

1 • Burden of Cancer in Maryland



CHAPTER CONTRIBUTORS

CHAPTER WRITERS

Samantha Hyner, ScB

University of Maryland School of Medicine, Medical Student
rotating in the Center for Cancer Surveillance and Control,
Department of Health & Mental Hygiene

Diane Dwyer, MD

Center for Cancer Surveillance and Control,
Maryland Department of Health and Mental Hygiene

CHAPTER REVIEWER

Carolyn Poppell, MS

University of Maryland, Baltimore
Center for Cancer Surveillance and Control,
Maryland Department of Health and Mental Hygiene

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BURDEN OF CANCER IN MARYLAND

Improvements in the prevention, early detection, and treatment of many types of cancer have led to a decline in cancer incidence and death rates in Maryland and the nation.^{1,2} Despite these declines, the cancer burden in Maryland remains large when measured by human suffering, loss of life, loss of quality of life, and expenditure for medical care.

TABLE 1.1

The Ten Leading Causes of Death in Maryland, 2006

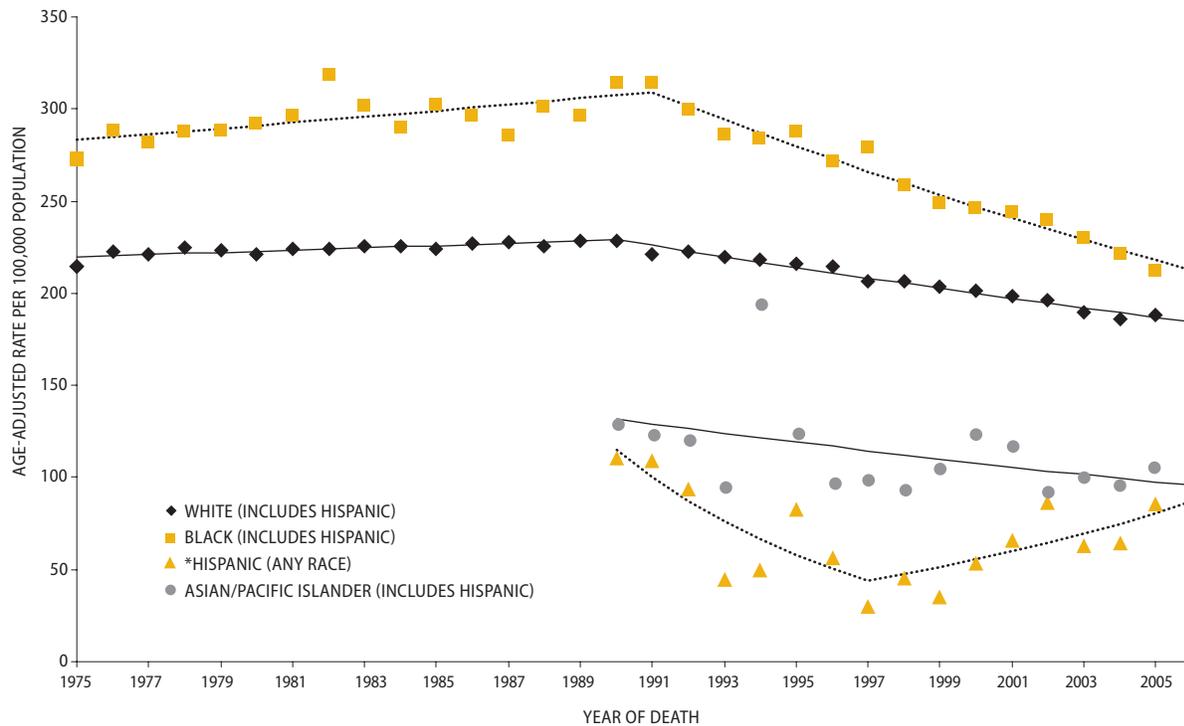
RANK*	CAUSE OF DEATH	NUMBER OF DEATHS	PERCENTAGE OF TOTAL DEATHS
	All Causes	43,491	
1	Heart Disease	11,191	25.7%
2	CANCER	10,336	23.8%
3	Cerebrovascular Disease	2,358	5.4%
4	Chronic Respiratory Disease	1,827	4.2%
5	Accidents	1,424	3.3%
6	Diabetes	1,230	2.8%
7	Influenza and Pneumonia	1,091	2.5%
7	Septicemia	964	2.2%
9	Alzheimer's Disease	908	2.1%
10	Nephritis, Nephrotic Syndrome, and Nephrosis	756	1.7%

*Ranking is based on number of deaths.

Source: Maryland Vital Statistics Annual Report, 2006.

FIGURE 1.1

Historical Trends in Cancer Mortality in Maryland for All Cancer Sites, Both Genders, and All Ages, 1975-2006



Rates are age-adjusted to the 2000 US standard population. Regression lines reflect the estimate calculated using the "Joinpoint Regression Program."
 *Data on Hispanic and non-Hispanic mortality may be unreliable for 1991-1993 and the user is cautioned against drawing conclusions from such data. This was based on the value of the Hispanic Index for these years.
 Source: State Cancer Profiles (accessed September, 2010).

THE GOALS FOR COMPREHENSIVE CANCER CONTROL are to decrease overall cancer mortality and reduce cancer disparities among ethnic minorities.

Cancer is the second leading cause of death in Maryland after heart disease, and approximately one in four deaths in Maryland is due to cancer (Table 1.1).

Demographic Trends and Cancer Burden

CANCER MORTALITY RATES IN MARYLAND have continued to decline after peaking in 1990 (Figure 1.1). Cancer mortality rates have fallen among whites, blacks or African Americans, and Asian/Pacific Islanders in Maryland. Although mortality rates from cancer remain lower, the cancer mortality rates among individuals of Hispanic or Latino ethnicity have been increasing in Maryland since 1998 at a time when the Hispanic or Latino population in the state has increased from nearly

5% of the Maryland population in 2002 to nearly 7% of the population in 2008.³

Disparities in cancer rates by race have improved; however, blacks or African Americans continue to suffer a disproportionate burden of cancer compared to whites. In 2006, the overall cancer mortality rate for blacks or African Americans in Maryland was 211.6 deaths per 100,000 population compared to a rate of 183.8 deaths per 100,000 population for whites in the state (Figure 1.1). The overall cancer mortality rate for Maryland blacks or African Americans was 15% higher than the cancer mortality rate for Maryland whites in 2006, showing improvement over the 26% rate disparity in 1999. See Chapter 3 of this cancer plan for discussion regarding cancer disparities.

The population in Maryland is continuing to age. The number of individuals ages 60 and older is expected to increase from just more than

TABLE 1.2

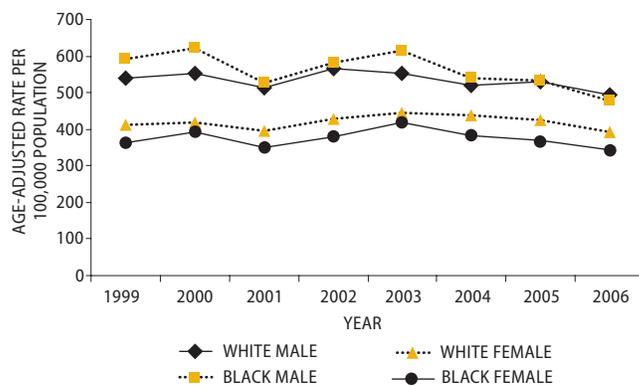
Overall Cancer Incidence and Mortality by Gender and Race in Maryland and the United States, 2006

INCIDENCE	TOTAL	MALES	FEMALES	WHITES	BLACKS	OTHER
MD New Cases (#)*	24,203	12,246	11,895	17,629	5,391	903
MD Incidence Rate*	426.3	495.6	376.9	434.3	395.7	353.1
US SEER Rate	450.5	521.9	401.0	458.1	467.3	299.7
MORTALITY	TOTAL	MALES	FEMALES	WHITES	BLACKS	OTHER
MD Deaths (#)	10,350	5,168	5,182	7,512	2,627	211
MD Mortality Rate	186.9	225.2	161.8	183.8	211.6	93.6
US Mortality Rate	180.7	220.0	153.6	179.9	217.4	108.4

Rates are per 100,000 population and are age-adjusted to the 2000 US standard population.
 Sources: Maryland Cancer Registry, 2006.
 SEER, National Cancer Institute, 2006.
 NCHS Compressed Mortality File in CDC WONDER, 1999-2006.

FIGURE 1.2

All Sites Cancer Incidence Rates by Race and Gender in Maryland, 1999-2006



Rates are per 100,000 population and are age-adjusted to the 2000 US standard population.
 Source: Maryland Cancer Registry, 1999-2006.

800,000 in 2000 to an estimated 1,220,000 in 2015.⁴ Because cancer is a disease that affects predominantly people over 50 (Figure 1.3), the number of people who are diagnosed with cancer is expected to increase in Maryland despite the age-adjusted rate of cancer falling. The total annual number of cancer cases and the number of persons living with cancer in the United States are expected to double by the year 2050.⁵ The increased number of persons living with cancer will place a growing demand on the healthcare system for more supportive, palliative, and general medical services. At the same time that the number of cancer cases is expected to rise, advances in and access to state-of-the-art cancer treatment and care are expected to lead to longer survival,

further reductions in cancer death rates, and an increase in the number of cancer survivors.⁶ A focus on the quality of life of cancer survivors will become essential.⁷ See Chapter 4 of this cancer plan for further discussion of long-term survivorship, Chapter 14 for a discussion of pain management, and Chapter 15 for information on palliative and hospice care.

Finally, the population in Maryland has become increasingly overweight and obese. In 2009, an estimated 62.9% of Maryland's population was overweight or obese.⁸ Being overweight or obese is thought to contribute to 14%-20% of all cancer-related mortality in the US.⁹ Overweight and obesity

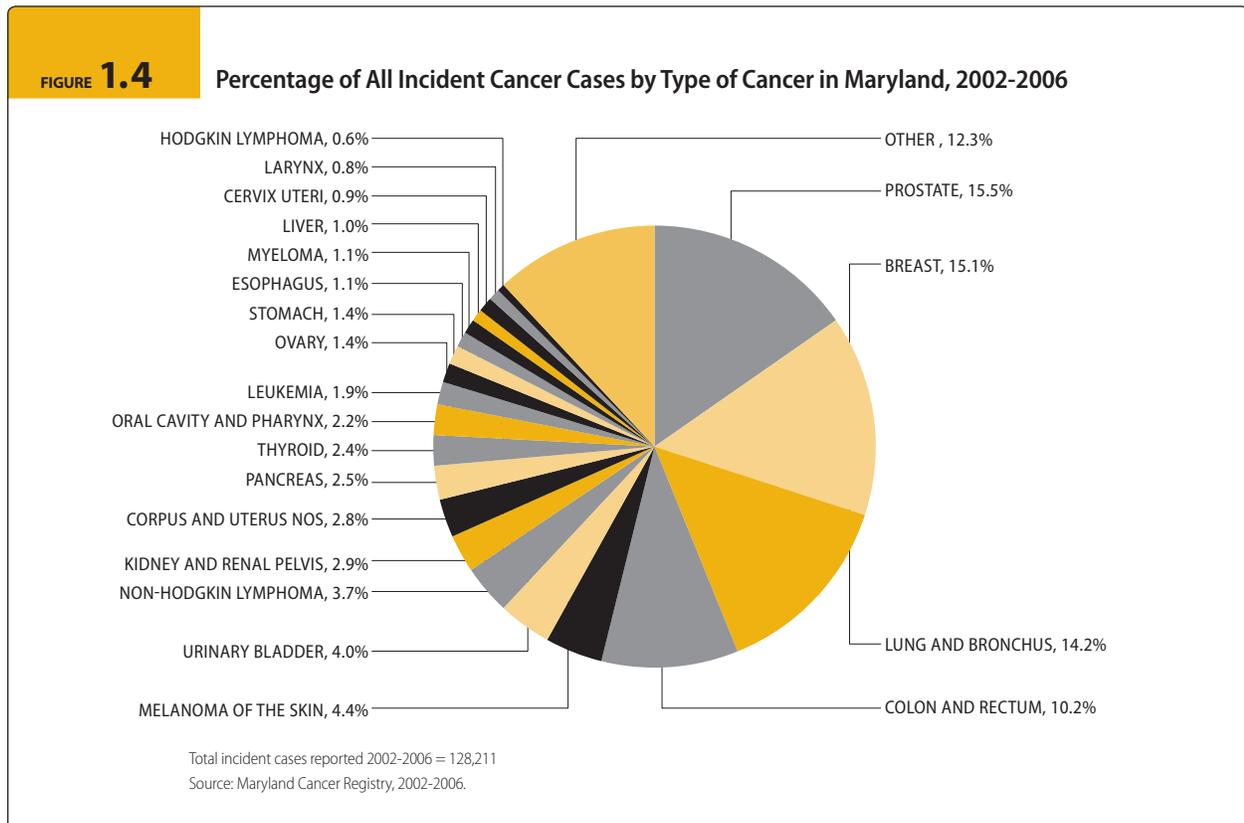
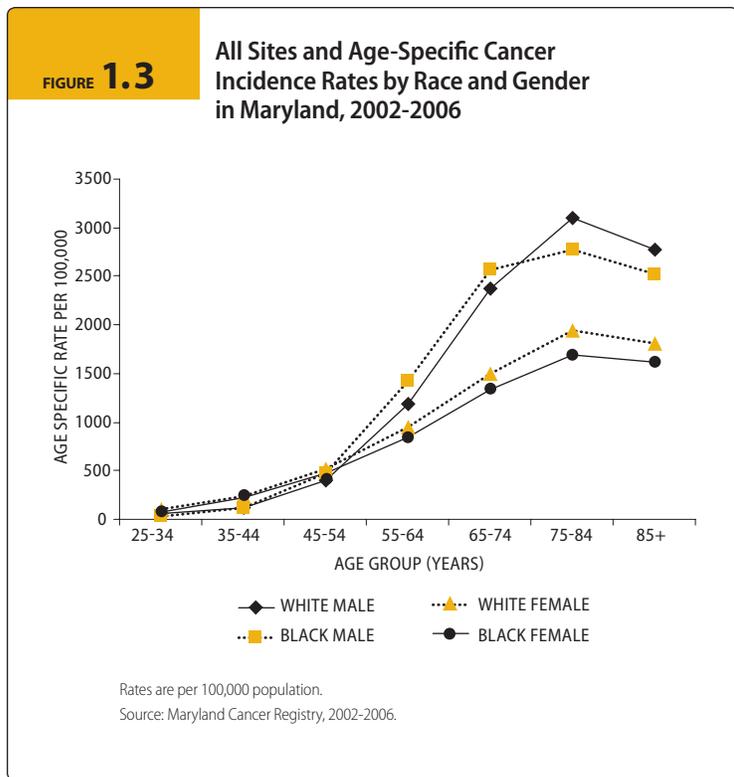
are risk factors for developing some cancers. See Chapter 6 for further discussion of nutrition, physical activity, and healthy weight.

Cancer Incidence (New Cases)

EACH YEAR more than 24,000 Marylanders are diagnosed with invasive cancer (excluding basal and squamous cell skin cancer). The 2006 age-adjusted cancer incidence rate for Maryland is 426.3 cancer cases per 100,000, which is lower than the 2006 US SEER cancer incidence rate of 450.5 (Table 1.2). The 2006 overall cancer incidence rates for men, women, blacks or African Americans, and whites in Maryland are lower than the corresponding US incidence rates.

Overall cancer incidence rates in Maryland decreased from 2002-2006.¹⁰ Total cancer incidence rates in black or African American and white men declined from 2005-2006, with the rate in black or African American men dropping slightly below the rate for white men in 2006. All sites cancer incidence rates in black or African American and white women have similarly declined from 2003-2006 (Figure 1.2).

Overall cancer incidence increases with age across all races and genders. In the US, 1 in 12 males and 1 in 11 females ages 40 to 59 will develop cancer, compared to 1 in 6 men and 1 in 10 women ages 60 to 69, and 1 in 3 men and 1 in 4 women ages 70 and older.¹¹ In Maryland, cancer incidence rates are higher in males than in females at ages 55 and older (Figure 1.3).



Black or African American males have the highest incidence rate among those ages 55 to 74, while white males have the highest rate among those ages 75 or older.

CANCER IS NOT A SINGLE DISEASE; there are more than 100 different types of cancer that are classified according to the organ or tissue that is the site of the tumor and the type of cells that have become cancerous. The most commonly diagnosed cancers among Marylanders are prostate (15.5%), breast (15.1%), lung and bronchus (14.2%), and colon and rectum (10.2%) cancers. Combined, these cancers comprise 55.0% of all cancers diagnosed (Figure 1.4). Among Maryland men, cancers of the prostate, lung and bronchus, and colon and rectum comprise 55.4% of all newly diagnosed cancers. Among Maryland women, cancers of the breast, lung and bronchus, and colon and rectum comprise 54.4% of all newly diagnosed cancer cases (Figure 1.5).

The most common sites of cancer vary by age. Among all persons in the US ages 20 to 49, the most commonly diagnosed cancers from 1999 to 2005 were breast cancer, melanoma, colorectal cancer, thyroid cancer, and cancers of the lung and bronchus. Among persons ages 50 and older, cancers of the prostate, lung and bronchus, breast, and colon and rectum were the most frequently occurring cancers.¹² Cancer in children is discussed later in this chapter.

TABLE 1.3

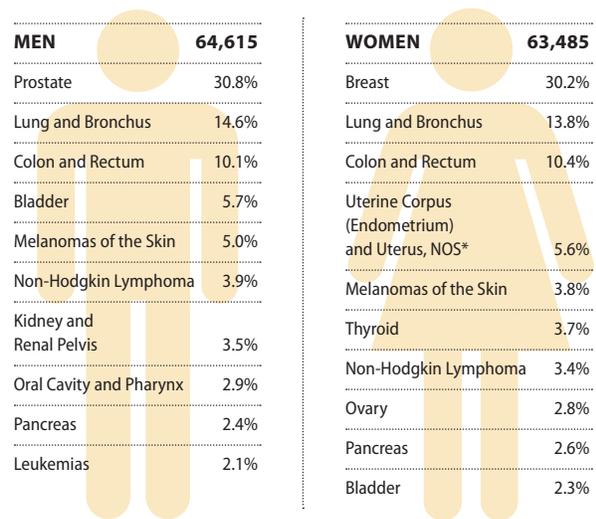
Leading Causes of Death by Age in Maryland, 2006

AGE	CAUSE OF DEATH	NUMBER OF DEATHS	PERCENTAGE OF DEATHS
1-4 years	Accidents	20	25.0%
	Congenital Abnormalities	12	15.0%
5-14 years	Accidents	33	31.1%
	CANCER	12	11.3%
15-24 years	Accidents	207	29.5%
	Assault	199	28.3%
	Suicide	70	10.0%
25-44 years	CANCER	352	13.3%
	Diseases of the Heart	343	12.9%
	Accidents	329	12.4%
45-64 years	CANCER	2,955	32.9%
	Diseases of the Heart	2,063	23.0%
	Cerebrovascular Disease	323	3.6%
65 years and older	Diseases of the Heart	8,751	28.8%
	CANCER	6,978	23.0%
	Cerebrovascular Disease	1,964	6.5%

Source: Maryland Vital Statistics Annual Report, 2006.

FIGURE 1.5

Ten Leading Cancer Incident Sites by Gender in Maryland, 2002-2006



*NOS is defined as Not Otherwise Specified
Source: Maryland Cancer Registry, 2002-2006

Cancer Mortality (Deaths)

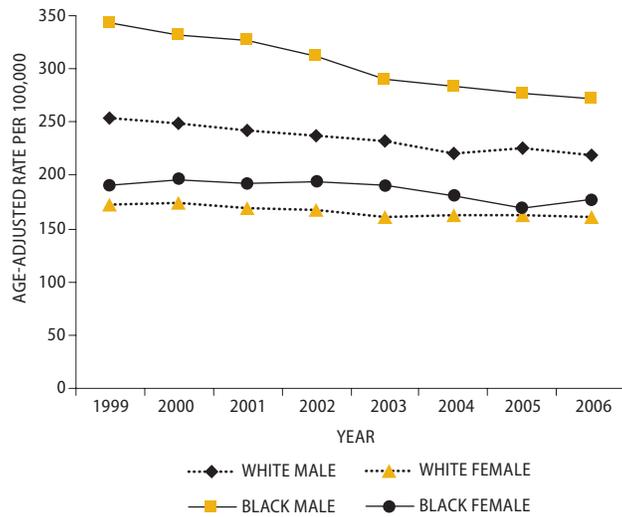
MORE THAN 10,000 MARYLANDERS die from cancer each year. Maryland's age-adjusted overall cancer mortality rate of 186.9 deaths per 100,000 in 2006 was higher than the 2006 US cancer mortality rate of 180.7 (Table 1.2).

Maryland's rank in overall cancer mortality has been steadily improving compared to other states and the District of Columbia. For the time period 1986-1990, Maryland had the third highest cancer mortality rate in the nation. This rate decreased over the following ten years and Maryland had the 11th highest cancer mortality rate for 1996-2000. For the time period 2002-2006 Maryland dropped to having the 20th highest cancer mortality rate in the nation.¹³

Overall cancer mortality rates in Maryland are higher in males than females, with black or African American males having higher overall cancer mortality rates than white males, and black or African American females having higher overall cancer mortality rates than white females (Figure 1.6).

FIGURE 1.6

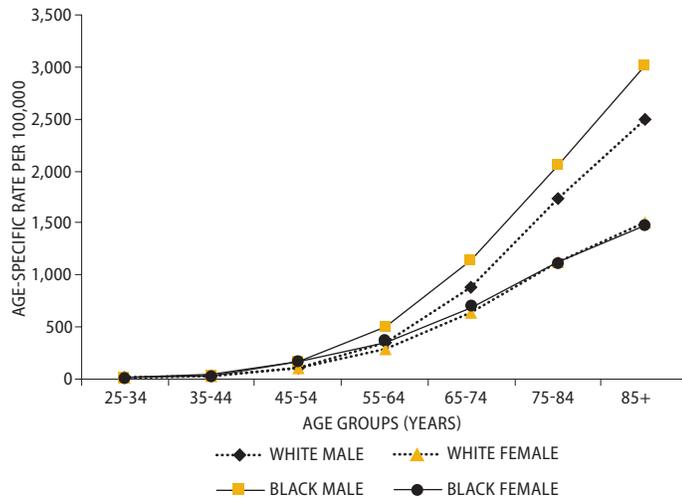
All Sites Cancer Mortality Rates by Race and Gender in Maryland, 1999-2006



Rates are per 100,000 population and are age-adjusted to the 2000 US standard population. Source: NCHS Compressed Mortality File in CDC WONDER, 1999-2006.

FIGURE 1.7

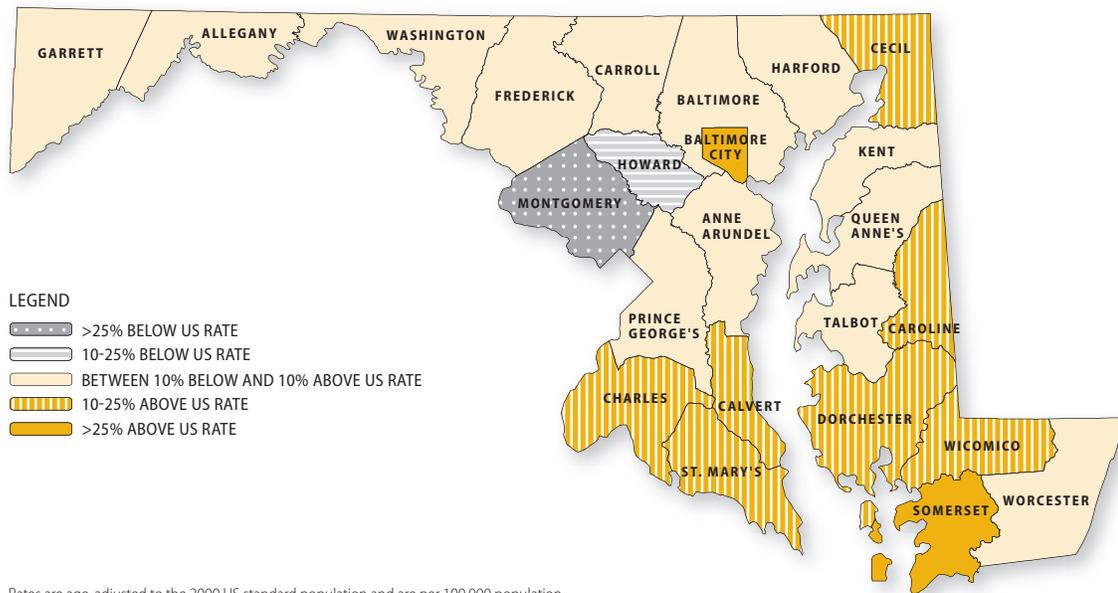
All Sites Cancer Age-Specific Mortality Rates by Race and Gender in Maryland, 2002-2006



Rates are per 100,000 population. Source: NCHS Compressed Mortality File in CDC WONDER, 1999-2006.

FIGURE 1.8

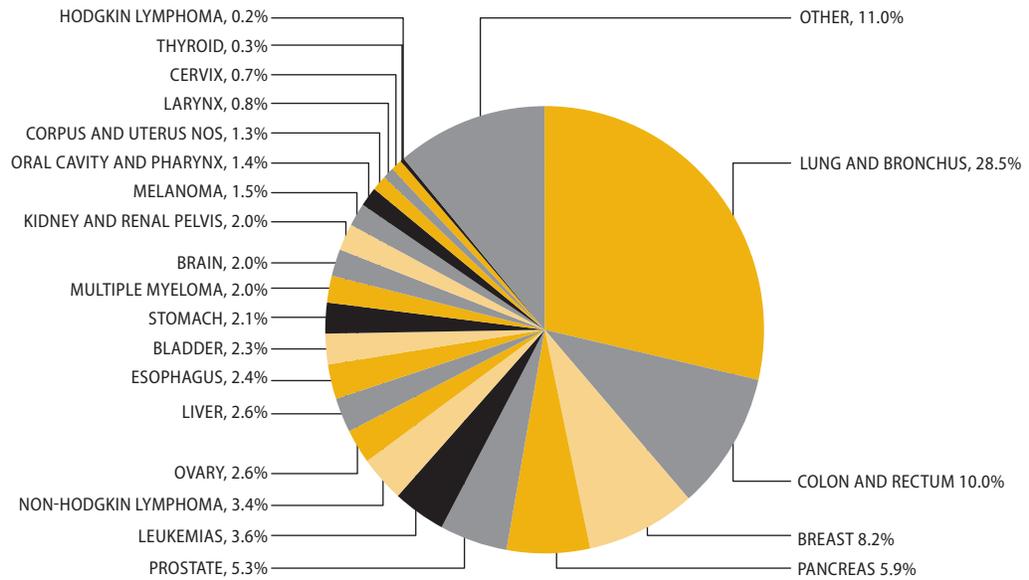
Maryland All Cancer Sites Mortality Rates by Geographical Area: Comparison to US Rate, 2002-2006



Rates are age-adjusted to the 2000 US standard population and are per 100,000 population.
 US all cancer sites mortality rate, 2002-2006: 186.7/100,000
 Source: NCHS Compressed Mortality File in CDC WONDER, 2002-2006.

FIGURE 1.9

Percent of Cancer Deaths by Type of Cancer in Maryland, 2002-2006



Source: NCHS Compressed Mortality File in CDC WONDER, 1999-2006.

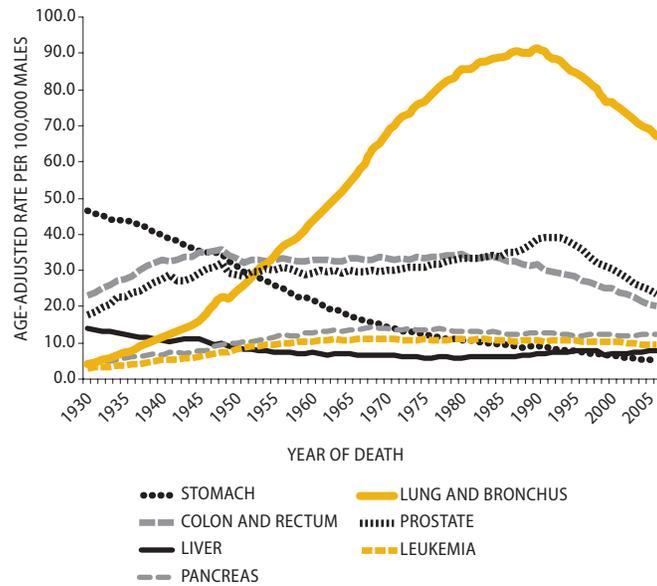
IN MARYLAND, AND IN THE US, cancer mortality rates increase with age for all races and genders (Figure 1.7). In 2006, cancer was the second leading cause of death in children ages 5 to 14 and the leading cause of death in adults ages 25 to 64 (Table 1.3). In 2006, cancers of the breast, lung and bronchus, brain, and colon were the most common causes of cancer death among adults ages 20 to 44 in Maryland (based on number of deaths); cancers of the lung and bronchus, colon, breast, pancreas, and prostate were the most common causes of cancer death among persons ages 45 and older in Maryland.¹⁴

Figure 1.8 shows the overall cancer mortality rates in Maryland’s 24 jurisdictions compared to the US rate for 2002-2006. The overall cancer mortality rates during the period 2002-2006 were at least 10% above the US rate in nine Maryland jurisdictions (Baltimore City, Calvert, Caroline, Cecil, Charles, Dorchester, St. Mary’s, Somerset, and Wicomico). Mortality rates were at least 10% lower than the US rate in two jurisdictions (Howard and Montgomery counties).

For the five-year period 2002-2006, lung cancer was the leading cause of cancer deaths, accounting for more than one quarter (28.5%) of all cancer deaths in Maryland (Figure 1.9). Colorectal cancer follows, accounting for 10.0% of all cancer deaths in the state. Breast cancer accounted for 8.2%, pancreatic cancer for 5.9%, and prostate cancer for 5.3% of all cancer deaths in Maryland. Collectively, these cancers accounted for 57.9% of all deaths due to cancer in Maryland.

FIGURE 1.10

Age-Adjusted Cancer Death Rates of US Males by Site, 1930-2006



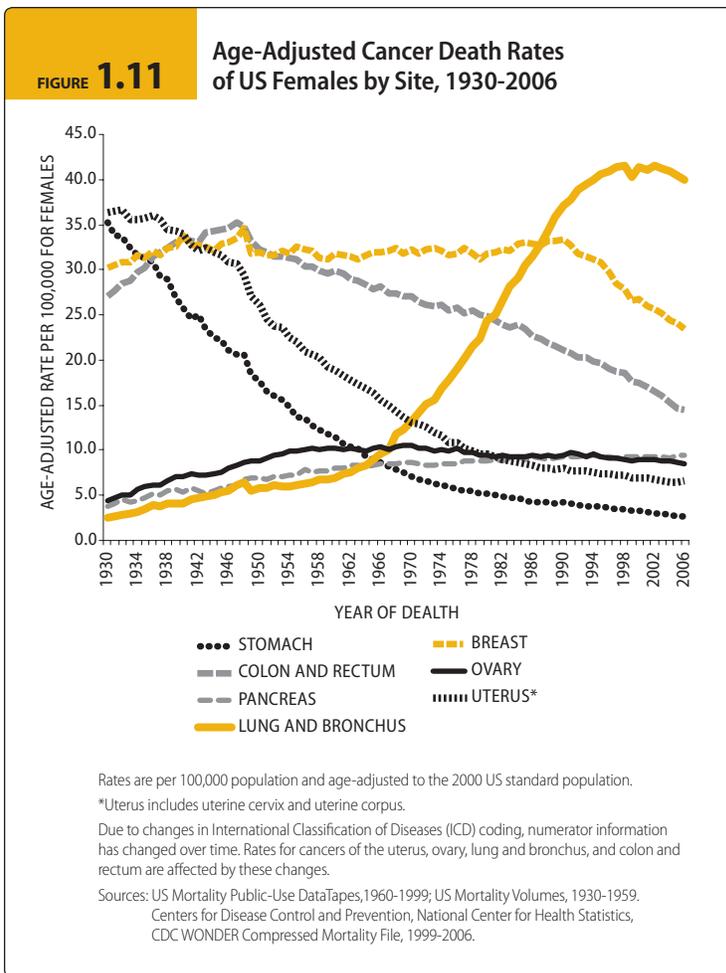
Rates are per 100,000 population and age-adjusted to the 2000 US standard population. Due to changes in International Classification of Diseases (ICD) coding, numerator information has changed over time. Rates for cancers of the lung and bronchus, colon and rectum, and liver are affected by these changes. Sources: US Mortality Public-Use Data Tapes, 1960-1999; US Mortality Volumes, 1930-1959. Centers for Disease Control and Prevention, National Center for Health Statistics, CDC WONDER Compressed Mortality File, 1999-2006.

TABLE 1.4

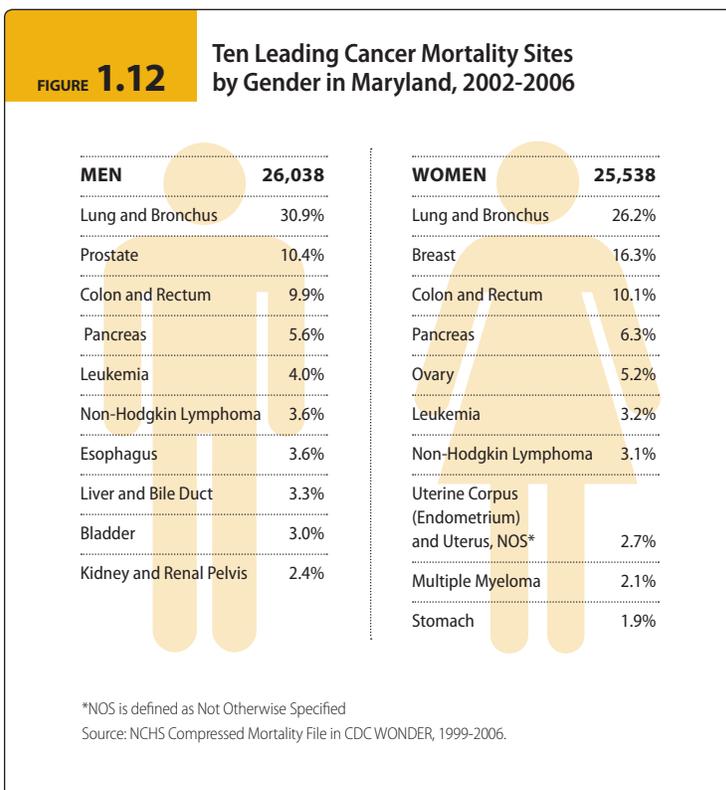
Trends in Five-Year Relative Survival Rates* by Year of Diagnosis in the US, 1975-2005

	1975-1977	1984-1986	1996-2005
All Cancers	50%	54%	68%
Lung and Bronchus	13%	13%	16%
Colon	52%	59%	66%
Rectum	49%	57%	69%
Breast	75%	79%	90%
Prostate	69%	76%	100%

*Survival rates are adjusted for normal life expectancy and are based on cases followed through 2006. Source: American Cancer Society, Cancer Facts & Figures, 2010.



Figures 1.10 and 1.11 show the long-term US trends in cancer mortality by type of cancer and gender from 1930-2006 (note: the scale of the Y axis is different in the two figures). Lung cancer remains, by far, the leading cause of cancer deaths in both men and women in the US. In the US, lung cancer became the leading cause of cancer death among males in the mid-1950s and the leading cause of cancer death among females by the late 1980s. Lung cancer mortality in Maryland decreased among males from 80.7 deaths per 100,000 in 1999 to 66.6 deaths per 100,000 in 2006; however, the female lung cancer mortality rate of 43.5 deaths per 100,000 in 1999 had only decreased to 42.6 deaths per 100,000 in 2006.¹⁵ See Chapter 5 for discussion of and approach to lung cancer and tobacco use prevention and cessation. Figure 1.12 shows the ten leading causes of cancer death among men and women in Maryland.



Stage of Disease and Survival

THE FIVE-YEAR SURVIVAL RATE FOR CANCER (that is, the proportion of persons who are living five years after their diagnosis of cancer) has been improving in the US for many cancers (survival data is not available for Maryland). Five-year relative survival rates for all cancers increased from 50% in 1975-1977 to 68% in 1996-2005 (Table 1.4). Of note, for nearly every cancer type, blacks or African Americans have lower five-year relative survival rates than whites (data not shown).¹⁶

Childhood Cancer

IT IS ESTIMATED THAT 10,700 CHILDREN ages 0 to 14 will be diagnosed with cancer in the US in 2010.¹⁷ The most frequently diagnosed cancers in children differ significantly from those in adults. Leukemia accounts for 31% of cancers in children, with acute lymphocytic leukemia being the most common type. Cancers of the brain and nervous system account for an additional 21% of childhood cancers. While less common, neuroblastoma, cancer of the kidney (i.e., Wilms tumor), lymphoma, soft tissue sarcoma (i.e., rhabdomyosarcoma), eye cancer (i.e., retinoblastoma), and bone cancer (e.g., osteosarcoma and Ewing sarcoma) also occur with relative frequency among children.¹⁸

From 2002–2006, there were 1,110 cases of cancer diagnosed in Maryland children younger than 20 (Table 1.5).

Childhood cancers represent less than 1% of all new cancer diagnoses in the US; however, cancer remains the second leading cause of death among those ages 0 to 14, and it is estimated that 1,340 cancer deaths will occur within this age group in 2010.¹⁹

Overall childhood cancer survival rates have improved markedly over the past 30 years due in large part to the development of better cancer treatments. In the US, five-year relative survival rates have risen from less than 50% prior to 1970 to 80% for the period 1999–2005.²⁰ Despite these advances, survival rates vary significantly depending on cancer type or subtype, and survivors of childhood cancer are susceptible to developing late-onset treatment side effects such as organ malfunction, secondary cancers, or cognitive impairment. Follow-up guidelines for screening and management of long-term effects have been developed to help preserve quality of life in survivors of childhood cancer.²¹

TABLE 1.5

Number of Cancer Cases in Children by Site and by Age in Maryland, 2002–2006

	0 YEARS	1-4 YEARS	5-9 YEARS	10-14 YEARS	15-19 YEARS
All Sites	93	214	150	225	428
Oral Cavity and Pharynx	0	0	0	6	13
Digestive System	8	6	0	<6	15
Bones and Joints	<6	<6	7	33	25
Soft Tissue including Heart	7	6	12	16	20
Melanoma of the Skin	<6	<6	<6	7	40
Ovary	0	0	0	<6	9
Testis	<6	0	0	<6	35
Kidney and Renal Pelvis	7	42	9	7	9
Eye and Orbit	12	6	<6	0	<6
Brain	9	36	36	39	33
Thyroid	0	0	<6	10	31
Other Endocrine including Thymus	10	11	<6	<6	<6
Hodgkin Lymphoma	0	<6	<6	19	73
Non-Hodgkin Lymphoma	<6	6	10	19	33
Acute Lymphocytic Leukemia	6	66	38	27	18
Chronic Lymphocytic Leukemia	0	0	0	<6	0
Acute Myeloid Leukemia	<6	13	10	9	11
Chronic Myeloid Leukemia	0	0	0	<6	7

<6 = Case counts of 1-5 are suppressed per DHMH.MCR Date Use Policy.
Source: Maryland Cancer Registry, 2002–2006.

Selected Cancer Types

WITHIN THIS CANCER PLAN are chapters specific to lung, skin, colorectal, breast, prostate, oral, and cervical cancers. These cancers were selected based upon their relatively high incidence and/or mortality rates in Maryland or because they have effective screening or modifiable risk factors. Information on the following additional cancers is given in Table 1.6: leukemia, lymphoma, and cancers of the liver, ovary, pancreas, thyroid, urinary bladder, and uterine corpus (endometrium).

Risk Factors

CANCER CAN BE ATTRIBUTED to a variety of factors. These factors may act together or in sequence to initiate or promote the growth of cancerous cells. There have been several studies done to estimate the proportion of cancer deaths attributable to certain factors, including an estimate from Doll and Peto in 1981, and an estimate from Harvard in 1996. These studies estimate that about one-third of cancer deaths are caused by tobacco, while another one-third of deaths are related to excess body weight, physical inactivity, and poor nutrition (Table 1.7). Additional discussion of environmental risk factors for cancer can be found in Chapter 8: Environmental/Occupational Issues and Cancer. More sophisticated analyses separate the risks for each cancer and list definite, probable, and possible exposures leading to each specific cancer.^{22,23,24}

There are many risk factors for cancer that are non-modifiable, such as age, gender, genetic makeup, family history, personal medical history, receipt of indispensable medical treatments (radiation, chemotherapy, immunosuppressants, tamoxifen), and certain reproductive factors (hormonal); however there are also many modifi-

able risk factors that have been identified. It is thought that more than 50% of cancer could be prevented if our current knowledge of risk factors were successfully implemented to reduce risk factor prevalence.²⁵

Modifiable risk factors for some cancers include lifestyle factors (tobacco and alcohol use, excess body weight, diet high in red meat, and lack of physical activity), environmental exposures (e.g., benzene, arsenic, aflatoxin, and ionizing radiation), reproductive factors (unopposed estrogen therapy), and certain infections (discussed in the next section). Protective factors have also been identified for several of these selected cancer types. For example, long-term oral contraceptive use, pregnancy, tubal ligation, and hysterectomy have all been shown to reduce the risk of ovarian cancer; use of oral contraceptives, pregnancy, and physical activity decrease risk of endometrial cancer; breastfeeding decreases the risk of breast cancer, and increased intake of fluids and vegetables may decrease risk of bladder cancer.²⁶

The cancer-specific chapters in this plan (lung, skin, colorectal, breast, prostate, oral, and cervical cancers) include information on risk factors for those cancers. For further information on risk factors for those and other cancers, visit the National Cancer Institute Web site: <http://www.cancer.gov/>.

Infectious Agents

GROWING KNOWLEDGE of the nature of carcinogenesis and the role of cell injury and repair has led to a better understanding of why some infectious agents play an important role in cancer causation. Chronic infections cause cell damage, which is then repaired. With each cycle of cell repair there is an opportunity for DNA “mistakes” to occur,

TABLE 1.6 Selected Cancer Types

	SIGNS AND SYMPTOMS	EARLY DETECTION	TREATMENT	US 5-YEAR RELATIVE SURVIVAL RATE (1999-2005)
Leukemia	Fatigue, paleness, weight loss, repeated infections, fever, easy bruising, nosebleeds, or other hemorrhages.	Difficult to detect early. Diagnosis made by blood tests and bone marrow biopsy.	Chemotherapy.	AML* 23% ALL 66% CML 56% CLL 78%
Liver	Abdominal pain and/or swelling, weight loss, weakness, loss of appetite, jaundice, fever.	Screening not proven to improve survival; however doctors may screen high-risk individuals with ultrasound and blood tests.	Surgical resection or liver transplantation. If non-operable, tumor destruction, embolization (cutting off tumor blood supply), or chemotherapy.	14%
Lymphoma	Swollen lymph nodes, itching, night sweats, fatigue, unexplained weight loss, intermittent fever.	No screening method recommended for the general population. Initial diagnosis made by blood tests, imaging, and/or biopsy.	Hodgkin: Various combinations of chemotherapy, radiation, and bone marrow or stem cell transplantation. Non-Hodgkin: Usually chemotherapy; radiation less often. Antibody therapy for certain types.	Hodgkin: 85% Non-Hodgkin: 67%
Ovary	Usually no obvious symptoms. Occasionally pelvic pain or abdominal enlargement or fullness.	No routine screening recommended. Pelvic exam, ultrasound, and blood CA125 levels for women with increased risk or persistent symptoms.	Surgery and usually chemotherapy.	46%

which could potentially lead to uncontrolled cell growth and cancer. The immune status of an individual may also be altered by exposure to biological agents, which could prevent the body from recognizing and destroying tumor cells. Research and education on the role of infectious agents in cancer causation could lead to better cancer controls through the development of interventions such as vaccines, antibiotics, and changes in personal behavior to avoid infection.

Several infectious agents have already been linked to cancer. The Epstein-Barr virus has been implicated in some forms of lymphoma; the human papilloma virus (HPV) has been linked to cancers of the cervix, head, and neck and the

human immunodeficiency virus (HIV) has been linked to Kaposi’s sarcoma, cervical cancer, and non-Hodgkin lymphoma. Liver cancer has been linked to parasitic infections with liver flukes and schistosomiasis, as well as viral infections with hepatitis B and C. Hepatitis C is also probably linked to some forms of non-Hodgkin lymphoma. Finally, stomach cancer is strongly associated with infection by the bacterium *Helicobacter pylori*, which is also associated with gastrointestinal ulcer formation. Strategies to address each of these agents should be recognized as part of cancer control efforts.

TABLE 1.6

Selected Cancer Types (continued)

	SIGNS AND SYMPTOMS	EARLY DETECTION	TREATMENT	US 5-YEAR RELATIVE SURVIVAL RATE (1999-2005)
Pancreas	May include abdominal pain that radiates to the back, weight loss, occasionally high blood glucose or jaundice.	No method for early detection. Only 7% of cases are diagnosed at an early stage.	Surgery, radiation therapy, and chemotherapy may extend survival and/or relieve symptoms, but seldom provide a cure.	6%
Thyroid	Lump, tight feeling, or pain in neck/throat; difficulty breathing or swallowing; hoarseness or swollen lymph nodes.	No method for early detection. Physical examination to detect nodules and evaluation of thyroid nodules with blood tests for hormone levels, imaging, and/or biopsy.	Surgery and sometimes radioactive iodine treatment following surgery to destroy any remaining thyroid tissue.	97%
Urinary Bladder	Blood in the urine. Increased frequency or urgency of urination, or irritation during urination.	No screening method recommended. Diagnosis made by looking at cells from urine or bladder tissue, and examining the bladder wall.	For most types, surgery, sometimes in combination with chemotherapy and/or radiation prior to bladder removal.	80%
Uterine Corpus (Endometrium)	Abnormal uterine bleeding (especially post-menopausal). Pain with urination or intercourse, or in the pelvic area.	No standard or routine screening test for endometrial cancer. Diagnosis made by transvaginal ultrasound and uterine biopsy.	Surgery, radiation, hormones, and/or chemotherapy depending on the stage of disease.	83%

*AML = acute myeloid leukemia, ALL = acute lymphocytic leukemia, CML = chronic myeloid leukemia, CLL = chronic lymphocytic leukemia

Sources: American Cancer Society, Cancer Facts & Figures 2010.

5-Year Relative Survival Rate: SEER Cancer Statistics Review, 1975-2006.

Costs for Cancer Care

THE ECONOMIC IMPACT OF CANCER IS LARGE. The National Institutes of Health estimates that the overall cost for cancer in the US in the year 2006 to be \$206.5 billion, of which \$78.2 billion was for direct medical costs (i.e., the total of all health expenditures), \$17.9 billion was for indirect morbidity costs (i.e., the cost of lost productivity due to illness), and \$110.2 billion was for indirect mortality costs (i.e., the cost of lost productivity due to premature death). Breast cancer carried the highest cost at \$13.9 billion, followed by colorectal cancer at \$12.2 billion, and cancer of the lung and bronchus at \$10.5 billion

(Table 1.8). Maryland's population represented approximately 1.88% of the total US population in 2006.²⁷ Taking this percentage of the national overall estimated cost for cancer, a rough estimate for the cost for cancer in Maryland in 2006 is \$3.9 billion, and the total direct medical cost is \$1.5 billion (costs of cancer care in Maryland can be estimated based on the assumption that in 2006 Maryland represented 1.88% of the US population).

Cancer Control in Maryland

A Cancer Control Model has been developed in Maryland to provide a framework for decision-making regarding cancer control policies and services in the state, and is available at www.marylandcancerplan.org.

AT ANY GIVEN TIME, each individual may be susceptible to developing a cancer, or he or she may have asymptomatic, clinical, or advanced disease. Cancer for an individual exists on a continuum from susceptibility, to early cancer, late stage cancer, and survivorship or potentially death from cancer. Along the continuum there are various opportunities for cancer control and treatment interventions called primary, secondary, and tertiary prevention.

Cancer control begins with various types of research (basic, translational, applied, and community-based participatory research) and involves promoting and funding research; promoting education, risk-factor prevention, and screening efforts; facilitating treatment and post-treatment interventions for survivors; and conducting cancer surveillance for risk factors, incidence, and mortality. Making surveillance information available to policymakers will foster education and policies, appropriate and accessible health-care services, and healthcare payment to reduce the burden of cancer among Maryland’s citizens and to improve the health of the population.

TABLE 1.7

Estimated Proportions of Cancer Deaths Attributable to Various Risk Factors

RISK FACTOR	DOLL AND PETO ESTIMATE	HARVARD ESTIMATE
Tobacco	30%	30%
Adult Diet/Obesity	35%	30%
Sedentary Lifestyle	-	5%
Occupational Factors	4%	5%
Family History of Cancer	-	5%
Viruses/Other Biologic Agents	10%	5%
Perinatal Factors/Growth	-	5%
Reproductive Factors	7%	3%
Alcohol	3%	3%
Socioeconomic Status	-	3%
Environmental Pollution	2%	2%
Ionizing/Ultraviolet Radiation	3%	2%
Prescription Drugs/Medical Procedures	1%	1%
Salt/Other Food Additives/Contaminants	-	1%

Sources: Doll R, Peto R. The Causes of Cancer. Quantitative Estimates of Avoidable Risks of Cancer in the United States Today. New York, NY: Oxford University Press, Inc.; 1981 and the Harvard Center for Cancer Prevention. Harvard Report on Cancer Prevention. Volume 1: Causes of Human Cancer, 1996.

TABLE 1.8

Estimated Annual Costs of Cancer Care in the US, 2006

TOTAL COSTS	ESTIMATED ANNUAL COSTS
Total Cancer Care	\$206.3 billion
Total Direct Medical Costs	\$78.2 billion
DIRECT MEDICAL COSTS BY CANCER TYPE	ESTIMATED ANNUAL COSTS
Breast	\$13.9 billion
Colorectal	\$12.2 billion
Lung and Bronchus	\$10.3 billion
Lymphoma	\$10.2 billion
Prostate	\$9.9 billion
Leukemia	\$4.5 billion
Ovary	\$4.4 billion
Brain	\$3.7 billion
Bladder	\$3.5 billion
Head and Neck Cancers	\$3.1 billion

Sources: American Cancer Society, Cancer Facts & Figures 2006 (for total costs). National Cancer Institute, Cancer Trends Progress Report 2009/2010 Update (for cancer-specific costs).

REFERENCES

- 1 American Cancer Society. Cancer facts & figures 2010. Report. Atlanta (GA): The Society; 2010. 1
- 2 American Cancer Society. South Atlantic Division cancer facts & figures 2009. Report. Atlanta (GA): The Society; 2009. 2
- 3 Maryland Department of Health and Mental Hygiene, Vital Statistics Administration (US). Maryland annual vital statistics reports [Internet]. Baltimore (MD): Maryland Department of Health and Mental Hygiene, Vital Statistics Administration (US); 2010 [cited 2010 Aug]. Available from: <http://vsa.maryland.gov/html/reports.cfm> 3
- 4 Maryland Department of Aging (US). Maryland's 60+ population projections by jurisdiction, 2000-2030 [Internet]. Baltimore (MD): Maryland Department of Aging (US); 2005 Sep [cited 2010 Oct 12]. Available from: <http://www.mdoa.state.md.us/statistics.html> 4
- 5 Hayat, MJ, Howlader N, Reichman ME, Edwards BK. Cancer statistics, trends, and multiple primary cancer analyses from the Surveillance, Epidemiology, and End Results (SEER) Program. *Oncologist*. 2007 Jan;12(1):20-37. 5
- 6 Ibid. 6
- 7 Simmonds MA. Cancer statistics, 2003: further decrease in mortality rate, increase in persons living with cancer. *CA Cancer J Clin*. 2003 Jan-Feb;53(1):4. 7
- 8 Maryland Department of Health and Mental Hygiene (US). Maryland Behavioral Risk Factor Surveillance System Survey Data, 2009 [Internet]. Baltimore (MD): Maryland Department of Health and Mental Hygiene (US); 2009 [cited 2010 Aug]. Available from www.marylandbrfss.org 8
- 9 See note 1. 9
- 10 Maryland Department of Health and Mental Hygiene (US). Cigarette Restitution Fund Program, Cancer report 2009 [Internet]. Baltimore (MD): Maryland Department of Health and Mental Hygiene (US); 2009 [cited 2010 Oct 19]. Available from: http://fha.maryland.gov/cancer/crf_surv.cfm 10
- 11 See note 1 11
- 12 Ibid. 12
- 13 US Cancer Statistics Working Group. United States cancer statistics: 1999-2006 incidence and mortality Web-based report [Internet]. Atlanta (GA): US Department of Health and Human Services, Centers for Disease Control and Prevention, and National Cancer Institute; 2010 [cited 2010 Aug]. Available from: <http://apps.ncccd.cdc.gov/uscs/> 13
- 14 Centers for Disease Control and Prevention, National Center for Health Statistics (US). Compressed Mortality File 1999-2006. CDC WONDER on-line database [Internet]. Atlanta (GA): Centers for Disease Control and Prevention, National Center for Health Statistics (US); 2010 [cited 2010 Aug]. Available from: <http://wonder.cdc.gov/cmfi-icd10.html> 14
- 15 Ibid. 15
- 16 See note 1
- 17 See note 1
- 18 See note 1
- 19 See note 1
- 20 See note 1
- 21 Children's Oncology Group (US). Long-term follow-up guidelines for survivors of childhood, adolescent, and young adult cancers; version 3.0 [Internet]. Arcadia (CA): Children's Oncology Group (US); 2008 Oct [cited 2010 Aug]. Available from: <http://survivorshipguidelines.org/>
- 22 Colditz GA, Atwood KA, Emmons K, Monson RR, Willett WC, Trichopoulos D, Hunter DJ. Harvard report on cancer prevention volume 4: Harvard Cancer Risk Index. Risk Index Working Group, Harvard Center for Cancer Prevention. *Cancer Causes Control*. 2000 Jul;11(6):477-88.
- 23 See note 1
- 24 National Cancer Institute (US). Physician Data Query [Internet]. Bethesda (MD): National Cancer Institute (US); 2010 [cited 2010 Oct 19]. Available from: <http://www.cancer.gov/>
- 25 See note 22
- 26 See note 1
- 27 US Census Bureau. Population Estimates Program [Internet]. Washington (DC): US Census Bureau; 2010 [cited 2010 Aug]. Available from: http://factfinder.census.gov/home/saff/main.html?_lang=en