Burden of Cancer-Mississippi

Mississippi State Department of Health

Cancer in Mississippi: An Overview

What is Cancer?

Cancer is a large group of diseases characterized by uncontrolled growth and spread of abnormal cells. If the spread is not controlled, it can result in death. Cancer can be caused by external (chemicals, radiation, viruses), internal (hormones, immune conditions, genetics), and lifestyle (tobacco and alcohol use, unprotected sun exposure, poor nutrition, physical inactivity) factors. Many cancers can be cured if detected and treated promptly, and many others can be prevented by lifestyle changes. Of the more than 30,000 cancer deaths in Mississippi during 2006-2010, it is estimated that nearly 32 percent could have been prevented by avoiding tobacco use [1] and approximately one-fifth could have been averted by improving nutrition and maintaining a normal body weight[2].

Who Gets Cancer?

Cancer may strike at any age. However, most cancers affect adults beginning in middle age and occur more frequently with advancing age. There are differences in the incidence of cancer by sex as well as race/ethnicity. Disparities in cancer occurrence by race/ethnicity may reflect differences in risk due to lifestyle factors, genes, and/or access to and utilization of medical services.

How Many New Cases Are Expected to Occur?

In 2006-2010, the average annual incidence of all cancers was 620 per 100,000 in men and 477 per 100,000 in women (age adjusted rate to 2000 US Population). Each year in Mississippi, approximately 14,800 are diagnosed with invasive cancer. Invasive cancer is defined as cancer that has spread beyond the layer of cells where it first began and has grown into nearby tissues[3]. This means that in a typical week, more than 280 Mississippi residents learn that they have invasive cancer.

How Many Lives Will Be Lost to Cancer?

Cancer accounts for roughly one of every five deaths in Mississippi[4] . It is second only to heart disease as the leading cause of all deaths in Mississippi. Each year, more than 6,000 residents die of cancer. During a five-year period (2006-2010), cancer was responsible for over 36,000 deaths[5].

Cancer is Many Diseases

There are more than 100 different types of cancer. In Mississippi (2006-2010), four cancer sites account for more than 54 percent of the cancer burden. These include cancers of the lung and bronchus, prostate, colon and rectum, and breast. The most common types of cancer for men in Mississippi include prostate (29 percent), lung and bronchus (18 percent), and colon and rectum (10 percent). Among women, the distribution is breast (28 percent), lung and bronchus (14.5 percent, followed by colon and rectum 11.5 percent).

[1]Moolgavkar, S H, et al Impact of Reduced Tobacco Smoking on Lung Cancer Mortality in the United States during 1975-2000, J Natl Cancer Inst 2012: 104:541-548

[2]Williams, S C P, Around one-fifth of cancer deaths in the United States are associated with obesity, PNAS 2013: 110:8753-8754

[3] American Cancer Society, Cancer Facts & Figures 2013: American Cancer Society; 2013

[4-5]MSDH-Vital Statistics – http://mstahrs.msdh.ms.gov/

Figure 1. Average Annual Incidence and Mortality Counts for Selected Cancers, Mississippi, 2006-2010

Source: MS Cancer Registry

Mississippi men account for approximately 54 percent of all newly diagnosed cancers, and have higher overall cancer rates. Prostate cancer is the most frequently diagnosed cancer among all males in Mississippi, followed by lung and bronchus cancer and colon and rectum (colorectal) cancers. Breast cancer is the most commonly diagnosed cancer among all females in Mississippi, followed by lung and bronchus and colon and rectum (colorectal) cancers. Lung and bronchus cancer is the leading cause of cancer deaths for both men and women in the state. The second and third leading causes of deaths among men, all races combined, are prostate and colorectal cancers. For women, the second leading cause of death is breast cancer, followed third by colorectal cancers.

Incidence and mortality rates (the number of deaths per 100,000 population adjusted by age) vary widely by race/ethnicity. When considering all cancer sites combined, black females have the lowest incidence rates. Among males, blacks have the highest incidence rates. In terms of cancer deaths, females both black and white have the lowest rates. Black men have the highest mortality rates for all cancer sites combined.

Age is another factor in the occurrence and type of cancer diagnosed. Among adults, cancer occurs more frequently with advancing age, and the risk of dying from cancer increases significantly with increasing age.
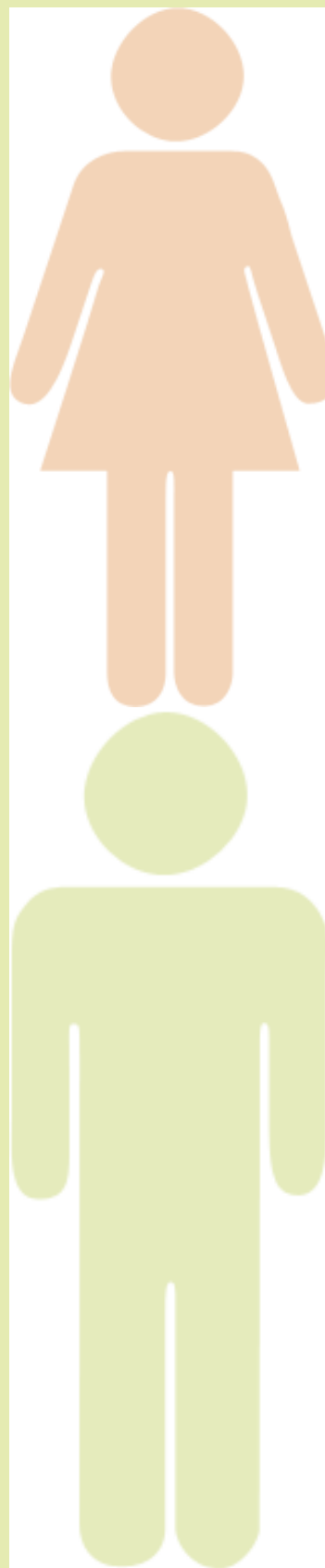
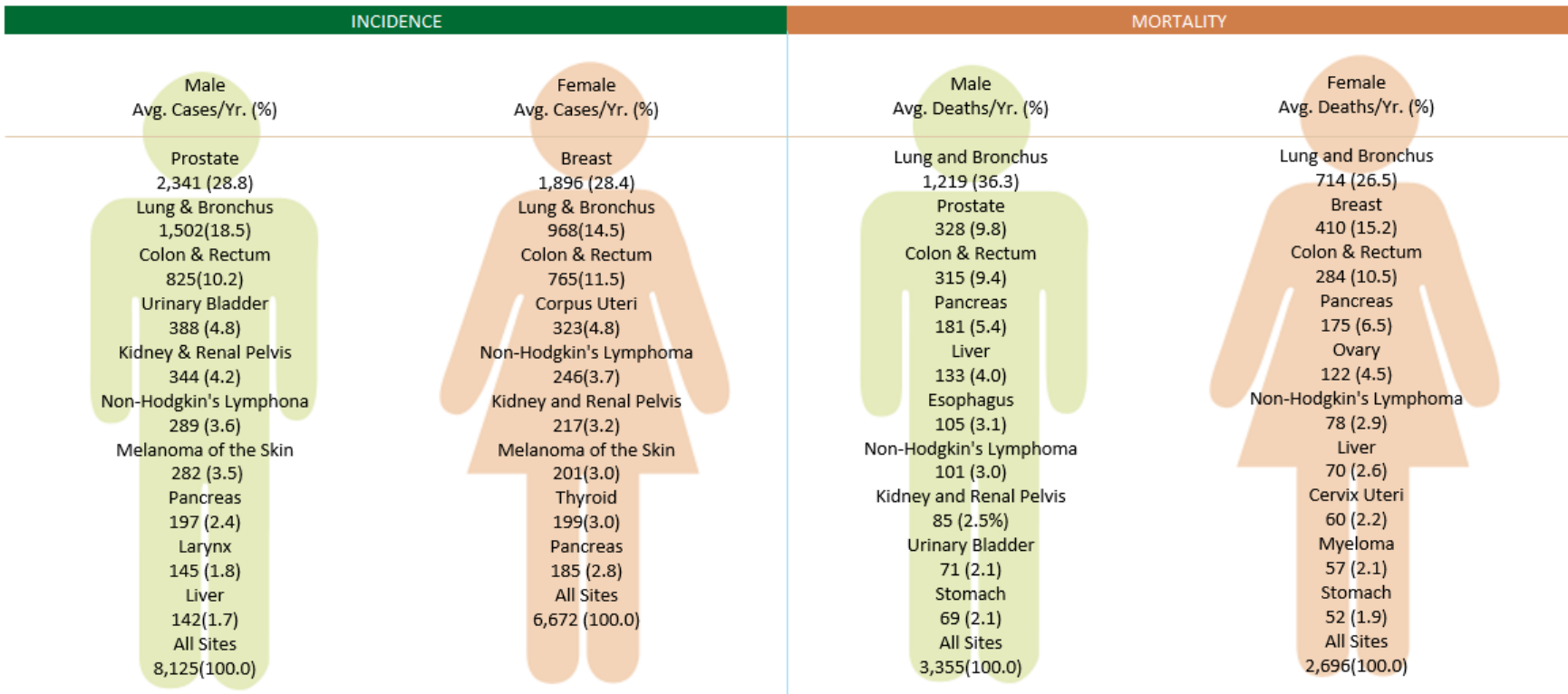**Figure 2. Leading Cancer Sites in Cases, Percentages & Deaths, Mississippi, 2006-2010**

INCIDENCE		MORTALITY	
Male Avg. Cases/Yr. (%)	**Female** Avg. Cases/Yr. (%)	**Male** Avg. Deaths/Yr. (%)	**Female** Avg. Deaths/Yr. (%)
Prostate 2,341 (28.8)	Breast 1,896 (28.4)	Lung and Bronchus 1,219 (36.3)	Lung and Bronchus 714 (26.5)
Lung & Bronchus 1,502(18.5)	Lung & Bronchus 968(14.5)	Prostate 328 (9.8)	Breast 410 (15.2)
Colon & Rectum 825(10.2)	Colon & Rectum 765(11.5)	Colon & Rectum 315 (9.4)	Colon & Rectum 284 (10.5)
Urinary Bladder 388 (4.8)	Corpus Uteri 323(4.8)	Pancreas 181 (5.4)	Pancreas 175 (6.5)
Kidney & Renal Pelvis 344 (4.2)	Non-Hodgkin's Lymphoma 246(3.7)	Liver 133 (4.0)	Ovary 122 (4.5)
Non-Hodgkin's Lymphona 289 (3.6)	Kidney and Renal Pelvis 217(3.2)	Esophagus 105 (3.1)	Non-Hodgkin's Lymphoma 78 (2.9)
Melanoma of the Skin 282 (3.5)	Melanoma of the Skin 201 (3.0)	Non-Hodgkin's Lymphoma 101 (3.0)	Liver 70 (2.6)
Pancreas 197 (2.4)	Thyroid 199 (3.0)	Kidney and Renal Pelvis 85 (2.5%)	Cervix Uteri 60 (2.2)
Larynx 145 (1.8)	Pancreas 185 (2.8)	Urinary Bladder 71 (2.1)	Myeloma 57 (2.1)
Liver 142(1.7)	All Sites 6,672 (100.0)	Stomach 69 (2.1)	Stomach 52 (1.9)
All Sites 8,125(100.0)		All Sites 3,355(100.0)	All Sites 2,696(100.0)

Table 1. Average Annual Incidence & Mortality Counts & Rates for All Cancer Sites by Sex & Race Combined, Mississippi 2006-2010

	INCIDENCE				MORTALITY			
	Male Incidence Count	Male Incidence Rate	Female Incidence Count	Female Incidence Rate	Male Mortality Count	Male Mortality Rate	Female Mortality Count	Female Mortality Rate
Black	2441	672.98	1993	392.34	1073	331.97	864	174.97
White	5603	571.47	4623	401.00	2264	244.34	1819	147.89
Total, All Races	8125	598.83	6672	397.25	3355	266.28	2696	156.07

Note: All rates are per 100,000. Rates are age-adjusted to the 2000 U.S. Standard Million Population.

Source: MS Cancer Registry

Health Disparities and Inequities in Cancer

Among U.S. men, for all cancers combined—

- The rate of new cancer cases is highest among black men, followed by white, Hispanic, Asian/Pacific Islander, and American Indian/Alaska Native men. http://www.cdc.gov/cancer/dcpc/resources/features/CancerHealthDisparities

- Death rates are highest among black men, followed by white, American Indian/Alaska Native, Hispanic*, and Asian/Pacific Islander men.

- Some of the proposed reasons for such disparities in survival rates include the relationship between lower SES status with delayed diagnosis and treatment at a later stage. http://www.cdc.gov/cancer/dcpc/resources/features/CancerHealthDisparities

Among U.S. women, for all cancers combined—

- The rate of new cancer cases is highest among white women, followed by black, Hispanic*, Asian/Pacific Islander, and American Indian/Alaska Native women. http://www.cdc.gov/cancer/dcpc/resources/features/CancerHealthDisparities

- Death rates are highest among black women, followed by white, American Indian/Alaska Native, Hispanic*, and Asian/Pacific Islander women. http://www.cdc.gov/cancer/dcpc/resources/features/CancerHealthDisparities
- Black women have the highest breast cancer death rates of all racial and ethnic groups and are 40% more likely to die of breast cancer than white women.

http://www.cdc.gov/cancer/dcpc/resources/features/CancerHealthDisparities

Health Disparities and Health Inequities

According to the National Institutes of Health, health disparities are *"differences in the incidence, prevalence, health conditions that exist among specific population groups in the United States. Population groups may be classified by sex, age, race/ethnicity, education, income, social class, disability, geographic location and sexual orientation."*

The National Association of Chronic Disease Directors Health Equity Council (NACDD-HEC) developed a more encompassing definition of health disparities, based on a compilation which states that "health disparities are differences in the incidence, prevalence, mortality, burden of diseases, and other adverse health conditions or outcomes that exist among specific population groups in the United States. Health disparities can affect population groups based on sex, age, ethnicity, socioeconomic status, geography, sexual orientation, disability, or special health care needs and occur among groups who have persistently experienced historical trauma, social disadvantage or discrimination, and systematically experience worse health or greater health risks than more advantaged social groups. (NACDD, 2006)"[3] Further, since "disparity" in the context of public health and social science has begun to take on the implication of injustice, the NACDD-HEC followed the conceptualization of health inequities for the World Health Organization (WHO) and the Pan American Health Organization (PAHO)[5], whereby health inequities are "…differences in health which are not only unnecessary and avoidable, but considered unfair and unjust."[1]

A health disparity specifically should be viewed as a chain of events signified by a difference in: (1) environment; (2) access to, utilization of, and quality of care; (3) health status; or (4) a particular health outcome that deserves scrutiny. It can also reflect genetic factors and family history, as well as personal health choices and behaviors.

According to WHO/PAHO, there are seven major determinants of health disparities:

1. Natural, biological variation;
2. Freely chosen health damaging behavior;
3. Transient health advantage of one over another (first adopters of health promoting behavior);
4. Health damaging behavior where the degree of lifestyle choices is severely restricted;
5. Exposure to unhealthy, stressful living and working conditions;
6. Inadequate access to essential health and other basic services;
7. Natural selection (health-related mobility). Sick people tend to move down the social scale.

The first three are most likely to be considered unavoidable or fair. The last four are considered avoidable and unfair. An inequity is said to exist when *"a health disparity is determined to be avoidable and unfair."* As reflected in this and other definitions, the differences in cancer incidence and mortality among diverse population groups may be influenced by variations in several social determinants or factors.

Social Determinants of Health
The social determinants of health (SDOH) are what Raphael (2006) refers to as "the non-medical and non-behavioral precursors of health and illness."[4] The 1986 Ottawa Charter for Health Promotion listed the prerequisites for health as peace, shelter, education, food, income, a stable ecosystem, sustainable resources, social justice, and equity. Another model by Dahlgren and Whitehead (1992) listed specific living and working conditions that contribute to health, including agriculture and food production, education, the work environment, unemployment, water and sanitation, health care services, and housing. Wilkinson and Marmot (2003), part of British working group tasked with identifying the social determinants of health, listed the social (class health) gradient, stress, early life, social exclusion, work, unemployment, social support, addiction, food, and transport. The U.S. Centers for Disease Control and Prevention (CDC) in 2005 identified socio-economic status, transportation, and housing, access to services, discrimination by social grouping (e.g., race, sex or class), and social or environmental stressors. A recent synthesis (Raphael, 2006) identified 11 key social determinants of health: aboriginal status, early life, education, employment and working conditions, food security, health care services, housing, income and its distribution, the social safety net, social exclusion, and unemployment and employment security.

The following are some of the social determinants[6] found to be associated with differential cancer rates:

Socioeconomic Status:
Socioeconomic status (SES) in particular appears to play a major role in cancer-related disparities seen among different racial/ethnic groups due to adopted behaviors that cause cancer, such as smoking and poor screening

behaviors. The American Cancer Society estimates that cancer survival rates of poor individuals are 10 to 15 percent lower than those of other Americans (American Cancer Society, 2009). Some of the proposed reasons for such disparities in survival rates include the relationship between lower SES status with delayed diagnosis and treatment at a later stage of disease.

Lack of health insurance:

Approximately 30 percent of adult residents of Mississippi under age 65 do not have health insurance. The impact of the Affordable Care Act is not known at this time.

Certain barriers to optimal cancer screening, diagnosis, and treatment may exist regardless of SES, health insurance status, or provider base. According to a recent Institutes of Medicine (IOM) report[2], such disparities ***"are complex and rooted in historic and contemporary inequities and involve many participants at several levels, including health systems, their administrative and bureaucratic processes, utilization managers, health care professionals, and patients."*** Disparities may be compounded by the institutional environment (legal, financial, and policy) and by the under-representation of racial and ethnic minorities among health professionals. Other barriers suggested in the IOM report may be related to health seeking behaviors of patients and health provider behavior in the clinical encounter. Awareness of such factors can assist in developing programs and services to best meet needs.

[1] Available at www.publichealthreports.org/userfiles/117_5/117426.pdf.

[2] Carter-Pokras, O. and Baquet, C. (2002) What is Health Disparity? Public Health Reports, Vol 117, September-October.

[3] National Association of Chronic Disease Directors. Health Equity Council, Definition of Health Disparities (2006).

[4] Institutes of Medicine, Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care, Washington, DC: The National Academy Press, 2002.

[5] Pan American Health Organization and the World Health Organization (1999) Principles and Basic Concepts of Equity and Health.

[6] Raphael, D, (2006) Social determinants of health: Present status, unanswered questions and further directions. International Journal of Health Services, Vol. 36, No 4, pp 651-657.

Cancer in Mississippi: Major Sites and Critical Issues

As is true of the United States as a whole, four cancer sites cause more than half of the state's cancer burden. These include prostate, lung and bronchus, breast, and colon and rectum. In Mississippi, these four cancer sites account for more than half (56 percent) of the newly diagnosed cancers and 54 percent of all cancer deaths in the state. This presents both challenges and opportunities. The challenge: the human and financial toll taken by these four cancers is high. The opportunity: something can be done about each of these cancers. Steps can be taken to prevent these cancers and to detect them early when they are most treatable. Other cancers that can be similarly influenced include cervical and skin cancer (melanoma). The following section provides an overview of the challenges and opportunities these cancer sites present.

Prostate (males only)

Lung and Bronchus

Female Breast

Colon and Rectum

Melanoma of the Skin

Pancreas

Cervix Uteri (females)

Prostate Cancer

Approximately 2,490 new cases of invasive prostate cancer were diagnosed during 2013 in Mississippi. Prostate cancer accounted for 330 deaths during the same period. Among males, prostate cancer is the leading type of cancer diagnosed. It is the second leading cause of cancer deaths among males. Prostate cancer accounts for approximately 29 percent of the cancer incidence and about 10 percent of the cancer deaths among males in Mississippi. Age is the strongest risk factor for prostate cancer. After age 55, prostate cancer incidence and mortality rates rise dramatically. About 90 percent of Mississippi males are age 55 or older at the time of diagnosis, and more than 58 percent are age 65 or older at the time of diagnosis.

Figure 3A. Trends in Prostate Cancer Incidence, All Races Combined, Mississippi, 2003-2010 (Mississippi Cancer Registry)
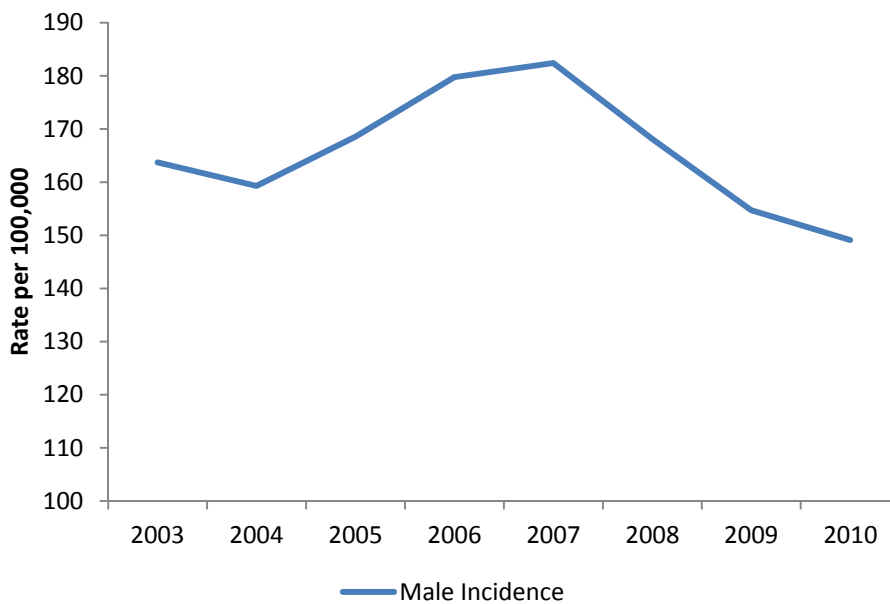
Figure 3B.Trends in Prostate Cancer Mortality Rates, All Races Combined, Mississippi, 2003-2010 (Mississippi Cancer Registry)
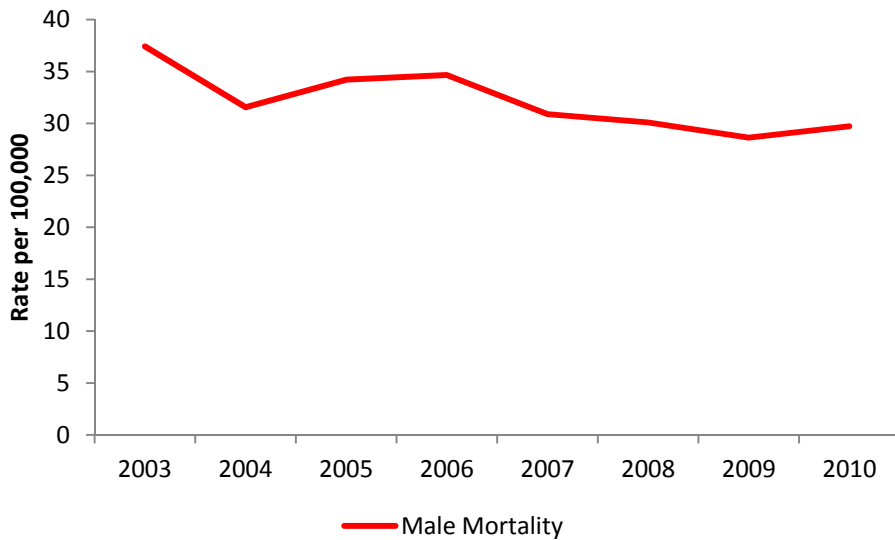
Prostate Cancer, U.S. and Mississippi

	Incidence Rate	Mortality Rate
US	151.4	23.6
Mississippi	166.4	30.7

MS Source: Mississippi Cancer Registry based on data released March 14, 2013

Note: All rates are per 100,000. Rates are age-adjusted to the 2000 U.S. Standard Population
US Source: US Mortality Data, NCHS, CDC (2005-2009)

Prostate cancer incidence rates are highest among black males and mortality rates among blacks are three times those of white males (Figure 4).

Figure 4. Prostate Cancer Incidence and Mortality Rates by Race, Mississippi (2006-2010 years combined)
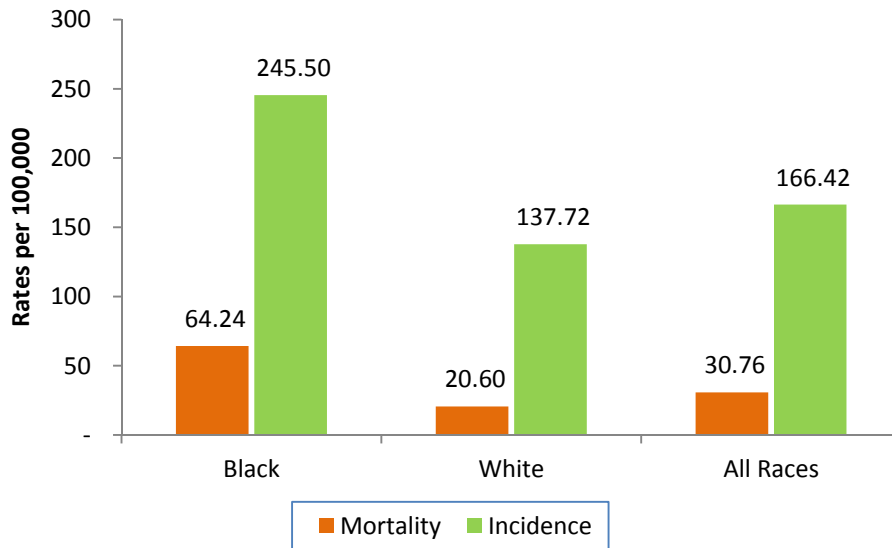
Source: MS Cancer Registry, 2013, All rates are per 100,000. Rates are age-adjusted to the 2000 U.S. Standard Population. Based on data released March 8, 2013

Prostate Cancer Early Detection and Screening

According to the American Cancer Society's screening guidelines, the prostate-specific antigen (PSA) test and the digital rectal examination (DRE) should be offered annually beginning at age 50 to men who have a life expectancy of at least 10 years. Men at high risk (Black/African American men and men who have a first-degree relative diagnosed with prostate cancer at a young age) should begin testing at age 45. Unlike many other cancers, prostate cancer often grows slowly. Information regarding potential risks and benefits of early detection and treatments should be discussed between physicians and patients, to assist men in making informed decisions about treatment.

In Mississippi, the 2010 Behavioral Risk Factor Surveillance Survey (BRFSS) revealed that of interviewed men 40 years and older, about 54 percent of reported having a PSA test within the past two years.

Prostate Cancer

Non-Modifiable Risk Factors

- Age (risk is greatest after age 40)
- Race (risk is higher in Blacks/African Americans)
- Nationality (occurs more frequently in North American and northwest Europe)
- Family history

Modifiable Risk Factors

- Diet high in saturated fat and red meat
- Not eating enough servings of fruits and vegetables

Risk Reduction

- Eating a healthy diet based on the American Cancer Society guidelines on nutrition

Lung and Bronchus Cancer

Approximately 2,630 new cases of lung and bronchus cancer (hereafter referred to as lung cancer) are estimated for 2013. About 2,010 residents are projected to die from the disease. (Source: American Cancer Society, 2013). Lung cancer is the leading cause of death from cancer in Mississippi, accounting for more than 30 percent of cancer deaths (Source: MS Vital Statistics 2009). Mississippi has the highest mortality rate and 2nd highest incidence rate of lung and bronchus cancer among the U.S. states and District of Columbia (Source: United States Cancer Statistics, 2009). Lung cancer, caused primarily from smoking, leads to more deaths every year in Mississippi than do breast, prostate, and colorectal cancers combined. This is due in part to lung cancer most often being diagnosed at a later stage. Approximately 76 percent of lung cancers are diagnosed at a late stage. Risks increase with both quantity and duration of smoking. Cigar and pipe smoking also increase risk. The risk of lung cancer increases significantly with age. Other risk factors include occupational or environmental exposure to secondhand smoke, asbestos (particularly among smokers), certain metals (chromium, cadmium, and arsenic), some organic chemicals, radiation, air pollution, diesel exhaust, and paint. Additional occupational exposures that increase lung cancer risk include rubber manufacturing, paving, roofing, and chimney sweeping. Risk is also probably increased among people with a history of tuberculosis.

In Mississippi, 24.8 percent of adults currently smoke which is the 3th highest smoking rate in the United States (Source: CDC BRFSS 2013). Smoking causes approximately 30 percent of all cancer deaths in the United States (Source: CDC). Cigarette smoking increases the risk for many types of cancer, including cancers of the lip, oral cavity, pharynx, esophagus, pancreas, larynx (voice box), lung, uterine cervix, urinary bladder, and kidney (Source CDC).

Sex and race are also factors in lung cancer incidence and mortality rates. Lung cancer incidence and mortality rates among males in Mississippi are approximately twice that of Mississippi females. This is similar to national trends.

Lung and Bronchus Cancer, U.S. and Mississippi -2006-2010 combined

|	Male		Female	
	Incidence Rate	Mortality Rate	Incidence Rate	Mortality Rate
US*	82.9	65.7	55.7	39.6
Mississippi**	112.9	94.1	56.2	41.2

Invasive cases only are included for incidence rates. Cases are 5 year totals.
Note: All rates are per 100,000. Rates are age-adjusted to the 2000 U.S. Standard Population
*United States Cancer Statistics 2005-2009
**MS Cancer Registry 2006-2010

Figure 5. Lung and Bronchus Cancer Incidence and Mortality Rates by Race, Mississippi Males, (2006-2010 years combined)
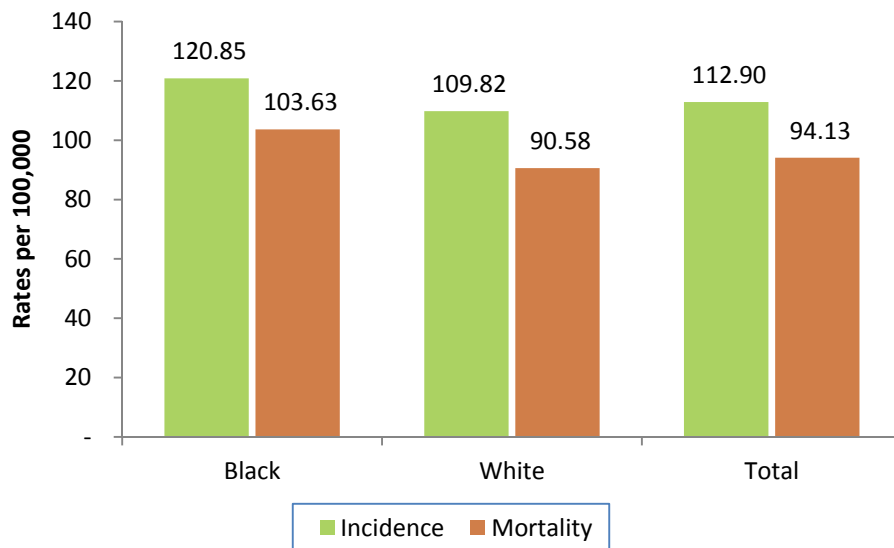

	Black	White	Total
Cases	2,113	5,369	7,482
Deaths	1,752	4,320	6,072

Figure 6. Lung and Bronchus Cancer Incidence and Mortality Rates by Race, Mississippi Females, (2006-2010 years combined)
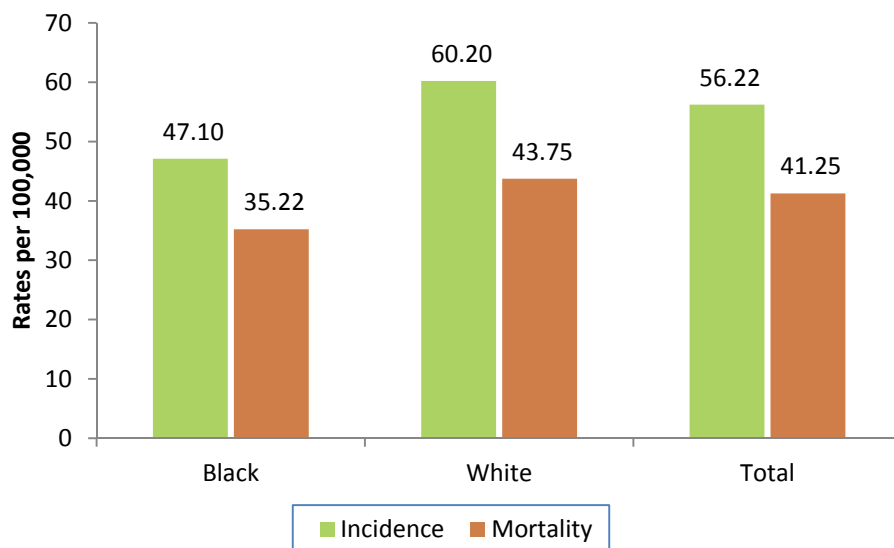
	Black	White	Total
Cases	1,158	3,661	4,819
Deaths	857	2,701	3,558

Lung and Bronchus Cancer

Non-Modifiable Risk Factors

- Personal and family history
- Age

Modifiable Risk Factors

- Cigarette smoking
- Secondhand smoke from cigarette smoking
- Low vegetable and fruit consumption

Risk Reduction

- Avoid radon and asbestos exposure
- Reduce occupational exposure to some chemicals
- Air pollution risk reduction

Colon and Rectum Cancer

Approximately 1,580 new cases of colon and rectum cancer are estimated for 2013. Colon and rectum cancer accounts for 630 of the 6,300 deaths projected from all cancer sites for 2013 according to the 2013 Cancer Facts and Figures published by the American Cancer Society. Combined, colon and rectum cancers (also known as colorectal cancer) account for approximately 10 percent of all cancer incidence and also 10 percent of all cancer mortality in Mississippi, males and females combined.

Colon and Rectum Cancer, U.S. and Mississippi (2006-2010 years combined)

	Male		Female	
	Incidence Rate	Mortality Rate	Incidence Rate	Mortality Rate
US*	53.8	20.2	40.2	14.1
Mississippi	61.3	24.5	44.7	16.2

Note: All rates are per 100,000. Rates are age-adjusted to the 2000 U.S. Standard Population
*2005-2009 Data from National Vital Statistics System (NVSS)
**Mississippi Cancer Registry

Figure 7. Colon and Rectum Cancer Incidence and Mortality Rates by Race, Mississippi Males, (2006-2010 years combined)
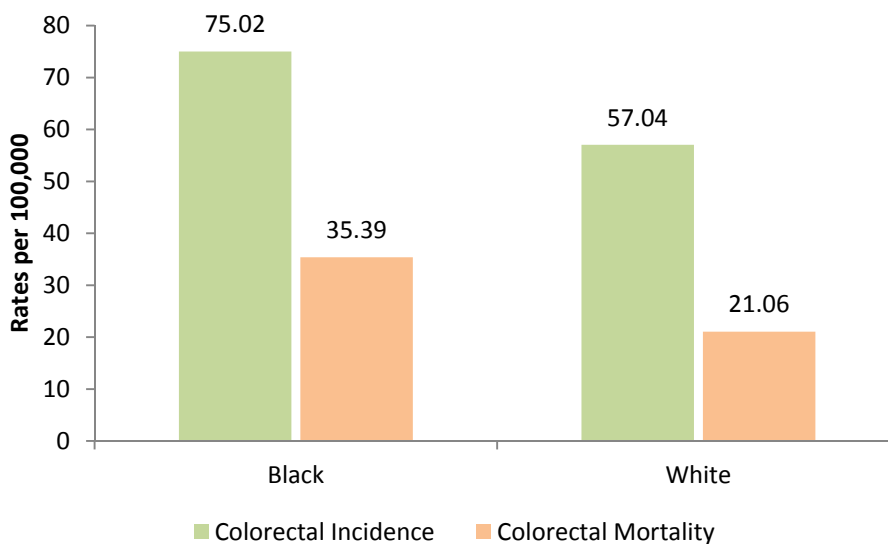
Figure 8. Colon and Rectum Cancer Incidence and Mortality Rates by Race, Mississippi Females, (2006-2010 years combined)
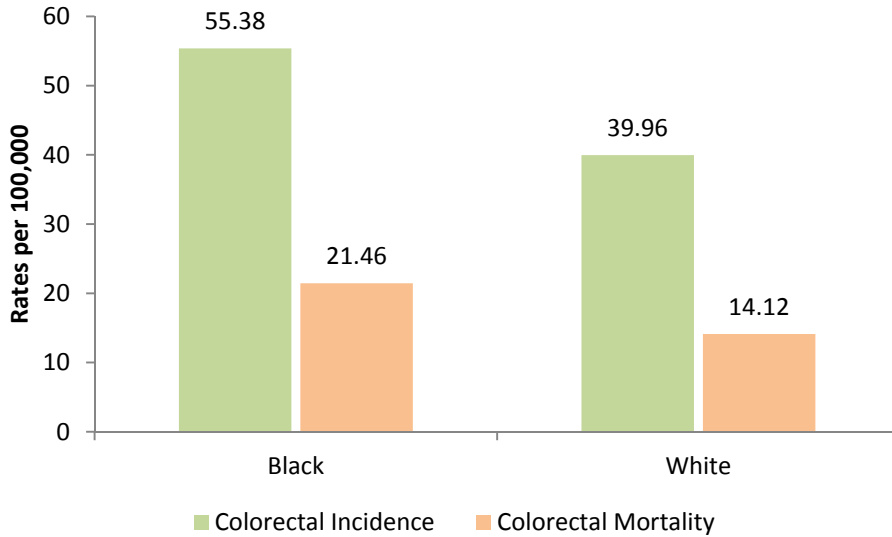
Colorectal Cancer Prevention, Early Detection and Screening

Approximately 90 percent of all colorectal cancer cases and deaths are thought to be preventable. Screening tests that detect occult blood in the stool or identify adenomatous polyps can prevent the occurrence of colorectal cancers by allowing the detection and removal of pre-cancerous lesions. Potentially modifiable risk factors include healthy dietary patterns, regular physical activity, and avoidance of obesity and smoking. Non-modifiable risk factors include a strong family history of colon cancer or adenomatous polyps. However, almost 75 percent of all colon cancers occur in people with no known predisposing factors.

Survival from colorectal cancer is more than 90 percent when the cancer is diagnosed before it has extended beyond the intestinal wall.

Colorectal Cancer

Non-Modifiable Risk Factors

- Age (risk increases as one get older)
- Family history
- Ethnicity
- Race (highest incidence in Blacks/African Americans)
- Personal history of colon cancer, intestinal polyps or chronic inflammatory bowel disease

Modifiable Risk Factors

- Diet predominately from animal source
- Physical inactivity
- Obesity
- Smoking
- Heavy alcohol consumption
- Low vegetable and fruit consumption
- Hyperinsulinemia/Type II Diabetes

Risk Reduction

- Follow American Cancer Society guidelines on nutrition and physical activity
- Maintain ideal body weight
- Multivitamin with folate intake
- Calcium supplement intake
- Hormone replacement therapy (but side effects may outweigh benefit)

Melanoma of the Skin

Approximately 500 new cases of melanoma of the skin are diagnosed in Mississippi each year. On average 70 Mississippi residents will die from the disease per year. Skin cancer of all types is associated with exposure to the sun. Age is another factor associated with melanoma incidence and mortality rates.

Race is the leading factor in all skin cancers, including melanoma. From 2007-2011 there were 2,580 new cases, among those new cases only eight Blacks/African Americans were diagnosed. The age-adjusted rate for whites was 25.3 per 100,000 compared to 1.0 among blacks (MS Cancer Registry).

Skin Cancer Prevention, Early Detection and Screening

Blistering sunburn in childhood and adolescence is an almost universal risk factor for melanoma in the White population. Other risk factors that may contribute to the development of skin cancer include:

Non-Modifiable Risk Factors

- Fair to light skin complexion.
- Sex (men are more likely to develop skin cancer than women).
- Age
- Race (risk of melanoma is more than 85 times higher for Whites than for Blacks/African Americans).
- Heredity (numerous moles, as well as certain types of high-risk moles, often run in families).

Actions to take to help prevent skin cancers are:

- Limit or avoid sun exposure between 10:00 a.m. and 4:00 p.m.
- When outdoors, cover as much skin as possible.
- Wear a hat that shades the face, neck and ears.
- Wear UV-coated sunglasses to protect the skin around the eyes.
- Use sunscreens with SPF 15 or greater.
- Protect children from sun exposure.

Melanoma, when detected early, is likely to be completely cured. Part of a routine cancer-related checkup should include a skin examination by a health care professional qualified to diagnose skin cancer.

Cancer of the Pancreas

Approximately 400 new cases of cancer of the pancreas are diagnosed in Mississippi each year. On average 360 Mississippi residents will die from the disease annually. Pancreatic cancer is more common with increasing age and slightly more common in men than women. Twice as many white residents died from pancreatic cancer compared to Blacks/African Americans from 2007 to 2011 in Mississippi (MS Cancer Registry).

Deaths due to pancreatic cancer account for approximately 6 percent of all cancer related deaths and is the 5th leading cause of cancer related death.

Pancreas Cancer, Mississippi (2007-2011 years combined)

Race/Ethnicities	Incidence Rate	Mortality Rate
Black	15.4	14.2
White	12.3	10.6

Source: Mississippi Cancer Registry

Note: All rates are per 100,000. Rates are age-adjusted to the 2000 U.S. Standard Population

Breast (Female) Cancer

Approximately 2,080 new cases of female invasive breast cancer will be diagnosed in Mississippi in 2013 (American Cancer Society –Cancer Facts and Figures 2013). It is projected that 420 deaths will occur in 2013 from breast cancer.

Breast (Female) Cancer, U.S. and Mississippi (2006-2010 years combined)

Female, All Race	Incidence Rate	Mortality Rate
US*	122.0	23.0
Mississippi**	113.94	24.07

*2005-2009 Data from National Vital Statistics System
**Mississippi Cancer Registry
Note: All rates are per 100,000. Rates are age-adjusted to the 2000 U.S. Standard Population

The risk of cancer is higher in women who have never had children or had the first child after age 30, who consume alcoholic beverages, or who have a personal or family history of breast cancer, biopsy-confirmed atypical hyperplasia, increased breast density, a long menstrual history, obesity after menopause, and recent use of oral contraceptives or post-menopausal estrogen and progestin. Regular rigorous physical activity and maintenance of a healthy body weight are associated with lower risk.

Figure 9. Female Breast Cancer Incidence and Mortality Rates by Race, Mississippi, (2005-2010 years combined)
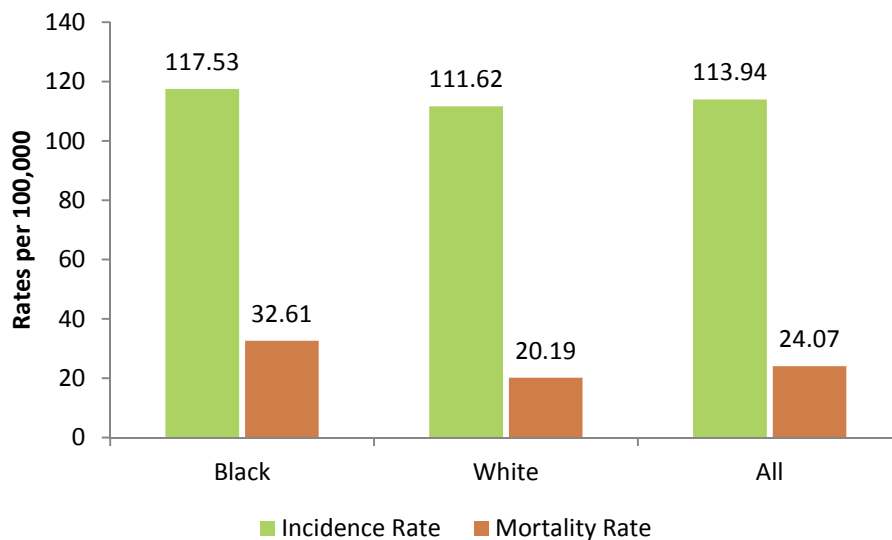
Incidence rates are higher among Blacks (69.53/100,000-age adjusted) compared to Whites (60.61). Mortality rates again are higher among Blacks (18.81/100,000) compared to 11.05 for Whites.

Breast Cancer Early Detection and Screening

When breast cancer is diagnosed at its earliest stage, survival is excellent. When detected at a localized stage, the 5-year relative survival is 98 percent. That falls to 84 percent when the cancer is detected at a regional stage, and 23 percent when detected at a distant stage.

A breast health program of regular mammograms starting at age 40 and clinical breast examinations as part of a periodic health exam are the most important actions a woman can take to detect breast cancer at its earliest stage. Breast self-exam is an option for women starting in their 20s. Women at increased risk (e.g., family history, genetic tendency, past breast cancer) should speak with their doctors about benefits and limitations of more frequent and/or additional tests.

Cervical Cancer

Approximately 150 women in Mississippi are diagnosed with invasive cervical cancer and another 60 women die from the disease each year. As cervical cancer screening has become more prevalent, pre-invasive lesions of the cervix are detected far more frequently than invasive cancer. Invasive cervical cancer represents 2.2 percent of all female cancer incidence and 2.2 percent of all female cancer mortality in Mississippi. Approximately 58 percent of new cases of invasive cervical cancer are diagnosed in women below the age of 55. Approximately 41 percent of cervical cancer deaths occur among women younger than 55.

Cervical Cancer, U.S. and Mississippi (2006-2010 years combined)

Female, All Race/Ethnicities	Incidence Rate	Mortality Rate
US*	8.0	2.4
Mississippi**	9.7	3.8

**Source: Mississippi Cancer Registry based on data released March 14, 2013
Note: All rates are per 100,000. Rates are age-adjusted to the 2000 U.S. Standard Population
*US(2005-2009) NPCR

Cervical cancers are caused by certain types of **Human papillomaviruses (HPV)**. HPVs are a group of more than 100 related viruses. Approximately 40 HPV types can be transmitted to the genitals through sexual contact. Cervical HPV infections are very common and most infections go away on their own after a short time. However, in some women, HPV can develop into a longer lasting infection. Persistent infection with certain types of HPV increases the risk of cervical cancer. HPV is the primary cause of cervical cancer and also contributes to the development of cancers of the anus, vulva, vagina, penis, oral cavity, and pharynx. HPV also causes genital warts.

Of all cancers, cervical cancer is among the most amenable to prevention and early detection through screening.

In recent years, major advances have been made toward the prevention of cervical cancer with the availability of HPV vaccines. Since 2006, two vaccines against HPV have been approved by the U.S. Food and Drug Administration. Gardasil® protects against cervical, vaginal, and vulgar cancers caused by HPV 16 and 18. It also protects against genital warts caused by HPV 6 and 11. Gardasil® is approved for use in females and males aged 9 to 26 years. Cervarix® protects against cervical cancers caused by HPV 16 and 18 and is approved for use in females aged 10 to 25 years. Both vaccines are given as a series of three shots administered over a 6-month period.

Cervical cancer can also be prevented or found early through regular screening. Pap smears can detect precancers (cell changes on the cervix that might become cervical cancer). Even women who have been vaccinated against HPV need to have regular Pap smears in order to detect precancers caused by HPV types not covered in the vaccine.

Figure 10. Cervical Cancer Incidence and Mortality Rates by Race, Mississippi, (2006-2010 years combined)
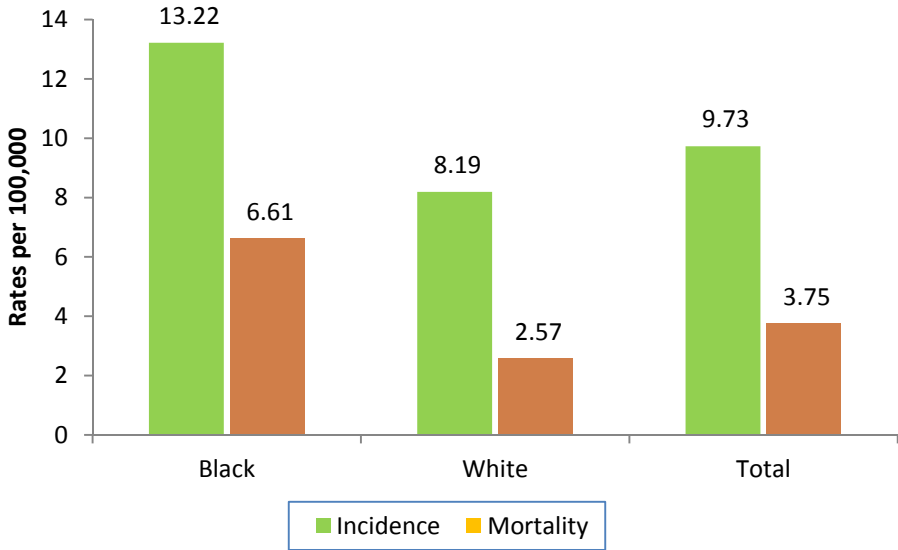
Rates are per 100,000 populations and are age-adjusted to the 2000 U.S. standard population
Source: Mississippi Cancer Registry

Cervical Cancer

Non-Modifiable Risk Factors

- Age (average age at diagnosis is 50 to 55)
- Family history

Modifiable Risk Factors

- Human papillomavirus (HPV) infection from intercourse at an early age, unprotected sex, and many sexual partners
- Cigarette smoking
- Human immunodeficiency virus (HIV) infection
- Chlamydia infection
- Diet
- Diethylstilbestrol (DES) usage
- Long-term use of oral contraceptives
- Having three or more pregnancies
- Young age (<17) at first full-term pregnancy

Risk Reduction

- Avoid early onset of sexual activity
- Limit number of sexual partners
- Avoid sexual intercourse with individuals who have had multiple partners
- Avoid cigarette smoking
- Use condoms (to prevent HIV and chlamydia infection)
- Get the HPV vaccine

The charts depicted in this section were created using information obtained from the Mississippi Cancer Registry (2013) and the Mississippi Behavioral Risk Factor Surveillance System (BRFSS 2011). The following table describes the general description of each chart.

Figure	Chart Description
11	Incidence of Cancer (all cancer sites) Mississippi and U.S., 2003-2010
12	Mortality of Cancer (all cancer sites) Mississippi and U.S., 2001-2009
13	Incidence of Cancer of the bladder (in situ and invasive) Mississippi and U.S., 2003-2010
14	Mortality of Cancer of the bladder Mississippi and U.S., 2001-2010
15	Incidence of Invasive cancer of the female breast Mississippi and U.S., 2003-2010
16	Mortality of Cancer of the female breast Mississippi and U.S., 2001-2010
17	Incidence of Invasive cancer of the cervix Mississippi and U.S., 2003-2010
18	Mortality of Cancer of the cervix Mississippi and U.S., 2001-2010
19	Incidence of Cancer of the colon and rectum Mississippi and U.S., 2003-2010
20	Mortality of Cancer of the colon and rectum Mississippi and U.S., 2001-2010
21	Incidence of Cancer of the lung and bronchus Mississippi and U.S., 2003-2010
22	Mortality of Cancer of the lung and bronchus Mississippi and U.S., 2001-2010
23	Incidence of Invasive melanoma Mississippi and U.S., 2003-2010
24	Mortality of Melanoma Mississippi and U.S., 2001-2010
25	Incidence of Invasive cancer of the oral cavity or pharynx Mississippi and U.S., 2003-2010
26	Mortality of Cancer of the oral cavity and pharynx Mississippi and U.S., 2001-2010
27	Incidence of Invasive cancer of the prostate Mississippi and U.S., 2003-2010
28	Mortality of Cancer of the prostate Mississippi and U.S., 2001-2010
29	Percentage of Women Aged 40+ who have had a mammogram within the past two years Mississippi and U.S.,1995-2010
30	Percentage of Women who have had Pap test within past 3 years Mississippi and U.S., 2004-2010
31	Percentage of adults receiving Colorectal Cancer Screening by Blood Stool test Mississippi and U.S., 1997-2010
32	Adults aged 50+ who have ever had a sigmoidoscopy or colonoscopy Mississippi and U.S., 1997-2010

Figure 11. Incidence of Cancer (all cancer sites) Mississippi and U.S., 2003-2010
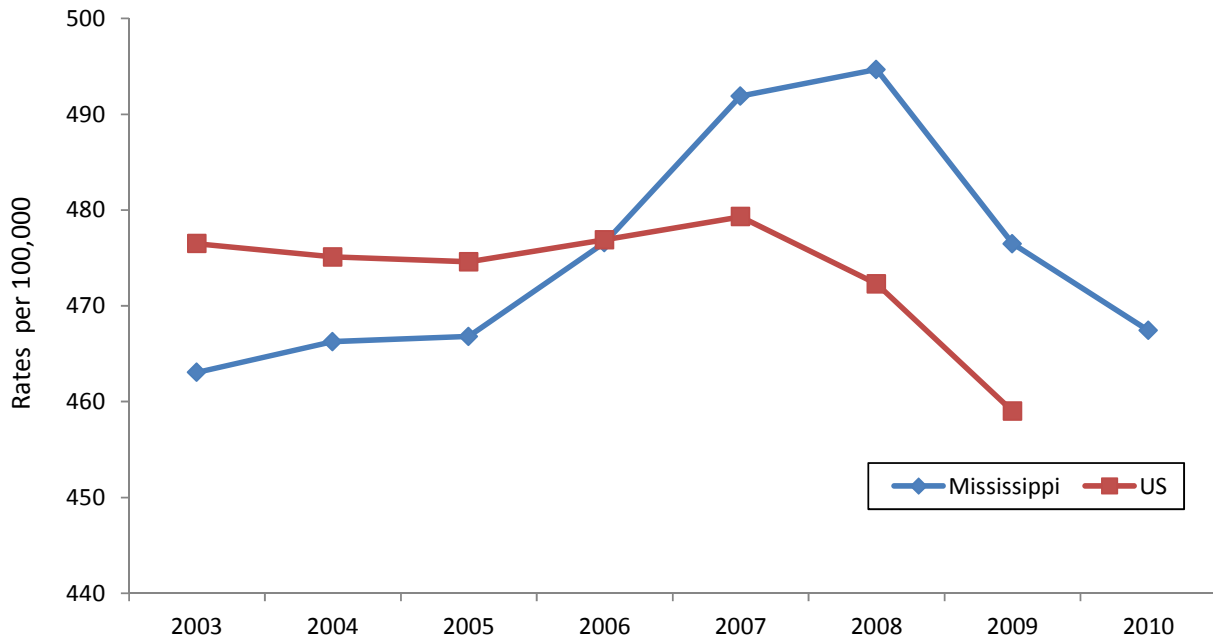
Figure 12. Mortality of Cancer (all cancer sites) Mississippi and U.S., 2001-2009
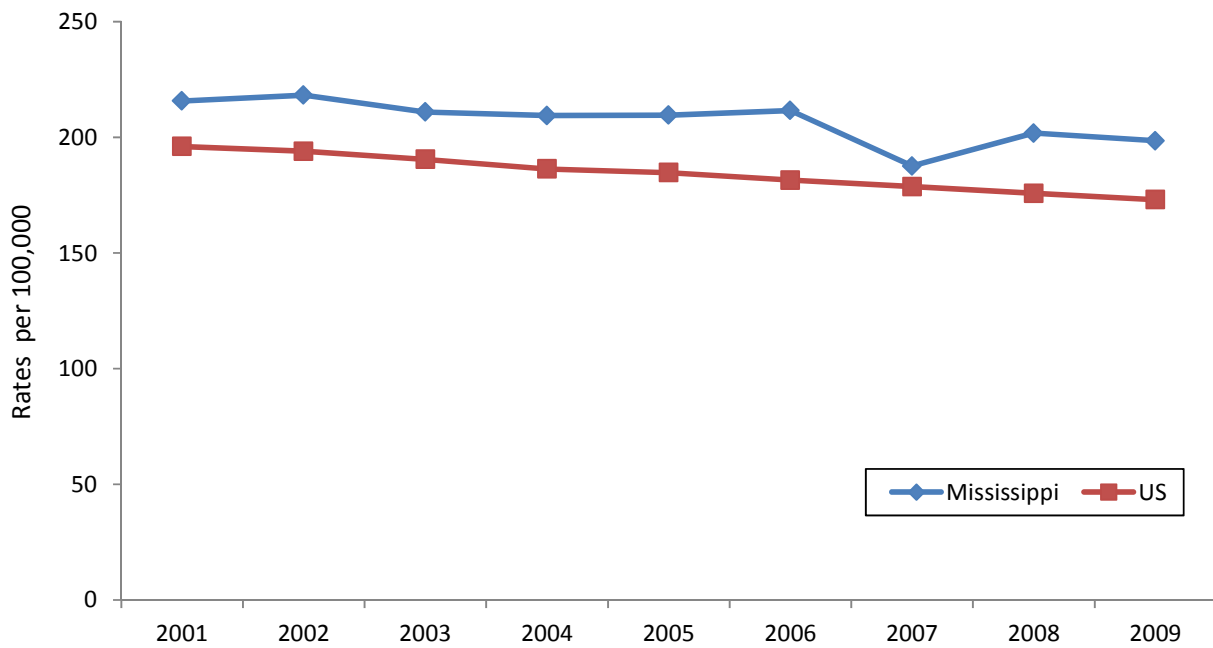
Figure 13. Incidence of Cancer of the bladder (in situ and invasive) Mississippi and U.S., 2003-2010
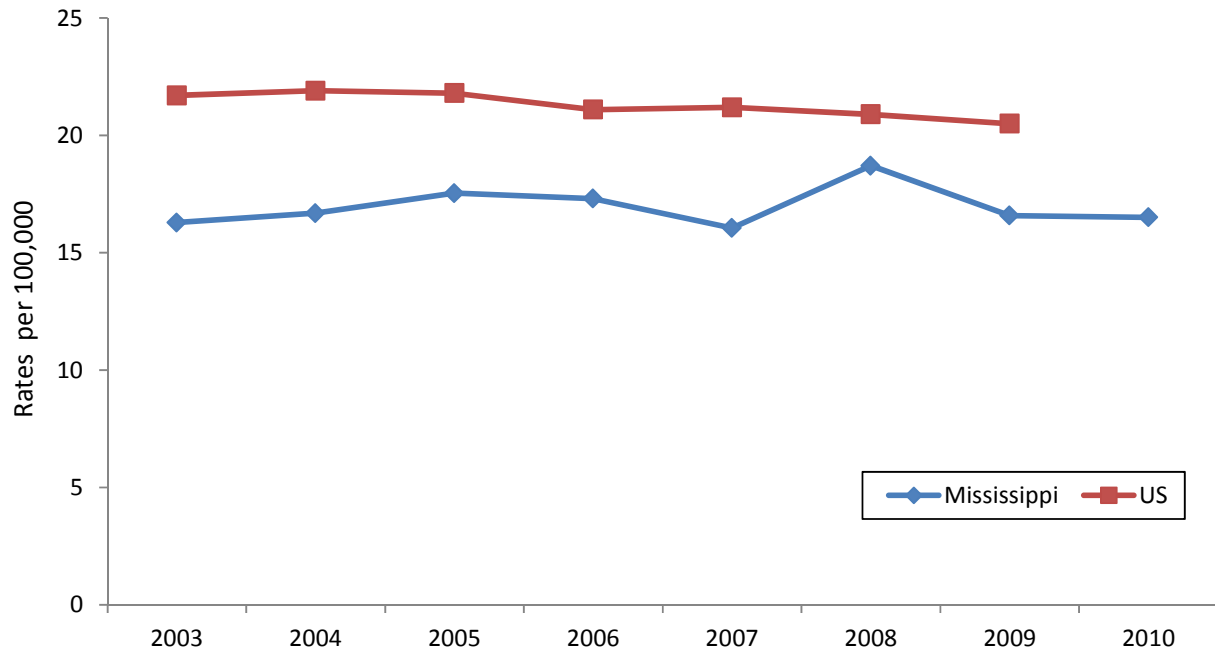

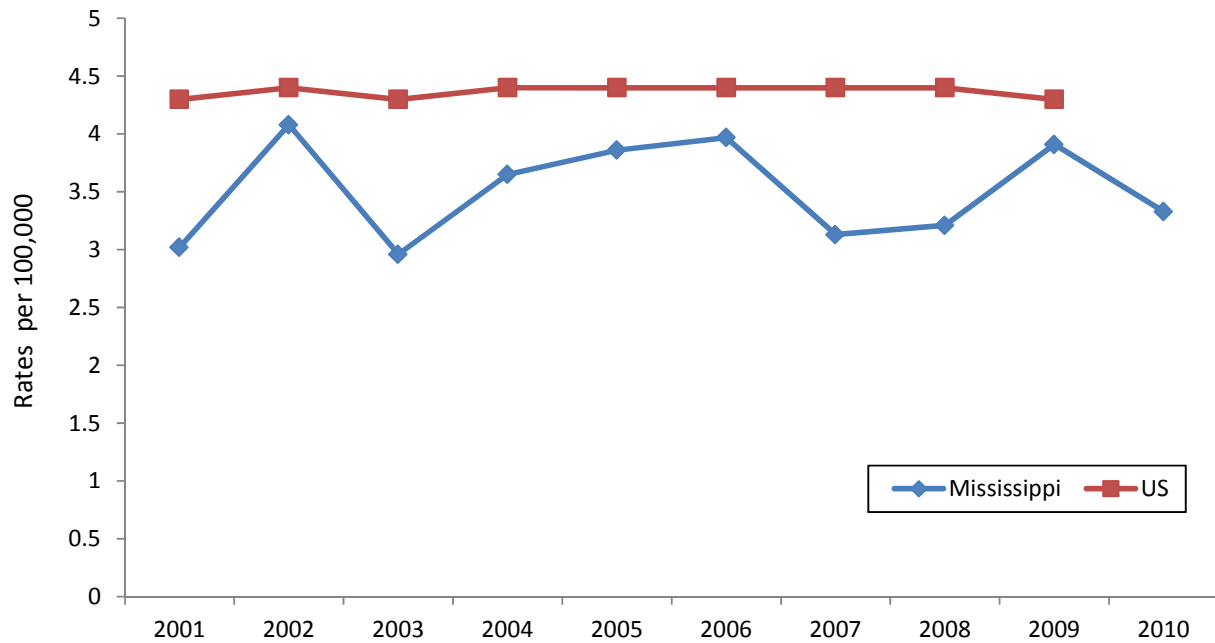Figure 14. Mortality of Cancer of the bladder Mississippi and U.S., 2001-2010

Figure 15. Incidence of Invasive cancer of the female breast Mississippi and U.S., 2003-2010
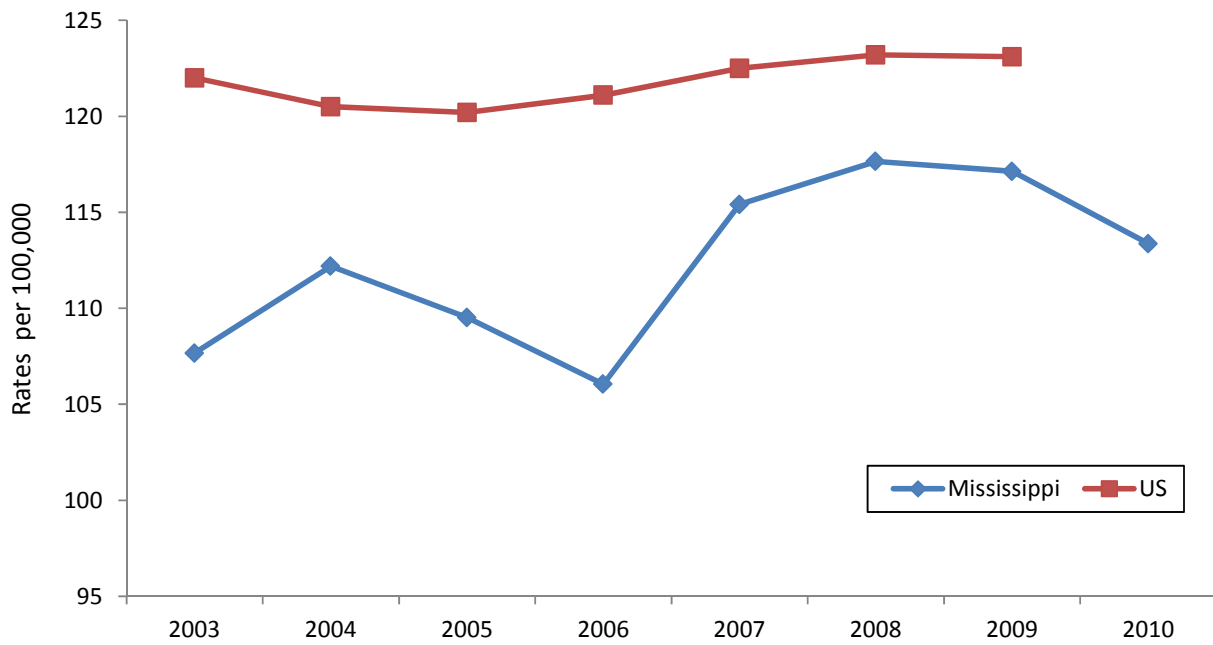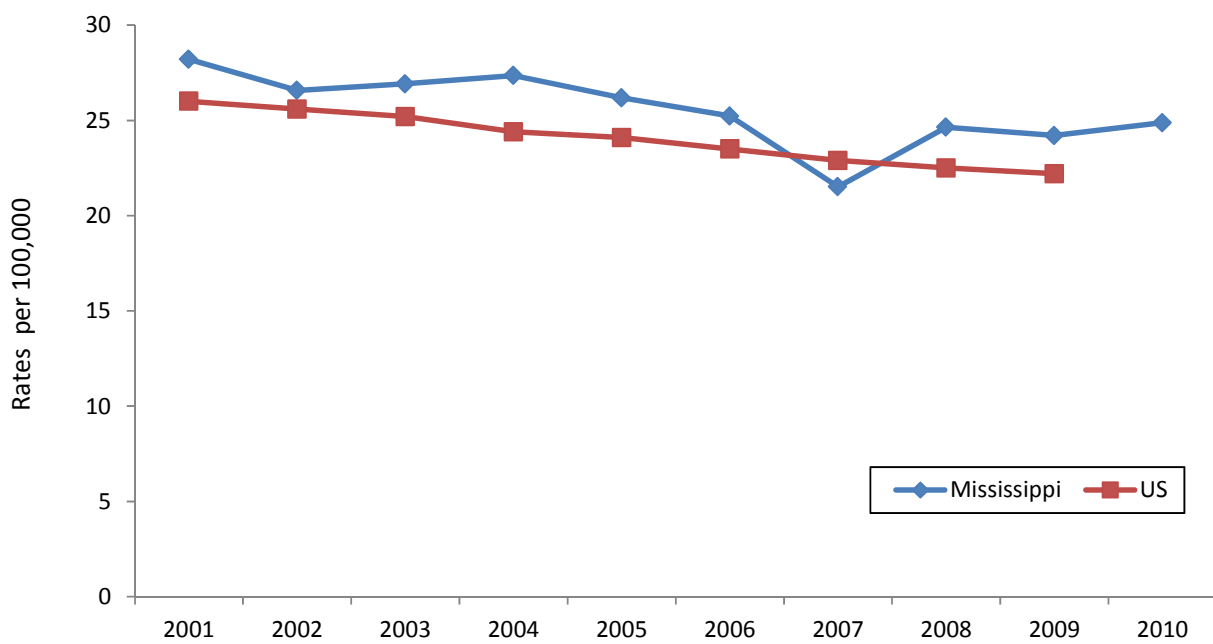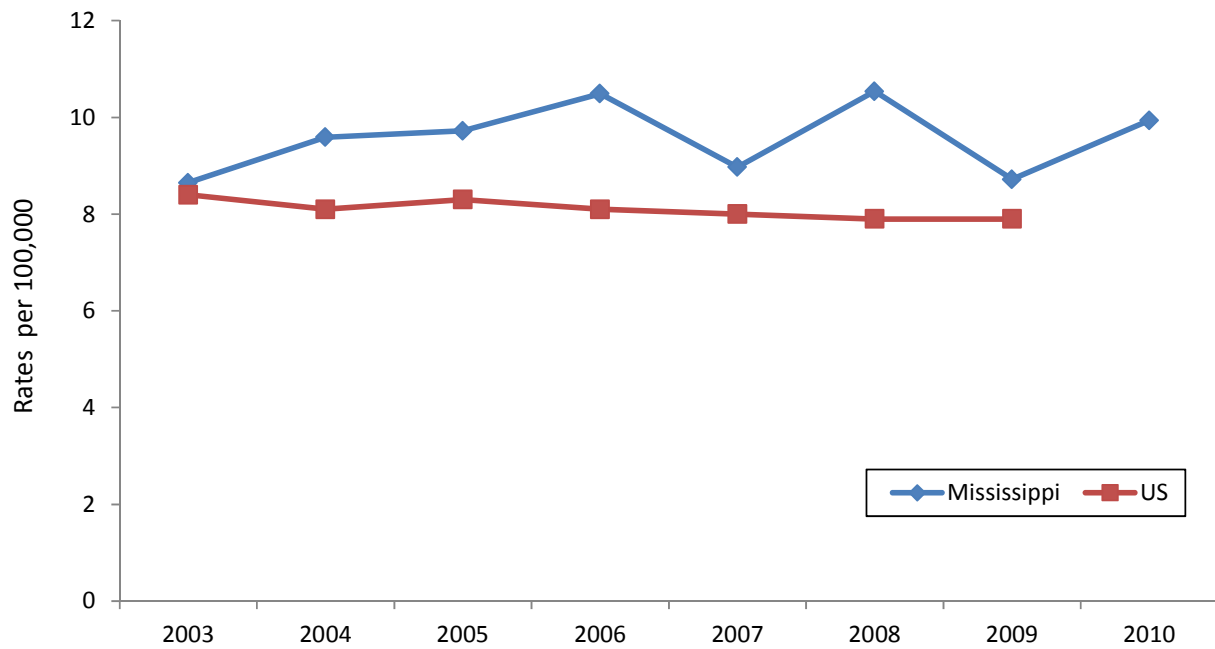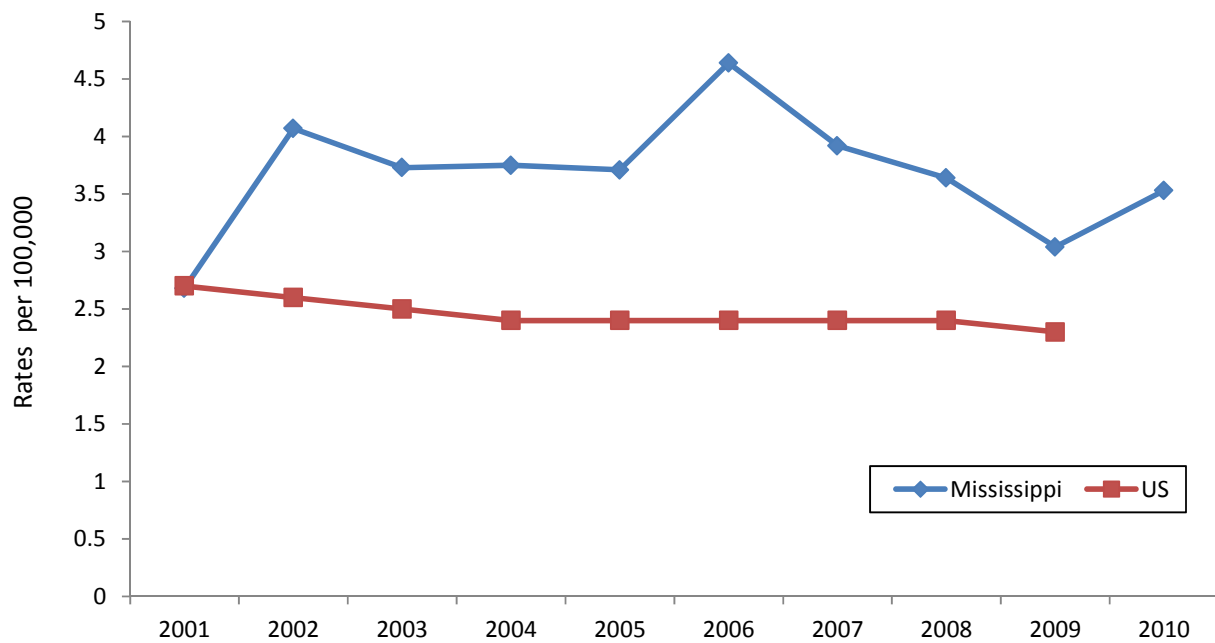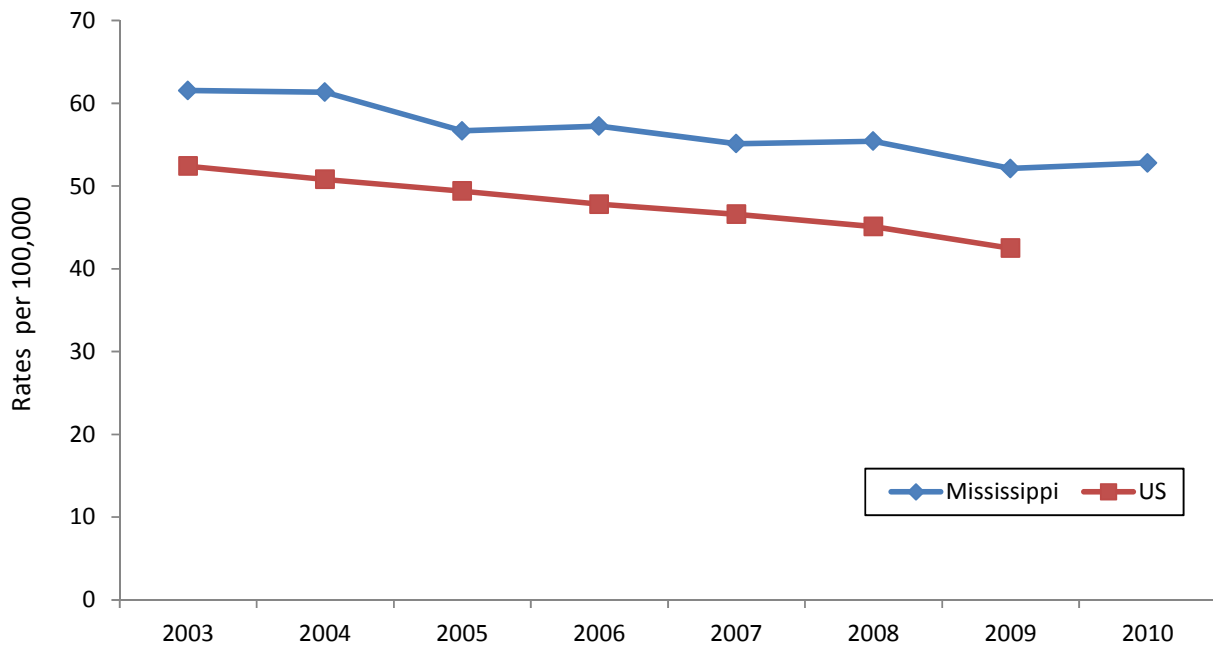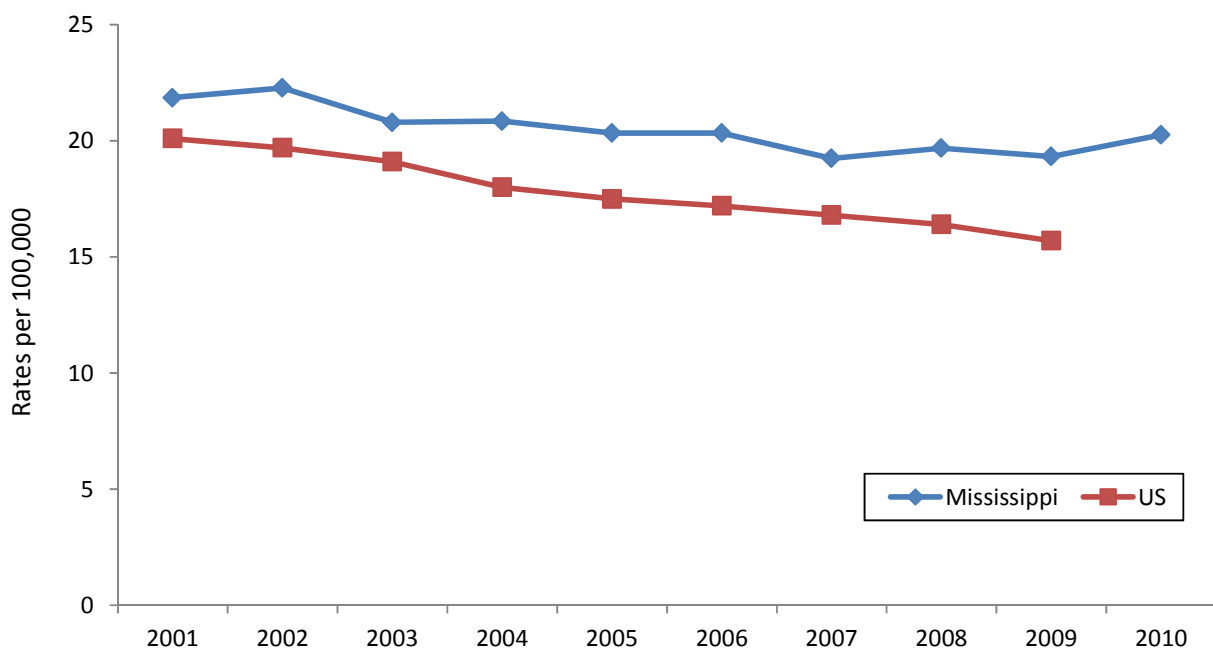

Figure 16. Mortality of Cancer of the female breast Mississippi and U.S., 2001-2010

Figure 17. Incidence of Invasive cancer of the cervix Mississippi and U.S., 2003-2010

Figure 18. Mortality of Cancer of the cervix Mississippi and U.S., 2001-2010

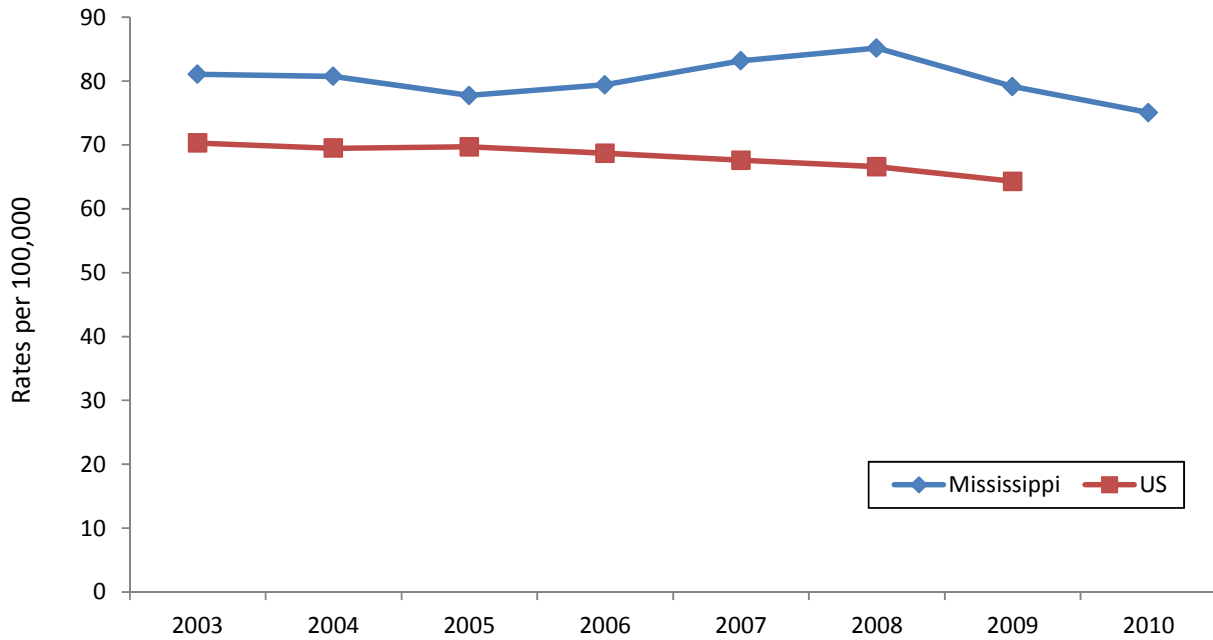Figure 19. Incidence of Cancer of the colon and rectum Mississippi and U.S., 2003-2010

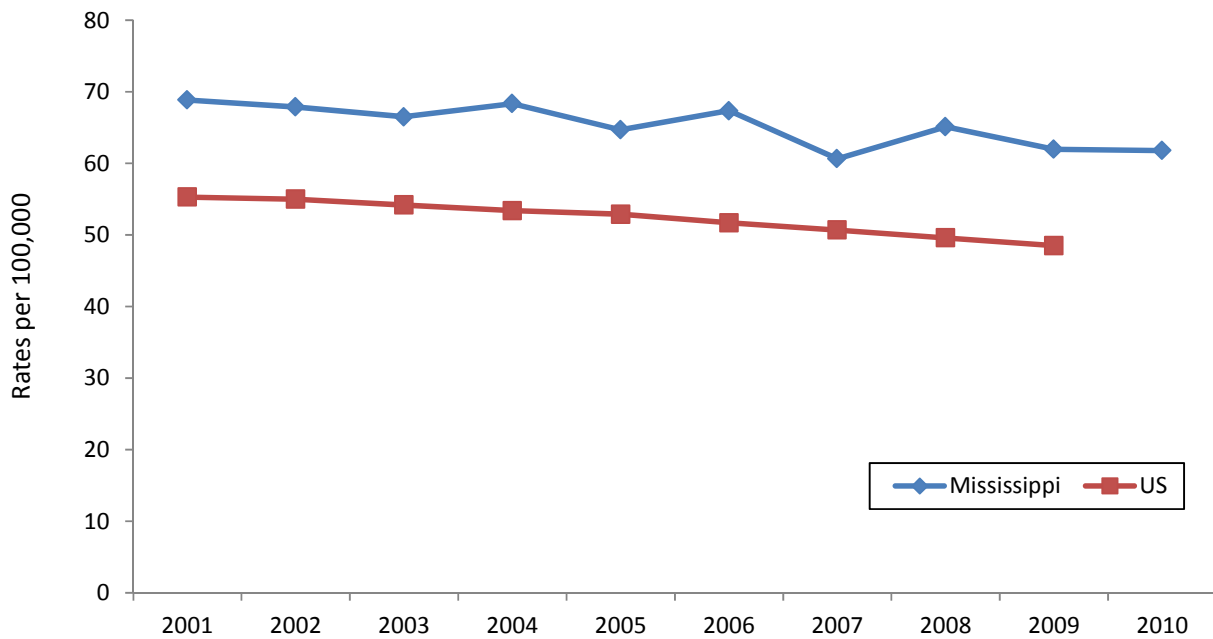Figure 20. Mortality of Cancer of the colon and rectum Mississippi and U.S., 2001-2010

Figure 21. Incidence of Cancer of the lung and bronchus Mississippi and U.S., 2003-2010

Figure 22. Mortality of Cancer of the lung and bronchus Mississippi and U.S., 2001-2010

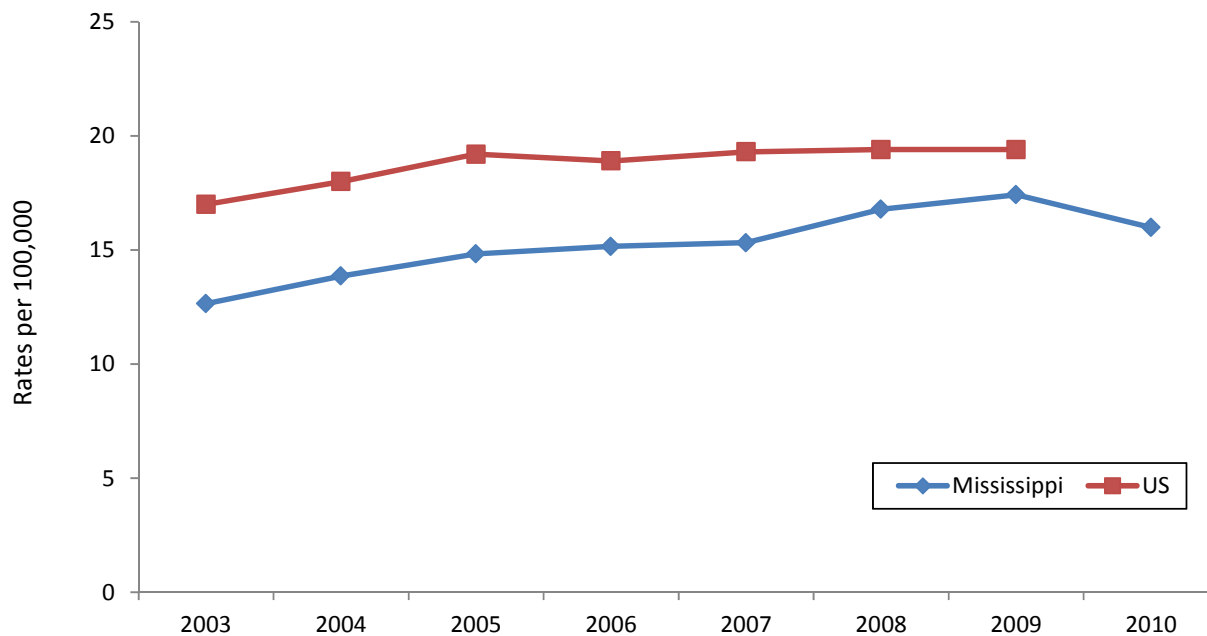Figure 23. Incidence of Invasive melanoma Mississippi and U.S., 2003-2010

Figure 24. Mortality of Melanoma Mississippi and U.S., 2001-2010
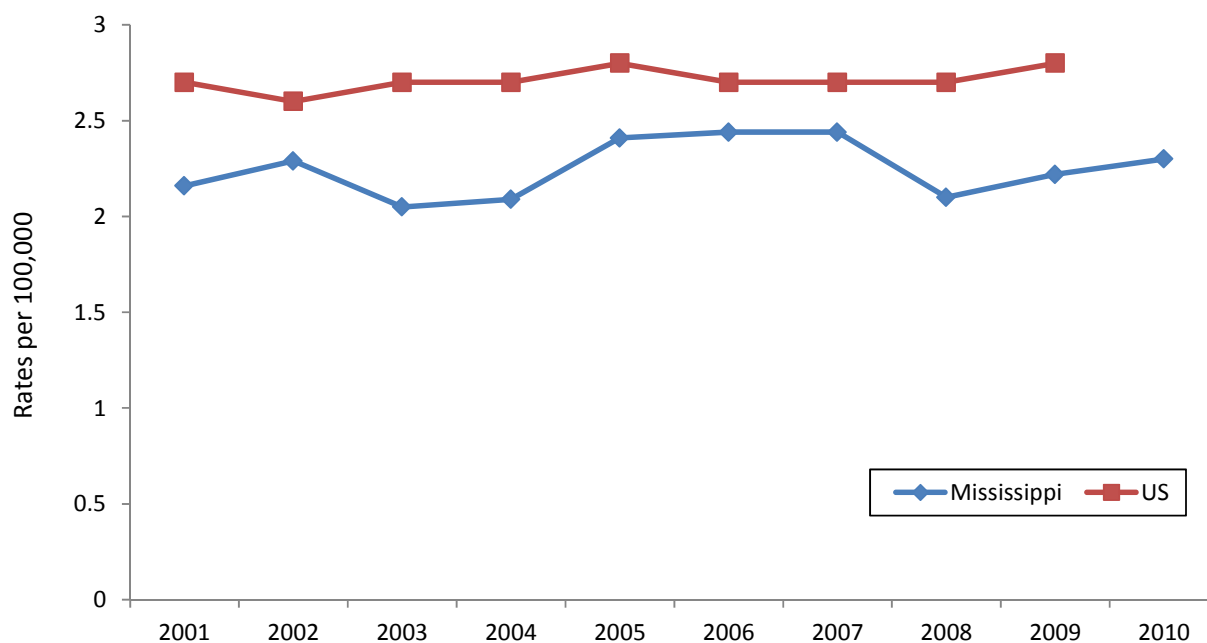
Figure 25. Incidence of Invasive cancer of the oral cavity or pharynx Mississippi and U.S., 2003-2010
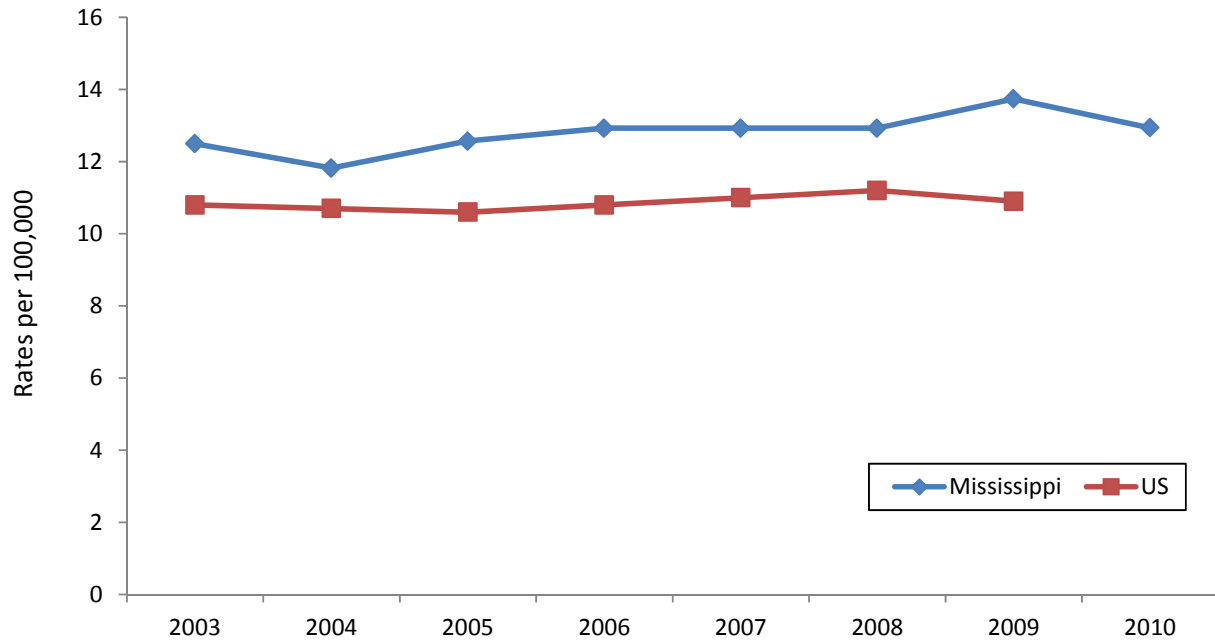

Figure 26. Mortality of Cancer of the oral cavity and pharynx Mississippi and U.S., 2001-2010
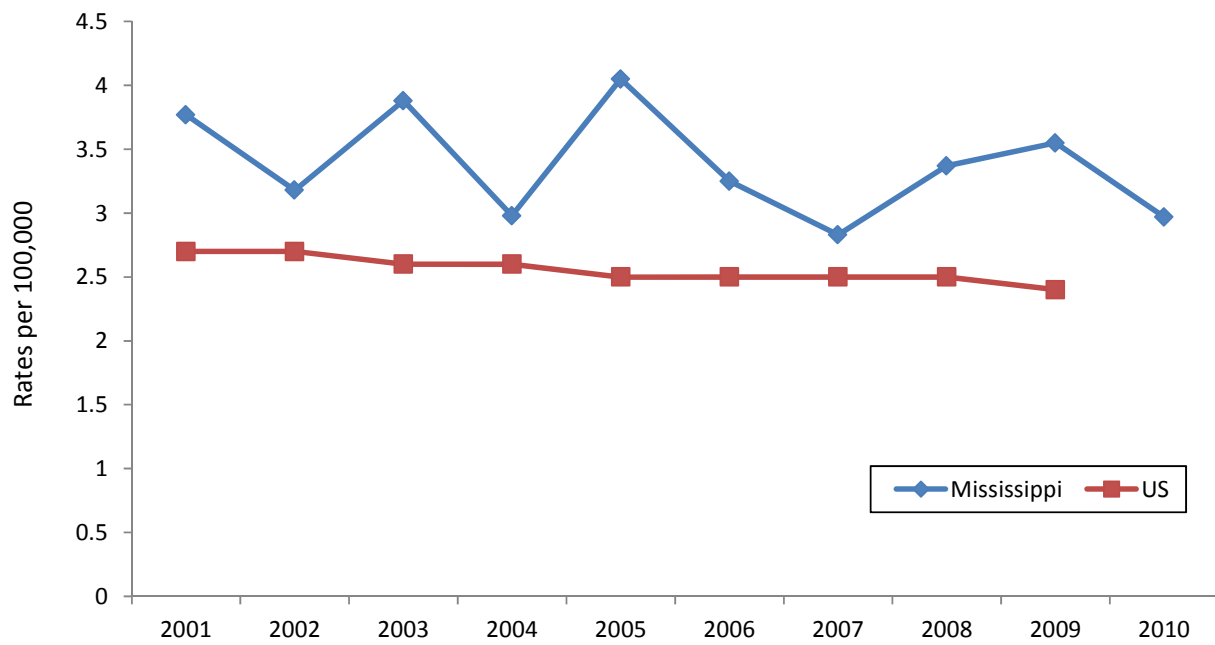
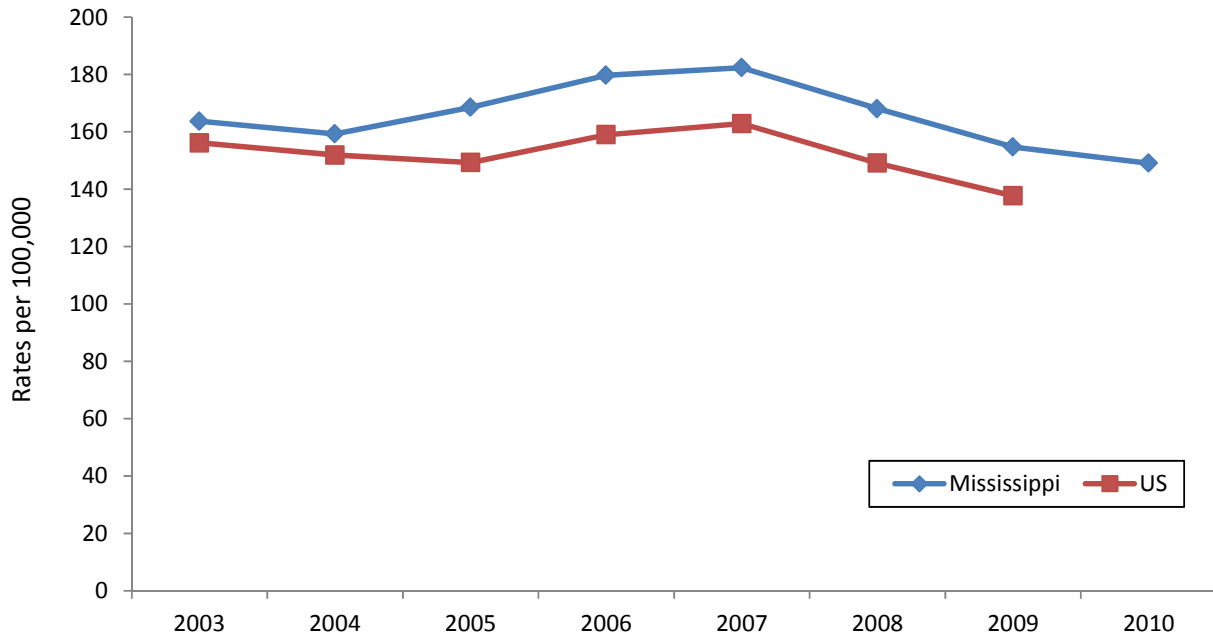Figure 27. Incidence of Invasive cancer of the prostate Mississippi and U.S., 2003-2010

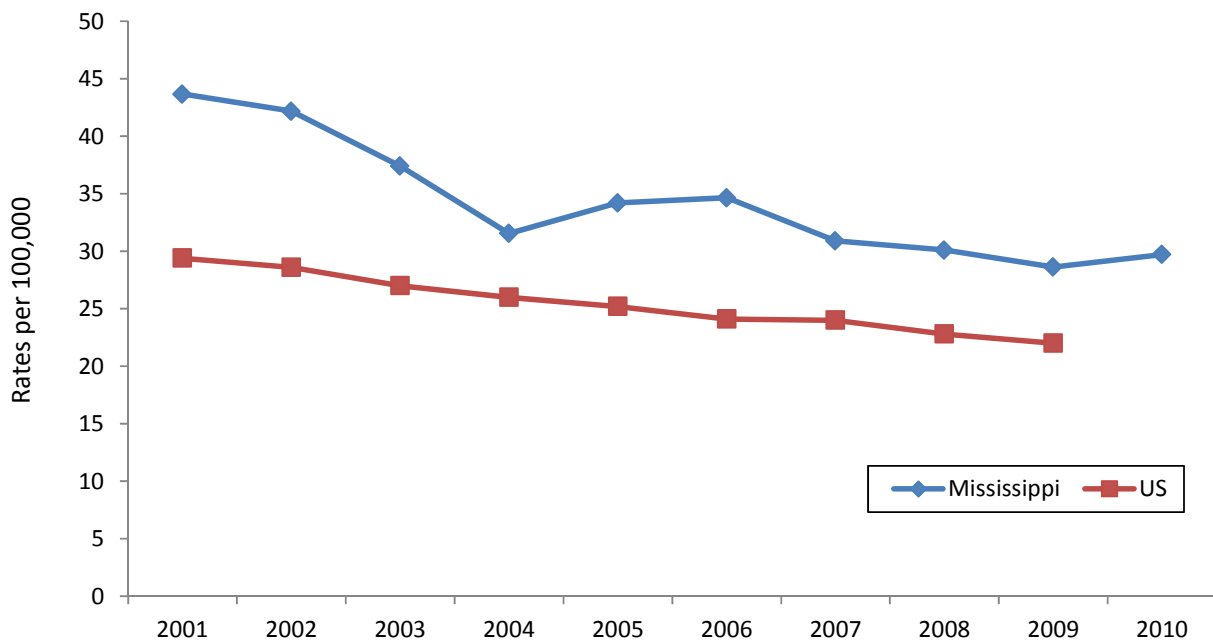Figure 28. Mortality of Cancer of the prostate Mississippi and U.S., 2001-2010

Figure 29. Percentage of Women Aged 40+ who have had a mammogram within the past two years Mississippi and U.S., 1995-2010
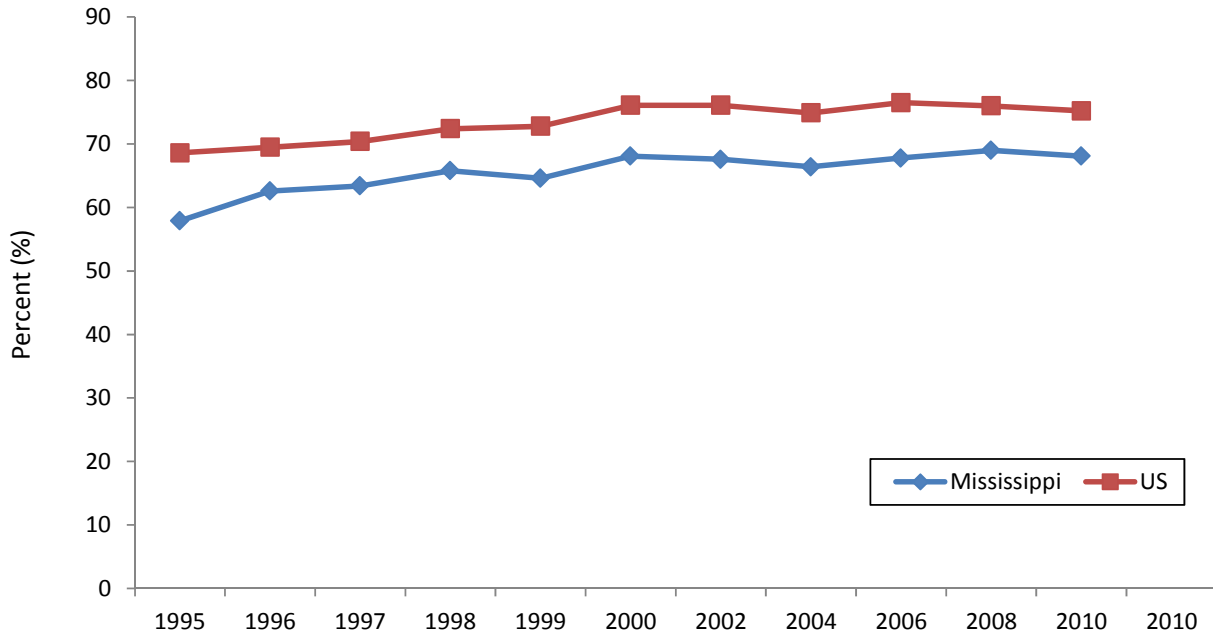

Figure 30. Percentage of Women who have had Pap test within past 3 years Mississippi and U.S., 2004-2010
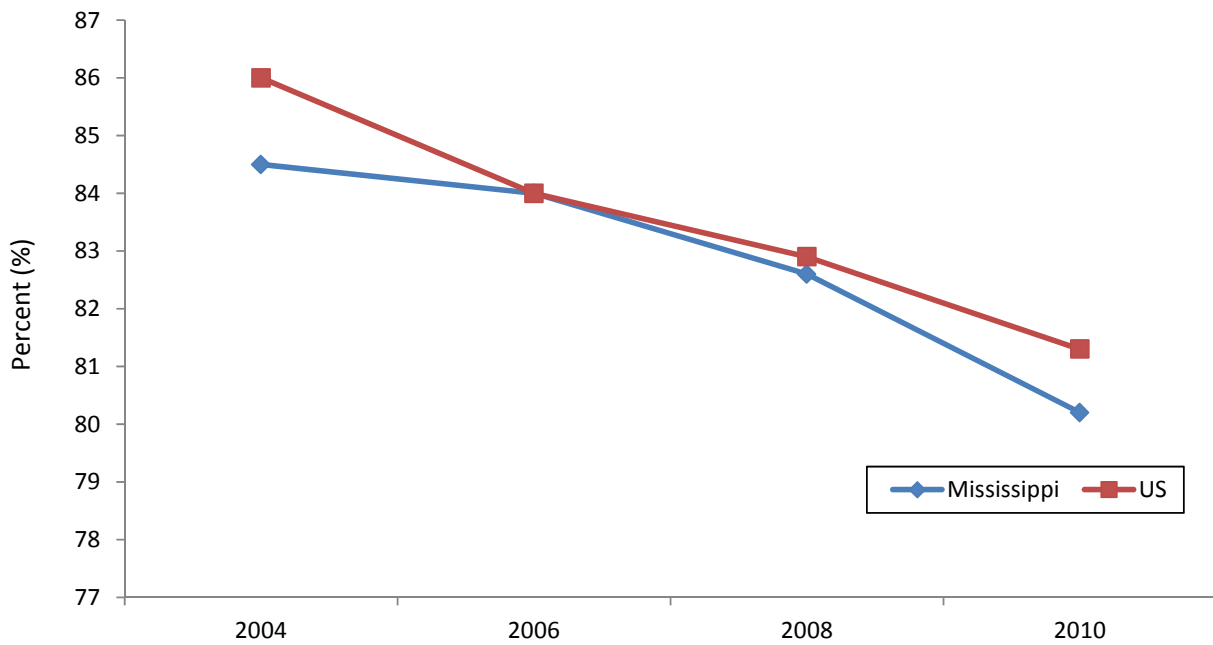
Figure 31. Percentage of adults receiving Colorectal Cancer Screening by Blood Stool test Mississippi and U.S., 1997-2010
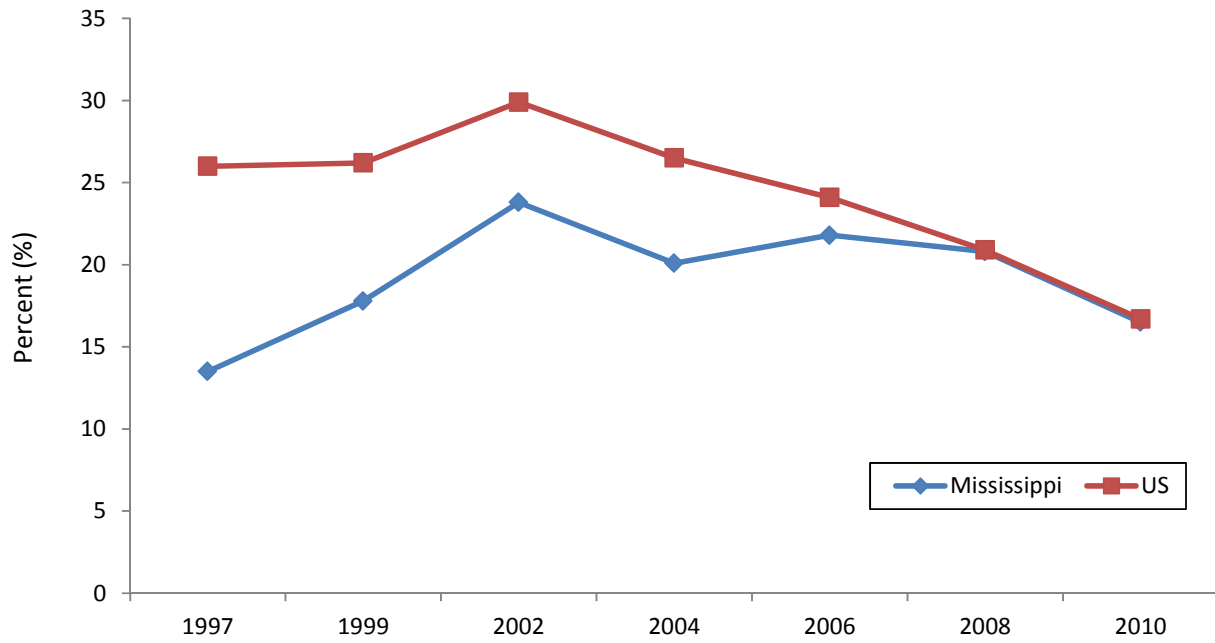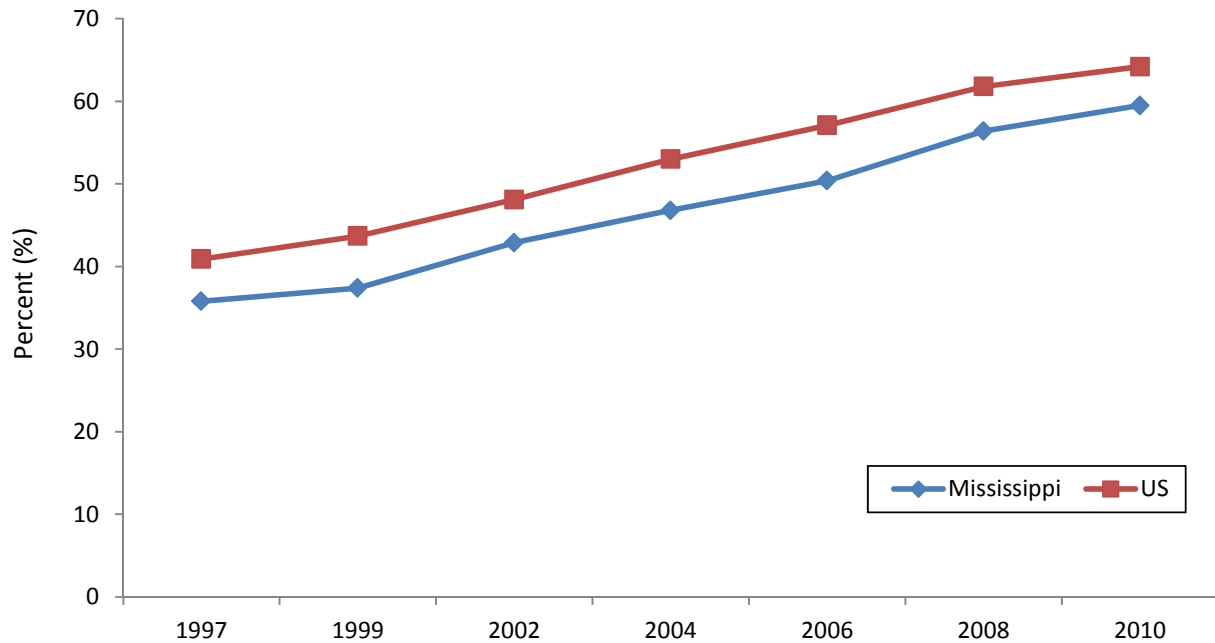

Figure 32. Adults aged 50+ who have ever had a sigmoidoscopy or colonoscopy Mississippi and U.S., 1997-2010

Economic Impact of Cancer –Treatment Costs (Mississippi)

Cancer accounts for approximately 5% of overall national health care expenditures. The following tables represent estimated annual Mississippi medical expenditures during 2004-2008 for cancer treatments by Medicare, Medicaid, private insurers, and by all payers combined (Tangka 2013).

Estimates of Average Annual State-Level Cancer Prevalence Rates per 100,000 population During 2004 to 2008, Overall and Among Residents Covered by Medicare, Medicaid, and Private Insurance

MS	All Residents	Medicare	Medicaid	Private Insurance
	4.2	15.6	3.3	4.8

Estimates of Average Annual State-Level Cancer Cost per Case During 2004 to 2008, Overall and Among Residents Covered by Medicare, Medicaid, and Private Insurance

MS	All Payers	Medicare	Medicaid	Private Insurance
	$9,800	$5,660	$4,380	$5,680

State-Level Estimates of Average Annual Payments for Cancer Treatment Made During 2004 to 2008 by All Payers Combined and by Medicare, Medicaid, and Private Insurance

MS	Payments by All Payers	Medicare Payments (% of total)	Medicaid Payments (% of total)	Private Insurance Payments (% of total)
	$1,199[a]	$419(35.0)	$96(8.0)	$433(36.1)

[a] Cost estimates in millions of 2010-equivalent US dollars

Estimates of the Percentage of State- Level Medical Expenditures Attributable to Cancer Treatment During 2004 to 2008, Overall and by Category of Payer

MS	All Payers %	Medicare %	Medicaid %	Private Insurance %
	6.4	8.6	2.8	6.7

Nutrition, Physical Activity, Obesity and Cancer

Approximately one-third of the cancer deaths that occur in the United States each year are due to nutrition and physical activity factors, including obesity. For the majority of Americans who do not use tobacco, dietary choices and physical activity are the most important modifiable cancer risk factors. Cancer risk can be reduced by an overall nutrition plan that includes mostly plant foods (fruits, vegetables, grains, and beans) and a balance between food intake and physical activity. Physical activity also promotes overall health and can help protect against some cancers, including colon cancer and breast cancer.

Evidence indicates that although genes do influence cancer risk, the majority of the variation in cancer risk among populations and among individuals is due to behavioral factors such as cigarette smoking, certain dietary patterns, and physical inactivity. The introduction of a healthy diet and regular physical activity at any time from childhood to old age can promote health and impact cancer risk.

Unfortunately, Mississippi adults are far from reaching the recommended guidelines for fruit and vegetable consumption, physical activity, and body weight. Less than one in five adults interviewed as part of the 2009 Mississippi Behavioral Risk Factor Surveillance System reported eating an average of five or more servings of fruits and vegetables per day. In addition to concerns about proper nutrition, not all Mississippi residents are meeting recommendations for daily physical activity or even participating in leisure time physical activity. The increasing number of overweight and obese individuals in the state may be related to poor nutritional habits and physical inactivity. Based on height to weight measures (known as body mass index or BMI), about 69 percent of Mississippi residents were considered overweight or obese in 2012.

Health Promotion Guidelines

1. **Eat a variety of healthful foods, with an emphasis on plant sources.**
   - **Eat five or more servings of vegetables and fruits each day.**
   - **Choose whole grains in preference to processed (refined) grains and sugar.**
   - **Limit consumption of red meats, especially high fat and processed meats.**
   - **Choose foods that help maintain a healthful weight.**
2. **Adopt a physically active lifestyle.**
   - **Adults: Engage in at least moderate activity for 30 minutes or more on five or more days of the week.**
   - **Children and adolescences: Engage in at least 60 minutes per day of moderate-to-vigorous physical activity at least five days per week.**
3. **Maintain a healthful weight throughout life.**
4. **Limit alcoholic beverage consumption.**

Eat a rainbow of colorful foods each day.

Obesity Linked to Increased Cancer Deaths

According to findings in a landmark study from the American Cancer Society,* excess body weight contributes to more than 90,000 cancer deaths in the U.S. each year. In the latest study ever done on the link between obesity and cancer, researchers followed more than 900,000 adults for 16 years. In the Cancer Prevention Study II, in both men and women, Body Mass Index (BMI) was found to be associated with higher rates of death due to cancer of the: esophagus, colon and rectum, liver, gallbladder, pancreas and kidney, non-Hodgkin lymphoma, and multiple myeloma. Significant trends were found with higher BMI, increasing risk of death from cancers of the stomach and prostate in men and breast, uterus, cervix, and ovary in women.

*Source: Calle, E.E., Rogriguez, C., Walker-Thurmond, K., Thun, M.J. Overweight, obesity, and mortality from cancer in a prospectively studied cohort of U.S. adults (2003). New England Journal of Medicine, April 24; 348(17):1625-38

What is My Body Mass Index (BMI)?

Your Body Mass Index (BMI) is an estimate of your body fat content, based on your height and weight. The higher your BMI, the higher your risk of developing such conditions as cancer, heart disease, high blood pressure, sleep apnea, and Type 2 diabetes.

What are Cancer Incidence & Mortality Rates?

Cancer incidence rates are measures of the risk of being diagnosed with cancer among the state's general population, while mortality rates are measures of risk of dying among the state's general population. Cancer rates in this document represent the number of new cases of cancer per 100,000 population (incidence) or the number of cancer deaths per 100,000 population (mortality) during a specific time period.

For example, if the state's average annual lung and bronchus cancer incidence rate among males is 112.9, that means for every 100,000 men in Mississippi, approximately 113 new cases of lung and bronchus cancer are diagnosed each year. If the state's adult male population numbers 1,063,236 (2011), then approximately 1,200 new cases of lung and bronchus cancer are diagnosed among men in Mississippi each year.

113 new cases diagnosed in one year = 1,200 new cases diagnosed in one year

100,000 population   1,063,236 population

A similar example can be used for an area smaller than the state or for specific race/ethnic groups. For example if the population of Hinds county's adult male population numbers 84,059 (2011), then approximately 95 new cases of lung and bronchus cancer are diagnosed among men in the county each year.

113 new cases diagnosed in one year = 95 new cases diagnosed in one year

100,000 population   84,059 population

Rates provide a useful way to compare the cancer burden irrespective of the actual population size. Rates can be used to compare demographic groups (males have higher lung cancer rates than females), racial/ethnic groups, or geographic area.

Mortality rates depend on the incidence of the cancer, as well as the stage at diagnosis, survival, and the treatment for the cancer type. Survival estimates reflect the risk of death among newly diagnosed cancer cases, while mortality rates reflect the risk of death among the general population. New screening programs, aimed at early detection and increased survival, tend to result in a greater number of new cases being diagnosed (i.e., higher incidence rates) with little delay. However, as most people dying of cancer today were diagnosed several years ago, mortality rates and survival estimates take time to show the influence of new programs.

What are Age-adjusted Rates?

The cancer risk of people at older ages is generally higher than people at younger ages. For example about 8 out of every 10 cancer cases diagnosed in Mississippi occur in people ages 55 and older. As a result, if one geographic area's cancer incidence rate is higher than another, the first question is whether the area with a higher rate has an older population.

To address this issue, all mortality and incidence rates presented in this burden document have been *"age-adjusted."* This removes the impact of different age distributions between populations and allows for a direct comparison of those populations. Age-adjustment also allows for a comparison of rates within a single population over time. An age-adjusted rate is not a real measure of the burden of the disease on a population, but rather an artificial measure that is used for comparison purposes.

Age-adjusting to the 2000 United States Standard Population

All mortality and incidence rates in this publication, obtained from the Mississippi Cancer Registry, were age-adjusted using the direct method. The direct standardization method weights the age-specific rates for a given sex, race, or geographic area by the age distribution of the standard population.

Mississippi Cancer Burden Document uses the 2000 United States standard population (2000 U.S. standard population) for age-adjusting data. The purpose of shifting to the 2000 U.S. standard population is to more accurately reflect contemporary incidence and mortality rates, given the aging of the U.S. population. On average, Americans are living longer because of the decline in infectious and cardiovascular diseases. Our longer life span is allowing us to reach the age where cancer and other chronic diseases become more common. Using the 2000 U.S. standard for age adjustment instead of the 1970 or 1940 U.S. standards allow age-adjusted rates to be closer to the actual, unadjusted rate in the population. Rates adjusted to the 2000 U.S. standard population will be higher than those adjusted to the 1970 U.S. standard or the world standard population because weighting is higher for older ages with the new standard.

Data comparisons should be limited to data adjusted to the same standard populations. Comparisons to publications that used the 1970 U.S. standard population should also be avoided. In addition, comparisons to publications using the world standard should be avoided. Comparisons of data age-adjusted according to different standards would lead to erroneous conclusions.