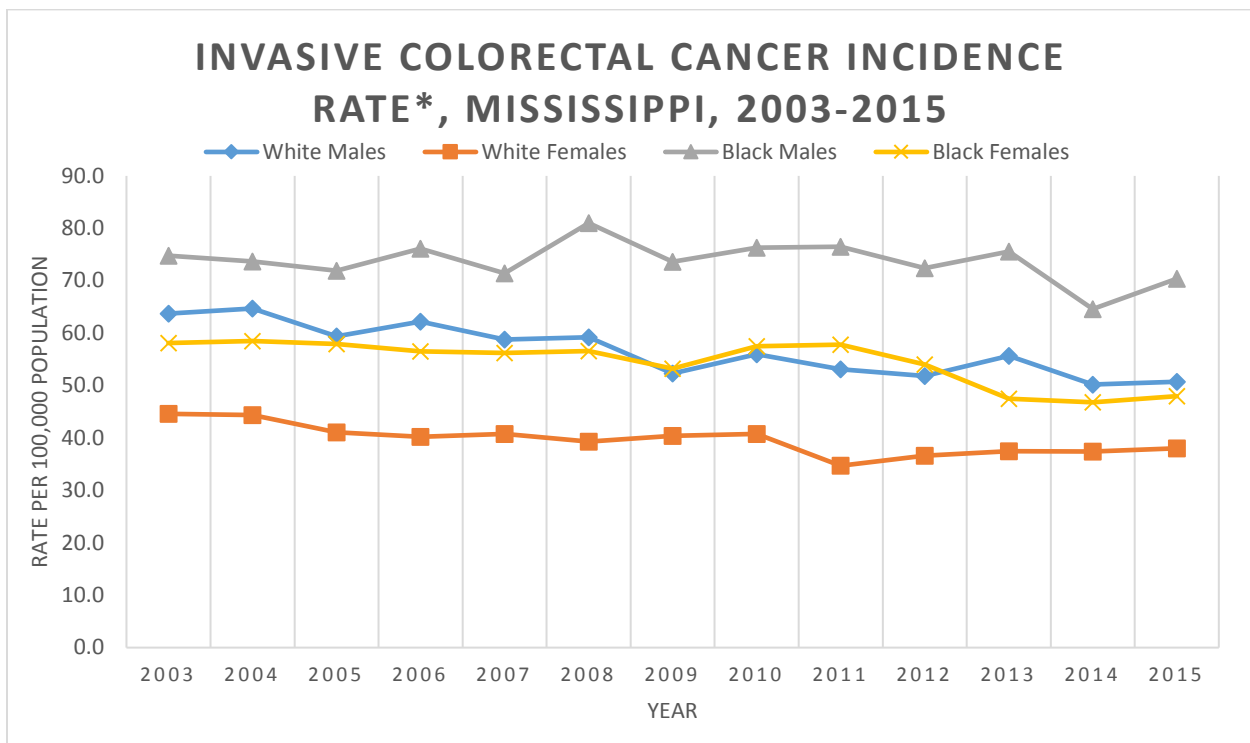


Obesity-Related Cancers in Mississippi, 2003-2015

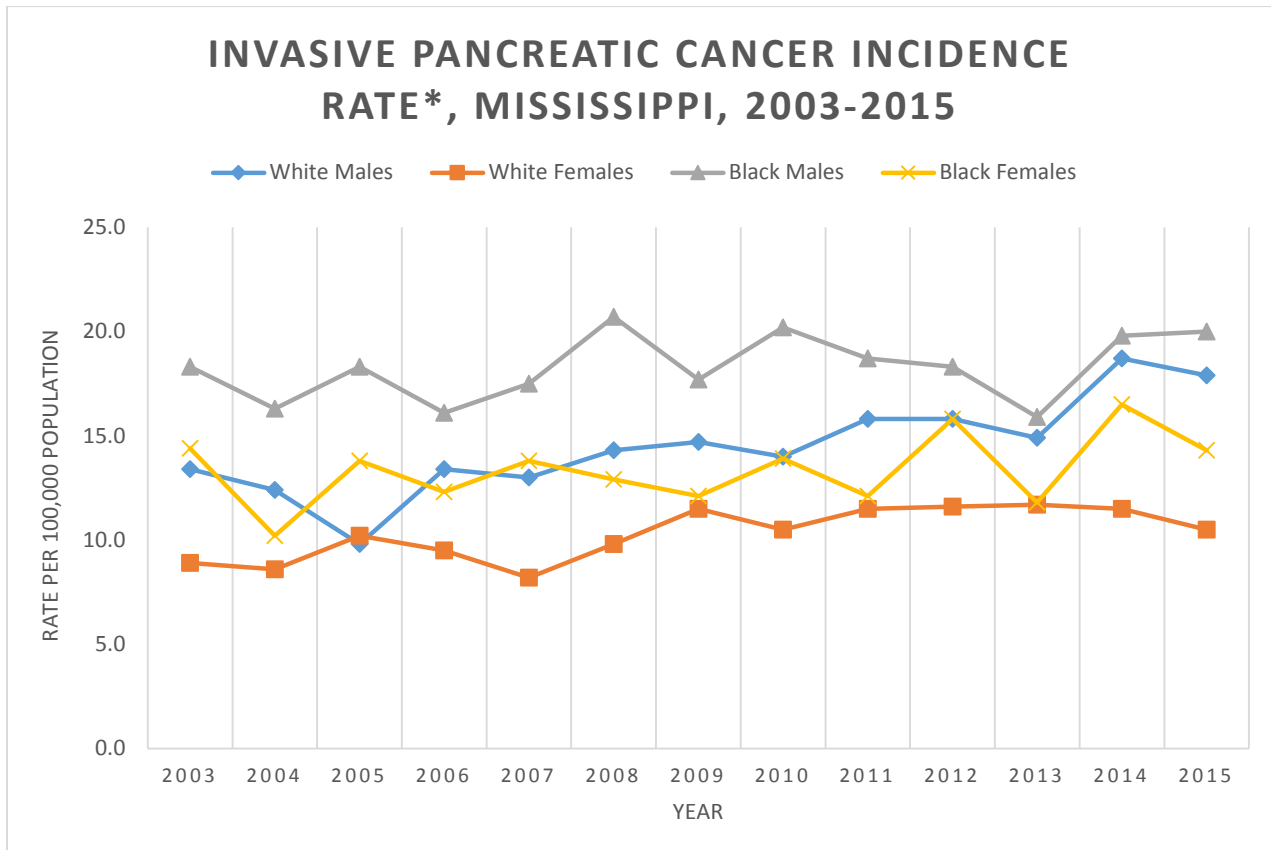
Obesity is a modifiable risk factor that increases the risk of developing certain cancers. According to data from the Behavioral Risk Factor Surveillance System for 2016, 37.3% of Mississippi adults are obese. Mississippi is tied with West Virginia for the highest obesity rate in the nation¹. Cancers that are associated with obesity include colorectal cancer, pancreatic cancer, post-menopausal breast cancer, uterine cancer, ovarian cancer, kidney cancer, adenocarcinoma of the esophagus, gastric cardia cancer, gallbladder cancer, liver cancer, thyroid cancer, multiple myeloma, and meningioma. Below are graphs of the trends in obesity-related cancers over the period 2003 to 2015 by race and sex with a description of the trends occurring in each group both for the full time period and for the most recent period between 2011 and 2015. All analysis was done using SEER*Stat software².



*Rates age-adjusted to the 2000 U.S. standard million population

Colorectal cancer rates decreased in all of the race/sex groups between 2003 and 2015. White males experienced the highest level of decrease in colorectal cancer at a significant rate of 2.0% annually. Black males had significantly higher rates of colorectal cancer incidence compared to all other groups and experienced the smallest change over time with a decrease of only 0.5% annually. Conversely, white females had lower rates of colorectal cancer than any other group, and experienced a significant annual decrease of 1.5%. Black females had the second highest annual decrease in colorectal cancer rates at a significant 1.7%. Their rates were similar to that of white males.

For the latest five-year period of 2011-2015, black females experienced a significant decrease annually of 5.0% in colorectal cancer rates. Conversely, white females experienced a significant increase of 2.0% annually. While white females had the lowest colorectal cancer incidence rates, the increasing trend is cause for concern. The annual percent decreases for white males of 1.2% and for black males of 2.7% were not statistically significant.

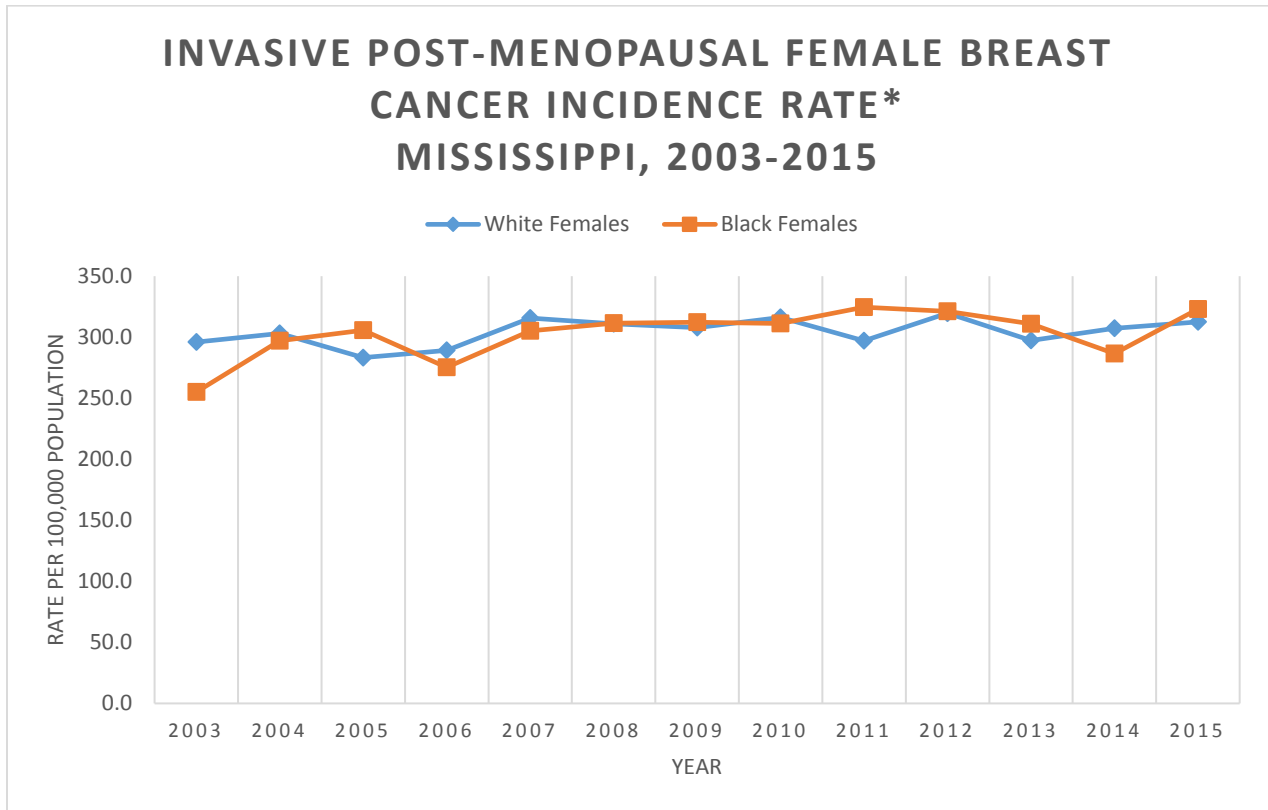


*Rates age-adjusted to the 2000 U.S. standard million population

Pancreatic cancer rates increased in all of the race/sex groups between 2003 and 2015. White males experienced the highest level of increase in pancreatic cancer at a significant 3.5% annually. White females also experienced a significant increase over time of 2.3% annually. While the trend for both black males and black females was increasing, neither was statistically significant. The annual percent change for black males was 0.8% and for black females was 1.3%.

For the latest five-year period of 2011-2015, none of the groups had a significant increase or decrease. Like for the overall time period of 2003-2015, white males, black males and black females all demonstrated an increasing trend. For white males, the annual percent change was 1.3%. For black males, the annual percent increase was 2.3%, and for black females the annual

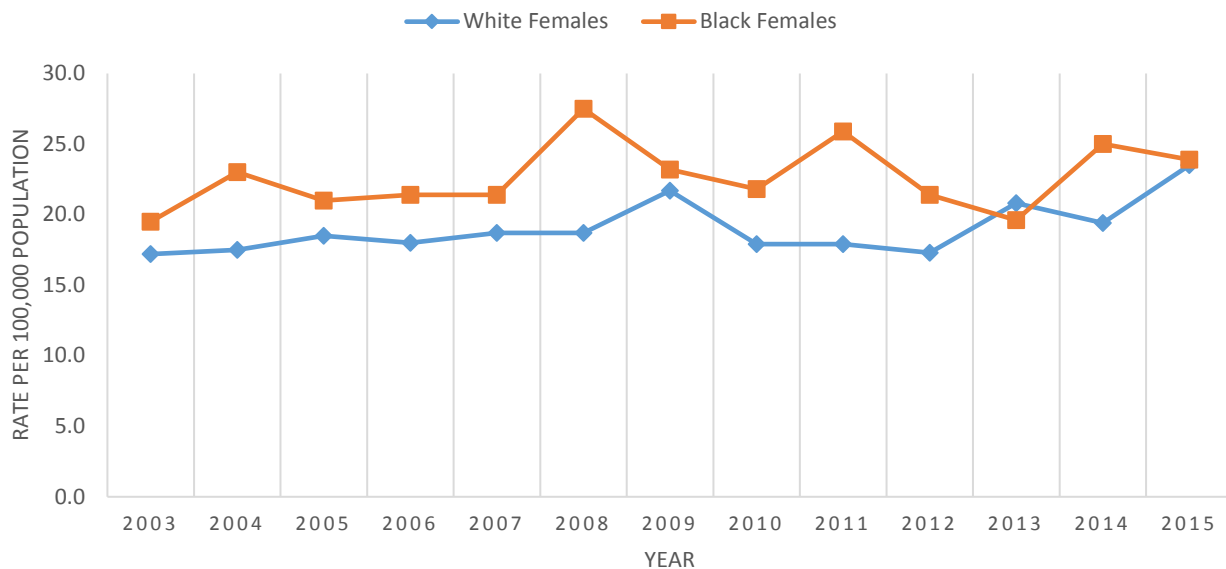
percent increase was 3.6%. Only white females showed the desired annual decrease of 2.0%. Again, this decrease was not statistically significant.



*Rates age-adjusted to the 2000 U.S. standard million population

Post-menopausal breast cancer is defined as breast cancer diagnosed in women ages 50 and older. The rates of post-menopausal breast cancer between 2003 and 2015 remained relatively unchanged. The annual percent change for white women was 0.4% and for black women was 0.9%. The rates of breast cancer by race were very similar to each other over time. For white females, the observed annual percent change was a slight increase of 0.6%. Black women experienced an annual decrease of 1.1%. The changes for neither groups were statistically significant.

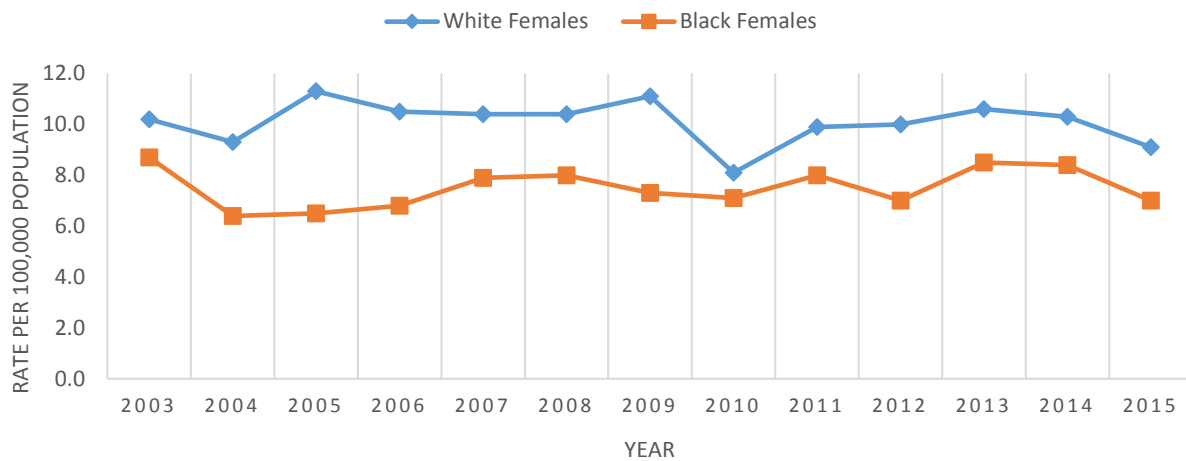
INVASIVE CORPUS AND UTERUS, NOS CANCER INCIDENCE RATE*, MISSISSIPPI, 2003-2015



*Rates age-adjusted to the 2000 U.S. standard million population

Uterine cancer rates increased significantly in white women between 2003 and 2015. The annual percent change over that period of time was 1.6%. Black women experienced only a small increase of 0.8% annual. This change was not statistically significant. The trend over the latest five-year period from 2011-2015 for white women was an annual increase of 7.1% which was not statistically significant. For black women, there was no change in the rate for the latest five-year period. Rates for white and black women were similar to each other.

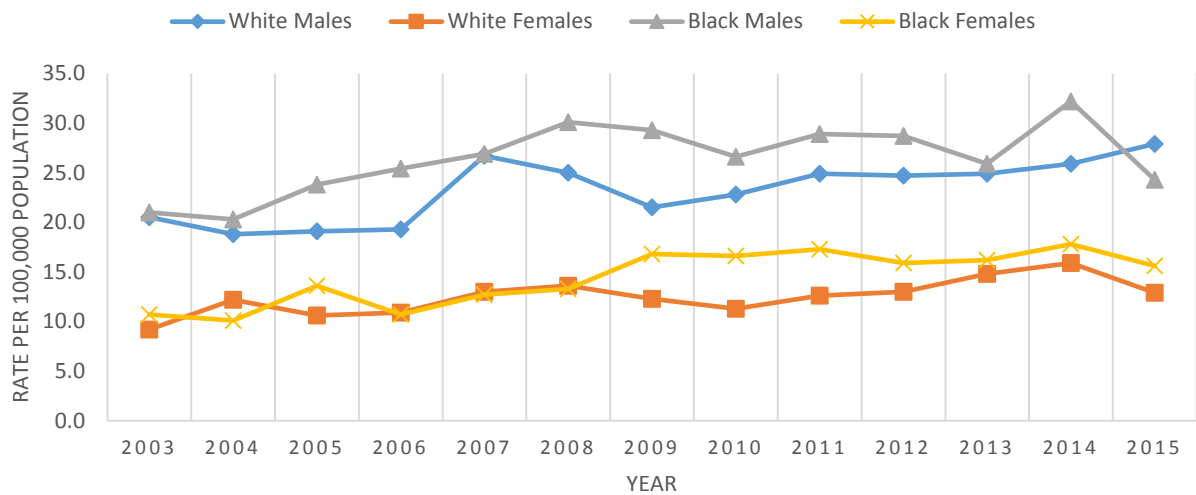
INVASIVE OVARIAN CANCER INCIDENCE RATE, MISSISSIPPI, 2003-2015



*Rates age-adjusted to the 2000 U.S. standard million population

Rates for ovarian cancer were similar between white females and black females for all years but 2005 where white females had significantly higher rates. Neither group experienced any significant change in rates over time. However, the direction of observed change was opposite for the groups. White females experienced a 0.5% decrease annually over the period of 2003 to 2015. Black females experienced a 0.5% increase annually over the same period. In the most recent five-year time period between 2011 and 2015, both groups experienced annual declines though the changes were not statistically significant. White female rates declined 1.2% annually, and black female rates were observed to decline at 0.7% annually.

INVASIVE KIDNEY CANCER INCIDENCE RATE* MISSISSIPPI, 2003-2015



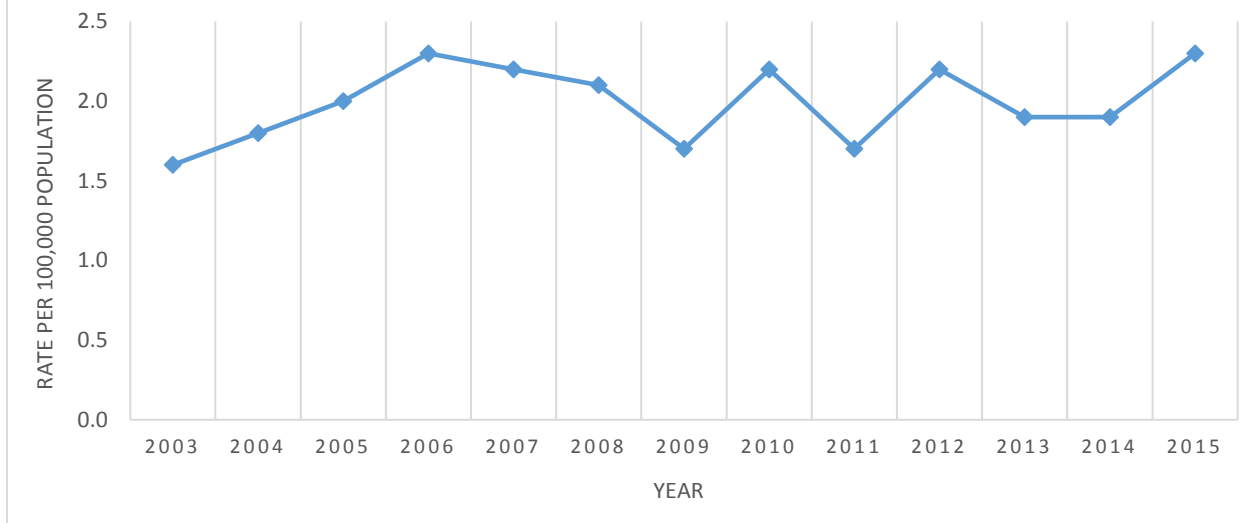
*Rates age-adjusted to the 2000 U.S. standard million population

Rates of kidney cancer were similar between black males and white males. Similarly, the rates for white females and black females were also similar to each other. White females consistently had rates that were significantly lower than the rates of both black males and white males. Black females had rates that were significantly lower than black males. Their rates were also significantly lower than white males for all years except 2005, 2009, and 2010.

All groups showed an increasing trend for the period from 2003 to 2015, and that trend was statistically significant for all groups except black males. The annual percent increase for white males and white females was 2.7%. For black females, the trend was an annual increase of 4.0%. For black males, the trend showed an increase of 1.9% annually.

For the latest five-year period of 2011-2015, whites showed an increasing trend, while blacks showed a decreasing trend. None of the changes were statistically significant. The annual percent increase during this five-year period for white males was 2.9% and for white females was 2.7%. The annual percent decrease for black males was 1.9% and for black females was 0.9%.

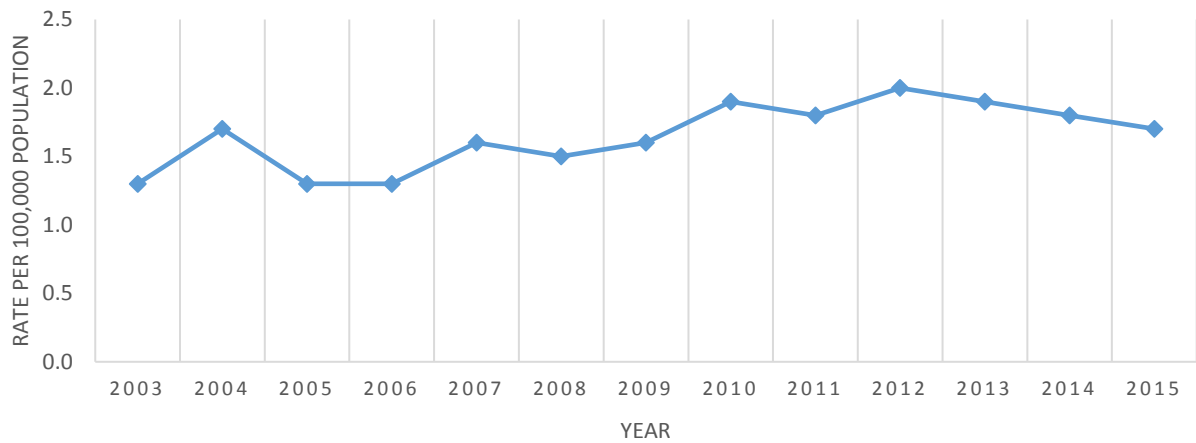
INVASIVE ESOPHAGEAL ADENOCARCINOMA INCIDENCE RATE*, MISSISSIPPI, 2003-2015



*Rates age-adjusted to the 2000 U.S. standard million population

Adenocarcinoma of the esophagus is one type of esophageal cancer that is associated with obesity. Because this is a rare cancer, the statistics could not be broken out by race and sex. Overall, the trend for esophageal cancer for the period from 2003-2015 was increasing with an annual increase of 0.9%. This change was not statistically significant. For the latest five-year period of 2011-2015, the annual increase of 5.4% was higher than for the full time period but was still not statistically significant.

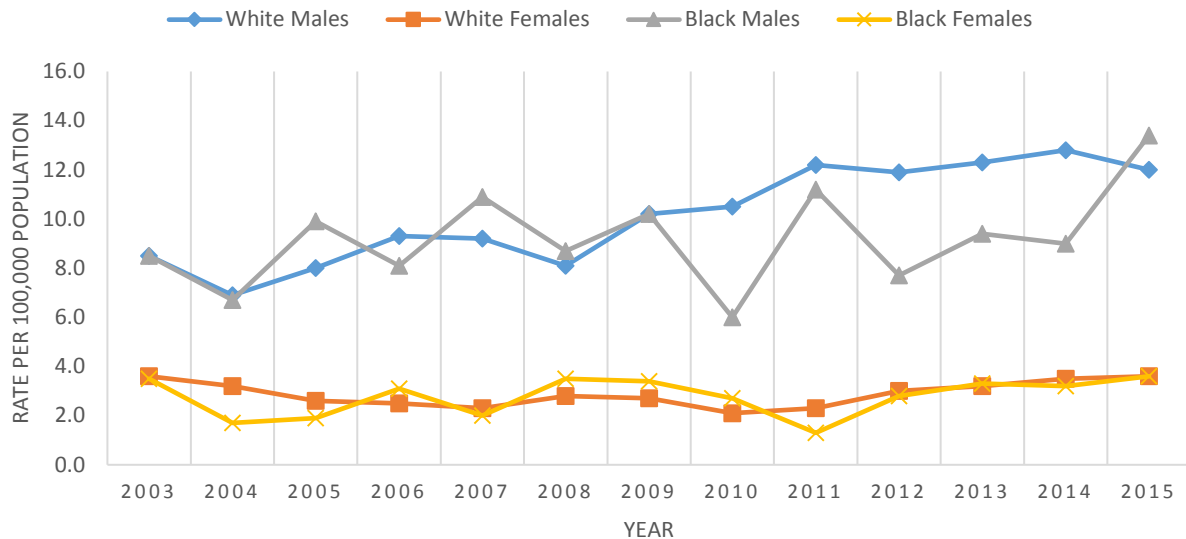
INVASIVE GASTRIC CARDIA CANCER INCIDENCE RATE*, MISSISSIPPI, 2003-2015



*Rates age-adjusted to the 2000 U.S. standard million population

Cancer occurring in the cardia portion of the stomach is associated with obesity. Because this is a rare cancer, the statistics could not be broken out by race and sex. Overall, the trend for gastric cardia cancer for the period from 2003-2015 was significantly increasing with an annual increase of 2.9%. For the latest five-year period of 2011-2015, the trend was a decrease of 2.0% annually, though this trend was not statistically significant.

INVASIVE LIVER CANCER INCIDENCE RATE* MISSISSIPPI, 2003-2015

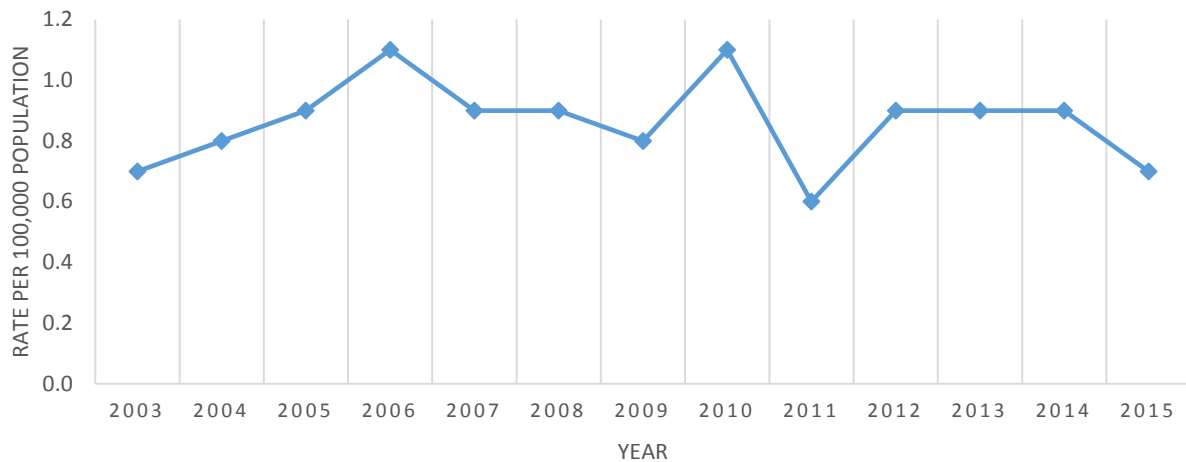


*Rates age-adjusted to the 2000 U.S. standard million population

Males had significantly higher rates of liver cancer than females. The rates were similar between the races for each sex group. All groups saw an increasing trend, but that trend was only statistically significant for white males. The annual percent change for white males was 4.6%. The rates for white females changed very little on average over the time period from 2003 to 2015 with an annual percent increase of 0.9%. The annual percent increase for black males was 2.4% and for black females was 1.9%.

For the most recent five-year time period from 2011 to 2015, the trends were also increasing for all groups with only white females having a statistically significant increase. In contrast to the significant increase over the full time period for white males, the period from 2011 to 2015 saw little change for white males with a small 0.4% annual increase. Conversely, white females over the full time period had a very small annual percent change, but they had a significant 10.8% annual percent increase over the period from 2011 to 2015. Though not statistically significant, black males experienced a 6.5% annual increase over the final five years, and black females experienced a 16.4% increase. The increase for black females seems large but is not statistically significant because of the small numbers of cases for black females. The increasing trends in liver cancer may be explained, in part, by advances in imaging that allow for better diagnosis of liver cancer.

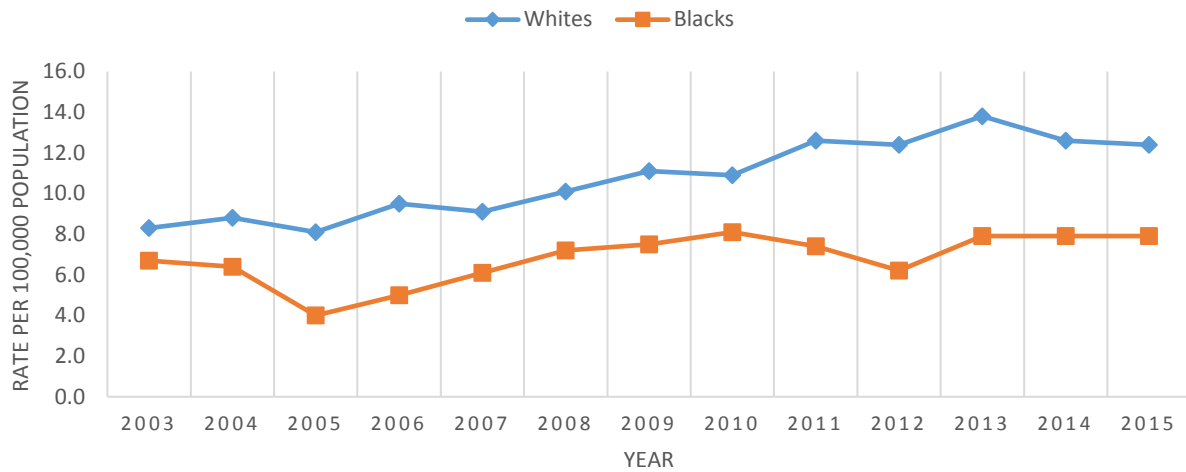
INVASIVE GALLBLADDER CANCER INCIDENCE RATE*, MISSISSIPPI 2003-2015



*Rates age-adjusted to the 2000 U.S. standard million population

Gallbladder cancer is a rare cancer, so the statistics could not be broken out by race and sex. Overall, the trend for gallbladder cancer for the period from 2003-2015 was decreasing annually at 0.6%. This change was not statistically significant. For the latest five-year period of 2011-2015, the change was very small with an annual increase of 0.1%. This change was also not statistically significant.

INVASIVE THYROID CANCER INCIDENCE RATE* MISSISSIPPI, 2003-2015

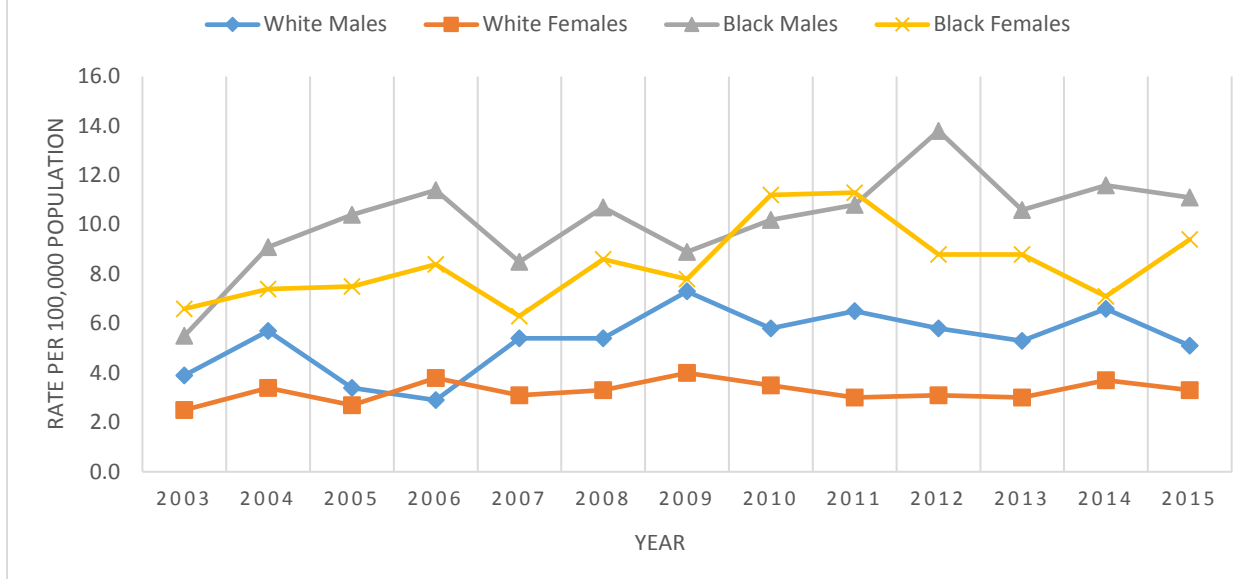


*Rates age-adjusted to the 2000 U.S. standard million population

Due to the number of cases diagnosed annually in black males being very small, the rates could not be broken out by both race and sex. However, females have significantly higher rates of thyroid cancer than males. Over the time period between 2003 and 2015, both race groups experienced significant annual rate increases. The increase for whites was 4.4% annually, and the increase for blacks was 2.9% annually. The increasing trends in thyroid cancer may be explained, in part, by advances in imaging that allow for better diagnosis.

For the latest five-year period between 2011 and 2015, the rates for whites are nearly flat with only a 0.2% annual decrease. The rate of increase during this period for blacks is 3.6% annually which is a higher observed annual increase than for the overall time period of 2003 to 2015. This most recent trend is not statistically significant due to a smaller number of cases being diagnosed in those five years compared to the overall 13 year period.

MULTIPLE MYELOMA INCIDENCE RATE* MISSISSIPPI, 2003-2015

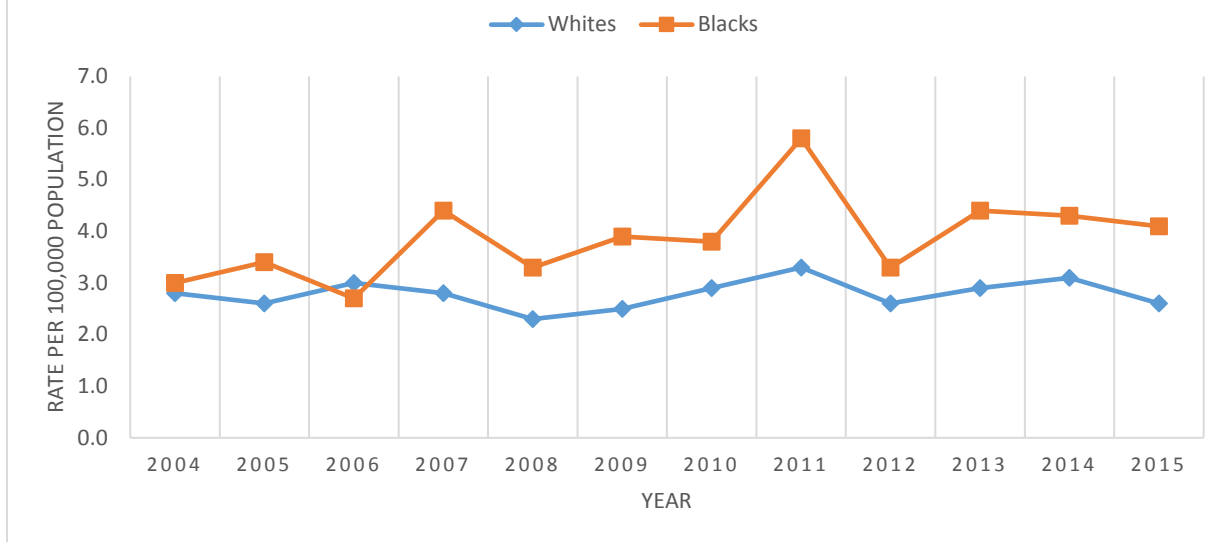


*Rates age-adjusted to the 2000 U.S. standard million population

For most time periods, black males and black females have significantly higher rates of multiple myeloma than white males and white females. Within each race group, there are no differences in the rates between sexes. For the period from 2003 to 2015, all groups had an observed annual increase in the rate of multiple myeloma. The rate of increase was only statistically significant for black males at 2.9% annually. White males also experienced an increase annually of 2.9%, but this increase was not statistically significant since multiple myeloma is less common in white males than black males. Black females experienced an increase of 2.2% annually, and white females experienced an increase of 0.7% annually.

Over the most recent five-year time period from 2011 to 2015, only white females experienced an annual increase. This increase of 4.4% annually was not statistically significant. The other groups all experienced an annual decrease in the rates of multiple myeloma over this five-year period. None of these decreases were statistically significant. The annual decrease for white males was 2.9%, and for black males was 1.3%. The decrease for black females annually was 5.4%.

MENINGIOMA INCIDENCE RATE* MISSISSIPPI, 2004-2015



*Rates age-adjusted to the 2000 U.S. standard million population

Meningiomas are brain tumors that grow on the surface of the brain and spinal cord. Most are benign. The Mississippi Cancer Registry did not begin collecting benign and borderline tumors of the brain and central nervous system until 2004. Prior to 2004, the cancer registry would have only collected malignant meningiomas which are very rare. The data represented here covers the time period beginning in 2004 instead of 2003 like for the other cancers in this report.

Meningiomas are still quite rare. Thus, the data could only be broken down by year and race and not race and sex. Rates are similar between whites and blacks, and both groups have experienced increases annually in rates of meningioma between 2004 and 2015 though the trends are not statistically significant. The increase for whites was 0.7% annually and for blacks was 3.0% annually. The observed trend for the latest five-year period between 2011 and 2015 was decreasing for both groups, though neither group experienced a significant decrease. The annual decrease for white males between 2011 and 2015 was 2.5% and for black males was 6.2%. The magnitude of the decrease for blacks was largely due to the spike in the rate that occurred in 2011.

Definitions

Age Adjusting: A statistical method that allows comparisons of populations that take into account age-distributions differences between the populations. The 2000 U.S. standard population is used and applied to all of the time periods being considered. This assures that the rates do not reflect changes in the age distribution of the population.

Annual Percent Change (APC): The average annual percent change over several years. It is used to measure the change in rates over time. Calculating the APC involves fitting a straight line to the natural logarithm of the data when it is displayed by calendar year.

Statistical Significance: This is a mathematical measure of the difference between groups. A difference is said to be statistically significant if it is greater than what might be expected to happen by chance alone 95% of the time.

Citations

¹Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health. BRFSS Prevalence & Trends Data [online]. 2015. [accessed Jun 20, 2018]. URL: <https://www.cdc.gov/brfss/brfssprevalence/>.

²Surveillance Research Program, National Cancer Institute SEER*Stat software (seer.cancer.gov/seerstat) version 8.3.5.

Acknowledgement

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