to carcinogens during medical treatments (such as radiation and estrogen), as well as from studies conducted among individuals who experienced large, short-term exposure to a chemical or physical agent due to an accidental or intentional release (such as survivors of the atomic bomb explosions of Hiroshima and Nagasaki).

Studies have been done to examine the relationship between exposure to potentially carcinogenic substances in the general population and cancer risk, but such studies are much more difficult, often because of uncertainties about exposure and the challenge of long-term follow-up. Moreover, relying upon epidemiological information to determine cancer risk does not fulfill the public health goal of prevention, since by the time the increased risk is detected, a large number of people may have been exposed. Thus, for the past 40 years, the US and many other countries have developed methods for identifying carcinogens through animal testing using the "gold standard" of a 2-year or lifetime bioassay in rodents. This test is expensive and time-consuming, but it can provide information about potential carcinogens so that human exposure can be reduced or eliminated.

Many substances that are carcinogenic in rodent bioassays have not been adequately studied in humans, usually because an acceptable study population has not been identified. Among the substances that have proven carcinogenic in humans, all have shown positive results when tested in well-conducted 2-year bioassays.[1] Moreover, between 25%-30% of established human carcinogens were first identified through animal bioassays. Since animal tests necessarily use high-dose exposures, human risk assessment usually requires extrapolation of the exposure-response relationship observed in rodent bioassays to predict effects in humans at lower doses. Typically, regulatory agencies in the US and abroad have adopted the default assumption that no threshold level (level below which there is no increase in risk) of exposure exists for carcinogenesis.

Evaluation of Carcinogens

The National Toxicology Program (NTP) plays an important role in the identification and evaluation of carcinogens in the US, and the International Agency for Research on Cancer (IARC) plays a similar role internationally. The National Toxicology Program was established in 1978 to coordinate toxicology testing programs within the federal government, including tests for carcinogenicity.

The NTP is also responsible for producing the Report on Carcinogens, an informational scientific and public health document that identifies agents, substances, mixtures, or exposure circumstances that may increase the risk of developing cancer.[2] For a list of substances listed in the *11th Report on Carcinogens* as known or reasonably anticipated to be human carcinogens, see http://ntp.niehs.nih.gov/ntp/roc/toc11.html.

The IARC is a branch of the World Health Organization that regularly convenes scientific consensus groups to evaluate potential carcinogens. After reviewing published data from laboratory, animal, and human research, these committees reach consensus about whether the evidence should be designated "sufficient," "limited," or "inadequate" to conclude that the substance is a carcinogen. For a list of substances that have been reviewed by the IARC monograph program, visit www-cie.iarc.fr/. The American Cancer Society does not have a formal program to review and evaluate carcinogens. However, information on selected topics can be found at www.cancer.org.

Although the relatively small risks associated with low-level exposure to carcinogens in air, food, or water are difficult to detect in epidemiological studies, scientific and regulatory bodies throughout the world have accepted the principle that it is reasonable and prudent to reduce human exposure to substances shown to be carcinogenic at higher levels of exposure.

Although much public concern about the influence of man-made pesticides and industrial chemicals has focused on cancer, pollution may adversely affect the health of humans and ecosystems in many other ways. Research to understand the short- and long-term impact of environmental pollutants on a broad range of outcomes, as well as regulatory actions to reduce exposure to recognized hazards, has contributed to the protection of the public and the preservation of the environment for future generations. It is important that this progress be recognized and sustained.

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The International Fight Against Cancer

The ultimate mission of the American Cancer Society is to eliminate cancer as a major health problem. Because cancer knows no boundaries, this mission extends around the world. Better prevention, early detection, and advances in treatment have helped some developed nations lower incidence and mortality rates for certain cancers, but in most parts of the world cancer, is a growing problem. Cancer killed 7.6 million people around the world in 2007, and this figure is expected to rise to 17.5 million by 2050 simply due to the growth and aging of the population.

Today, most cancers are linked to a few controllable factors – tobacco use, poor diet, lack of exercise, and infectious diseases. Tobacco use is the number one cause of cancer and the number one cause of preventable death throughout the world. If current trends continue, 650 million people alive today will eventually die of tobacco-related diseases, including cancers of the lung, esophagus, and bladder. In the developed world, poor diets, inadequate physical activity, and obesity are second only to tobacco as causes of cancer. As these unhealthy lifestyle behaviors spread to other parts of the world, cancers of the colon, breast, and prostate are rising to levels now seen in industrialized countries. At the same time, cancers linked to infectious agents – including cervix, stomach, and liver cancers – remain a serious threat throughout the developing world.

Although the vast majority of these deaths could be avoided with the implementation of widespread programs in prevention, early detection, and access to effective treatment, the resources necessary to achieve this are not available in developing countries.

The American Cancer Society addresses the global cancer burden through three key initiatives aimed at building effective, sustainable programs in cancer control in low- and middle-income countries: American Cancer Society University, International Relay For Life®, and the International Partners Program.

The American Cancer Society also collaborates with other cancer-related organizations worldwide in the global fight against cancer, especially in the developing world, where survival rates are low and resources are limited. Its international mission includes:

- Capacity building for cancer organizations
- Tobacco control
- Information exchange and delivery
- Cancer research

Working with key partners such as the International Union Against Cancer (UICC), the World Health Organization (WHO), and the International Network for Cancer Treatment and Research (INCTR), the American Cancer Society is expanding its efforts to address the rising cancer burden throughout the world.

The American Cancer Society

In 1913, 10 physicians and 5 laypeople founded the American Society for the Control of Cancer. Its stated purpose was to disseminate knowledge about cancer symptoms, treatment, and prevention; to investigate conditions under which cancer was found; and to compile cancer statistics. Later renamed the American Cancer Society, Inc., the organization now includes more than 3 million volunteers working together to conquer cancer. Since its inception nearly a century ago, the American Cancer Society has made significant contributions to progress against cancer in the US. The Society's work in cancer research, education, advocacy, and service has yielded remarkable strides in cancer prevention, early detection, treatment, and patient quality of life. As a result, overall cancer mortality has steadily declined since the early 1990s, and the 5-year survival rate is now 66%, up from 50% in the 1970s. Today, more than ever, our goal of eliminating cancer as a major public health threat is within reach.

How the American Cancer Society Is Organized

The American Cancer Society consists of a National Home Office with 13 chartered Divisions and a local presence in nearly every community nationwide.

The National Society

A National Assembly of volunteer representatives from each Division approves Division charters and elects a national volunteer Board of Directors. The Board of Directors sets and approves strategic goals for the Society, ensures management accountability, and provides stewardship of donated funds. The National Home Office is responsible for overall planning and coordination of the Society's programs, provides technical support and materials to Divisions and local offices, and administers the Society's research program.

American Cancer Society Divisions

The Society's 13 Divisions are responsible for program delivery and fundraising in their regions. They are governed by Division Boards of Directors composed of both medical and lay volunteers in their regions.

Local offices

More than 3,400 local offices nationwide raise funds at the community level and deliver cancer prevention, early detection, and patient service programs.

Volunteers

More than 3 million volunteers carry out the Society's work in communities across the country. These dedicated people donate their time and talents to further cancer research; educate the public about early detection and prevention; advocate for responsible

cancer legislation at the local, state, and federal levels; serve cancer patients and their families; and raise funds for the fight against cancer.

How the American Cancer Society Fights Cancer

The Society has set challenge goals for 2015 to dramatically decrease cancer incidence and mortality rates while increasing the quality of life for all cancer survivors. The Society is uniquely qualified to make a difference in the fight against cancer by continuing its leadership position in supporting high-impact research; improving the quality of life for those affected by cancer; preventing and detecting cancer; and reaching more people, including the medically underserved, with the reliable cancer-related information they need.

Research

The aim of the American Cancer Society's research program is to determine the causes of cancer and to support efforts to prevent, detect, and cure the disease. The Society is the largest source of private, nonprofit cancer research funds in the US, second only to the federal government in total dollars spent.

In 2007, the Society spent an estimated $136 million on research and health professional training and has invested approximately $3.1 billion in cancer research since the program began in 1946. The Society's comprehensive research program consists of extramural grants, as well as intramural programs in epidemiology and surveillance research, behavioral research, and statistics and evaluation. Intramural research programs are led by the Society's own staff scientists.

Extramural Grants

The American Cancer Society's extramural grants program supports the best research in a wide range of cancer-related disciplines at about 230 US medical schools and universities. Grant applications are solicited through a nationwide competition and are subjected to a rigorous external peer review, ensuring that only the most promising research is funded. The Society usually funds investigators early in their research careers, a time when they are less likely to receive funding from the federal government. The Society's priorities focus on needs that are unmet by other funding organizations, such as the current targeted research area of cancer in the poor and medically underserved. To date, 42 Nobel Prize winners received grant support from the Society early in their careers.

Epidemiology and Surveillance Research

For more than 60 years, the Society's intramural epidemiologic research program has evaluated trends in cancer incidence, mortality, and survival. Through this program, the Society publishes the most current statistics and trend information in *CA: A Cancer Journal for Clinicians* (www.caonline.amcancersoc.org), as well as a variety of *Cancer Facts & Figures* publications. These publications are the most widely cited source for cancer statistics and are available in hard copy or online through the Society's Web site at www.cancer.org.

Over the years, Society researchers have conducted three large prospective studies to identify factors that cause or prevent cancer:

- Hammond-Horn Study (188,000 men followed from 1952-1955 in 9 states)
- Cancer Prevention Study I (CPS-I, 1 million people followed from 1959-1972 in 25 states)
- Cancer Prevention Study II (CPS-II, an ongoing study of 1.2 million people enrolled in 1982 in 50 states)

More than 300 scientific publications resulting from these studies have identified the contributions of lifestyle (smoking, nutrition, obesity, etc.), family history, illness, medications, and environmental exposures to various cancers. Recruitment into a new Cancer Prevention Study (CPS-3) that includes an ethnically and geographically diverse population of 500,000 adults began in 2006 and will continue through 2011.

Additional information about the Cancer Prevention Studies, including copies of questionnaires and publication citations, is available at www.cancer.org.

Since 1998, the Society has collaborated with the National Cancer Institute, the Centers for Disease Control and Prevention, the National Center for Health Statistics, and the North American Association of Central Cancer Registries to produce the *Annual Report to the Nation on the Status of Cancer*, a peer-reviewed journal article that reports current information related to cancer rates and trends in the US. More recently, the Society has become involved in a series of studies to identify inherited susceptibility genes and gene-environmental interactions that affect cancer occurrence as part of The Cohort Consortium, an international collaboration of leading cancer research groups formed by the National Cancer Institute.

Society scientists also monitor trends in cancer risk factor and screening prevalence and publish these results annually – along with Society recommendations, policy initiatives, and evidence-based programs – in *Cancer Prevention & Early Detection Facts and Figures*.

In addition, in 2007 the Surveillance Research Department collaborated with the Department of International Affairs to publish the first edition of *Global Cancer Facts & Figures*, an international companion to *Cancer Facts & Figures*.

Behavioral Research Center

The American Cancer Society was one of the first organizations to recognize the importance of behavioral and psychosocial factors in the prevention and control of cancer and to fund extramural research in this area. In 1995, the Society established the Behavioral Research Center as an intramural department. The Center's research has focused on five aspects of the cancer experience: prevention, detection and screening, treatment, survivorship, and end-of-life issues. It also focuses on special populations, including minorities, the poor, rural populations, and other underserved groups.

The Center's ongoing research projects include:

- An extensive, nationwide longitudinal study of adult cancer survivors to explore their physical and psychosocial adjustment, identify factors affecting quality of life (QOL), examine late effects, and assess changes over time and the long-term impacts of cancer.
- A large-scale, nationwide, cross-sectional study of cancer survivors who are 2, 5, and 10 years from their initial diagnosis and treatment, focusing on QOL and psychosocial functioning. This study provides immediate information on long-term survivors.
- Two studies of family caregivers that explore the impact of the family's involvement in cancer care on the quality of life of the cancer survivor and the caregiver. The first study identifies the prevalence of the family's involvement in cancer care and the unmet needs of caregivers at 2 and 5 years after diagnosis; it also examines the impact on the caregiver's quality of life and health behaviors. The second longitudinal study follows cancer patients and their caregivers from the time of diagnosis and examines the behavioral, physical, psychological, and spiritual adjustment of the patients and their family caregivers across various ethnic groups.
- Two studies of underserved populations to help reduce cancer inequalities. One study investigates patient-related, provider-related, and systemic barriers to colorectal cancer screening among patients at federally funded primary care clinics. The other examines how African Americans diagnosed with cancer have reported their symptoms in comparison with how their loved ones interpret and report the symptoms to health care providers.

The Center is also developing research projects designed to prevent and control tobacco use and research that explores individual and community-level factors affecting health behaviors among diverse cultural, racial, and socioeconomic groups.

Statistics and Evaluation Center

In August 2005, the American Cancer Society inaugurated the Statistics and Evaluation Center (SEC), a shared resource that provides consultation to investigators in the research department, health promotion experts at the National Home Office, and mission delivery staff throughout the Society. The SEC has three main responsibilities: 1) to assist Society researchers in the design, analysis, and preparation of manuscripts for publication in peer-reviewed scientific journals; 2) to function as part of the Society team that evaluates selected mission delivery interventions; and 3) to conduct methods research on cancer-related problems for publication in peer-reviewed journals. The Center's researchers engage in original research on predictive modeling for cancer control and advocacy and in developing optimal and ethical cancer study designs that minimize the required number of patients to be accrued for the study. The group also provides design and analysis support for a number of Society projects, including:

- Behavioral Research Center quality of life research
- Optimization testing and deriving best practices by Society online team and e-communications
- Tobacco control and the National Cancer Information Center/Quitline®, including clinical trials design and analysis, operational improvements, and Employer Initiative activities with Health Promotions
- Predictive modeling for Planned Giving

Education

The American Cancer Society's education efforts are aimed at informing the public and health professionals about opportunities to reduce cancer risk and increase cancer survival.

Prevention

Primary cancer prevention means taking the necessary precautions to prevent the occurrence of cancer. The Society's prevention programs focus on preventing the use of tobacco products; educating individuals, health professionals, and policymakers about the relationship between weight control, diet, physical activity, and cancer; reducing excessive sun exposure; and encouraging individuals to follow the Society's guidelines for preventive screenings for colorectal and cervical cancers, as well as vaccination against HPV to prevent cervical cancer.

The American Cancer Society collaborates with several national groups to implement comprehensive tobacco control programs. The Society's tobacco control efforts include:

- Reducing tobacco advertising and promotions directed at young people
- Increasing funding to support comprehensive tobacco control programs and tobacco-related research
- Reducing secondhand smoke exposure by supporting clean indoor air laws
- Providing access to cessation programs for people who wish to quit, including a science-based telephone counseling service
- Increasing tobacco taxes to offset the health care costs associated with tobacco use
- Supporting global partnerships to reduce tobacco-related deaths and diseases

For the majority of Americans who do not smoke, the most important ways to reduce cancer risk are to maintain a healthy weight, be physically active on a regular basis, and eat a mostly plant-based diet that limits saturated fat. The Society publishes *Guidelines on Nutrition and Physical Activity for Cancer Prevention* to review the accumulating scientific evidence on diet and cancer; to synthesize this evidence into clear, informative recommendations for the general public; to promote healthy individual behaviors, as well as environments that support healthy eating and physical activity habits; and, ultimately, to reduce cancer risk. These guidelines form the foundation for the Society's communication, worksite, school, and community strategies designed to encourage and support people in making healthy lifestyle behavior changes.

In January 2007, the *American Cancer Society Guideline for Human Papillomavirus (HPV) Vaccine Use to Prevent Cervical Cancer and Its Precursors* was published. Studies show the vaccine has the potential to prevent up to 70% of the more than 11,000 invasive cervical cancers and 3,600 cervical cancer deaths in the United States each year. Routine use of the HPV vaccine, coupled with continued screening according to American Cancer Society guidelines, has the potential to greatly reduce the occurrence of cervical cancer.

Early Detection

Finding cancer at its earliest, most treatable stage gives patients the greatest chance of survival. To help the public and health care providers make informed decisions about cancer screening, the American Cancer Society publishes a variety of early detection guidelines. These guidelines are assessed regularly to ensure that recommendations are based on the most current scientific evidence. The Society currently provides screening recommendations for cancers of the breast, cervix, colon and rectum, and endometrium; information and guidance on testing for early prostate cancer; and general recommendations for a cancer-related checkup to examine the thyroid, mouth, skin, lymph nodes, testicles, and ovaries.

Throughout its history, the American Cancer Society has implemented a number of aggressive public awareness campaigns targeting the public and health care professionals. Campaigns to increase usage of Pap testing and mammography have led to a 70% decrease in cervical cancer incidence rates since the introduction of the Pap test in the 1950s and a steady decline in breast cancer mortality rates since 1990. In the last 5 years, the Society has launched ambitious multimedia campaigns to encourage adults aged 50 and older to get tested for colon cancer. The Society also continues to encourage the early detection of breast cancer through public awareness and other efforts targeting poor and underserved communities.

Treatment

In addition to providing comprehensive information about all available cancer treatments, the Society collaborates with organizations such as the National Comprehensive Cancer Network (NCCN), an alliance of 19 of the country's leading cancer centers, to ensure that people with cancer receive the highest quality care. Through this alliance, the Society produces treatment

guidelines for cancer patients and physicians and works with the NCCN to translate *Clinical Practice Guidelines in Oncology* into easy-to-understand booklets for patients and their families. These booklets help guide cancer patients to appropriate treatment and assist them in understanding the treatment process so they become well-informed partners in their treatment.

Information Delivery

Information on every aspect of the cancer experience, from prevention to survivorship, is available to the public 24 hours a day, seven days a week, through the Society's call center (1-800-ACS-2345) and Web site (www.cancer.org). The site includes an interactive cancer resource center containing in-depth information on every major cancer type. The Society also publishes a wide variety of pamphlets and books that cover a multitude of topics, from patient education, quality-of-life, and caregiving issues to healthy living. A complete list of Society books is available online at www.cancer.org/bookstore.

The Society publishes a variety of information sources for health care providers, including three clinical journals: *Cancer*, *Cancer Cytopathology*, and *CA: A Cancer Journal for Clinicians* – as well as several cancer-related and clinical oncology books. More information about free subscriptions and online access to *CA* and *Cancer Cytopathology* articles can be found at www.cancer.org/bookstore.

The American Cancer Society also collaborates with numerous community groups, nationwide health organizations, and large employers to deliver health information and encourage Americans to adopt healthy lifestyle habits through the Society's science-based worksite programs.

Advocacy

Cancer is more than just a scientific and medical challenge – it is also a political issue. Government support for proven solutions in the fight against cancer is never guaranteed in a world of competing policy concerns. It doesn't matter how noble an individual cause might be; legislators often overlook crucial issues when faced with pressure from a variety of active constituencies. The American Cancer Society and its sister advocacy organization, the American Cancer Society Cancer Action Network℠ (ACS CAN), work in partnership to ensure that elected officials in Washington, D.C., and across the nation make the fight against cancer a top national priority.

The Society, in cooperation with ACS CAN, uses applied policy analysis, direct lobbying, grassroots action, media outreach, and litigation to accomplish its advocacy goals. A community-based grassroots network of cancer survivors and caregivers, volunteers and staff, health care professionals, public health organizations, and other partners work together to fight for policies that secure investments in research and prevention, expand access to care, and improve quality of life for cancer patients. These efforts produce policies, laws, and regulations that further the Society's and ACS CAN's joint overall mission.

Many of the challenges that cancer patients confront are the result of systemic problems not specific to cancer. The ACS CAN Federal Congressional Cancer Promise and the American Cancer Society State Cancer Promise identify policy changes and investments that should be made now as we look toward a time when more cancer patients have the opportunity to live fuller lives. Specifically, legislators are asked to make health care reform a priority; to elevate prevention, early detection, quality of life, and survivorship; to increase the nation's commitment to cancer research; and to expand access to health care.

Increasing access to health care is a significant undertaking that will require concentrated effort. Cancer patients having no insurance or inadequate insurance have higher medical costs, poorer outcomes, and higher rates of death. The Society and ACS CAN believe meaningful health insurance must include adequate, available, affordable, and administratively simple health insurance coverage for all without regard to health status or risk. Both organizations are focusing on the broader issue by educating the public and policymakers, developing policy tools to evaluate proposals, training and mobilizing grassroots activists to speak out and take action, and working with like-minded health groups and other allies.

Of course, ACS CAN is also working on the issue as part of its ongoing legislative agenda. ACS CAN, in partnership with the American Cancer Society Divisions, advocates for local, state, and federal programs and policies that ensure that all Americans, regardless of income level or insurance status, have access to lifesaving prevention, early detection, and treatment opportunities.

- ACS CAN is leading the fight to increase the federal cigarette tax and to use the revenue to expand the State Children's Health Insurance Program (SCHIP),

which provides health insurance to children in low-income families whose parents earn too much to qualify for Medicaid.

- ACS CAN was successful in enacting into law an expansion of the National Breast and Cervical Cancer Early Detection Program, which helps low-income, uninsured, and medically underserved women gain access to lifesaving breast and cervical cancer screenings and a gateway to treatment upon diagnosis.
- ACS CAN helped author federal legislation that would create a community colorectal cancer screening and treatment program modeled after the breast and cervical program.
- ACS CAN is the leader of a coalition working to secure annual funding increases for the National Cancer Institute that, at a minimum, keep pace with medical inflation to sustain past progress and continued modernization of cancer research so that more treatment options are discovered and made available.
- ACS CAN and the Society support passage and protection of laws that guarantee insurance coverage of critical cancer screenings and treatments (including clinical trials) so people can prevent cancer or catch it early, when it is more treatable.
- ACS CAN supports legislation that will waive breast and colorectal cancer screening co-pays in Medicare, extend the eligibility window for the "Welcome to Medicare" physical from six months to a year, and expand smoking cessation coverage in Medicaid.
- ACS CAN is pushing for funding for the patient navigator program to expand access to cancer and other chronic disease care in medically underserved communities.
- ACS CAN helped author legislation in Congress that will improve pain care research, education, training, and access at the federal level. At the state level, ACS CAN is behind efforts to eliminate statutory and regulatory barriers to effective management of pain and other side effects of cancer and its treatment.
- ACS CAN, working in collaboration with the Society, actively supports smoke-free workplace laws, higher cigarette taxes, and sufficient funding for tobacco prevention and cessation programs. ACS CAN is also the leading public health organization fighting for enactment of legislation that will grant the FDA the authority to regulate tobacco products and marketing. ACS CAN and the Society also advocate for more federal grants and state funding to implement comprehensive state cancer control plans.

Some efforts in the fight against cancer are more visible than others, but each successful battle makes an important contribution to what will ultimately be victory over the disease. That's why the American Cancer Society, working in concert with ACS CAN, is an unfailing presence at all levels of government when it comes to issues of concern to the cancer community.

Patient/Survivor Services

For more than 1.4 million cancer patients diagnosed this year and more than 10 million American cancer survivors, the American Cancer Society Cancer Resource Network is here to help. The Cancer Resource Network is a free resource designed to help patients understand their cancer, manage their lives through treatment and recovery, and find the emotional support they need.

24-Hour Information from the Cancer Resource Network

The American Cancer Society is available 24 hours a day, seven days a week online at www.cancer.org. Or call 1-800-227-2345 to be connected with a cancer information specialist who can help patients locate a hospital, understand their cancer and treatment options, learn what to expect and how to plan, help address insurance concerns, find financial resources, or find a local support group. We can also help those who speak a language other than English or Spanish find the help they need.

Day-to-Day Help from the Cancer Resource Network

Transportation to Treatment: The American Cancer Society can help cancer patients and their families find transportation to and from treatment facilities. In some areas, trained American Cancer Society volunteer drivers donate their time to take patients to and from their appointments.

"*tlc*"™ or Tender Loving Care®: A magazine and catalog in one, "tlc" offers helpful articles and a line of products made for women battling cancer to help restore their appearance and dignity with information and one-stop, private shopping for products that address special appearance-related needs such as wigs, hairpieces, breast forms, bras, hats, turbans, swimwear, and accessories. All proceeds from product sales go back into the American Cancer Society's programs and services for patients and survivors.

Hope Lodge: For patients whose best hope for a cure may be far from home, this nurturing, home-like environment near major cancer centers provides free housing and support for cancer patients undergoing treatment and their caregivers.

Scholarships: Fighting cancer can be an enormous financial and emotional hardship, especially on young people. In an effort to ease this burden, many American Cancer Society Divisions offer college scholarships to young cancer survivors to help them pursue higher education.

Emotional Support from the Cancer Resource Network

Reach to Recovery®: Breast cancer survivors provide one-on-one support, information, and inspiration to help individuals cope with breast cancer. Volunteer survivors are trained to respond in person or by telephone to individuals facing breast cancer diagnosis, treatment, recurrence, or recovery.

Man to Man®: This comfortable, community-based education and support program offers individual and group support and information to men with prostate cancer. Man to Man also offers men the opportunity to educate their communities about prostate cancer and to advocate with lawmakers for stronger research and treatment policies.

I Can Cope®: Educational classes for adults with cancer and their loved ones are conducted in a supportive environment by doctors, nurses, social workers, and other health care professionals. Participants gain practical knowledge and skills to help them cope with the challenges of living with cancer.

Children's Camps: In some areas, the Society sponsors camps for child cancer survivors. These camps are equipped to handle the special needs of children undergoing treatment and the needs of the cancer survivor.

Look Good…Feel Better®: A collaboration of the American Cancer Society, the Personal Care Products Council Foundation, and the National Cosmetology Association, Look Good…Feel Better is a free service that helps women in active cancer treatment learn beauty techniques to restore their self-image and cope with appearance-related side effects. Certified beauty professionals provide tips on makeup, skin care, nail care, and head coverings. Additional information and materials are available for men and teens.

Cancer Survivors Network℠: Created by and for cancer survivors and their families, this online community offers unique opportunities for people with cancer and their loved ones to find and connect with others like themselves. It's a welcoming, safe place for people to find hope and inspiration from others who have "been there."

Sources of Statistics

New cancer cases. The estimated numbers of new US cancer cases are projected using a spatiotemporal model based on incidence data from 41 states and the District of Columbia for the years 1995-2004 that met the North American Association of Central Cancer Registries' (NAACCR) high-quality data standard for incidence, which covers about 85% of the US population. This contrasts with the previous quadratic autoregressive model used to estimate cases from 1998 through 2006, which was based on incidence data from the 9 oldest SEER registries, covering about 10% of the US population. In addition to the substantial increase in population data coverage, the new method considers geographic variations in socio-demographic and lifestyle factors, medical settings, and cancer screening behaviors as predictors of incidence, as well as accounting for expected delays in case reporting. Comparisons of estimates from the new and old methods showed that estimates were generally similar for all cancers combined but differ substantially for some specific cancer sites, particularly leukemia and female breast and lung cancers. However, for the reasons listed above, the estimates from the new method are likely to be more accurate than those from the old method (see "E" in Additional Information on page 66 for details on this subject).

The methods used to estimate new US and state cases for the upcoming year can produce numbers that vary considerably from year to year, particularly for less common cancers and for smaller states. For this reason, we discourage the use of our estimates to track year-to-year changes in cancer occurrence. Incidence rates reported by SEER are generally more informative statistics to use when tracking cancer incidence trends for the US, and rates from state cancer registries are useful for tracking local trends.

Incidence rates. Incidence rates are defined as the number of people per 100,000 who are diagnosed with cancers during a given time period. State incidence rates presented in this publication are published in NAACCR's publication *Cancer Incidence in North America, 2000-2004*. Incidence rates for the US by race/ethnicity were originally published in *SEER Cancer Statistics Review (CSR), 1975-2004*. Unless otherwise indicated, incidence rates in this publication are age-adjusted to the 2000 US standard population to allow comparisons across populations that have different age distributions. Incidence trends described in this publication are based on delay-adjusted incidence rates. Delay-adjusted trends for selected cancer sites are reported in *CSR 1975-2004*. Cancer incidence rates that are not delay-adjusted may underestimate the most recent diagnosis years. Cancers most affected by reporting delays are melanoma of the skin, leukemia, and prostate, which are frequently diagnosed in non-hospital settings.

Cancer deaths. The estimated numbers of US cancer deaths are calculated by fitting the numbers of cancer deaths for 1969-2005 to a statistical model that forecasts the numbers of deaths expected to occur in 2008. The estimated numbers of cancer deaths for each state are calculated similarly, using state-level data. For both US and state estimates, data on the numbers of deaths are obtained from the National Center for Health Statistics (NCHS) at the Centers for Disease Control and Prevention (CDC).

We discourage the use of our estimates to track year-to-year changes in cancer deaths because the numbers are model-based and can vary considerably from year to year, particularly for less common cancers and for smaller states. Mortality rates reported by NCHS are generally more informative statistics to use when tracking cancer mortality trends because they are based on the actual number of deaths for the most recent year available.

Mortality rates. Mortality rates or death rates are defined as the number of people per 100,000 dying of a disease during a given year. In this publication, mortality rates are based on counts of cancer deaths compiled by NCHS for 1930-2004 and population data from the US Census Bureau. Unless otherwise indicated, death rates in this publication are age-adjusted to the 2000 US standard population to allow comparisons across populations with different age distributions. These rates should only be compared to other statistics that are age-adjusted to the US 2000 standard population.

Survival. Unless otherwise specified, 5-year relative survival rates are presented in this report for cancer patients diagnosed between 1996-2003, followed through 2004. Relative survival rates are used to adjust for normal life expectancy (and events such as death from heart disease, accidents, and diseases of old age). Relative survival is calculated by dividing the percentage of observed 5-year survival for cancer patients by the 5-year survival expected for people in the general population who are similar to the patient group with respect to age, sex, race, and calendar year of observa-

tion. Five-year survival statistics presented in this publication were originally published in *CSR 1975-2004*. In addition to 5-year survival rates, 1-year, 10-year, and 15-year survival rates are presented for selected cancer sites. These survival statistics are generated using the NCI SEER 17 database and SEER*Stat software version 6.3.5 (see "G" in Additional Information). One-year survival rates are based on cancer patients diagnosed between 2000-2003, 10-year survival rates are based on diagnoses between 1991-2003, and 15-year survival rates are based on diagnoses between 1986- 2003. All patients were followed through 2004.

Probability of developing cancer. Probabilities of developing cancer are calculated using DevCan (Probability of Developing Cancer Software) developed by the NCI. These probabilities reflect the average experience of people in the US and do not take into account individual behaviors and risk factors. For example, the estimate of 1 man in 13 developing lung cancer in a lifetime underestimates the risk for smokers and overestimates risk for nonsmokers.

Additional information. More information on the methods used to generate the statistics for this report can be found in the following publications:

A. For information on data collection and processing methods used by NCHS: www.cdc.gov/nchs/deaths.htm. Accessed October 15, 2007.

B. For information on data collection methods used by the SEER program: Ries LAG, Melbert D, Krapcho M, et al. (eds). *SEER Cancer Statistics Review, 1975-2004*. National Cancer Institute. Bethesda, MD, 2007. Available at: www.seer.cancer.gov/csr/ 1975_2004/.

C. For information on data collection methods used by the North American Association of Central Cancer Registries: Wu XC, McLaughlin CC, Lake A, et al. (eds). *Cancer in North America, 2000-2004. Volume One: Incidence*. Springfield, IL: North American Association of Central Cancer Registries, Inc. May 2007. Available at www.naaccr.org/filesystem/pdf/CINA2007.v1.incidence.pdf.

D. For information on the methods used to estimate the number of cancer deaths: Tiwari, et al. *CA Cancer J Clin*. 2004;54:30-40.

E. For information on the methods used to estimate the numbers of new cancer cases: Pickle L, Hao Y, Jemal A, et al. *CA Cancer J Clin*. 2007;57:30-42.

F. For information on the methods used to calculate the probability of developing cancer: DevCan 6.2.1. Probability of developing or dying of cancer. Statistical Research and Applications Branch, NCI, 2007. Available at: www.srab.cancer.gov/devcan/.

G. For information on the methods used to calculate relative survival rates: software – Surveillance Research Program, National Cancer Institute SEER*Stat software (www.seer.cancer.gov/seerstat) version 6.3.6; database – Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence – SEER 17 Regs Limited-Use, Nov 2006 Sub (1973-2004 varying) – Linked to County Attributes – Total US, 1969-2004 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, Cancer Statistics Branch, released April 2007, based on the November 2006 submission.

Factors That Influence Cancer Rates

Age Adjustment to the Year 2000 Standard

Epidemiologists use a statistical method called "age adjustment" to compare groups of people with different age compositions. This is especially important when examining cancer rates, since cancer is generally a disease of older people. For example, without adjusting for age, it would be inaccurate to compare the cancer rates of Florida, which has a large elderly population, to that of Alaska, which has a younger population. Without adjusting for age, it would appear that the cancer rates in Florida are much higher than Alaska. However, once the ages are adjusted, it appears their rates are similar.

Since the publication of *Cancer Facts & Figures 2003*, the Society has used the Year 2000 Standard for age adjustment. This is a change from statistics previously published by the American Cancer Society. Prior to 2003, most age-adjusted rates were standardized to the 1970 census, although some were based on the 1980 census or even the 1940 census. This change has also been adopted by federal agencies that publish statistics. The new age standard applies to data from calendar year 1999 forward. The change also requires a recalculation of age-adjusted rates for previous years to allow valid comparisons between current and past years.

The purpose of shifting to the Year 2000 Standard is to more accurately reflect contemporary incidence and mortality rates, given the aging of the US population. On average, Americans are living longer because of the decline in infectious and cardiovascular diseases. Greater longevity allows more people to reach the age when cancer and other chronic diseases become more common. Using the Year 2000 Standard in age adjustment instead of the 1970 or 1940 standards allows age-adjusted rates to be closer to the actual, unadjusted rate in the population.

The effect of changing to the Year 2000 Standard will vary from cancer to cancer, depending on the age at which a particular cancer usually occurs. For all cancers combined, the average annual age-adjusted incidence rate for 2000-2004 will increase approximately 20% when adjusted to the Year 2000, compared to the Year 1970 Standard. For cancers that occur mostly at older ages, such as colon cancer, the Year 2000 Standard will increase incidence by up to 25%, whereas for cancers such as acute lymphocytic leukemia, the new standard will decrease the incidence by about 7%. These changes are caused by the increased representation of older ages (for all cancers combined and colon cancer) or by the decreased representation of younger ages (for acute lymphocytic leukemia) in the Year 2000 Standard compared to the Year 1970 Standard.

It is important to note that in no case will the actual number of cases/deaths or age-specific rates change, only the age-standardized rates that are weighted to the different age distribution.

Change in Population Estimates

Cancer rates are also affected by changes in population estimates, which are the basis for calculating rates for new cancer cases and deaths. The Census Bureau updates and revises population estimates every year. The Bureau calculates "intercensal" estimates after a new census is completed – for example, using information from both the 1990 and 2000 censuses, the Bureau obtains better estimates for the 1990s. These revisions are based on the most recent census information and on the best available demographic data reflecting components of population change (e.g., births, deaths, net internal migration, and net international immigration). Thus, it is customary to recalculate cancer rates based on the revised population estimates. In less populated areas, such as rural counties, or in adjacent urban and suburban areas where there is substantial migration of residents from a more populous urban area to a less populous suburban one between censuses, a change in the population estimates can affect the county rate by as much as 20%. This is in contrast to large counties, where a small change in a large population estimate will not affect rates nearly as much. More information about the influence of change in population count on US cancer rates is available on the NCI Web site (www.cancer.gov/newscenter/pressreleases/ Census2000).

Screening Guidelines

For the Early Detection of Cancer in Asymptomatic People

Site	Recommendation
Breast	• Yearly mammograms are recommended starting at age 40. The age at which screening should be stopped should be individualized by considering the potential risks and benefits of screening in the context of overall health status and longevity. • Clinical breast exam should be part of a periodic health exam about every 3 years for women in their 20s and 30s and every year for women 40 and older. • Women should know how their breasts normally feel and report any breast change promptly to their health care providers. Breast self-exam is an option for women starting in their 20s. • Screening MRI is recommended for women with an approximately 20%-25% or greater lifetime risk of breast cancer, including women with a strong family history of breast or ovarian cancer and women who were treated for Hodgkin disease.
Colon & rectum	Beginning at age 50, men and women should begin screening with 1 of the examination schedules below: • A fecal occult blood test (FOBT) or fecal immunochemical test (FIT) every year • A flexible sigmoidoscopy (FSIG) every 5 years • Annual FOBT or FIT and flexible sigmoidoscopy every 5 years* • A double-contrast barium enema every 5 years • A colonoscopy every 10 years **Combined testing is preferred over either annual FOBT or FIT, or FSIG every 5 years, alone. People who are at moderate or high risk for colorectal cancer should talk with a doctor about a different testing schedule.*
Prostate	The PSA test and the digital rectal examination should be offered annually, beginning at age 50, to men who have a life expectancy of at least 10 years. Men at high risk (African American men and men with a strong family history of 1 or more first-degree relatives diagnosed with prostate cancer at an early age) should begin testing at age 45. For both men at average risk and high risk, information should be provided about what is known and what is uncertain about the benefits and limitations of early detection and treatment of prostate cancer so that they can make an informed decision about testing.
Uterus	**Cervix:** Screening should begin approximately 3 years after a woman begins having vaginal intercourse, but no later than 21 years of age. Screening should be done every year with regular Pap tests or every 2 years using liquid-based tests. At or after age 30, women who have had 3 normal test results in a row may get screened every 2 to 3 years. Alternatively, cervical cancer screening with HPV DNA testing and conventional or liquid-based cytology could be performed every 3 years. However, doctors may suggest a woman get screened more often if she has certain risk factors, such as HIV infection or a weak immune system. Women aged 70 and older who have had 3 or more consecutive normal Pap tests in the last 10 years may choose to stop cervical cancer screening. Screening after total hysterectomy (with removal of the cervix) is not necessary unless the surgery was done as a treatment for cervical cancer. **Endometrium:** The American Cancer Society recommends that at the time of menopause all women should be informed about the risks and symptoms of endometrial cancer and strongly encouraged to report any unexpected bleeding or spotting to their physicians. Annual screening for endometrial cancer with endometrial biopsy beginning at age 35 should be offered to women with or at risk for hereditary nonpolyposis colon cancer (HNPCC).
Cancer-related checkup	For individuals undergoing periodic health examinations, a cancer-related checkup should include health counseling and, depending on a person's age and gender, might include examinations for cancers of the thyroid, oral cavity, skin, lymph nodes, testes, and ovaries, as well as for some nonmalignant diseases.

American Cancer Society guidelines for early cancer detection are assessed annually in order to identify whether there is new scientific evidence sufficient to warrant a reevaluation of current recommendations. If evidence is sufficiently compelling to consider a change or clarification in a current guideline or the development of a new guideline, a formal procedure is initiated. Guidelines are formally evaluated every 5 years regardless of whether new evidence suggests a change in the existing recommendations. There are 9 steps in this procedure, and these "guidelines for guideline development" were formally established to provide a specific methodology for science and expert judgment to form the underpinnings of specific statements and recommendations from the Society. These procedures constitute a deliberate process to ensure that all Society recommendations have the same methodological and evidence-based process at their core. This process also employs a system for rating strength and consistency of evidence that is similar to that employed by the Agency for Health Care Research and Quality (AHCRQ) and the US Preventive Services Task Force (USPSTF).

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Acknowledgments

The production of this report would not have been possible without the efforts of: Rick Alteri, MD; Priti Bandi, MS; Jeanne Calle, PhD; Vilma Cokkinides, PhD, MSPH; Colleen Doyle, MS, RD; Ted Gansler, MD, MBA; Tom Glynn, PhD; Michael Halpern, MD, PhD; Yongping Hao, PhD; Patricia Hartge, ScD; Brady Hill; Eric Jacobs, PhD; Kelly Green Kahn, MPA; Wendi Klevan; Dama Laurie; Lamar McGinnis, MD; Taylor Murray; Erin Reidy, MA; Carmen Rodriguez, MD, MPH; Debbie Saslow, PhD; Christy Schmidt, MPA; Robert Smith, PhD; Kristen Sullivan, MS, MPH; Sophia Wang, PhD; Marty Weinstock, MD, PhD; and Jerome Yates, MD, MPH.

Cancer Facts & Figures is an annual publication of the American Cancer Society, Atlanta, Georgia.

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No. 500808

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