

# Burden of Cancer in Tennessee

**Developed by the Office of Cancer Surveillance in support of the  
Tennessee Comprehensive Cancer Control Coalition (TCCCC)**

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## Document Summary

The purpose of this document is to describe in detail the effect that cancer has on Tennesseans, including incidence and mortality estimates for the variety of cancers affecting Tennesseans, the economic impact of cancer, risk factors for cancer and, finally, a discussion of how cancer affects different geographic, ethnic and racial groups in Tennessee. The Tennessee Cancer Registry (TCR), which was established in 1983 by act of the Tennessee General Assembly, is responsible for collecting data on all cancer cases diagnosed in Tennessee residents, whether the diagnosis was rendered in Tennessee or another state in the Union. The Tennessee Comprehensive Cancer Control Coalition (TCCCC) is a collaborative group of Tennessee citizens who use TCR data and other data sources to target cancer prevention and control activities to areas of Tennessee experiencing a high cancer burden.

The overall cancer incidence rate per 100,000 population for the state of Tennessee (399.8 per 100,000 population) with all races and genders combined was below the U.S. rate (469.7) for the years 1999 through 2003. The overall incidence rate for blacks and whites was very similar, 399.4 versus 400.1 respectively. Blacks had higher cancer incidence rates than whites for the following cancers: cervix uteri, colorectal, esophagus, kidney, larynx, liver, multiple myeloma, oral cavity and oropharynx, pancreas, prostate, and stomach. Women had a lower overall incidence rate of cancer versus men (362.2 vs. 460.2) and were lower in individual cancers except thyroid, which was three times higher in women. For lung and kidney cancer, the incidence rate for men was approximately double that of women. The incidence rate for bladder, laryngeal and esophageal cancer was four times greater in men than women.

For the years 1999 through 2003 combined, Tennessee's overall cancer mortality rate was 214.7, which was higher than the national mortality rate (195.7) for that same time period. The leading causes of cancer deaths in Tennessee were lung and bronchus, colorectal, breast, and prostate. In Tennessee, cancer of the lung and bronchus accounted for about 1 in 3 deaths due to cancer, and smoking can be attributed to 87% of these deaths. Men had a cancer mortality rate that is at least two times greater than women for the following cancers: lung, kidney, liver, melanoma, stomach, bladder, esophageal and laryngeal cancers. Oral cavity and oropharyngeal cancer mortality rates were 30 times greater in men compared to women. Cancer mortality rates were 30 percent higher for blacks (273.1) than for whites (208.0). In 2003, age-adjusted rates were 33.4 percent higher for black men (358.0) than white men (268.4), and 25.6 percent higher for black women (210.9) than white women (167.9).

In 2005, total annual costs of cancer diagnosis and treatment (direct medical costs) in the U.S. were estimated to be 74.0 billion dollars, which suggests annual costs in Tennessee were about 1.5 billion dollars. In 2004, direct medical costs, for selected cancers presented, incurred by BlueCross/BlueShield, which insured about 40 percent of Tennesseans, for commercial and TennCare sources in Tennessee were over 275 million dollars; prostate, lung, and breast cancers, which are the top three incident cancers in Tennessee and the U.S., accounted for about half of total costs.

Cancer is largely a preventable disease, with approximately two-thirds of all cancers being attributed to unhealthy lifestyles and behaviors, including tobacco use, excessive sun exposure,

lack of physical activity, and being overweight or obese. Smoking accounts for about one-third of all cancer deaths. Exposure to second-hand smoke is also associated with an increased risk for lung cancer. More than one-quarter (26.7 percent) of adult Tennesseans reported being current smokers in 2005 compared to 20.6 percent for the U.S. 50 States and the District of Columbia. When compared to other states, Tennessee was tied with West Virginia for the third highest percentage of current smokers. The prevalence of current smoking among adults aged 18 years or older in Tennessee has remained about the same since 2000, whereas nationwide there has been a drop in current smoking prevalence. Excessive sun exposure is associated with skin cancer, the most deadly of which is malignant melanoma. In 2003, 25 percent of Tennesseans reported having had a sunburn within the past 12 months, with almost 7 percent of those reporting having been sunburned six or more times. Lack of physical activity is associated with an increased risk of some forms of cancer. In 2005, 33.1 percent of Tennessee adults reported no physical activity during the last month compared to 23.8 percent for the U.S. 50 states and District of Columbia. Despite repeated health education messages and recommendations in the news media, physical activity has not improved over the past five years beginning in 2000 for Tennessee or the U.S. During the last two decades, the percentage of overweight and obese adults and children has steadily increased. About one-third of adults in the U.S. are considered obese, an increase of 7.6 percent since 1994. In 2005, 62.3 percent of Tennesseans reported being overweight or obese compared to 61.1 percent for the U.S. 50 states and District of Columbia. Being overweight or obese is associated with physical inactivity and lack of fruit and vegetable consumption. In 2005, 26.5 percent of Tennesseans reported consuming fruits and vegetables at the recommended five or more times per day, versus 23.2 percent nationwide.

Differences in age, socioeconomic status, ethnicity and race, and geography are associated with cancer trends. Cancer is largely a disease of aging populations with over two-thirds of cancers affecting those greater than or equal to 65 years of age. The entire Appalachian region, which stretches across many states, has a higher mortality rate for all cancers combined than the U.S., 178.6 versus 171.4 respectively. For Tennesseans, however, the mortality rate for all cancers is lower in the Appalachian counties versus non-Appalachian counties (107.1 vs. 123.9), which is also true for cancer incidence (192.8 vs. 206.2).

## **Introduction**

The purpose of this document is to describe the burden of cancer in Tennessee, including cancer incidence and mortality by race, behavioral risk factor survey data, urban-rural differences and the effect of socioeconomic status on cancer risk. The cancer sites selected are priority cancers for the Tennessee Comprehensive Cancer Control Coalition (TCCCC) and the Healthy People 2010 objectives produced by the U.S. Department of Health and Human Services. These include lung and bronchus, female breast, prostate, colorectal, cervical, and melanoma/skin cancers. The State of Tennessee has not developed guidelines similar to the Healthy People 2010 goals; therefore, stated goals in this publication for Tennessee will be identical to those recommended by the federal government. Results presented in this document will be used to guide the TCCCC in developing goals and achieving plan objectives.

### **Tennessee's Comprehensive Cancer Control Coalition**

Comprehensive cancer control, as defined by the Centers for Disease Control and Prevention (CDC), is an integrated and coordinated approach to reducing cancer incidence, morbidity, and mortality through prevention, early detection, treatment, rehabilitation, and palliation. The process is interdisciplinary, involving administration, basic and clinical research, evaluation, health education, program development, surveillance, public policy, clinical services, and health communication. While Tennessee has several centers of excellence that diagnose and treat cancer, there are unmet needs and disparities in knowledge, access, treatment, and survival among some populations.

In November of 2000, representatives from the Tennessee Department of Health, the Office of Cancer Surveillance, the Tennessee Physician Liaison Committee of the American College of Surgeon's Commission on Cancer (COC), and the Tennessee Mid-South Division of the American Cancer Society attended a federally-funded conference titled "An Institute for State Leaders: Working Together for Comprehensive Cancer Control." This Institute, primarily established by the CDC, was organized as a part of a federal initiative to support states' efforts to implement a comprehensive cancer program. As a result of that federal initiative, a statewide coalition of individuals concerned with the health of Tennesseans was formed. From that coalition, representatives from throughout the state, who were also outstanding representatives in the cancer control field, formed a steering committee in June of 2001. The steering committee conceptualized the development of the framework to form a comprehensive cancer plan for the State of Tennessee and organized work groups composed of coalition members.

The TCCCC is a broad-based group of about 325 people interested in reducing the human and fiscal suffering caused by cancer and it uses cancer data collected by the Tennessee Cancer Registry to target activities to Tennessee populations experiencing a greater cancer burden. Coalition members wrote the 2005-2008 State Cancer Plan, which is available on the Coalition website, <http://health.state.tn.us/CCCP/index.htm>. It addresses prevention, control and treatment priorities, as well as service gaps. This initial plan consists of nine components that include specific disease sites and cross-cutting issues such as quality of life, disparities and clinical trials. The Coalition decided to focus initially on melanoma/skin, prostate, colorectal,

women's cancers and tobacco-related cancers, since education and awareness of early detection screening for these would have the greatest potential to influence the overall incidence and mortality of cancer in most Tennesseans.

## **Tennessee Cancer Registry**

The Tennessee Cancer Registry (TCR) is a population-based central cancer incidence registry that serves the entire state of Tennessee, which has a population of almost 6 million people. The TCR was established in 1983 by the Tennessee Department of Health (TDoH) when state law, Tennessee Code Annotated 68-1-1001 et seq., made cancer a reportable condition. This law requires hospitals, laboratories, facilities, and health care practitioners to report to the TDoH information on patients diagnosed and/or treated for cancer in Tennessee. Currently, cancer incidence cases are captured by the TCR from the following sources: hospitals, pathology laboratories, ambulatory surgery treatment centers, death certificates and exchange of data with neighboring state's cancer registries that enables the TCR to collect cancer information on Tennessee residents diagnosed with cancer in other states. All primary invasive and *in situ* (localized) neoplasms are reportable to the TCR, except *in situ* cervical cancers diagnosed after January 1, 1996 and certain cancers of the skin, benign tumors (except benign brain and other central nervous system tumors, which became reportable as of January 1, 2004), and benign polyps.<sup>1</sup> The principle reason why cancer registries have been established is for the tracking of cancer trends and providing a central access point for research scientists to acquire data for the testing of specific scientific hypotheses about cancer, which also reduces the costs of research.

TCR follows the TDoH's Cancer Reporting System Rules, Chapter 1200-7-2. These rules provide for the implementation of the Tennessee Cancer Reporting System Act of 1983 and its amendments. In May 2000, the Tennessee General Assembly amended the 1983 law broadening its scope by expanding the number of reporting sources, allowing access to medical records in the event data is not reported, and providing for the interstate exchange of data. This amendment strengthened the TCR by establishing penalties for late or incomplete reporting.

In 1992, the 102<sup>nd</sup> Congress passed Public Law 102-515 which allows states to receive federal grants to support population-based statewide cancer registries. The TCR has received federal funding from the Centers for Disease Control and Prevention (CDC) through the National Program of Cancer Registries (NPCR) since 1999. The TCR is a member of the North American Association of Central Cancer Registries (NAACCR), an organization that sets standards for cancer registries, facilitates data exchange, and publishes cancer data.

While estimates of completeness for cancer incidence data are currently 86 percent for the 2003 reporting year, completeness for previous years range from 78 to 80 percent. National standards for data completeness and quality have been developed by the various standard setters, including the COC, NAACCR, the Surveillance, Epidemiology and End Results (SEER) program of the National Cancer Institute, and, finally, the NPCR. The quality criteria dictate the percent of errors that abstracts contain, the number of duplicates within the database, the percent of missing core data elements that include race, age and sex and other criteria. The minimum completeness criteria state that registries should collect at least 90 percent of expected cases 24 months after

the close of the diagnosis year that is calculated using a complex formula that takes into consideration changes in population, changes in overall cancer mortality and other factors. The TCR continues to work towards improving the quality and number of its reporting sources. Over the past two years (2005 and 2006), significant improvements have been realized in this regard. One of the most significant improvements has been the implementation of pathology laboratory reporting. The TCR obtains cancer mortality (death) data from the Tennessee Department of Health's Office of Vital Records and it is 100 percent complete.

## **Technical Notes**

### **Age-Adjusted Rates for Tennessee and the Year 2000 Standard**

The U.S. Department of Health and Human Services requires that health data be age-adjusted using the U.S. Year 2000 population as a standard, beginning with the 1999 reporting year. Prior to the release of 1999 data, various federal and state agencies calculated disease rates using different U.S. population standards, including the 1940 and 1970 standard populations. All incidence and mortality rates presented in this report are age-adjusted, except for those rates specific to an age group.

### **Tennessee Population Denominators Used in Age-adjusted Calculations**

The population data used in this report to calculate age-adjusted rates were obtained from the Tennessee Department of Health's Division of Statistics.<sup>2</sup> When comparing age-adjusted rates in this report to national rates and other cancer registry data, which may use U.S. Census population totals, slight variations may occur.

### **Definitions**

Several technical terms are used in presenting the information in this report. The following definitions are provided to assist the reader.

#### **Incidence Rate**

An incidence rate is the number of new cases of a disease that occur in a specific time period within a specific population, divided by the size of the population at risk. For example, if 10 residents of a county with 20,000 residents at risk for the disease are diagnosed with lung cancer during a single year, then the incidence rate for that county for that year is .0005. Since cancer incidence rates are usually expressed per 100,000 population, this figure is then multiplied by 100,000 to yield a rate of 50 per 100,000 per year. The term "at risk" above is an important distinction. The "at risk" population is not necessarily the total population. For example, when calculating rates for uterine cancer, the "at risk" population in the denominator would be the total population of women, men would not be included since men cannot develop uterine cancer.

#### **In situ**

Cases diagnosed as *in situ* include malignant tumors that are confined to the cell group/layer of origin, and have not penetrated the supporting structure of the organ/cell layer in which they arose.

### **Mortality Rate (Death Rate)**

A mortality rate is the number of deaths that occur in a specific time period within a specific population divided by the size of the population at risk for the disease. Only those persons whose death certificate lists cancer as the underlying (i.e., primary) cause of death are included in a cancer mortality rate. Like incidence rates, mortality rates are usually expressed as the number of deaths per 100,000 population.

### **Age-adjusted rate**

Age-adjustment is a statistical process used to calculate a weighted average of the rates for two or more different populations based on the different age distributions of the populations of interest. Almost all diseases or health outcomes vary according to age groups. Most chronic diseases, including most cancers, occur more often among older populations. Other outcomes, such as many types of injuries, occur more often among younger populations. The age distribution determines what the most common health problems in a community will be. One way of examining the pattern of health outcomes in communities of different sizes is to calculate an incidence or mortality rate, which is the number of new cases or deaths divided by the size of the population. In chronic diseases and injuries, rates are usually expressed in terms of the number of cases or deaths per 100,000 people per year.

The incidence and mortality rates in this report were age-adjusted using the United States population in 2000 as the standard and using Tennessee Department of Health population estimates as denominators.

## Cancer Incidence

The overall incidence rate for Tennessee in 2003 was 415.9 per 100,000 people (age-adjusted to the 2000 standard population using 5-year age groups).<sup>1</sup> Between 1999 and 2003, an average of approximately 23,000 Tennesseans was diagnosed with cancer:

- 11,700 new cases among women and 11,600 new cases among men;
- 20,000 new cases among whites and 2,700 new cases among blacks.

**Table 1. Cancer Incidence for Tennessee, Males vs. Females, 1999-2003**

Site	All Males		All Females		Total	
	Cases	Rate*	Cases	Rate*	Cases	Rate*
Brain and ONS	950	7.1	805	5.2	1755	6.0
Female Breast	*	*	18588	116.5	18588	116.5
Cervix Uteri	*	*	1290	8.4	1290	8.4
Colon and Rectum	6919	56.8	6842	41.3	13761	47.8
Corpus Uteri and Uterus	*	*	2844	17.6	2844	17.6
Esophagus	927	7.3	258	1.6	1185	4.0
Hodgkin's Disease	185	1.3	140	0.9	325	1.1
Kidney and Renal Pelvis	2085	15.9	1429	8.9	3514	12.0
Larynx	1082	8.2	321	2.0	1403	4.7
Leukemia	1025	8.6	1268	8.3	2293	8.4
Liver and Intrahepatic Bile Duct	507	3.9	248	1.5	755	2.6
Lung and Bronchus	12421	98.9	8523	52.2	20946	71.7
Melanoma of the Skin	763	5.9	649	4.1	1412	4.8
Multiple Myeloma	296	2.4	298	1.8	594	2.1
Non-Hodgkin's Lymphoma	1100	8.8	1004	6.1	2104	7.3
Oral Cavity and Pharynx	93	0.7	41	0.3	134	0.4
Ovary	*	*	1950	12.1	1950	12.1
Pancreas	1250	10.1	1273	7.6	2523	8.8
Prostate	14451	113.1	*	*	14451	113.1
Stomach	960	8.0	660	4.0	1620	5.6
Testis	566	4.0	*	*	566	4.0
Thyroid	462	3.4	1567	10.3	2029	6.9
Urinary Bladder	3426	29.0	1241	7.4	4667	16.2

\*Rates per 100,000 Tennessee residents and age-adjusted to the 2000 U.S. standard population. Rates based on less than six cases are suppressed. ONS = Other Nervous System

Cancer incidence rates differ by gender, age group and racial/ethnic groups. For the years 1999 through 2003 combined, the overall cancer incidence rate for men was 460.2 compared to 362.2

for women.<sup>1</sup> The overall incidence rate for blacks and whites is very similar, 399.4 versus 400.1. For individual cancers this is not the case. Blacks have higher incidence rates of cancer than whites in the following cancers: cervix uteri, colorectal, esophagus, kidney, larynx, liver, multiple myeloma, oral cavity and pharynx, pancreas, prostate, and stomach (see Table 6, p. 37-38). For the same years, women have a lower overall rate of cancer incidence versus men (362.2 vs. 460.2) and are lower in individual cancers except thyroid (see Table 1). The incidence rate of thyroid cancer in women is three times as high as in men. For lung cancer, the incidence rate for men is approximately double that of women. The incidence rate for bladder, larynx and esophageal cancer is four times greater in men than women. Men have an incidence rate of kidney cancer that is approximately double that of women.

**Figure 1. Overall Cancer Incidence Rate by County, Tennessee, 1999 - 2003.**



As was mentioned in the introduction, cancer incidence data for Tennessee is not yet 90 percent complete. While specific cancers may be more complete than others, overall the data is approximately 80 percent complete. Due to this fact, rates calculated using these numbers may not represent a true picture of cancer incidence in Tennessee. Using the data that is available to the registry, rates were calculated and compared to U.S. rates. The overall cancer incidence rate for the state of Tennessee (399.8) with all races and genders combined was below the U.S. rate (469.7) for the years 1999 through 2003. Tennessee was higher than the U.S. rate for lung cancer, (71.7 versus 61.0).

Figure 2.

All Races and Genders, Cancer Incidence  
Tennessee 1999-2003

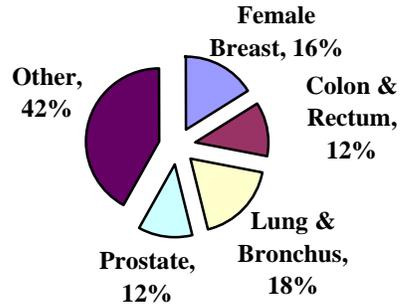


Figure 3.

All Males, Cancer Incidence  
Tennessee, 1999-2003

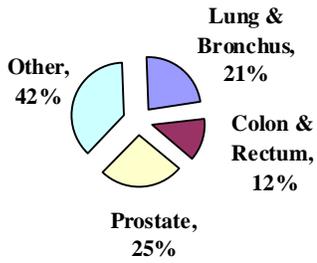
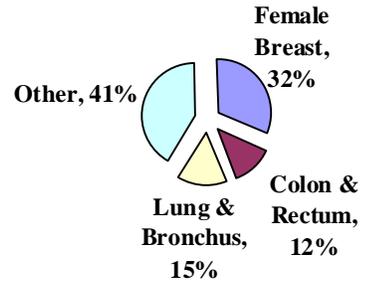


Figure 4.

All Females, Cancer Incidence  
Tennessee, 1999-2003



## Cancer Mortality

In 2003, the overall cancer mortality rate in Tennessee was 213.1 per 100,000 people (age-adjusted to the 2000 standard population using 5-year age groups).<sup>1</sup> Between 1999 and 2003, an average of approximately 12,300 Tennesseans died from cancer each year:

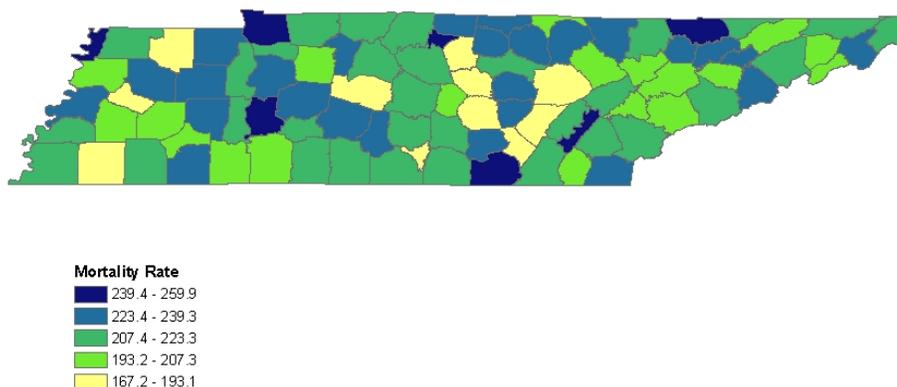
- 5,700 deaths among women and 6,600 deaths among men;
- 10,500 deaths among whites and 1,800 deaths among blacks.

**Table 2. Cancer Mortality for Tennessee, Males vs. Females, 1999-2003**

Site	All Males		All Females		Total	
	Cases	Rate*	Cases	Rate*	Cases	Rate*
Brain and ONS	819	6.3	704	4.4	1523	5.3
Breast (Female)	*	*	4330	26.3	4330	26.3
Cervix Uteri	*	*	523	3.3	523	3.3
Colon and Rectum	2949	25.8	2954	17.4	5903	20.8
Corpus Uteri and Uterus	*	*	279	1.7	279	1.7
Esophagus	934	7.5	263	1.6	1198	4.1
Hodgkin's Disease	69	0.5	55	0.3	124	0.4
Kidney and Renal Pelvis	787	6.5	481	2.9	1268	4.4
Larynx	363	2.9	104	0.6	467	1.6
Leukemia	1268	10.3	1025	6.5	2293	8.1
Liver and Intrahepatic Bile Duct	812	6.7	510	3.0	1322	4.6
Lung and Bronchus	12439	102.7	7366	44.6	19805	68.5
Melanoma of the Skin	689	5.9	411	2.5	1100	3.8
Multiple Myeloma	651	5.6	597	3.5	1248	4.4
Non-Hodgkin's Lymphoma	101	0.9	102	0.6	203	0.7
Oral Cavity and Pharynx	50	0.4	16	0.1	66	0.2
Ovary	*	*	1490	9.0	1490	9.0
Pancreas	1519	12.7	1562	9.2	3081	10.8
Prostate	3180	32.8	*	*	3180	32.8
Stomach	648	5.7	485	2.9	1133	4.0
Testis	32	0.2	*	*	32	0.2
Thyroid	38	0.3	78	0.5	116	0.4
Urinary Bladder	802	7.5	401	2.3	1203	4.3

\*Rates per 100,000 Tennessee residents and age-adjusted to the 2000 U.S. standard population. Rates based on less than six cases are suppressed. ONS = Other Nervous System

**Figure 5. Overall Cancer Mortality Rate by County, Tennessee, 1999 - 2003.**



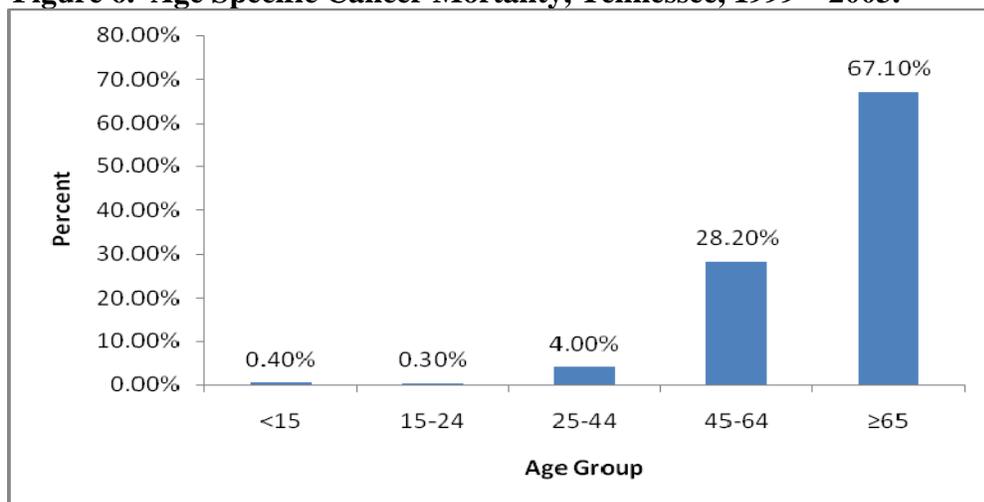
For the years 1999 through 2003 combined, Tennessee's overall cancer mortality rate is 214.7, which is higher than the national mortality rate (195.7) for that same time period. As seen in Figure 5, there are many counties that have mortality rates that are higher than the overall state rate and that of the U.S. Over 70 counties have a higher lung cancer mortality rate than the U.S. rate of 61.0. Thirty-two counties have higher mortality rates of colorectal cancer than the U.S. rate of 52.9. Fourteen counties have breast cancer mortality rates that are above the U.S. rate of 134.4. Only six counties have prostate mortality rates that are higher than the U.S. rate of 173.8. As with cancer incidence rates, cancer mortality rates also differ by gender, age group and racial/ethnic groups. Men have a cancer mortality rate that is twice as high as women in the following cancers: lung, kidney, liver, melanoma, and stomach (see Table 2). The mortality rate for bladder cancer is two times greater in men than women. Esophageal and laryngeal cancer mortality rates are four times higher in men than women. The oral cavity and pharyngeal cancer mortality rates are 30 times greater in men compared to women.

For the years 1999 through 2003, cancer mortality rates were 30 percent higher for blacks (273.1) than for whites (208.0) (See Table 7, p. 38-39). Additionally, rates were 65.5 percent higher for men (283.3) than for women (171.2). In 2003, age-adjusted rates were 33.4 percent higher for black men (358.0 per 100,000) than white men (268.4 per 100,000), and 25.6 percent

higher for black women (210.9 per 100,000) than white women (167.9 per 100,000). The reason/s for these disparities is unknown and will be discussed further in the cancer disparities section.

Cancer is generally a disease of the older population, with increased risk beginning around the age of forty. Premature mortality due to cancer is greater for men than women and for blacks than whites. The largest amount of premature cancer mortality in Tennessee in 2003 occurred in blacks. For the years 1999 through 2003, 51 percent of all cancer deaths in black men and 48 percent in black women occurred before age 69.

**Figure 6. Age Specific Cancer Mortality, Tennessee, 1999 – 2003.**



**Table 3. Age-Specific Cancer Mortality Rates, Tennessee, 1999 – 2003.**

Age at Death	Cases	Rate per 100,000 Population
< 15	242	4.2
15 – 24	227	5.9
25 – 44	2698	32.1
45 – 64	18854	281.5
≥65	44849	1268.3

A Healthy People 2010 goal is to reduce the overall cancer death rate.<sup>3</sup> The U.S. target goal is 159.9 deaths per 100,000 people for all races and genders combined. The baseline cancer death rate for Tennessee in 1998 was 217.5 deaths per 100,000. In 2003, this was reduced to 213.1, a 2 percent decrease, with an additional 25 percent decrease needed to achieve the Healthy People 2010 goal of 159.9 (See Table 5, p. 32). The death rate in blacks decreased 6.5 percent, going from 282.3 in 1998 to 263.9 deaths per 100,000 in 2003. The death rate in whites decreased from 209.5 (1998) to 207.2 deaths per 100,000 in 2003, a 1.1 percent decrease. Female death rates have slightly increased, rising from 172.4 deaths per 100,000 in 1998, to 172.8 in 2003. Death rates in males have decreased from 289.2 in 1998 to 276.7 in 2003, a 4.3 percent decrease.

## Economic Impact

The National Institutes of Health estimates that in 2005 the overall cost of cancer was \$209.9 billion.<sup>4</sup> This includes \$74 billion for direct medical costs (defined as costs associated directly with the diagnosis and/or treatment of cancer that are usually reimbursable by medical insurance policies), \$17.5 billion for lost worker productivity due to illness and \$118 billion for lost worker productivity due to premature death, both of which are indirect medical costs. Tennessee represents approximately 2 percent of the total U.S. population according to 2005 estimated data available from the U.S. Bureau of the Census. Using this proportion of the national annual direct cost for cancer, it is estimated that the total overall annual cost for cancer in Tennessee in 2005 was \$4.2 billion and the total direct medical costs were \$1.5 billion.

**Table 4. The Cost of Cancer in the U.S. and Tennessee in 2005.**

Cancer Type	Estimated Annual Costs in the U.S.	Estimated Annual Costs in Tennessee
Total Cancer Care	\$209.9 billion	\$4.2 billion
Total Direct Medical Costs	\$ 74.0 billion	\$1.5 billion
<b>Direct Medical Costs by Type of Cancer</b>		
Breast Cancer	\$8.1 billion*	\$ 162 million*
Colorectal Cancer	\$8.4 billion*	\$ 168 million*
Lung and Bronchus Cancer	\$9.6 billion*	\$ 192 million*
Prostate Cancer	\$8.0 billion*	\$ 160 million*

\* 2004 estimated costs. Total annual costs of cancer care in 2004 were \$72.1 billion. See Cancer Trends Progress Report, published by the National Cancer Institute.  
[http://progressreport.cancer.gov/doc\\_detail.asp?pid=1&did=2005&chid=25&coid=226&mid=](http://progressreport.cancer.gov/doc_detail.asp?pid=1&did=2005&chid=25&coid=226&mid=)

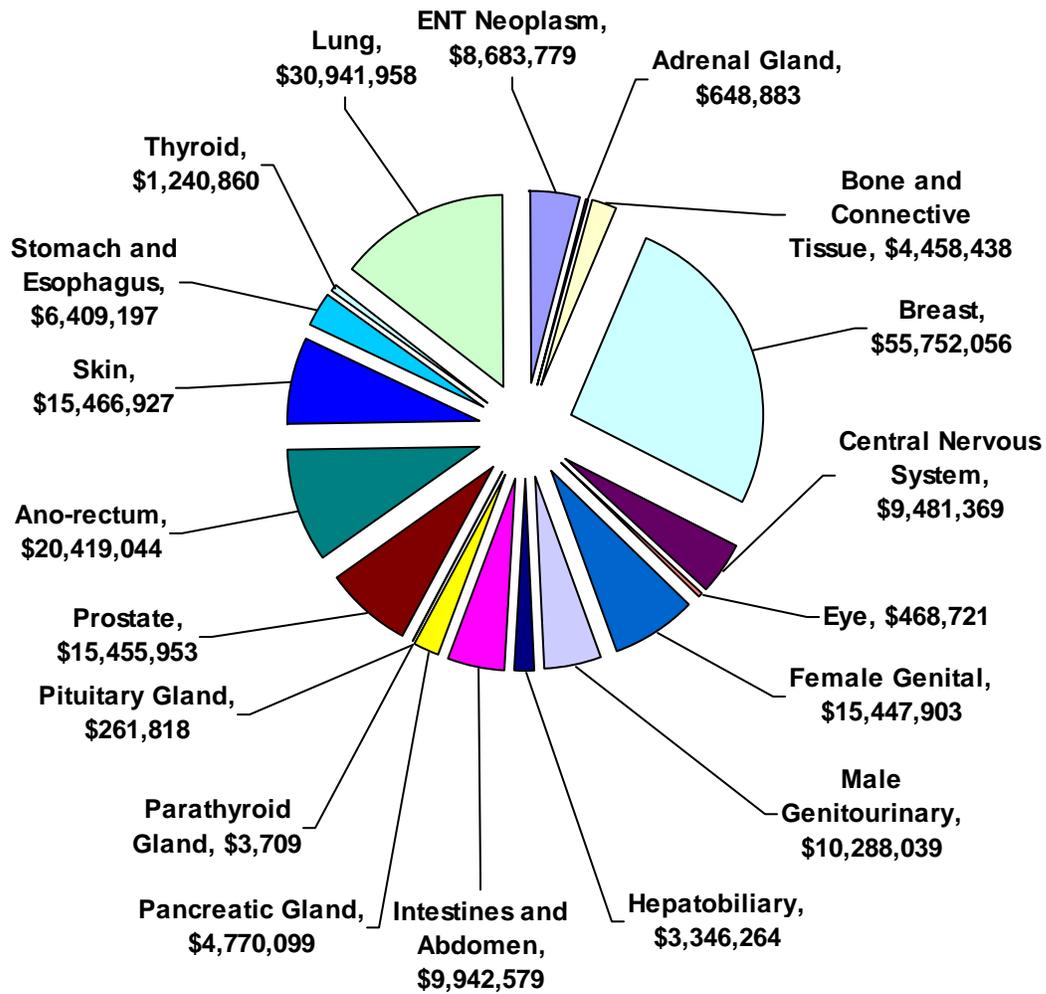
Calculating the burden of cancer is not an easy task, especially when it comes to nonmedical costs such as patient time lost to cancer care. A study from the *Journal of the National Cancer Institute* estimated the value of patient time lost to cancer care was nearly \$2.3 billion in the U.S. in 2005. This amount was only in the first year following diagnosis. This estimation included hours traveling to and from, waiting for, and receiving treatment based on the just over one million newly diagnosed cancer patients in 2005, and using the 2002 median wage rate of \$15.23 per hour.<sup>5</sup> According to the CDC's fact sheet, "Targeting Tobacco Use: The Nation's Leading Cause of Death, At A Glance 2007", the total medical expenditures related to tobacco use were more than \$75 billion per year in the U.S. in addition to another \$92 billion per year resulting from lost productivity.<sup>6</sup>

Medical costs are presented in this section for selected cancer sites and all cancers combined. These medical costs include physician office visits, screening, counseling, diagnostic testing, hospitalization, and prescription drugs. Cost data associated with claims paid for self-insured, fee-for-service plans, and TennCare for the year 2004 were made available from BlueCross BlueShield of Tennessee (BCBST) and are displayed in the following figures. In the figures to be presented, commercial place of service simply refers to charges incurred for individuals not

insured by TennCare. BlueCross BlueShield of Tennessee insures more than 2 million Tennesseans for health plan coverage, representing approximately 40 percent of all Tennesseans.

The true economic costs for goods and services are ideally defined as medical costs. The true economic costs are equivalent to the value of foregone opportunities, otherwise described as opportunity costs. In the healthcare market, the terms medical costs and medical charges are often used interchangeably. However, medical charges typically do not represent the true economic costs of goods and services. Reimbursement to health systems for medical services is greatly influenced by the government and other third-party payers due to their size and financial power. Negotiation and discounted prices by these entities accounts for discrepancies between costs and charges. Expenditures reported in this document reflect discounted medical costs or medical charges, called “direct spending” in the figures that follow.

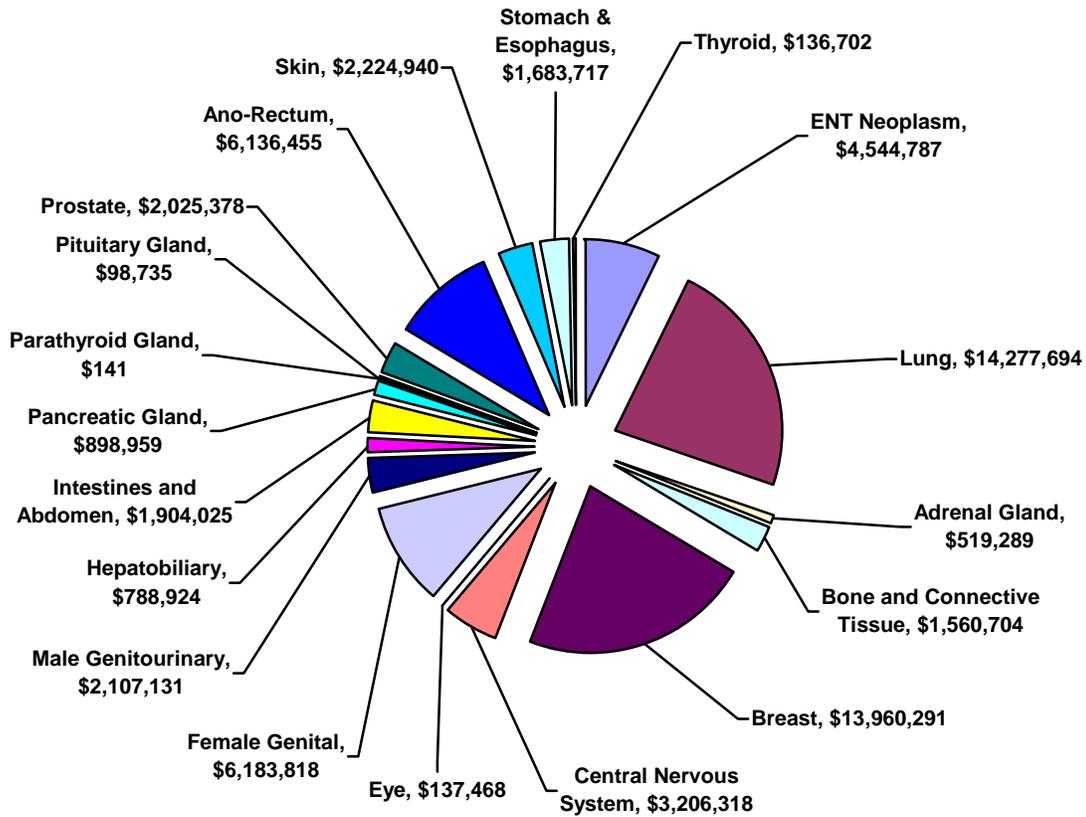
**Figure 7.  
BCBST 2004 Direct Spending by Cancer Type  
Commercial Place of Service**



**Total \$213,487,596**

**Note: Total costs presented exclude prescription drug 'carve out' that is administered by an external pharmacy benefits management company**

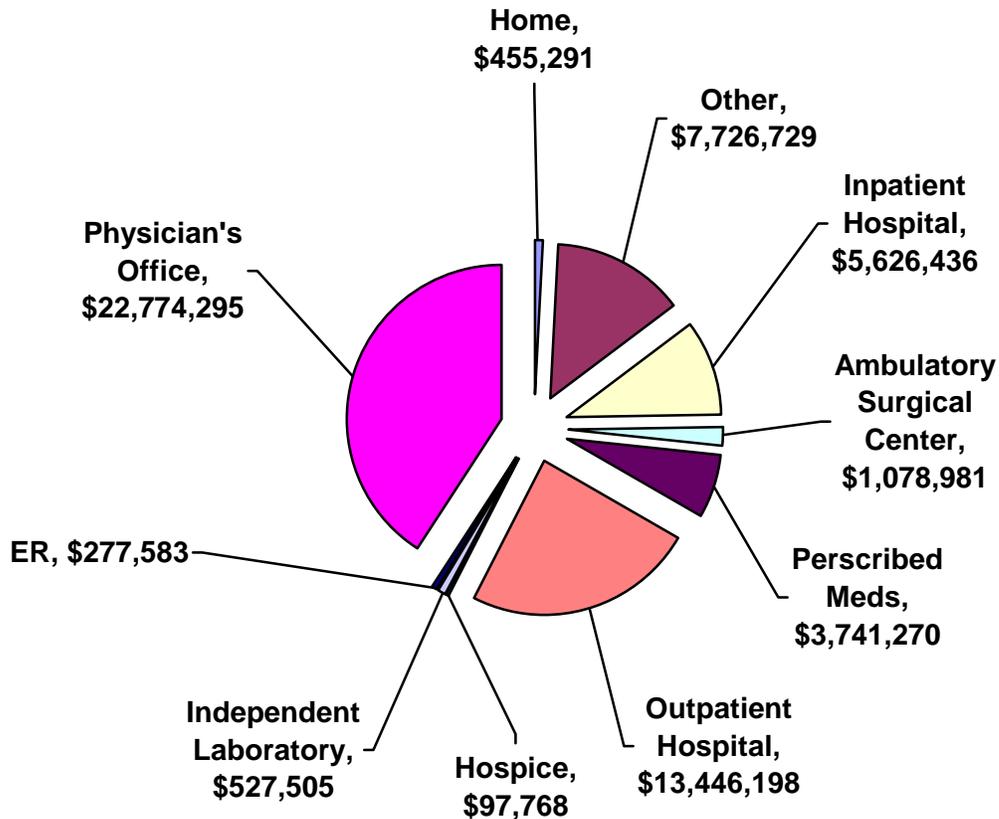
**Figure 8.  
BCBST 2004 Direct Spending by Cancer Type  
TennCare Place of Service**



**Total \$ 62,395,476**

**Note: Total costs presented exclude prescription drug ‘carve out’ that is administered by an external pharmacy benefits management company**

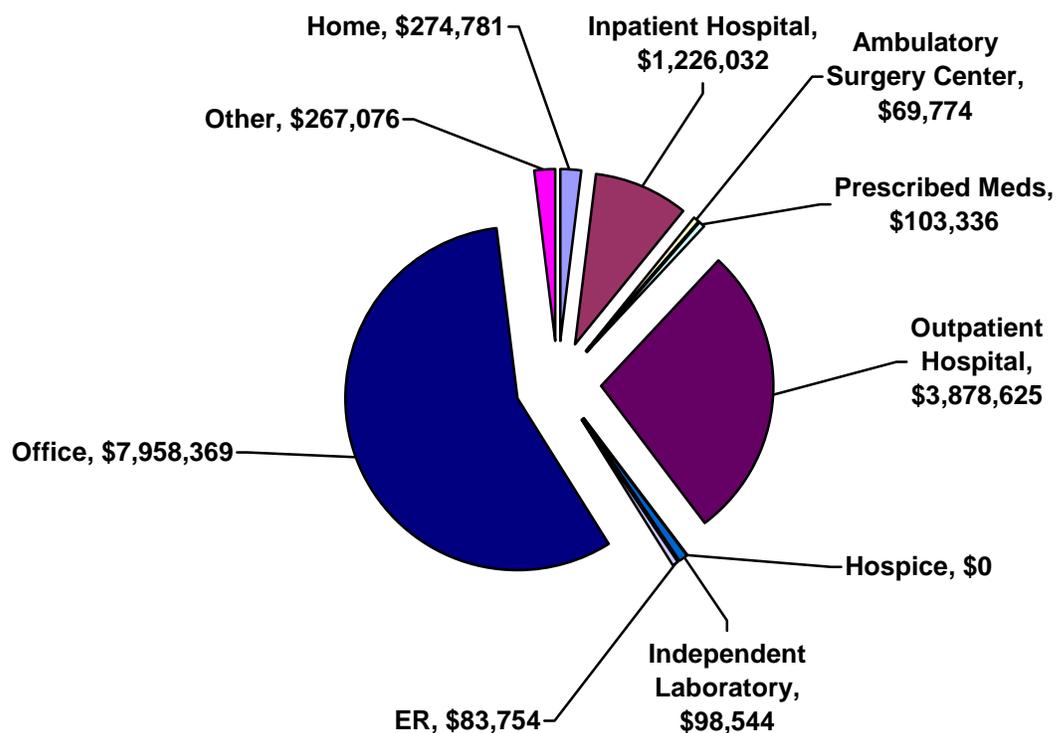
**Figure 9.  
BCBST 2004 Direct Spending for  
Breast Cancer both sexes, Commercial**



**Total \$ 55,752,056**

**Note: Total costs presented exclude prescription drug 'carve out' that is administered by an external pharmacy benefits management company**

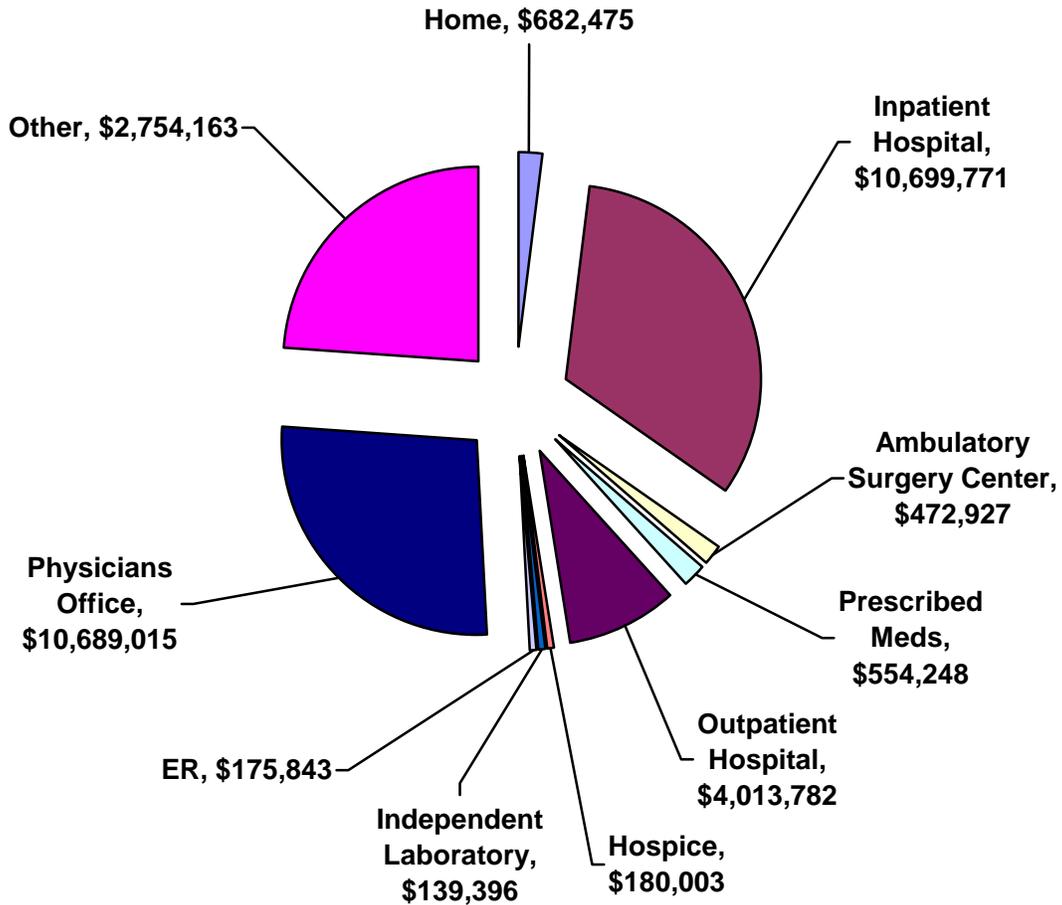
**Figure 10.  
BCBST 2004 Direct Spending for  
Breast Cancer both sexes, TennCare**



**Total \$ 13,960,291**

**Note: Total costs presented exclude prescription drug 'carve out' that is administered by an external pharmacy benefits management company**

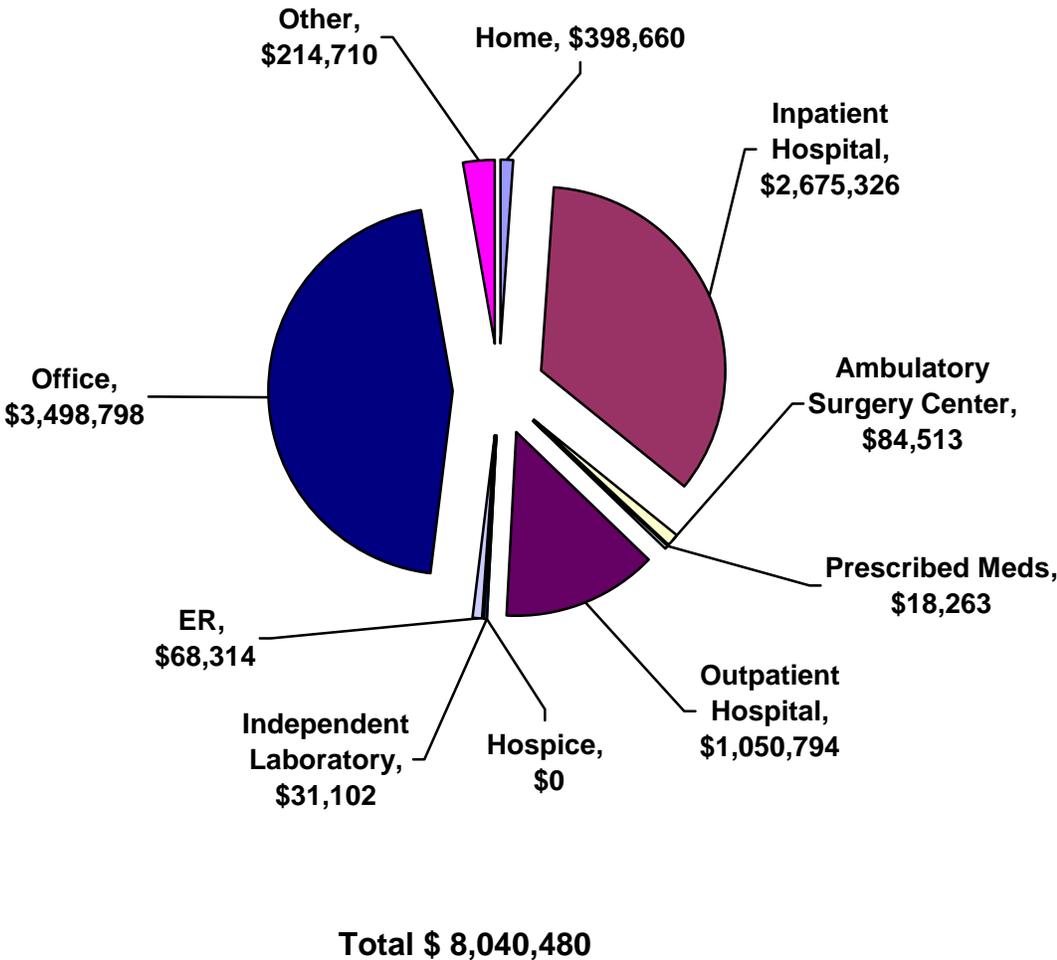
**Figure 11.  
BCBST 2004 Direct Spending for  
Gastrointestinal Cancers, Commercial**



**Total \$ 30,361,623**

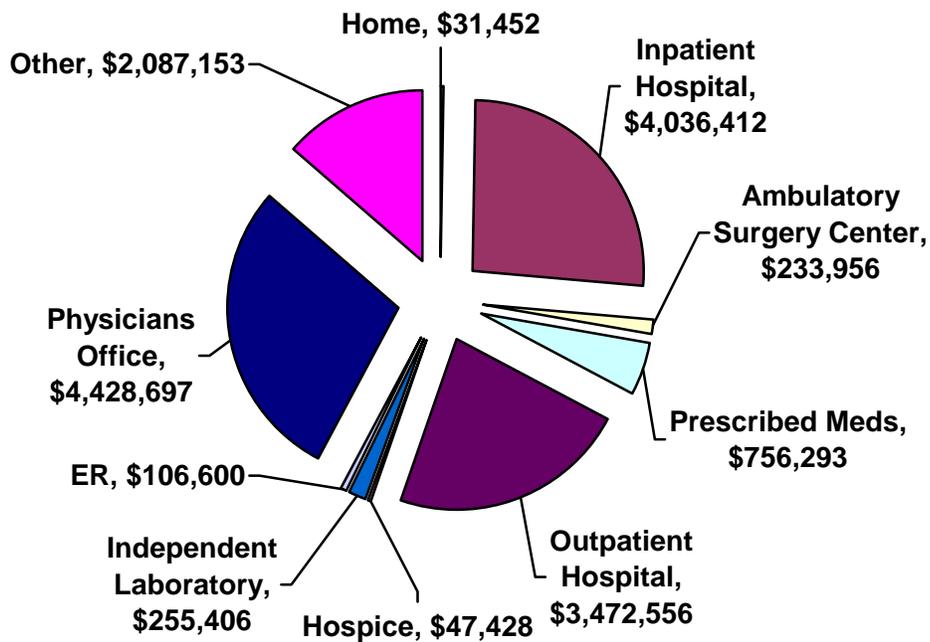
**Note: Gastrointestinal (GI) Cancers include cancers of the small and large intestine, rectum, anus, and associated tissues, such as the peritoneum. Colo-rectal cancers are the most common comprising over 90 percent of these GI cancers, though this distribution may not necessarily be reflective of costs associated with colo-rectal cancers. Total costs presented exclude prescription drug ‘carve out’ that is administered by an external pharmacy benefits management company.**

**Figure 12.  
BCBST 2004 Direct Spending for  
Gastrointestinal Cancers, TennCare**



**Note: Gastrointestinal (GI) Cancers include cancers of the small and large intestine, rectum, anus, and associated tissues, such as the peritoneum. Colo-rectal cancers are the most common comprising over 90 percent of these GI cancers, though this distribution may not necessarily be reflective of costs associated with colo-rectal cancers. Total costs presented exclude prescription drug ‘carve out’ that is administered by an external pharmacy benefits management company.**

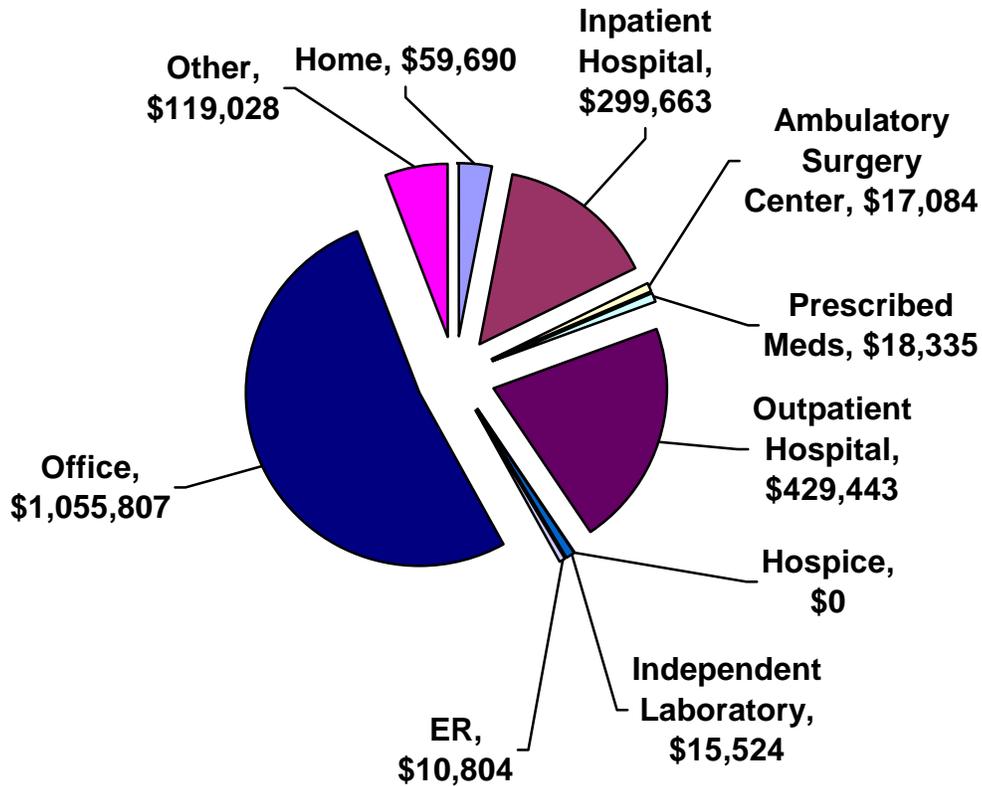
**Figure 13.  
BCBST 2004 Direct Spending for  
Prostate Cancer, Commercial**



**Total \$ 15,455,953**

**Note: Total costs presented exclude prescription drug 'carve out' that is administered by an external pharmacy benefits management company**

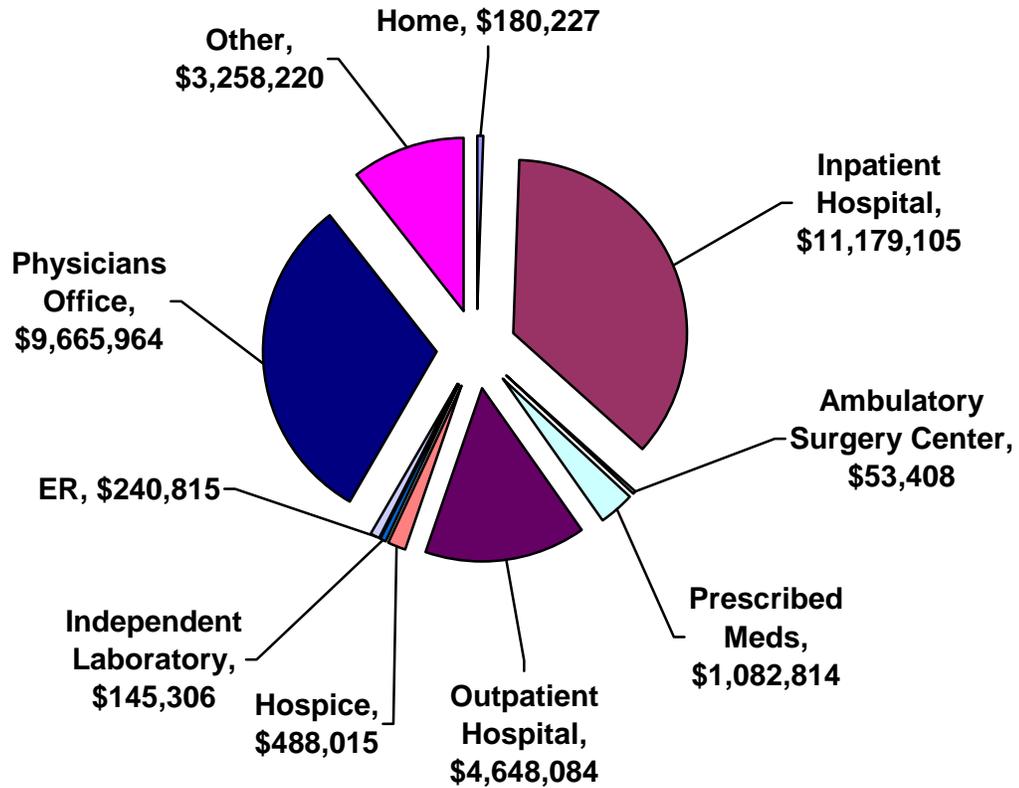
**Figure 14.  
BCBST 2004 Direct Spending for  
Prostate Cancer, TennCare**



**Total \$ 2,025,378**

**Note: Total costs presented exclude prescription drug 'carve out' that is administered by an external pharmacy benefits management company**

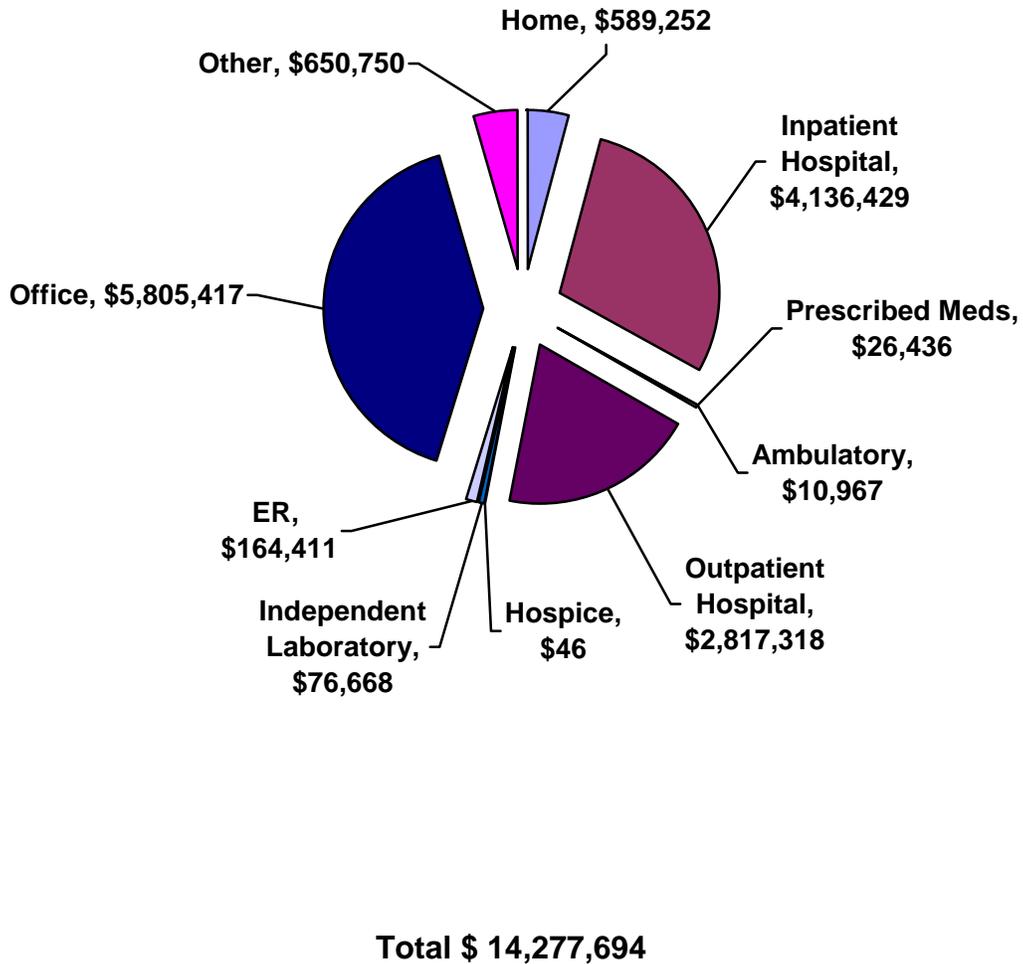
**Figure 15.  
BCBST 2004 Direct Spending for  
Lung Cancer, Commercial**



**Total \$ 30,941,958**

**Note: Total costs presented exclude prescription drug 'carve out' that is administered by an external pharmacy benefits management company**

**Figure 16.  
BCBST 2004 Direct Spending for  
Lung Cancer, TennCare**



**Note: Total costs presented exclude prescription drug ‘carve out’ that is administered by an external pharmacy benefits management company**

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## **Risk Factors for Cancer**

By definition, a risk factor for cancer is a condition or behavior that increases a person's risk of developing cancer, but it does not guarantee that the person will develop the specific disease. Some risk factors are "modifiable;" in other words, the risk factor can be controlled or reduced, and the risk for developing cancer lessened. Risk factors for cancer that cannot be changed are genetic factors, exposure to radiation, age, gender, race, family history of cancer at an early age (that is often due to genetic factors), and previous medical history of cancer. The main modifiable risk factors are use of tobacco products, sun exposure, lack of regular exercise, obesity, and a Western-style diet. Certain behaviors such as individual cancer screening practices and lifestyle choices are relevant to the incidence, morbidity and mortality of breast, cervical, colorectal, lung and prostate cancers. Approximately two-thirds of all cancer cases may be preventable. The most common risk factors are discussed in this section.

Behavior data for Tennessee residents were obtained from the Tennessee Department of Health's Behavioral Risk Factor Surveillance System (TN BRFSS).<sup>7</sup> The TN BRFSS is an ongoing state-level telephone survey that the Tennessee Department of Health regularly conducts in cooperation with the Centers for Disease Control and Prevention (CDC). Each month a random sample of approximately 400 Tennessee adults 18 years or older is interviewed. Survey instruments are designed so that a core set of questions dealing with some of the main risk indicators are asked each year. Additional questions about areas of importance are rotated in and out of the protocol. This design allows for more precise estimates of major risk or health promotion behaviors as well as allowing for a broad range of questions to be included. Tennessee BRFSS data used in this report were collected in the years 2000 through 2005. Tennessee BRFSS reports are available to the public on the Tennessee Department of Health's website at <http://health.state.tn.us/statistics/BRFSS.html> and the CDC's BRFSS website at <http://www.cdc.gov/brfss/>. In this report, TN BRFSS data are included to illustrate trends in prevalence over time for various behaviors relevant to cancer prevention or detection. Nationwide comparisons include U.S. states and the District of Columbia.

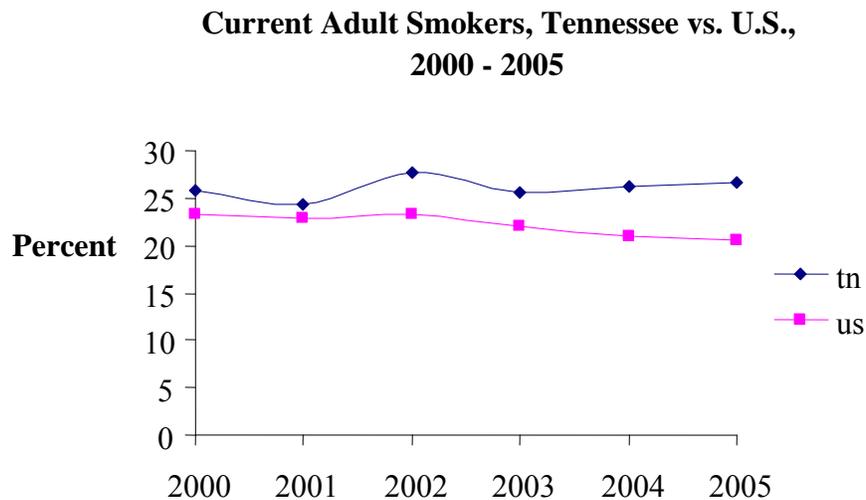
### **Lung Cancer Prevention / Tobacco Use**

Cigarette smoking accounts for approximately one-third of all cancer deaths. It is a major cause of cancers of the oral cavity, larynx, pharynx, esophagus, and lung; it contributes to the development of cancers of the pancreas, bladder, liver, uterine cervix, kidney, colon and rectum, stomach, and some forms of leukemia. According to NCI's "Cigarette Smoking and Cancer" fact sheet, nearly 87 percent of all lung cancer deaths are caused by smoking.<sup>8</sup> Secondhand smoke causes approximately 3,000 lung cancer deaths each year nationally. The 2005 annual health care costs in Tennessee directly caused by smoking was \$2.16 billion, of which approximately \$680 million of that was covered by the state Medicaid program according to the "Toll of Tobacco in Tennessee" provided by the Campaign for Tobacco-Free Kids (<http://www.tobaccofreekids.org/reports/settlements/toll.php?StateID=TN>).<sup>9</sup> The "Toll of Tobacco in Tennessee" report estimated the portion of tobacco industry marketing expenditures spent each year in Tennessee to be \$406.3 million of the \$15.4 billion spent nationwide. Studies have found that tobacco advertising has more of an impact on children than adults. Children are twice as likely to be influenced to smoke by cigarette marketing as by peer pressure. Tobacco

company advertising is also attributable to one-third of underage experimentation with smoking, according to these studies.<sup>9</sup>

More than one-quarter (26.7 percent) of adult Tennesseans reported being current smokers in 2005 according to the TN BRFSS data, compared to 20.6 percent for the U.S. 50 States and the District of Columbia. When compared to other states, Tennessee is tied with West Virginia for the third highest percentage of current smokers. The prevalence of current smoking among adults aged 18 years or older in Tennessee has remained about the same since 2000, whereas nationwide there has been a drop in current smokers by a few percentage points over the same time period (Figure 17). Tennessee has remained above the national rate of adults who reported they were current smokers.<sup>7</sup>

**Figure 17.**



In Tennessee in 2005, among current smokers who had been advised by a health care provider to quit smoking, 63.3 percent reported that medications to assist with quitting were never recommended or discussed, and 62.8 percent reported that methods and strategies to assist with quitting were never recommended or discussed. Of those Tennesseans surveyed in 2005, who had seen a healthcare provider within the past 12 months, 36.1 percent reported never being advised to quit smoking.

### **Sun Exposure**

In Tennessee, the 1999-2003 age-adjusted mortality rate for melanoma was 3.8 per 100,000. This is higher than the U.S. mortality rate of 2.6 per 100,000. The Healthy People 2010 target is 2.5 deaths per 100,000. Although death rates from basal cell and squamous cell carcinomas are low, these cancers can cause considerable damage and disfigurement if they are untreated.

However, when detected early, approximately 95 percent of these carcinomas can be cured. Melanoma is the most serious form of skin cancer and is more likely to spread to other parts of the body. If detected early, it is highly curable.

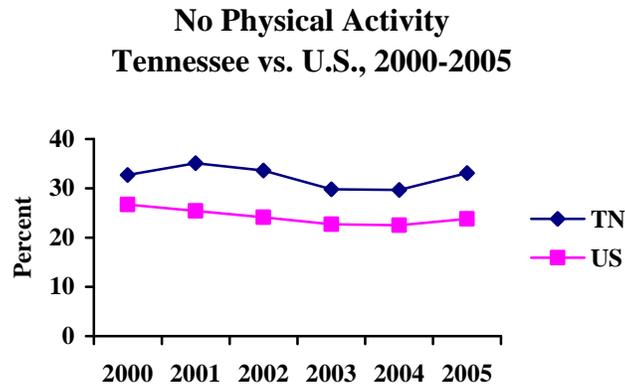
Exposure to the sun's ultraviolet (UV) rays (even if the UV rays do not result in sunburn) appears to be the most important environmental factor involved in the development of skin cancer. UV rays from artificial sources of light, such as tanning beds and sunlamps, are as dangerous as those from the sun and exposure should be minimized. Although both tanning and burning can increase a person's risk for skin cancer, most Americans do not consistently protect themselves from UV rays. A independent telephone survey of parents and primary caretakers of children conducted in the summer of 1998 and sponsored by the CDC found that nationally approximately 43 percent of white children under age 12 had at least one sunburn during the past year.<sup>10</sup> According to the TN BRFSS data, in 2003, 25 percent of people surveyed reported having had a sunburn within the past 12 months, with almost 7 percent of those reporting having been sunburned six or more times. The Healthy People 2010 target is to increase to 75 percent the proportion of adults, 18 or older, who are very likely to use sunscreen with an SPF of 15 or higher, wear protective clothing, or seek shade.<sup>3</sup> This goal however needs to be balanced with the realization that sun exposure is the major source of vitamin D for humans; humans cannot synthesize vitamin D and dietary intake of vitamin D is often inadequate.

### **Lack of Regular Physical Activity**

About one-third of all cancer deaths that occur in the U.S. are due to unhealthy diets and a lack of physical activity. The Centers for Disease Control and Prevention (CDC) recommends that adults engage in moderate-intensity physical activity for at least 30 minutes on five or more days of the week, or engage in vigorous-intensity physical activity for at least 20 minutes on three or more days of the week. To reduce risk of colon cancer and breast cancer, daily requirements should increase. Ideally, regular exercise needs to begin in childhood.

According to 2005 TN BRFSS data, only 36.1 percent of adults met recommended guidelines for any type of physical activity. Only 18.7 percent of adults met recommended guidelines for moderate intensity physical activity, and 17.4 percent met the recommended level for vigorous intensity physical activity. In 2005, 33.1 percent of Tennessee adults reported no physical activity during the last month compared to 23.8 percent for the U.S. 50 states and District of Columbia. Unfortunately, physical activity has not improved much over the past five years for Tennessee or the U.S. Despite repeated health education messages and recommendations in the news media that people become more active, the percent of physically inactive adults has remained about the same (see Figure 18).

**Figure 18.**



### **Overweight or Obesity**

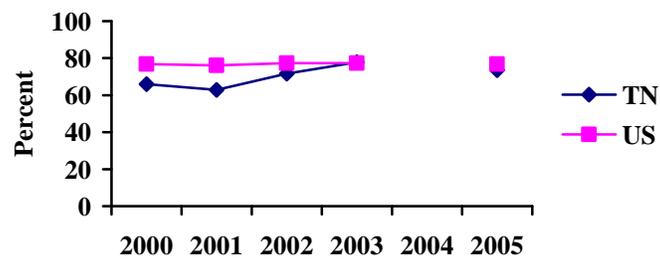
Being overweight or obese increases the risk of cancers of the esophagus, breast (postmenopausal women), kidneys, endometrium, and colon. Those who are considered obese or overweight are twice as likely than healthy people to develop cancer of the esophagus.<sup>11</sup> Overall, cancer mortality is 10 to 25 percent higher for persons with a body mass index (BMI) between 25 to 29.9 (which is considered overweight), and 50 to 100 percent higher for persons with a BMI of 30 or more (which is considered obese). During the last two decades, the percentage of overweight and obese adults and children has been steadily increasing. About one-third of adults in the U.S. are considered obese, an increase of 7.6 percent since 1994. In 2005, 62.3 percent of Tennesseans reported being overweight or obese.<sup>7</sup>

People whose diets are rich in fruits and vegetables have a lower risk of getting cancers of the colon, mouth, pharynx, esophagus, stomach, and lung, and possibly prostate cancer.<sup>11</sup> High fat diets are associated with an increased risk of cancers of the colon and prostate. Preventing weight gain can reduce the risk of many cancers. A diet high in fruits and vegetables helps to reduce calorie intake and may help to control weight. In 2005, 26.5 percent of Tennesseans reported they consumed fruits and vegetables five or more times per day, versus the 23.2 percent nationwide.<sup>7</sup> Experts recommend that people establish habits of healthy eating and physical activity early in life to prevent overweight and obesity.

The Healthy People 2010 target is for at least 75 percent of the population to consume the minimum of two daily servings of fruits and at least 50 percent of the population to consume the minimum of three servings of vegetables, with at least one-third being dark-green/orange.<sup>3</sup> This predates the 2005 Dietary Guidelines for Americans which recommend higher intakes, nine servings combined.

**Figure 19.**

**Adults That Consume Less Than 5 Fruits  
or Vegetables a Day,  
Tennessee vs. U.S., 2000-2005**



Note: The BRFSS did not survey Americans for fruit and vegetable consumption during 2004.

## Selected Cancers

This section highlights the top cancers in Tennessee and those addressed in the Healthy People 2010 goals.<sup>3</sup> Healthy People 2010 goals are designed to increase quality and years of healthy life and to eliminate health disparities. The 1998 data serves as baseline mortality data from which change is to be measured. The following table presents the baseline and target mortality rates for Tennessee based on Healthy People 2010 and presents progress through 2003 towards meeting the target.

**Table 5. Healthy People 2010 Goals per Cancer Site**

Cancer Type	1998 TN Mortality Rate*	Healthy People 2010 Percent Decrease	Healthy People 2010 Target Mortality Rate*, TN	2003 TN Mortality Rate*	Percent Change in TN 1998 to 2003
All Cancers	217.2	26.4%	159.9	213.0	1.9 ↓
Lung/Bronchus	69.0	34.9%	44.9	67.8	1.7 ↓
Female Breast	28.5	21.8%	22.3	27.6	3.2 ↓
Colorectal	21.7	35.9%	13.9	20.7	4.6 ↓
Prostate	35.2	18.2%	28.8	32.6	7.4 ↓
Melanoma (Skin)	3.2	21.9%	2.5	2.7	15.6 ↓

\* Rates are age-adjusted to the U.S. 2000 standard population, 5-year age groups, per 100,000 people.

### Lung and Bronchus

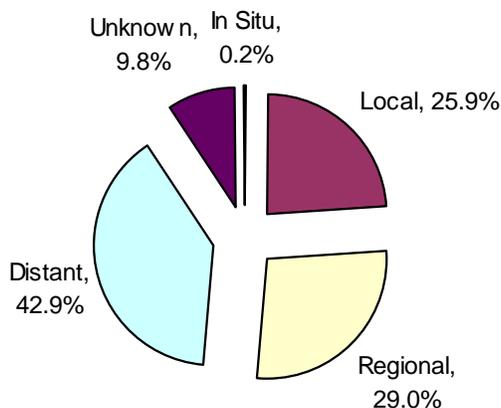
Approximately 4,600 cases of lung cancer are diagnosed in Tennessee annually.<sup>1</sup> There are approximately 4,000 deaths caused by lung cancer each year in Tennessee. During 1999-2003, cancer of the lung and bronchus occurred about twice as often among Tennessee men as among Tennessee women (98.9 per 100,000 Tennessee men and 52.2 per 100,000 Tennessee women). Overall, Tennessee has a higher incidence rate of lung and bronchus cancer than that of the U.S. (71.7 vs. 68.1). Of the 95 counties in Tennessee, 60 have higher incidence rates than the U.S. In 1999-2003, cancer of the lung and bronchus remained the leading cause of cancer-related death in Tennessee for both men and women. Cancer of the lung and bronchus accounted for slightly less than one of every three deaths due to cancer in Tennessee.<sup>1</sup>

Cigarette smoking is attributed as the major risk factor for lung/bronchus cancer. According to National Cancer Institute's "Cigarette Smoking and Cancer" Factsheet (<http://www.cancer.gov/cancertopics/factsheet/tobacco/cancer>), smoking can be attributed to 87 percent of all lung cancer deaths.<sup>11</sup> Environmental or occupational exposures may also increase risk of developing lung cancer. The TN BRFSS survey estimates that the smoking prevalence rate for the 1997 to 2003 time period for the state has been between 26.0 and 27.7 percent.<sup>6</sup>

Females had an increase in the death rate for lung cancer, rising from 43.2 in 1998 to 47.1 in 2003, a 9.0 percent increase. Males, however, had a 7.6 percent decrease, 106.1 to 98.0 deaths per 100,000.

**Figure 20.**

**Cancer of the Lung & Bronchus  
Stage of Disease at Diagnosis  
Tennessee Residents, 1999 - 2003**



**Female Breast**

Cancer of the breast was the most commonly diagnosed cancer among Tennessee women. Each year from 1997 through 2003, approximately 3,700 Tennessee women were diagnosed with breast cancer. Compared to women aged 25-44, those aged 45-64 were over four times more likely to be diagnosed with breast cancer and those 65 years of age and older were almost seven times more likely. The incidence of female breast cancer increases markedly with age. Breast cancer is one of the leading causes of cancer death in women in the United States, resulting in over 40,000 cases each year.<sup>12</sup> There were 931 deaths caused by breast cancer in 2003 in Tennessee.

According to 2004 Tennessee BRFSS data, among Tennessee women aged 40 years or older, 78.0 percent reported having a mammogram within the past two years compared to 74.9 percent of women nationally. Among those women surveyed in Tennessee in 2004, 80.2 percent of black women reported receiving mammograms and 77.4 percent of white women. Women surveyed nationwide who received mammograms within the last two years were 75.4 and 75.1 percent for blacks and whites respectively. Sixty-five percent of women surveyed in 2004 with less than a high school education reported having a mammogram within the past two years versus 85.6 percent of women that were college graduates.<sup>7</sup>

Along with age, risk factors for breast cancer include heredity, a family history, early age at menarche, nulliparity, and having one's first child after the age of 30. Please see the American Cancer Society's Cancer Facts and Figures for more information.<sup>12</sup>

From 1998-2003 in Tennessee, breast cancer in white females has declined by 8.4 percent, but has increased by 11.9 percent in black females. For 1998-2003, mortality rates for black women remained relatively stable; mortality rates for white women may have decreased slightly.

## **Colorectal**

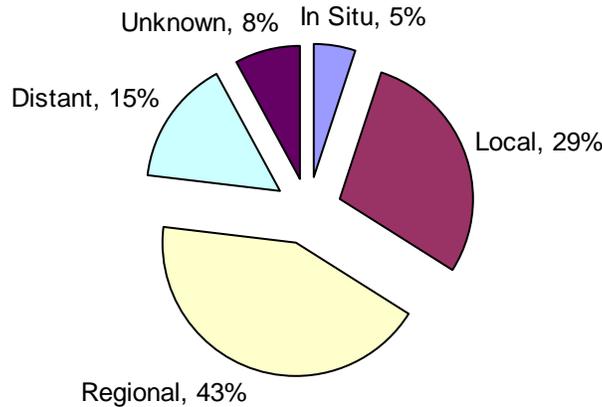
Approximately 1,200 deaths each year in Tennessee are due to colorectal cancer. The 1999-2003 age-adjusted colorectal cancer mortality rate in Tennessee was 20.8 per 100,000 population.<sup>1</sup> This is slightly higher than the U.S. rate of 19.6 per 100,000. The mortality rate for colorectal cancer is higher in Tennessee males than in females, 25.8 versus 17.4 per 100,000 for the years 1999-2003 combined. Tennessee blacks have a higher mortality rate than whites, 32.8 versus 19.3 for the same years combined. This trend is also seen in the incidence of colorectal cancer, with blacks having a higher incidence than whites, 55.4 versus 46.7. Cancer of the colon and rectum was the third most common primary cancer diagnosed in both Tennessee men and women. Colorectal cancer was over four times more common among those aged 65 years of age and older compared to individuals aged 45-64.

Colorectal cancer can affect anyone. The lifetime risk of being diagnosed with cancer of the colon or rectum is about 5.6 percent for men and about 5.2 percent for women in the U.S.<sup>11</sup> Although 15 percent of colorectal cancer cases occur among individuals with a family history of colorectal cancer or a predisposing illness, about 85 percent of cases occur in people without these risk factors. In the U.S., more than 90 percent of colorectal cancer cases occur in persons over the age of 50. Other risk factors include inflammatory bowel disease, a personal family history of colorectal cancer or colorectal polyps, and certain hereditary syndromes. Lifestyle factors that may contribute to increased risk of colorectal cancer include lack of regular physical activity, low fruit and vegetable intake, a low-fiber and high-fat diet, obesity, alcohol consumption, and tobacco use.<sup>12</sup>

Colorectal screening is an effective method for detecting cancers and is generally recommended for all individuals not in a high risk group over the age of 50 years old. In 2004, 29 percent of Tennesseans aged 50 and older reported having a Fecal Occult Blood Test within the past two years, versus 26.5 percent nationwide. Of those Tennesseans surveyed in 2004, 29.6 percent of whites and 22.4 percent of blacks reported having had a blood stool test within the past two years (TN BRFSS) versus 27.5 percent and 24.1 percent nationally. In this same year, only 50.6 percent reported ever having a sigmoidoscopy or colonoscopy, versus 53.5 percent nationwide. Fifty-one percent of white Tennesseans aged 50 and older reported ever having had a sigmoidoscopy or colonoscopy. This was a significant increase from the previous year surveyed, 2002, of 47.4 percent. No total was listed for blacks in Tennessee for 2004, but was 39.8 percent for 2002.<sup>7</sup>

**Figure 21.**

**Cancer of the Colon & Rectum  
Stages of Disease at Diagnosis  
Tennessee Residents, 1999 - 2003**



**Prostate**

Approximately 3,083 new cases were diagnosed in Tennessee in 2003, and 673 deaths occurred due to prostate cancer.<sup>1</sup> Prostate cancer incidence and mortality rates remain significantly higher in African American men than in white men. Cancer of the prostate was the most commonly diagnosed cancer among males in Tennessee during 1997-2003, with over 19,000 men diagnosed. Cancer of the prostate in Tennessee was the second leading cause of cancer-related mortality in men during 1999-2003. It accounted for approximately one in ten male cancer deaths.

Age is a major risk factor in the development of prostate cancer. About 80 percent of all prostate cancers are diagnosed in men aged 65 and older. African American men are more likely to be diagnosed with prostate cancer than Caucasian men and are more than twice as likely to die from it. A diet high in fat may also be a risk factor according to international studies.<sup>12</sup>

**Cervical**

Of the over 12,000 cases of invasive cervical cancer diagnosed in the United States in 2003, approximately 300 occurred in Tennessee. Cervical cancer accounted for over 4,000 deaths in the U.S. in 2003. It was once one of the most common causes of cancer death for American women. Cervical cancer tends to occur in midlife. Half of women diagnosed with this cancer are between the ages of 35 and 55. It rarely occurs in women younger than 20. In the U.S., cervical cancer occurs most often in Hispanic women; the rate is over twice that in non-Hispanic

white women. African-American women develop this cancer about 50 percent more often than non-Hispanic white women and have double the mortality rate<sup>11</sup>. In Tennessee, the cervical cancer incidence rate for the years 1999 through 2003 for African-American women was 52 percent higher than in whites (12.0 vs. 7.9).

Certain factors increase a woman's risk of developing cervical cancer. A woman can best protect herself from cervical cancer by: limiting her number of sexual partners, getting screened regularly, following up any abnormal test results as recommended by her health care provider, and not smoking. Human papillomavirus (HPV) infection increases the risk of developing cervical cancer.<sup>12</sup>

The Healthy People target goal for cervical cancer is 2.2 deaths per 100,000 females. The mortality rate for Tennessee was 3.4 in 1998 and 2.9 in 2003, a 14.7 percent reduction. A dramatic 25.0 percent decrease was seen in white females when comparing 1998 cervical cancer mortality rates with those for 2003, but there was a 21.6 percent increase in black females for the same time points.

### **Melanoma (Skin Cancer)**

Melanoma is the least common type of skin cancer, but the most serious. It can spread quickly to other parts of the body, so early detection and treatment is important. In Tennessee, the mortality rate for melanoma was 2.8 per 100,000 population for the years 1999-2003 combined, with approximately 164 deaths occurring each year. In Tennessee, whites had a four times greater mortality rate of melanoma as compared to blacks in 2003, 3.00 versus 0.74 per 100,000. Tennessee has approximately 280 melanoma incidence cases reported each year. Cancer incidence for melanoma may be underreported in Tennessee due to the fact that more treatment and diagnosis is being conducted at private physicians' offices versus hospitals. Private physicians do not currently report cases to the TCR, with the exception of one dermatology clinic and a pilot study including three urologists. The incidence rate is five times higher in whites than in blacks, 5.5 versus 0.3 per 100,000 for the years 1999-2003 combined.

Many different factors increase risk for melanoma. Some factors include having fair skin, severe sunburns as a child, a family history of melanoma, having had melanoma in the past, exposure to UV rays from tanning beds and having more than fifty moles on the skin. Melanoma can be found anywhere on the skin. In men, it is found more often between the shoulders and hips, or on the head and neck area. In women, melanoma is more likely to be found on the lower legs and between the shoulders and hips.

## **Cancer Disparities**

A substantial body of scientific literature documents racial/ethnic and low-income population differences in behavioral, environmental and other risk factors related to cancer. Access to, and delivery of, quality health care and differences in cancer screening, follow-up, treatment, palliative care, and pain management are all factors related to racial/ethnic and geographic and socioeconomic status (SES) disparities in cancer rates. These health care factors play a pivotal role in cancer prognosis, stage, survival, mortality and recurrence for minorities and the poor.

In Tennessee, increasing attention is being placed on reducing and eliminating health disparities. While major efforts are underway to define and describe disparities, the identification of specific factors that cause disparities and how these factors are interrelated is complex and poorly understood. Interventions to reduce these disparities are even more poorly understood. As on the national level, Tennessee cancer disparities occur in a variety of categories including race/ethnicity, geographic, gender, age, and socioeconomic status.

### **Racial Disparities**

Racial and ethnic minorities and underserved communities in Tennessee suffer distinct disadvantages in accessible health care services for cancer prevention, screening and follow up, early detection and treatment. Racial/ethnic disparities in cancer incidence and mortality by cancer type can be found in Tables 6 and 7. Data on disparities have focused on the two largest segments of the population, blacks and whites, which make up 97 percent of the state's population. Because of this fact, this document will use blacks and whites for comparisons. Figure 22 shows the distribution of blacks by county in Tennessee, with the largest populations in Shelby county and other metro counties including Madison, Davidson, Knox and Hamilton.

The overall cancer incidence rate for blacks and whites is very similar (399.8 vs. 400.1).<sup>1</sup> The incidence rate is higher in whites for most specific cancers, except cervix uteri, colorectal, kidney, larynx, liver, multiple myeloma, pancreas, prostate and stomach (see Table 6). Blacks in Tennessee have the highest overall cancer mortality rates (271.3 vs. 208.0 for whites), as well as the highest mortality rates for many specific cancer sites, including the highest rates for colorectal, oral cavity and pharynx, esophagus, stomach, liver, pancreas, larynx, female breast, cervix, uterus, prostate, and multiple myeloma (see Table 7).

**Table 6. Cancer Incidence in Tennessee by race, 1999 – 2003, total includes all races.**

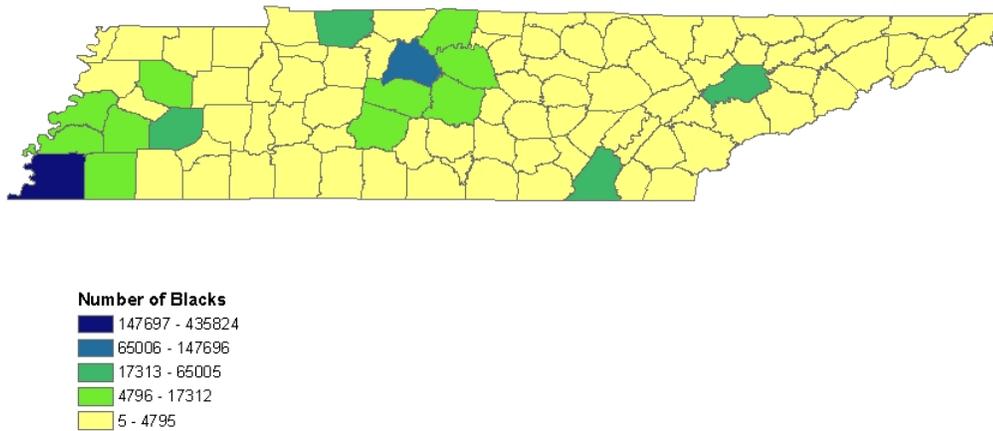
Site	All Whites		All Blacks		Total	
	Cases	Rate	Cases	Rate	Cases	Rate
Brain and ONS	1592	6.4	140	3.2	1755	6.0
Female Breast	16145	117.6	2257	106.8	18588	116.5
Cervix Uteri	1005	7.9	265	12.0	1290	8.4
Colon and Rectum	11819	46.7	1835	55.4	13761	48.7
Corpus Uteri and Uterus	2531	18.2	288	14.4	2844	17.6
Esophagus	978	3.8	202	5.9	1855	4.0
Hodgkin's Disease	279	1.2	40	0.8	325	1.1
Kidney and Renal Pelvis	2991	11.8	497	14.0	3514	12.0
Larynx	1205	4.6	190	5.6	1403	4.7
Liver and Intrahepatic Bile Duct	608	2.4	124	3.4	755	2.6
Lung and Bronchus	18601	72.4	2238	67.6	20946	71.7
Melanoma of the Skin	1387	5.5	11	0.3	1412	4.8
Multiple Myeloma	473	1.9	117	3.6	954	2.1
Non-Hodgkin's Lymphoma	1916	7.6	171	4.6	2104	7.3
Oral Cavity and Pharynx	110	0.4	24	0.7	134	0.4
Ovary	1725	12.5	204	10.0	1950	12.1
Pancreas	2122	8.4	374	11.5	2523	8.8
Prostate	12268	107.7	2066	157.8	14451	113.1
Stomach	1296	5.1	307	9.3	1620	5.6
Testis	542	4.6	19	0.9	566	4.0
Thyroid	1827	7.4	169	4.2	2029	6.9
Urinary Bladder	4362	17.2	278	8.7	4667	16.2
All Cancers Total	101643	400.1	13781	399.4	116443	399.8
*Rates per 100,000 Tennessee residents and age-adjusted to the 2000 U.S. standard population. ONS = Other Nervous System						

**Table 7. Cancer Mortality for Tennessee by race, 1999 – 2003, total includes all races.**

Site	All Whites		All Blacks		Total	
	Cases	Rate	Cases	Rate	Cases	Rate
Brain and ONS	1396	5.6	115	3.0	1523	5.3
Female Breast	3590	25.1	727	34.8	4330	26.3
Cervix Uteri	369	2.8	151	7.1	523	3.3
Colon and Rectum	4830	19.3	1052	32.8	5903	20.8
Corpus Uteri and Uterus	228	1.6	50	2.6	279	1.7
Esophagus	964	3.8	230	6.9	1198	4.1
Hodgkin's Disease	109	0.4	14	0.3	124	0.4
Kidney and Renal Pelvis	1105	4.4	162	4.9	1268	4.4
Larynx	373	1.4	93	2.7	467	1.6
Liver and Intrahepatic Bile Duct	1081	4.3	211	6.2	1322	4.6
Lung and Bronchus	17328	68.0	2427	74.7	19805	68.5
Melanoma of the Skin	1066	4.3	33	1.0	1100	3.8
Multiple Myeloma	1004	4.0	238	7.4	1248	4.4
Non-Hodgkin's Lymphoma	186	0.7	17	0.5	203	0.7
Oral Cavity and Pharynx	47	0.2	19	0.6	66	0.2
Ovary	1318	9.1	168	8.4	1490	9.0
Pancreas	2571	10.2	499	15.7	3081	10.8
Prostate	2436	28.4	742	72.9	3180	32.8
Stomach	862	3.4	260	8.0	1133	4.0
Testis	29	0.3	*	*	32	0.2
Thyroid	106	0.4	10	0.3	116	0.4
Urinary Bladder	1059	4.2	142	4.6	1203	4.3
All Cancers Total	52427	208.0	8874	271.3	61525	214.7

\*Rates per 100,000 Tennessee residents and age-adjusted to the 2000 U.S. standard population. Rates based on less than 6 cases are suppressed.

**Figure 22. Blacks by County, Tennessee, 2000**



### **Geographic Disparities**

Tennessee is a geographically diverse state, with three grand divisions, consisting of 95 counties with a total land area of 41,217 square miles.<sup>13</sup> The population in the 2000 U.S. Census was nearly 5.7 million residents in 336 incorporated cities, towns, and communities. The population ranges from 4,945 in Pickett county to 897,472 in Shelby county, with 36.4 percent of Tennessean's living in rural areas. The state has six metropolitan counties: Davidson, Hamilton, Knox, Madison, Shelby, and Sullivan.

Fifty of Tennessee's 95 counties are in the area considered to be a part of the Appalachian region; the other 45 counties are classified as non-Appalachian (see Figure 23). Appalachia refers to the area around the Appalachian Mountains. The Appalachian chain is the major mountain system of eastern North America, covering more than 1,500 miles of territory from the Canadian province of Quebec to northern Alabama. The Great Smoky Mountains along the North Carolina and Tennessee border are included in the Appalachian chain.<sup>14</sup> The definition of Appalachia has varied through the years with focus remaining mainly on economic types.

**Figure 23. Appalachian versus Non-Appalachian Counties in Tennessee, 2003.**

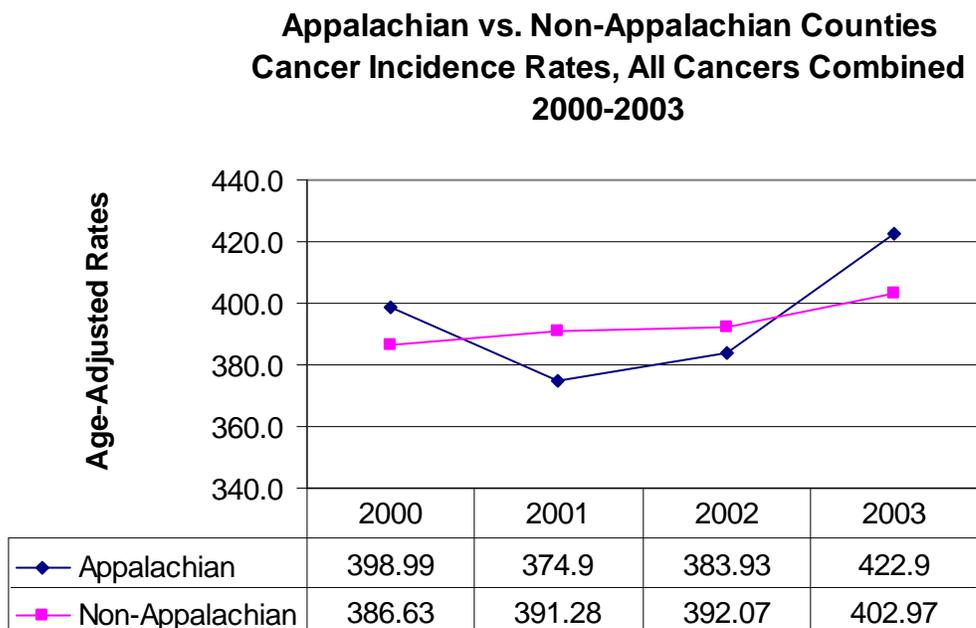


Thirteen states and 410 counties are included in the Appalachian region. This region contains pockets of rural isolation and parts of large metropolitan areas, such as Knoxville. A variety of economic differences exists in this area. Many areas continue to be almost as economically depressed as they were in the late 1960's. Many other areas, however, have an economic status that approaches, and in some cases, surpasses that of the U.S. as a whole.

In general, the entire Appalachian region has a higher mortality rate for all cancers combined than the U.S., 178.6 versus 171.4 respectively.<sup>15</sup> For Tennesseans, however, the mortality rate for all cancers is lower in the Appalachian counties versus non-Appalachian counties (107.1 vs. 123.9). This is also true for the incidence of all cancers (192.8 vs. 206.2). According to the Appalachian Tri-State (KY, TN and WV) Area Incidence Tool, there is no significant difference in cancer mortality for all cancers combined for the Appalachian counties versus the non-Appalachian counties for the combined years of 1998 through 2002.<sup>16</sup> But for specific cancers such as lung, colorectal, breast, prostate and melanoma mortality rates, the Appalachian counties are significantly higher than the non-Appalachian counties. This website ([http://cancer-rates.info/racdp\\_mort/](http://cancer-rates.info/racdp_mort/)) combines data from all three states, Kentucky, Tennessee and West Virginia, for these calculations. For Tennessee, the cancer incidence rate for Appalachian

counties versus non-Appalachian counties for the years 2000 through 2003 for all cancers combined is shown in Figure 24. There is no significant difference between the areas or years.

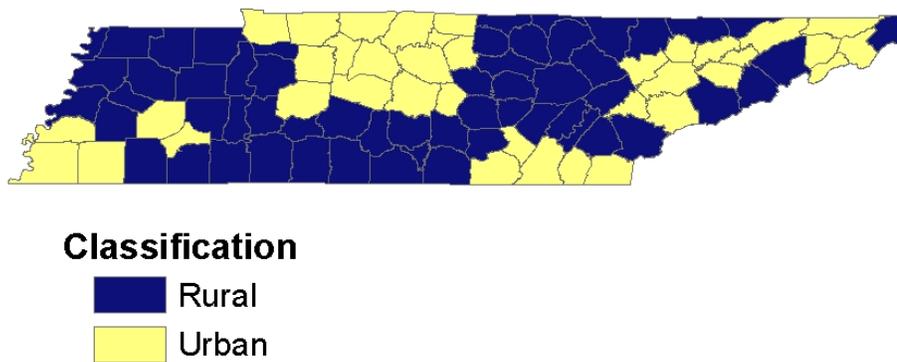
**Figure 24. Cancer Incidence Rates in Tennessee for Appalachian and Non-Appalachian counties for the years 2000 through 2003.**



According to the Cultural Competence in Cancer Care: A Health Care Professional’s Passport, Appalachians are more likely to have risk factors that increase cancer incidence and mortality including tobacco use, high fat diet, physical inactivity, and inadequate access to medical care. They are less likely to receive early detection screening tests for cancer. Although more than 80 percent of Tennesseans overall reported having some kind of health care coverage from the years 1995 through 2005 (TN BRFSS), barriers still exist in the Appalachian area. Barriers to cancer care include lack of primary and specialty care services. While the number of physicians in the Appalachian area has grown, many are clustered in urban areas. Other barriers include physical distance, mountainous terrain, lack of public or private transportation to and from health care facilities, lack of health insurance, and inability to pay for prescription cancer drugs.<sup>15</sup>

Populations from rural counties experience health disparities based partially on the isolated location and reduced access to resources and income, and population size. Barriers to cancer prevention, detection, diagnosis, and treatment exist in Tennessee’s rural and urban communities. In Tennessee, sixteen counties are ranked as completely rural according to the 2003 Rural-Urban Continuum Codes produced by the U.S. Department of Agriculture’s Economic Research Service.<sup>17</sup> Counties ranked as completely rural counties are as follows: Bledsoe, Clay, Crockett, Decatur, Fentress, Grundy, Hancock, Houston, Jackson, Lake, Meigs, Moore, Perry, Pickett, Van Buren, and Wayne. According to these same codes, fifty-seven counties are considered rural and thirty-eight urban (see Figure 25).

**Figure 25. Rural or Urban Classifications for Counties in Tennessee, 2003.**



### **Socioeconomic Status Disparities**

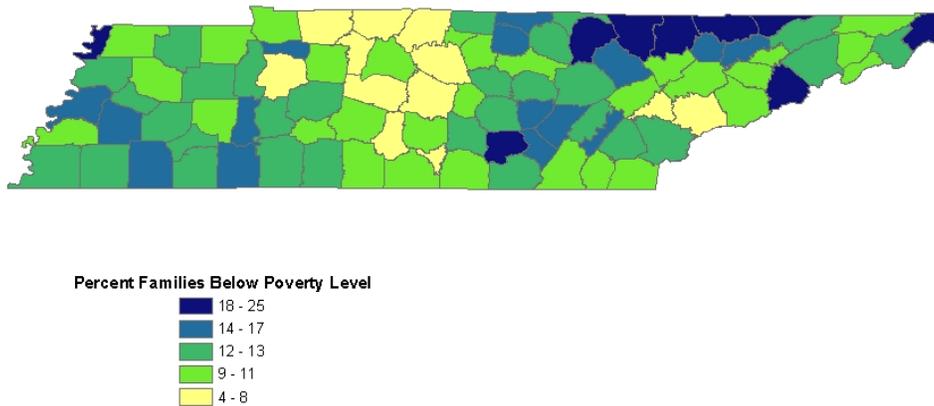
Socioeconomic status (SES) is one of the major determinants of health. According to the U.S. Department of Health and Human Service's Healthy People 2010 report, higher socioeconomic groups experienced greater health gains compared to lower socioeconomic groups. Lower SES has been associated with higher cancer risk behaviors, as well as, poorer cancer outcomes, particularly for cancers of the breast, colon and prostate. Cancer mortality rates in the U.S. are significantly higher in the lower socioeconomic groups. Contributing factors associated with lower SES may include lower educational level, culture, ethnic/cultural beliefs, and access to adequate health care. The U.S. Census Bureau reports that in 2000, 24.1 percent of Tennesseans had less than a high school education (18.4 percent of U.S.) with approximately 19.6 percent of the population over 25 years of age holding a bachelor's degree or higher. Tennessee's per capita income for 2005 was \$22,090 and ranked 43<sup>rd</sup> in median family income (\$47,950 per Tennessee family) according to the U.S. Census Bureau for 2005.<sup>13</sup> In 2005, 15.5 percent of Tennesseans were below the poverty level.

**Figure 26. Percent of Population with Less than a High School Education by County, Tennessee, 2000.**



Counties in the northcentral to northeastern part of the state, which are also rural Appalachian counties, have the highest percent population with less than a high school education (37-45 percent) (see Figure 26). The metropolitan counties tend to have a lower percent of the population with less than a high school education. Counties with the lowest percent of the population with less than a high school education (10-21 percent) include: Shelby, Madison, Montgomery, Hamilton, Anderson, Knox, Davidson, Williamson, Rutherford, Wilson, and Sumner.

**Figure 27. Percent of Population of Families Below Poverty Level by County, Tennessee, 2000.**



The majority of counties with the highest percentage of families below poverty level (18-25 percent) are located in the eastern section of the state (see Figure 27). These include Fentress, Scott, Campbell, Claiborne, Hancock, Johnson, Cocke, and Grundy counties in the east and Lake County in the west. Many of these counties with the highest percentage below poverty level are also considered to be rural and Appalachian. Counties with eight percent or less families below poverty level are located mainly in the central portion of the state. These counties are Montgomery, Robertson, Sumner, Cheatham, Williamson, Rutherford, Wilson, Humphreys, Marshall and Moore in the middle Tennessee area, and Loudon and Blount counties in the east.

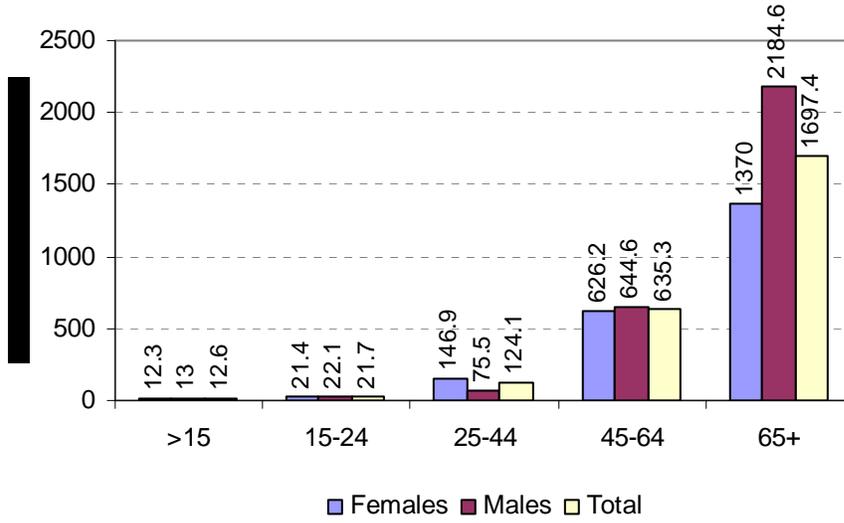
**Figure 28. Percent People Aged 65 and Older by County, Tennessee, 2000.**



### **Age Disparities**

The majority of cancers in the US occur in people aged 65 and older. Senior citizens, individuals 65 years and older, make up only 12.2 percent of Tennessee's population; however, 67.1 percent of all cancer deaths occurring between 1999-2003 were from this age group. The county with the highest percent population aged 65 and older is Madison county (see Figure 28). Many of the counties with the highest percent population aged 65 and older (22-33 percent) are located in the western part of the state. These counties include Houston, Henry, Benton, Carroll, Gibson, Crockett, Decatur, Perry, Hardin and McNairy. Counties with populations at or less than 10 percent aged 65 and older include Shelby, Tipton, Montgomery, Cheatham, Williamson, Rutherford and Wilson.

**Figure 29. Age-Specific Cancer Incidence Rates for All Cancers Combined, All Races and Genders, for Tennessee for the years 1999 through 2003 combined.**





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