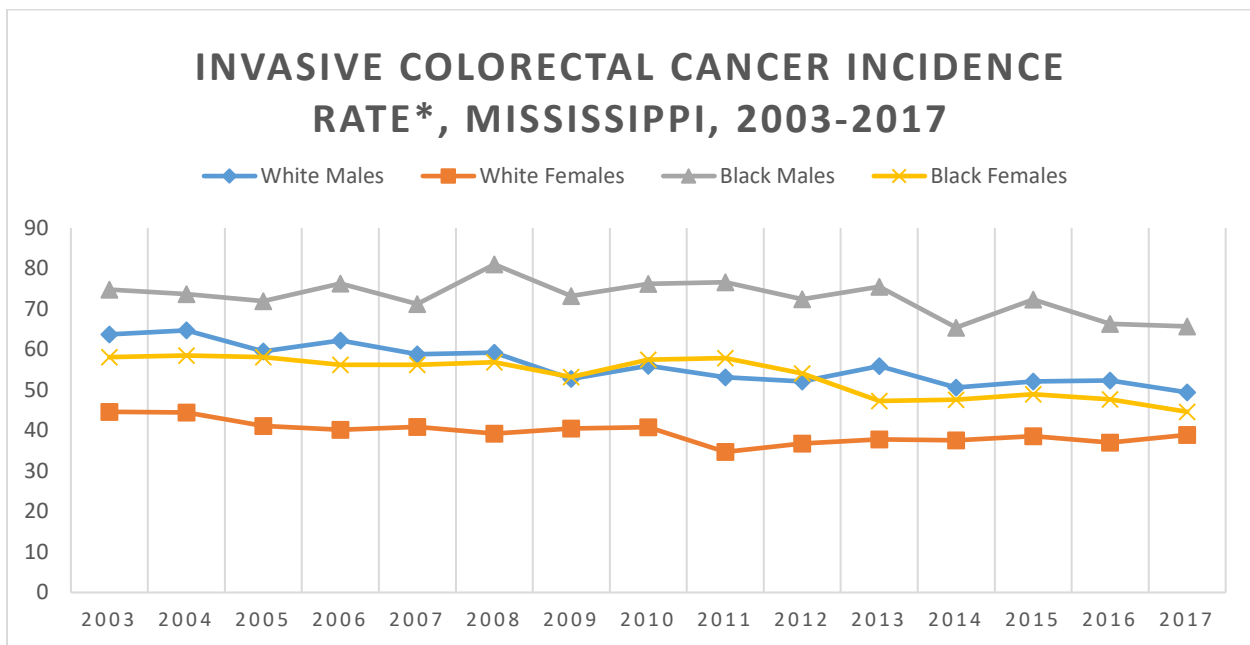


## Obesity-Related Cancers in Mississippi, 2003-2017

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 2018, 39.5% of Mississippi adults are obese. Mississippi is tied with West Virginia for the highest obesity rate in the nation<sup>1</sup>. 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 2017 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 2013 and 2017. All analysis was done using SEER\*Stat software<sup>2</sup>.

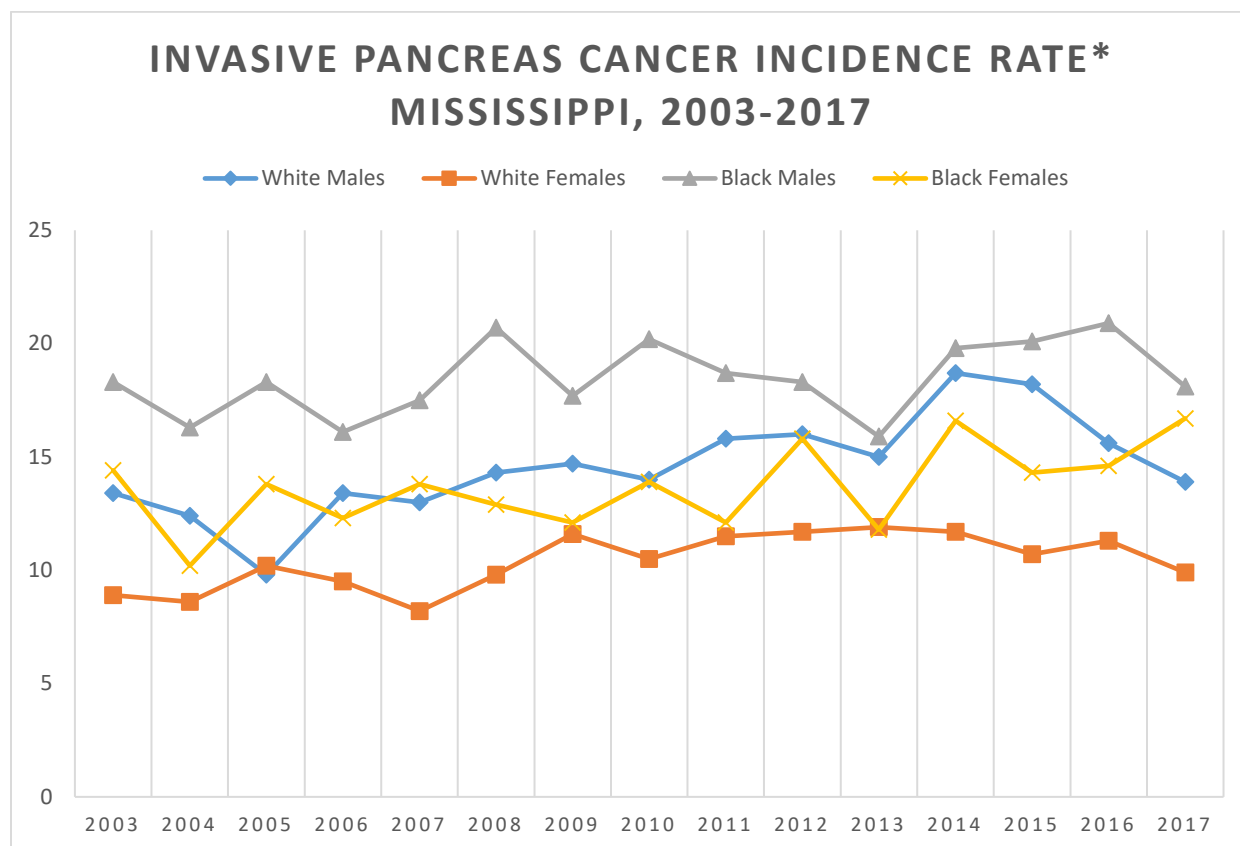


\*Rates age-adjusted to the 2000 U.S. standard million population

Colorectal cancer rates decreased in all of the race/sex groups between 2003 and 2017. Black females and white males experienced the highest levels of annual decrease in colorectal cancer at significant rates of 1.80% and 1.76%, respectively. Black males had significantly higher rates of colorectal cancer incidence compared to all other groups and experienced the smallest change over time with a significant decrease of 0.8% annually. Conversely, white females had lower rates of colorectal cancer than any other group except for black females in 2017, and experienced a significant annual decrease of 1.13%.

For the latest five-year period of 2013 to 2017, white males, black males, and black females had similar observed trends to those for the full time period from 2003 to 2017. For white males, the trend for the last five year period was a decrease of 2.18% annually. For black males, the most recent trend observed was a decrease of 2.68% annually, and for black females the

observed trend for the most recent five years was a 1.14% decrease annually. Though white females had a significant decrease annually for the full time period from 2003 to 2017, the trend for the most recent five years was an observed 0.44% annual increase.

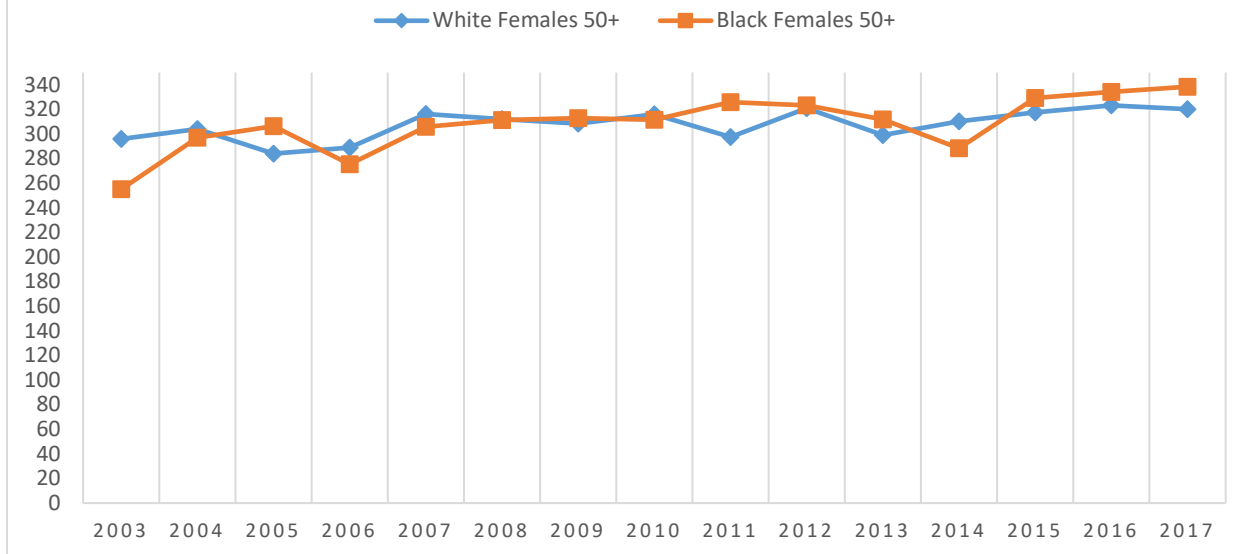


\*Rates age-adjusted to the 2000 U.S. standard million population

Pancreatic cancer rates increased significantly between 2003 and 2017 for females. White females experienced annual increase of 1.67%, while the rate for black females increased 1.65% annually. Black males had an observed increase of 0.83% annually, though this change was not statistically significant. White males experienced a significant increase between 2003 and 2015 of 3.56% annually then experienced an observed decrease annually between 2015 and 2017 of 12.0%.

For the latest five-year period of 2013 to 2017, white males, black males, and black females had similar observed trends to those for the full time period from 2003 to 2017. For white males, the trend for the last five year period was a decrease of 3.63% annually. For black males, the most recent trend observed was an increase of 2.73% annually, and for black females the observed trend for the most recent five years was a 5.17% increase annually. Though white females had a significant increase annually for the full time period from 2003 to 2017, the trend for the most recent five years was an observed 3.78% annual decrease.

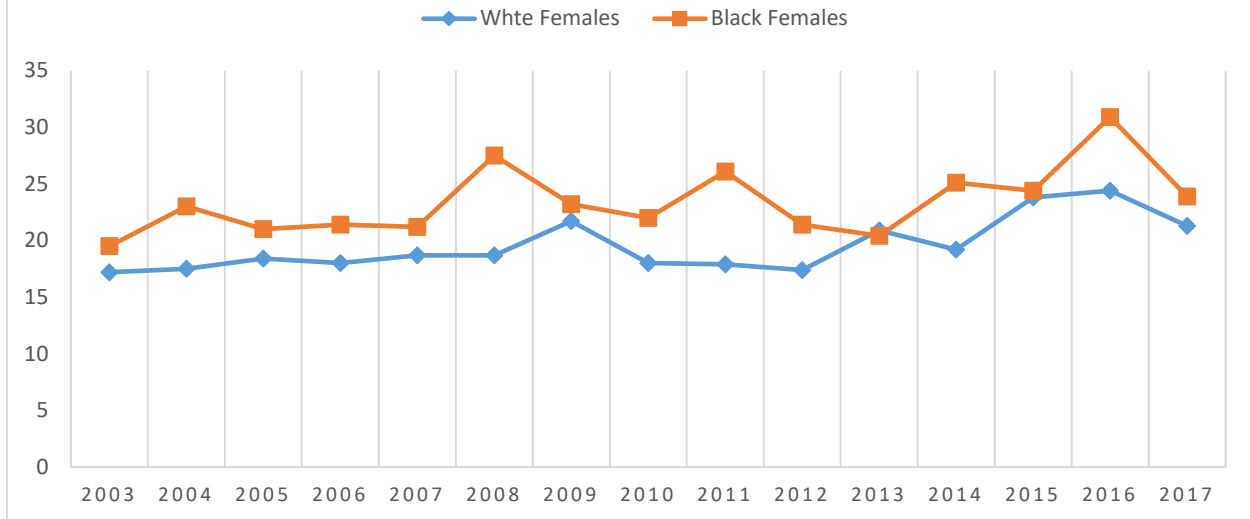
## INVASIVE POST-MENOPAUSAL FEMALE BREAST CANCER INCIDENCE RATE\* MISSISSIPPI, 2003-2017



\*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 2017 increased significantly by 0.75% annually. The annual percent change for white females was a significant 0.57% and for black females was a significant 1.16%. The rates of breast cancer by race were very similar to each other over time. For the most recent five-year time from 2013 to 2017, white females experienced a significant annual increase of 1.76%. Black females also experienced an annual increase over the period of 2013 to 2017 of 3.13%, though this change was not statistically significant.

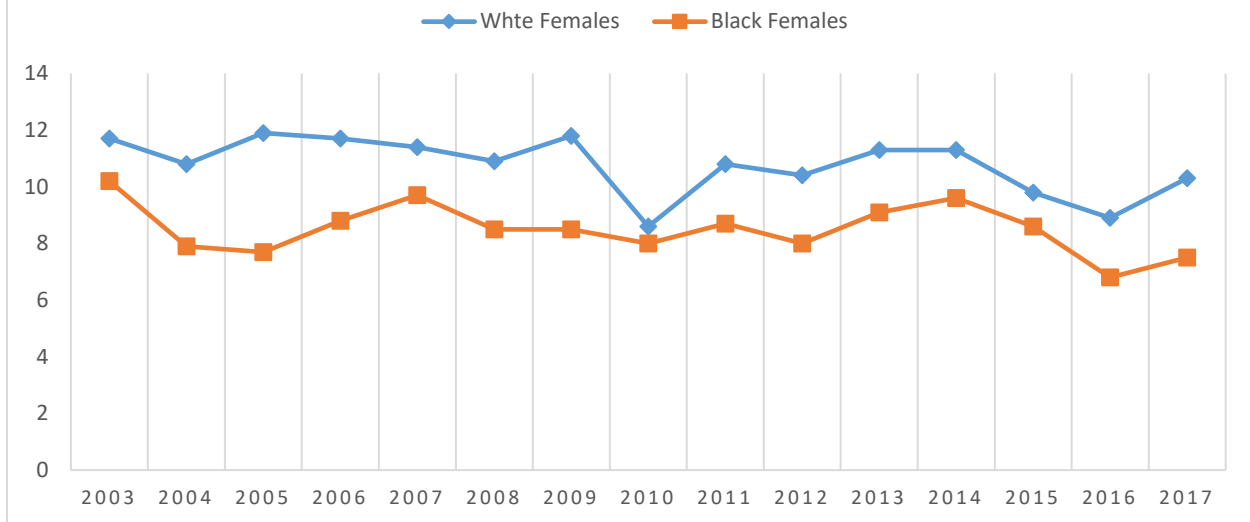
## INVASIVE CORPUS AND UTERUS, NOS CANCER INCIDENCE RATE\* MISSISSIPPI, 2003-2017



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

Uterine cancer rates increased significantly in white females between 2003 and 2017. The annual percent change over that period of time was 1.83%. Black females experienced a significant increase of 1.56% annually, and white females experienced a significant increase of 1.90%. The trend over the latest five-year period from 2013 to 2017 for white females was an annual increase of 2.87% which was not statistically significant. For black females, there was an increase of 5.43% annually. Rates for white and black females were similar to each other for most years.

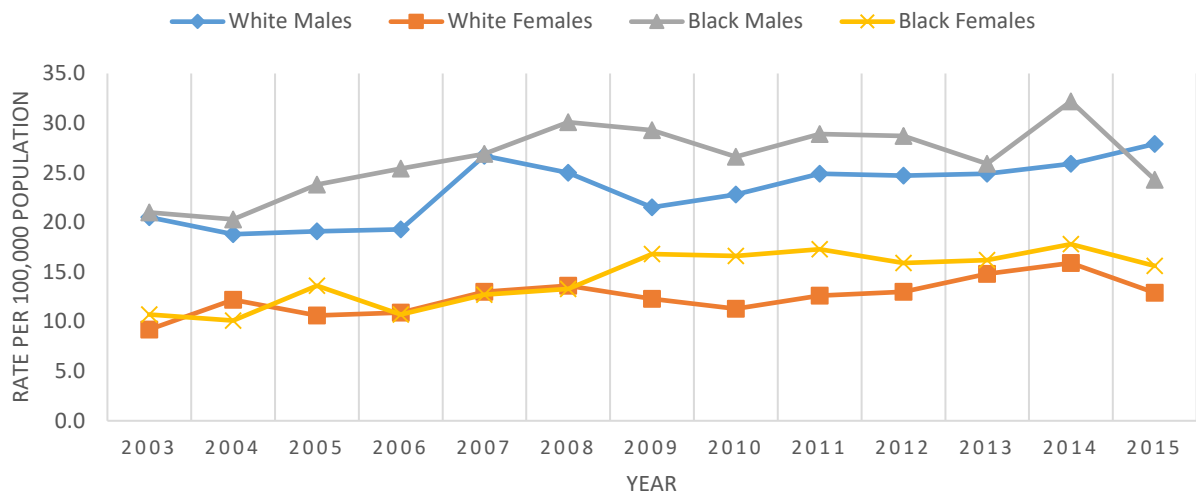
## INVASIVE OVARIAN CANCER INCIDENCE RATE\* MISSISSIPPI, 2003-2017



\*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. Only white females had a significant change over time. However, both groups had a decreasing trend. White females experienced a 1.15% decrease annually over the period of 2003 to 2017. Black females experienced a 0.89% decrease annually over the same period. In the most recent five-year time period between 2013 and 2017, both groups experienced annual declines though the changes were not statistically significant. White female rates declined 4.18% annually, and black female rates were observed to decline at 6.91% annually.

## INVASIVE KIDNEY CANCER INCIDENCE RATE\* MISSISSIPPI, 2003-2015



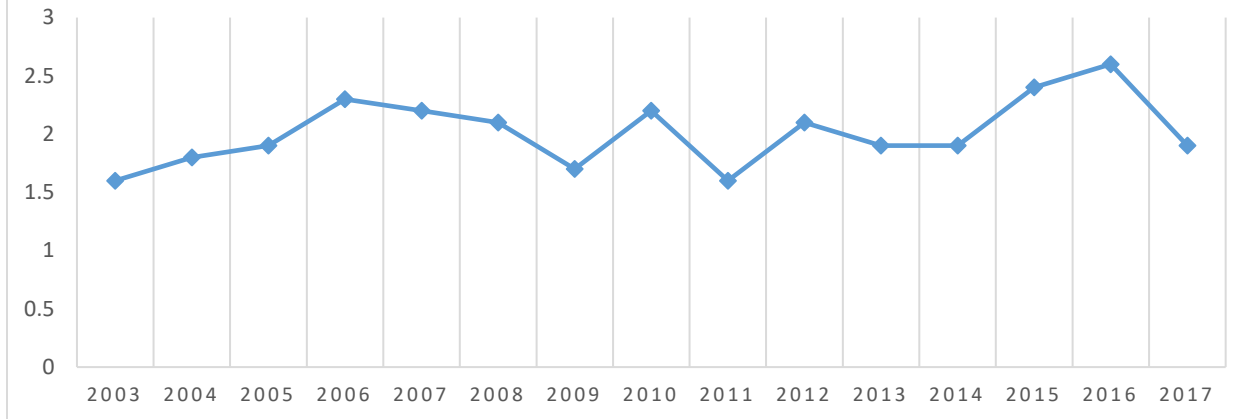
\*Rates age-adjusted to the 2000 U.S. standard million population

Rates of kidney cancer were similar between black males and white males for most years. Additionally, the rates for white females and black females were also similar to each other for all years except 2009 to 2011 and the most recent years of 2016 and 2017 where black females had significantly higher rates. 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 2009.

All groups showed an increasing trend for the period from 2003 to 2017, and those trends were statistically significant for all groups. The annual percent increase for white males was 2.50% and white females was 2.58%. For black females, the trend was an annual increase of 4.34%. For black males, the trend showed an increase of 1.96% annually.

For the latest five-year period of 2013 to 2017, white males, black males, and black females all showed an increasing trend, though these increases were not statistically significant. The annual increase for white males was 1.98% and for black males was 1.82%. The increase for black females was 6.07% annually. In contrast, white females experienced a decrease of 2.48% annually, though this decrease was not statistically significant.

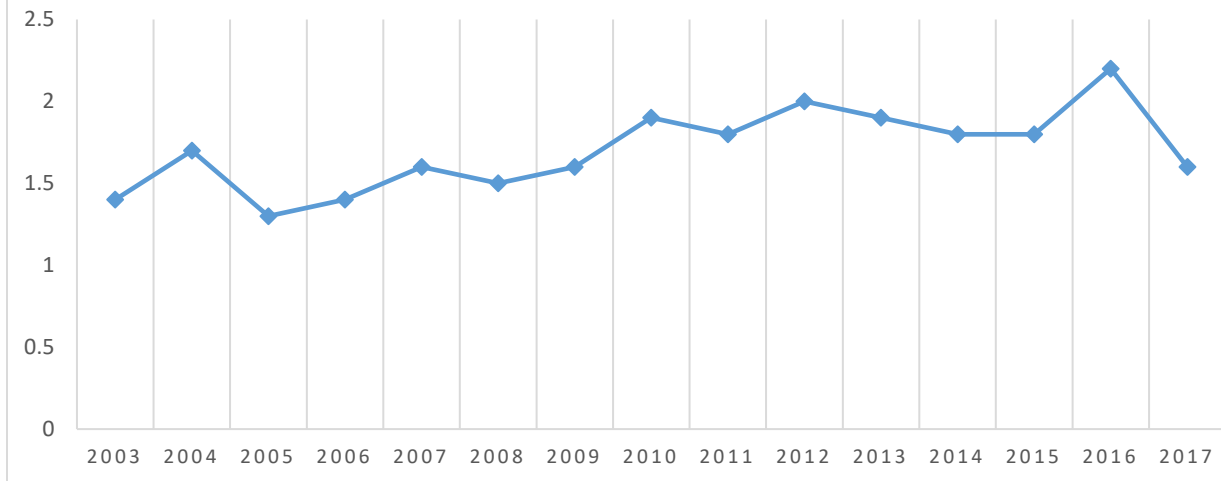
## INVASIVE ESOPHAGEAL ADENOCARCINOMA INCIDENCE RATE\* MISSISSIPPI, 2003-2017



\*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 to 2017 was increasing with an annual increase of 1.16%. This change was not statistically significant. The increase was largely being driven by females whose rate of increase was a significant 5.93% annually. For the latest five-year period of 2013 to 2017, the annual increase of 2.86% was higher than for the full time period but was still not statistically significant.

## INVASIVE GASTRIC CARDIA INCIDENCE RATE\* MISSISSIPPI, 2003-2017

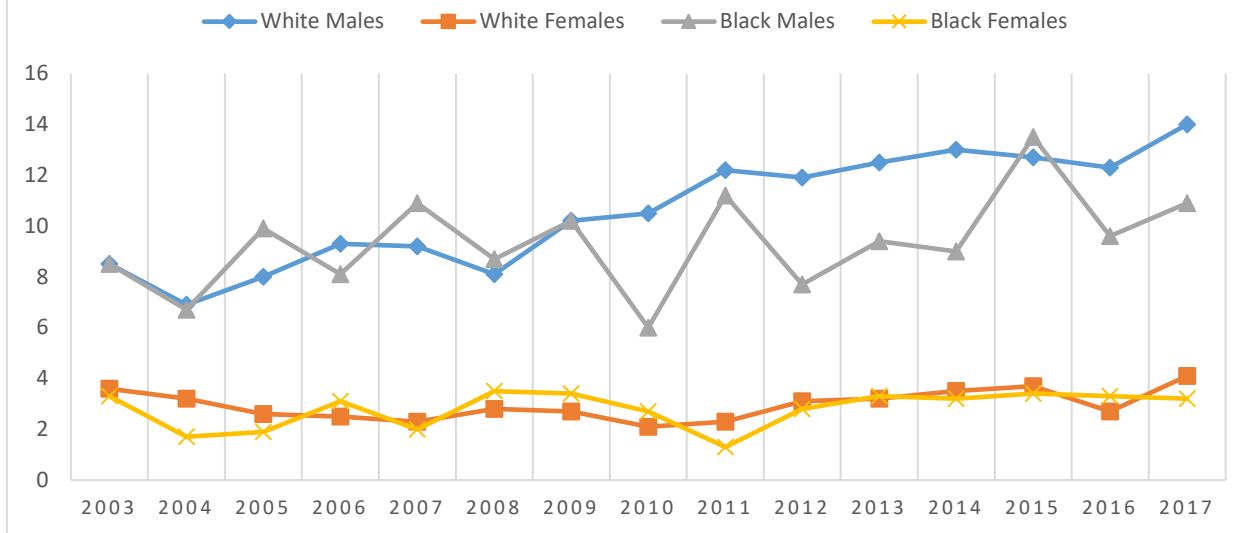


\*Rates age-adjusted to the 2000 U.S. standard million population

Cancer occurring in the cardia portion of the stomach is associated with obesity. Similar to esophageal adenocarcinoma, this is a rare cancer, so the statistics could not be broken out by race and sex. Overall, the trend for gastric cardia cancer for the period from 2003 to 2017 was significantly increasing with an annual increase of 1.99%. This type of cancer is most common in men. The overall increase was largely being driven by a significant increase in white males of 4.39% annually. Black males had an observed decrease annually of 3.48%, though this was not statistically significant. For the latest five-year period of 2013 to 2017, the trend was a decrease of 1.66% annually, though this trend was not statistically significant.



## INVASIVE LIVER CANCER INCIDENCE RATE\* MISSISSIPPI, 2003-2017

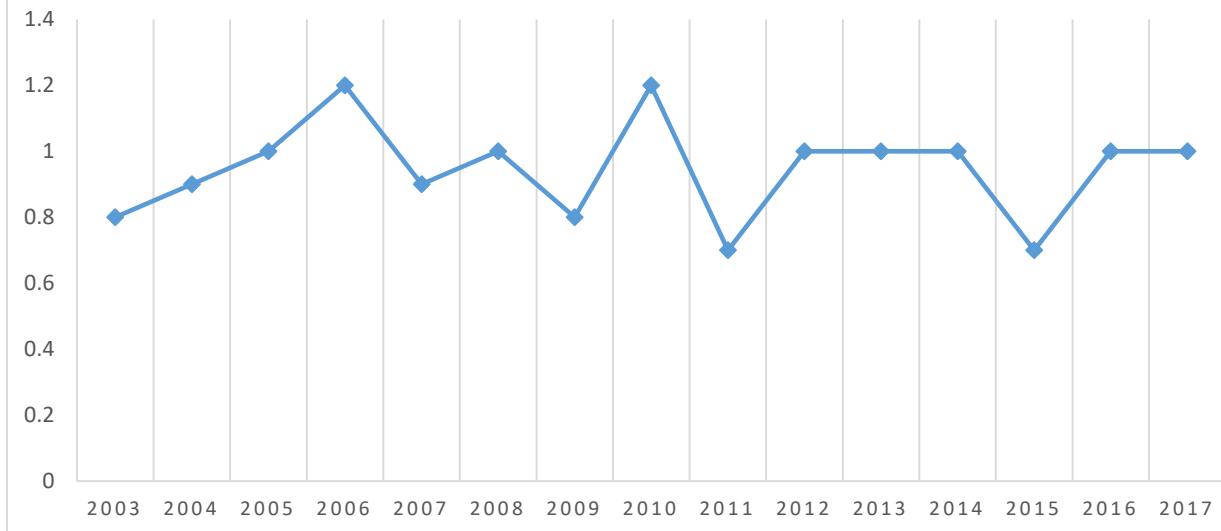


\*Rates age-adjusted to the 2000 U.S. standard million population

Males had significantly higher rates of liver cancer than females. The rates were similar between the races for each sex group. All groups saw a statistically significant increasing trend. The annual percent increase for white males was 4.37%. The annual percent increase for black males was 2.02% and for black females was 2.01%. The rate for white females showed an annual decrease of 10.54% from 2003 to 2007, but then showed a significant increasing trend from 2007 to 2017 with an annual increase of 5.36%.

For the latest five-year period of 2013 to 2017, white males, white females, and black males had similar observed trends to those for the full time period from 2003 to 2017. For white males, the trend for the last five year period was an increase of 2.17% annually. For white females, the most recent trend observed was an increase of 3.45% annually, and for black males the observed trend for the most recent five years was a 3.46% increase annually. Though black females had a significant increase annually for the full time period from 2003 to 2017, the trend for the most recent five years was an observed 0.37% annual decrease.

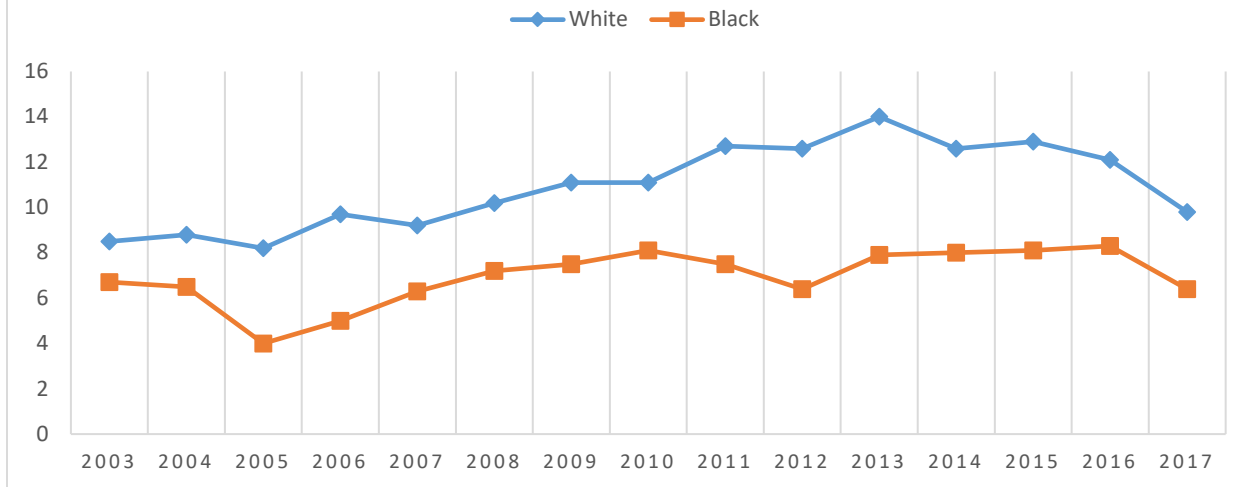
## INVASIVE GALLBLADDER INCIDENCE RATE\* MISSISSIPPI, 2003-2017



\*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 to 2017 was decreasing annually at 0.94%. This change was not statistically significant. For the latest five-year period of 2013 to 2017, there was no change in the rates annually.

## INVASIVE THYROID INCIDENCE RATE\* MISSISSIPPI, 2003-2017

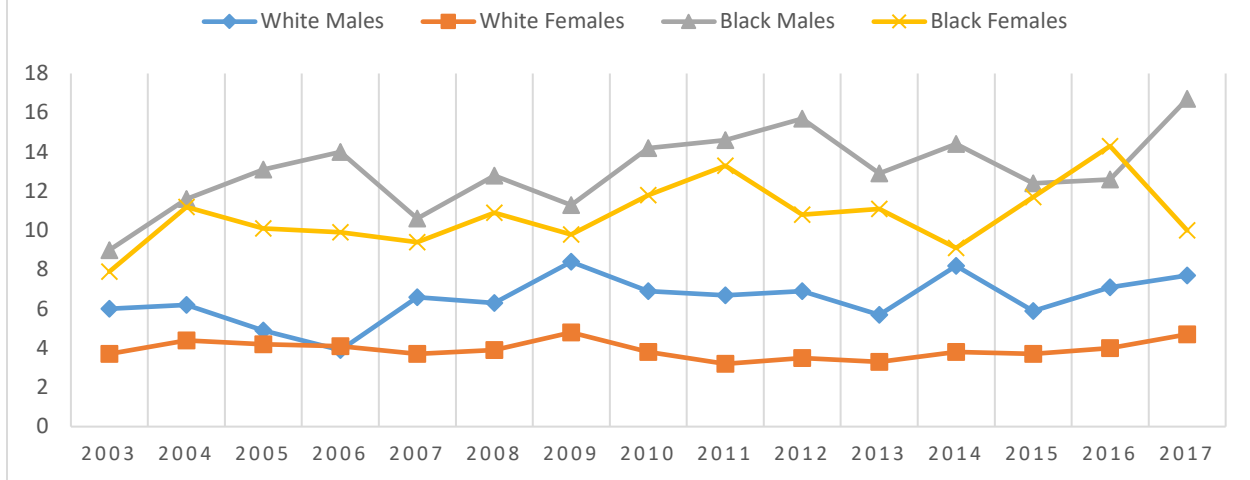


\*Rates age-adjusted to the 2000 U.S. standard million population

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 2017, the black population experienced a significant annual increase of 2.20%. During the period from 2003 to 2013, the white population had a significant annual increase of 5.56%. However, during the period from 2013 to 2017, the white population had a significant annual decrease of 5.98%. 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 2013 and 2017, both groups saw decreasing trends. The rates for whites significantly decreased annually 7.01%. The rate of decrease during this period for blacks is 3.26% annually. 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 15 year period.

## MULTIPLE MYELOMA INCIDENCE RATE\* MISSISSIPPI, 2003-2017

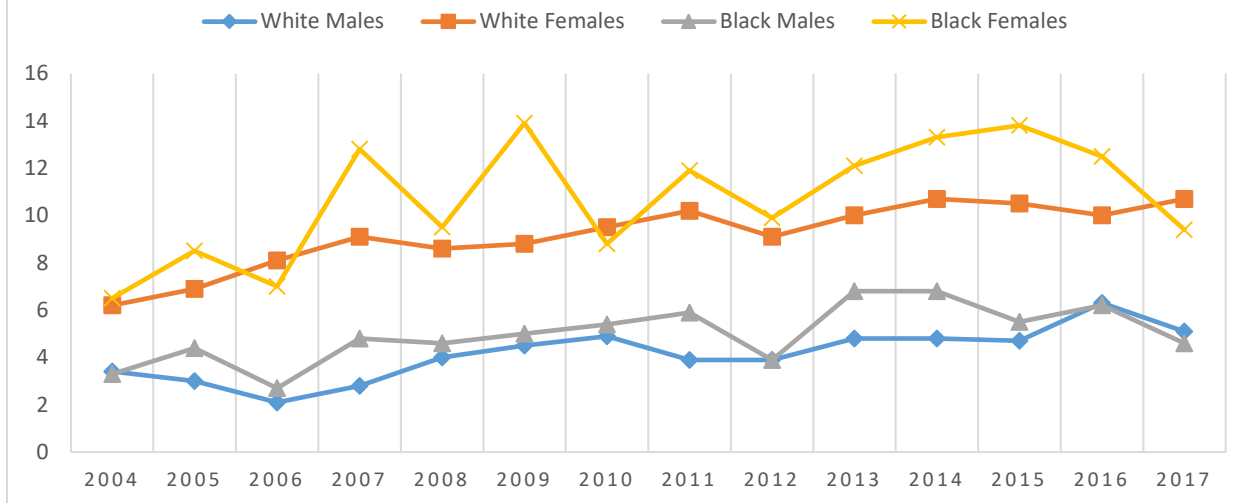


\*Rates age-adjusted to the 2000 U.S. standard million population

For most time periods, black males and black females had significantly higher rates of multiple myeloma than white males and white females. Black males and females had similar rates except in 2014 and 2017 when black males had significantly higher rates. White males had significantly higher rates of multiple myeloma than white females in 2003 and again from 2008 to 2017. For the period from 2003 to 2017, all groups except white females had an observed annual increase in the rate of multiple myeloma. The rate of increase was only statistically significant for black males at 1.99% annually. White males also experienced an increase annually of 1.98%, 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 1.58% annually. White females were the only ones to show a decrease, but this decrease was a small 0.25% annually.

Over the most recent five-year time period from 2013 to 2017, only white females experienced a significant annual increase. This increase was 8.24% annually. The other groups all experienced an annual increase in the rates of multiple myeloma over this five-year period, but these changes were not statistically significant. The annual increase for white males was 4.15%, and for black males was 3.00%. The increase for black females annually was 2.91%.

## MENINGIOMA INCIDENCE RATE\* MISSISSIPPI, 2004-2017



\*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.

Females had higher rates than males. Within each sex group, the two race groups had similar rates for most years. Meningioma trends were increasing for all groups. White males experienced a significant increase of 5.15% annually, and black males experienced a significant increase of 3.48% annually. The trend for black females was an increase of 2.87% annually, but this increase was not statistically significant. For white females between 2004 and 2007, the annual increase was a significant 12.64%. From 2007 to 2017, white females still experienced a significant increase of 1.88%, but this was much lower than the earlier time period.

The observed trend for the latest five-year period between 2013 and 2017 was increasing for white males and white females, though these changes were not statistically significant. The annual increase for white males was 4.29% and for white females was 0.68%. The observed trend for black males and black females was decreasing, though not statistically significant. The annual decrease for black males was 8.05% and for black females was 4.87%.

## Definitions

**Age Adjusting:** A statistical method that allows comparisons of populations that take into account age-distribution 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 differences 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. Rate ratios were used to assess the statistical significance between groups.

## Citations

<sup>1</sup>Centers 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 5, 2020]. URL: <https://www.cdc.gov/brfss/brfssprevalence/>.

<sup>2</sup>Surveillance Research Program, National Cancer Institute SEER\*Stat software (seer.cancer.gov/seerstat) version 8.3.6.

## Acknowledgement

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