

# **Cancer Incidence and Mortality in Delaware, 2007-2011**

**Delaware Health and Social Services**

**Division of Public Health**

**2015**



*DELAWARE HEALTH AND SOCIAL SERVICES*  

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*Division of Public Health*



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## 1. EXECUTIVE SUMMARY

This report includes cancer statistics for all cancer sites combined (all-site cancer), as well as eight specific cancer types. These cancer statistics reflect incidence and mortality data for 2007-2011. We compare Delaware's cancer incidence and mortality trends for 2007-2011 to those of the U.S. over the same time period. We also summarize how Delaware and U.S. cancer rates have changed from 1997-2001 to 2007-2011.

Despite fluctuations in all-site cancer incidence from 1997-2001 to 2007-2011, Delaware's 2007-2011 all-site cancer incidence rate was only 1.1 percent less than in 1997-2001. During the same time period, the comparable U.S. all-site cancer incidence rate fell 5.6 percent. Delaware's 2007-2011 all-site cancer incidence rate (508.9 per 100,000) remains 10.5 percent higher than the comparable U.S. rate (460.4 per 100,000).

From 1997-2001 to 2007-2011, all-site cancer incidence decreased 2.2 percent among Delaware males and 1.6 percent among Delaware females. African American Delawareans have experienced especially noteworthy declines in all-site cancer incidence. From 1997-2001 to 2007-2011, the all-site cancer incidence rate fell 7.4 percent among African Americans in Delaware; among Caucasian Delawareans, the all-site cancer incidence rate increased 0.1 percent during the same time period.

Delaware's 2007-2011 all-site cancer mortality rate of 184.2 per 100,000 was 6.0 percent higher than the U.S. rate of 173.8 per 100,000 and the difference in rates was statistically significant.

Although Delaware's all-site cancer mortality rate has historically been higher than the U.S. rate, the gap has narrowed over the last decade as the state continues to make excellent strides in reducing its cancer mortality rates.

In the early 1990s, Delaware ranked second highest among U.S. states in terms of all-site cancer mortality; for the 2007-2011 time period, Delaware ranked 14<sup>th</sup> highest among U.S. states. **From 1997-2001 to 2007-2011, Delaware's cancer death rate decreased 15.8 percent, an improvement that was 21 percent greater than the decline seen nationally (13.1 percent).**

Male Delawareans experienced a slightly greater rate of decline in cancer mortality than females (17.6 percent vs. 15.8 percent, respectively). The all-site cancer mortality rate among African American Delawareans declined 28.0 percent, compared to 14.2 percent among Caucasian Delawareans.

**Many factors contribute Delaware's progress in reducing our cancer burden.** Below is a brief summary of key factors, broken down by cancer type, that impact cancer in Delaware.

## Lung Cancer

- **Lung cancer continues to account for an enormous share of Delaware’s overall cancer burden.** From 2007-2011, lung cancer accounted for 14.5 percent of all newly-diagnosed cancer cases and 29.9 percent of all cancer deaths in Delaware.
- Beginning in 2015, the Delaware Division of Public Health’s Screening for Life Program covers lung cancer screenings for Delawareans who qualify for the Screening for Life Program. The screening – known as a low-dose CT scan – aims to catch lung cancer early, when it is most treatable. The screening is available to current and former smokers deemed at high-risk for lung cancer.
- **According to the U.S. Department of Health and Human Services, an estimated 85 to 90 percent of all lung cancer cases are caused by tobacco use.** Delaware has been reaping benefits of statewide reductions in tobacco use that began decades ago. While tobacco use rates have fallen sharply among Delaware males, more tobacco cessation work is needed among Delaware females.
- Prior to January 2013, there were no early lung cancer screening recommendations endorsed by the American Cancer Society. Unfortunately, the majority of lung cancer cases continue to be diagnosed in the distant stage (i.e., when the cancer has spread from the primary site to distant tissues or organs or to distant lymph nodes); from 2007-2011, 52.2 percent of Delaware lung cancer cases and 53.3 percent of U.S. lung cancer cases were diagnosed in the distant stage. Additionally, treatment options are not as effective for lung cancer as for some other forms of cancer.
- Despite the grim statistics, Delaware continues to make progress in reducing statewide lung cancer incidence rates. From 1997-2001 to 2007-2011, lung cancer rates declined 17.8 percent for Delaware males, compared to 14.5 percent for U.S. males. The lung cancer incidence rate for Delaware females increased 3.9 percent during the same time period, compared to a 2.1 percent decline in the U.S. rate.
- Historically, Delaware’s lung cancer mortality rates have been higher than U.S. rates; however, the gap in rates has narrowed among males. Delaware’s 1980-1984 male lung cancer mortality rate was 19.2 percent greater than that of the U.S. For 2007-2011, Delaware’s male lung cancer mortality rate was 13.0 percent higher than the U.S. rate.
- Between 1997-2001 and 2007-2011, Delaware’s lung cancer mortality rate fell 14.7 percent while the U.S. rate dropped 13.9 percent.
- **Delaware’s lung cancer mortality rates have declined noticeably among African Americans.** From 1997-2001 to 2007-2011, Delaware’s lung cancer mortality rates declined 37.4 percent among African American males and 30.6 percent among African American females.
- Among Caucasian Delawareans, males experienced greater reductions in lung cancer mortality compared to females. From 1997-2001 to 2007-2011, Delaware’s lung cancer mortality rate decreased 21.1 percent among male Caucasians and 1.2 percent among Caucasian females.

- For the 2007-2011 time period, Delaware females ranked fourth highest in the nation in lung cancer mortality while Delaware males ranked 12<sup>th</sup>.

## Colorectal Cancer

- From 1997-2001 to 2007-2011, Delaware's colorectal cancer incidence rate decreased 28.7 percent while the comparable U.S. rate fell 20.8 percent. For both males and females, Delaware's colorectal incidence rates declined faster than the U.S. Among males, Delaware's incidence rate declined 30.0 percent while the U.S. rate declined 22.6 percent. Among females, Delaware's incidence rate declined 28.4 percent while the U.S. rate declined 19.7 percent.
- From 1997-2001 to 2007-2011, Delaware's greatest improvements in colorectal cancer rates were observed among African Americans; incidence rates for African American males and females declined 34.0 percent and 36.2 percent, respectively.
- **For 2007-2011, the colorectal cancer incidence rate among African Americans in Delaware (43.6 per 100,000) was lower than the U.S. (53.6 per 100,000). For the first time since cancer surveillance efforts began, the difference is statistically significant.**
- For the 2007-2011 time period, 55.0 percent of all colorectal cancer cases diagnosed in Delaware were detected in the regional or distant stages (i.e. after the cancer had spread from its original location). This reflects a 13.7 percent decline since 1997-2001 in the percentage of regional and distant stage colorectal cancer diagnoses.
- **Historically, Delaware's colorectal cancer mortality rate has been higher than the U.S. rate. However, for 2007-2011, Delaware's colorectal cancer mortality rate was identical to that of the U.S. (both 15.9 per 100,000).**
- From 1997-2001 to 2007-2011, Delaware's colorectal cancer mortality rate decreased 28.1 percent while the national rate decreased 23.9 percent. Compared to 1997-2001, Delaware's 2007-2011 colorectal cancer mortality rate declined nearly 50 percent (from 29.0 per 100,000 to 15.9 per 100,000).
- **The reduction in colorectal cancer mortality rates is especially noteworthy among African American Delawareans.** From 1997-2001 to 2007-2011, Delaware's colorectal cancer mortality rates declined 47.5 percent among African American males, compared to 21.9 percent among Caucasian males. During the same time period, colorectal cancer mortality declined 45.9 percent among African American females, compared to 29.7 percent among Caucasian females.
- Improvements in the number of colorectal cancer cases diagnosed in the earliest, most treatable stages contributed to Delaware's reduction in colorectal cancer mortality rates. Data from the 2012 Behavioral Risk Factor Surveillance (BRFS) survey showed that **in 2012, Delaware ranked fourth highest in the U.S. for colorectal cancer screening.** Nearly 76 percent of Delawareans age 50 and older reported ever having had a

sigmoidoscopy or colonoscopy. In the U.S., 67.3 percent of adults age 50 and older report ever having been screened for colorectal cancer.

## Female Breast Cancer

- The 2007-2011 female breast cancer incidence rate for Delaware (128.2 per 100,000) was higher than the U.S. rate (124.6 per 100,000), but the difference was not statistically significant.
- From 1997-2001 to 2007-2011, Delaware's female breast cancer incidence rate declined 5.5 percent while the comparable U.S. rate fell 10.2 percent. During this time period, Delaware's decline in breast cancer incidence was limited to Caucasian females. While the breast cancer incidence rate declined 6.9 percent among Caucasian females in the state, it increased 4.7 percent among African American females.
- The proportion of female breast cancer cases diagnosed in the earliest, most treatable stage has greatly improved in Delaware over the past three decades. The proportion of Delaware breast cancers diagnosed at the local stage increased from 42.2 percent in 1980-1984 to 64.6 percent in 2007-2011.
- Although Delaware's 2007-2011 female breast cancer mortality rate (22.8 per 100,000) was nearly identical to the U.S. rate (22.2 per 100,000), African American women in Delaware had a significantly lower mortality rate (24.0 per 100,000) than African American women in the U.S. (30.6 per 100,000).
- **From 1997-2001 to 2007-2011, Delaware's decline in female breast cancer mortality (24.5 percent) was 37.6 percent greater than the decline seen nationally (17.8 percent).**
- **Delaware's decline in female breast cancer mortality rates was especially pronounced among African Americans.** From 1997-2001 to 2007-2011, Delaware's female breast cancer mortality rate decreased 33.0 percent among African Americans and 21.7 percent among Caucasians. Nationally, breast cancer mortality declined 13.6 percent among African Americans and 17.8 percent among Caucasians.
- It is highly likely that improvements in the early detection of breast cancer contributed to Delaware's progress seen in breast cancer mortality. Data from the 2012 BRFS survey showed that Delaware females ranked third highest nationally in the prevalence of women ages 40 and over who have had a mammogram within the past two years (80.5 percent).

## Prostate Cancer

- From 1997-2001 to 2007-2011, Delaware's prostate cancer incidence rate increased 0.4 percent while the U.S. rate fell 17.4 percent. Delaware's 2007-2011 prostate cancer incidence rate (168.4 per 100,000) was significantly higher than the U.S. (147.8 per 100,000). These trends most likely reflect a greater prevalence of prostate cancer screening in Delaware compared to the U.S.

- **Results from the 2012 BRFSS survey show that Delaware ranked 1<sup>st</sup> in the nation in the prevalence of men aged 40 and over who have had a PSA (protein-specific antigen) test within the past two years.**
- The proportion of prostate cancer cases detected in the local stage has increased dramatically during the past 30 years in Delaware. From 1980-1984 through 2007-2011, Delaware's percentage of prostate cancer cases diagnosed in the local stage increased substantially from 49.6 percent to 86.0 percent – a nearly 74 percent increase in the percentage of local-stage prostate cancer cases.
- **The prostate cancer incidence rate among African American Delawareans continues to be significantly greater than the comparable rate for Caucasians. Delaware's 2007-2011 prostate cancer incidence rate was 62.4 percent higher among African Americans than among Caucasians. This same trend is observed in the U.S.**
- Although the prostate cancer mortality rate for African American Delawareans remains nearly double the comparable rate for Caucasians, Delaware has made progress in reducing this health disparity. From 1997-2001 to 2007-2011, prostate cancer mortality declined 36.1 percent among African American Delawareans, compared to 27.4 percent among Caucasian Delawareans.
- From 1987–1991 to 1995-1999, Delaware's prostate cancer mortality rate among African Americans was substantially elevated compared to Caucasians. Beginning in 2000–2004, however, the racial disparity began to narrow with each successive time period considered. As of 2007-2011, the African American and Caucasian prostate cancer mortality rates were as similar as they had ever been since cancer data surveillance efforts began in 1980.

## Trends in Cancer Incidence

Tables A and B summarize 2007-2011 age-adjusted incidence and mortality rates (and 95 percent confidence intervals), respectively, for Delaware and the U.S. for all-site cancer and the eight individual cancer sites included in this report. Included in the tables is the percentage change in rates (both for Delaware and the U.S.) from 1997-2001 to 2007-2011.

For 2007-2011, Delaware's all-site cancer incidence was significantly higher than the U.S. Delaware's incidence rates were also statistically significantly higher than the U.S. for lung and prostate cancers (Table A).

Delaware's all-site cancer incidence rate declined just 1.1 percent from 1997-2001 to 2007-2011; however, during the same time period, incidence rates for several cancer sites experienced more substantial fluctuations. In both Delaware and the U.S., kidney and thyroid cancer incidence rates increased noticeably from 1997-2001 to 2007-2011. In Delaware, myeloma incidence increased 26.4 percent from 1997-2001 to 2007-2011 while the comparable U.S. rate increased 3.4 percent. During the same time period, Delaware's colorectal cancer incidence rate declined 25.7 percent while the comparable U.S. rate declined 20.8 percent.

**Table A: Average Annual Age-Adjusted Cancer Incidence Rates with 95% Confidence Intervals; Delaware vs. U.S., 2007-2011**

Cancer Site	DE Incidence Rate 2007-2011	U.S. Incidence Rate 2007-2011	DE % Change: 97-01 to 07-11	U.S. % Change: 97-01 to 07-11
All-Site *	508.9 (502.6 , 515.2)	460.4 (459.7 , 461.0)	-1.1%	-5.6%
Female breast	128.2 (123.9 , 132.6)	124.6 (124.1 , 125.0)	-5.5%	-10.2%
Colorectal	44.8 (42.9 , 46.7)	43.7 (43.5 , 43.9)	-25.7%	-20.8%
Kidney	16.6 (15.5 , 17.8)	15.5 (15.4 , 15.6)	22.1%	30.3%
Leukemia	13.1 (12.1 , 14.2)	13.0 (12.9 , 13.1)	13.9%	-3.0%
Lung / bronchus *	73.3 (70.9 , 75.7)	60.1 (59.9 , 60.3)	-7.9%	-8.4%
Myeloma	6.7 (6.0 , 7.4)	6.1 (6.0 , 6.2)	26.4%	3.4%
Prostate*	168.4 (163.2 , 173.7)	147.8 (147.2 , 148.3)	0.4%	-17.4%
Thyroid	12.6 (11.6 , 13.7)	12.9 (12.8 , 13.0)	46.5%	74.3%

Rates are per 100,000 and age-adjusted to 2000 U.S. standard population.

\* = Delaware incidence rate is significantly higher than the U.S. rate at the 95% confidence level.

**SOURCE:** Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014. U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

### Trends in Cancer Mortality

Although Delaware's 2007-2011 all-site cancer mortality rate was significantly greater than the U.S., Delaware's rate has shown a greater rate of decline compared to the U.S. for the 1997-2001 to 2007-2011 time period (15.8 percent decline vs. 13.1 percent decline, respectively). A similar pattern was observed for lung cancer. While Delaware's 2007-2011 lung cancer mortality rate was significantly greater than that of the U.S., Delaware's rate declined 14.7 percent from 1997-2001 to 2007-2011 while the comparable U.S. rate declined 13.9 percent during the same time period.

From 1997-2001 to 2007-2011, Delaware has made great strides in reducing its cancer mortality burden for several cancer types (especially female breast, colorectal, and prostate cancer). In addition to all-site and lung cancer rates described above, Delaware's rate of decline for female breast, colorectal, kidney, leukemia, and prostate cancer was greater than that of the U.S. from 1997-2001 to 2007-2011.

**Table B: Average Annual Age-Adjusted Cancer Mortality Rates with 95% Confidence Intervals; Delaware vs. U.S., 2007-2011**

Cancer Site #	DE Mortality Rate 2007-2011	U.S. Mortality Rate 2007-2011	DE % Change: 97-01 to 07-11	U.S. % Change: 97-01 to 07-11
All-Site*	184.2 (180.4 , 188.0)	173.8 (173.6 , 174.0)	-15.8%	-13.1%
Female breast	22.8 (21.0 , 24.7)	22.2 (22.1 , 22.3)	-24.5%	-17.8%
Colorectal	15.9 (14.8 , 17.1)	15.9 (15.9 , 16.0)	-28.1%	-23.9%
Kidney	3.8 (3.3 , 4.4)	4.0 (3.9 , 4.0)	-9.5 %	-4.8%
Leukemia	6.7 (6.0 , 7.5)	7.0 (7.0 , 7.1)	-19.3%	-9.1%
Lung / bronchus*	54.7 (52.7 , 56.8)	48.4 (48.3 , 48.5)	-14.7%	-13.9%
Myeloma	3.7 (3.2 , 4.3)	3.4 (3.3 , 3.4)	0.0%	-10.2%
Prostate	23.4 (21.3 , 25.7)	22.3 (22.2 , 22.5)	-28.9%	-29.4%
Thyroid	0.6 (0.4 , 0.9)	0.5 (0.5 , 0.5)	n/a	0.0%

Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

\* = Delaware mortality rate is statistically significantly higher than the U.S. rate at the 95% confidence level.

**SOURCE:** Delaware: Delaware Health Statistics Center, 2014. U.S.: National Center for Health Statistics, 2014.

## Census Tract Analyses

This report also includes cancer incidence rates for each of Delaware’s census tracts as required by Title 16, Chapter 292 of the Delaware Code (Appendix E). Census tract analyses were conducted for 2007-2011. Census tracts were determined by the Census 2010 designations since they were in effect at the time of analysis. The Census 2010 subdivided Delaware into 214 census tracts rather than the 197 census tracts in the Census 2000.

Results for 2007-2011 show that:

- In nine of Delaware’s 214 census tracts, the all-site cancer incidence rate was statistically significantly higher than Delaware’s average 2007-2011 incidence rate (510.5 per 100,000).<sup>1</sup>
- In 14 of Delaware’s 214 census tracts, the all-site cancer incidence rate was statistically significantly lower than Delaware’s average 2007-2011 incidence rate (510.5 per 100,000).
- All-site cancer incidence rates for the remaining 192 census tracts were not significantly different from the state’s average rate for the 2007-2011 time period.

Age-adjusted five-year cancer incidence rates by census tract with 95 percent confidence intervals are presented in Appendix H for 2007-2011. Census tract maps color-coded by rate quintiles are located in Appendix I. Census tract maps that indicate tracts with significantly high or significantly low incidence rates are located in Appendix J.

There is an inherent instability in calculating cancer incidence rates at the census tract level. In a small group, such as a census tract, the snapshot changes considerably from year to year. If one case of cancer is diagnosed in a census tract one year, and three cases of

<sup>1</sup> 510.5 is average 2007-2011 Delaware incidence rate calculated by Excel rather than SEER\*Stat (508.9).

cancer are diagnosed in the same census tract the next year, the cancer rate for that census tract will change dramatically from one year to the next. These large fluctuations do not typically occur in larger populations. If we compare the cancer rate for a census tract to the cancer rate for the whole state of Delaware for a given time period, it would not be unusual to find the comparison different (perhaps even reversed) in the following time period.

When assessing cancer incidence data by census tract, the occurrence of cancer may differ across census tracts for a variety of reasons. For example, lifestyle behaviors may cluster in a homogeneous community. In addition, the presence or absence of exposure to environmental or occupational carcinogen(s) is often limited to a defined geographic area. In addition, residents in certain geographic areas may be more impoverished than other residents, which will affect their availability of health insurance coverage as well as their level of access to health care, particularly cancer screening services. Finally, chance or random variation can play a role, since approximately five percent of all comparisons would be significantly different due to chance alone.

## 2. INTRODUCTION

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### Delaware Cancer Registry

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The Delaware Cancer Registry (DCR) is managed by the Delaware Division of Public Health (DPH) and serves as the state's central cancer information center. The DCR was founded in 1972 and legally established in 1980 under the Delaware Cancer Control Act<sup>2</sup>. The act stipulated that all hospitals, clinical laboratories, and cancer treatment centers in the state report all new cancer cases to the DCR. In 1996 the Delaware Cancer Control Act was amended to require any health care practitioner who diagnoses or provides treatment to report cancer cases to the DCR. Further enhancements of the Delaware Cancer Control Act took effect in 2002 with the passage of Senate Bill 372 that requires physicians to provide additional information to the DCR, including patients' duration of residence in Delaware and their occupational history. Senate Bill 372 also extended the reporting deadline to 180 days from initial diagnosis or treatment.

Today, Delaware is one of 45 states whose central cancer registry is supported by the National Program of Cancer Registries (NPCR) of the Centers for Disease Control and Prevention (CDC).<sup>3</sup> The DCR ensures accurate, timely, and routine surveillance of cancer trends among Delawareans.

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### Reporting Facilities

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Sixty physicians and 31 facilities currently submit data to the DCR. These facilities include seven hospitals, 10 diagnostic laboratories, and 14 free-standing ambulatory surgery centers. Additionally, the DCR has reciprocal data exchange agreements with Alaska, Florida, Maryland, New Jersey, Pennsylvania, South Carolina, Texas, Washington, Wyoming, and the District of Columbia. Interstate data exchange agreements assist in identifying Delaware residents whose cancer was diagnosed and/or treated in another state.

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### Data Confidentiality

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The DCR maintains patient confidentiality using a combination of techniques. Reporting facilities submit cancer data using computerized data encryption techniques. Published reports and data releases are limited to aggregate data. DCR datasets are released only after removal of all personal identifiers. Researchers who use DCR data must comply with regulations stated in DPH data use agreements and obtain clearance from Delaware's Human Subjects Review Board.

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### Data Quality

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Internal quality control procedures were implemented at the DCR to verify the consistency of cancer data. Data consistency standards are set by the North American Association of Central Cancer Registries (NAACCR). The DCR also conducts record consolidation using a computerized matching program to identify multiple reports on the same individual. This scenario often arises when a patient is diagnosed and treated in two or more facilities and each facility submits a cancer case reporting form to the DCR.

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### NAACCR Certification and NPCR Standard Status

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In 1997, the NAACCR instituted a program to independently and annually review data from member registries for their completeness, accuracy, and timeliness. The registry certification metrics are pre-determined and established by NAACCR.<sup>4</sup> Gold or Silver Standard certifications are awarded following an evaluation of data quality, completeness, and timeliness of reporting. The DCR received Gold Standard certification for diagnosis

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<sup>2</sup> <http://delcode.delaware.gov/title16/c032/index.shtml>

<sup>3</sup> <http://www.cdc.gov/cancer/npcr>

<sup>4</sup> <http://www.naacr.org/Certification/Criteria.aspx>

years 1999, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, and 2011 (most recent year for which complete data are currently available). The DCR received Silver Standard certification in 1998 and 2002.

Additionally, the NPCR provides an annual Standard Status Report to state cancer registries supported by CDC. Delaware's data submissions for diagnosis years 2000 through 2012 surpassed all standard levels for quality, completeness, and timeliness.

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## Uses of Data

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DPH uses DCR data to support various programs and initiatives, including the Screening for Life program and the Delaware Cancer Treatment Program. DPH also uses DCR data to investigate citizen inquiries and provide up-to-date cancer statistics to Delaware residents, hospitals, health care providers, community organizations, federal agencies, research institutions, and academic institutions. Committees associated with the Delaware Cancer Consortium rely heavily on DCR data to monitor cancer trends across the state, promote research, and guide policy planning.

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## Organization of This Report

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This report includes cancer statistics for all cancer sites combined (all-site cancer), as well as eight specific cancer types. These cancer statistics reflect incidence and mortality data for 2007-2011. We compare Delaware's cancer incidence and mortality trends for 2007-2011 to those of the U.S. over the same time period. We also summarize how Delaware and U.S. cancer rates have changed from 1997-2001 to 2007-2011. In addition to incidence and mortality, stage at diagnosis and age-specific statistics are evaluated for each cancer type. In many cases, these statistics are also calculated separately by sex, race, county of residence, and age group.

Limited data on cancer incidence and mortality rates by Hispanic ethnicity are presented in Appendix C. Chapter 12 serves as a special topic chapter highlighting the evidence-based association between obesity and cancer. Additional behavioral risk factor data relevant to adult Delawareans are presented throughout the report and Appendix D.

Delaware's 2007-2011 cancer incidence and mortality rankings among all 50 U.S. states are provided for each cancer site included in the report. State rankings for cancer incidence were obtained from the U.S. Cancer Statistics Working Group.<sup>5</sup> State mortality rankings were obtained from the Cancer Statistics Review (1975-2011) provided by the Surveillance, Epidemiology and End Results (SEER) program of the National Cancer Institute.<sup>6</sup>

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## Delaware's Population

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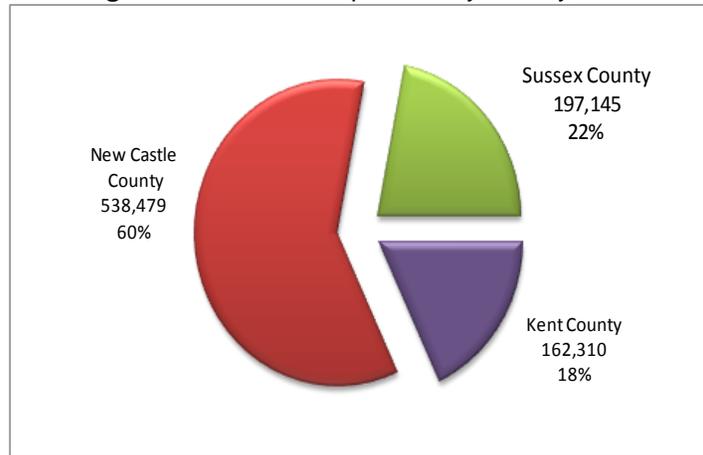
In 2010, census data estimated Delaware's total population at 897,934. The majority of Delawareans – 60 percent – reside in New Castle County. Kent and Sussex Counties are home to 18 percent and 22 percent of Delawareans, respectively (Figure 1).

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<sup>5</sup> U.S. Cancer Statistics Working Group. United States Cancer Statistics: 1999-2011 Incidence and Mortality Web-based Report. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; 2014. Available at: [www.cdc.gov/uscs](http://www.cdc.gov/uscs).

<sup>6</sup> Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, [http://seer.cancer.gov/csr/1975\\_2011/](http://seer.cancer.gov/csr/1975_2011/), based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

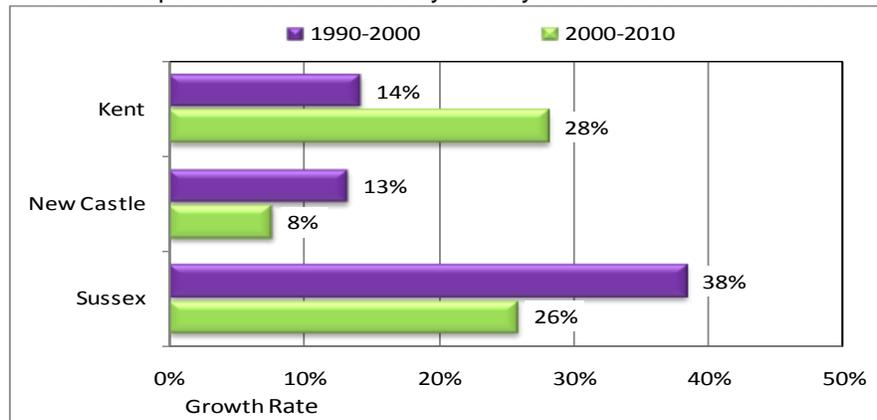
**Figure 1. Delaware Population by County, 2010**



SOURCE: U.S. Census Bureau, American FactFinder <http://factfinder2.census.gov/>

Since 1990, population growth rates have varied across Delaware counties. New Castle County – the most populated of Delaware’s three counties – demonstrated the smallest population growth, increasing its total population by 13 percent from 1990-2000 and just 8 percent from 2000-2010. Kent County grew in total population by 14 percent from 1990-2000, and by 28 percent from 2000-2010. Sussex County – Delaware’s southernmost county – experienced the largest population growth from 1990-2000 with an increase in total population of nearly 40 percent. Population growth slowed slightly in Sussex County from 2000-2010, as total population increased by 26 percent.

**Figure 2. Delaware Population Growth Rate by County and Decade: 1990-2000 and 2000-2010**



SOURCE: U.S. Census Bureau 2010, American FactFinder <http://factfinder2.census.gov/>

The most recently available census data (2010; Table 1) show that nearly 70 percent of all Delawareans are Caucasian. Just under 80 percent of all Sussex County residents are Caucasian; approximately 68 percent and 66 percent of Kent and New Castle County residents, respectively, are Caucasian. African Americans comprise roughly 21 percent of Delaware’s population. Approximately 13 percent of Sussex County residents are African American; Kent and New Castle Counties are comparatively more racially diverse with 24.0 percent and 23.7 percent of African American residents, respectively. Three percent of Delawareans are Asian. Another 6 percent of Delawareans are considered “other” race, which is defined as: (a) an other race group that was too small to enumerate separately; or (b) unknown race or (c) mixed race (i.e., two or more races). Regardless of race, persons of Hispanic ethnicity make up just over 8 percent of Delaware’s population.

**Table 1. Delaware Population Percentage by Race/Ethnicity and County, 2010**

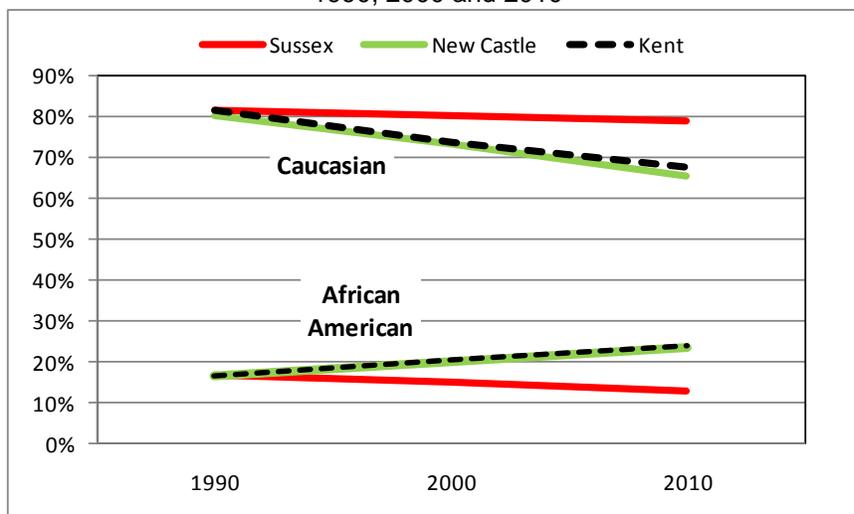
Race	Delaware	Kent	New Castle	Sussex
Caucasian	68.9	67.8	65.5	79.0
African American	21.4	24.0	23.7	12.7
American Indian/ Alaska Native	0.5	0.6	0.3	0.8
Asian	3.2	2.0	4.3	1.0
Other or 2 or more races	6.1	5.5	6.1	6.4
<b>Total</b>	100.0	100.0	100.0	100.0
<b>Hispanic Ethnicity</b>	8.2	5.8	8.7	8.6

**SOURCE:** U.S. Census Bureau 2010, American FactFinder <http://factfinder2.census.gov/>

In 1990, the proportion of African American residents was essentially equal across all three Delaware counties (ranging from 16.5 percent to 16.8 percent), as was the proportion of Caucasian residents (ranging from 80.3 percent to 81.6 percent). From 1990-2000, Delaware’s total Caucasian population decreased to 74.6 percent; from 2000-2010, it declined further to just under 69 percent. Over this 20-year time period, the decrease in proportion of Caucasians in Delaware was accompanied by increases in the African American and Asian populations, as well as among persons considered “other” race. The increase in the “other” category is largely due to revisions in data standards implemented in 1997 that modified the manner in which race data are collected by the Census Bureau. Beginning in 2000, respondents have the option of selecting one or more race categories to indicate racial identities. Because of this change, the 2000 Census data on race are not directly comparable with data from 1990 or earlier censuses.

Since 1990, racial diversity has expanded at different rates across Delaware’s counties. Both Kent and New Castle Counties experienced substantial increases in the proportion of African American residents (and concurrent decreases in the proportion of Caucasian residents) from 1990 to 2010 (Figure 3). An opposite trend was observed in Sussex County, where the African American population decreased from 16.8 percent in 1990 to 12.7 percent in 2010. During the same time period, the Caucasian population in Sussex County declined from 81.6 percent to 79.0 percent. The declines in the proportion of both African American and Caucasian residents in Sussex County were accompanied by an increase (from 0.5 percent to 6.4 percent) in the proportion of persons of other and unknown race (not shown in Figure 3).

**Figure 3. Proportions of Caucasian and African American Residents in Delaware, by County: 1990, 2000 and 2010**



**SOURCE:** U.S. Census Bureau 2010, American FactFinder <http://factfinder2.census.gov/>

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## Guidelines for Interpretation of Incidence and Mortality Rates

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Incidence and mortality rates for Delaware are expressed per 100,000 Delawareans and rates for the U.S. are expressed per 100,000 U.S. residents. Due to Delaware's small population base, cancer rates were calculated using five-year calendar year groupings for both cancer incidence and mortality.

Cancer incidence and mortality rates were adjusted by age to enable comparisons between populations that may have different age distributions (e.g., Delaware vs. the U.S.). Thus, age-adjusted cancer rates can be compared without any concern about how differences in age distribution of the populations would affect cancer rates. The standard population used to adjust for age is the 2000 U.S. population.

Ninety-five percent confidence intervals were computed for each cancer rate. Confidence intervals represent the range of values in which the cancer rate could reasonably fall 95 percent of the time. They are used to determine whether the amount by which two cancer rates differ is statistically significant. If the confidence interval for one rate does not overlap with the confidence interval for another rate, the two rates are significantly different. When one rate is significantly different from another rate, we assume that the difference between the rates is larger than would be expected by chance alone. If the confidence interval for one rate overlaps with the confidence interval for another rate, the two rates are not statistically significantly different and this is commonly referred to as "no meaningful difference" between rates.

For this report, cancer frequencies and rates were suppressed according to the Division of Public Health Policy Memorandum 49 (Data and Data Release Standards):

- Incidence and mortality frequencies of fewer than six were not shown to protect patient privacy and confidentiality. In some instances, additional cells were suppressed so that one cannot deduce the actual count in the initially-suppressed cell. Suppressing incidence and mortality statistics based on a small number of cancer cases or deaths helps protect patient privacy and confidentiality.<sup>7,8</sup>
- Age-adjusted incidence and mortality rates based on fewer than 25 cases or deaths were suppressed as they are inherently unstable and cannot be reliably interpreted.

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<sup>7</sup> Coughlin SS, Clutter GG, Hutton M. Ethics in Cancer Registries. *Journal of Cancer Registry Management*, 2: 5-10, 1999.

<sup>8</sup> McLaughlin CC. Confidentiality protection in publicly released central registry data. *Journal of Cancer Registry Management*, 2: 84-88, 2002.

### 3. ALL-SITE CANCER (ALL CANCER SITES COMBINED)

#### All-Site Cancer Incidence

For 2007-2011, Delaware's all-site cancer incidence rate was second highest in the U.S. (the same ranking for 2006-2010). Delaware males ranked fourth and females ranked 10<sup>th</sup> in all-site cancer incidence.<sup>9</sup> (For 2006-2010, males ranked third and females 11<sup>th</sup>.)

#### All-Site Cancer Incidence: Number of Cancer Cases (Table 3-1)

- A total of 25,922 cases of cancer were diagnosed among Delawareans from 2007 through 2011, an average of 5,184 cases per year. Of that total, 13,686 cases (52.8 percent) were male and 12,236 cases (47.2 percent) were female.
- Caucasians comprised 81.9 percent of Delaware cancer cases diagnosed from 2007 through 2011. African Americans accounted for 16.1 percent of cases; an additional 1.9 percent were diagnosed among Delawareans of other or unknown race.
- More than half (53.9 percent; 13,960) of all cancer cases diagnosed in Delaware from 2007 through 2011 were among New Castle County residents. Sussex County residents accounted for 28.0 percent (7,271) of cases; the remaining 18.1 percent (4,961) of cases were diagnosed among Kent County residents.

**Table 3-1.** Number of Cancer Cases by Race and Sex; Delaware and Counties, 2007-2011

	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
<b>DELAWARE</b>	25,922	13,686	12,236	21,239	11,196	10,043	4,178	2,244	1,934
<b>Kent</b>	4,691	2,518	2,173	3,724	1,970	1,754	889	509	380
<b>New Castle</b>	13,960	7,187	6,773	11,037	5,680	5,357	2,644	1,379	1,265
<b>Sussex</b>	7,271	3,981	3,290	6,478	3,546	2,932	645	356	289

SOURCE: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

#### All-Site Cancer Incidence: Rates (Table 3-2)

- Delaware's 2007-2011 all-site cancer incidence rate of 508.9 per 100,000 was significantly higher than the U.S. rate of 460.4 per 100,000. This statistically significant difference was also observed when all-site cancer rates were calculated separately for males (DE: 591.5 per 100,000; U.S.: 529.4 per 100,000) and females (DE: 446.5 per 100,000; U.S.: 411.3 per 100,000).
- Within Delaware, the 2007-2011 all-site cancer incidence rate among males (591.5 per 100,000) was significantly higher than among females (446.5 per 100,000). This difference was observed across all three counties and for both Caucasians and African Americans.
- African American men in Kent County had the highest all-site cancer incidence rate (683.1 per 100,000) when all-site cancer incidence rates were calculated by county and race.
- Among male Delawareans, the all-site cancer incidence rate was statistically significantly higher among African Americans than among Caucasians (630.3 per 100,000 vs. 587.6 per 100,000). The same pattern is observed nationally.
- The reverse trend is observed among female Delawareans. The 2007-2011 all-site cancer rate for African

<sup>9</sup> U.S. Cancer Statistics Working Group. United States Cancer Statistics: 1999-2011 Incidence and Mortality Web-based Report. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; 2014. Available at: [www.cdc.gov/uscs](http://www.cdc.gov/uscs).

American women is significantly lower than that for Caucasian women (414.2 per 100,000 vs. 457.5 per 100,000). The same pattern is seen nationally.

**Table 3-2.** Five-Year Average Annual Age-Adjusted All-Site Cancer Incidence Rates and 95% Confidence Intervals by Race and Sex; U.S., Delaware and Counties, 2007-2011

<b>RACE AND REGION</b>	<b>All</b>	<b>Male</b>	<b>Female</b>
<b>ALL RACES</b>			
<b>United States</b>	460.4 (459.7 , 461.0)	529.4 (528.4 , 530.5)	411.3 (410.5 , 412.2)
<b>DELAWARE</b>	508.9 (502.6 , 515.2)	591.5 (581.4 , 601.6)	446.5 (438.5 , 454.6)
<b>Kent</b>	542.3 (526.7 , 558.2)	639.7 (614.4 , 665.8)	464.9 (445.3 , 485.1)
<b>New Castle</b>	497.3 (489.0 , 505.8)	577.0 (563.5 , 590.8)	440.4 (429.8 , 451.1)
<b>Sussex</b>	511.4 (499.2 , 523.8)	591.4 (572.3 , 610.9)	447.6 (431.5 , 464.2)
<b>CAUCASIAN</b>			
<b>United States</b>	468.9 (468.2 , 469.6)	532.1 (530.9 , 533.2)	424.4 (423.4 , 425.3)
<b>DELAWARE</b>	513.1 (506.1 , 520.2)	587.6 (576.5 , 598.8)	457.5 (448.4 , 466.9)
<b>Kent</b>	550.7 (532.9 , 568.9)	632.8 (604.6 , 662.0)	485.4 (462.6 , 509.1)
<b>New Castle</b>	506.2 (496.7 , 515.9)	578.7 (563.5 , 594.2)	456.0 (443.6 , 468.7)
<b>Sussex</b>	505.5 (492.6 , 518.8)	581.7 (561.6 , 602.4)	444.5 (427.3 , 462.4)
<b>AFRICAN AMERICAN</b>			
<b>United States</b>	480.8 (478.6 , 482.9)	600.9 (597.0 , 604.7)	398.8 (396.3 , 401.4)
<b>DELAWARE</b>	505.8 (490.0 , 522.1)	630.3 (602.6 , 658.8)	414.2 (395.4 , 433.6)
<b>Kent</b>	534.1 (498.3 , 571.7)	683.1 (621.9 , 748.4)	415.6 (373.8 , 460.8)
<b>New Castle</b>	490.6 (471.1 , 510.7)	602.2 (568.0 , 637.8)	410.6 (387.5 , 434.8)
<b>Sussex</b>	532.7 (491.6 , 576.2)	666.8 (596.8 , 742.5)	431.6 (382.6 , 484.9)

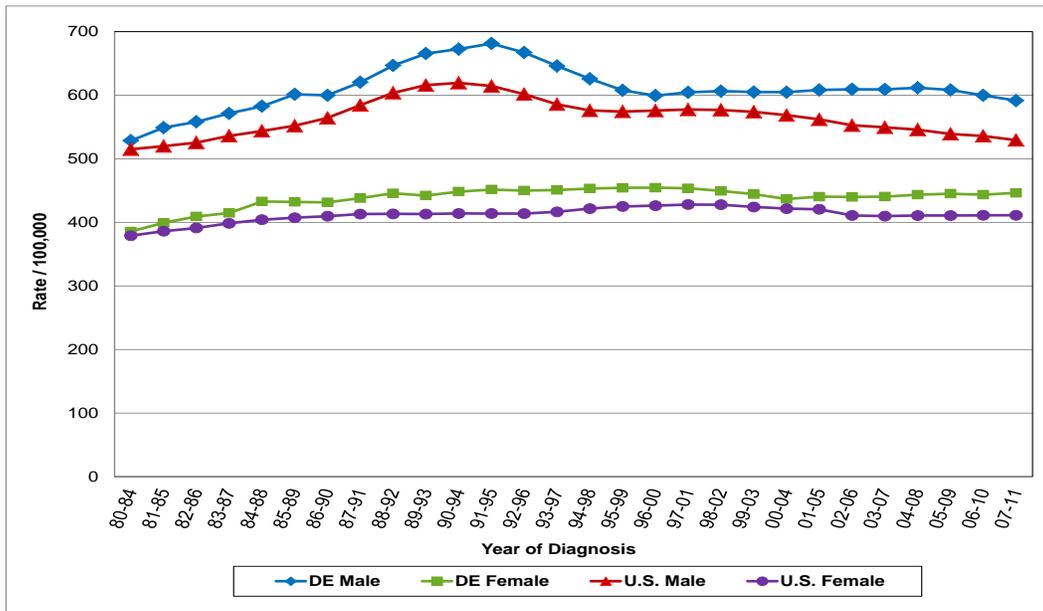
\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

**SOURCE:** Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

### Trends in Incidence Rates for All-Site Cancer (Figures 3-1 and 3-2)

- From 1997-2001 to 2007-2011, Delaware's all-site cancer incidence rate declined 1.1 percent while the U.S. rate declined 5.6 percent.
- Compared to the 1997-2001 rates, Delaware's 2007-2011 all-site cancer incidence rates declined 2.2 percent for males and 1.6 percent for females. When comparing the same two time periods at the national level, the U.S. all-site cancer incidence rates declined 8.3 percent for males and 3.9 percent for females.

**Figure 3-1.** Five-Year Average Age-Adjusted All-Site Cancer Incidence Rates by Sex; U.S. and Delaware, 1980-2011

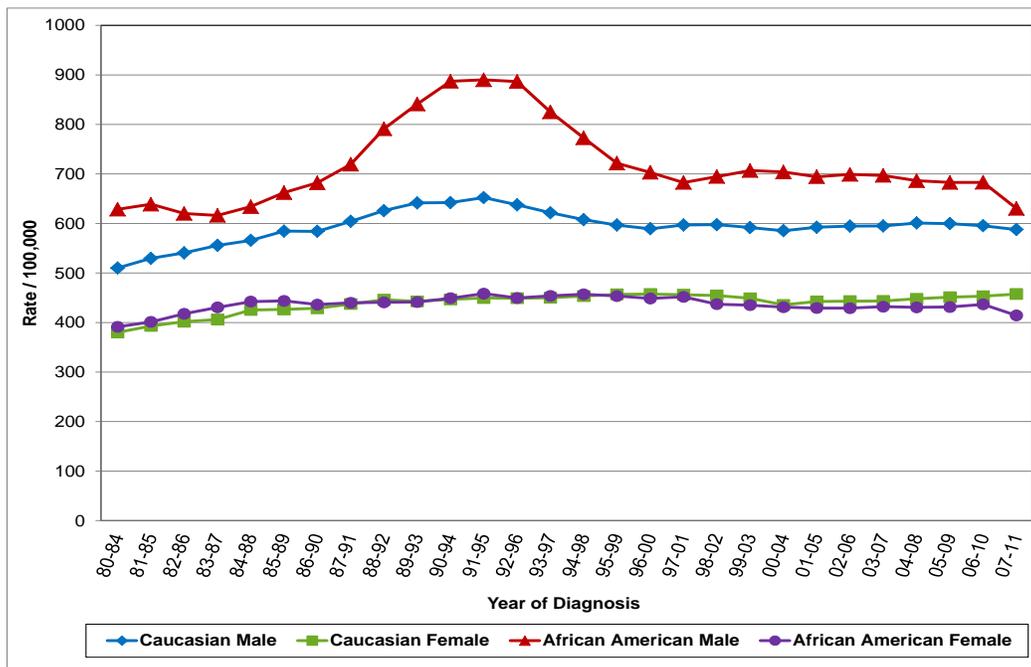


\* = Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

**SOURCE:** Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

- Compared to 1997-2001, Delaware’s 2007-2011 all-site cancer incidence rate increased 0.1 percent among Caucasians and declined 7.4 percent among African Americans.
- When all-site cancer incidence rates were calculated by race and sex, African American Delaware women had the greatest reduction in all-site cancer incidence rates. Compared to the 1997-2001 rate, Delaware’s 2007-2011 all-site cancer incidence rate for African American women declined 8.3 percent.

**Figure 3-2.** Five-Year Average Age-Adjusted All-Site Cancer Incidence Rates by Race and Sex; Delaware, 1980-2011



\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.  
**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

### Age-Specific All-Site Cancer Incidence Rates (Table 3-3, Figures 3-3 and 3-4)

- Between birth and age 39, Delaware’s all-site cancer incidence rate was higher among females compared to males. When incidence rates were calculated separately by race, this same trend was observed among Caucasians and African American Delawareans. Beginning at age 40, all-site cancer incidence rates were consistently higher among males compared to females.
- Among both Caucasians and African Americans in Delaware, the all-site cancer incidence rate increased with age from birth through ages 75-84; rates then declined among those age 85 and older.
- From birth through age 65-74, Delaware’s all-site cancer incidence rates were similar for Caucasians and African Americans. Beginning at age 75, all-site cancer incidence rates were approximately 15 percent higher among Caucasians than African Americans.

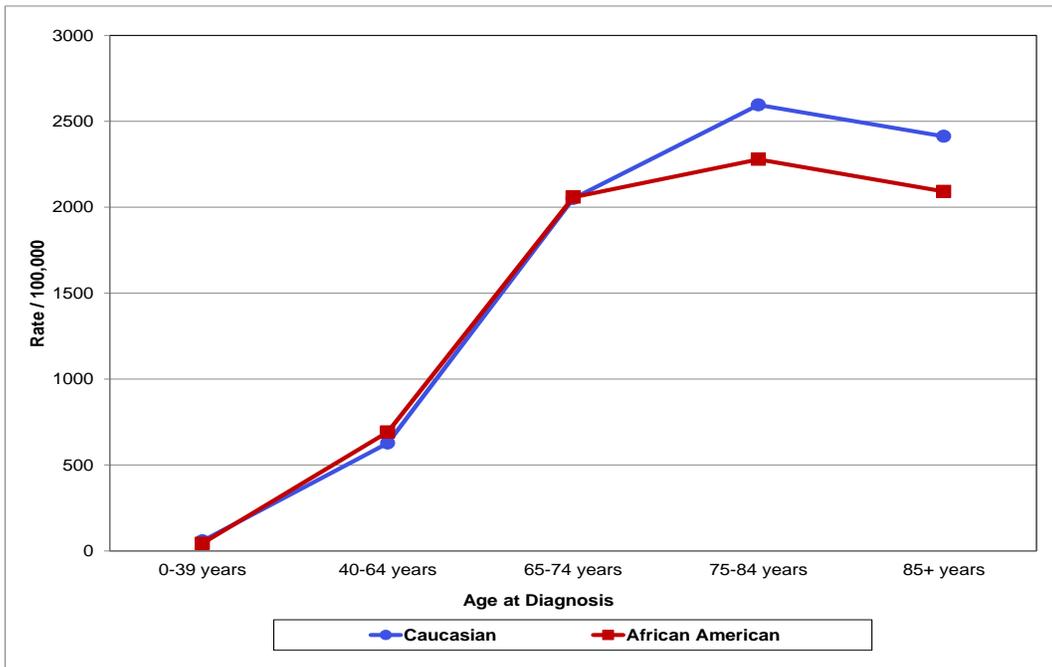
**Table 3-3.** Age-Specific All-Site Cancer Incidence Rates by Race and Sex; Delaware, 2007-2011

Age at Diagnosis	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
<b>0-39</b>	54.6	42.9	65.9	58.3	45.5	70.9	44.1	33.6	53.4
<b>40-64</b>	632.9	668.6	602.3	627.6	645.3	613.1	691.7	822.4	588.3
<b>65-74</b>	2039.0	2586.6	1565.6	2050.4	2536.2	1624.1	2058.0	3007.3	1310.0
<b>75-84</b>	2540.8	3163.6	2061.3	2595.4	3247.3	2081.2	2278.0	2679.0	2017.4
<b>85+</b>	2376.7	3298.1	1940.0	2412.7	3379.3	1951.0	2091.8	2738.6	1807.2

\* = Rates are per 100,000 population.

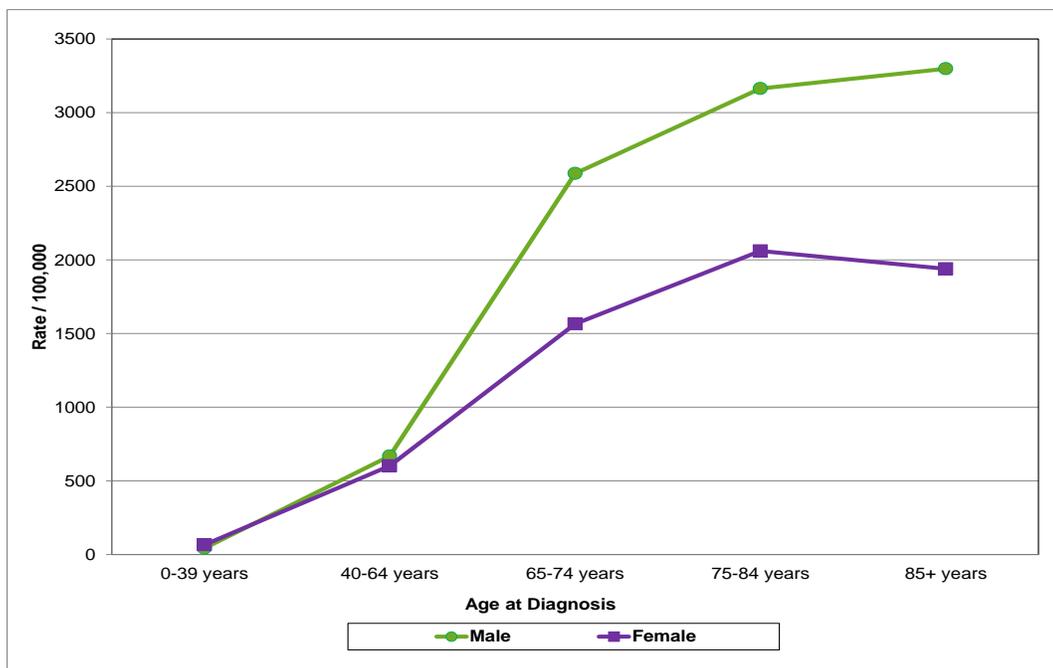
**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

**Figure 3-3.** Age-Specific All-Site Cancer Incidence Rates by Race; Delaware, 2007-2011



\* = Rates are per 100,000 population.  
**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

**Figure 3-4.** Age-Specific All-Site Cancer Incidence Rates by Sex; Delaware, 2007-2011



\* = Rates are per 100,000 population  
**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

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### All-Site Cancer Mortality

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For 2007-2011, Delaware ranked 14<sup>th</sup> in the nation for all-site cancer mortality, unchanged from its ranking for 2006-2010. Males ranked 17<sup>th</sup> highest (17<sup>th</sup> for 2006-2010) and females 9<sup>th</sup> highest (13<sup>th</sup> for 2006-2010) in all-site cancer mortality.<sup>10</sup>

#### All-Site Cancer Mortality: Number of Deaths (Table 3-4)

- From 2007-2011, 9,328 Delawareans died from cancer; 4,852 (52.0 percent) were male and 4,476 (48.0 percent) female.
- Caucasians accounted for 7,733 (82.9 percent) of cancer deaths in Delaware during this time period. African Americans and Delawareans of other races accounted for 1,451 deaths (15.6 percent) and 144 deaths (1.5 percent), respectively.
- The majority (54.7 percent) of Delaware cancer deaths from 2007 to 2011 were among New Castle County residents. Sussex County residents accounted for 27.3 percent of cancer deaths. Kent County residents accounted for 18.0 percent of cancer deaths.

**Table 3-4.** Number of All-Site Cancer Deaths by Race and Sex; Delaware and Counties, 2007-2011

	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
<b>DELAWARE</b>	9,328	4,852	4,476	7,733	4,021	3,712	1,451	757	694
<b>Kent</b>	1,677	855	822	1,366	687	679	278	156	122
<b>New Castle</b>	5,108	2,646	2,462	4,103	2,132	1,971	928	471	457
<b>Sussex</b>	2,543	1,351	1,192	2,264	1,202	1,062	245	130	115

SOURCE: Delaware Health Statistics Center, 2014.

#### All-Site Cancer Mortality: Rates (Table 3-5)

- Delaware's 2007-2011 all-site cancer mortality rate of 184.2 per 100,000 was 6.0 percent higher than the U.S. rate of 173.8 per 100,000 and the difference in rates was statistically significant. Although Delaware's all-site cancer mortality rate has historically been higher than the U.S. rate, the gap has narrowed over the last decade. When rates were calculated separately by sex, the same trend was observed for males and females. Delaware's male all-site cancer mortality rate was significantly higher than the comparable U.S. rate (221.2 per 100,000 vs. 211.6 per 100,000, respectively). Similarly, Delaware's female all-site cancer mortality rate was significantly higher than the comparable U.S. rate (157.9 per 100,000 vs. 147.4 per 100,000, respectively).
- Like the U.S., Delaware's 2007-2011 all-site cancer mortality rate among males (221.2 per 100,000) was significantly higher than for females (157.9 per 100,000). This significant difference in male and female all-site cancer mortality rates was observed across all three Delaware counties, and also among Caucasians and African Americans.
- Delaware's Caucasian all-site cancer mortality rate (183.6 per 100,000) was significantly higher than the U.S. Caucasian rate (173.3 per 100,000). The same trend was observed when rates were calculated separately by sex. Delaware's male Caucasian all-site cancer mortality rate (218.6 per 100,000) was significantly higher than the comparable U.S. rate (209.8 per 100,000). Similarly, Delaware's female Caucasian all-site cancer rate (158.5 per 100,000) was significantly higher than the comparable U.S. rate (147.5 per 100,000).
- Delaware's African American all-site cancer mortality rate (192.7 per 100,000) was significantly lower than the rate for U.S. African Americans (206.4 per 100,000). When rates were calculated separately by sex, Delaware's all-site cancer mortality rate for African American males (242.9 per 100,000) was significantly

<sup>10</sup> Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, [http://seer.cancer.gov/csr/1975\\_2011/](http://seer.cancer.gov/csr/1975_2011/), based on November 2013 SEER data submission, posted to the SEER website, April 2014.

lower than the comparable U.S. rate (269.3 per 100,000). The difference in rates (Delaware vs. the U.S.) did not reach a level of statistical significance for African American females.

- Among male Delawareans, the all-site cancer mortality rate was higher among African Americans (242.9 per 100,000) than among Caucasians (218.6 per 100,000). However, the difference did not reach the threshold for statistical significance.
- Among men in Sussex County, the all-site cancer mortality rate for African Americans was significantly higher than that for Caucasians (268.7 per 100,000 vs. 201.9 per 100,000, respectively).

**Table 3-5.** Five-Year Average Age-Adjusted All-Site Cancer Mortality Rates and 95% Confidence Intervals by Race and Sex; U.S., Delaware and Counties, 2007-2011

RACE AND REGION	All	Male	Female
<b>ALL RACES</b>			
United States	173.8 (173.6 , 174.0)	211.6 (211.3 , 212.0)	147.4 (147.2 , 147.7)
<b>DELAWARE</b>	184.2 (180.4 , 188.0)	221.2 (214.9 , 227.6)	157.9 (153.2 , 162.6)
<b>Kent</b>	198.6 (189.1 , 208.4)	232.1 (216.4 , 248.7)	174.3 (162.5 , 186.8)
<b>New Castle</b>	185.3 (180.2 , 190.5)	226.5 (217.7 , 235.4)	156.9 (150.7 , 163.3)
<b>Sussex</b>	174.3 (167.4 , 181.4)	207.4 (196.0 , 219.3)	150.0 (141.3 , 159.1)
<b>CAUCASIAN</b>			
United States	173.3 (173.1 , 173.5)	209.8 (209.4 , 210.1)	147.5 (147.3 , 147.8)
<b>DELAWARE</b>	183.6 (179.4 , 187.7)	218.6 (211.8 , 225.6)	158.5 (153.4 , 163.8)
<b>Kent</b>	203.2 (192.5 , 214.4)	232.1 (214.7 , 250.6)	183.0 (169.3 , 197.5)
<b>New Castle</b>	186.1 (180.3 , 191.9)	226.4 (216.7 , 236.3)	158.2 (151.2 , 165.5)
<b>Sussex</b>	170.2 (163.0 , 177.6)	201.9 (190.1 , 214.3)	146.7 (137.7 , 156.3)
<b>AFRICAN AMERICAN</b>			
United States	206.4 (205.7 , 207.1)	269.3 (267.9 , 270.7)	169.0 (168.2 , 169.9)
<b>DELAWARE</b>	192.7 (182.5 , 203.4)	242.9 (224.5 , 262.3)	158.6 (146.7 , 171.2)
<b>Kent</b>	181.9 (160.3 , 205.4)	236.3 (198.4 , 279.0)	140.2 (115.8 , 168.0)
<b>New Castle</b>	191.6 (178.7 , 205.0)	237.0 (213.8 , 261.7)	161.7 (146.6 , 177.8)
<b>Sussex</b>	210.0 (184.0 , 238.4)	268.7 (222.7 , 320.8)	172.9 (142.3 , 207.9)

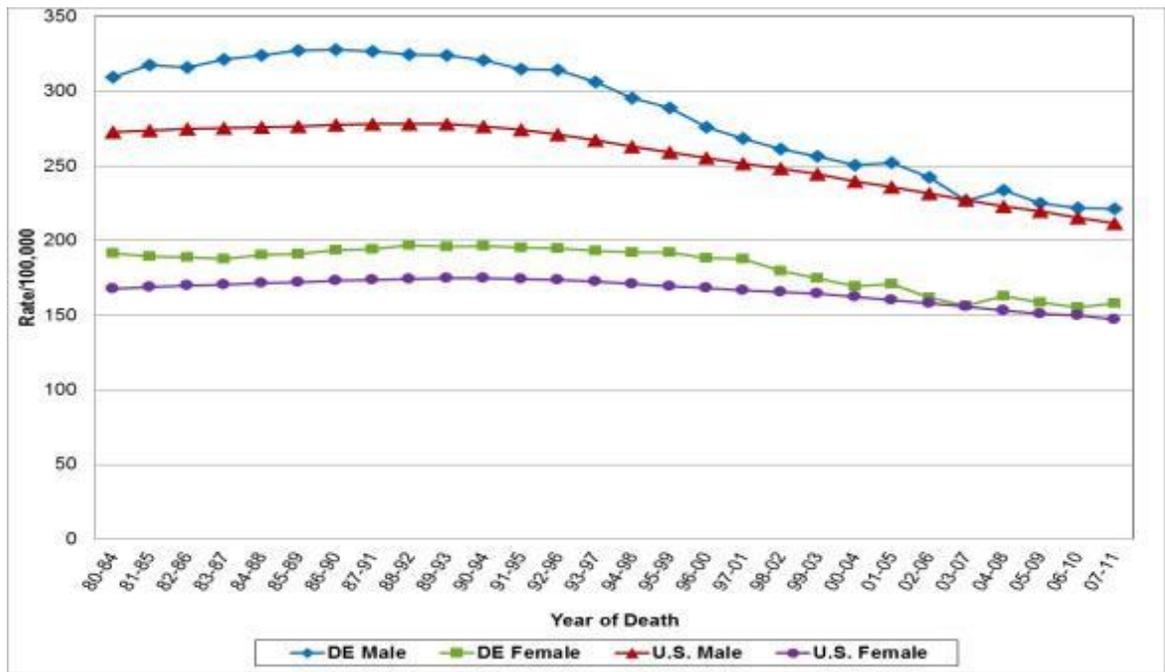
\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

SOURCE: Delaware: Delaware Health Statistics Center, 2014. U.S.: National Center for Health Statistics, 2014.

### Trends in All-Site Cancer Mortality (Figures 3-5 and 3-6)

- From 1997-2001 to 2007-2011, Delaware's all-site cancer mortality rate decreased 15.8 percent while the comparable U.S. rate decreased 13.1 percent.
- From 1997-2001 to 2007-2011, Delaware's all-site cancer mortality rates declined 17.6 percent for males and 15.8 percent for females. When comparing the same two time periods at the national level, the U.S. all-site cancer incidence rates declined 15.8 percent for males and 11.6 percent for females.

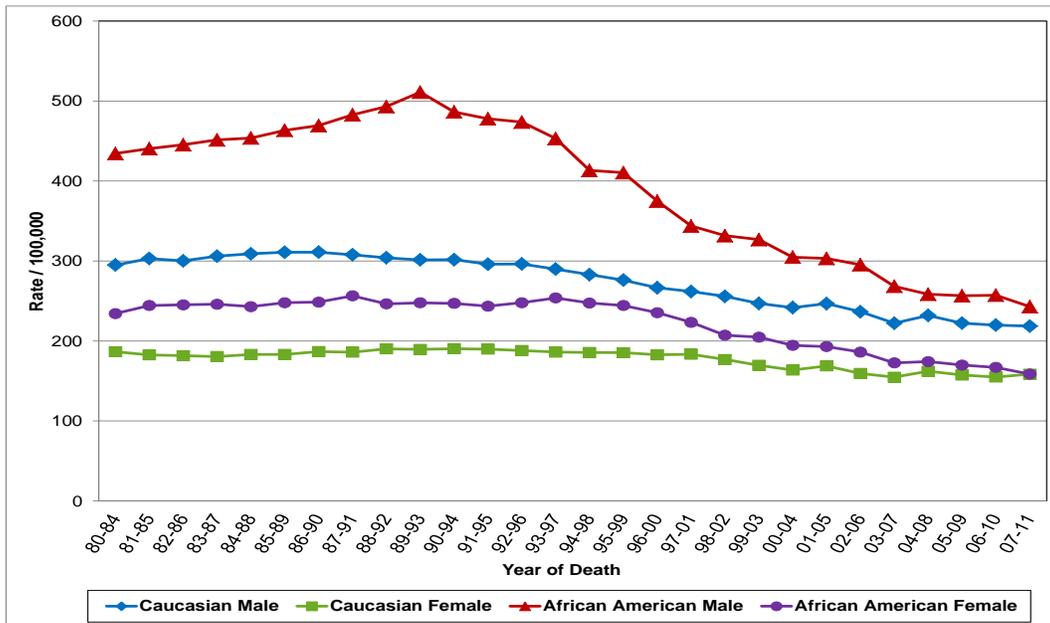
**Figure 3-5.** Five-Year Average Age-Adjusted All-Site Cancer Mortality Rates by Sex; U.S. and Delaware, 1980-2011



\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.  
**SOURCE:** Delaware: Delaware Health Statistics Center, 2014; U.S.: National Center for Health Statistics, 2014.

- When calculated by sex and race, African American males in Delaware represented the cohort with the highest 2007-2011 all-site cancer mortality rate (242.9 per 100,000); however, this cohort also experienced the greatest decline in all-site cancer mortality rates over time (a 29.3 percent reduction in rates from 1997-2001 to 2007-2011).
- In addition to the substantial decline in the all-site cancer mortality rate among African American males in Delaware, noteworthy declines in rates were observed for other cohorts. From 1997-2001 to 2007-2011, Delaware’s all-site cancer mortality rate declined by 16.5 percent for Caucasian males; 13.6 percent for Caucasian females; and 29.0 percent for African American males.

**Figure 3-6.** Five-Year Average Age-Adjusted All-Site Cancer Mortality Rates by Race and Sex; Delaware, 1980-2011



\* = Rates are age-adjusted to the 2000 U.S. standard population. SOURCE: Delaware Health Statistics Center, 2014.

### Age-Specific All-Site Cancer Mortality Rates (Table 3-6, Figures 3-7 and 3-8)

- In Delaware, age-specific all-site cancer mortality rates among African Americans were comparable to those among Caucasians, with the exception of adults ages 85 and older. Among this oldest sub-population, the all-site cancer mortality rate was 15.4 percent higher among Caucasians than African Americans.
- Beginning with ages 40-64, Delaware men have a higher all-site cancer mortality rate compared to Delaware women. By age 85 and over, the death rate was 72.7 percent higher among men than among women.

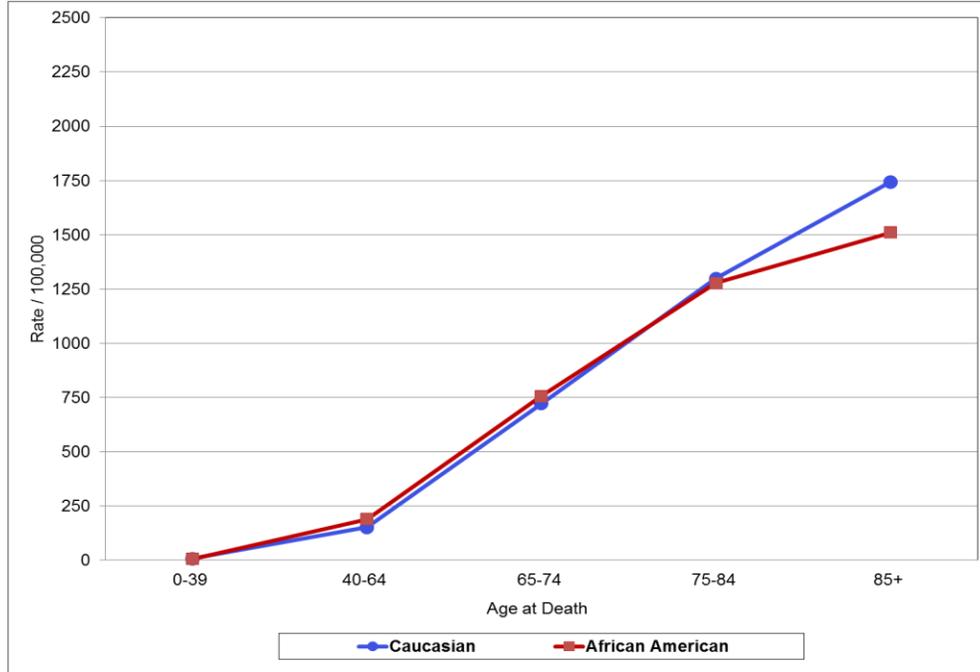
**Table 3-6.** Age-Specific All-Site Cancer Mortality Rates by Race and Sex; Delaware, 2007-2011

Age at Death	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
0-39	7.2	6.2	8.2	7.5	6.4	8.5	7.3	---	---
40-64	157.9	175.0	142.6	152.5	167.4	138.8	190.2	219.6	166.9
65-74	719.5	837.4	617.9	722.1	813.7	641.9	757.7	1055.9	523.7
75-84	1292.1	1602.4	1058.3	1298.5	1611.0	1056.2	1277.9	1620.5	1071.1
85+	1717.9	2405.0	1392.3	1743.5	2459.4	1401.6	1510.6	1977.8	1305.1

\* = Rates are per 100,000 population. --- = Rates based on fewer than 25 deaths are not shown.

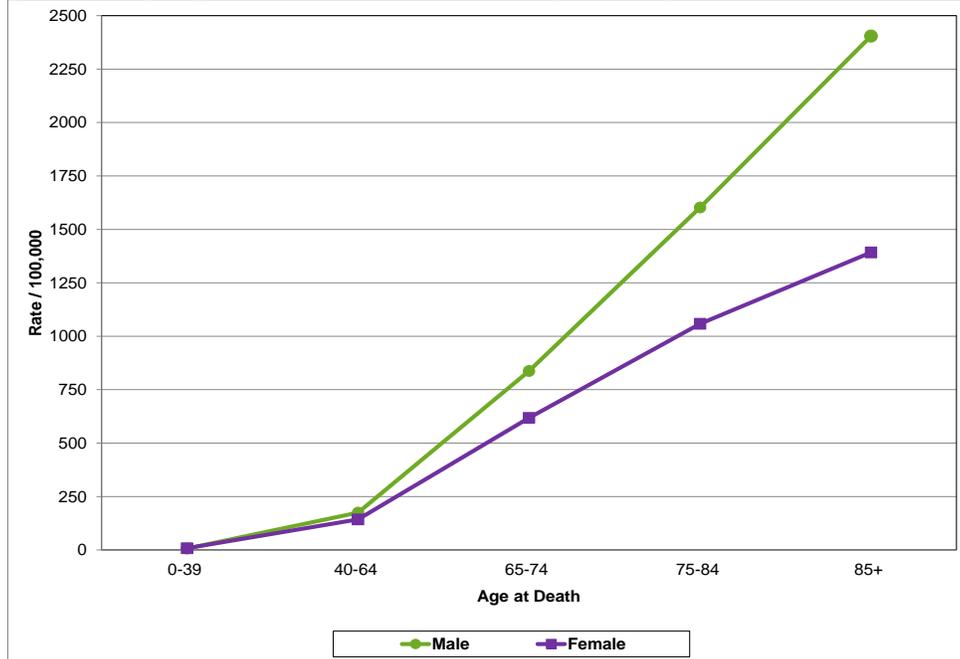
SOURCE: Delaware Health Statistics Center, 2014.

**Figure 3-7. Age-Specific All-Site Cancer Mortality Rates by Race; Delaware, 2007-2011**



\* = Rates are per 100,000 population. **SOURCE:** Delaware Health Statistics Center, 2014.

**Figure 3-8. Age-Specific All-Site Cancer Mortality Rates by Sex; Delaware, 2007-2011**



\* = Rates are per 100,000 population. **SOURCE:** Delaware Health Statistics Center, 2014.

## 4. BREAST CANCER (FEMALE)

### Risk Factors and Early Detection

#### **Risk Factors for Female Breast Cancer:**

Most women who have one or more breast cancer risk factors never develop the disease; some women who develop the disease have no apparent risk factors other than being a female and growing older. Even when a woman with one or more risk factors develops breast cancer, it is difficult to know how much these factors might have contributed to the development of the disease.

#### **Established and Suspected Lifestyle Risk Factors for Female Breast Cancer:**

- Alcohol use (two to five drinks daily)
- Obesity or overweight status, especially after menopause
- Reproductive history (breast cancer risk increases among women who have never had children, or who had their first child after age 30)
- High-fat diet, low intake of fruits and vegetables (suspected risk factor)
- Smoking and secondhand smoke (suspected risk factor)
  - Chemicals from the smoke reach breast tissue and are detectable in breast milk.

#### **Environmental and Medically-Related Causes of Female Breast Cancer:**

- Birth control pill use within the previous 10 years
- Combined hormone therapy (both estrogen and progesterone) for two or more years after menopause
  - Breast cancer risk returns to normal five years following discontinued use.
- History of high-dose radiation therapy to the chest area as a child or young adult
- Diethylstilbestrol (DES) (personal use or having a mother who used DES during pregnancy)

#### **Non-Modifiable Breast Cancer Risk Factors (Risk Factors that Cannot be Changed):**

- Gender (breast cancer is 100 times more common in women than men)
- Increasing age
  - Only about one in eight invasive breast cancers are diagnosed among women younger than 45.
  - Two-thirds of invasive breast cancers occur in women age 55 and older.
- Family history
  - Having one first-degree relative (mother, sister, or daughter) with breast cancer approximately doubles a woman's risk of developing breast cancer herself; two first-degree relatives with breast cancer increases a woman's risk three-fold.
- Gene defects or mutations
  - Approximately 5 to 10 percent of breast cancer cases appear to result from gene defects or mutations inherited from a parent. The most common is an inherited mutation in the BRCA1 or BRCA2 genes, found most often in Jewish women of Eastern European origin.
- Personal history of breast cancer

- Having a history of breast cancer nearly triples a woman's risk of developing a new cancer in another part of the previously-affected breast or in the other breast.
- Race
  - Caucasian women ages 45 and over are more likely to develop breast cancer than African-American women. African-American women, however, are more likely to be diagnosed with breast cancer at a younger age and are more likely to die from breast cancer.
- Dense breast tissue
  - Increases risk of breast cancer and also makes it more difficult to identify potential problems on mammograms
- Personal history of certain benign breast conditions
- Early age at menarche (before age 12) and/or a later age at menopause (after age 55)
- Exposure to chemical compounds in the environment that have estrogen-like properties (e.g., pesticides (such as DDE) and polychlorinated biphenyls (PCBs), as well as substances found in some plastics, certain cosmetics, and personal care products)

#### **Factors Protective against Female Breast Cancer:**

- Following age-recommended guidelines for breast cancer screenings helps increase the likelihood that breast cancer is diagnosed in its earliest, most treatable stage.
- Prophylactic drugs such as tamoxifen and EVISTA (raloxifene hydrochloride) have been shown to be beneficial in reducing breast cancer incidence among women with increased breast cancer risk.
- Newer drugs (aromatase inhibitors), as well as some dietary supplements and herbs, may help lower the risk of breast cancer.
- Breastfeeding for 1½ to two years may slightly lower the risk of breast cancer.
- Managing lifestyle risk factors such as dietary intake, tobacco use, alcohol use, and physical activity help reduce breast cancer risk.

#### **Early Detection of Female Breast Cancer:**

A screening mammogram (x-ray of the breast) is used to detect breast disease in women who appear to have no breast problems. For early breast cancer detection in women without breast symptoms, the American Cancer Society (ACS) recommends that women age 40 and older have a mammogram every year and continue to do so for as long as they are in good health. The Delaware Cancer Consortium also recommends the ACS breast cancer screening guidelines.

Also, women should know how their breasts normally look and feel and report any breast change promptly to their health care provider. Breast self-exam is encouraged for women starting in their 20s.<sup>11</sup> Women at increased risk for breast cancer should discuss with their health care provider the benefits and limitations of beginning mammograms when they are younger, having additional tests, and/or having more frequent exams.

#### **Mammography Screening among Women in Delaware:**

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<sup>11</sup> American Cancer Society recommendations for early breast cancer detection in women without breast symptoms. Accessed July 30, 2013. <http://www.cancer.org/Cancer/BreastCancer/MoreInformation/BreastCancerEarlyDetection/breast-cancer-early-detection-ac-s-recs>

The Behavioral Risk Factor Surveillance Survey (BRFSS) collected yearly mammogram use data through 2000; after 2000, mammogram use data are collected biannually. The BRFSS questionnaire inquires about a respondent's mammogram use during the previous two years (as opposed to the annual mammogram screening schedule recommended by the ACS) to account for minor variations in scheduling that may cause a woman to miss the one-year threshold (e.g., two mammogram screening appointments 14 months apart).

Data from the 2012 BRFSS provide information on breast cancer screening among Delaware women:

- In 2012, 80.5 percent of Delaware women age 40 and older reported having a mammogram within the previous two years compared to 74.0 percent of U.S. women age 40 and older. Delaware women ranked third highest nationally for this response.
- In Delaware, the percentage of African American women age 40 and older who reported having a mammogram in the past two years was higher than Caucasian women, but the difference was not significantly different (84.0 percent vs. 79.5 percent, respectively).
- Women age 40 and older in the two highest income categories had the highest percentages of mammography use (79.8 percent for women with an annual income of \$35,000 – \$49,999; and 86.3 percent for women with an annual income of \$50,000 and over).
- Delaware women (age 40 and older) who were college graduates were more likely to have had a mammogram than those who didn't complete high school; this difference was statistically significant.

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### Female Breast Cancer Incidence

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Delaware ranked 13th highest in the U.S. for incidence of female breast cancer during 2007-2011.<sup>12</sup> This ranking was the same for the 2006-2010 time period.

#### Cases of Breast Cancer (Table 4-1)

- Breast cancer is the most frequently diagnosed cancer among females in Delaware and the U.S.
- From 2007-2011, 3,491 cases of female breast cancer were diagnosed among Delawarean women. Breast cancer accounted for 28.5 percent of all new cancer cases diagnosed among women in Delaware.
- Nearly 80 percent (2,777) of Delaware female breast cancer cases were diagnosed among Caucasian women. African American women accounted for 17.1 percent (632) cases; women of other or unknown race accounted for the remaining 2.3 percent (82) of cases in Delaware.
- Thirty-five cases of breast cancer were diagnosed among male Delawareans from 2007-2011; 68.6 percent (24) of these cases occurred among Caucasian males. Male breast cancer cases are not included in the following statistics.

**Table 4-1.** Number of Female Breast Cancer Cases by County and Race; Delaware, 2007-2011

	All Female	Caucasian	African American
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<sup>12</sup> U.S. Cancer Statistics Working Group. United States Cancer Statistics: 1999-2011 Incidence and Mortality Web-based Report. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; 2014. Available at: [www.cdc.gov/uscs](http://www.cdc.gov/uscs).

<b>DELAWARE</b>	3,491	2,777	632
<b>Kent</b>	583	448	127
<b>New Castle</b>	2,011	1,532	428
<b>Sussex</b>	897	797	77

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

### Incidence Rates for Female Breast Cancer (Table 4.2)

- The 2007-2011 female breast cancer incidence rate for Delaware (128.2 per 100,000) was 2.9 percent higher than the U.S. rate (124.6 per 100,000). This difference was not statistically significant.
- The 2007-2011 breast cancer incidence rate for African American females in Delaware (131.2 per 100,000) was higher than the comparable U.S. rate (122.8 per 100,000). This difference was not statistically significant. At the national level, the opposite trend is observed. The 2007-2011 female breast cancer rate for African American women (122.8 per 100,000) was significantly lower than the rate for Caucasian women (128.0 per 100,000).
- Delaware's 2007-2011 breast cancer incidence rate among Caucasian females (127.8 per 100,000) was slightly lower than the U.S. rate (128.0 per 100,000).

**Table 4-2.** Five-Year Average Age-Adjusted Female Breast Cancer Incidence Rates and 95% Confidence Intervals by Race; U.S., Delaware and Counties, 2007-2011

	<b>All Female</b>	<b>Caucasian</b>	<b>African American</b>
<b>United States</b>	124.6 (124.1 , 125.0)	128.0 (127.5 , 128.5)	122.8 (121.4 , 124.2)
<b>DELAWARE</b>	128.2 (123.9 , 132.6)	127.8 (122.9 , 132.8)	131.2 (120.9 , 142.1)
<b>Kent</b>	124.4 (114.4 , 135.1)	124.2 (112.8 , 136.6)	134.3 (111.5 , 160.4)
<b>New Castle</b>	131.0 (125.3 , 137.0)	131.5 (124.9 , 138.4)	134.3 (121.5 , 148.1)
<b>Sussex</b>	125.3 (116.7 , 134.4)	123.1 (114.0 , 132.7)	114.9 (90.4 , 143.9)

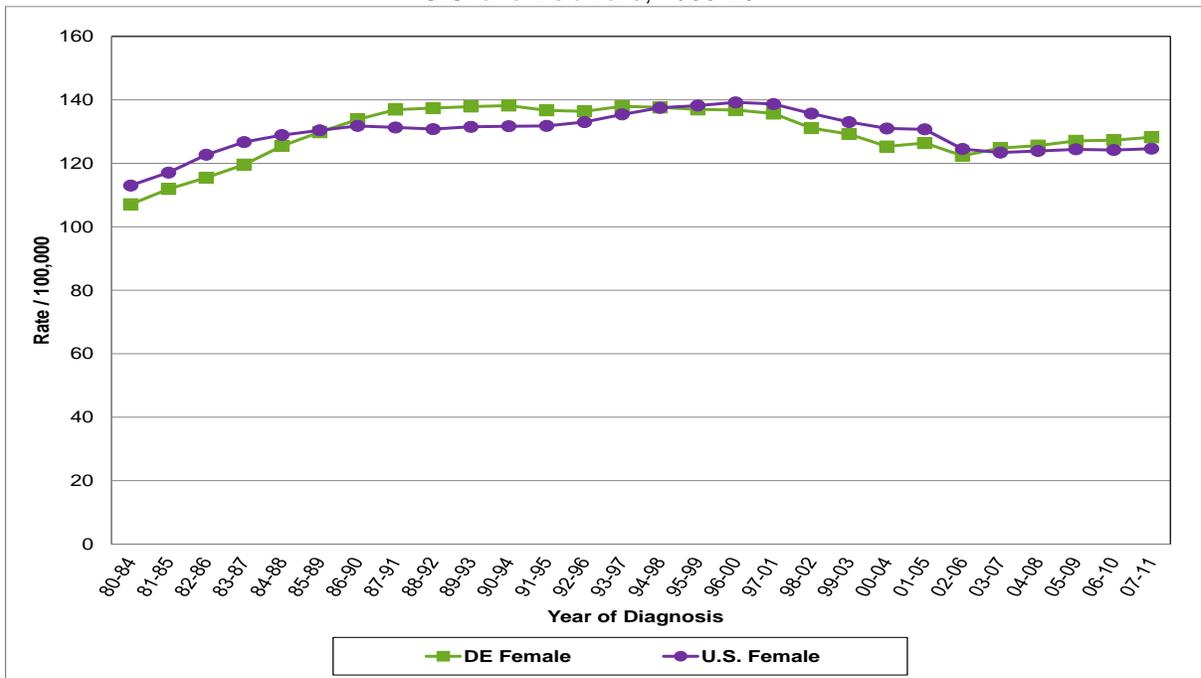
\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

**SOURCE:** Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

### Trends in Incidence of Female Breast Cancer (Figures 4.1 and 4.2)

- From 1997-2001 to 2007-2011, Delaware's female breast cancer incidence rate declined 5.5 percent while the comparable U.S. rate fell 10.2 percent.
- Female breast cancer incidence has slightly increased among Delaware women in recent years. Compared to the 2002-2006 female breast cancer incidence rate, Delaware's 2007-2011 rate was 4.7 percent higher.

**Figure 4-1. Five-Year Average Age-Adjusted Female Breast Cancer Incidence Rates; U.S. and Delaware, 1980-2011**

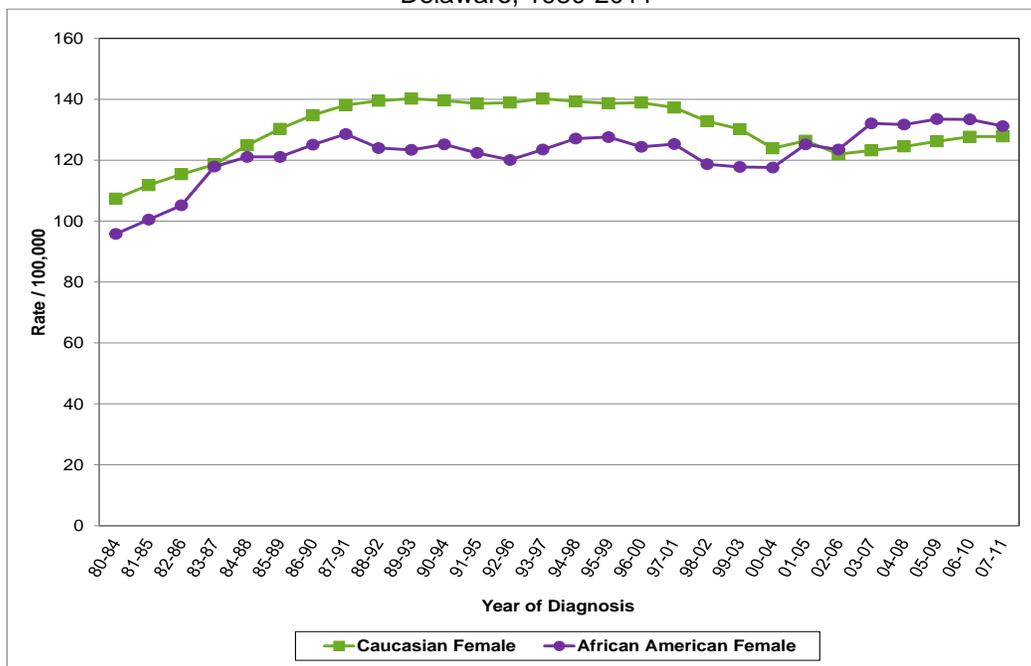


\* = Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

**SOURCE:** Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

- From 1997-2001 through 2007-2011, Delaware's female breast cancer incidence rate fell 6.9 percent among Caucasian women, but increased 4.7 percent among African American women. A similar trend is observed at the national level. During the same time period, the U.S. female breast cancer incidence rate declined 11.7 percent among Caucasians and increased 1.3 percent among African Americans (not shown in Figure 4-2).
- Historically, Delaware's female breast cancer incidence had been higher among Caucasians than African Americans; beginning in 2002–2006, the incidence rate among African Americans surpassed that of Caucasians.

**Figure 4-2. Five-Year Average Age-Adjusted Female Breast Cancer Incidence Rates by Race; Delaware, 1980-2011**



\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

### Age-Specific Female Breast Cancer Incidence Rates (Table 4-3 and Figure 4-3)

- Among all Delaware women, breast cancer incidence increased with age from birth through ages 75-84. The breast cancer incidence rate then declined among women ages 85 and older.
- When rates were calculated separately by race, the same trend was observed among Caucasian women in Delaware. Among African American women in Delaware, female breast cancer increased by age through ages 75-84 (insufficient data in the oldest age group).

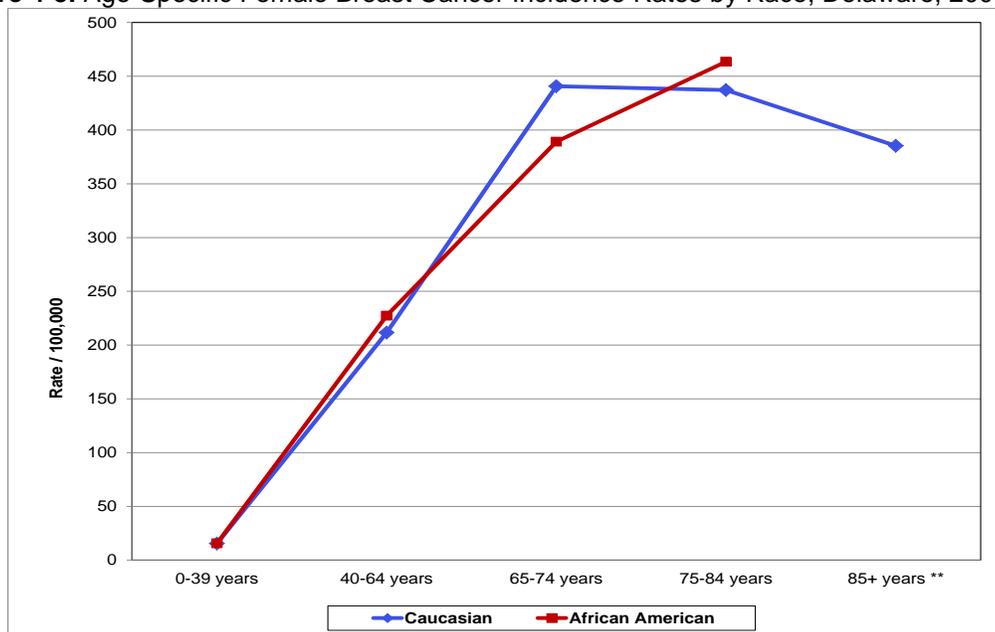
**Table 4-3. Age-Specific Female Breast Cancer Incidence Rates by Race; Delaware, 2007-2011**

Age at Diagnosis	All Female	Caucasian	African American
<b>0-39</b>	15.6	15.4	15.6
<b>40-64</b>	214.8	211.6	227.3
<b>65-74</b>	430.7	440.7	389.2
<b>75-84</b>	437.0	437.2	463.6
<b>85+</b>	388.4	385.4	---

\* = Rates are per 100,000 population. --- = Rates based on fewer than 25 cases are not shown.

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

**Figure 4-3. Age-Specific Female Breast Cancer Incidence Rates by Race; Delaware, 2007-2011**



\* = Rates are per 100,000 population.

\*\* = Rates based on fewer than 25 cases are not shown.

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

#### Female Breast Cancer by Stage at Diagnosis (Table 4-4 and Figures 4-4 and 4-5)

- During 2007-2011, the majority (64.6 percent) of breast cancer cases diagnosed in Delaware were diagnosed in the local stage. However, the proportion of female breast cancer cases diagnosed in the local stage was higher among Caucasian women (66.2 percent) than African American women (58.5 percent).
- Consequently, the proportions of regional- and late-stage diagnoses were higher among African American women in Delaware (32.4 percent) than among Caucasian women (6.5 percent). Among African American women in Delaware, 32.4 percent of breast cancer cases were diagnosed in the regional stage compared to 26.8 percent of Caucasian female breast cancer cases. Late-stage diagnoses accounted for 6.5 percent of breast cancer cases diagnosed among African American women, compared to and 5.4 percent diagnosed in Caucasian women in Delaware.

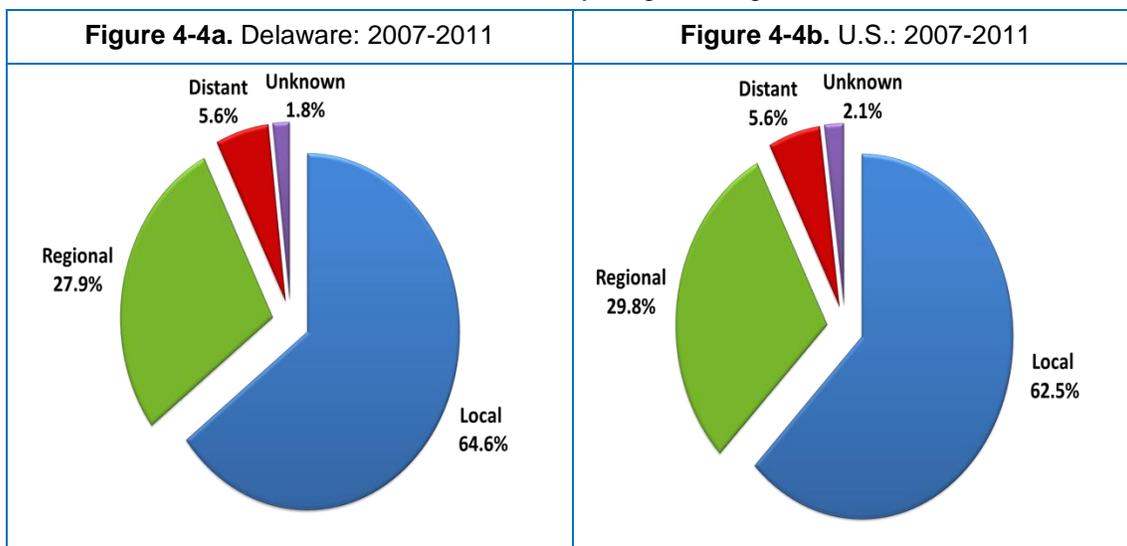
**Table 4-4. Number (Percent) of Female Breast Cancer Cases\by Stage at Diagnosis and Race; Delaware, 2007-2011**

Stage at Diagnosis	Number (Percent)		
	All Female	Caucasian	African American
<b>Local</b>	2,256 (64.6)	1,837 (66.2)	370 (58.5)
<b>Regional</b>	975 (27.9)	745 (26.8)	205 (32.4)
<b>Distant</b>	197 (5.6)	150 (5.4)	41 (6.5)
<b>Unknown</b>	63 (1.8)	45 (1.6)	16 (2.5)
<b>Total</b>	3,491 (100.0)	2,777 (100.0)	632 (100.0)

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

- For 2007-2011, 64.6 percent of female breast cancer cases in Delaware were diagnosed at the local stage; 27.9 percent were diagnosed in the regional stage; and 5.6 percent were diagnosed in the distant stage. Comparable national rates were slightly less favorable. In the U.S. during the same time period, 62.5 percent of female breast cancer cases were diagnosed in the local stage; 29.8 percent were diagnosed in the regional stage; and 5.6 percent were diagnosed in the distant stage.

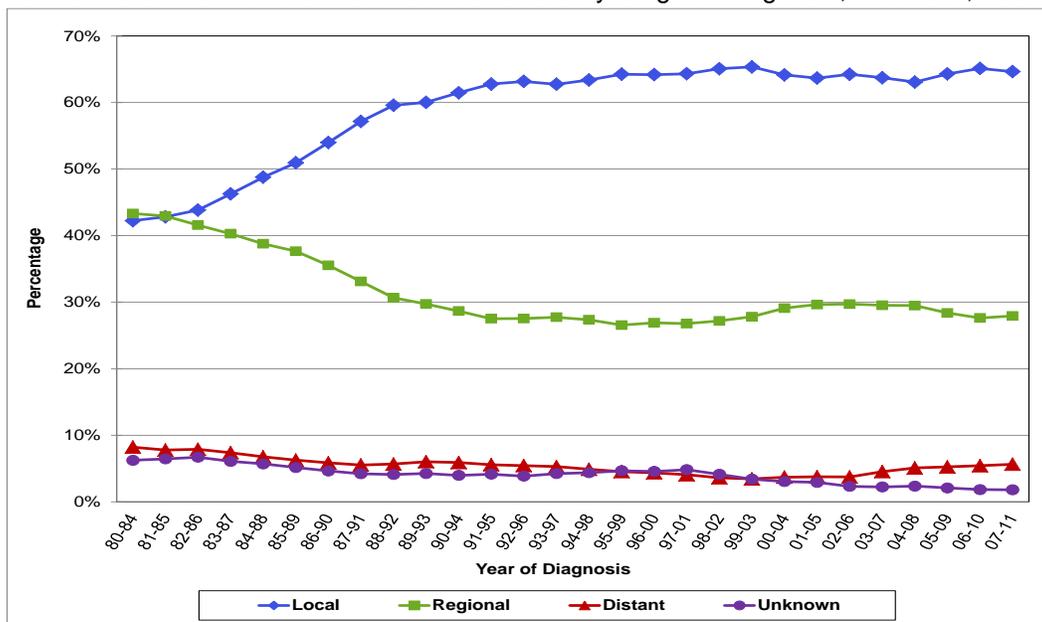
**Figure 4-4.** Percent of Female Breast Cancer Cases by Stage at Diagnosis; U.S. and Delaware, 2007-2011



**SOURCE:** Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

- The proportion of female breast cancer cases diagnosed in the earliest, most treatable stage has greatly improved in Delaware over the past three decades. From 1980-1984 to 2007-2011, the proportion of Delaware breast cancers diagnosed in the local stage increased from 42.2 percent to 64.6 percent.
- As a result of an increase in the proportion of local-stage diagnoses, the proportion of Delaware breast cancer cases diagnosed in the regional stage decreased from 43.3 percent to 27.9 percent over the same time period. The proportion of Delaware breast cancer cases diagnosed in the distant stage declined from 8.2 percent to 5.6 percent over the same time period.

**Figure 4-5.** Percent of Female Breast Cancer Cases by Stage at Diagnosis; Delaware, 1980-2011



**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

## Female Breast Cancer Mortality

Delaware females ranked 17<sup>th</sup> highest in breast cancer mortality for the 2007-2011 time period, up from 23<sup>rd</sup> for 2006-2010.<sup>13</sup>

### Deaths due to Breast Cancer (Table 4-5)

- In Delaware and the U.S., breast cancer is the second leading cause of cancer death among females (following lung cancer).
- During 2007-2011, breast cancer accounted for 14.2 percent of all cancer deaths among Delaware women.
- During 2007-2011, 637 Delaware women died from breast cancer. The majority (81.2 percent; 517) of deaths occurred among Caucasian women. African American women accounted for 17.4 percent (111) of breast cancer cases.
- Seven Delaware males died from breast cancer from 2007 through 2011 (six deaths among Caucasian males; one African American male death). Male deaths due to breast cancer are not included in the following statistics.

**Table 4-5.** Number of Female Breast Cancer Deaths by County and Race; Delaware, 2007-2011

	All Female	Caucasian	African American
<b>DELAWARE</b>	637	517	111
<b>Kent</b>	128	101	24
<b>New Castle</b>	346	269	72
<b>Sussex</b>	163	147	15

**SOURCE:** Delaware Health Statistics Center, 2014.

### Female Breast Cancer Mortality Rates (Table 4-6)

- Delaware's 2007-2011 female breast cancer mortality rate (22.8 per 100,000) was nearly identical to the U.S. rate (22.2 per 100,000).
- Delaware's female breast cancer mortality rate for African Americans was significantly lower than the comparable U.S. rate (24.0 per 100,000 vs. 30.6 per 100,000, respectively).
- In the U.S., the female breast cancer mortality rate was significantly higher among African Americans (30.6 per 100,000) than Caucasians (21.7 per 100,000). However, Delaware's difference in female breast cancer mortality rates between African Americans and Caucasians did not reach the threshold for statistical significance (African Americans: 24.0 per 100,000; Caucasians: 22.7 per 100,000).

<sup>13</sup> Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, [http://seer.cancer.gov/csr/1975\\_2011/](http://seer.cancer.gov/csr/1975_2011/), based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

**Table 4.6.** Five-Year Average Age-Adjusted Female Breast Cancer Mortality Rates and 95% Confidence Intervals by Race; U.S., Delaware and Counties, 2007-2011

Region	All Female	Caucasian	African American
United States	22.2 (22.1 , 22.3)	21.7 (21.6 , 21.8)	30.6 (30.2 , 30.9)
DELAWARE	22.8 (21.0 , 24.7)	22.7 (20.7 , 24.8)	24.0 (19.6 , 29.0)
Kent	27.4 (22.8 , 32.6)	27.6 (22.4 , 33.7)	---
New Castle	22.0 (19.7 , 24.5)	21.9 (19.3 , 24.8)	23.7 (18.3 , 30.1)
Sussex	21.6 (18.2 , 25.5)	21.4 (17.9 , 25.6)	---

\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

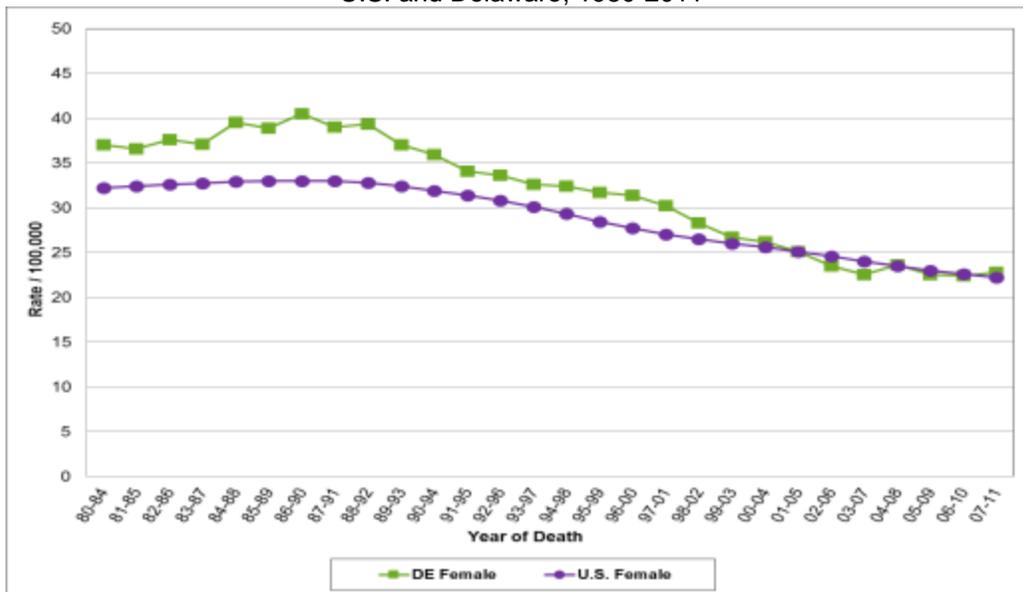
--- = Rates based on fewer than 25 deaths are not shown.

SOURCE: Delaware: Delaware Health Statistics Center, 2014; U.S.: National Center for Health Statistics, 2014.

### Trends in Female Breast Cancer Mortality (Figures 4-6 and 4-7)

- Historically, Delaware's female breast cancer mortality rates were higher than the U.S. However, since 1999-2003, Delaware's female breast cancer mortality rate has been comparable to, or lower than, the U.S. rate.
- From 1997-2001 to 2007-2011, Delaware's female breast cancer mortality rate decreased 24.5 percent while the U.S. rate fell 17.8 percent.

**Figure 4-6.** Five-Year Average Age-Adjusted Female Breast Cancer Mortality Rates; U.S. and Delaware, 1980-2011

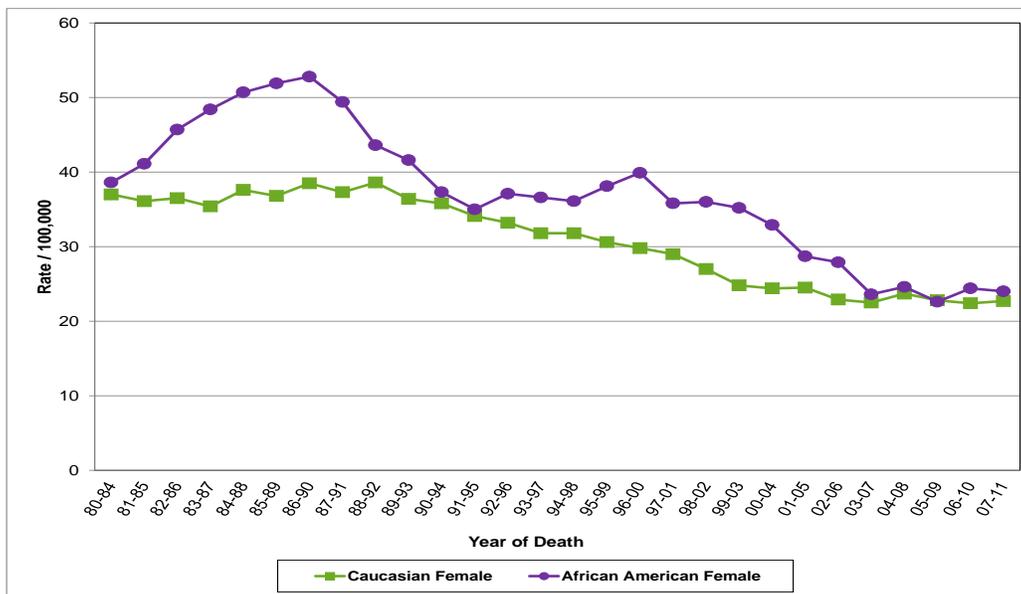


\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

SOURCE: Delaware: Delaware Health Statistics Center, 2014; U.S.: National Center for Health Statistics, 2014.

- From 1997-2001 to 2007-2011, Delaware's female breast cancer mortality rate decreased 33.0 percent among African Americans and 21.7 percent among Caucasians. Nationally (not shown), breast cancer mortality declined 13.6 percent among African Americans and 17.8 percent among Caucasians.

**Figure 4-7. Five-Year Average Age-Adjusted Female Breast Cancer Mortality Rates by Race; Delaware, 1980-2011**



\* = Rates are age-adjusted to the 2000 U.S. standard population. **SOURCE:** Delaware Health Statistics Center, 2014.

#### Age-Specific Female Breast Cancer Mortality Rates (Table 4-7)

- Among Caucasian women in Delaware, breast cancer mortality increased with age, from 29.7 deaths per 100,000 among women ages 40-64 to 167.0 per 100,000 among ages 85 and older.
- The number of female breast cancer deaths was too small to examine age-specific mortality rates by race.

**Table 4-7. Age-Specific Female Breast Cancer Mortality Rates by Race; Delaware, 2007-2011**

Age at Death	All Female	Caucasian	African American
0-39	---	---	---
40-64	29.7	28.8	35.6
65-74	72.2	75.0	---
75-84	119.6	117.9	---
85+	167.0	167.5	---

\* = Rates are per 100,000 population. --- = Rates based on fewer than 25 deaths are not shown.

**SOURCE:** Delaware Health Statistics Center, 2014.

## 5. COLORECTAL CANCER

### Risk Factors and Early Detection

Colorectal cancer is cancer that originates either in the colon or the rectum. Since they have many characteristics in common, cancers of the colon and rectum are grouped together in this document.

#### Lifestyle Risk Factors for Colorectal Cancer:

- Diet high in red meat and processed meats
- Lack of physical activity
- Obesity (The association between obesity and colorectal cancer appears to be stronger for men than for women.)
- Long-term tobacco use
- Heavy alcohol use
- Type 2 diabetes

#### Environmental and Medically-Related Causes of Colorectal Cancer:

- Personal history of testicular cancer (most likely due to testicular cancer treatment strategies)
- History of radiation therapy for prostate cancer
- Limited data suggest night-shift work may increase risk among women.

#### Non-Modifiable Colorectal Cancer Risk Factors (Risk Factors that Cannot Be Changed):

- Age
  - Although younger adults develop colorectal cancer, risk increases markedly after age 50.
- Race
  - African Americans are typically considered at greater risk compared to Caucasians.
- Ethnicity
  - Jewish men and women of Eastern European descent exhibit greater risk.
- Personal history of colorectal adenomatous polyps or previous history of colorectal cancer
- History of Inflammatory Bowel Disease, ulcerative colitis, or Crohn's Disease
  - These syndromes can lead to dysplasia (the generation of abnormal cells) in the lining of the colon and rectum; these abnormal cells can develop into cancer over time.
- Familial adenomatous polyposis (FAP)
  - Responsible for about 1 percent of colorectal cancers
- Family history of colorectal cancer or adenomatous polyps in one or more first-degree relatives

#### Factors Protective against Colorectal Cancer:

- Regular screening is the most effective way to prevent colorectal cancer because early removal of colorectal polyps can prevent colorectal cancer from developing.
- Risk of colorectal cancer can be lowered by managing lifestyle risk factors such as diet (high in fruits, vegetables, and whole grains), alcohol use, and physical activity.
- Some studies have demonstrated a decrease in colorectal cancer risk from daily multi-vitamins containing folic acid, vitamin D, and/or magnesium. More research is needed to substantiate these early claims.
- People who use aspirin and other anti-inflammatory drugs such as ibuprofen show a lower risk of colorectal cancer; however, long-term use of these drugs may potentially cause serious side effects. Before beginning an aspirin regimen, people should consult their doctor to discuss their personal health histories.
- Combined hormone replacement therapy, which includes both estrogen and progesterone, may reduce a woman's risk of postmenopausal colorectal cancer.

### **Early Detection of Colorectal Cancer:**

The American Cancer Society's colorectal cancer screening guidelines are as follows:<sup>14</sup>

Beginning at age 50, men and women at average risk of developing colorectal cancer should use one of the screening options below:

- a. fecal occult blood test (FOBT) every year
- b. fecal immunochemical test (FIT) every year
- c. Flexible sigmoidoscopy every five years
- d. Double-contrast barium enema every five years
- e. CT colonography (virtual colonoscopy) every five years
- f. Colonoscopy every 10 years

For screening options a-e, a follow-up colonoscopy should be performed if results from an initial screening test are positive. ACS screening guidelines offer suggested screening schedules for individuals with an elevated risk of developing colorectal cancer.

### **Colorectal Cancer Screening among Delawareans:**

Data from the 2012 Behavioral Risk Factor Surveillance System (BRFSS) survey provide information on colorectal cancer screening patterns among Delawareans.

- In 2012, Delaware ranked fourth highest in the prevalence (75.1 percent) of adults age 50 and older who reported that they had ever had a colonoscopy or sigmoidoscopy. The U.S. prevalence rate of ever having had a sigmoidoscopy or colonoscopy was 67.3 percent.
- The percentage of Delawareans who have ever had a colonoscopy or sigmoidoscopy increased with age. Significantly more Delawareans ages 60-64 and 65+ (83.4 percent and 82.3 percent, respectively) reported ever having had a colonoscopy or sigmoidoscopy, compared to those ages 50-59 (63.3 percent).
- In 2012, the proportion of Caucasians age 50 and older in Delaware who had ever had a colonoscopy or sigmoidoscopy (75.5 percent ) was slightly higher than that for African Americans in Delaware (72.1 percent).
- In Delaware, the proportion of adults ages 50 and over who had ever had a colonoscopy or sigmoidoscopy increased by level of education.

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<sup>14</sup> Detailed screening guidelines for colorectal cancer:  
<http://www.cancer.org/Cancer/ColonandRectumCancer/MoreInformation/ColonandRectumCancerEarlyDetection/colorectal-cancer-early-detection-acs-recommendations>

- Compared to the U.S., Delaware residents in the lowest income category were more likely to have ever been screened for colorectal cancer (73.0 percent for Delaware vs. 53.8 percent for the U.S.).

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## Colorectal Cancer Incidence

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During 2007-2011, Delaware ranked 28<sup>th</sup> highest in the U.S. for colorectal cancer incidence, down from a ranking of 24<sup>th</sup> in 2006-2010. Males ranked 27<sup>th</sup> (down from 21<sup>st</sup> in 2006-2010) and females ranked 31<sup>st</sup> (down from 24<sup>th</sup> in 2006-2010).<sup>15</sup>

### Cases of Colorectal Cancer (Table 5-1)

- Colorectal cancer is the third most commonly-diagnosed cancer among males and females in Delaware and the U.S. (following prostate and lung cancer for males and breast and lung cancer for females).
- A total of 2,174 cases of colorectal cancer were diagnosed among Delawareans during 2007-2011, accounting for 8.4 percent of all cancer cases diagnosed during this time period. Male Delawareans accounted for 1,109 cases (51.0 percent) and females accounted for 1,065 cases (48.9 percent).
- From 2007-2011, Caucasian Delawareans accounted for 1,782 cases (82.0 percent) of colorectal cancer cases. African American Delawareans accounted for 350 cases (16.1 percent), and individuals of other or unknown race accounted for the remaining 42 cases (1.9 percent).

**Table 5-1.** Number of Colorectal Cancer Cases by Race and Sex; Delaware and Counties, 2007-2011

	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
<b>DELAWARE</b>	2,174	1,109	1,065	1,782	907	875	350	179	171
<b>Kent</b>	381	190	191	303	150	153	71	37	34
<b>New Castle</b>	1,177	601	576	929	475	454	223	111	112
<b>Sussex</b>	616	318	298	550	282	268	56	31	25

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

### Incidence Rates for Colorectal Cancer (Table 5-2)

- Delaware's 2007-2011 colorectal cancer incidence rate (43.08 per 100,000) was slightly lower than the U.S. rate (43.7 per 100,000). The same pattern was observed when incidence rates were calculated separately for male and female Delawareans. However, in none of these three instances was the Delaware incidence rate significantly different from the U.S. rate.
- Like the U.S., Delaware's colorectal cancer incidence rates were significantly higher among males than females (49.3 per 100,000 vs. 37.6 per 100,000). This same pattern was observed for Delaware Caucasians (male: 49.1 per 100,000 vs. female: 37.9 per 100,000) as well as for Delaware African Americans (52.1 per 100,000 vs. 37.3 per 100,000).
- The colorectal cancer incidence rate among African Americans in Delaware was lower than the comparable U.S. rate (43.6 per 100,000 vs. 53.6 per 100,000). For the first time since cancer surveillance efforts began in Delaware, the difference is statistically significant.
- Although the U.S. colorectal cancer incidence rate for 2007-2011 was significantly higher among African Americans than Caucasians for both males and females, this racial disparity was not seen in Delaware for

<sup>15</sup> U.S. Cancer Statistics Working Group. United States Cancer Statistics: 1999-2011 Incidence and Mortality Web-based Report. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; 2014. Available at: [www.cdc.gov/uscs](http://www.cdc.gov/uscs).

2007-2011. In Delaware, colorectal cancer incidence rates for African Americans and Caucasians were not significantly different.

**Table 5-2.** Five-Year Average Age-Adjusted Colorectal Cancer Incidence Rates\* and 95% confidence Intervals by Race and Sex; U.S., Delaware and Counties, 2007-2011

<b>RACE AND REGION</b>	<b>All</b>	<b>Male</b>	<b>Female</b>
<b>ALL RACES</b>			
<b>United States</b>	43.7 (43.5 , 43.9)	50.6 (50.3 , 50.9)	38.2 (37.9 , 38.4)
<b>DELAWARE</b>	43.0 (41.2 , 44.8)	49.3 (46.4 , 52.2)	37.6 (35.3 , 39.9)
<b>Kent</b>	44.8 (40.3 , 49.3)	50.1 (42.9 , 57.2)	40.1 (34.4 , 45.8)
<b>New Castle</b>	42.3 (39.9 , 44.7)	49.0 (45.1 , 52.9)	36.7 (33.7 , 39.7)
<b>Sussex</b>	43.6 (40.1 , 47.0)	49.9 (44.4 , 55.4)	38.1 (33.7 , 42.4)
<b>CAUCASIAN</b>			
<b>United States</b>	42.9 (42.6 , 43.1)	49.6 (49.3 , 50.0)	37.3 (37.0 , 37.5)
<b>DELAWARE</b>	43.1 (41.1 , 45.1)	49.1 (45.9 , 52.3)	37.9 (35.4 , 40.4)
<b>Kent</b>	45.3 (40.2 , 50.4)	50.5 (42.4 , 58.6)	40.9 (34.5 , 47.4)
<b>New Castle</b>	42.8 (40.0 , 45.5)	49.3 (44.9 , 53.8)	37.1 (33.7 , 40.5)
<b>Sussex</b>	42.9 (39.3 , 46.5)	48.4 (42.8 , 54.1)	38.0 (33.4 , 42.5)
<b>AFRICAN AMERICAN</b>			
<b>United States</b>	53.6 (52.9 , 54.3)	62.3 (61.1 , 63.6)	47.5 (46.6 , 48.4)
<b>DELAWARE</b>	43.6 (39.1 , 48.2)	52.1 (44.4 , 59.7)	37.3 (31.7 , 42.9)
<b>Kent</b>	44.3 (34.6 , 55.9)	47.6 (34.0 , 64.8)	39.5 (27.3 , 55.2)
<b>New Castle</b>	42.8 (37.2 , 48.5)	51.0 (41.5 , 60.5)	37.0 (30.1 , 43.8)
<b>Sussex</b>	46.2 (34.9 , 60.0)	59.7 (40.5 , 84.7)	37.3 (24.2 , 55.1)

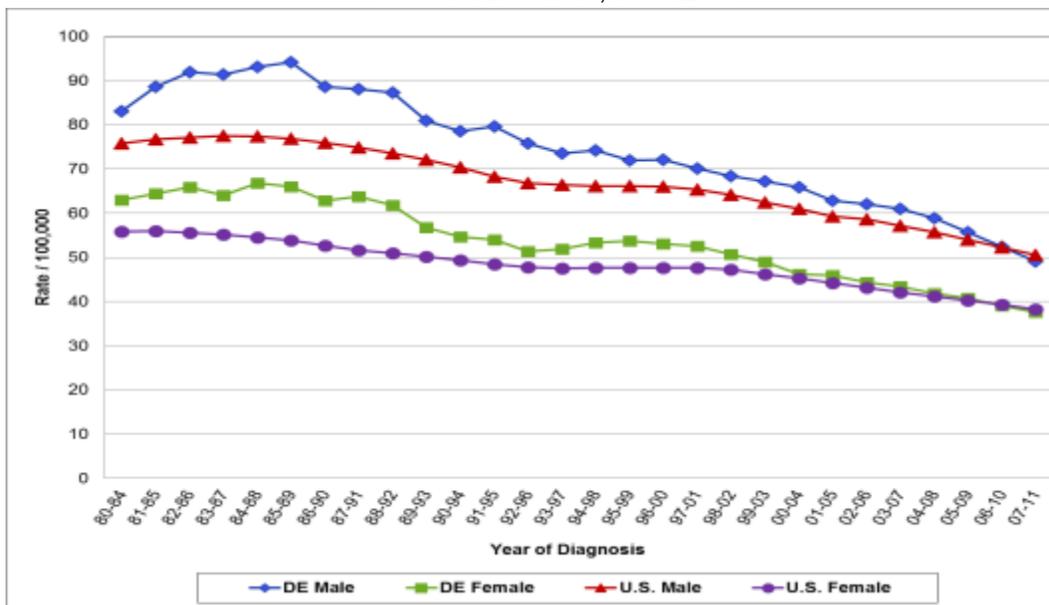
\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

**SOURCE:** Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

### Trends in Colorectal Cancer Incidence (Figures 5-1 and 5-2)

- From 1997-2001 to 2007-2011, Delaware's colorectal cancer incidence rate decreased 28.7 percent while the U.S. rate fell 20.8 percent.
- From 1997-2001 to 2007-2011, Delaware's colorectal incidence rates showed steeper declines than nationally among both males and females. Among males, the Delaware incidence rate declined 30.0 percent while the U.S. rate declined 22.6 percent. Among females, the Delaware incidence rate declined 28.4 percent while the U.S. rate declined 19.7 percent.

**Figure 5-1.** Five-Year Average Age-Adjusted Colorectal Cancer Incidence Rates by Sex; U.S. and Delaware, 1980-2011

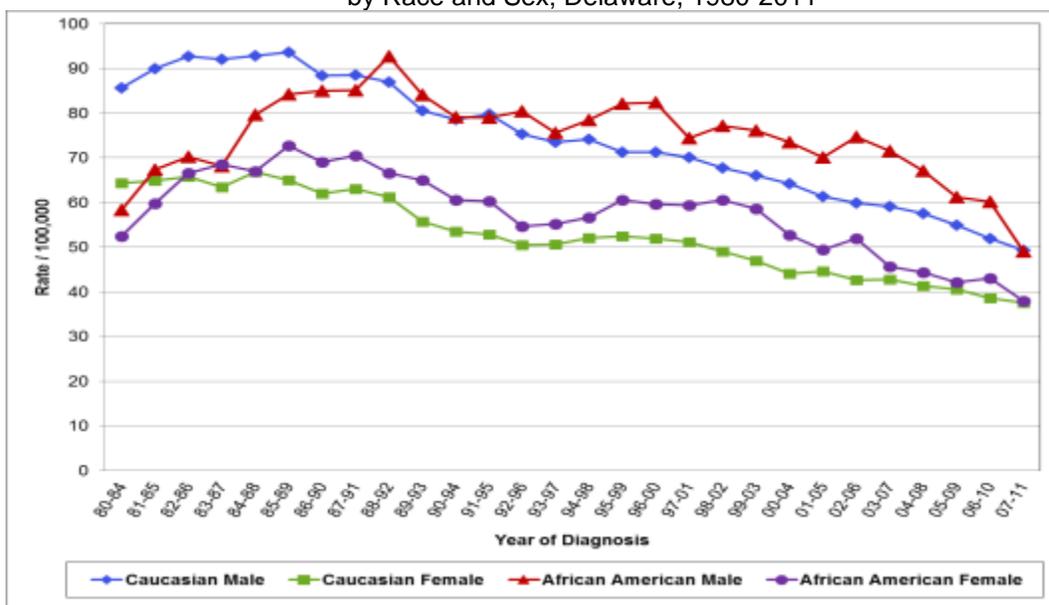


\* = Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

SOURCE: Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

- From 1997-2001 to 2007-2011, Delaware’s colorectal cancer incidence rate decreased 29.7 percent and 26.4 percent among male and female Caucasians, respectively.
- From 1997-2001 to 2007-2011, Delaware’s greatest improvements in colorectal cancer rates were observed among African Americans; incidence rates for African American males and females declined 34.0 percent and 36.2 percent, respectively.

**Figure 5-2.** Five-Year Average Age-Adjusted Colorectal Cancer Incidence Rates by Race and Sex; Delaware, 1980-2011



\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

SOURCE: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

### Age-Specific Colorectal Cancer Incidence Rates (Table 5-3, Figures 5-3 and 5-4)

- Age-specific incidence rates for the 2007-2011 time period demonstrate that colorectal cancer incidence increased with age among Delawareans. This same trend held true when incidence rates were calculated separately for males and females, and also for Caucasians and African Americans.
- On average, for each age group considered, male colorectal cancer incidence rates in Delaware were approximately 30 percent higher than the corresponding female rate.

**Table 5-3.** Age-Specific Colorectal Cancer Incidence Rates by Race and Sex; Delaware, 2007-2011

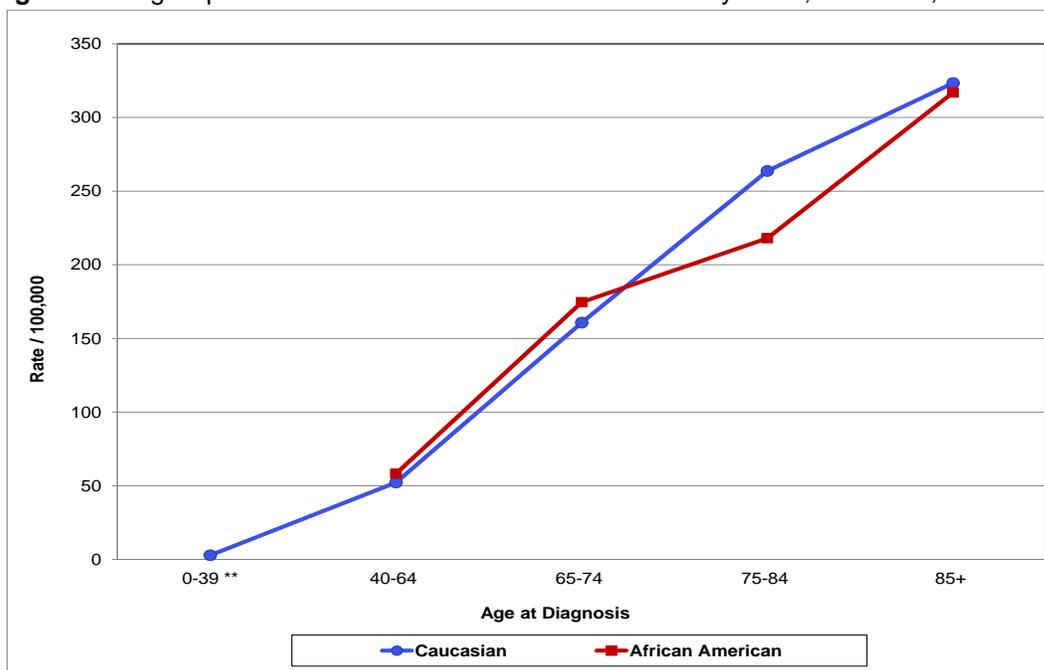
Age at Diagnosis	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
0-39	2.7	4.0	---	2.8	4.1	---	---	---	---
40-64	53.1	58.7	48.0	52.2	56.6	48.1	58.2	67.6	50.4
65-74	161.0	196.7	130.1	160.7	197.3	128.5	174.6	205.3	150.0
75-84	256.0	273.5	240.6	263.7	277.0	251.3	218.0	269.0	183.6
85+	321.5	364.6	301.0	323.4	368.8	301.7	316.9	---	---

\* = Rates are per 100,000 population.

--- = Rates based on fewer than 25 cases are not shown.

SOURCE: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

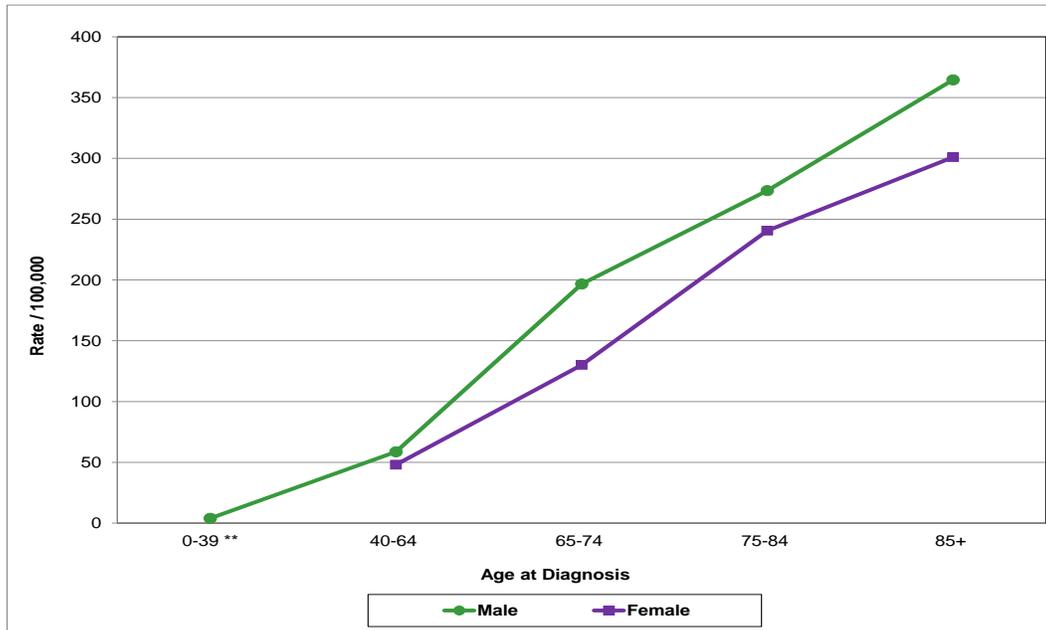
**Figure 5-3.** Age-Specific Colorectal Cancer Incidence Rates by Race; Delaware, 2007-2011



\* = Rates are per 100,000 population. \*\* = Rates based on fewer than 25 cases are not shown.

SOURCE: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

**Figure 5-4. Age-Specific Colorectal Cancer Incidence Rates by Sex; Delaware, 2007-2011**



\* = Rates are per 100,000 population. \*\* = Rates based on fewer than 25 cases are not shown.

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

**Colorectal Cancer by Stage at Diagnosis (Tables 5-4 and 5-5, Figures 5-5 and 5-6)**

- African American Delawareans were slightly more likely than Caucasian Delawareans to have their colorectal cancer diagnosed in the local stage (41.9 percent vs. 38.7 percent, respectively).
- Among African American Delawareans, males were more likely than females to have their colorectal cancer diagnosed in the local stage (44.6 percent vs. 39.1 percent, respectively). African American females were more likely than African American males to have their colorectal cancer diagnosed in the distant stage (21.2 percent vs. 16.7 percent, respectively).

**Table 5-4. Number of Colorectal Cancer Cases by Stage at Diagnosis, Race and Sex; Delaware, 2007-2011**

Stage at Diagnosis	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
Local	844	436	408	680	345	335	145	79	66
Regional	756	387	369	625	321	304	117	59	58
Distant	439	221	218	365	188	177	66	30	36
Unknown	135	65	70	112	53	59	22	11	11
<b>Total</b>	<b>2174</b>	<b>1109</b>	<b>1065</b>	<b>1782</b>	<b>907</b>	<b>875</b>	<b>350</b>	<b>179</b>	<b>171</b>

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

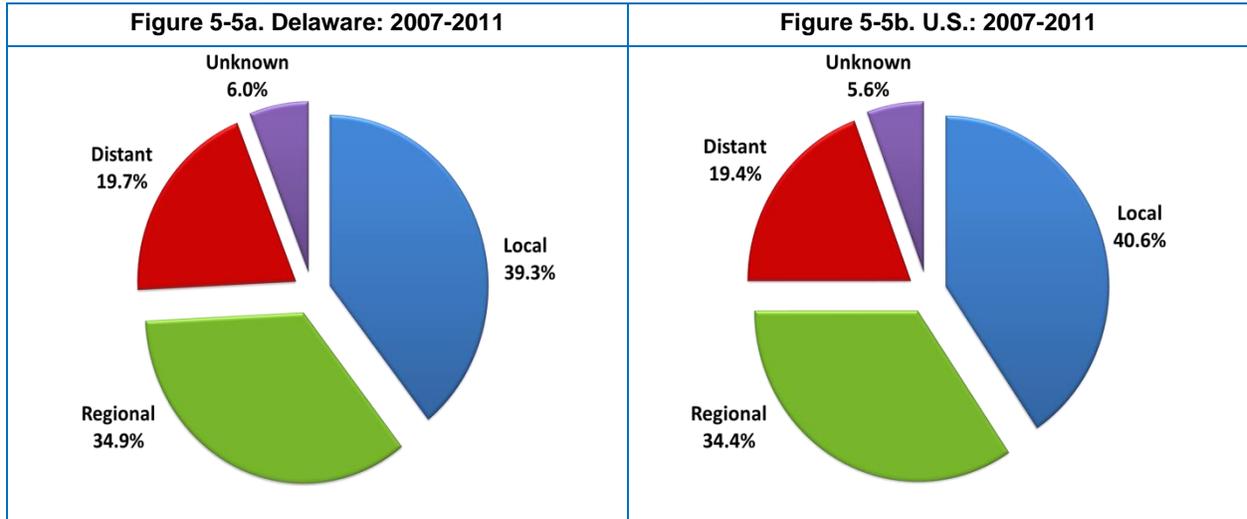
**Table 5-5. Percentage of Colorectal Cancer Cases by Stage at Diagnosis, Race and Sex; Delaware, 2007-2011**

Stage at Diagnosis	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
Local	39.3	40.0	38.7	38.7	38.8	38.6	41.9	44.6	39.1
Regional	34.9	34.9	34.8	35.2	35.3	35.1	32.9	32.8	33.0
Distant	19.7	19.5	20.0	19.9	20.3	19.6	18.9	16.7	21.2
Unknown	6.0	5.6	6.5	6.1	5.5	6.6	6.3	5.9	6.7
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>						

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

- In Delaware, from 2007-2011, 844 colorectal cancer cases (39.3 percent) were diagnosed in the local stage, 756 cases (34.8 percent) were diagnosed in the regional stage, and 439 cases (20.2 percent) were diagnosed in the distant stage.
- Delaware's colorectal cancer stage at diagnoses trends were similar to that of the U.S. for the 2007-2011 time period. In the U.S., 40.6 percent of colorectal cancer cases were diagnosed in the local stage; 34.4 percent were diagnosed in the regional stage; and 19.4 percent of colorectal cancer cases were diagnosed in the distant stage.

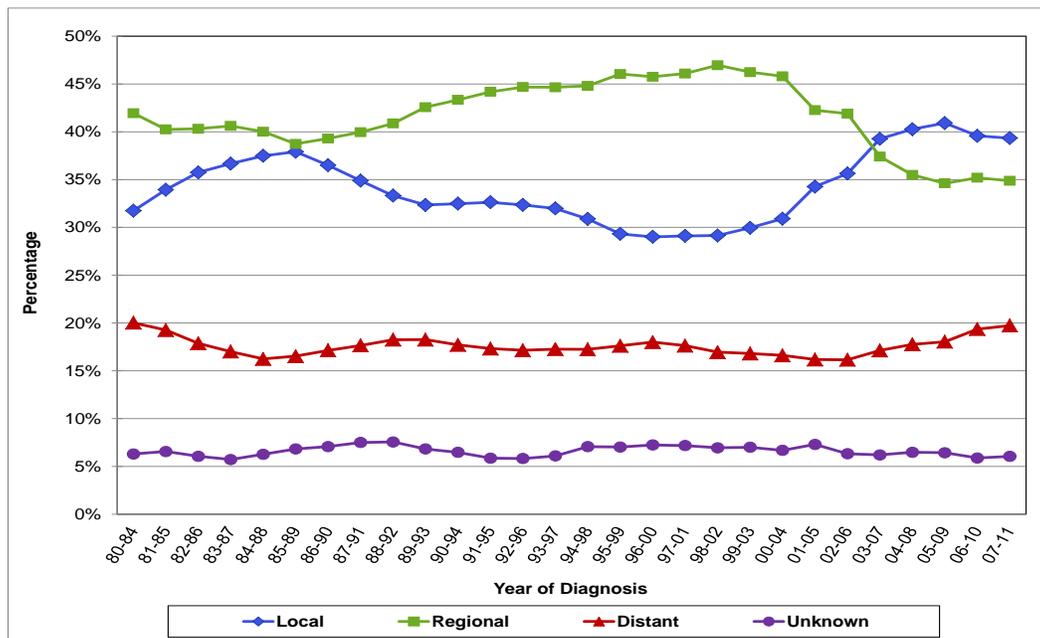
**Figure 5-5.** Percentage of Colorectal Cancer Cases by Stage at Diagnosis; Delaware and U.S., 2007-2011



**SOURCE:** Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

- In Delaware, the percentage of colorectal cancer cases diagnosed in the local stage increased from 31.7 percent in 1980-1984 to 38.8 percent in 2007-2011.
- Concurrently, the percentage of colorectal cancer cases diagnosed in the regional stage declined from 41.9 percent in 1980-1984 to 34.8 percent in 2007-2011. During the same time period, the percentage of distant stage diagnoses remained relatively unchanged (20.0 percent in 1980-1984; 20.2 percent in 2007-2011).

**Figure 5-6.** Percentage of Colorectal Cancer Cases by Stage at Diagnosis; Delaware, 1980-2011



SOURCE: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

## Colorectal Cancer Mortality

For 2007-2011, Delaware ranked 27<sup>th</sup> in the nation for colorectal cancer mortality, down from 24<sup>th</sup> in 2006-2010. Delaware males ranked 29<sup>th</sup> (down from 21<sup>st</sup> in 2006-2010) and females ranked 27<sup>th</sup> (up from 33<sup>rd</sup> in 2006-2010) in colorectal cancer mortality.<sup>16</sup>

### Deaths from Colorectal Cancer (Table 5-6)

- In Delaware and the U.S., colorectal cancer is the third most common cause of cancer deaths among males and females.
- From 2007-2011, 801 Delawareans died from colorectal cancer, accounting for 8.6 percent of all the cancer deaths that occurred in the state during this time period.
- Delaware males accounted for 51.3 percent of colorectal cancer deaths during 2007-2011. In the same time period, Delaware females accounted for 48.7 percent of colorectal cancer deaths. In terms of race, Caucasian Delawareans accounted for 83.6 percent of colorectal cancer deaths. African American Delawareans accounted for 14.9 percent and residents of other or unknown race accounted for 1.5 percent of deaths.

<sup>16</sup> Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, [http://seer.cancer.gov/csr/1975\\_2011/](http://seer.cancer.gov/csr/1975_2011/), based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

**Table 5-6.** Number of Colorectal Cancer Deaths by Race and Sex; Delaware and Counties, 2007-2011

	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
<b>DELAWARE</b>	801	411	390	670	351	319	119	53	66
<b>Kent</b>	142	73	69	114	58	56	26	14	12
<b>New Castle</b>	437	219	218	356	186	170	74	29	45
<b>Sussex</b>	222	119	103	200	107	93	19	10	9

SOURCE: Delaware Health Statistics Center, 2014.

### Colorectal Cancer Mortality Rates (Table 5-7)

- Historically, Delaware's colorectal cancer mortality rate was higher than the U.S. rate. However, for 2007-2011, Delaware's colorectal cancer mortality rate was identical to that of the U.S. (both 15.9 per 100,000).
- For both Delaware and the U.S., 2007-2011 colorectal cancer mortality rates were significantly higher for males than for females.
- In the U.S., the 2007-2011 colorectal cancer mortality rate among African Americans was significantly higher than among Caucasians; this trend was also observed when rates were calculated separately for males and females. However, in Delaware, the difference in rates between African Americans and Caucasians did not reach the threshold for statistical significance.

**Table 5-7.** Five-Year Average Age-Adjusted Colorectal Cancer Mortality Rates and 95% Confidence Intervals by Race and Sex; U.S., Delaware and Counties, 2007-2011

RACE AND REGION	All	Male	Female
<b>ALL RACES</b>			
United States	15.9 (15.9 , 16.0)	19.1 (19.0 , 19.2)	13.5 (13.4 , 13.5)
<b>DELAWARE</b>	15.9 (14.8 , 17.1)	18.9 (17.1 , 20.8)	13.5 (12.1 , 14.9)
Kent	17.1 (14.4 , 20.2)	19.9 (15.5 , 25.2)	14.6 (11.3 , 18.5)
New Castle	15.9 (14.4 , 17.5)	18.8 (16.4 , 21.5)	13.7 (11.9 , 15.6)
Sussex	15.6 (13.6 , 17.9)	18.8 (15.4 , 22.7)	12.6 (10.3 , 15.5)
<b>CAUCASIAN</b>			
United States	15.5 (15.4 , 15.5)	18.5 (18.4 , 18.7)	13.0 (12.9 , 13.1)
<b>DELAWARE</b>	15.9 (14.8 , 17.2)	19.3 (17.3 , 21.5)	13.0 (11.6 , 14.6)
Kent	17.1 (14.1 , 20.6)	19.8 (14.9 , 25.8)	14.7 (11.1 , 19.3)
New Castle	16.2 (14.5 , 17.9)	19.9 (17.1 , 23.0)	13.2 (11.2 , 15.4)
Sussex	15.5 (13.4 , 18.0)	18.5 (15.0 , 22.7)	12.5 (10.1 , 15.6)
<b>AFRICAN AMERICAN</b>			
United States	22.1 (21.9 , 22.4)	27.7 (27.2 , 28.1)	18.5 (18.2 , 18.8)
<b>DELAWARE</b>	16.2 (13.3 , 19.6)	17.0 (12.3 , 22.6)	15.7 (12.0 , 20.1)
Kent	17.4 (11.1 , 25.8)	---	---
New Castle	15.3 (11.8 , 19.4)	14.9 (9.5 , 22.1)	15.9 (11.4 , 21.4)
Sussex	---	---	---

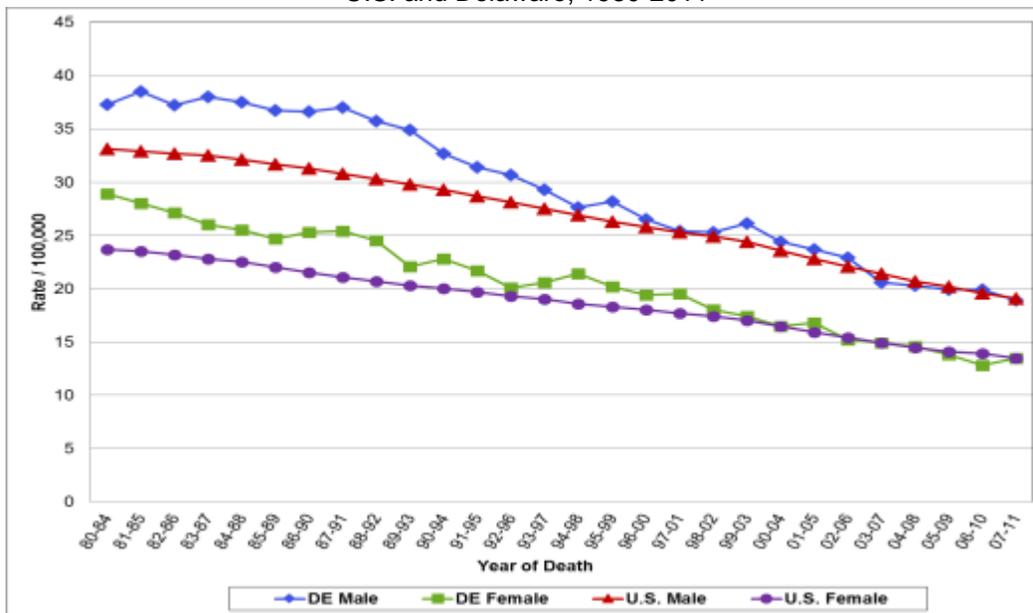
Rates based on fewer than 25 deaths are not shown. \* = Rates are per 100,000 population.

SOURCE: Delaware: Delaware Health Statistics Center, 2014;  
U.S.: National Center for Health Statistics, 2014.

### Trends in Colorectal Cancer Mortality (Figures 5-6 and 5-7)

- From 1997-2001 to 2007-2011, Delaware's colorectal cancer mortality rate decreased 28.1 percent while the national rate decreased 23.9 percent.
- From 1997-2001 to 2007-2011, Delaware's colorectal cancer mortality rates declined 25.6 percent for males and 30.8 percent for females, while the U.S. rates declined 24.5 percent for males and 23.7 percent for females.
- From 1997-2001 to 2007-2011, the rate of decline in colorectal cancer mortality was 29.7 percent greater among female Delawareans than the decline among U.S. females.

**Figure 5-6. Five-Year Average Age-Adjusted Colorectal Cancer Mortality Rates; U.S. and Delaware, 1980-2011**

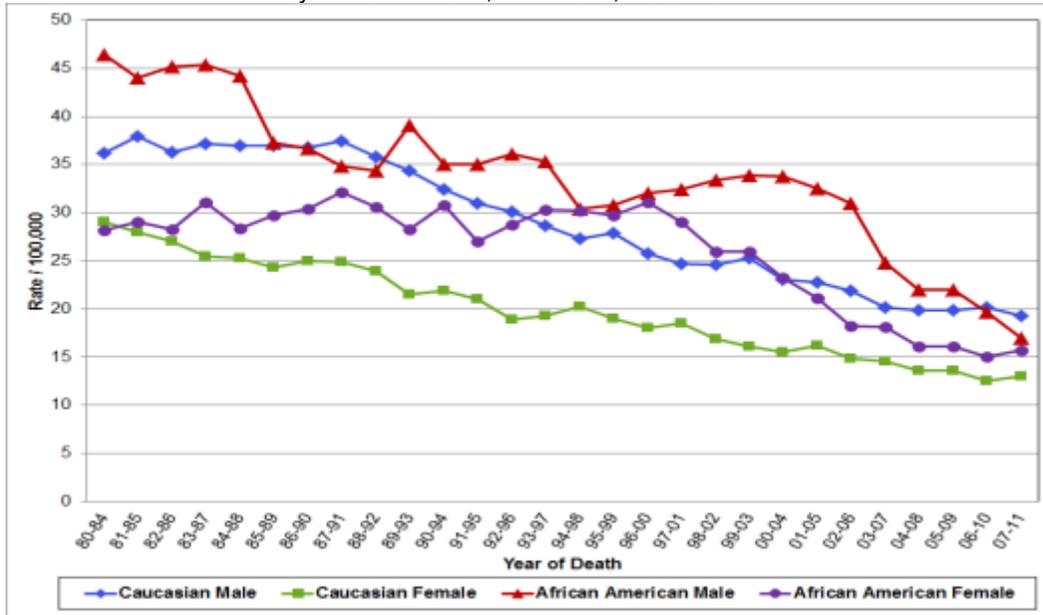


\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

**SOURCE:** Delaware: Delaware Health Statistics Center, 2014; U.S.: National Center for Health Statistics, 2014.

- For the 1980-1984 time period, African American males in Delaware had substantially higher colorectal cancer mortality rates compared to Caucasian males. Over time, the rate declined sharply among this cohort. For the 2007-2011 time period, the colorectal cancer mortality rate for African American males in Delaware (17.0 per 100,000 ) was lower than that for Caucasian males (19.3 per 100,000).
- Compared to 1997-2001, Delaware's 2007-2011 colorectal cancer mortality rates declined 47.5 percent among African American males and 21.9 percent among Caucasian males.
- Compared to 1997-2001, Delaware's 2007-2011 colorectal cancer mortality rates declined nearly 50 percent (from 29.0 per 100,000 to 15.9 per 100,000).
- In Delaware, from 1997-2001 to 2007-2011, colorectal cancer mortality declined 45.9 percent among African American females and 29.7 percent among Caucasian females.

**Figure 5-7. Five-Year Average Age-Adjusted Colorectal Cancer Mortality Rates by Race and Sex; Delaware, 1980-2011**



\* = Rates are age-adjusted to the 2000 U.S. standard population.  
**SOURCE:** Delaware Health Statistics Center, 2014.

**Age-Specific Colorectal Cancer Mortality Rates (Table 5-8 and Figure 5-8)**

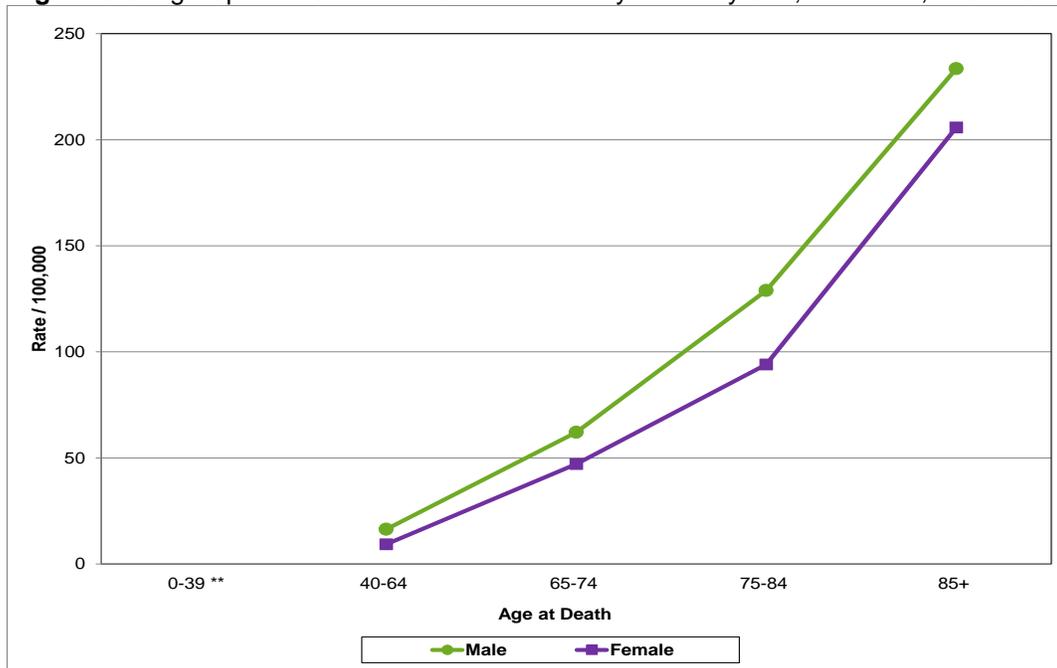
- In Delaware, from 2007-2011, colorectal cancer mortality increased with age from birth to 85+; within each age group considered, male colorectal cancer mortality rates were higher than the corresponding female rate.
- The number of colorectal cancer deaths was too small to examine age-specific mortality patterns by race.

**Table 5-8. Age-Specific Colorectal Cancer Mortality Rates by Race and Sex; Delaware, 2007-2011**

Age at Death	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
0-39	---	---	---	---	---	---	---	---	---
40-64	12.7	16.4	9.3	12.0	16.2	8.1	16.6	18.1	15.3
65-74	54.1	62.1	47.1	56.1	63.7	49.4	---	---	---
75-84	109.7	128.9	94.1	108.9	132.9	88.8	126.2	---	---
85+	214.7	233.5	205.8	222.2	235.3	216.0	---	---	---

\* = Rates are per 100,000 population. --- = Rates based on fewer than 25 deaths are not shown.  
**SOURCE:** Delaware Health Statistics Center, 2014.

**Figure 5-8. Age-Specific Colorectal Cancer Mortality Rates by Sex; Delaware, 2007-2011**



\* = Rates are per 100,000 population. \*\* = Rates based on fewer than 25 deaths are not shown.

**SOURCE:** Delaware Health Statistics Center, 2014.

## 6. KIDNEY AND RENAL PELVIS CANCER<sup>17</sup>

<sup>17</sup> Kidney cancer” is used instead of “kidney and renal pelvis cancer” throughout this section

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## Risk Factors and Early Detection

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### **Lifestyle Risk Factors for Kidney Cancer:**

- Cigarette and/or cigar use
- Overweight or obesity
- High blood pressure

### **Environmental and Medically-Related Risk Factors for Kidney Cancer:**

- Occupational exposures to certain chemicals
  - Examples include asbestos, cadmium, benzene, and some herbicides and organic solvents (particularly trichloroethylene)
- Long-term dialysis for advanced kidney disease

### **Non-Modifiable Kidney Cancer Risk Factors (Risk Factors that Cannot be Changed):**

- Gender
  - Males are twice as likely as females to develop kidney cancer.
- Race
  - African Americans are slightly more likely to develop kidney cancer than Caucasians.
- Family history of kidney cancer, particularly a sibling
- Inherited conditions
  - Examples include Von Hippel-Lindau (VHL) syndrome, papillary renal cell carcinoma, leiomyoma-renal cell carcinoma, Birt-Hogg-Dube syndrome, and renal oncocytoma

### **Factors Protective against Kidney Cancer:**

- Risk of kidney cancer can be lowered by managing lifestyle risk factors such as increased physical activity and consuming a diet high in fruits, vegetables, and whole grains.

### **Early Detection of Kidney Cancer:**

- There are currently no recommended screening guidelines for kidney cancer – persons at increased risk should discuss screening options with their health care provider.

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## Kidney Cancer Incidence

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For 2007-2011, Delaware's kidney cancer incidence rate was 19<sup>th</sup> highest in the U.S (unchanged from its ranking for 2006-2010). Males ranked 21<sup>st</sup> (20<sup>th</sup> for 2006-2010) and females ranked 16<sup>th</sup> (19<sup>th</sup> for 2006-2010) among all states in terms of 2007-2011 kidney cancer incidence rates.<sup>18</sup>

### Cases of Kidney Cancer (Table 6-1)

- From 2007-2011, 834 cases of kidney cancer were diagnosed in Delaware, accounting for 3.2 percent of all cancer cases diagnosed in the state.
- During this time period, Delaware males accounted for 60.7 percent (506 cases) of kidney cancer cases. Four out of five kidney cancer cases (80.0 percent) were diagnosed among Caucasian Delawareans.

**Table 6-1.** Number of Kidney Cancer Cases by Race and Sex; Delaware and Counties, 2007-2011

	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
<b>DELAWARE</b>	834	506	328	667	406	261	158	95	63
<b>Kent</b>	172	104	68	141	80	61	30	24	6
<b>New Castle</b>	463	277	186	348	214	134	109	59	50
<b>Sussex</b>	199	125	74	178	112	66	19	12	7

--- = Cell counts less than six are not shown to protect patient confidentiality.

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

### Kidney Cancer Incidence Rates (Table 6-2)

- Delaware's 2007-2011 kidney cancer rate (16.6 per 100,000 ) was slightly higher than that of the U.S. (15.5 per 100,000). When rates were calculated separately by sex, Delaware's male and female kidney cancer rates were also slightly higher than those of the U.S. However, in all three instances, the difference in rates between Delaware and the U.S. just missed the threshold of statistical significance.
- In Delaware, the 2007-2011 kidney cancer incidence rate was higher for African Americans (19.0 per 100,000 ) than Caucasians (16.6 per 100,000). However, the difference in rates was not statistically significant.
- In Delaware, as in the U.S., males have a significantly higher kidney cancer incidence rate than females. The kidney cancer incidence rate among male Delawareans (22.0 per 100,000) was nearly double the incidence rate among female Delawareans (12.0 per 100,000). The same pattern was observed at the national level; the 2007-2011 U.S. male kidney cancer incidence rate was 21.2 per 100,000, compared to the female incidence rate of 10.7 per 100,000.
- The statistically significant difference in kidney cancer incidence rates between males and females was observed when rates were calculated by race. Among African Americans in Delaware, the male kidney cancer rate of 26.1 per 100,000 was significantly higher than the female rate of 13.5 per 100,000. Among Caucasians in Delaware, the male kidney cancer incidence rate of 21.8 per 100,000 was significantly higher than the female rate of 12.3 per 100,000.

**Table 6-2.** Five-Year Average Age-Adjusted Kidney Cancer Incidence Rates and 95% Confidence Intervals by Race and Sex; U.S., Delaware and Counties, 2007-2011

RACE AND REGION	All	Male	Female
ALL RACES			

<sup>18</sup> U.S. Cancer Statistics Working Group. United States Cancer Statistics: 1999-2011 Incidence and Mortality Web-based Report. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; 2014. Available at: [www.cdc.gov/uscs](http://www.cdc.gov/uscs).

<b>United States</b>	15.5 (15.4 , 15.6)	21.2 (21.0 , 21.4)	10.7 (10.6 , 10.8)
<b>DELAWARE</b>	16.6 (15.5 , 17.8)	22.0 (20.1 , 24.1)	12.0 (10.7 , 13.4)
<b>Kent</b>	20.3 (17.3 , 23.6)	26.4 (21.5 , 32.1)	15.0 (11.6 , 19.1)
<b>New Castle</b>	16.4 (14.9 , 18.0)	21.6 (19.1 , 24.4)	12.2 (10.5 , 14.1)
<b>Sussex</b>	14.7 (12.6 , 17.0)	19.6 (16.2 , 23.7)	10.3 (7.9 , 13.1)
<b>CAUCASIAN</b>			
<b>United States</b>	15.9 (15.8 , 16.1)	21.7 (21.5 , 21.9)	11.0 (10.8 , 11.2)
<b>DELAWARE</b>	16.6 (15.4 , 18.0)	21.8 (19.7 , 24.1)	12.3 (10.8 , 13.9)
<b>Kent</b>	21.7 (18.2 , 25.7)	25.9 (20.4 , 32.4)	18.0 (13.7 , 23.3)
<b>New Castle</b>	16.0 (14.4 , 17.8)	21.5 (18.6 , 24.6)	11.6 (9.7 , 13.8)
<b>Sussex</b>	14.8 (12.6 , 17.4)	19.8 (16.1 , 24.3)	10.3 (7.8 , 13.6)
<b>AFRICAN AMERICAN</b>			
<b>United States</b>	17.9 (17.5 , 18.3)	24.7 (24.0 , 25.5)	12.7 (12.3 , 13.2)
<b>DELAWARE</b>	19.0 (16.0 , 22.3)	26.0 (20.8 , 32.1)	13.5 (10.3 , 17.4)
<b>Kent</b>	18.7 (12.3 , 27.0)	---	---
<b>New Castle</b>	19.9 (16.2 , 24.2)	23.8 (17.8 , 31.1)	16.7 (12.2 , 22.1)
<b>Sussex</b>	---	---	---

\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

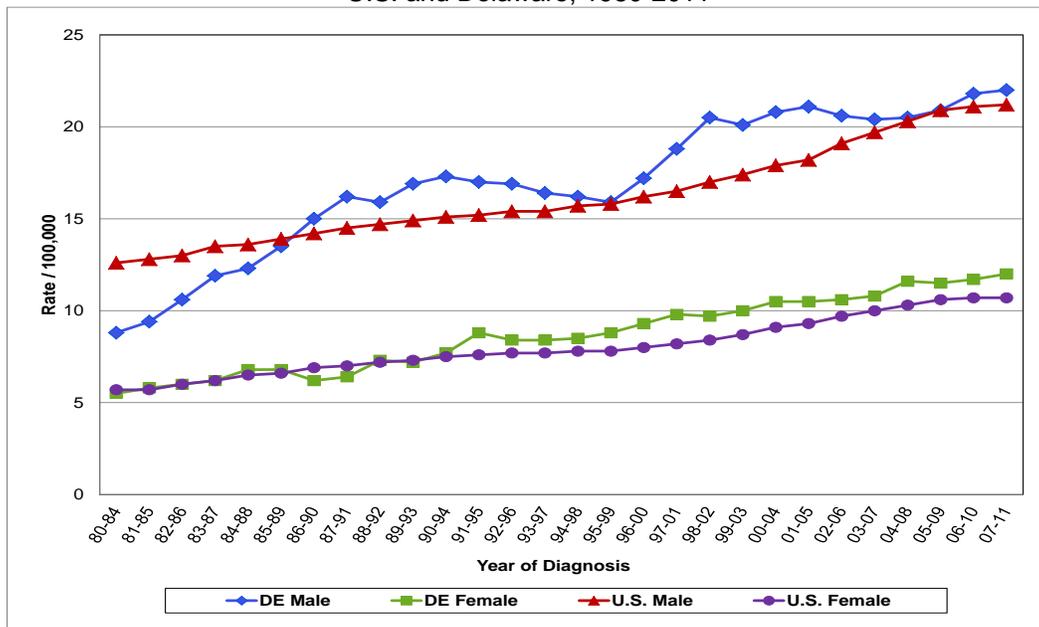
--- = Rates based on fewer than 25 cases are not shown.

**SOURCE:** Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

### Trends in Kidney Cancer Incidence Rates (Figures 6-1 and 6-2)

- From 1997-2001 to 2007-2011, Delaware's kidney cancer incidence rate increased 22.1 percent while the comparable U.S. rate increased 30.3 percent.
- For both Delaware and the U.S., the increase in kidney cancer incidence rates from 1997-2001 to 2007-2011 was observed for both males and females. Kidney cancer incidence increased among Delaware males (17.0 percent) and females (22.4 percent). In the U.S., kidney cancer incidence increased 28.5 percent among males and 30.5 percent in females.

**Figure 6-1.** Five-Year Average Age-Adjusted Kidney Cancer Incidence Rates by Sex; U.S. and Delaware, 1980-2011

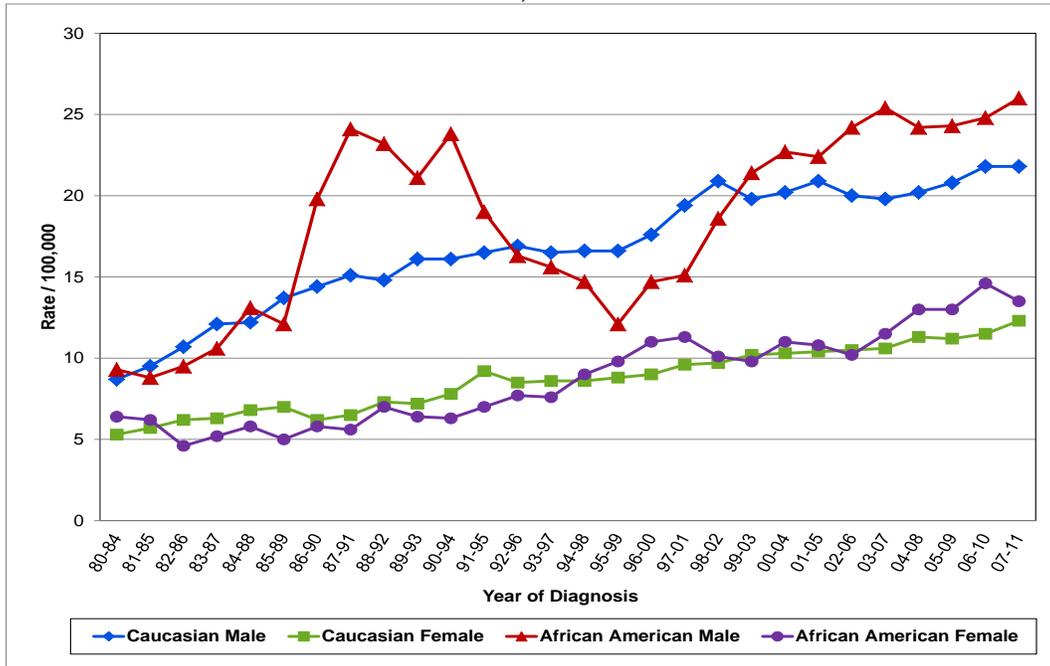


\* = Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

**SOURCE:** Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

- Among Caucasian Delawareans, from 1997-2001 to 2007-2011, kidney cancer incidence rates increased 12.4 percent for males and 28.1 percent for females. Among African American Delawareans, from 1997-2001 to 2007-2011, kidney cancer incidence rates increased 72.2 percent among males and 19.5 percent among females.

**Figure 6-2.** Five-Year Average Age-Adjusted Kidney Cancer Incidence Rates by Race and Sex; Delaware, 1980-2011



\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

SOURCE: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

**Age-Specific Kidney Cancer Incidence Rates (Table 6-3 and Figure 6-3)**

- Among male and female Delawareans, kidney cancer incidence generally increased with age, peaking among those age 75-84 years. The difference in incidence rates between males and females was especially pronounced among the 65-74 and 75-84 year age groups.
- Kidney cancer incidence peaked at ages 75-84 among Caucasian Delawareans. The number of cases was too small to identify age-specific incidence patterns among African Americans.

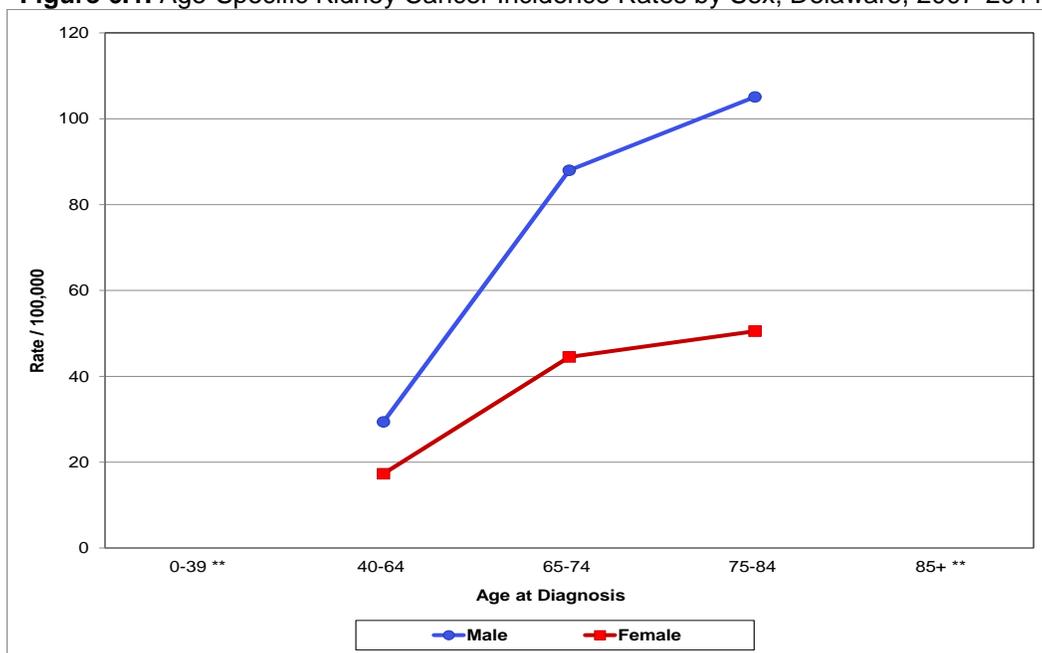
**Table 6-3.** Age-Specific Kidney Cancer Incidence Rates\* by Race and Sex; Delaware, 2007-2011

Age at Diagnosis	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
0-39	2.3	2.7	---	2.6	---	---	---	---	---
40-64	23.1	29.4	17.3	23.8	29.5	18.4	24.9	35.1	16.6
65-74	64.6	88.0	44.5	57.5	82.4	35.8	108.7	132.0	90.5
75-84	74.1	105.1	50.5	76.7	104.3	55.1	---	---	---
85+	43.5	---	---	44.7	---	---	---	---	---

\* = Rates are per 100,000 population. --- = Rates based on fewer than 25 cases are not shown.

SOURCE: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

**Figure 6.1. Age-Specific Kidney Cancer Incidence Rates by Sex; Delaware, 2007-2011**



\* = Rates are per 100,000 population. \*\* = Rates based on fewer than 25 cases are not shown.  
**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

**Kidney Cancer by Stage at Diagnosis (Tables 6-4 and 6-5, Figures 6-4 and 6-5)**

- Of the 834 kidney cancer cases diagnosed in Delaware from 2007-2011, 588 (70.5 percent) were diagnosed in the local stage.
- African American Delawareans were more likely than Caucasian Delawareans to have kidney cancer diagnosed in the local stage (77.2 percent vs. 68.8 percent, respectively).
- In Delaware, males were more likely than females to have their cancer diagnosed in the local stage (43.7 percent vs. 36.6 percent, respectively).

**Table 6-4. Number of Kidney Cancer Cases by Stage at Diagnosis, Race and Sex; Delaware, 2007-2011**

Stage at Diagnosis	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
Local	588	355	233	459	276	183	122	76	46
Regional	121	71	50	108	---	---	12	---	---
Distant	91	58	33	75	49	26	15	8	7
Unknown	34	22	12	25	---	---	9	---	---
<b>Total</b>	<b>834</b>	<b>506</b>	<b>328</b>	<b>667</b>	<b>406</b>	<b>261</b>	<b>158</b>	<b>95</b>	<b>63</b>

--- = Cell counts less than six are not shown to protect patient confidentiality.  
**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

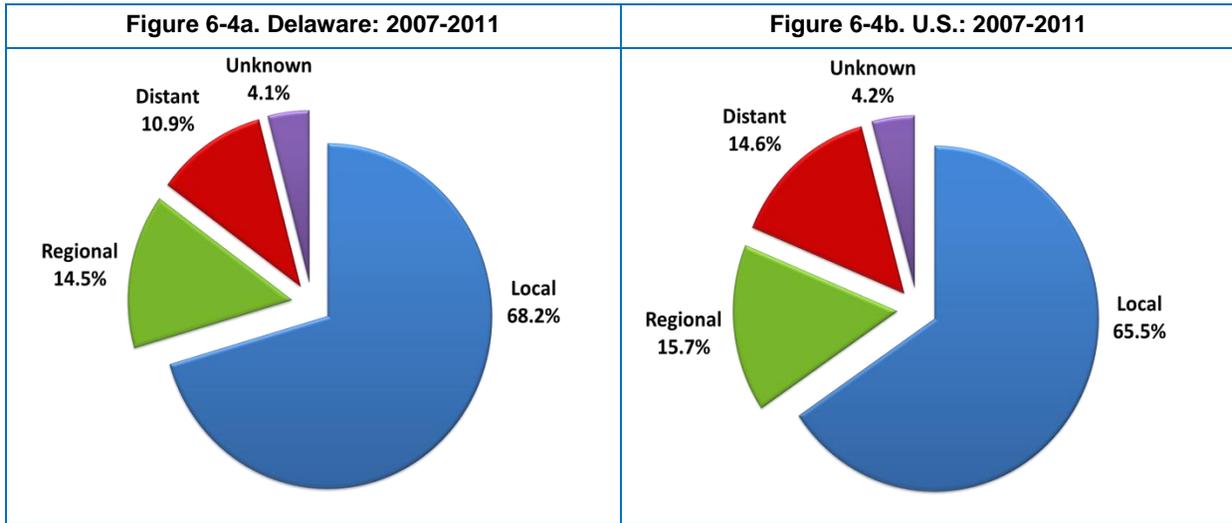
**Table 6-5. Percentage of Kidney Cancer Cases by Stage at Diagnosis, Race and Sex; Delaware, 2007-2011**

Stage at Diagnosis	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
Local	70.5	70.2	71.0	68.8	68.0	70.1	77.2	80.0	73.0
Regional	14.5	14.0	15.2	16.2	---	---	7.6	---	---
Distant	10.9	11.5	10.1	11.2	12.1	10.0	9.5	8.4	11.1
Unknown	4.1	4.3	3.7	3.7	---	---	5.7	---	---
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>						

--- = Percentages based on cell counts less than six are not shown to protect patient confidentiality.  
**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

- In Delaware, for the 2007-2011 time period, 70.5 percent, 14.5 percent and 10.9 percent of kidney cancers were detected at the local, regional, and distant stages, respectively. Comparable percentages for the U.S. were 65.5 percent, 15.7 percent, and 14.6 percent, respectively.

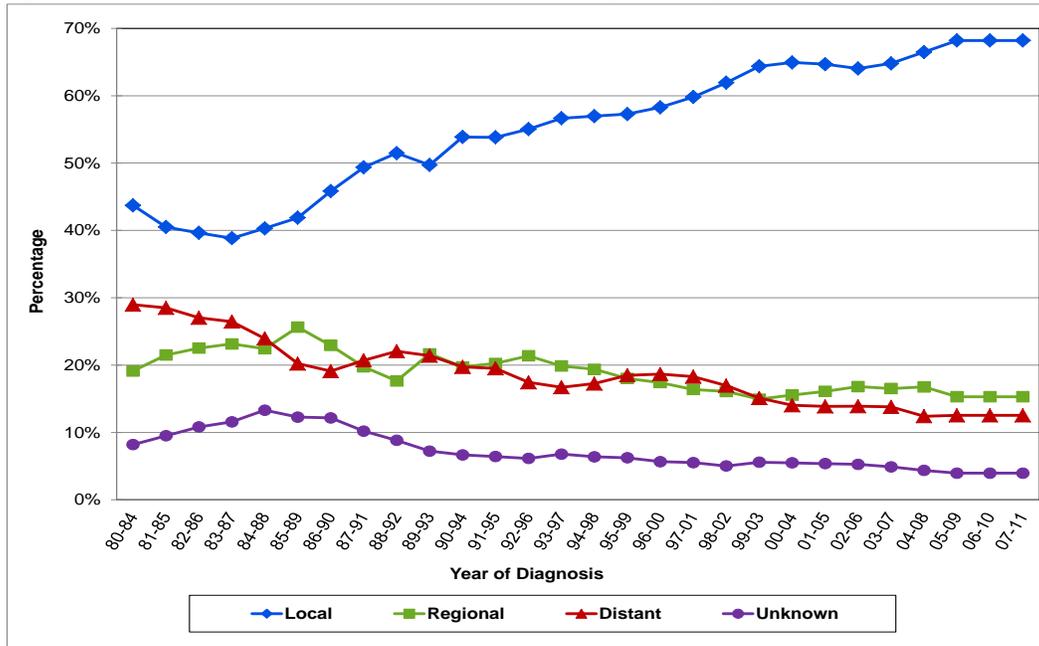
**Figure 6-4.** Percent of Kidney Cancer Cases by Stage at Diagnosis; Delaware and U.S., 2007-2011



**SOURCE:** Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

- From 1980-1984 to 2007-2011, the percentage of Delaware kidney cancer cases diagnosed in the local stage increased from 43.7 percent to 70.5 percent – a 61.3 percent increase.
- During the same time period, the percentage of Delaware kidney cancer cases diagnosed in the distant stage declined from 29.0 percent to 10.9 percent – a 62.3 percent decrease.

**Figure 6-5.** Percent of Kidney Cancer Cases by Stage at Diagnosis; Delaware, 1980–2011



**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

## Kidney Cancer Mortality

For 2007-2011, Delaware ranked 34<sup>th</sup> in the nation for kidney cancer mortality, unchanged from its ranking for 2006-2010. Males ranked 41<sup>st</sup> (down from 33<sup>rd</sup> for 2006-2010) and females ranked 20<sup>th</sup> (up from 27<sup>th</sup> for 2006-2010).<sup>19</sup>

### Deaths from Kidney Cancer (Table 6-6)

- From 2007-2011, 194 Delawareans died from kidney cancer, accounting for 2.1 percent of all of the state's cancer deaths during the time period.
- Males accounted for 116 of Delaware's 194 kidney cancer deaths (59.8 percent) from 2007-2011.
- Caucasians accounted for 159 of Delaware's 194 kidney cancer deaths (82.0 percent) from 2007-2011. Of the remaining kidney cancer deaths, African American Delawareans accounted for 17.5 percent and 0.5 percent of kidney cancer deaths occurred among Delawareans of other or unknown race.

**Table 6-6.** Number of Kidney Cancer Deaths by Race and Sex; Delaware and Counties, 2007-2011

	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
<b>DELAWARE</b>	194	116	78	159	99	60	34	16	18
<b>Kent</b>	41	22	19	---	---	---	---	---	---
<b>New Castle</b>	114	70	44	90	59	31	23	10	13
<b>Sussex</b>	39	24	15	---	---	---	---	---	---

--- = Cell counts less than six are not shown to protect patient confidentiality.

SOURCE: Delaware Health Statistics Center, 2014.

### Kidney Cancer Mortality Rates (Table 6-7)

- Delaware's 2007-2011 kidney cancer mortality rate was nearly twice as high among males (5.3 per 100,000) as females (2.8 per 100,000). The difference in rates was statistically significant.
- The 2007-2011 kidney cancer mortality rate for African American Delawareans (4.3 per 100,000) was higher than that for Caucasian Delawareans (3.7 per 100,000). The difference in rates did not reach a level of statistical significance. (Delaware's kidney cancer mortality rate for African Americans was relatively unstable due to the small number of deaths among this sub-population).
- Delaware's 2007-2011 kidney cancer mortality rate did not significantly differ from the U.S. rate (3.8 per 100,000 vs. 4.0 per 100,000, respectively).

**Table 6-7.** Five-Year Average Age-Adjusted Kidney Cancer Mortality Rates and 95% Confidence Intervals by Race and Sex; U.S., Delaware and Counties, 2007-2011

RACE AND REGION	All	Male	Female
<b>ALL RACES</b>			
<b>United States</b>	4.0 (3.9 , 4.0)	5.8 (5.7 , 5.8)	2.6 (2.5 , 2.6)
<b>DELAWARE</b>	3.8 (3.3 , 4.4)	5.3 (4.3 , 6.3)	2.8 (2.2 , 3.5)
<b>Kent</b>	4.9 (3.5 , 6.6)	---	---
<b>New Castle</b>	4.1 (3.4 , 4.9)	5.8 (4.5 , 7.4)	2.8 (2.0 , 3.8)
<b>Sussex</b>	2.8 (2.0 , 3.9)	---	---
<b>CAUCASIAN</b>			
<b>United States</b>	4.0 (4.0 , 4.1)	5.9 (5.8 , 5.9)	2.6 (2.6 , 2.6)
<b>DELAWARE</b>	3.7 (3.2 , 4.4)	5.3 (4.3 , 6.5)	2.5 (1.9 , 3.2)
<b>Kent</b>	5.2 (3.6 , 7.3)	---	---

<sup>19</sup> Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, [http://seer.cancer.gov/csr/1975\\_2011/](http://seer.cancer.gov/csr/1975_2011/), based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

<b>New Castle</b>	4.0 (3.2 , 4.9)	6.0 (4.6 , 7.8)	2.4 (1.6 , 3.5)
<b>Sussex</b>	---	---	---
<b>AFRICAN AMERICAN</b>			
<b>United States</b>	3.9 (3.8 , 4.0)	5.6 (5.4 , 5.8)	2.6 (2.5 , 2.8)
<b>DELAWARE</b>	4.3 (2.9 , 6.0)	---	---
<b>Kent</b>	---	---	---
<b>New Castle</b>	---	---	---
<b>Sussex</b>	---	---	---

\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

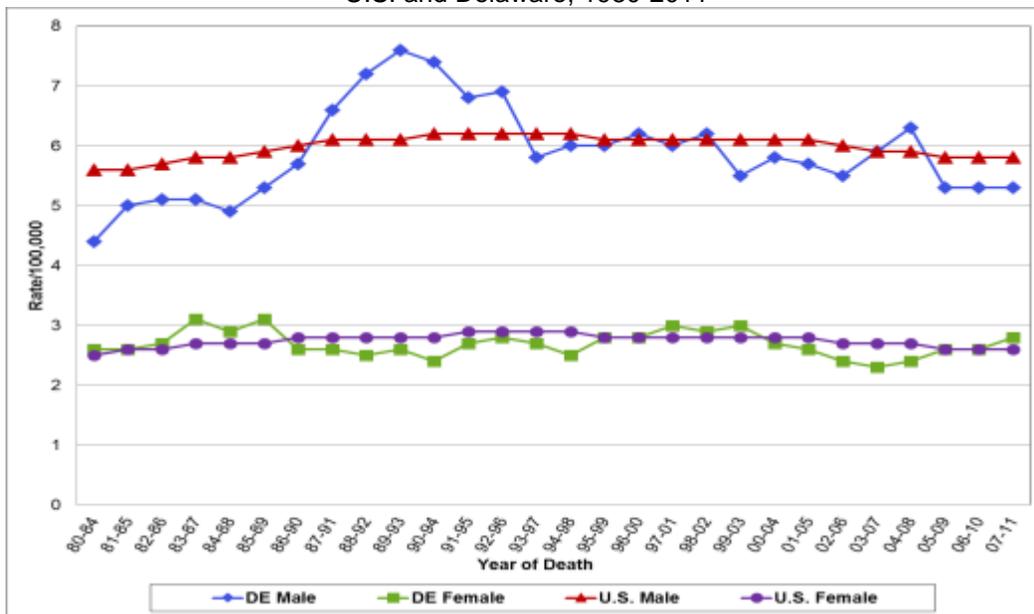
--- = Rates based on fewer than 25 deaths are not shown.

**SOURCE:** Delaware: Delaware Health Statistics Center, 2014; U.S.: National Center for Health Statistics, 2014.

### Trends in Kidney Cancer Mortality (Figures 6-5 and 6-6)

- From 1997-2001 to 2007-2011, Delaware's kidney cancer mortality rate decreased 9.5 percent while the U.S. rate fell 4.8 percent.
- From 1997-2001 to 2007-2011, Delaware's kidney cancer mortality rate decreased 11.7 percent among males and 6.7 percent among females. During the same time period, U.S. kidney cancer rates fell 4.9 percent among males and 7.1 percent among females.

**Figure 6-5.** Five-Year Average Age-Adjusted Kidney Cancer Mortality Rates by Sex; U.S. and Delaware, 1980-2011

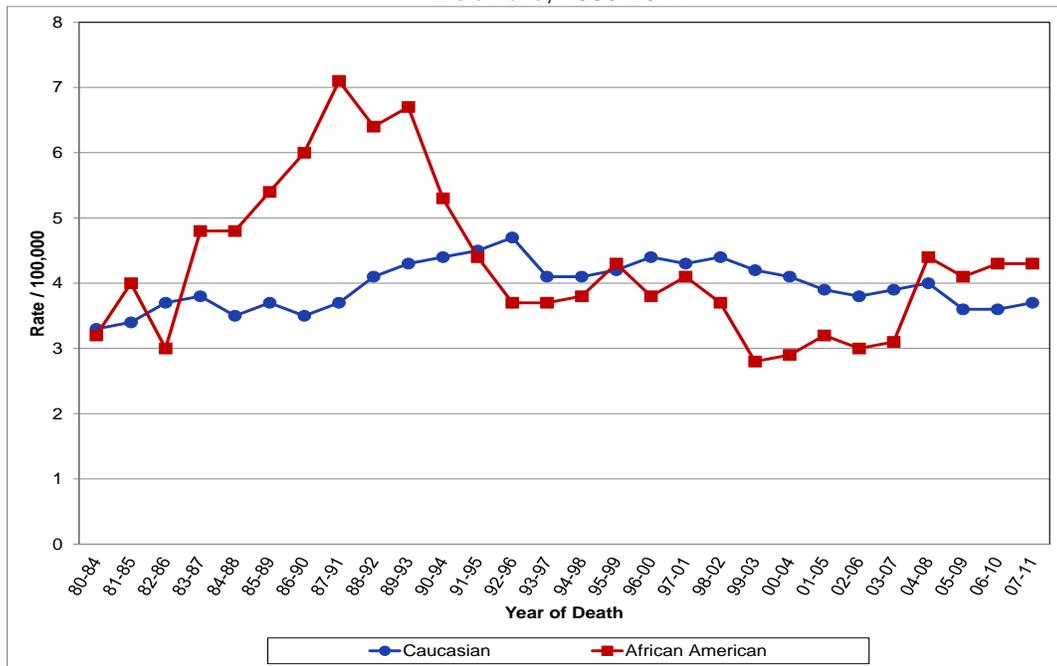


\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

**SOURCE:** Delaware: Delaware Health Statistics Center, 2014; U.S.: National Center for Health Statistics, 2014.

- In Delaware, from 1997-2001 to 2007-2011, there was a 14.0 percent decline in kidney cancer mortality among Caucasians and 4.9 percent increase in kidney cancer mortality among African Americans. The increase in kidney cancer mortality in African Americans was limited to women (Figure 6-6). African American females experienced a 28.1 percent increase in kidney cancer mortality while African American males experienced a 27.1 percent decline in kidney cancer mortality.

**Figure 6-6.** Five-Year Average Age-Adjusted Kidney Cancer Mortality Rates by Race; Delaware, 1980-2011



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

SOURCE: Delaware Health Statistics Center, 2014.

### Age-Specific Kidney Cancer Mortality Rates (Table 6-8)

- Kidney cancer mortality data for Delaware were too sparse to determine age-specific patterns; however, U.S. data show that for 2007-2011, kidney cancer mortality increased with age, peaking for males at age 85+ and for females at ages 75-79.

**Table 6-8.** Age-Specific Kidney Cancer Mortality Rates\* by Race and Sex; Delaware, 2007-2011

Age at Death	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
0-39	---	---	---	---	---	---	---	---	---
40-64	3.2	4.7	---	2.9	4.5	---	---	---	---
65-74	12.3	15.1	---	11.5	---	---	---	---	---
75-84	30.3	42.8	21.3	31.5	44.7	---	---	---	---
85+	38.2	---	---	---	---	---	---	---	---

\* = Rates are per 100,000 population. - = Rates based on fewer than 25 deaths are not shown.

SOURCE: Delaware Health Statistics Center, 2014.

## 7. LEUKEMIA

### Classifications of Leukemia:

Leukemias are grouped broadly according to how quickly the disease develops: chronic (slowly) or acute (quickly). Specific types of chronic and acute leukemias are defined by the particular type of affected white blood cell: lymphoid cells (the cell type affected in lymphoid, lymphocytic, or lymphoblastic leukemias) or myeloid cells (the cell type affected in myelogenous or myeloblastic leukemias).

The four most common types of leukemia are as follows:

1. **Chronic Lymphocytic Leukemia (CLL):** CLL affects lymphoid cells and usually develops slowly. CLL occurs most often among persons age 40 and over and almost never affects children.
2. **Chronic Myeloid Leukemia (CML):** CML affects myeloid cells and usually develops slowly. CML mainly affects adults.
3. **Acute Lymphocytic (lymphoblastic) Leukemia (ALL):** ALL affects lymphoid cells and grows quickly. ALL is the most common type of leukemia in young children and it also affects adults.
4. **Acute Myeloid Leukemia (AML):** AML affects myeloid cells and grows quickly. AML occurs in both adults and children.

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### Risk Factors and Early Detection

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#### Lifestyle Risk Factors for Leukemia:

- Cigarette smoking (AML)

#### Environmental and Medically-Related Causes of Leukemia:

- Very high levels of exposure to ionizing radiation from diagnostic x-rays, radiation therapy, or atomic bomb explosions (ALL, AML, and CML)
- Exposure to benzene (via the workplace, cigarette smoke, or gasoline inhalation) (ALL, AML, and CML)
- Chemotherapy, especially treatments involving alkylating agents (AML and ALL)
- Exposure to low-level solvent and metal mixtures (suspected)
- Exposure to electromagnetic fields (e.g., from power lines) (suspected)

#### Non-Modifiable Leukemia Risk Factors (Risk Factors that Cannot be Changed):

- Down syndrome and certain other genetic conditions (ALL and AML)
- Certain blood disorders (e.g., myelodysplastic syndrome) (AML)

#### Factors Protective against Leukemia:

- Risk of leukemia can be lowered by eliminating exposure to tobacco products.

#### Early Detection of Leukemia:

- No standardized screening tests have been shown to improve leukemia outcomes. Persons with risk factors for leukemia should discuss testing options with their health care provider.

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## Leukemia Incidence

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For 2007-2011, Delaware ranked 25<sup>th</sup> highest in the U.S. for incidence of leukemia, up from 30<sup>th</sup> for 2006-2010. Males ranked 24<sup>th</sup> (up from 27<sup>th</sup> for 2006-2010) and females ranked 34<sup>th</sup> (up from 37<sup>th</sup> for 2006-2010).<sup>20</sup>

### Cases of Leukemia (Table 7-1)

- From 2007-2011, 648 cases of leukemia were diagnosed in Delaware, accounting for 2.5 percent of all cancers diagnosed in the state during this time period.
- Males accounted for slightly more than half (57.7 percent) of leukemia cases diagnosed in Delaware from 2007-2011.
- Caucasian Delawareans accounted for 274 leukemia cases (82.7 percent) diagnosed from 2007-2011. African American Delawareans accounted for 94 cases (14.5 percent) and 18 cases (2.8 percent) occurred among Delawareans of other or unknown race..

**Table 7-1.** Number of Leukemia Cases by Race and Sex; Delaware and Counties, 2007-2011

	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
<b>DELAWARE</b>	648	374	274	536	311	225	94	55	39
<b>Kent</b>	91	50	41	73	40	33	14	---	---
<b>New Castle</b>	361	207	154	295	167	128	54	34	20
<b>Sussex</b>	196	117	79	168	104	64	26	---	---

--- = Cell counts less than six are not shown to protect patient confidentiality.

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

### Leukemia Incidence Rates (Table 7-2)

- Delaware's 2007-2011 leukemia incidence rate was nearly identical to that of the U.S. (13.1 per 100,000 Delaware vs. 13.0 per 100,000, respectively). When rates were calculated separately by sex, Delaware's leukemia incidence rates for males and females (17.0 per 100,000 and 10.0 per 100,000, respectively) did not differ significantly from the U.S. male and female rates (16.7 per 100,000 and 10.2 per 100,000, respectively).
- In both Delaware and the U.S., leukemia incidence rates were significantly higher among males than females.
- In the U.S., the leukemia incidence rates was significantly higher for Caucasians than for African Americans (13.7 per 100,000 vs. 10.0 per 100,000, respectively). However, the difference in rates between Caucasian Delawareans and African American Delawareans did not reach a level of statistical significance (13.3 per 100,000 vs. 11.4 per 100,000, respectively).

<sup>20</sup> U.S. Cancer Statistics Working Group. United States Cancer Statistics: 1999-2011 Incidence and Mortality Web-based Report. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; 2014. Available at: [www.cdc.gov/uscs](http://www.cdc.gov/uscs).

**Table 7-2. Five-Year Average Age-Adjusted Leukemia Incidence Rates and 95% Confidence Intervals by Race and Sex; U.S., Delaware and Counties, 2007-2011**

<b>RACE AND REGION</b>	<b>All</b>	<b>Male</b>	<b>Female</b>
<b>ALL RACES</b>			
<b>United States</b>	13.0 (12.9 , 13.1)	16.7 (16.5 , 16.9)	10.2 (10.0 , 10.3)
<b>DELAWARE</b>	13.1 (12.1 , 14.2)	17.0 (15.3 , 18.8)	10.0 (8.9 , 11.3)
<b>Kent</b>	10.8 (8.7 , 13.3)	13.5 (9.9 , 18.0)	9.0 (6.4 , 12.3)
<b>New Castle</b>	13.1 (11.8 , 14.6)	17.0 (14.7 , 19.5)	9.9 (8.4 , 11.6)
<b>Sussex</b>	14.3 (12.2 , 16.5)	18.3 (15.0 , 22.2)	11.0 (8.6 , 14.0)
<b>CAUCASIAN</b>			
<b>United States</b>	13.7 (13.6 , 13.8)	17.5 (17.3 , 17.7)	10.7 (10.5 , 10.9)
<b>DELAWARE</b>	13.3 (12.2 , 14.5)	17.1 (15.2 , 19.2)	10.3 (8.9 , 11.8)
<b>Kent</b>	11.1 (8.6 , 14.0)	13.8 (9.7 , 19.0)	9.4 (6.4 , 13.4)
<b>New Castle</b>	13.7 (12.2 , 15.4)	17.4 (14.8 , 20.3)	10.6 (8.8 , 12.8)
<b>Sussex</b>	13.5 (11.4 , 15.9)	18.1 (14.6 , 22.3)	9.6 (7.2 , 12.7)
<b>AFRICAN AMERICAN</b>			
<b>United States</b>	10.0 (9.7 , 10.3)	12.9 (12.3 , 13.4)	8.0 (7.7 , 8.4)
<b>DELAWARE</b>	11.4 (9.1 , 14.1)	15.1 (11.1 , 20.0)	8.4 (5.9 , 11.6)
<b>Kent</b>	8.0 (4.2 , 13.6)	10.5 (4.7 , 20.5)	5.4 (1.7 , 12.8)
<b>New Castle</b>	10.4 (7.7 , 13.8)	14.7 (9.7 , 21.1)	7.1 (4.2 , 11.0)
<b>Sussex</b>	20.6 (13.3 , 30.3)	22.7 (11.3 , 40.3)	19.4 (10.6 , 32.8)

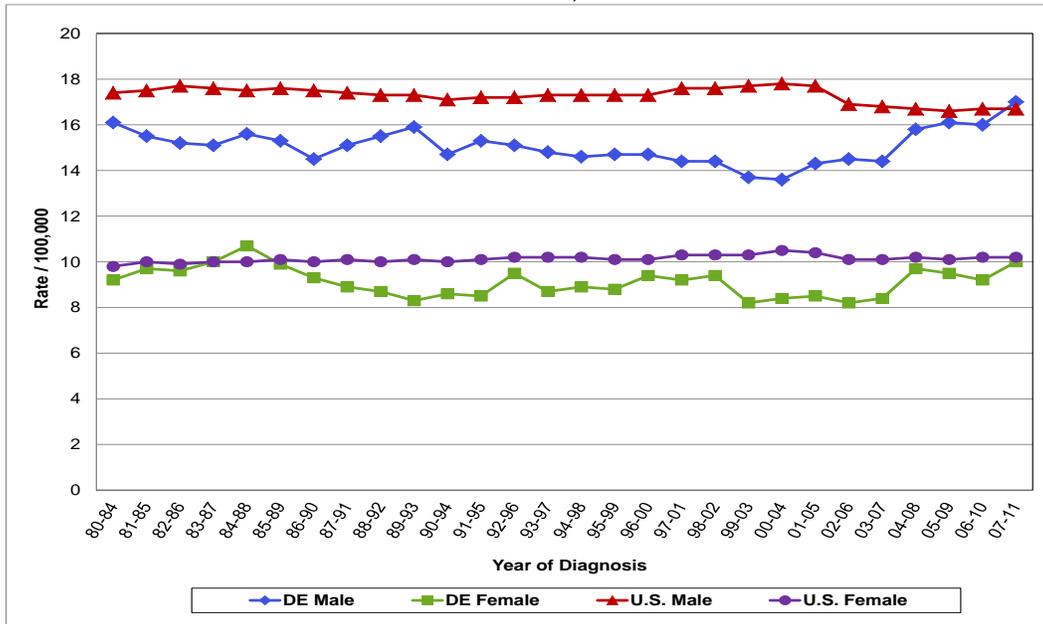
\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

**SOURCE:** Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

#### **Trends in Leukemia Incidence (Figures 7-1 and 7-2)**

- From 1997-2001 to 2007-2011, Delaware's leukemia incidence rate increased 13.9 percent while the U.S. incidence rate declined 3.0 percent.
- From 1997-2001 to 2007-2011, Delaware's leukemia incidence rate increased 18.1 percent among males and 8.7 percent among females. During the same time period, the U.S. leukemia incidence rate declined 5.1 percent among males and 1.0 percent among females.

**Figure 7-1. Five-Year Average Age-Adjusted Leukemia Incidence Rates by Sex; U.S. and Delaware, 1980-2011**

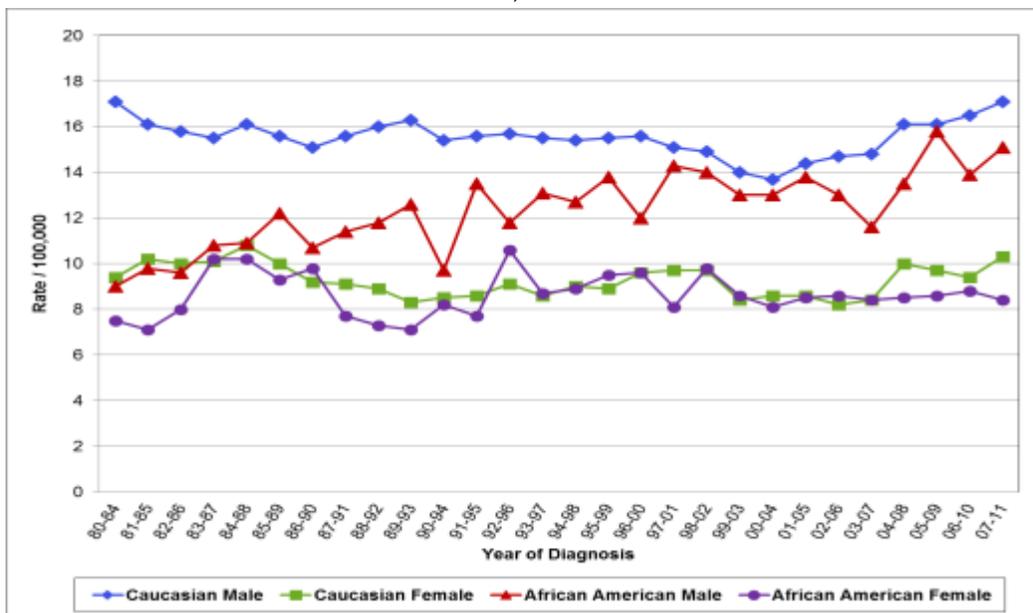


\* = Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

**SOURCE:** Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

- From 1997-2001 to 2007-2011, Delaware's leukemia incidence rates increased 13.2 percent among Caucasian males and 6.2 percent among Caucasian females.
- From 1997-2001 to 2007-2011, Delaware's leukemia incidence rates increased 5.6 percent among African American males and 3.7 percent among African American females.

**Figure 7-2. Five-Year Average Age-Adjusted Leukemia Incidence Rates\* by Race and Sex; Delaware, 1980-2011**



\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

## Age-Specific Leukemia Incidence Rates (Table 7-3 and Figure 7-3)

- For 2007-2011, leukemia incidence rates increased with age among Delawareans, from birth through age 85+. This same trend was observed when leukemia incidence rates were calculated separately for males and females. Additionally, when rates were further calculated by race, the same correlation between age and leukemia incidence rates was observed for Caucasian males and females. Data were too sparse to examine age-specific incidence patterns among African Americans.
- For each age group considered, the leukemia incidence rate for Delaware males was greater than that for females. However, the greatest disparity between males and females in age-specific rates was for the age 75-84 cohort, where the leukemia incidence rate among males was 2.3 times that among females.

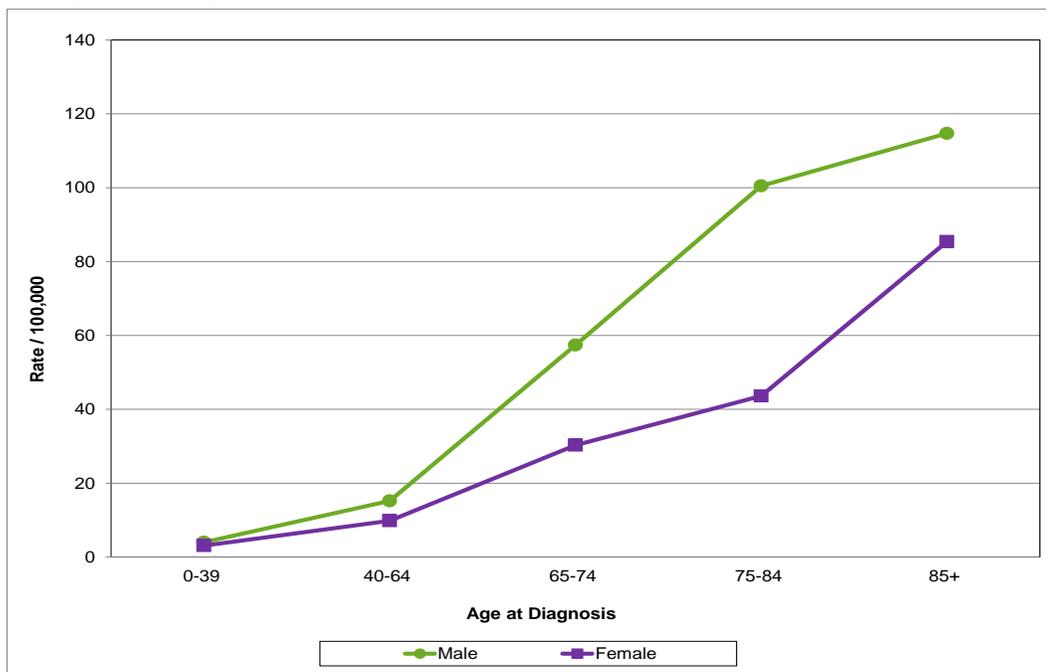
**Table 7-3.** Age-Specific Leukemia Incidence Rates\* by Race and Sex; Delaware, 2007-2011

Age at Diagnosis	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
0-39	3.5	4.0	3.1	3.5	3.9	---	---	---	---
40-64	12.4	15.2	9.8	12.4	15.1	9.9	11.9	---	---
65-74	42.8	57.4	30.3	43.1	55.5	32.3	---	---	---
75-84	67.9	100.5	43.6	71.5	107.8	43.9	---	---	---
85+	94.9	114.7	85.4	96.9	119.9	85.9	---	---	---

\* = Rates are per 100,000 population. -- = Rates based on fewer than 25 cases are not shown.

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

**Figure 7-3.** Age-Specific Leukemia Incidence Rates\* by Sex; Delaware, 2007-2011



\* = Rates are per 100,000 population. \*\* = Rates based on fewer than 25 cases are not shown.

## Leukemia by Stage at Diagnosis

- Leukemia is not staged as local, regional and distant.

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## Leukemia Mortality

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For 2007-2011, Delaware ranked 33<sup>rd</sup> in the nation for leukemia mortality, down from 29<sup>th</sup> for 2006-2010. Delaware males ranked 25<sup>th</sup> (20<sup>th</sup> for 2006-2010) and females ranked 47<sup>th</sup> (47<sup>th</sup> for 2006-2010) in leukemia mortality.<sup>21</sup>

### Deaths due to Leukemia (Table 7-4)

- During 2007-2011, 333 Delawareans died from leukemia, accounting for 3.6 percent of all cancer deaths in the state during that time period.
- Delaware males accounted for 202 leukemia deaths (60.7 percent); females accounted for 131 leukemia deaths (39.3 percent).
- Caucasian Delawareans accounted for 286 leukemia deaths (85.9 percent). African American Delawareans accounted for 45 leukemia deaths (13.5 percent). Two leukemia deaths (0.6 percent) were among Delawareans of other or unknown race.

**Table 7-4.** Number of Leukemia Deaths by Race and Sex; Delaware and Counties, 2007-2011

	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
<b>DELAWARE</b>	333	202	131	286	169	117	45	32	13
<b>Kent</b>	50	33	17	43	28	15	7	---	---
<b>New Castle</b>	195	112	83	168	95	73	25	16	9
<b>Sussex</b>	88	57	31	75	46	29	13	---	---

--- = Cell counts less than six are not shown to protect patient confidentiality.

**SOURCE:** Delaware Health Statistics Center, 2014.

### Leukemia Mortality Rates (Table 7-5)

- Delaware's 2007-2011 leukemia mortality rate (6.7 per 100,000) was not significantly different from that of the U.S. (7.0 per 100,000).
- In the U.S., 2007-2011 leukemia mortality rates were significantly higher among Caucasians (7.3 per 100,000) than African Americans (6.0 per 100,000). However, in Delaware, the difference in leukemia mortality rates between Caucasians and African Americans did not reach the threshold for statistical significance (6.9 per 100,000 vs. 5.8 per 100,000, respectively).
- In both Delaware and the U.S., the 2007-2011 leukemia mortality rates were significantly higher among males than females.

<sup>21</sup> Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, [http://seer.cancer.gov/csr/1975\\_2011/](http://seer.cancer.gov/csr/1975_2011/), based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

**Table 7-5. Five-Year Average Age-Adjusted Leukemia Mortality Rates and 95% Confidence Intervals by Race and Sex; U.S., Delaware and Counties, 2007-2011**

<b>RACE AND REGION</b>	<b>All</b>	<b>Male</b>	<b>Female</b>
<b>ALL RACES</b>			
<b>United States</b>	7.0 (7.0 , 7.1)	9.4 (9.4 , 9.5)	5.3 (5.2 , 5.3)
<b>DELAWARE</b>	6.7 (6.0 , 7.5)	9.5 (8.2 , 10.9)	4.6 (3.8 , 5.4)
<b>Kent</b>	6.0 (4.4 , 7.9)	9.0 (6.1 , 12.7)	3.8 (2.2 , 6.1)
<b>New Castle</b>	7.2 (6.2 , 8.3)	9.9 (8.1 , 11.9)	5.1 (4.1 , 6.4)
<b>Sussex</b>	6.6 (5.3 , 8.2)	9.6 (7.2 , 12.6)	3.9 (2.6 , 5.8)
<b>CAUCASIAN</b>			
<b>United States</b>	7.3 (7.2 , 7.3)	9.7 (9.7 , 9.8)	5.4 (5.4 , 5.5)
<b>DELAWARE</b>	6.9 (6.1 , 7.8)	9.5 (8.1 , 11.0)	5.0 (4.1 , 6.0)
<b>Kent</b>	6.6 (4.7 , 8.9)	9.6 (6.3 , 14.0)	4.4 (2.4 , 7.4)
<b>New Castle</b>	7.7 (6.5 , 8.9)	10.4 (8.4 , 12.7)	5.6 (4.4 , 7.1)
<b>Sussex</b>	6.1 (4.7 , 7.7)	8.3 (6.0 , 11.3)	4.1 (2.7 , 6.1)
<b>AFRICAN AMERICAN</b>			
<b>United States</b>	6.0 (5.9 , 6.2)	8.0 (7.8 , 8.2)	4.8 (4.7 , 4.9)
<b>DELAWARE</b>	5.8 (4.2 , 7.9)	9.3 (6.2 , 13.4)	3.0 (1.6 , 5.1)
<b>Kent</b>	4.7 (1.8 , 9.6)	6.9 (2.1 , 16.4)	2.4 (0.3 , 8.5)
<b>New Castle</b>	5.1 (3.2 , 7.6)	7.4 (4.1 , 12.3)	3.2 (1.4 , 6.1)
<b>Sussex</b>	10.5 (5.5 , 18.1)	19.5 (9.5 , 35.5)	2.8 (0.3 , 10.4)

\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

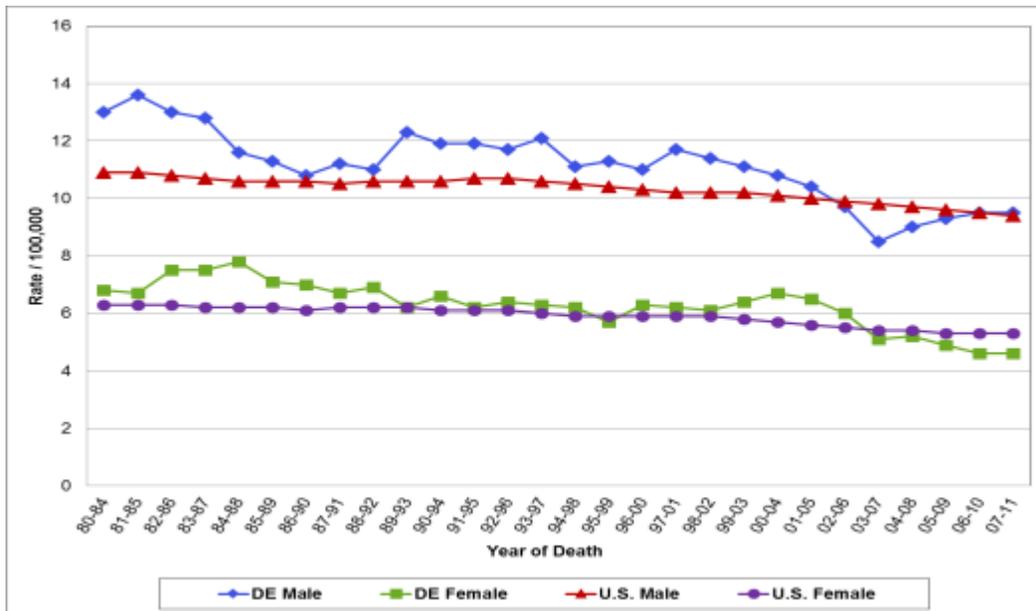
--- = Rates based on fewer than 25 deaths are not shown.

**SOURCE:** Delaware: Delaware Health Statistics Center, 2014; U.S.: National Center for Health Statistics, 2014.

#### **Trends in Leukemia Mortality (Figures 7-4 and 7-5)**

- From 1997-2001 to 2007-2011, Delaware's leukemia mortality rate dropped 18.8 percent for males, compared to falling 7.8 percent nationally. Among Delaware females, the leukemia mortality rate dropped 25.8 percent, compared to 10.2 percent nationally.

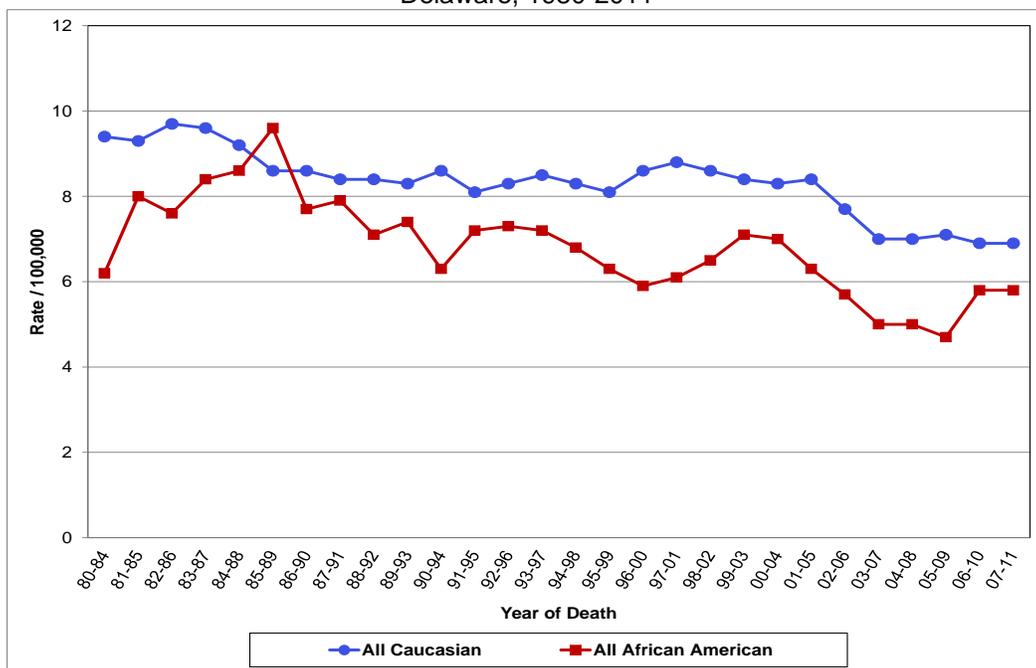
**Figure 7-4. Five-Year Average Age-Adjusted Leukemia Mortality Rates\* by Sex; U.S. and Delaware, 1980-2011**



\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.  
**SOURCE:** Delaware: Delaware Health Statistics Center, 2014; U.S.: National Center for Health Statistics, 2014.

- From 1997-2001 to 2007-2011, leukemia mortality rates among Caucasian Delawareans fell 22.8 percent for males and 24.2 percent for females. The leukemia mortality rate also fell 36.2 percent among African American females in Delaware. However, among African American males, the leukemia mortality rate increased 8.1 percent from 1997-2001 to 2007-2011.

**Figure 7-5. Five-Year Average Age-Adjusted Leukemia Mortality Rates\* by Race; Delaware, 1980-2011**



\* = Rates are age-adjusted to the 2000 U.S. standard population.  
**SOURCE:** Delaware Health Statistics Center, 2014.

**Age-Specific Leukemia Mortality Rates (Table 7-6 and Figure 7-6)**

- Limited data on age-specific leukemia mortality rates show that mortality from leukemia increased with age in Caucasians, from 4.3 per 100,000 in ages 40-64 to 75.1 per 100,000 in ages 85+.

**Table 7-6.** Age-Specific Leukemia Mortality Rates\* by Race and Sex; Delaware, 2007-2011

Age at Diagnosis	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
<b>0-39</b>	---	---	---	---	---	---	---	---	---
<b>40-64</b>	4.3	4.9	3.7	4.0	4.1	3.9	---	---	---
<b>65-74</b>	24.1	36.1	13.9	24.3	33.6	16.2	---	---	---
<b>75-84</b>	50.2	82.4	26.3	54.5	88.5	28.5	---	---	---
<b>85+</b>	75.1	---	69.9	76.1	---	68.3	---	---	---

\* = Rates are per 100,000 population. --- = Rates based on fewer than 25 deaths are not shown.

SOURCE: Delaware Health Statistics Center, 2014.

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### Risk Factors and Early Detection

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#### Lifestyle Risk Factors for Lung Cancer:

- Tobacco use
  - According to the U.S. Department of Health and Human Services, an estimated 85 to 90 percent of all lung cancer cases are caused by tobacco use.
- Exposure to secondhand smoke
- Diet low in fruits and vegetables
- Diet high in cholesterol (suspected)
- Heavy alcohol use (suspected)
- Smoking marijuana (suspected)

#### Environmental and Medically-Related Causes of Lung Cancer:

- Occupational exposure to:
  - Asbestos
  - Mustard gas
  - Radioactive ores
  - Certain metals such as chromium, cadmium, and arsenic
  - Certain organic chemicals
  - Paint
- Environmental exposure to:
  - Radon gas released from soil or building materials
  - Asbestos, particularly among smokers
  - Exposure to air pollution
  - High levels of arsenic in drinking water (suspected)
- Radiation therapy to the chest, especially for people who smoke

#### Non-Modifiable Lung Cancer Risk Factors (Risk Factors that Cannot be Changed):

- Family history of lung cancer
- Personal history of tuberculosis

#### Factors Protective against Lung Cancer:

- Avoiding tobacco use
- Avoiding secondhand exposure to smoke from tobacco products
- Consuming a diet rich in fruits and vegetables
- Engaging in recommended levels of physical activity
- Maintaining a healthy weight

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<sup>22</sup> "Lung cancer" is used instead of "lung and bronchus cancer" throughout this chapter.

## Early Detection of Lung Cancer:

In January 2013, the American Cancer Society (ACS) published new lung cancer screening guidelines<sup>23</sup> recommending that doctors discuss screening options with patients who meet certain criteria for high risk of developing the disease. High-risk patients are defined as those who (a) are aged 55 to 74 years and in fairly good health; (b) have a smoking history equivalent to a pack of cigarettes per day for 30 years or longer; and (c) currently smoke or have quit within the past 15 years.

If a high-risk individual decides to be screened for lung cancer, the ACS recommends that the testing be performed using a low-dose computed tomography (CT) scan and take place at a facility with experience in lung cancer screening. The guidelines emphasize that screening is not a substitute for quitting smoking.

## Current Trends in Smoking in Delaware:

The Behavioral Risk Factor Surveillance System (BRFSS) collects data annually on tobacco use among the Delaware population. Current smoking trends may be predictive of cancer rates in the 2030s. In the 1980s (i.e., the time period relevant to current lung cancer rates in terms of tobacco use behaviors), Delaware's smoking prevalence rates were among the highest in the country. Historical BRFSS data show that in 1982, 30 percent of adult Delawareans smoked cigarettes. By the 1990s, Delaware's smoking rate among adults had declined to approximately 25 percent.

In recent years, tobacco use prevalence has continued to decline among Delawareans. Based on data from 2013, 19.5 percent of adult Delawareans smoke cigarettes (defined as smoking every day or some days). However, the BRFSS survey methodology was refined over time; therefore, data from this survey item are unable to be compared with earlier tobacco use data due to fundamental differences in the way in which participants were questioned about their smoking behaviors.

- The 2013 prevalence rate of current smokers in Delaware (19.6 percent) is nearly identical to the 2012 U.S. prevalence rate of 19.7 percent.
- In 2013, approximately 22.0 percent of male Delawareans defined themselves as current smokers. This prevalence rate is significantly higher than the rate among female Delawareans (17.3 percent).
- In 2013, African American Delawareans had the highest prevalence rate of current smokers (23.0 percent), followed by Hispanics (20.9 percent), and Caucasians (19.0 percent).
- When smoking prevalence rates were stratified by age group, Delawareans ages 25-36 reported the highest rate of current smoking (26.9 percent). The prevalence rate for this age group was significantly higher than that for Delawareans age 65 and older.
- Current smoking prevalence was correlated with education level. In Delaware, 30.5 percent of residents who did not complete their high school education identified themselves as current smokers. Current smoking prevalence gradually declined as education level increased. Current smoking prevalence rates were 26.4 percent among those with a high school diploma or equivalent; 18.6 percent among those with some post-high school education; and 7.1 percent among those who attended college.
- Current smoking prevalence was also correlated with income level. In Delaware, 29.6 percent of Delawareans earning less than \$15,000 per year identified themselves as current smokers. The lowest current smoking prevalence occurred among Delawareans earning \$75,000 or more per year; 13.3 percent of Delawareans in this income bracket identified themselves as current smokers.

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<sup>23</sup> Wender R, et al. American Cancer Society Lung Cancer Screening Guidelines. Published early online January 11, 2013 in *CA: A Cancer Journal for Clinicians*.

## Lung Cancer Incidence

For 2007-2011, Delaware ranked 12<sup>th</sup> highest in the U.S. for incidence of lung cancer, down from 11<sup>th</sup> for 2006-2010. Males ranked 16<sup>th</sup> (15<sup>th</sup> for 2006-2010) and females ranked 7<sup>th</sup> (4<sup>th</sup> for 2006-2010).

### Cases of Lung Cancer (Table 8-1)

- In Delaware, as well as the U.S., lung cancer is the most frequently diagnosed cancer in the general population. When males and females are considered separately, lung cancer is the second-most common cancer diagnosed for both sexes (following prostate cancer for males and breast cancer for females).
- During 2007-2011, 3,753 lung cancer cases were diagnosed in Delaware, accounting for 14.5 percent of all cancers diagnosed in the state during this time period.
- During 2007-2011, Delawarean males accounted for 52.1 percent of lung cancer diagnoses.
- Caucasian Delawareans accounted for 3,199 lung cancer cases (85.2 percent) diagnosed during 2007-2011. African American Delawareans and Delawareans of other or unknown race accounted for 509 cases (13.6 percent) and 45 cases (1.2 percent), respectively.

**Table 8-1.** Number of Lung Cancer Cases by Race and Sex; Delaware and Counties, 2007-2011

	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
<b>DELAWARE</b>	3,753	1,956	1,797	3,199	1,658	1,541	509	277	232
<b>Kent</b>	715	384	331	603	316	287	101	64	37
<b>New Castle</b>	1,891	974	917	1,541	787	754	333	176	157
<b>Sussex</b>	1,147	598	549	1,055	555	500	75	37	38

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

### Lung Cancer Incidence Rates (Table 8-2)

- Delaware's 2007-2011 lung cancer incidence rate was significantly higher than the U.S. rate (73.3 per 100,000 vs. 60.1 per 100,000, respectively). This significant excess was limited to Caucasians; Delaware's Caucasian lung cancer incidence rate was significantly higher than the U.S. Caucasian lung cancer incidence rate (75.3 per 100,000 vs. 60.1 per 100,000, respectively). Delaware's 2007-2011 lung cancer incidence rate for African Americans was not significantly different from the U.S. African American rate (65.3 per 100,000 vs 68.0 per 100,000, respectively).
- When calculated separately by sex, Delaware's 2007-2011 male and female lung cancer incidence rates were significantly higher than those for the U.S. Delaware's male lung cancer incidence rate was 86.1 per 100,000, compared to the U.S. male rate of 72.2 per 100,000. Delaware's female lung cancer incidence rate was 63.6 per 100,000 compared to the U.S. female rate of 51.1 per 100,000.
- In Delaware and the U.S., the 2007-2011 lung cancer incidence rate for males was significantly higher than the rate for females. When rates were further stratified by race, significant differences in rates between males and females were observed for Caucasians and African Americans.

**Table 8-2.** Five-Year Average Age-Adjusted Lung Cancer Incidence Rates and 95% confidence Intervals by Race and Sex; U.S., Delaware and Counties, 2007-2011

<b>RACE AND REGION</b>	<b>All</b>	<b>Male</b>	<b>Female</b>
<b>ALL RACES</b>			
<b>United States</b>	60.1 (59.9 , 60.3)	72.2 (71.8 , 72.6)	51.1 (50.8 , 51.4)
<b>DELAWARE</b>	73.3 (70.9 , 75.7)	86.1 (82.3 , 90.1)	63.6 (60.7 , 66.7)
<b>Kent</b>	82.9 (76.8 , 89.3)	99.4 (89.5 , 110.2)	70.0 (62.6 , 78.1)
<b>New Castle</b>	68.6 (65.5 , 71.8)	81.4 (76.3 , 86.8)	59.1 (55.3 , 63.2)
<b>Sussex</b>	76.2 (71.8 , 80.9)	87.3 (80.2 , 94.9)	68.1 (62.4 , 74.3)
<b>CAUCASIAN</b>			
<b>United States</b>	61.7 (61.5 , 62.0)	72.4 (72.0 , 72.9)	53.8 (53.5 , 54.1)
<b>DELAWARE</b>	75.3 (72.7 , 77.9)	87.2 (83.0 , 91.6)	66.3 (63.0 , 69.7)
<b>Kent</b>	88.0 (81.0 , 95.4)	101.6 (90.5 , 113.7)	77.1 (68.3 , 86.7)
<b>New Castle</b>	70.4 (66.9 , 74.0)	82.3 (76.6 , 88.3)	61.6 (57.2 , 66.3)
<b>Sussex</b>	77.0 (72.3 , 82.0)	88.4 (80.9 , 96.5)	68.8 (62.7 , 75.4)
<b>AFRICAN AMERICAN</b>			
<b>United States</b>	68.0 (67.1 , 68.8)	93.0 (91.4 , 94.6)	51.2 (50.3 , 52.1)
<b>DELAWARE</b>	65.3 (59.5 , 71.5)	83.1 (72.9 , 94.2)	52.4 (45.7 , 59.8)
<b>Kent</b>	64.0 (51.6 , 78.4)	94.4 (71.1 , 122.5)	42.0 (29.1 , 58.3)
<b>New Castle</b>	66.8 (59.4 , 74.8)	83.7 (70.8 , 98.2)	54.7 (46.2 , 64.3)
<b>Sussex</b>	63.5 (49.7 , 79.9)	69.4 (48.2 , 96.3)	57.0 (40.2 , 78.5)

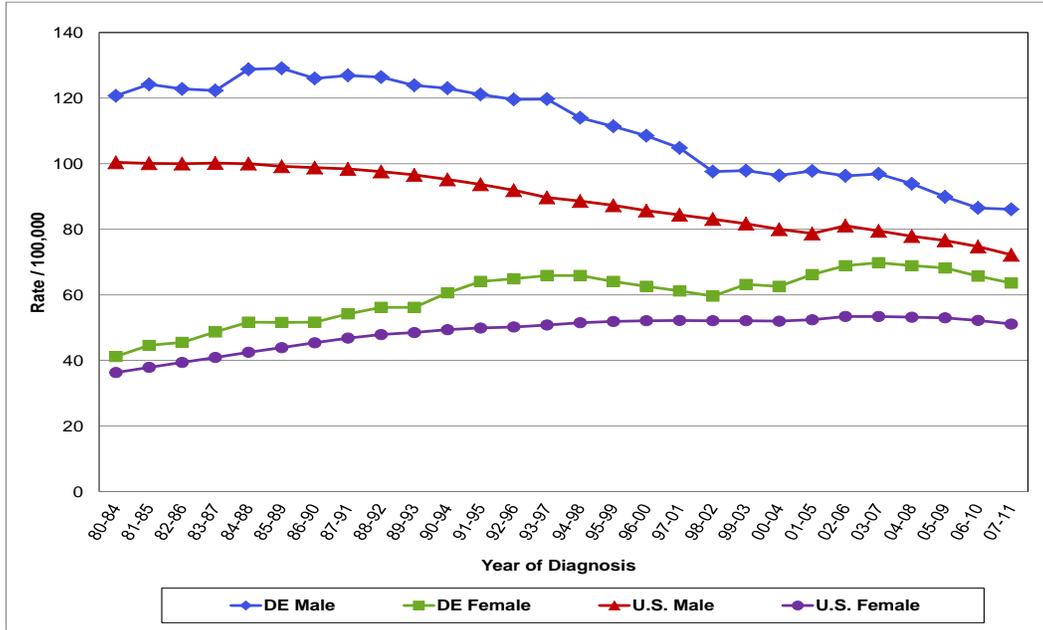
\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

**SOURCE:** Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

### Trends in Lung Cancer Incidence (Figures 8-1 and 8-2)

- From 1997-2001 to 2007-2011, lung cancer incidence rates declined for both Delaware and the U.S. The rates of decline in lung cancer incidence from 1997-2001 to 2007-2011 were similar for Delaware and the U.S. (Delaware: 7.9 percent; U.S.: 8.4 percent).
- During this time period, Delaware's lung cancer incidence rate declined 17.8 percent among males; however, among Delaware females, the lung cancer incidence rate increased 3.9 percent. In the U.S., from 1997-2001 to 2007-2011, male and female lung cancer incidence rates declined 14.5 percent and 2.1 percent, respectively.

**Figure 8-1.** Five-Year Average Age-Adjusted Lung Cancer Incidence Rates by Sex; U.S. and Delaware, 1980-2011

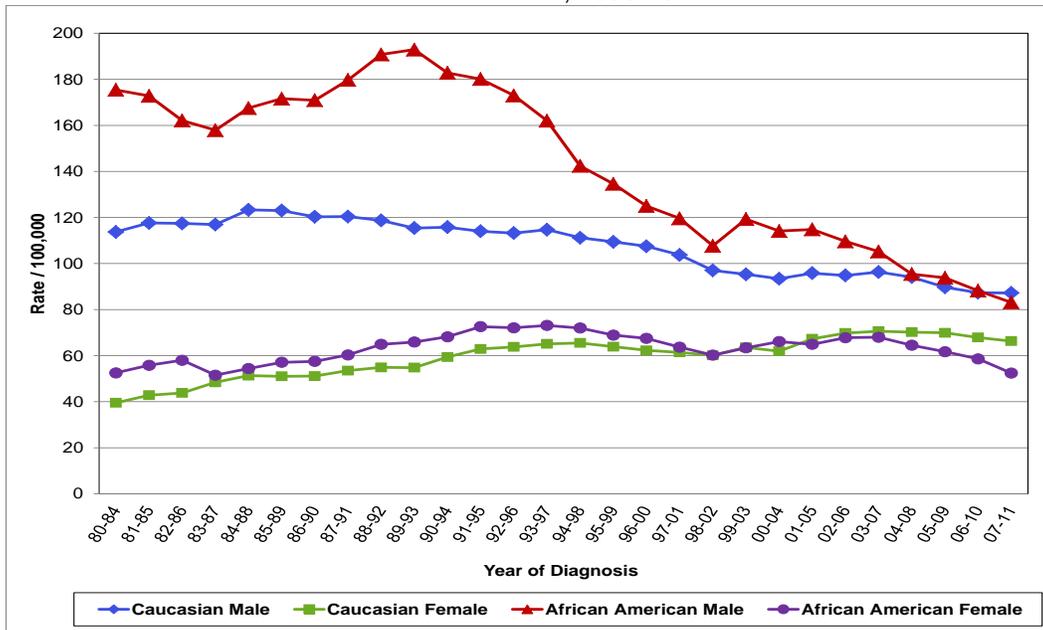


\* = Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

SOURCE: Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

- From 1997-2001 to 2007-2011, Delaware’s lung cancer incidence rates decreased 15.9 percent among Caucasian males and increased 8.0 percent among Caucasian females.
- From 1997-2001 to 2007-2011, Delaware’s lung cancer incidence rates decreased 30.5 percent among African American males and 17.7 percent among African American females.

**Figure 8-2.** Five-Year Average Age-Adjusted Lung Cancer Incidence Rates by Race and Sex; Delaware, 1980-2011



\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

SOURCE: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

**Age-Specific Lung Cancer Incidence Rates (Table 8-3 and Figure 8-3)**

- During 2007-2011, age-specific lung cancer incidence rates in Delaware increased from ages 40-64 through ages 75-84, then decreased among those ages 85 and older. (Data were too sparse to calculate lung cancer incidence rates among individuals age 0-39).
- The magnitude of difference between male and female lung cancer incidence rates also increased with age. Among Delawareans, age 40-64, the male lung cancer incidence rate was 22 percent higher than the female rate. By ages 75-84 and 85 and older, the male lung cancer incidence rate was 41 percent and 81 percent higher than the females rates, respectively.
- Limited data for African American Delawareans also showed a large increase in lung cancer incidence rates between the ages 40-64 to ages 75-84 among both males and females.

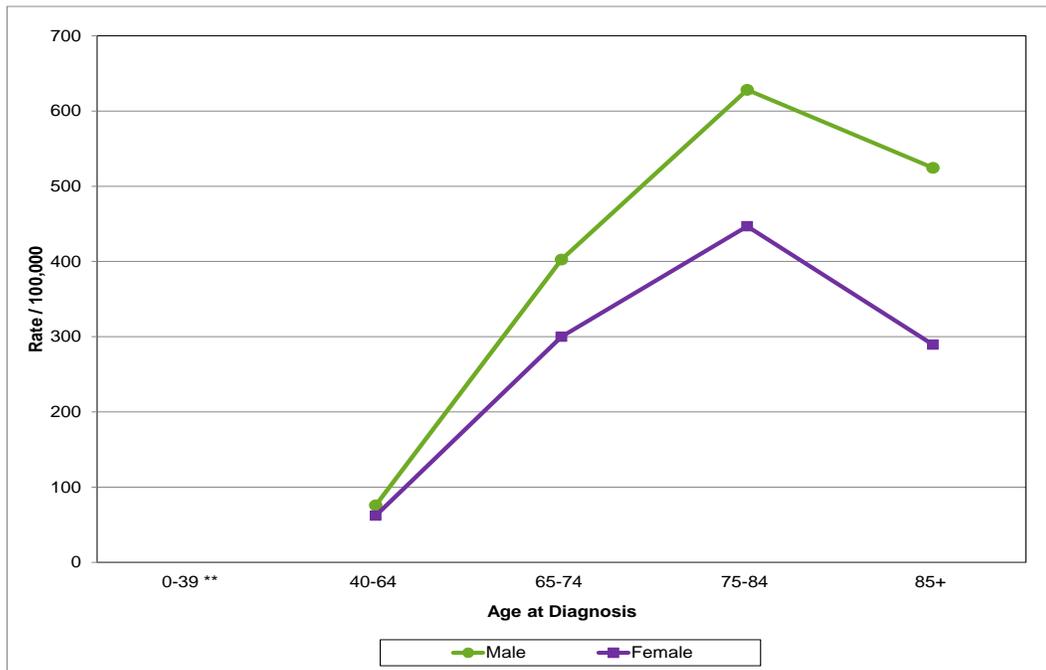
**Table 8-3.** Age-Specific Lung Cancer Incidence Rates by Race and Sex; Delaware, 2007-2011

Age at Diagnosis	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
0-39	---	---	---	---	---	---	---	---	---
40-64	68.5	75.7	62.0	68.0	73.2	63.2	77.3	95.7	62.6
65-74	347.4	402.5	300.0	365.9	409.2	327.9	266.1	392.5	166.9
75-84	524.5	628.2	446.8	538.5	652.5	451.2	455.8	497.4	429.2
85+	364.9	524.4	289.3	383.0	539.4	308.3	---	---	---

\* = Rates are per 100,000 population. --- = Rates based on fewer than 25 cases are not shown.

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

**Figure 8-3.** Age-Specific Lung Cancer Incidence Rates by Sex; Delaware, 2007-2011



\* = Rates are per 100,000 population. \*\* = Rates based on fewer than 25 cases are not shown.

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

### Lung Cancer by Stage at Diagnosis (Tables 8-4 and 8-5, Figures 8-4 and 8-5)

- During 2007-2011, 707 (18.8 percent) of Delaware's 3,753 lung cancer cases were diagnosed in the local stage. Eight hundred forty-three cases (22.5 percent) were diagnosed in the regional stage. The majority of Delaware's lung cancer cases (1,958; 52.2 percent) were diagnosed in the distant stage.
- A smaller percentage of lung cancer cases were diagnosed in the local stage for African American Delawareans (13.4 percent ) compared to Caucasians (19.5 percent). The disparity primarily occurred among females; 14.2 percent of lung cancer cases diagnosed among African American women were diagnosed in the local stage compared to 22.1 percent of cases diagnosed among Caucasian women.
- Correspondingly, a larger percentage of lung cancer cases were diagnosed in the distant stage for African American Delawareans (56.2 percent) compared to Caucasians (51.6 percent). Again, the disparity primarily occurred among females; 55.2 percent of lung cancer cases diagnosed among African American women were diagnosed in the distant stage, compared to 48.5 percent of cases diagnosed among Caucasian women.

**Table 8-4.** Number of Lung Cancer Cases by Stage at Diagnosis, Race and Sex; Delaware, 2007-2011

Stage at Diagnosis	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
<b>Local</b>	707	324	383	625	284	341	68	35	33
<b>Regional</b>	843	423	420	711	357	354	124	62	62
<b>Distant</b>	1,958	1,075	883	1,652	905	747	286	158	128
<b>Unknown</b>	245	134	111	211	112	99	31	22	9
<b>Total</b>	3,753	1,956	1,797	3,199	1,658	1,541	509	277	232

SOURCE: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

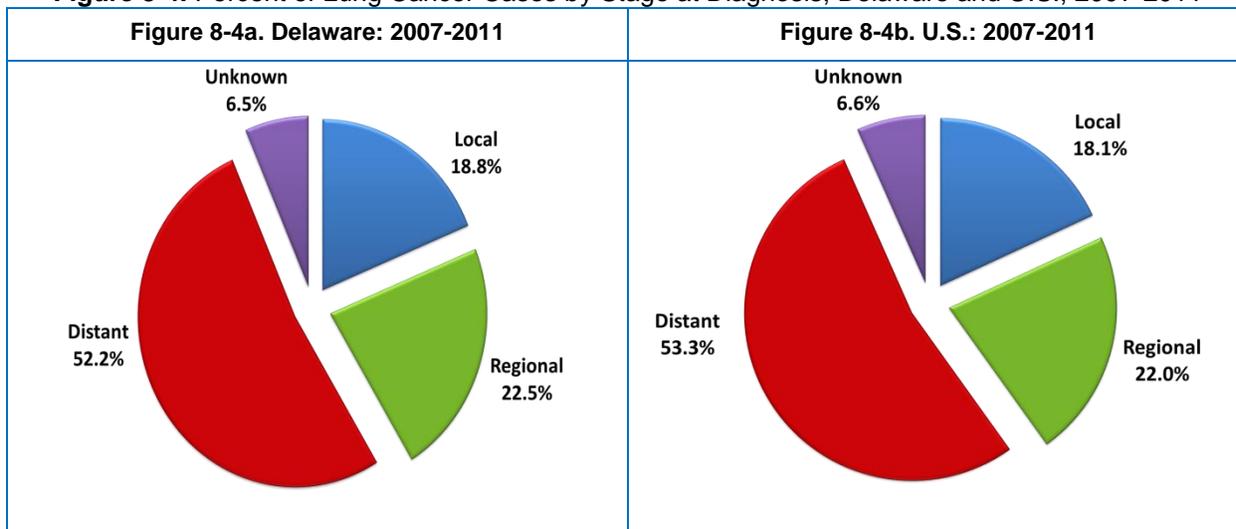
**Table 8-5.** Percentage of Lung Cancer Cases by Stage at Diagnosis, Race and Sex; Delaware, 2007-2011

Stage at Diagnosis	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
<b>Local</b>	18.8	16.6	21.3	19.5	17.1	22.1	13.4	12.6	14.2
<b>Regional</b>	22.5	21.6	23.4	22.2	21.5	23.0	24.4	22.4	26.7
<b>Distant</b>	52.2	55.0	49.1	51.6	54.6	48.5	56.2	57.0	55.2
<b>Unknown</b>	6.5	6.9	6.2	6.6	6.8	6.4	6.1	7.9	3.9
<b>Total</b>	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

SOURCE: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

- During 2007-2011, 18.8 percent, 22.5 percent, and 52.2 percent of lung cancers diagnosed in Delaware were detected at the local, regional, and distant stages, respectively. These rates were comparable to the U.S. in terms of stage at diagnoses. Nationally, from 2007-2011, 18.1 percent, 22.0 percent, and 53.3 percent of lung cancers were detected in the local, regional, and distant stages, respectively.

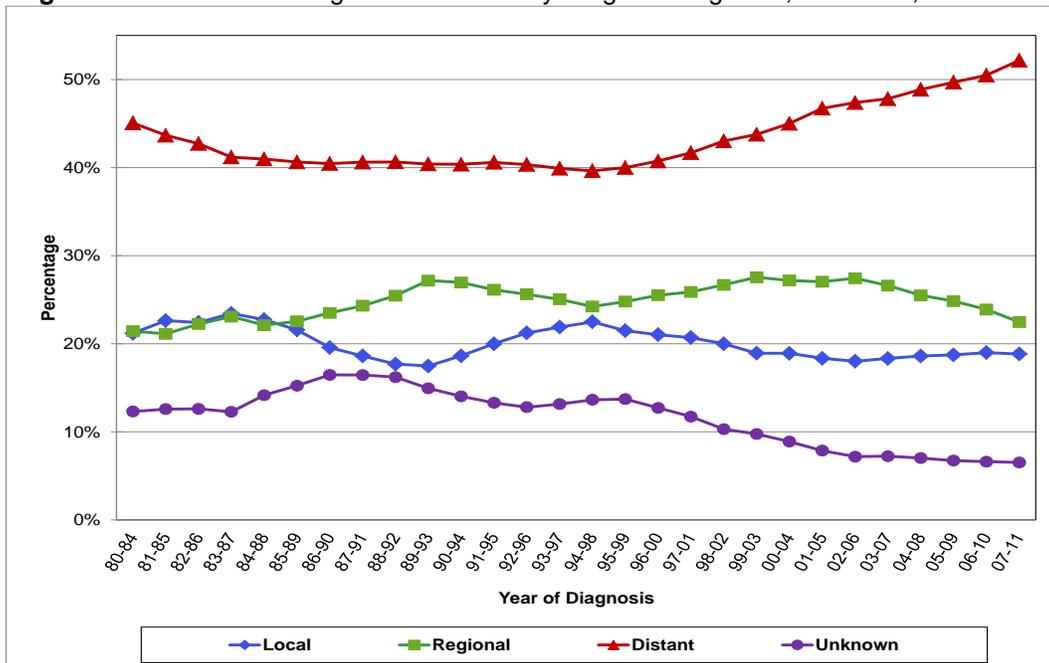
**Figure 8-4.** Percent of Lung Cancer Cases by Stage at Diagnosis; Delaware and U.S., 2007-2011



**SOURCE:** Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

- From 1980-1984 to 2007-2011, the percentage of Delaware lung cancer cases diagnosed in the local stage declined from 21.2 percent to 18.8 percent.
- During the same time period, the percentage of Delaware lung cancer cases diagnosed in the distant stage increased from 45.1 percent to 52.2 percent.

**Figure 8-5.** Percent of Lung Cancer Cases by Stage at Diagnosis; Delaware, 1980-2011



**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

## Lung Cancer Mortality

For 2007-2011, Delaware ranked 12<sup>th</sup> in the nation for lung cancer mortality, unchanged from its ranking for the 2006-2010 time period. Males ranked 12<sup>th</sup> (17<sup>th</sup> for 2006-2010) and females ranked 4<sup>th</sup> (3<sup>rd</sup> for 2006-2010) in lung cancer mortality.<sup>24</sup>

### Deaths due to Lung Cancer (Table 8-6)

- In Delaware, as in the U.S., lung cancer is the most common cause of deaths from cancer.
- During 2007-2011, 2,793 Delawareans died from lung cancer, accounting for 29.9 percent of all cancer deaths.
- Delaware males accounted for 53.7 percent of the lung cancer deaths during this time period.
- Caucasian Delawareans accounted for 2,385 (85.4 percent) lung cancer deaths during 2007-2011. African American Delawareans accounted for 374 (13.4 percent) of deaths and Delawareans of other or unknown race accounted for 34 (1.2 percent) of deaths.

**Table 8-6.** Number of Lung Cancer Deaths by Race and Sex; Delaware and Counties, 2007-2011

	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
<b>DELAWARE</b>	2,793	1,500	1,293	2,385	1,269	1,116	374	213	161
<b>Kent</b>	508	284	224	435	240	195	63	42	21
<b>New Castle</b>	1,466	768	698	1,196	615	581	253	142	111
<b>Sussex</b>	819	448	371	754	414	340	58	29	29

SOURCE: Delaware Health Statistics Center, 2014.

### Lung Cancer Mortality Rates (Table 8-7)

- Delaware's 2007-2011 overall lung cancer mortality rate was significantly higher than the U.S. rate (54.7 per 100,000 Delaware vs. 48.4 per 100,000 U.S.). When rates were calculated separately by sex, Delaware's male and female lung cancer mortality rates were also significantly higher than those of the U.S.
- Delaware's 2007-2011 lung cancer mortality rate among Caucasians (56.1 per 100,000) was significantly higher than the comparable U.S. rate (49.1 per 100,000). Among African Americans, the difference in lung cancer mortality rates between Delaware and the U.S. did not reach the threshold for statistical significance.
- For both Delaware and the U.S., lung cancer mortality rates were significantly higher among males than females. At both the state and national levels, the significant difference in rates between males and females was observed when lung cancer mortality rates were calculated separately for Caucasians and African Americans.

<sup>24</sup> Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, [http://seer.cancer.gov/csr/1975\\_2011/](http://seer.cancer.gov/csr/1975_2011/), based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

**Table 8-7. Five-Year Average Age-Adjusted Lung Cancer Mortality Rates and 95% Confidence Intervals by Race and Sex; U.S., Delaware and Counties, 2007-2011**

<b>RACE AND REGION</b>	<b>All</b>	<b>Male</b>	<b>Female</b>
<b>ALL RACES</b>			
<b>United States</b>	48.4 (48.3 , 48.5)	61.6 (61.4 , 61.8)	38.5 (38.4 , 38.7)
<b>DELAWARE</b>	54.7 (52.7 , 56.8)	66.8 (63.4 , 70.4)	45.5 (43.1 , 48.1)
<b>Kent</b>	59.4 (54.3 , 64.8)	75.2 (66.5 , 84.7)	47.2 (41.2 , 53.9)
<b>New Castle</b>	53.5 (50.7 , 56.3)	64.9 (60.3 , 69.7)	45.1 (41.8 , 48.6)
<b>Sussex</b>	54.2 (50.5 , 58.2)	65.8 (59.6 , 72.5)	45.2 (40.7 , 50.2)
<b>CAUCASIAN</b>			
<b>United States</b>	49.1 (48.9 , 49.2)	61.4 (61.2 , 61.6)	39.8 (39.6 , 39.9)
<b>DELAWARE</b>	56.1 (53.9 , 58.4)	67.3 (63.6 , 71.2)	47.5 (44.8 , 50.5)
<b>Kent</b>	64.1 (58.1 , 70.4)	78.7 (68.9 , 89.5)	52.5 (45.3 , 60.5)
<b>New Castle</b>	54.5 (51.4 , 57.7)	64.6 (59.5 , 70.0)	47.2 (43.4 , 51.2)
<b>Sussex</b>	54.7 (50.8 , 58.9)	66.3 (59.9 , 73.4)	45.7 (40.9 , 51.0)
<b>AFRICAN AMERICAN</b>			
<b>United States</b>	52.0 (51.7 , 52.4)	75.7 (75.0 , 76.4)	36.5 (36.1 , 36.9)
<b>DELAWARE</b>	48.6 (43.6 , 54.0)	64.8 (55.8 , 74.7)	36.7 (31.1 , 43.0)
<b>Kent</b>	39.3 (29.8 , 50.7)	62.7 (43.9 , 86.2)	22.3 (13.6 , 34.5)
<b>New Castle</b>	52.2 (45.6 , 59.4)	68.2 (56.5 , 81.4)	40.4 (33.0 , 48.9)
<b>Sussex</b>	47.9 (36.1 , 62.1)	55.0 (36.3 , 79.6)	41.9 (27.9 , 60.4)

\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

--- = Rates based on fewer than 25 deaths are not shown.

**SOURCE:** Delaware: Delaware Health Statistics Center, 2014;

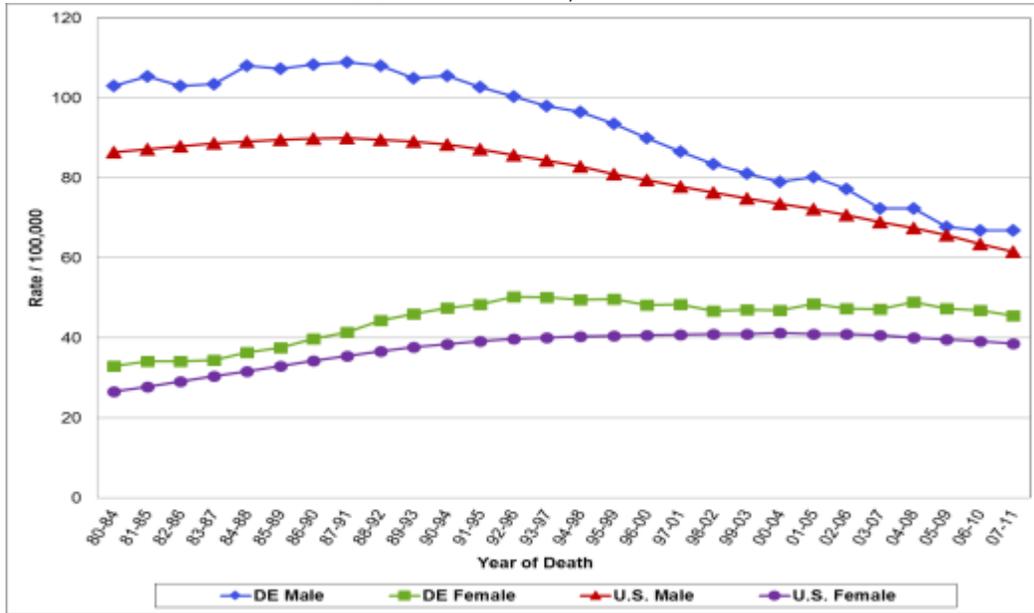
U.S.: National Center for Health Statistics, 2014.

### Trends in Lung Cancer Mortality (Figures 8-6 and 8-7)

- Historically, Delaware's lung cancer mortality rates have been higher than U.S. rates; however, the gap in rates has narrowed among males. Delaware's 1980-1984 male lung cancer mortality rate was 19.2 percent greater than that of the U.S. For 2007-2011, Delaware's male lung cancer mortality rate was 13.0 percent higher than the U.S. rate.
- Between 1997-2001 and 2007-2011, Delaware's lung cancer mortality rate fell 14.7 percent while the U.S. rate dropped 13.9 percent.

Delaware's recent decline in lung cancer mortality is especially noteworthy among males. Between 1997-2001 and 2007-2011, Delaware's lung cancer death rate dropped 22.8 percent for males, compared to the U.S. decline of 20.9 percent. In the same period, the lung cancer death rate dropped 5.8 percent for Delaware females, compared to the U.S. decline of 5.6 percent.

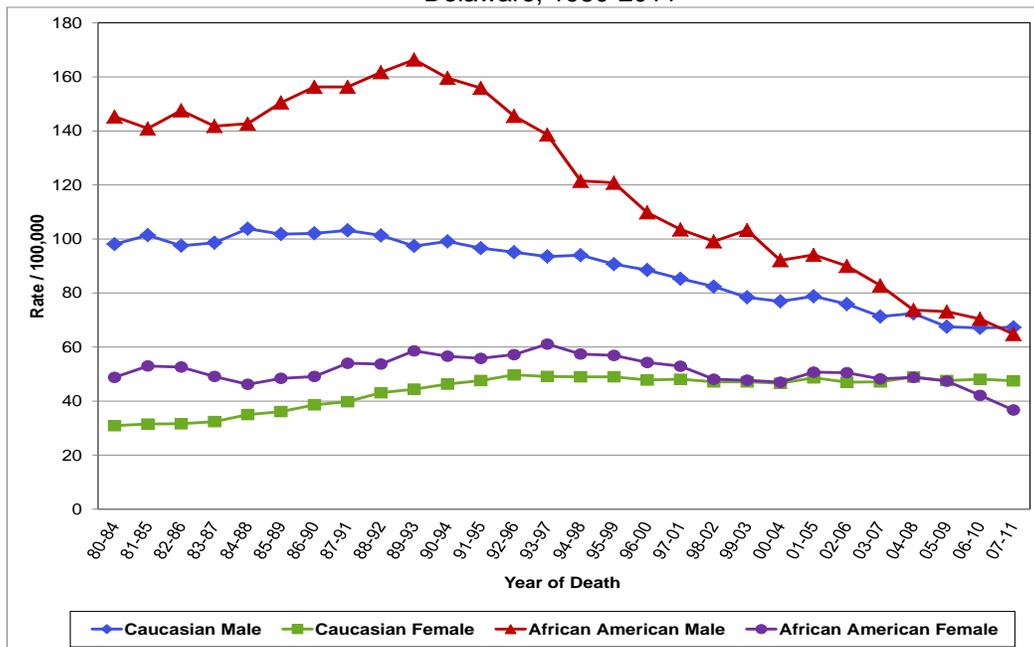
**Figure 8-6.** Five-Year Average Age-Adjusted Lung Cancer Mortality Rates by Sex; U.S. and Delaware, 1980-2011



\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.  
**SOURCE:** Delaware: Delaware Health Statistics Center, 2014; U.S.: National Center for Health Statistics, 2014.

- From 1997-2001 to 2007-2011, Delaware’s lung cancer mortality rate decreased 21.1 percent among male Caucasians and decreased 1.2 percent among Caucasian females.
- From 1997-2001 to 2007-2011, Delaware’s lung cancer mortality rates declined 37.4 percent among African American males and declined 30.6 percent among African American females.

**Figure 8-7.** Five-Year Average Age-Adjusted Lung Cancer Mortality Rates by Race and Sex; Delaware, 1980-2011



\* = Rates are age-adjusted to the 2000 U.S. standard population.  
**SOURCE:** Delaware Health Statistics Center, 2014.

### Age-Specific Lung Cancer Mortality Rates (Table 8-8 and Figure 8-8)

- During 2007-2011, age-specific lung cancer mortality rates in Delaware increased from ages 40-64 through ages 75-84, then decreased among those ages 85 and older. (Data were too sparse to calculate lung cancer mortality rates among individuals age 0-39).
- The difference in lung cancer mortality rates between males and females increased with age. Among individuals age 40-64, Delaware's male lung cancer mortality rate was 37.0 percent greater than the corresponding female rate. Among Delawareans age 85 and older, the male lung cancer mortality rate was 80.0 percent higher than the corresponding female rate.
- Due to sparse data, just three age-specific lung cancer mortality rates could be calculated for African American Delawareans (age 40-64, age 65-74, and age 75-84). Among these three age groups, lung cancer mortality increased with age for African Americans. The same trend was observed when age-specific mortality rates were calculated separately for African American males and females.

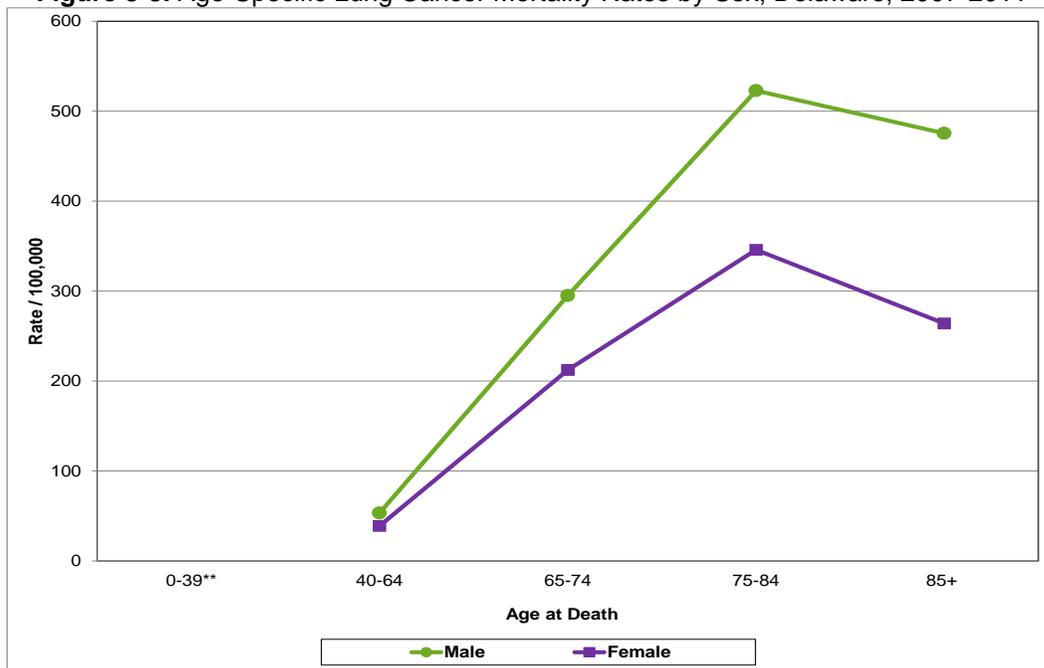
**Table 8-8.** Age-Specific Lung Cancer Mortality Rates by Race and Sex; Delaware, 2007-2011

Age at Diagnosis	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
0-39	---	---	---	---	---	---	---	---	---
40-64	45.7	53.3	38.9	45.8	52.3	39.9	50.7	65.1	39.2
65-74	250.6	295.0	212.2	256.8	290.4	227.3	237.8	357.2	144.1
75-84	422.0	522.9	345.9	438.7	543.5	357.8	305.7	358.6	272.8
85+	332.0	475.3	264.1	340.0	484.5	271.1	---	---	---

\* = Rates are per 100,000 population. --- = Rates based on fewer than 25 deaths are not shown.

SOURCE: Delaware Health Statistics Center, 2014.

**Figure 8-8.** Age-Specific Lung Cancer Mortality Rates by Sex; Delaware, 2007-2011



\* = Rates are per 100,000 population. \*\* = Rates based on fewer than 25 deaths are not shown.

SOURCE: Delaware Health Statistics Center, 2014.

## 9. MYELOMA

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### Risk Factors and Early Detection

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#### Lifestyle Risk Factors for Myeloma:

- Overweight or obesity
- Cigarette smoking (suspected)

#### Environmental and Medically-Related Causes of Myeloma:

- Occupational and/or agricultural exposures (including benzene and other solvents)
- Exposure to non-medical irradiation

#### Non-Modifiable Myeloma Risk Factors (Risk Factors that Cannot be Changed):

- Increasing age (very low risk before age 35 and greatest risk for ages 65 and over)
- Race (African Americans are at greater risk for the development of myeloma).
- Family history of myeloma
- Gender (Males are slightly more likely than females to develop myeloma).
- Monoclonal gammopathy (a non-malignant disorder involving plasma cells)

#### Factors Protective against Myeloma:

- Risk of myeloma may be lowered by managing lifestyle risk factors such as diet (high in fruits, vegetables, and whole grains), physical activity, and tobacco use.

#### Early Detection of Myeloma:

- There are no screening tests for myeloma in asymptomatic individuals.

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### Myeloma Incidence

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Delawareans ranked 8<sup>th</sup> highest in the nation for myeloma incidence for the 2007-2011 time period, up from 10<sup>th</sup> for 2006-2010. Delaware males ranked 35<sup>th</sup> (30<sup>th</sup> for 2006-2010) and females ranked 3<sup>rd</sup> (4<sup>th</sup> for 2006-2010).<sup>25</sup>

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<sup>25</sup> U.S. Cancer Statistics Working Group. United States Cancer Statistics: 1999-2011 Incidence and Mortality Web-based Report. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; 2014. Available at: [www.cdc.gov/uscs](http://www.cdc.gov/uscs).

### Cases of Myeloma (Table 9-1)

- During 2007-2011, 338 myeloma cases were diagnosed in Delaware, accounting for 1.3 percent of all cancer cases diagnosed in the state during this time period.
- Myeloma cases were evenly distributed between males and females. Male Delawareans accounted for 172 myeloma cases (49.1 percent) and female Delawareans accounted for the remaining 166 myeloma cases (50.9 percent).
- Caucasian Delawareans accounted for 232 cases (68.6 percent). African American Delawareans accounted for 96 myeloma cases (28.4 percent). There were 10 myeloma cases (1.3 percent) among Delawareans of other or unknown race.

Table 9-1. Number of Myeloma Cases by Race and Sex; Delaware and Counties, 2007-2011

	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
<b>DELAWARE</b>	338	166	172	232	114	118	96	48	48
<b>Kent</b>	69	31	38	41	20	21	28	11	17
<b>New Castle</b>	165	82	83	113	55	58	45	25	20
<b>Sussex</b>	104	53	51	78	39	39	23	12	11

SOURCE: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

### Myeloma Incidence Rates (Table 9-2)

- Delaware's overall 2007-2011 myeloma incidence rate (6.7 per 100,000) was not significantly different from the U.S. rate (6.1 per 100,000). When incidence rates were calculated separately by sex, Delaware's male myeloma incidence rate (7.3 per 100,000) was not significantly different from that of the U.S. (7.7 per 100,000). However, Delaware's 2007-2011 female myeloma incidence rate (6.2 per 100,000) was significantly higher than the U.S. female myeloma incidence rate (4.9 per 100,000).
- In both Delaware and the U.S., the male myeloma incidence rate was higher than female rates. This same trend was observed when rates were calculated separately by sex. However, whereas the difference between male and female rates was significantly different in the U.S., the difference between male and female rates did not reach a level of statistical significance for Delaware.
- For the U.S. and in Delaware, the 2007-2011 African American myeloma incidence rate was significantly higher than that for Caucasians.

**Table 9-2.** Five-Year Average Age-Adjusted Myeloma Incidence Rates\* and 95% Confidence Intervals by Race and Sex; U.S., Delaware and Counties, 2007-2011

RACE AND REGION	All	Male	Female
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ALL RACES			
United States	6.1 (6.0 , 6.2)	7.7 (7.6 , 7.8)	4.9 (4.8 , 5.0)
DELAWARE	6.7 (6.0 , 7.4)	7.3 (6.2 , 8.5)	6.2 (5.3 , 7.3)
Kent	8.0 (6.2 , 10.2)	8.3 (5.6 , 11.9)	8.0 (5.6 , 11.0)
New Castle	5.9 (5.0 , 6.8)	6.6 (5.2 , 8.2)	5.4 (4.3 , 6.7)
Sussex	7.4 (6.0 , 9.0)	8.0 (5.9 , 10.7)	6.9 (5.0 , 9.3)
CAUCASIAN			
United States	5.6 (5.5 , 5.7)	7.2 (7.1 , 7.4)	4.3 (4.2 , 4.4)
DELAWARE	5.5 (4.8 , 6.3)	6.0 (4.9 , 7.3)	5.2 (4.3 , 6.3)
Kent	6.0 (4.3 , 8.2)	---	---
New Castle	5.1 (4.2 , 6.2)	5.6 (4.2 , 7.3)	4.9 (3.7 , 6.3)
Sussex	5.7 (4.5 , 7.3)	6.3 (4.4 , 8.9)	5.3 (3.7 , 7.5)
AFRICAN AMERICAN			
United States	12.2 (11.9 , 12.6)	14.8 (14.1 , 15.4)	10.5 (10.1 , 11.0)
DELAWARE	12.0 (9.7 , 14.8)	14.5 (10.4 , 19.5)	10.4 (7.6 , 13.9)
Kent	18.6 (12.2 , 27.1)	---	---
New Castle	7.9 (5.7 , 10.7)	10.9 (6.7 , 16.6)	5.9 (3.5 , 9.2)
Sussex	---	---	---

\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

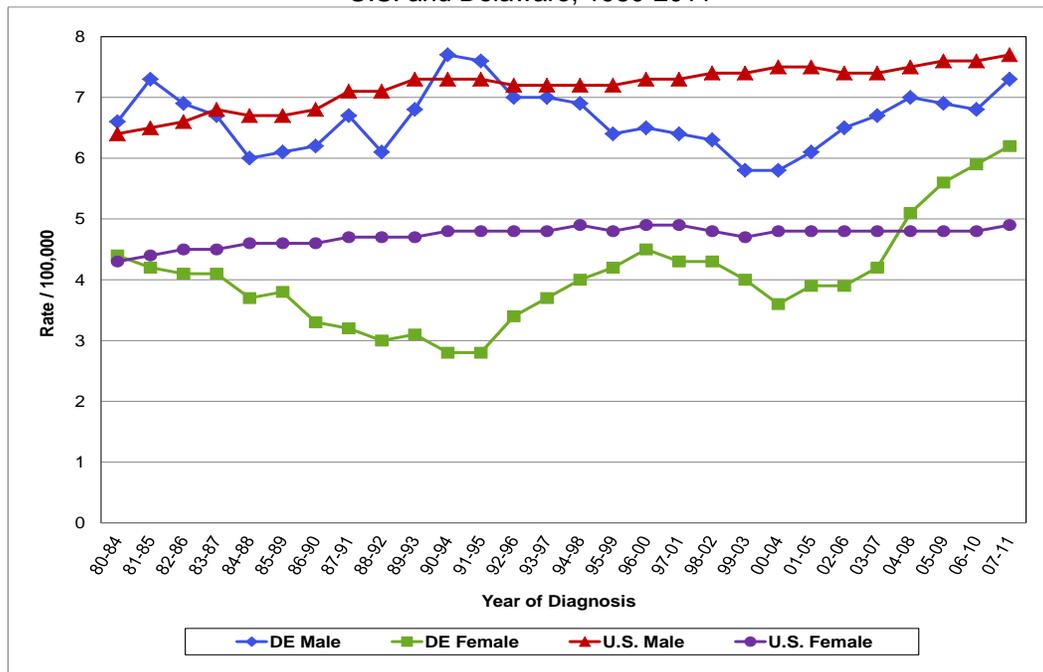
--- = Rates based on fewer than 25 cases are not shown.

SOURCE: Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

### Trends in Myeloma Incidence (Figures 9-1 and 9-2)

- From 1997-2001 to 2007-2011, Delaware's myeloma incidence rate increased 26.4 percent. The increase in incidence was especially pronounced among Delaware female. During this time period, myeloma incidence increased 44.2 percent among females, compared to 14.1 percent among males.
- From 1997-2001 to 2007-2011, the U.S. myeloma incidence rate increased 3.4 percent (5.5 percent increase among U.S. males; no change in incidence among U.S. women).

**Figure 9-1. Five-Year Average Age-Adjusted Myeloma Incidence Rates by Sex; U.S. and Delaware, 1980-2011**

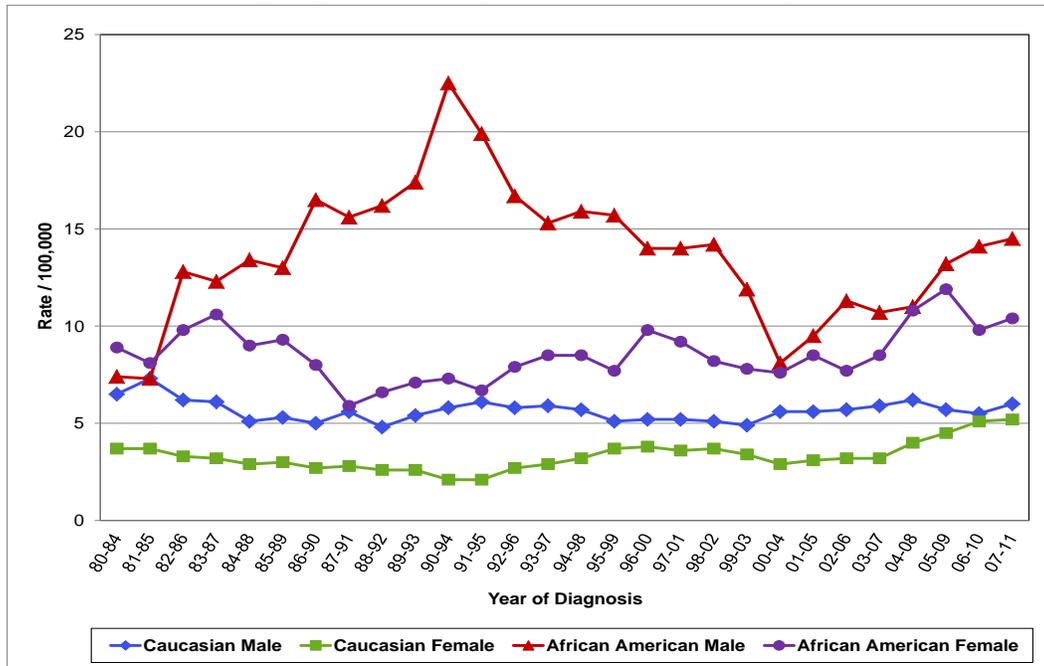


\* = Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

SOURCE: Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014;

- From 1997-2001 to 2007-2011, Delaware's myeloma incidence rate increased 27.9 percent among Caucasians (15.4 percent among males and 44.4 percent among females). Among African American Delawareans, myeloma incidence increased 8.1 percent (3.6 percent among males and 13.0 percent among females).

**Figure 9-2.** Five-Year Average Age-Adjusted Myeloma Incidence Rates by Race; Delaware, 1980-2011



\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

SOURCE: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

### Age-Specific Myeloma Incidence Rates (Table 9-3 and Figure 9-3)

- Due to sparse data, age-specific myeloma incidence rates were calculated for just three cohorts of Delawareans (ages 40-64, ages 65-74, and ages 75-84). Based on the available data, myeloma incidence in Delaware increased with age.
- For each of the three age groups considered, the male myeloma incidence rate was slightly elevated compared to the corresponding female rate.

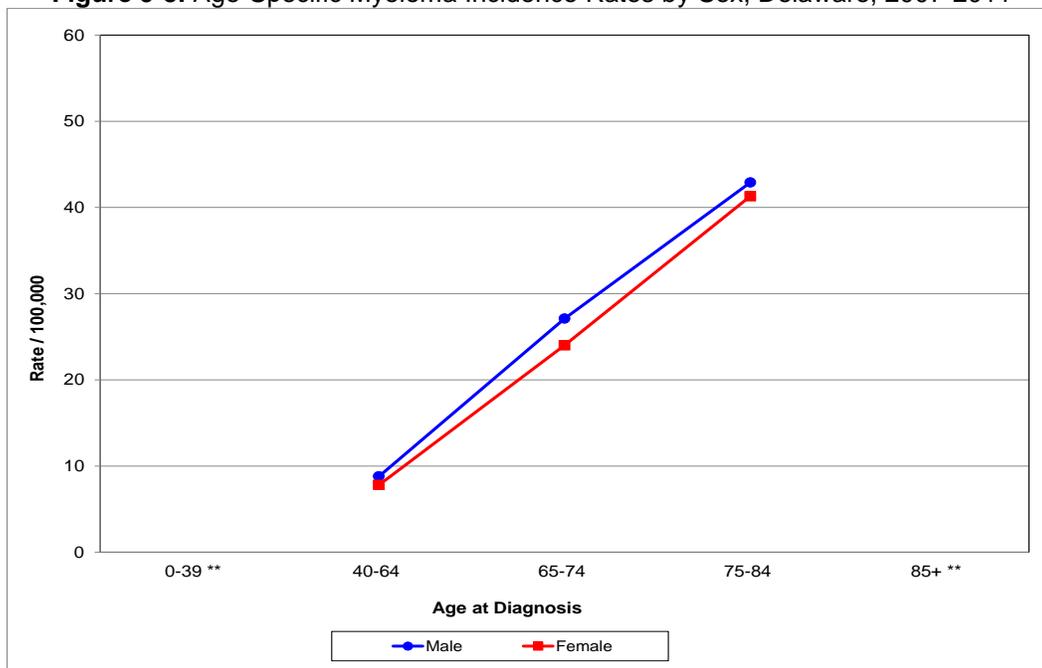
**Table 9-3.** Age-Specific Myeloma Incidence Rates by Race and Sex; Delaware, 2007-2011

Age at Diagnosis	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
0-39	---	---	---	---	---	---	---	---	---
40-64	8.3	8.8	7.8	6.3	6.7	5.9	16.9	18.3	15.7
65-74	25.4	27.1	24.0	22.0	22.6	21.5	---	---	---
75-84	41.9	42.9	41.3	38.1	39.9	36.7	---	---	---
85+	---	---	---	---	---	---	---	---	---

\* = Rates are per 100,000 population. --- = Rates based on fewer than 25 cases are not shown.

SOURCE: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

**Figure 9-3. Age-Specific Myeloma Incidence Rates by Sex; Delaware, 2007-2011**



\*\* = Rates based on fewer than 25 cases are not shown.

SOURCE: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

**Myeloma by Stage at Diagnosis (Table 9-4, Figures 9-4 and 9-5)**

- Nearly all (94.7 percent) of myeloma cases diagnosed in Delaware during 2007-2011 were diagnosed in the distant stage. A small minority of cases – 5.3 percent – were diagnosed in the local stage.
- Numbers of myeloma cases were too small to show the distribution by race or sex.

**Table 9.4. Number and Percentage of Myeloma Cases by Stage at Diagnosis; Delaware, 2007-2011**

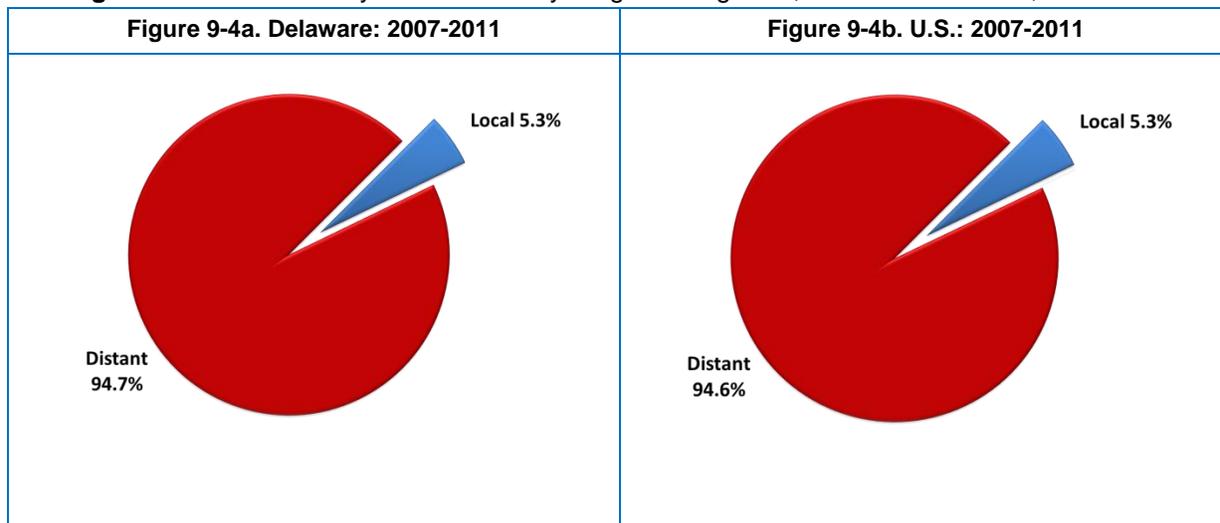
Stage at Diagnosis	Number	Percentage
Local	18	5.3
Regional	---	---
Distant	320	94.7
Unknown	---	---
<b>Total</b>	<b>338</b>	<b>100.0</b>

--- = Cell counts less than six are not shown to protect patient confidentiality.

SOURCE: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

- The percentage of Delaware myeloma cases diagnosed in the distant stage for 2007-2011 (94.7 percent) was comparable to that of the U.S. (94.6 percent).

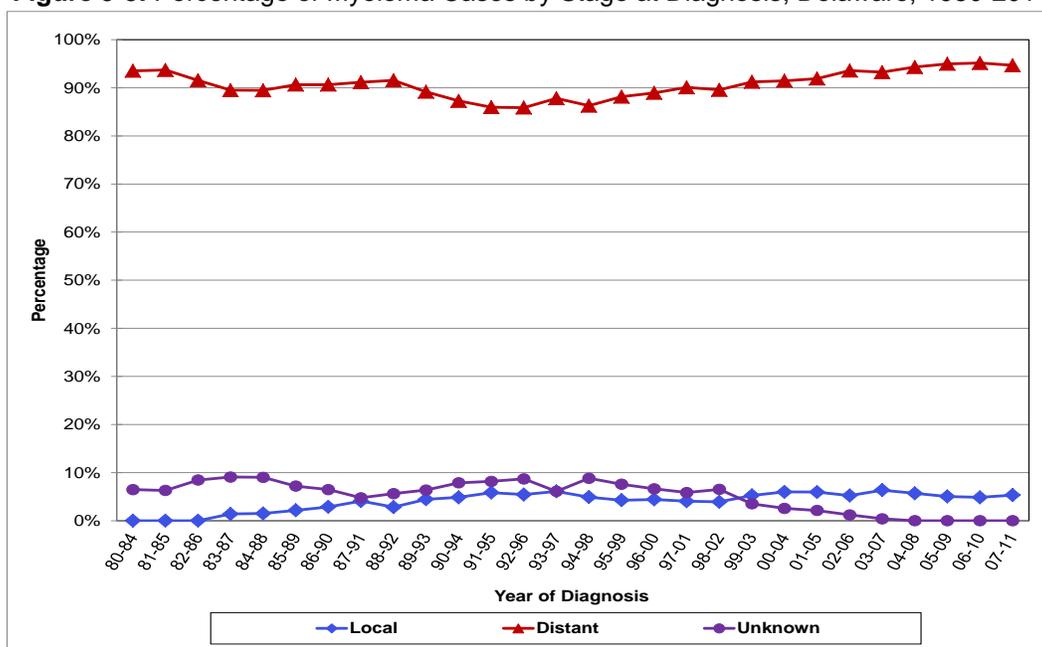
**Figure 9-4. Percent of Myeloma Cases by Stage at Diagnosis; Delaware and U.S., 2007-2011**



**SOURCE:** Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

- From 1980-1984 to 2007-2011, the percentage of Delaware myeloma cases diagnosed in the local stage increased from 0.0 percent to 5.3 percent.

**Figure 9-5. Percentage of Myeloma Cases by Stage at Diagnosis; Delaware, 1980-2011**



**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

## Myeloma Mortality

For 2007-2011, Delaware ranked 9<sup>th</sup> in the nation for myeloma mortality, up from 23<sup>rd</sup> for the 2006-2010 time period. Delaware males ranked 16<sup>th</sup> (11th for 2006-2010) and Delaware females ranked 8<sup>th</sup> (34<sup>th</sup> for 2006-2010).<sup>26</sup>

### Deaths due to Myeloma (Table 9-5)

- During 2007-2011, 189 Delawareans died from myeloma, accounting for 2.0 percent of all cancer deaths in the state during this time period.
- Delaware males accounted for 54.0 percent of myeloma deaths during 2007-2011.
- Caucasian Delawareans accounted for 145 myeloma deaths (76.7 percent) during 2007-2011. African American Delawareans and Delawareans of other or unknown race accounted for 43 myeloma deaths (22.8 percent) and one myeloma death (0.5 percent), respectively.

**Table 9-5.** Number of Myeloma Deaths by Race and Sex; Delaware and Counties, 2007-2011

	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
<b>DELAWARE</b>	189	102	87	145	77	68	43	25	18
<b>Kent</b>	28	14	14	27	14	13	1	0	1
<b>New Castle</b>	119	69	50	84	46	38	34	23	11
<b>Sussex</b>	42	19	23	34	17	17	8	2	6

--- = Cell counts less than six are not shown to protect patient confidentiality

SOURCE: Delaware Health Statistics Center, 2014.

### Myeloma Mortality Rates (Table 9-6)

- Delaware's 2007-2011 overall myeloma mortality rate (3.7 per 100,000) was not significantly different from the comparable U.S. rate (3.4 per 100,000).
- For 2007-2011, for both Delaware and the U.S., the male myeloma mortality rate was significantly greater than the comparable female rate.

**Table 9-6.** Five-Year Average Age-Adjusted Myeloma Mortality Rates and 95% Confidence Intervals by Race and Sex; U.S., Delaware and Counties, 2007-2011

RACE AND REGION	All	Male	Female
<b>ALL RACES</b>			
<b>United States</b>	3.4 (3.3 , 3.4)	4.3 (4.2 , 4.3)	2.7 (2.7 , 2.7)
<b>DELAWARE</b>	3.7 (3.2 , 4.3)	4.6 (3.8 , 5.6)	3.0 (2.4 , 3.8)
<b>Kent</b>	3.4 (2.2 , 4.9)	3.8 (2.0 , 6.5)	3.1 (1.7 , 5.2)
<b>New Castle</b>	4.3 (3.5 , 5.1)	5.9 (4.6 , 7.5)	3.1 (2.3 , 4.1)
<b>Sussex</b>	2.7 (2.0 , 3.8)	2.7 (1.6 , 4.4)	2.8 (1.8 , 4.4)
<b>CAUCASIAN</b>			

<sup>26</sup> Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, [http://seer.cancer.gov/csr/1975\\_2011/](http://seer.cancer.gov/csr/1975_2011/), based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

<b>United States</b>	3.1 (3.1 , 3.2)	4.0 (4.0 , 4.1)	2.5 (2.4 , 2.5)
<b>DELAWARE</b>	3.4 (2.9 , 4.0)	4.1 (3.2 , 5.1)	2.9 (2.2 , 3.7)
<b>Kent</b>	4.0 (2.6 , 5.9)	4.7 (2.5 , 8.0)	3.5 (1.9 , 6.2)
<b>New Castle</b>	3.7 (3.0 , 4.6)	4.9 (3.5 , 6.5)	2.9 (2.1 , 4.1)
<b>Sussex</b>	2.4 (1.7 , 3.5)	2.7 (1.5 , 4.5)	2.3 (1.3 , 3.9)
<b>AFRICAN AMERICAN</b>			
<b>United States</b>	6.3 (6.1 , 6.4)	7.7 (7.5 , 8.0)	5.3 (5.2 , 5.5)
<b>DELAWARE</b>	6.1 (4.3 , 8.2)	8.3 (5.1 , 12.6)	4.5 (2.6 , 7.1)
<b>Kent</b>	0.7 (0.0 , 3.6)	0.0 (0.0 , 5.2)	1.3 (0.0 , 6.5)
<b>New Castle</b>	7.5 (5.1 , 10.6)	12.4 (7.4 , 19.2)	4.3 (2.1 , 7.6)
<b>Sussex</b>	7.0 (3.0 , 13.8)	4.2 (0.4 , 14.8)	8.9 (3.2 , 19.5)

\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

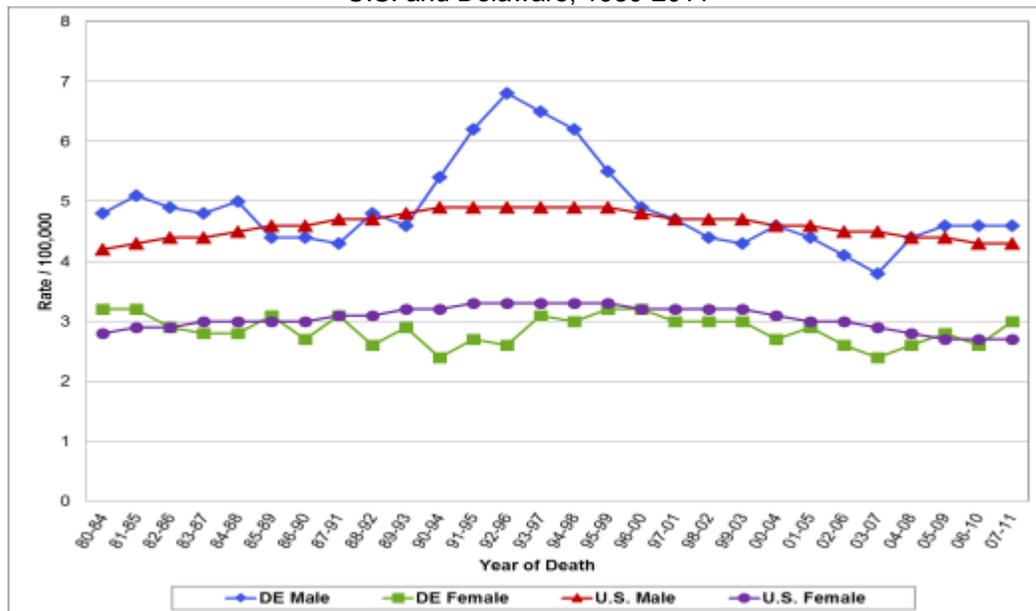
--- = Rates based on fewer than 25 cases are not shown.

**SOURCE:** Delaware: Delaware Health Statistics Center, 2014; U.S.: National Center for Health Statistics, 2014.

### Trends in Myeloma Mortality (Figures 9-6 and 9-7)

- Delaware's male myeloma mortality rate fluctuated substantially from 1980-1984 to 2007-2011, peaking for the 1993-1997 time period and declining to a low during the 2003-2007 time period. Compared to the male rate, Delaware's female myeloma mortality rate fluctuated to a lesser extent from 1980-1984 to 2007-2011.
- From 1997-2001 to 2007-2011, Delaware's myeloma mortality rate experienced a net change of zero percent while the comparable U.S. rate fell 10.2 percent.

**Figure 9-6.** Five-Year Average Age-Adjusted Myeloma Mortality Rates by Sex; U.S. and Delaware, 1980-2011

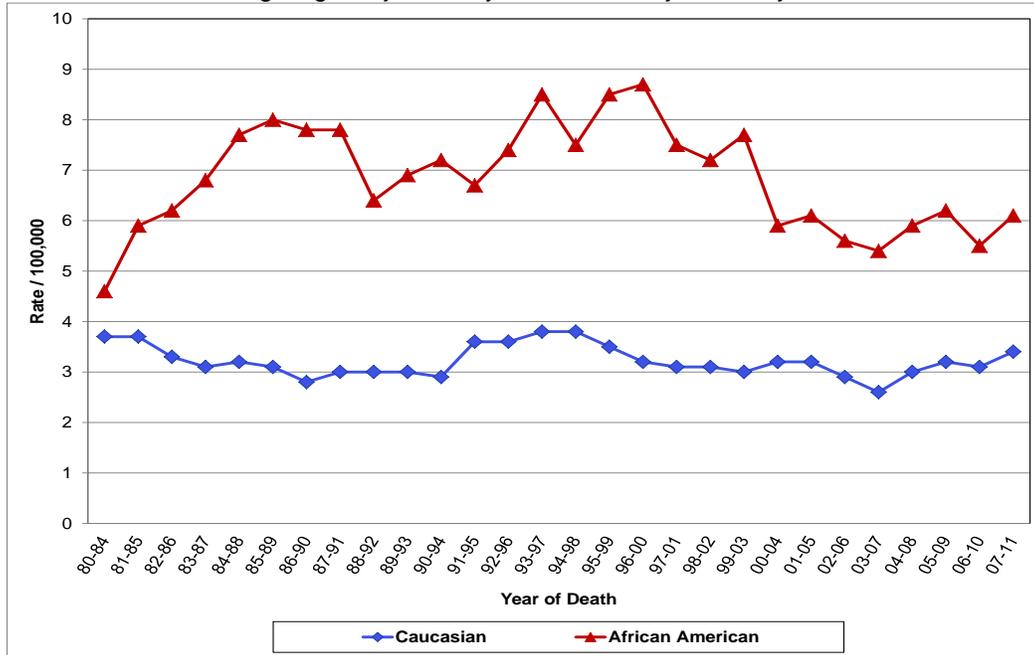


\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

**SOURCE:** Delaware: Delaware Health Statistics Center, 2014; U.S.: National Center for Health Statistics, 2014.

- From 1997-2001 to 2007-2011, Delaware's myeloma mortality rates increased by 9.7 percent among Caucasians and decreased by 18.7 percent among African Americans.
- From 1997-2001 to 2007-2011, Delaware's myeloma mortality rates increased 11.5 percent among Caucasian women and 2.5 percent among Caucasian men. (Not shown in Figure 9.7.)

**Figure 9-7. Five-Year Average Age-Adjusted Myeloma Mortality Rates by Race; Delaware, 1980-2011**



\* = Rates are age-adjusted to the 2000 U.S. standard population.  
**SOURCE:** Delaware Health Statistics Center, 2014.

**Age-Specific Myeloma Mortality Rates (Table 9.7)**

- With the exception of those displayed in Table 9.7, numbers of Delaware myeloma deaths were too small to examine mortality rates by age.
- Where age-specific rates were able to be calculated, Delaware’s myeloma mortality rates generally increase with age.

**Table 9.7. Age-Specific Myeloma Mortality Rates by Race and Sex; Delaware, 2007-2011**

Age at Diagnosis	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
0-39	---	---	---	---	---	---	---	---	---
40-64	2.8	3.1	---	2.4	---	---	---	---	---
65-74	14.7	18.5	---	14.1	---	---	---	---	---
75-84	31.8	38.3	27.2	30.0	35.9	25.7	---	---	---
85+	---	---	---	---	---	---	---	---	---

\* = Rates are per 100,000 population. --- = Rates based on fewer than 25 deaths are not shown.  
**SOURCE:** Delaware Health Statistics Center, 2014.

## 10. PROSTATE CANCER

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### Risk Factors and Early Detection

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#### **Lifestyle Risk Factors for Prostate Cancer:**

- Diets high in red meat and/or high-fat dairy products and low in fruits and vegetables
- Obesity (suspected)
- Tobacco usage (suspected)
- Heavy alcohol use (suspected)

#### **Environmental and Medically-Related Causes of Prostate Cancer:**

- Employment in certain industries (suspected), including welders, battery manufacturers, rubber workers, and workers exposed to cadmium

#### **Non-Modifiable Prostate Cancer Risk Factor (Risk Factors that Cannot be Changed):**

- Increasing age (Prostate cancer risk increases sharply after age 50.)
- Race (African Americans are at a higher risk for the development of prostate cancer.)
- Ethnicity (Persons of Hispanic ethnicity are at lower risk for the development of prostate cancer.)
- Nationality (Prostate cancer risk is elevated among males in North America and northwestern Europe.)
- Family history of prostate cancer
- Inherited DNA changes (e.g. HPC1 (hereditary prostate cancer gene 1))
- Gene mutations that occur during a man's life
- Higher levels of certain male hormones such as testosterone (suspected)
- Infection and inflammation of the prostate gland (prostatitis) (suspected)
- Certain genes, such as the BRCA 1 and BRCA 2 genes (suspected)

#### **Factors Protective against Prostate Cancer:**

- Maintaining a healthy weight
- Consuming a diet high in fruits, vegetables, and whole grains
- Regular physical activity
- Limiting calcium intake

## Early Detection of Prostate Cancer:

The American Cancer Society (ACS) recommends that men make an informed decision with their health care provider about whether to be screened for prostate cancer. Men should receive from their doctors information about the risks and possible benefits of prostate cancer screening. Men should not be screened unless they have received this information.<sup>27</sup>

## The Delaware Cancer Consortium recommends the following prostate cancer screening guidelines for Delaware males:

- No mass prostate cancer screening efforts
- Promote education for informed prostate cancer screening decision-making
- Screening men older than 75 years is less desirable; however, screening decisions should be based on individual risk.
- Screening is not recommended for men with life expectancy less than 10 years.
- Offer average-risk individuals screening beginning at age 50 using an informed decision-making process.
- High-risk individuals should be encouraged to be screened beginning at the following ages:
  - 40 years of age (with risk factor = several 1<sup>st</sup> degree relatives);
  - 40 years of age (with risk factor = African American, 1<sup>st</sup> degree relative, family or personal history of BRCA1 and BRCA2 gene and/or younger than 65 years of age).
- Screening at one-to-two-year intervals via prostate specific antigen (PSA) test, with or without digital rectal exam (DRE)

## Prostate Cancer Screening among Delawareans:

Data from the 2012 Behavioral Risk Factor Surveillance System (BRFSS) Survey provide information on the prevalence of prostate cancer screening among Delaware men:

- In 2012, 52.7 percent of Delaware men ages 40 and older reported having had a PSA blood test in the past two years, compared to 47.3 percent of men in the U.S. The difference in screening prevalence rates between Delaware and the U.S. did not reach a level of statistical significance.
- Delaware ranked first in the nation in the prevalence of men aged 40 and over who reported having had a PSA test within the past two years.
- The proportion of Delaware men who received a PSA test within the past two years increased with age: 27.3 percent of men ages 40-49 were tested, compared to 72.2 percent of men ages 65 and older.
- In Delaware, Caucasian men were more likely to have had a PSA test (56.6 percent ) than African American men (46.2 percent). The difference in screening prevalence rates between Caucasians and African Americans did not reach a level of statistical significance.
- As the level of education increased, so, too, did the proportion of Delaware men who had had a PSA test. Among Delaware males with less than a high school education, the prostate cancer screening prevalence rate was 40.8 percent. Among Delaware males who graduated from college, the comparable screening prevalence rate was 57.7 percent.

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<sup>27</sup> American Cancer Society; Prostate Cancer: Early Detection.  
<http://www.cancer.org/cancer/prostatecancer/moreinformation/prostatecancerearlydetection/prostate-cancer-early-detection-ac-recommendations>

## Prostate Cancer Incidence

Delaware ranked 4<sup>th</sup> highest in the U.S. for prostate cancer incidence for 2007-2011, down from 2<sup>nd</sup> for 2006-2010.<sup>28</sup>

### Cases of Prostate Cancer (Table 10-1)

- Prostate cancer is the most-frequently diagnosed cancer among men in Delaware and the U.S.
- From 2007 through 2011, 4,137 new cases of prostate cancer were diagnosed in Delaware, accounting for 30.2 percent of all newly-diagnosed cancer cases among males in the state during this time period.
- Caucasian males accounted for 3,136 of the 4,137 prostate cancer cases (75.8 percent) diagnosed in Delaware from 2007 through 2011. African American males accounted for 924 prostate cancer cases (22.3 percent). Males of other or unknown race accounted for 77 prostate cancer cases (1.9 percent),.
- More than half of the prostate cancer cases (52.7 percent) diagnosed in Delaware from 2007 through 2011 were diagnosed among New Castle County males. Kent and Sussex County males accounted for 20.1 percent and 27.2 percent of prostate cancer cases, respectively.

**Table 10-1.** Number of Prostate Cancer Cases by County and Race; Delaware, 2007-2011

	All Male	Caucasian	African American
<b>DELAWARE</b>	4,137	3,136	924
<b>Kent</b>	831	581	235
<b>New Castle</b>	2,179	1,601	546
<b>Sussex</b>	1,127	954	143

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

### Prostate Cancer Incidence Rates (Table 10-2)

- Delaware's 2007-2011 overall prostate cancer incidence rate (168.4 per 100,000) was significantly higher than the U.S. (147.8 per 100,000).
- When prostate cancer incidence rates were calculated separately by race, Delaware's rates for Caucasians and African Americans were significantly elevated compared to the U.S. rates. Delaware's Caucasian prostate cancer incidence rate was 154.3 per 100,000, compared to the U.S. Caucasian rate of 139.9 per 100,000. Delaware's African American prostate cancer incidence rate was 250.6 per 100,000, compared to the U.S. African American rate of 223.9 per 100,000.
- For both Delaware and the U.S., the 2007-2011 prostate cancer incidence rate for African Americans was significantly higher than the rate for Caucasians. In Delaware, the statistically significant difference in prostate cancer incidence rates between African American and Caucasian males persisted when separate incidence rates were calculated for each of the three counties.

<sup>28</sup>U.S. Cancer Statistics Working Group. United States Cancer Statistics: 1999-2011 Incidence and Mortality Web-based Report. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; 2014. Available at: [www.cdc.gov/uscs](http://www.cdc.gov/uscs).

**Table 10-2.** Five-Year Average Age-Adjusted Prostate Cancer Incidence Rates\* and 95% confidence Intervals by Race; U.S., Delaware and Counties, 2007-2011

	All Male	Caucasian	African American
<b>United States</b>	147.8 (147.2 , 148.3)	139.9 (139.3 , 140.5)	223.9 (221.6 , 226.2)
<b>DELAWARE</b>	168.4 (163.2 , 173.7)	154.3 (148.9 , 159.9)	250.6 (233.8 , 268.3)
<b>Kent</b>	197.8 (184.3 , 212.0)	173.9 (159.8 , 188.9)	301.1 (262.4 , 343.7)
<b>New Castle</b>	167.2 (160.1 , 174.6)	156.0 (148.3 , 164.0)	231.5 (211.1 , 253.2)
<b>Sussex</b>	152.8 (143.8 , 162.4)	140.6 (131.5 , 150.3)	260.0 (217.7 , 307.9)

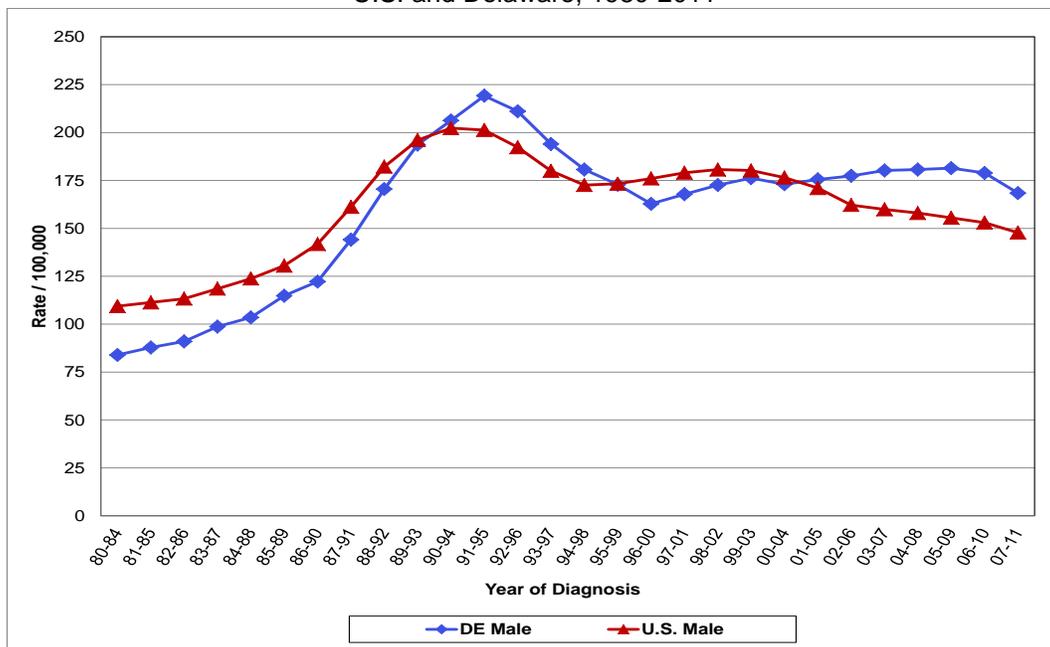
\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

**SOURCE:** Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

### Trends in Prostate Cancer Incidence (Figures 10-1 and 10-2)

- In Delaware and the U.S., prostate cancer incidence sharply increased during the early 1990s following the introduction of the prostate-specific antigen (PSA) screening test. Delaware's prostate cancer incidence rate peaked in 1991-1995 with a rate of 219.2 per 100,000. The U.S. prostate cancer incidence rate peaked in 1990-1994 with a rate of 202.1 per 100,000.
- From 1997-2001 to 2007-2011, Delaware's prostate cancer incidence rate increased 0.4 percent while the U.S. rate declined 17.4 percent.

**Figure 10-1.** Five-Year Average Age-Adjusted Prostate Cancer Incidence Rates; U.S. and Delaware, 1980-2011

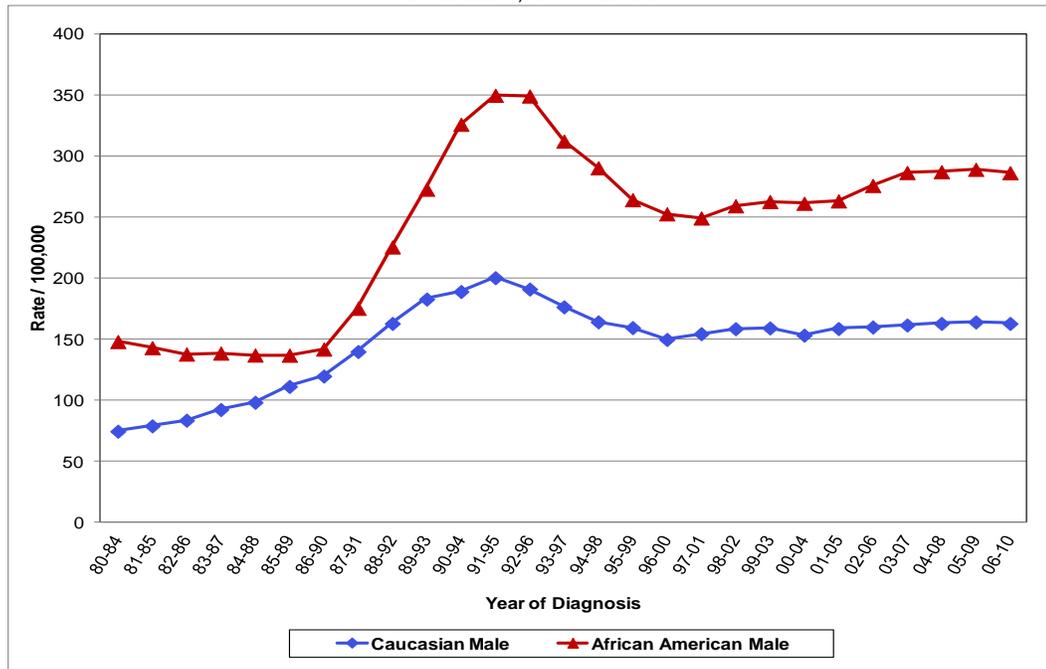


\* = Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

**SOURCE:** Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

- From 1997-2001 to 2007-2011, Delaware's prostate cancer incidence rate increased 8.7 percent among Caucasians and 13.4 percent among African Americans.

**Figure 10-2.** Five-Year Average Age-Adjusted Prostate Cancer Incidence Rates by Race; Delaware, 1980-2011



\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

SOURCE: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

### Age-Specific Prostate Cancer Incidence Rates (Table 10-3)

- In Delaware, 2007-2011 age-specific prostate cancer incidence rates increased with age, from ages 40-64 through ages 85+.
- At ages 75-84, the prostate cancer incidence rate was more than three times greater among African Americans than among Caucasians.

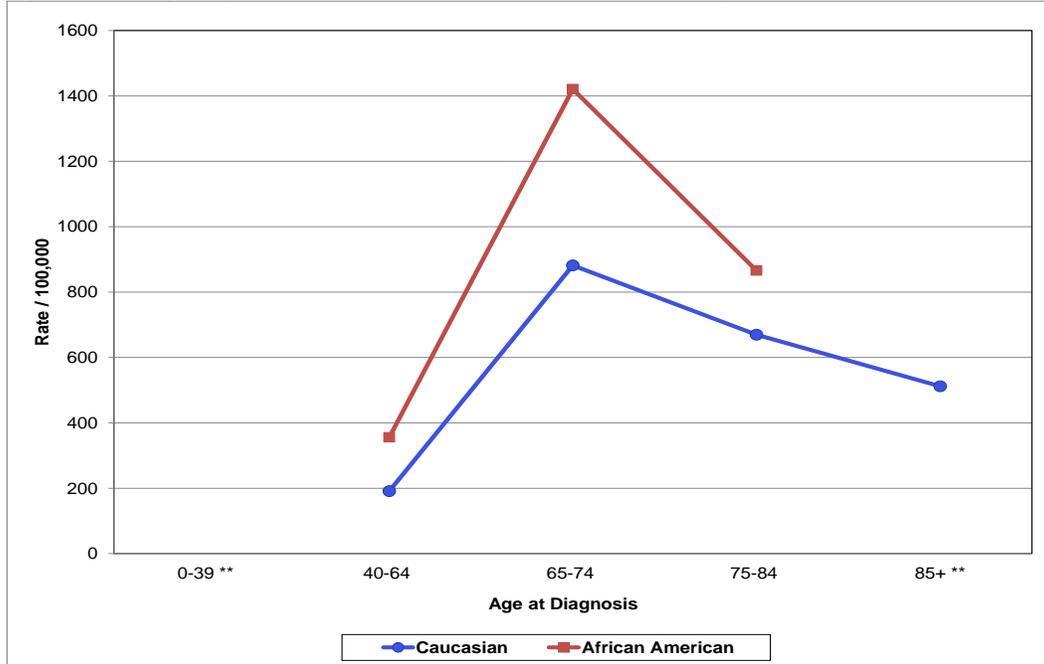
**Table 10-3.** Age-Specific Prostate Cancer Incidence Rates by Race; Delaware, 2007-2011

Age at Diagnosis	All Male	Caucasian	African American
0-39	---	---	---
40-64	218.1	191.1	355.5
65-74	955.5	881.4	1420.9
75-84	689.2	669.5	865.6
85+	516.2	511.7	---

\* = Rates are per 100,000 population. --- = Rates based on fewer than 25 cases are not shown.

SOURCE: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

**Figure 10-3. Age-Specific Prostate Cancer Incidence Rates by Race; Delaware, 2007-2011**



\* = Rates are per 100,000 population. \*\* = Rates based on fewer than 25 cases are not shown.

SOURCE: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

**Prostate Cancer by Stage at Diagnosis (Table 10-4, Figures 10-4 and 10-5)**

- During 2007-2011, 86.0 percent of prostate cancer cases diagnosed among Delaware males were diagnosed in the local stage.
- Prostate cancer stage of diagnosis trends were comparable between Caucasian and African American males for the 2007-2011 time period.

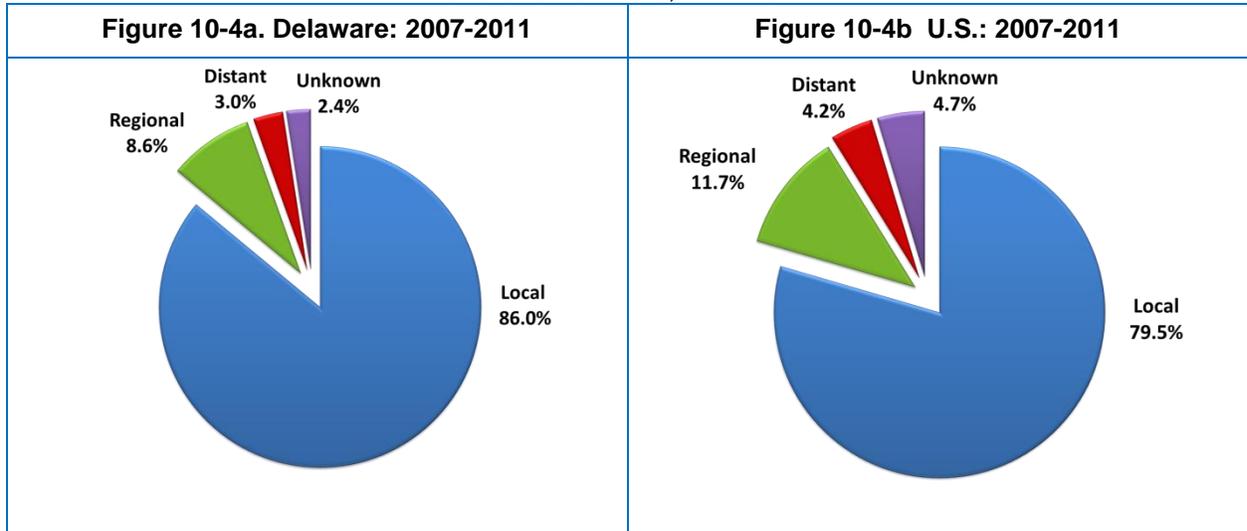
**Table 10-4. Number and Percentage of Prostate Cancer Cases by Stage at Diagnosis and Race; Delaware, 2007-2011**

Stage at Diagnosis	Number			Percentage		
	All Male	Caucasian	African American	All Male	Caucasian	African American
<b>Local</b>	3,559	2,693	798	86.0	85.9	86.4
<b>Regional</b>	354	275	72	8.6	8.8	7.8
<b>Distant</b>	124	96	28	3.0	3.1	3.0
<b>Unknown</b>	100	72	26	2.4	2.3	2.8
<b>Total</b>	4,137	3,136	924	100.0	100.0	100.0

SOURCE: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

- During 2007-2011, local stage diagnoses (86.0 percent) accounted for a larger percentage of all prostate cancer cases in Delaware compared to the U.S. (79.5 percent).
- In 2007-2011, 8.6 percent of prostate cancer cases in Delaware were diagnosed at the regional stage, compared to 11.7 percent in the U.S. In the same period, 3.0 percent of prostate cancer cases in Delaware were diagnosed in the distant stage, compared to 4.2 percent in the U.S..

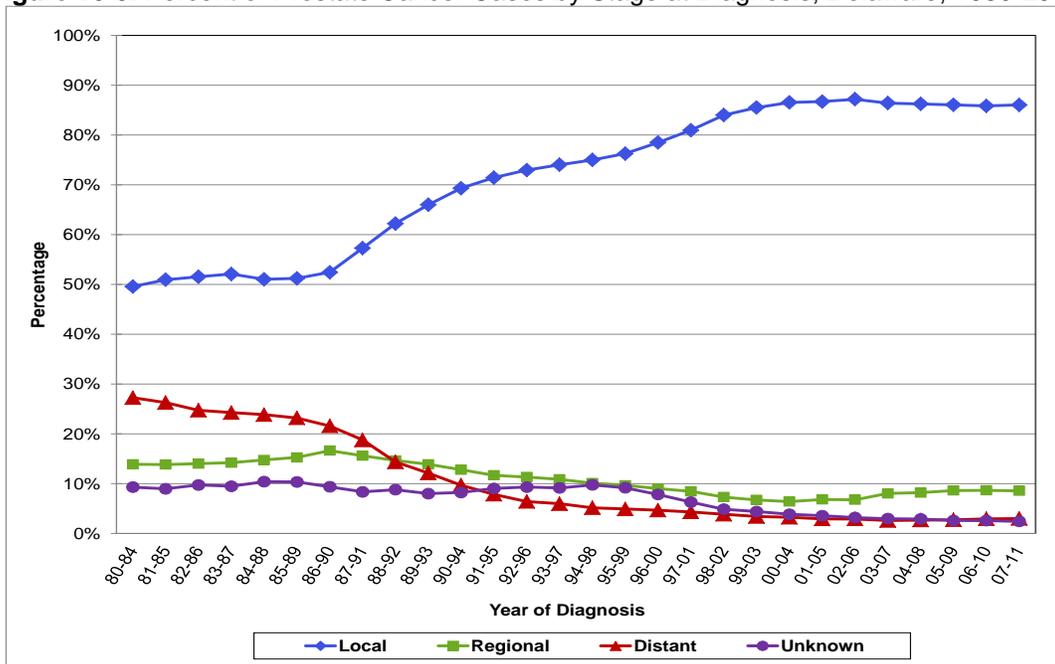
**Figure 10-4. Percent of Prostate Cancer Cases by Stage at Diagnosis and Race; U.S. and Delaware, 2007-2011**



**SOURCE:** Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

- From 1980-1984 to 2007-2011, Delaware’s percentage of prostate cancer cases diagnosed in the local stage increased substantially from 49.6 percent to 86.0 percent – an increase of 73.6 percent.
- During the same time period, Delaware’s percentage of prostate cancer cases diagnosed in the distant stage decreased substantially from 27.3 percent to 3.0 percent – a decline of 38.3 percent.

**Figure 10-5. Percent of Prostate Cancer Cases by Stage at Diagnosis; Delaware, 1980-2011**



**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

## Prostate Cancer Mortality

For 2007-2011, Delaware ranked 17<sup>th</sup> in the nation for prostate cancer mortality, up from 24<sup>th</sup> for the 2006-2010 time period.<sup>29</sup>

### Deaths due to Prostate Cancer (Table 10-5)

- In Delaware and the U.S., prostate cancer is the second leading cause of cancer death among men (following lung cancer).
- During 2007-2011, 463 Delawarean males died from prostate cancer, accounting for 9.5 percent of all male cancer deaths in the state during this time period.
- Of the 463 decedents, 354 decedents (76.5 percent) were Caucasian; 105 decedents (22.7 percent) were African American, and four decedents (0.9 percent) were other or unknown race.

**Table 10-5.** Number of Prostate Cancer Deaths by County and Race; Delaware, 2007-2011

	All Male	Caucasian	African American
<b>DELAWARE</b>	463	354	105
<b>Kent</b>	69	45	23
<b>New Castle</b>	271	210	60
<b>Sussex</b>	123	99	22

**SOURCE:** Delaware Health Statistics Center, 2014.

### Prostate Cancer Mortality Rates (Table 10-6)

- Delaware's 2007-2011 prostate cancer mortality rate (23.4 per 100,000) was not significantly different from the U.S. rate (22.3 per 100,000).
- Delaware's 2007-2011 prostate cancer mortality rate for African Americans (44.7 per 100,000) was significantly higher than the Caucasians (20.9 per 100,000). The same trend was observed nationally; in the U.S., the African American prostate cancer mortality rate (48.9 per 100,000) was significantly higher than the Caucasian rate (20.6 per 100,000).

**Table 10-6.** Five-Year Average Age-Adjusted Prostate Cancer Mortality Rates and 95% Confidence Intervals by Race; U.S., Delaware and Counties, 2007-2011

Region	All Male	Caucasian	African American
<b>United States</b>	22.3 (22.2 , 22.5)	20.6 (20.5 , 20.7)	48.9 (48.3 , 49.6)
<b>DELAWARE</b>	23.4 (21.3 , 25.7)	20.9 (18.8 , 23.2)	44.7 (36.1 , 54.4)
<b>Kent</b>	21.4 (16.5 , 27.3)	17.2 (12.4 , 23.2)	---
<b>New Castle</b>	25.6 (22.6 , 28.9)	23.8 (20.6 , 27.2)	39.6 (29.5 , 51.5)
<b>Sussex</b>	21.2 (17.4 , 25.5)	18.3 (14.7 , 22.5)	---

\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

--- = Rates based on fewer than 25 deaths are not shown

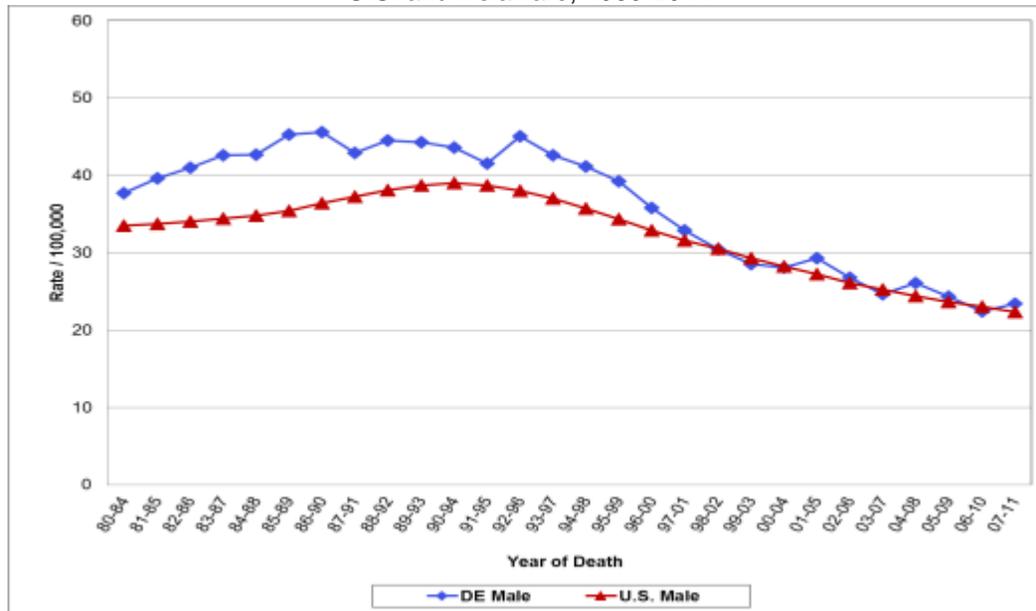
**SOURCE:** Delaware: Delaware Health Statistics Center, 2014; U.S.: National Center for Health Statistics, 2014.

<sup>29</sup> Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, [http://seer.cancer.gov/csr/1975\\_2011/](http://seer.cancer.gov/csr/1975_2011/), based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

## Trends in Prostate Cancer Mortality (Figures 10-6 and 10-7)

- From 1997-2001 to 2007-2011, Delaware's prostate cancer mortality rate decreased 28.9 percent while the comparable U.S. rate decreased 29.4 percent.

**Figure 10-6.** Five-Year Average Age-Adjusted Prostate Cancer Mortality Rates; U.S. and Delaware, 1980-2011

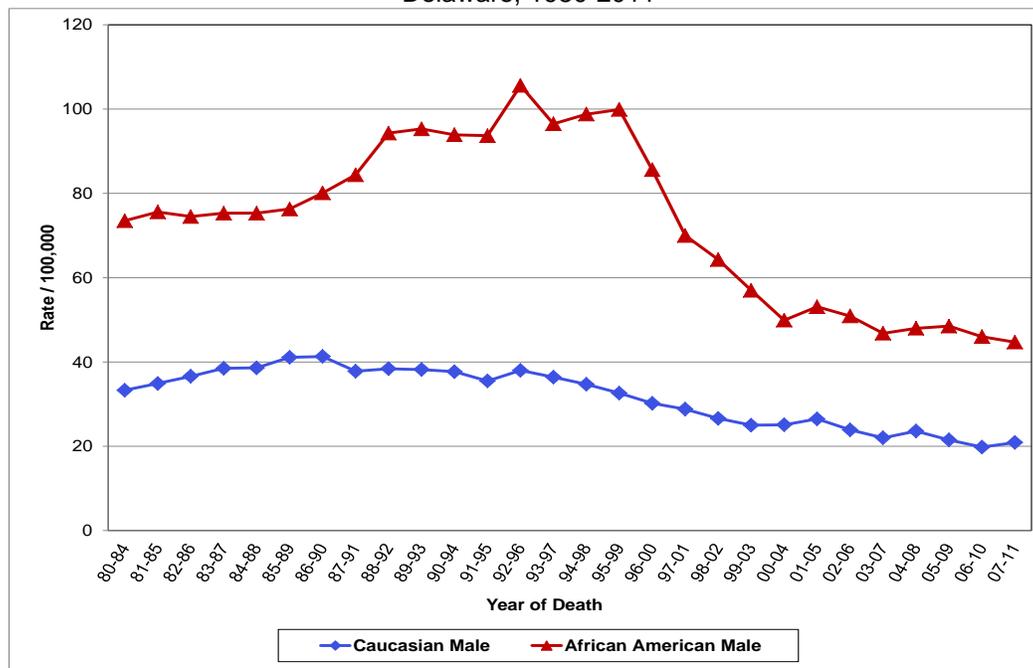


\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

**SOURCE:** Delaware: Delaware Health Statistics Center, 2014; U.S.: National Center for Health Statistics, 2014.

- From 1997-2001 to 2007-2011, Delaware's Caucasian and African American prostate cancer mortality rates decreased 27.4 percent and 36.1 percent, respectively.
- From 1987-1991 to 1995-1999, Delaware's prostate cancer mortality rate among African Americans was substantially elevated compared to Caucasians. Beginning in 2000-2004, however, the racial disparity began to narrow with each successive time period considered. As of 2007-2011, the African American and Caucasian rates were as similar as they have ever been since cancer data surveillance efforts began in 1980. Still, the prostate cancer mortality rate among African American males in Delaware remains nearly double the comparable rate for Caucasians.

**Figure 10-7. Five-Year Average Age-Adjusted Prostate Cancer Mortality Rates by Race; Delaware, 1980-2011**



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

SOURCE: Delaware Health Statistics Center, 2014.

### Age-Specific Prostate Cancer Mortality Rates (Table 10-7 and Figure 10.8)

- Delaware's 2007-2011 age-specific rates show that the prostate cancer mortality rate was highest among males ages 65-74. When age-specific rates were calculated separately by race, the same trend was observed for Caucasian and African American males.
- Among Delaware males ages 60-74, the prostate cancer mortality rate for African Americans was 61.2 percent higher than the comparable Caucasian rate.

**Table 10-7. Age-Specific Prostate Cancer Mortality Rates by Race; Delaware, 2007-2011**

Age at Death	All Male	Caucasian	African American
0-39	---	---	---
40-64	6.1	4.9	---
65-74	67.4	56.4	144.7
75-84	176.3	147.8	474.5
85+	528.2	513.0	---

\* = Rates are per 100,000 population. --- = Rates based on fewer than 25 deaths are not shown.

SOURCE: Delaware Health Statistics Center, 2014.

## 11. THYROID CANCER

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### Risk Factors and Early Detection

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#### **Lifestyle Risk Factors for Thyroid Cancer:**

- Consuming a diet low in iodine

#### **Environmental and Medically-Related Causes of Thyroid Cancer:**

- Exposure to radiation fallout from power plant accidents or nuclear weapons (particularly in childhood)
- History of head or neck radiation treatments in childhood
  - Risk increases with larger doses of radiation and younger ages of treatment initiation.

#### **Non-Modifiable Thyroid Cancer Risk Factors (Risk Factors That Cannot be Changed):**

- Gender (Thyroid cancer is three times more common among women than men.)
- Age (Risk peaks for women in their 40s and 50s, and for men in their 60s and 70s.)
- Race (Thyroid cancer risk is elevated for Caucasians compared to African Americans.)
- Several inherited conditions (Approximately one-third of medullary thyroid carcinomas (MTCs) arise from inheriting an abnormal gene.)

#### **Factors Protective against Thyroid Cancer:**

- Avoid unnecessary x-rays
- Genetic counseling for persons with family history
- Removal of thyroid gland in children who have inherited the abnormal gene that places them at higher risk for development of thyroid cancer.

#### **Early Detection of Thyroid Cancer:**

- Routine checkups by health care provider
- Self-examination of neck to identify any abnormal lumps or bumps
- Routine diagnostic tests for persons at high risk

## Thyroid Cancer Incidence

For 2007-2011, Delaware's thyroid cancer incidence rate was 28<sup>th</sup> highest in the U.S, up from 31<sup>st</sup> in 2006-2010. Males ranked 21<sup>st</sup> (20<sup>th</sup> in 2006-2010) and females ranked 32<sup>nd</sup> (35<sup>th</sup> in 2006-2010) in thyroid cancer incidence.<sup>30</sup>

### Cases of Thyroid Cancer (Table 11-1)

- From 2007-2011, 590 thyroid cancer cases were diagnosed in Delaware, accounting for 2.3 percent of all cancer cases diagnosed in the state during this time period.
- From 2007-2011, Delaware females accounted for three out of four diagnosed thyroid cancers (438 cases; 74.2 percent).

**Table 11-1.** Number of Thyroid Cancer Cases by Race and Sex; Delaware and Counties, 2007-2011

	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
<b>DELAWARE</b>	590	152	438	482	128	354	84	16	68
<b>Kent</b>	104	29	75	86	25	61	15	---	---
<b>New Castle</b>	362	88	274	288	68	220	56	13	43
<b>Sussex</b>	124	35	89	108	35	73	13	---	---

--- = Cell counts less than six are not shown to protect patient confidentiality.

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

### Thyroid Cancer Incidence Rates (Table 11-2)

- Delaware's 2007-2011 thyroid cancer incidence rate (12.6 per 100,000) was not statistically different from the comparable U.S. rate (12.9 per 100,000).
- For 2007-2011, Delaware's thyroid cancer incidence rate was significantly higher among females (18.2 per 100,000) than males (6.6 per 100,000). The same trend was observed at the national level. The U.S. female thyroid cancer incidence rate of 19.1 per 100,000 was significantly higher than the male rate of 6.4 per 100,000.

<sup>30</sup> U.S. Cancer Statistics Working Group. United States Cancer Statistics: 1999-2011 Incidence and Mortality Web-based Report. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; 2014. Available at: [www.cdc.gov/uscs](http://www.cdc.gov/uscs).

**Table 11-2.** Five-Year Average Age-Adjusted Thyroid Cancer Incidence Rates and 95% Confidence Intervals by Race and Sex; U.S., Delaware and Counties, 2007-2011

<b>RACE AND REGION</b>	<b>All</b>	<b>Male</b>	<b>Female</b>
<b>ALL RACES</b>			
<b>United States</b>	12.9 (12.8 , 13.0)	6.4 (6.3 , 6.5)	19.1 (19.0 , 19.3)
<b>DELAWARE</b>	12.6 (11.6 , 13.7)	6.6 (5.6 , 7.8)	18.2 (16.5 , 20.0)
<b>Kent</b>	12.7 (10.3 , 15.4)	7.6 (5.0 , 10.9)	17.5 (13.7 , 22.0)
<b>New Castle</b>	13.1 (11.8 , 14.6)	6.6 (5.3 , 8.2)	19.1 (16.9 , 21.6)
<b>Sussex</b>	11.3 (9.3 , 13.6)	5.9 (4.0 , 8.4)	16.5 (13.0 , 20.7)
<b>CAUCASIAN</b>			
<b>United States</b>	13.7 (13.5 , 13.8)	6.9 (6.8 , 7.0)	20.4 (20.2 , 20.7)
<b>DELAWARE</b>	13.7 (12.4 , 15.0)	7.1 (5.9 , 8.5)	20.1 (18.0 , 22.4)
<b>Kent</b>	13.9 (11.1 , 17.3)	8.4 (5.4 , 12.6)	19.4 (14.7 , 25.1)
<b>New Castle</b>	14.6 (12.9 , 16.4)	6.9 (5.3 , 8.7)	22.1 (19.2 , 25.3)
<b>Sussex</b>	11.3 (9.1 , 13.9)	6.8 (4.6 , 9.8)	15.7 (12.0 , 20.3)
<b>AFRICAN AMERICAN</b>			
<b>United States</b>	7.6 (7.3 , 7.8)	3.3 (3.0 , 3.5)	11.3 (10.9 , 11.7)
<b>DELAWARE</b>	8.7 (6.9 , 10.8)	3.8 (2.1 , 6.4)	12.8 (9.9 , 16.3)
<b>Kent</b>	---	---	---
<b>New Castle</b>	8.6 (6.4 , 11.3)	4.7 (2.4 , 8.4)	11.8 (8.5 , 16.1)
<b>Sussex</b>	---	---	---

\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

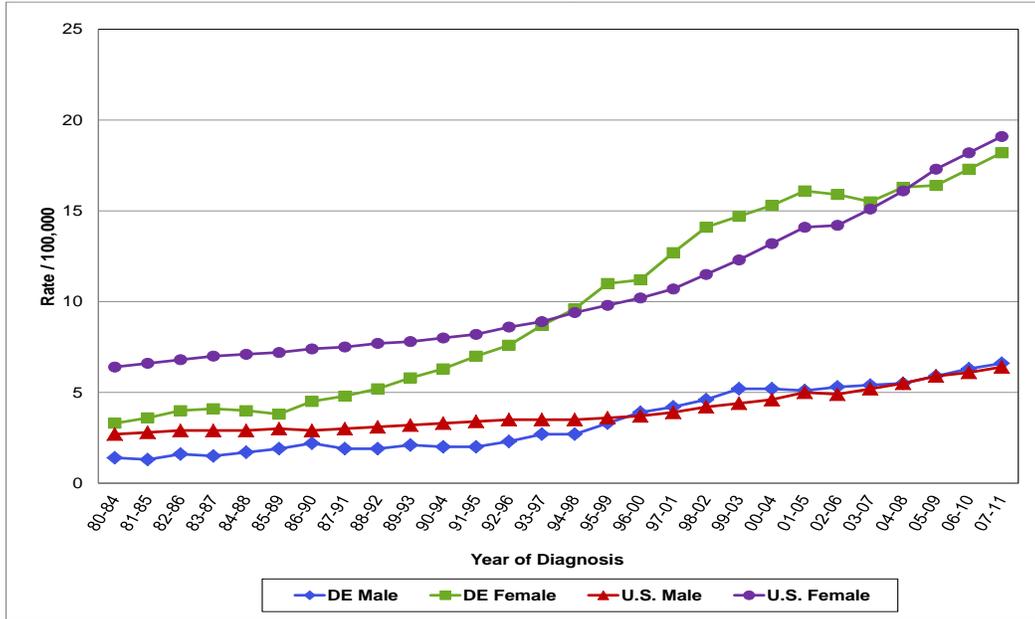
--- = Rates based on fewer than 25 cases are not shown.

**SOURCE:** Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

### Trends in Thyroid Cancer Incidence Rates (Figures 11-1 and 11-2)

- From 1997-2001 to 2007-2011, Delaware's thyroid cancer incidence rate increased 46.5 percent while the comparable U.S. rate increased 74.3 percent.
- From 1997-2001 to 2007-2011, Delaware's thyroid cancer incidence rates increased 57.1 percent among males and 43.4 percent among females. During the same time period, the U.S. thyroid cancer incidence rates increased 64.1 percent among males and 78.5 percent among females.

**Figure 11-1. Five-Year Average Age-Adjusted Thyroid Cancer Incidence Rates by Sex; U.S. and Delaware, 1980-2011**

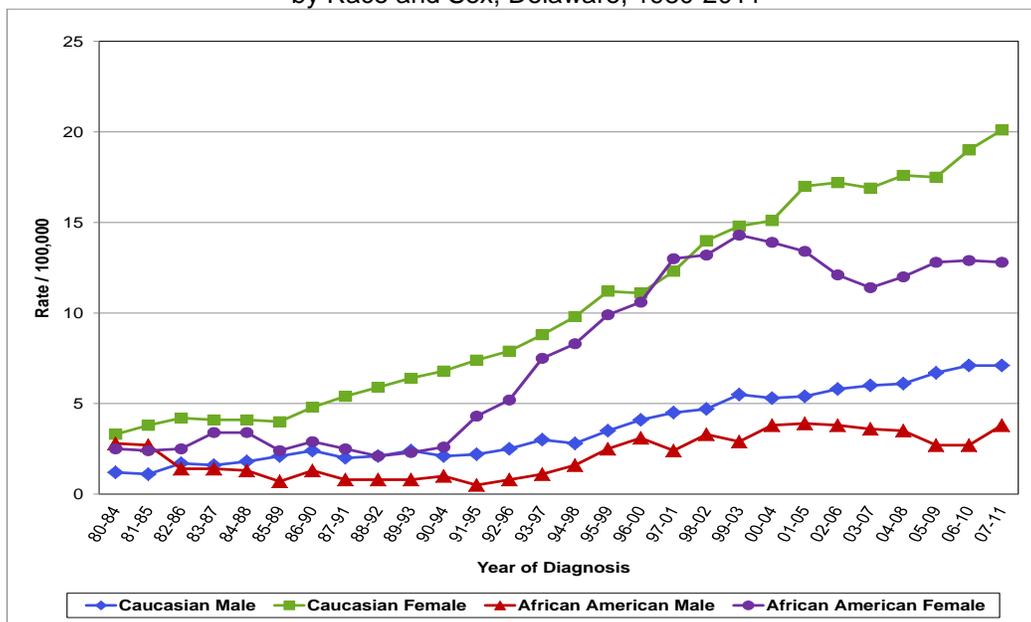


\* = Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

**SOURCE:** Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

- From 1997-2001 to 2007-2011, the overall thyroid cancer incidence rate for Delaware Caucasians increased 59.3 percent. Increases in thyroid cancer incidence affected both Caucasian males and females. During this time period, thyroid cancer incidence increased 57.8 percent for Caucasian males and 63.4 percent for Caucasian females.
- From 1997-2001 to 2007-2011, the overall thyroid cancer incidence rate for African American Delawareans increased 6.1 percent. However, the increase in thyroid cancer incidence did not affect African American males and females equally. During this time period, the thyroid cancer incidence rate for African American males increased 58.3 percent while the comparable rate for African American females declined 1.5 percent.

**Figure 11-2. Five-Year Average Age-Adjusted Thyroid Cancer Incidence Rates by Race and Sex; Delaware, 1980-2011**



\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.  
**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

**Age-Specific Thyroid Cancer Incidence Rates (Table 11-3)**

- Delaware’s age-specific thyroid cancer incidence rates show that incidence increases sharply beginning at ages 40-64 and remains fairly stable through ages 75-84.
- The number of thyroid cancer cases was too small to examine age-specific thyroid cancer incidence rates by race or gender.

**Table 11.1. Age-Specific Thyroid Cancer Incidence Rates by Race and Sex; Delaware, 2005-2009**

Age at Diagnosis	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
0-39	6.0	---	10.2	6.9	---	12	---	---	---
40-64	21.9	11.6	31.3	23.1	12.7	33.2	17.6	---	26.3
65-74	23.1	16.7	28.6	24.7	---	31.3	---	---	---
75-84	19.1	---	---	20.4	---	---	---	---	---
85+	---	---	---	---	---	---	---	---	---

\* = Rates are per 100,000 population.  
 --- = Rates based on fewer than 25 cases are not shown.  
**SOURCE:** Delaware Cancer Registry, Delaware’s Division of Public Health, 2012.

**Thyroid Cancer by Stage at Diagnosis (Tables 11-4 and 11-5, Figures 11-3 and 11-4)**

- During 2007-2011, a slightly larger percentage of thyroid cancer cases diagnosed among African American Delawareans was diagnosed in the local stage (80.0 percent), compared with Caucasian Delawareans (75.3 percent).
- During 2007-2011, 78.8 percent of thyroid cancer cases diagnosed among Delaware females were diagnosed in the local stage, compared to 65.1 percent of cases diagnosed among Delaware males.

**Table 11-4.** Number of Thyroid Cancer Cases by Stage at Diagnosis, Race and Sex; Delaware, 2007-2011

Stage at Diagnosis	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
Local	444	99	345	359	81	278	66	13	53
Regional	119	44	75	---	---	---	---	---	---
Distant	21	7	14	---	---	---	---	---	---
Unknown	6	---	---	---	---	---	---	---	---
<b>Total</b>	<b>590</b>	<b>152</b>	<b>438</b>	<b>482</b>	<b>128</b>	<b>354</b>	<b>84</b>	<b>16</b>	<b>68</b>

--- = Cell counts less than six are not shown to protect patient confidentiality.

**SOURCE:** Delaware Cancer Registry Delaware Health and Social Services, Division of Public Health, 2014.

**Table 11-5.** Percent of Thyroid Cancer Cases by Stage at Diagnosis, Race and Sex; Delaware, 2007-2011

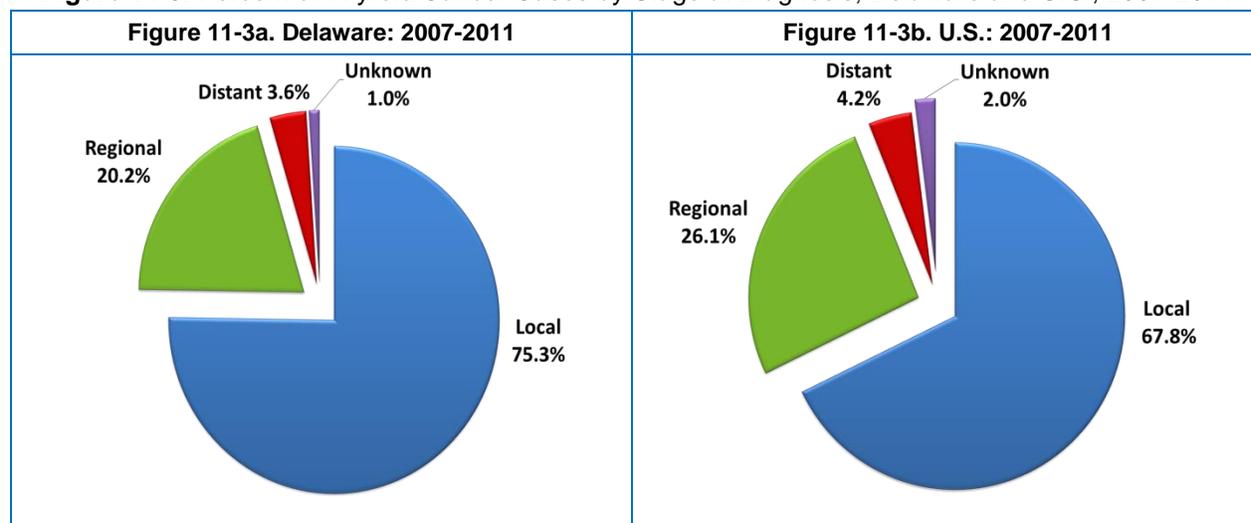
Stage at Diagnosis	All Races			Caucasian			African American		
	All	Male	Female	All	Male	Female	All	Male	Female
Local	75.3	65.1	78.8	74.5	63.3	78.5	78.6	81.3	77.9
Regional	20.2	28.9	17.1	---	---	---	---	---	---
Distant	3.6	4.6	3.2	---	---	---	---	---	---
Unknown	1.0	---	---	---	---	---	---	---	---
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>						

--- = Percentages based on cell counts less than six are not shown to protect patient confidentiality.

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

- In Delaware, during 2007-2011, 75.3 percent of thyroid cancers were diagnosed in the local stage, 20.2 percent were diagnosed in the regional stage, and 3.6 percent were diagnosed in the distant stage. Comparable percentages for the U.S. were 67.8 percent, 26.1 percent and 4.2 percent, respectively.

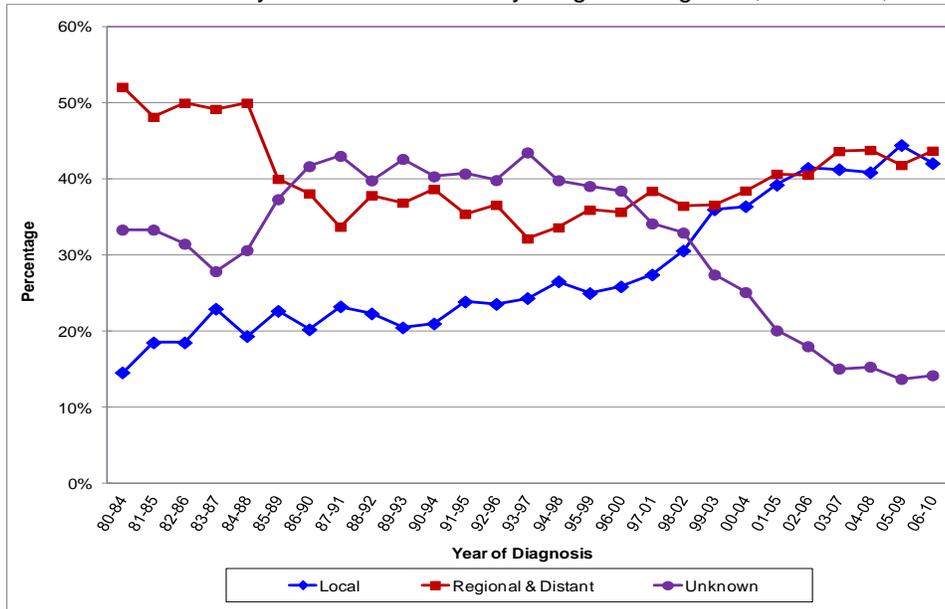
**Figure 11-3.** Percent of Thyroid Cancer Cases by Stage at Diagnosis; Delaware and U.S., 2007-2011



**SOURCE:** Delaware: Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014; U.S.: Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, 2014.

- From 1980-1984 to 2007-2011, the percentage of Delaware thyroid cancer cases diagnosed in the local stage increased from 52.5 percent to 75.3 percent. Concurrently, there was a decline in the percentage of thyroid cases diagnosed in the distant stage from 19.7 percent to 3.6 percent.

**Figure 11-4.** Percent of Thyroid Cancer Cases by Stage at Diagnosis; Delaware, 1980-2011



**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

## Thyroid Cancer Mortality

For 2007-2011, Delaware ranked 6<sup>th</sup> in the nation for thyroid cancer mortality, down from 4<sup>th</sup> for the 2006-2010 time period. A thyroid cancer mortality ranking for Delaware males was not available for the 2007-2011 time period due to the small number of cases. Delaware females ranked 7<sup>th</sup> (down from 5<sup>th</sup> for 2006-2010).<sup>31</sup>

### Deaths from Thyroid Cancer (Table 11-6)

- During 2007-2011, 31 Delawareans died from thyroid cancer, accounting for 0.3 percent of all cancer deaths that occurred in the state during this time period.
- Of the 31 Delawareans who died from thyroid cancer during 2007-2011, 18 (58.1 percent) were female.

**Table 11-5.** Number of Thyroid Cancer Deaths by County and Sex; Delaware, 2007-2011

	All Races		
	All	Male	Female
<b>DELAWARE</b>	31	13	18
<b>Kent</b>	9	---	---
<b>New Castle</b>	15	---	---
<b>Sussex</b>	7	---	---

--- = Cell counts less than six are not shown to protect patient confidentiality.

**SOURCE:** Delaware Health Statistics Center, 2014.

No further breakdown or analysis can be conducted due to the small number of thyroid cancer deaths.

<sup>31</sup> Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, [http://seer.cancer.gov/csr/1975\\_2011/](http://seer.cancer.gov/csr/1975_2011/), based on November 2013 SEER data submission, posted to the SEER web site, April 2014.

## 12. OVERWEIGHT / OBESITY AS A CANCER RISK FACTOR

The prevalence of overweight and obesity sharply increased in the U.S. and worldwide during the last decades of the 20<sup>th</sup> century. While the rate of increase of overweight and obesity has slowed, it has not stopped. Currently, just 26.1 percent of U.S. males and 32.6 percent of U.S. females are considered to have a healthy weight.<sup>32</sup> The vast majority of the U.S. population (75.4 percent) is overweight or obese, placing them at greater risk of developing cancer and also dying from the disease<sup>33</sup>.

### Current Prevalence of Overweight and Obesity

According to guidelines established by the National Institutes of Health (NIH), overweight and obesity are identified using the body mass index (BMI), calculated by dividing a person's weight (in kilograms) by their height (in meters) squared. Adults age 20+ are considered overweight if they have a body mass index (BMI) between 25.0 and 29.9. Obesity is defined as having a BMI of 30.0 or greater. For children and adolescents under the age of 20, overweight is defined as having a BMI-for-age at or above the sex-specific 85<sup>th</sup> percentile, but less than the 95<sup>th</sup> percentile. Obesity is defined as having a BMI-for-age at or above the sex-specific 95<sup>th</sup> percentile.

According to the most recently available 2013 data from the Delaware Behavioral Risk Factor Surveillance Survey (BRFSS), 33.5 percent of Delawareans are overweight and 31.0 percent are obese, while just 33.6 percent are considered normal weight.<sup>34</sup> At the national level, 35.4 percent of Americans are overweight and 29.4 percent are obese, while just 33.4 percent are considered normal weight. Considered together, 64.5 percent of Delawarean adults and 64.8 percent of U.S. adults are overweight or obese.

In Delaware and the U.S., the prevalence rate of overweight or obese is higher among males than females. In Delaware, 70.9 percent of males and 58.5 percent of females are overweight or obese. In the U.S., 73.0 percent of males and 64.7 percent of females are overweight or obese.<sup>35</sup>

When considered separately by race, in both Delaware and the U.S., Caucasian males are more likely than Caucasian females to be overweight or obese. In Delaware, 73.2 percent of Caucasian males and 53.1 percent of Caucasian females are overweight or obese. In the U.S., 73.2 percent of Caucasian males and 60.9 percent of Caucasian females are overweight or obese. Among African Americans in Delaware and the U.S., the opposite trend is observed. African American females in Delaware are more likely than their male counterparts to be overweight or obese (74.1 percent vs. 69.1 percent, respectively). Comparable prevalence rates for U.S. African American females and males are 82.2 percent and 70.7 percent, respectively.<sup>36</sup>

The prevalence of overweight or obese increases with age. Delawareans age 18-24 are much less likely to be overweight or obese compared to older residents. Among Delawareans age 18-24, 37.6 percent were overweight or obese in 2013. Comparable rates for Delawareans: ages 25-34 at 62.4 percent, ages 35-44 at 67.3 percent, ages 45-54 at 70.3 percent, ages 55-64 at 73.6 percent, and ages 65+ at 68.7 percent.<sup>37</sup> In the U.S., prevalence rates for overweight or obese among males age 20-39, 40-59, and 60+ were 63.5 percent, 77.8 percent, and 78.4 percent. Among U.S. females comparable prevalence rates were 59.5 percent, 66.3 percent, and 68.6 percent.<sup>38</sup>

Delaware-specific data about the prevalence of overweight and obesity among children and adolescents are not readily available. However, across the U.S., approximately 17 percent of children and teens age 2-19 are obese. Overall, U.S. obesity prevalence is higher among boys than girls (18.6 percent vs. 15.0 percent,

<sup>32</sup> CDC/NCHS, National Health and Nutrition Examination Survey, Hispanic Health and Nutrition Examination Survey (1982-1984), and National Health Examination Survey (1960-1962). See Appendix I, National Health and Nutrition Examination Survey (NHANES).

<sup>33</sup> *ibid*

<sup>34</sup> Behavioral Risk Factor Surveillance System; Delaware Calculated Variable Data Report, 2013

<sup>35</sup> CDC/NCHS, National Health and Nutrition Examination Survey, Hispanic Health and Nutrition Examination Survey (1982-1984), and National Health Examination Survey (1960-1962). See Appendix I, National Health and Nutrition Examination Survey (NHANES).

<sup>36</sup> *ibid*

<sup>37</sup> Behavioral Risk Factor Surveillance System; Delaware Calculated Variable Data Report, 2013

<sup>38</sup> Flegal, K.M., Carroll, M.D., Ogden, C.L., & Curtin, L.R. Prevalence and trends in obesity among US adults, 1999-2008. *JAMA* 2010; 303(3): 235-241.

respectively. U.S. obesity prevalence is higher among children and adolescents age 12-19 (18.4 percent) than among those age 2-5 (2.1 percent).<sup>39</sup>

## Historical Trends

In the U.S., prevalence rates of overweight or obese sharply increased beginning in the mid-1970s and continued to increase at a rapid pace throughout the end of the 20<sup>th</sup> century. Between 1976-1980 and 1988-1994, the national prevalence of overweight or obese increased from 48.5 percent to 58.5 percent among U.S. adults.<sup>40</sup> Between 1988-1994 and 1999-2000, it increased again to 69.5 percent. By the early 2000s, the soaring prevalence rates of overweight or obese began to slow. From 2001-2002 to 2005-2006, the prevalence rate increased from 71.0 percent to 73.5 percent. By 2009-2010, it increased slightly to 75.4 percent. Currently, the prevalence rate for overweight or obese is estimated at 75.4 percent among U.S. adults.<sup>41</sup>

When stratified by BMI, it is clear that the sharp increases in overweight or obese prevalence rates that occurred in the U.S. since the mid-1970s are mainly attributable to increases in the percentage of the population that is obese or extremely obese, as opposed to the segment of the population that is overweight. Since 1960-1962, the U.S. prevalence of overweight increased slightly from 31.5 percent to 34.4 percent in 2003-2004, then declined slightly to its current (2011-2012) rate of 33.3 percent. By contrast, the prevalence rates for obesity and extreme obesity in 1960-1962 were 13.4 percent and 0.9 percent, respectively. By 2011-2012, U.S. prevalence rates for obesity and extreme obesity had grown to 35.5 percent and 6.6 percent, respectively.<sup>42</sup>

While overweight or obese prevalence rates have slowed, they continue to increase at a slower pace among certain segments of the U.S. Between 1999-2000 and 2009-2010, obesity prevalence increased significantly among males (from 27.5 percent to 35.5 percent) but non-significantly among females (from 33.4 percent to 35.8 percent).<sup>43</sup> A similar trend was observed among U.S. children and adolescents. Between 1999-2000 and 2009-2010, obesity prevalence increased significantly among boys age 2-19 (from 14.0 percent to 18.6 percent) but non-significantly among girls (from 13.8 percent to 15.0 percent).<sup>44</sup>

## Overweight and Obesity as Cancer Risk Factors

Being overweight or obese sharply increases a person's risk for cancer. Research estimates that in 2007 alone, obesity accounted for approximately 33,966 new cancers (4 percent of all cancers diagnosed) in U.S. males and 50,535 new cancers (7 percent of all cancers diagnosed) in U.S. females.<sup>45</sup> In terms of cancer mortality, overweight and obesity are estimated to account for nearly 14 percent of all male cancer deaths and 20 percent of all female cancer deaths in the U.S.<sup>46</sup> If every adult in the U.S. maintained a BMI under 25.0 throughout his or her life, more than 90,000 U.S. deaths per year from cancer might be avoided.<sup>47</sup>

The importance of overweight and obesity as cancer risk factors varies by cancer type. For some cancers, overweight and obesity are not predictors of developing the disease. For other cancer types, such as endometrial cancer, uterine cancer, and esophageal adenocarcinoma, overweight and obesity are estimated to account for up to 40 percent of new cancer cases. Research has found strong evidence for a linear association between BMI and increased risk for the development of uterine, gallbladder, kidney, cervical, and thyroid cancers, as well as leukemia.<sup>48</sup> A linear association means that as BMI increases, so, too, does the risk of development of the disease. That is, those with a BMI of 40.0 or greater are at greater risk for cancer than those with a BMI of 35.0-39.9. Those with a BMI of 35.0-39.9 are at greater risk for cancer than those with a BMI of

<sup>39</sup> Ogden, C., Carroll, M.D., Kit, B.K., & Flegal, K.M. Prevalence of obesity in the United States, 2009-2010. *NCHS Data Brief* 2012; 82: 1-7.

<sup>40</sup> Fryar, C.D., Carroll, M.D., & Ogden, C.L. Prevalence of overweight, obesity, and extreme obesity among adults: United States, 1960-1962 through 2011-2012. *NCHS Health E-Stats* (2014): 1-6.

<sup>41</sup> *ibid*

<sup>42</sup> *ibid*

<sup>43</sup> Ogden, C., Carroll, M.D., Kit, B.K., & Flegal, K.M. Prevalence of obesity in the United States, 2009-2010. *NCHS Data Brief* 2012; 82: 1-7.

<sup>44</sup> *ibid*

<sup>45</sup> Polednak AP. Estimating the number of U.S. incident cancers attributable to obesity and the impact on temporal trends in incidence rates for obesity-related cancers. *Cancer Detection and Prevention* 2008; 32(3):190-199.

<sup>46</sup> Calle, E.E., Rodriguez, C., Walker-Thurmond, K., & Thun, M.J. Overweight, obesity, and mortality from cancer in a prospectively studied cohort of U.S. adults. *NEJM* 2003; 348(17): 1625-1638.

<sup>47</sup> *ibid*

<sup>48</sup> Bhaskaran, K., Douglas, I., Forbes, H., dos-Santos-Silva, I., Leon, D.A., & Smeeth, L. Body-mass index and risk of 22 specific cancers: a population-based cohort study of 5.24 million UK adults. *Lancet* 2014; 384(9945): 755-765.

30.0 to 34.9, and so forth. Weaker, but still evident, associations were found between BMI and the risk of developing liver, colon, ovarian, and postmenopausal breast cancers.<sup>49</sup>

In addition to the development of cancer, overweight and obesity are strongly associated with death from cancer. A major prospective study by the ACS (the Cancer Prevention Study II) began following over 1 million U.S. adults in 1982 to gain insight into how different risk factors impacted cancer incidence and mortality rates. Among adults with the heaviest BMIs (40.0 or greater), all-site cancer mortality rates were 52 percent higher for males and 62 percent higher for females than the rates for their normal weight counterparts.<sup>50</sup>

Among males, significant linear trends in death rates with increasing BMI exist for all-site cancer, esophageal cancer, stomach cancer, colorectal cancer, liver cancer, gallbladder cancer, pancreatic cancer, prostate cancer, kidney cancer, non-Hodgkin's lymphoma, multiple myeloma, and leukemia.<sup>51</sup> Among females, significant linear trends in death rates with increasing BMI exist for all-site cancer, colorectal cancer, liver cancer, gallbladder cancer, pancreatic cancer, breast cancer, uterine cancer, cervical cancer, ovarian cancer, kidney cancer, non-Hodgkin's lymphoma, and multiple myeloma.<sup>52</sup>

For several cancer types, the increased risk from death among the heaviest adults (those with a BMI of 40.0) is striking. Among men with a BMI of 40.0 or greater, the liver cancer death rate is over 4.5 times as high as that of their normal weight counterparts. The pancreatic cancer death rate is over 2.6 times as high as that of their normal weight counterparts. Among women with a BMI of 40.0 or greater, the uterine, kidney, and cervical cancer death rates are 6.3 times, 4.8 times, and 3.2 times higher than the comparable death rates among their normal weight counterparts.<sup>53</sup>

### Hypothesized Mechanisms of Impact

The ways in which overweight and obesity increases cancer risk are complex and generally classified into two groups: (a) widespread effects stemming from general hormonal or metabolic abnormalities that increase the likelihood of nearly all tumor types; or (b) site-specific effects stemming from damaged tissues or organs that increase the likelihood of very specific tumor types.<sup>54</sup> Research points to several mechanisms through which overweight and obesity exert their effects on cancer risk. Three of the main mechanisms are reviewed below.

- **Diet.** Overweight and obesity can result from excessive dietary intake as well as poor quality of diet. General dietary patterns such as high alcohol intake and low fruit, vegetable, and fiber intake have long been associated with increased cancer risk. Research continues to uncover the links between specific micronutrient and macronutrient intake associated with increased risk of developing cancer. As one example, low levels of Vitamin C and lycopene were associated with increased breast cancer risk among women.<sup>55</sup>
- **Physical Activity.** In addition to helping to achieve and maintain a healthy body weight, regular physical activity impacts many metabolic processes such as the regulation of sex hormones, insulin, and prostaglandins. Regular physical activity is less common among overweight and obese individuals compared to normal weight individuals. Physically active men and women have a 30 to 40 percent reduction in colon cancer risk compared to their inactive peers.<sup>56</sup> Physically active women have a 20 to 30 percent reduction in breast cancer risk.<sup>57</sup>
- **Insulin Resistance.** Overweight and obese people often have elevated levels of insulin in their bloodstream. High circulating levels of insulin are associated with colorectal, pancreatic, liver, postmenopausal breast, and endometrial cancers, among others.<sup>58</sup> Additionally, increases in the availability

<sup>49</sup> *ibid*

<sup>50</sup> Calle, E.E., Rodriguez, C., Walker-Thurmond, K., & Thun, M.J. Overweight, obesity, and mortality from cancer in a prospectively studied cohort of U.S. adults. *NEJM* 2003; 348(17): 1625-1638.

<sup>51</sup> *ibid*

<sup>52</sup> *ibid*

<sup>53</sup> *ibid*

<sup>54</sup> DePergola, G. & Silvestris, F. Obesity as a major risk factor for cancer. *Journal of Obesity* 2013; 2013:291546, 1-11.

<sup>55</sup> Levi, F., Pasche, C., Lucchini, F. and La Vecchia, C. Dietary intake of selected micronutrients and breast-cancer risk. *Int. J. Cancer*, 2010; 91: 260-263

<sup>56</sup> Lee, I.M. Physical activity and cancer prevention-data from epidemiologic studies. *Medicine & Science in Sports & Exercise*, 2003; 35(11):1823-7.

<sup>57</sup> *ibid*

<sup>58</sup> DePergola, G. & Silvestris, F. Obesity as a major risk factor for cancer. *Journal of Obesity* 2013; 2013:291546, 1-11.

of insulin-like growth factor 1 stimulate tumor growth. Among others, insulin resistance has been linked to elevated risk of colon, liver, and pancreatic cancers.<sup>59</sup>

- **Chronic Inflammation.** Excess fat cells often produce a state of chronic inflammation throughout the body. In turn, chronic inflammation induces the body to remain in a state of chronic immune activation, a state that promotes cancer development<sup>60</sup>. Certain cancer types – such as breast and prostate cancer – are more likely to develop in chronically inflamed tissue. Additionally, research suggests that anti-inflammatory drugs can slow the rate of tumor growth.<sup>61</sup>

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<sup>59</sup> Tsugane, S. and Inoue, M. Insulin resistance and cancer: Epidemiological evidence. *Cancer Science* 2010; 101: 1073-1079

<sup>60</sup> O'Byrne, K.J. & Dalglish, A.G. Chronic immune activation and inflammation as the cause of malignancy. *British Journal of Cancer* 2001; 85(4): 473-483.

<sup>61</sup> *ibid*

## 13. CANCER INCIDENCE BY CENSUS TRACT

### Background

As required by Title 16, Chapter 292 of the *Delaware Code* (Appendix E), the Delaware Health and Social Services, Division of Public Health (DPH) publishes cancer rates by census tract annually. Specifically:

*“The agency [DPH] shall create a detailed map of each county in Delaware that graphically illustrates the overall incidence of cancer in each census tract. The census tracts will be identified on the maps and shall be color-coded to designate the degree of cancer incidence in each tract. These maps shall be created within 90 days of the agency receiving the cancer incidence data. The agency shall post the maps created ... on their website in a format that can be easily accessed and read by the public.”*

### Methods

Census tract analysis methods are described in detail in Appendix F.

- As of the 2010 Census, Delaware is divided into 214 census tracts.
- For 2007-2011, the least populated census tract (511.01 in Sussex County) had an annual average of 676 residents. The most populous census tract (402.02 in Kent County) had an annual average population of 11,692 residents. The average annual number of residents per census tract was 4,160.
- For 2007-2011 census tract analyses, 25,921 Delaware cancer cases diagnosed during the time period were included in the analyses. One case was excluded due to unknown residence at the time of diagnosis.

### Results of Census Tract Analyses

Cancer incidence rates by census tract (with confidence intervals) are shown in Appendix H for the 2007-2011 time period. Census tracts with rates that are significantly higher or lower than the state average are shaded in yellow and blue, respectively.

#### Results for 2007-2011 show that:

- In nine of Delaware’s 214 census tracts, the all-site cancer incidence rate was statistically significantly higher than Delaware’s average 2007-2011 incidence rate (510.5 per 100,000)<sup>62</sup>
- In 14 of Delaware’s 214 census tracts, the all-site cancer incidence rate was statistically significantly lower than Delaware’s average 2007-2011 incidence rate (510.5 per 100,000).
- All-site cancer incidence rates for the remaining 192 census tracts were not significantly different from the state’s average rate for the 2007-2011 time period.

Appendix I shows maps of Delaware census tracts grouped by 2007-2011 all-site cancer incidence quintile. Appendix J shows maps of Delaware census tracts in which census tracts with 2007-2011 all-site cancer incidence rates are significantly different from the state average. These are shaded for ease of identification.

<sup>62</sup> 510.5 is average 2007-2011 Delaware incidence rate calculated by Excel rather than SEER\*Stat (508.9).

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## Discussion of Results of Census Tract Analyses

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When assessing cancer incidence data by census tract, it should be kept in mind that the occurrence of cancer may differ across census tracts for a variety of reasons. For example, lifestyle behaviors may cluster in a homogeneous community. In addition, the presence or absence of exposure to environmental or occupational carcinogen(s) is often limited to a defined geographic area. In addition, residents in certain geographic areas may be more impoverished than other residents, which will affect their availability of health insurance coverage as well as their level of access to health care, particularly cancer screening services. Finally, chance or random variation can play a role, since approximately 5 percent of all comparisons will be significantly different due to chance alone.

Additional caution is needed when comparing results from the 2007-2011 census tract analysis to results for 2003–2007 and earlier time periods. Because of the change in the configuration of census tracts in Delaware (i.e., shifting from 197 census tracts defined by the 2000 Census to 214 census tracts defined by the 2010 Census), results derived using the two different census tract configurations would be expected to differ due to various reasons. Despite population growth in the intervening decade, the average population size of each census tract decreased when census tracts were redrawn for the 2010 Census. Using the 2000 Census configuration of 197 census tracts, each census tract had an average of 4,257 residents. Using the 2010 Census configuration of 214 census tracts, each census tract had an average of 4,118 residents.

Furthermore, there is an inherent instability in calculating cancer incidence rates at the census tract level. In a small group, such as a census tract, the relative number of cancer diagnoses can change considerably from year to year. If one case of cancer is diagnosed in a census tract one year, and three cases of cancer are diagnosed in the same census tract the next year, the cancer rate for that census tract will change dramatically from one year to the next. These relatively large fluctuations do not typically occur in larger populations. If a census tract has an all-site cancer incidence rate that is significantly different from the state rate for one time period, it is not unusual to find a non-significant difference in rates for the following time period (and vice versa).

The all-site cancer incidence fluctuations in census tract 513.02 illustrate this key point. During 2003-2007, 134 cancer cases were diagnosed and the all-site cancer incidence rate of 823.3 per 100,000 in census tract 513.02 was significantly elevated, compared to the all-site cancer incidence rate for Delaware as a whole. In 2004-2008, 123 cancer cases were diagnosed in census tract 513.02 – 11 fewer than the previous time period. However, despite the decrease in the number of cases, the all-site cancer incidence rate of 649.2 per 100,000 for this time remained significantly elevated, compared to the all-site cancer incidence rate for Delaware as a whole. For the most recent time period, 2007-2011, 112 cancer cases were diagnosed in census tract 513.02, yielding an all-site cancer incidence rate of 583.9 per 100,000 – not statistically significantly different from the all-site cancer incidence rate for the Delaware as a whole.

Inaccurate data on the population at risk in small geographic areas continues to complicate epidemiologic studies in community settings. Census data are known to be less accurate for cities or counties than for states. In addition: *“The uncertainty is greatest for demographic subgroups of the population during the 10-year interval between national census counts.”*<sup>63</sup> Because population estimates for census tracts in analyses during the three initial time periods (2001-2005, 2002-2006, 2003-2007) relied solely on 2000 Census population data, there was the potential for major fluctuations in the rate when comparing that data with data using the 2010 Census population projections. A further complication is that before 2004-2008, geocoding was not yet available, further reducing the accuracy of geographic data.

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<sup>63</sup> Thun M. Sinks T. Understanding Cancer Clusters. *Cancer: A Cancer Journal for Clinicians*, 54(5), 273-280 (2004)

## Appendix A: Data Sources and Methodology

### Cancer Incidence Data

#### Delaware Cancer Registry

This report covers data on cancer cases diagnosed among Delawareans from January 1, 2007 to December 31, 2011 and that were reported to the Delaware Cancer Registry (DCR) by May 2013. Trends in incidence rates are based on cancers diagnosed from January 1, 1980 to December 31, 2011.

During 2007-2011, 25,475 cancer cases were diagnosed among Delawareans, which includes individuals with cancers diagnosed at more than one site (known as multiple primaries). With the exception of bladder cancer, only malignant tumors are included in the analyses. *In situ* bladder cancer cases are included because, based on language used by pathologists, it is difficult to distinguish them from malignant cancers.

The International Classification of Diseases for Oncology, Second Edition (ICD-O-2), describes the topography (primary anatomic site) and morphology (histology) for cancers reported from 1988 through 2000. Cancers diagnosed from 2001 through the present are coded using the International Classification of Diseases for Oncology, Third Edition (ICD-O-3).<sup>64</sup> Relevant codes for this report are in Appendix B. The topography code defines both the site of the tumor and the type of cancer. The first four digits of the morphology code define the histology of the cancer and the fifth digit indicates whether or not the cancer is malignant, benign, *in situ*, or uncertain. Consistent with publication of the Centers for Disease Control and Prevention's (CDC) *U.S. Cancer Statistics*, Kaposi's sarcoma and mesothelioma are considered separate sites based on distinct histology codes.

#### SEER Program of the National Cancer Institute

U.S. incidence and mortality data obtained from the Surveillance, Epidemiology and End Results (SEER) program of the National Cancer Institute were used as the comparison for Delaware's cancer incidence and mortality rates. These data were accessed using SEER\*Stat. Since 1973, the SEER program collects, analyzes, and disseminates cancer incidence data for cancer control, diagnosis, treatment and research from population-based registries throughout the United States. The initial SEER reporting areas were Connecticut, Iowa, New Mexico, Utah, and Hawaii; the metropolitan areas of Detroit, Michigan, and San Francisco-Oakland, California; and the Commonwealth of Puerto Rico (through 1989). Additional geographic areas were selected for inclusion in the SEER Program based on their ability to operate and maintain a high quality population-based cancer reporting system and for their epidemiologically-relevant population subgroups.<sup>65</sup>

Historically, Delaware's cancer incidence rates have been compared to cancer incidence rates calculated using data from the original nine registries (SEER-9) that provided data to SEER beginning in 1974-1975. In 2009, Delaware's Division of Public Health (DPH) and the Delaware Cancer Consortium elected to begin using cancer incidence rates based on 17 population-based registries as a comparison for Delaware's cancer incidence rates. Currently SEER incidence rates are based on data from 18 population-based registries (SEER-18) that represent 28 percent of the U.S. population. The primary benefit of using U.S. comparison rates derived from SEER-18 is that these rates are based on a larger and more representative sub-sample of the U.S. population. Also, comparing Delaware's incidence rates with rates derived from the SEER-18 registries provides a comparison of cancer surveillance statistics that is consistent with those of other population-based registries throughout the U.S.

<sup>64</sup> Fritz A, Jack A, Parkin DM, Percy C, Shanmugarathan, Sobin L, Whelan S (eds). International Classification of Diseases for Oncology, Third Edition (ICD-O-3). World Health Organization, Geneva.

<sup>65</sup> Surveillance, Epidemiology and End Results (SEER) Program, National Cancer Institute. <http://seer.cancer.gov/about/>

## Cancer Mortality Data

### Delaware Health Statistics Center

Mortality data are provided by the Delaware Health Statistics Center for all death certificates filed in Delaware from 2007 through 2011. Five-year average annual age-adjusted cancer mortality rates are based on deaths that occurred in the five-year time period from January 1, 2007 to December 31, 2011. Trends in cancer mortality are presented for deaths that occurred from 1980 through 2011.

Underlying cause-of-death codes are based on the International Classification of Diseases, Ninth Edition (ICD-9) for deaths that occurred between 1980 and 1998. For deaths that occurred from 1999 to the present, the International Classification of Diseases, Tenth Edition (ICD-10) is used to code cause of death. To determine the underlying cause of death, the sequence of events leading to the individual's death are recorded on the death certificate and run through the Automated Classification of Medical Entities (ACME) software used by the National Center for Health Statistics. This program uses a series of rules and hierarchies of events to select the most appropriate underlying cause of death.

### National Center for Health Statistics

U.S. mortality data were obtained from the National Center for Health Statistics (NCHS). U.S. mortality data are compiled from all death certificates filed in the 50 states and the District of Columbia from 1980 through 2011. Cause of death was coded by NCHS in accordance with World Health Organization regulations that stipulate that cancer deaths be coded using the most current revision of the International Classification of Diseases. As in Delaware, deaths that occurred prior to 1999 in the U.S. are coded using ICD-9 and beginning with 1999 deaths are coded using ICD-10. These U.S. mortality data were accessed through SEER\*Stat.<sup>66</sup>

## Population Estimates, 2007-2011

Cancer incidence and mortality rates for the U.S. are calculated using population totals estimated by the U.S. Census. Delaware rates are based on population estimates released by the Delaware Population Consortium (DPC) in March 2012.

## Risk Factors and Early Detection

Data on known and suspected cancer risk factors, prevention options, and screening recommendations are located at the beginning of each site-specific chapter of this report. Primary resources for this information are: (1) American Cancer Society ([www.cancer.org](http://www.cancer.org)) and (2) National Cancer Institute ([www.cancer.gov](http://www.cancer.gov)).

The Behavioral Risk Factor Surveillance System (BRFSS) system provides estimates of the prevalence of risk factors across Delaware and nationally. The most recently available risk factor data from BRFSS are from 2013. Risk factor data are included in appropriate chapters for site-specific cancers; supplemental data on obesity, physical inactivity, and diet are presented in Appendix D.

## Statistical Methodology and Technical Terms

### Age-Adjustment of Incidence and Mortality Rates

The age distribution of a population is an important determinant of the burden of cancer. Because cancer incidence and mortality increase with age, crude rates cannot be used for comparisons of cancer statistics between sexes, racial or ethnic groups, or geographic entities across different time spans.

Age adjustment is useful when comparing two or more populations with different age distributions at one point

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<sup>66</sup> SEER\*Stat Software, Surveillance, Epidemiology and End Results (SEER) program, National Cancer Institute. <http://seer.cancer.gov/seerstat/index.html>

in time or one population at two or more points in time.<sup>67</sup> To calculate an age-adjusted incidence rate, the crude incidence rate for each of 18 five-year age groups is multiplied by a fixed population weight for that specific age group using the appropriate 2000 U.S. Standard Population (Table A-1).<sup>68</sup> Individual age-specific rates are then summed to obtain the overall age-adjusted rate.

**Table A-1. U.S. Standard Year 2000 Population Weights, by Age Group**

Age Group	Population Weight	Age Group	Population Weight
0-4	0.0691	45-49	0.0721
5-9	0.0725	50-54	0.0627
10-14	0.0730	55-59	0.0485
15-19	0.0722	60-64	0.0388
20-24	0.0665	65-69	0.0343
25-29	0.0645	70-74	0.0318
30-34	0.0710	75-79	0.0270
35-39	0.0808	80-84	0.0178
40-44	0.0819	85+	0.0155

Source: Surveillance, Epidemiology, and End Results Program  
<http://seer.cancer.gov/stdpopulations/19ages.proportions.html>

The formula for an age-adjusted rate can be presented as follows:

$$\text{Age-Adjusted Rate} = \text{sum} (w_i \times ((c_i/n_i) \times 100,000))$$

- $c_i$  is the number of new cases or deaths in the  $i$  age group.  $n_i$  is the population estimate for the  $i$  age group.
- $w_i$  is the proportion of the standard population in the  $i$  age group.
- All rates were expressed per 100,000 of the population.

### Race- and Sex-Specific Incidence and Mortality Rates

Race- and sex-specific incidence and mortality rates are calculated to assess how cancer patterns differed across subgroups within the state. These rates are calculated by dividing the number of cases or deaths that occurred in each race and/or sex group by the total population in the corresponding race and/or sex group over the same time period. As with other rates, these rates were adjusted to the U.S. standard population and expressed per 100,000 of the population.

### Confidence Intervals

Age-adjusted incidence and mortality rates are subject to chance variation, particularly when they are based on a small number of cancer cases or deaths occurring over a limited time period or in a limited geographic area. Aggregating several years of data provides more reliable estimates of incidence and mortality in these situations. The level of uncertainty associated with incidence and mortality rates is estimated by the 95% confidence interval.

When incidence rates are based on more than 100 cases, lower and upper limits of the 95% confidence intervals for an age-adjusted (AA) incidence or mortality rate are calculated using SEER\*Stat<sup>69</sup> by methodology shown here.<sup>70</sup>

<sup>67</sup> Anderson RN, Rosenberg HM. Report of the second workshop on age adjustment. National Center for Health Statistics. Vital Health Stat 4(30). 1998.

<sup>68</sup> Klein RJ, Schoenborn CA. Age Adjustment Using the 2000 Projected U.S. Population. Healthy People statistical notes, no. 20. <http://www.cdc.gov/nchs/data/statnt/statnt20.pdf>

<sup>69</sup> Surveillance, Epidemiology and End Results (SEER) Program, National Cancer Institute. SEER\*Stat Software, Latest Release: Version 7.1.0 - July 17, 2012. <http://seer.cancer.gov/seerstat/index.html>

<sup>70</sup> Tiwari RC, Clegg LX, Zou Z. Efficient interval estimation for age-adjusted cancer rates. Stat Methods Med Res 2006;15(6):547-69.

$$\text{Lower Confidence Limit} = \text{AA Rate} - 1.96 \left( \frac{\text{AA Rate}}{\sqrt{\# \text{ Cases}}} \right)$$

$$\text{Upper Confidence Limit} = \text{AA Rate} + 1.96 \left( \frac{\text{AA Rate}}{\sqrt{\# \text{ Cases}}} \right),$$

- where AA Rate is the age-adjusted incidence or mortality rate

When an incidence or mortality rate is based on fewer than 100 cases or deaths, the 95% confidence intervals are calculated using the following formulas:

$$\begin{aligned} \text{Lower Confidence Limit (LCL)} &= \text{AA Rate} \times L \\ \text{Upper Confidence Limit (LCL)} &= \text{AA Rate} \times U \end{aligned}$$

where L and U are values published by the National Center for Health Statistics for the specific purpose of calculating 95% confidence intervals for rates based on fewer than 100 cases.<sup>71</sup>

### Stage at Diagnosis

Stage at diagnosis describes the extent to which a cancer has spread from the site of origin at the time of diagnosis. SEER summary staging is used to define the stage at diagnosis for all incident cancer cases. Cancer cases diagnosed between 1980 and 2000 are coded according to Summary Stage 1977. Cases diagnosed from 2001 through 2003 are coded according to Summary Stage 2000. Beginning in 2004, SEER Summary Stage 2000, derived using the Collaborative Staging Algorithm, is used.

Three categories define the stage at diagnosis for a particular cancer site:

1. **Local** - Tumor is invasive but confined to the organ of origin.
2. **Regional** - Tumor has extended beyond limits of the organ of origin with no evidence of distant metastasis.
3. **Distant** - Cancer cells have detached from the tumor at the primary site and are growing at a new site in the body.

### Data Release Standards

For this report, cancer frequencies and rates are released according to DPH Policy Memorandum 49 (Data and Data Release Standards). Incidence and mortality frequencies of fewer than six are not presented and age-adjusted incidence and mortality rates based on fewer than 25 cases or deaths are not calculated. This DPH policy helps protect patient privacy and confidentiality.<sup>72, 73</sup> Furthermore, a cancer rate based on a very small number of cases is inherently unstable and cannot be reliably interpreted.

### Definition of Race

Race-specific statistics in this report are limited to Caucasians and African Americans, with the exception of Section 12 (Overweight/Obesity as a Cancer Risk Factor) and Appendix C. Incidence and mortality rates for the total population, however, do include residents of all race categories or unknown race regardless of Hispanic ethnicity status.

<sup>71</sup> Martin JA, Hamilton BE, Ventura SJ, Menacker F, Park MM, Sutton PD. Births: Final data for 2001. National vital statistics reports; vol. 51 no. 2. Hyattsville, Maryland: National Center for Health Statistics, 2002.

<sup>72</sup> Coughlin SS, Clutter GG, Hutton M. Ethics in Cancer Registries. *Journal of Cancer Registry Management*, 2: 5-10, 1999.

<sup>73</sup> McLaughlin CC. Confidentiality protection in publicly released central registry data. *Journal of Cancer Registry Management*, 2: 84-88, 2002.

## Appendix B: Primary Cancer Site Definitions<sup>74</sup>

Cancer Site Group	ICD-O-3 Site (Topography)	ICD-O-3 Histology (Morphology)
<b>Female Breast</b>	C500–C509	excludes 9050–9055, 9140 and 9590–9992
<b>Colon and Rectum</b>	C180–C189, C260, C199, C209	excludes 9050–9055, 9140 and 9590–9992
<b>Kidney</b>	C649, C659	excludes 9050–9055, 9140 and 9590–9992
<b>Leukemia</b>	C420, C421, C424	9733, 9742, 9800, 9801, 9805-9809, 9811-9818, 9820, 9823, 9826, 9827, 9831, 9832-9837, 9840, 9860-9861, ,9863, 9865-9867, 9869, 9870-9876, 9891, 9895-9898, 9910-9911, 9920, 9930-9931, 9940, 9945-9946, 9948, 9963-9964
<b>Lung and Bronchus</b>	C340–C349	excludes 9050–9055, 9140 and 9590–9992
<b>Myeloma</b>		9731-9732, 9734
<b>Prostate</b>	C619	excludes 9050–9055, 9140 and 9590–9992
<b>Thyroid</b>	C739	excludes 9050–9055, 9140 and 9590–9992

**SOURCE:** Surveillance, Epidemiology, and End Results Program [http://seer.cancer.gov/siterecode/icdo3\\_dwhohome/index.html](http://seer.cancer.gov/siterecode/icdo3_dwhohome/index.html)

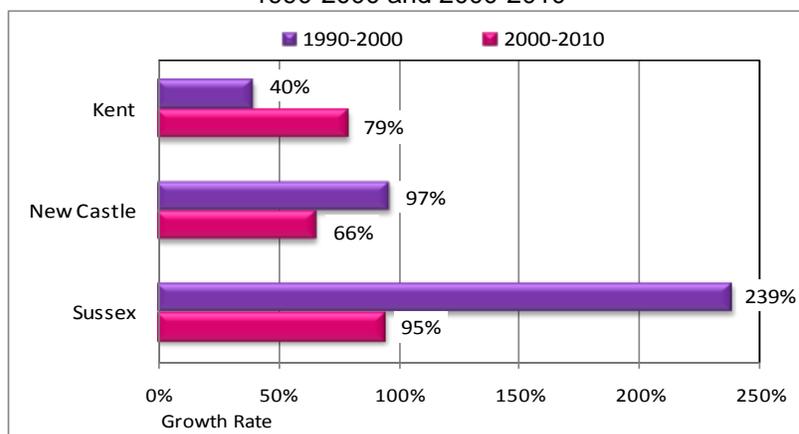
<sup>74</sup> Site Recode ICD-O-3/WHO 2008 Definition. [http://seer.cancer.gov/siterecode/icdo3\\_dwhohome/index.html](http://seer.cancer.gov/siterecode/icdo3_dwhohome/index.html) – accessed 8/21/2014.

## Appendix C: Cancer Incidence and Mortality among Persons of Hispanic Ethnicity

The Census Bureau defines "Hispanic or Latino" as "a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin regardless of race."<sup>75</sup> In 1990, persons of Hispanic ethnicity comprised 2.4 percent of Delaware's population. By 2000, Delaware's Hispanic population doubled to 4.8 percent. As of the 2010 U.S. Census, persons of Hispanic origin comprise 8.4 percent of Delaware's population.

The largest growth in the Hispanic population occurred in Sussex County, where the Hispanic prevalence grew from 1.3 percent in 1990 to 4.4 percent in 2000, and again to 8.6 in 2010. Historically, since 1990 when Hispanic prevalence data began to be collected, New Castle County had the largest percentage of persons of Hispanic ethnicity. The Hispanic population in New Castle County grew from 2.7 percent in 1990, to 5.3 percent in 2000, and to 8.7 percent in 2010. Among Kent County residents, the Hispanic population grew from 2.3 percent in 1990, to 3.2 percent in 2000, and to 5.8 percent in 2010.

**Figure C-1.** Changes in Delaware's Hispanic Population by County and Decade, 1990-2000 and 2000-2010



**SOURCE:** U.S. Census Bureau 2010, American FactFinder <http://factfinder2.census.gov/>

Hispanic cancer rates were calculated for 2007-2011. Incidence and mortality frequencies of fewer than six cases and incidence and mortality rates based on fewer than 25 cases are not shown according to the Division of Public Health Policy Memorandum 49. Cancer rates are heavily influenced by changes or uncertainties in the number of cancer cases and the size of the population. Specific issues that suggest that Hispanic cancer rates would be subject to misinterpretation are discussed below:

- **Uncertain estimate of Delaware's Hispanic population** — Estimates of Delaware's population are derived from the census performed every 10 years by the U.S. Census Bureau. The Delaware Population Consortium (DPC) uses census data to estimate the Delaware population between census years. In preparation for the post-2010 Census benchmarking when the race categories will shift to white non-Hispanic, black non-Hispanic, other non-Hispanic, and Hispanic, a separate projection for Hispanics is provided by the DPC. This projection is made by using the overall age structure of the total population and applying the current percentage of a given age-sex category measured in the American Community Survey for years 2007-2011 combined. A final adjustment was made based on projections from the U.S. Census Bureau as to the overall rate of growth for the Hispanic population in both the state and the nation. A more conventional methodology will be used for the 2012 Delaware Population Consortium release.
- **Inaccurate recording of Hispanic ethnicity on death certificates** — Race and Hispanic origin are treated as distinct categories and reported separately on death certificates and to the Delaware Cancer

<sup>75</sup> Grieco, EM, Cassidy RC. (2001-03). "[Overview of Race and Hispanic Origin: Census 2000 Brief](http://www.census.gov/prod/2001pubs/cenbr01-1.pdf)" U.S. Census Bureau. <http://www.census.gov/prod/2001pubs/cenbr01-1.pdf> Accessed May 26, 2011.

Registry, in accordance with guidelines from the federal Office of Management and Budget. However, it is possible that Hispanic race is under-reported both in the cancer registry and on death certificates.

- **Hispanic Identification in the Delaware Cancer Registry data** — NAACCR convened an Expert Panel in 2001 to develop a best practices approach to Hispanic identification. In the resulting approach to enhance Hispanic identification, the NAACCR Hispanic Identification Algorithm (NHIA) was computerized and released for use by central cancer registries in 2003. NHIA is used for identification of Hispanic origin in this report. The expert panel continues to evaluate NHIA considering the possibility of under- or over-estimation of Hispanic cancer incidence using this algorithm due to misclassification.
- **Small number of cases or deaths and small population sizes** — An incidence or mortality rate is an estimate, and the reliability of estimates can be measured by calculating a confidence interval. A narrow confidence interval suggests that the rate is a good estimate; a wide confidence interval suggests that the rate should be interpreted with caution. If the confidence intervals of two rates do not overlap, the rates are considered to be statistically different. Both the size of the numerator (the number of cases or deaths) and size of the denominator (the population) determine the width of the confidence interval. Typically, researchers report 95% confidence intervals. When constructed properly, a 95% confidence interval includes the true cancer rate 95 percent of the time.

### Cancer Incidence among Persons of Hispanic Ethnicity (Table C-1)

- During 2007-2011, 638 cases of cancer were reported among Delawareans known to be of Hispanic ethnicity: 307 male (48.1 percent) and 331 female (51.9 percent).
- The 2007-2011 all-site cancer incidence rate for Hispanic Delawareans was 425.9 per 100,000 and this incidence rate is significantly lower than the rate for the state of Delaware (508.9 per 100,000).
- The all-site cancer incidence rate among Hispanic males (438.1 per 100,000) is significantly lower than the comparable rate for Delaware males (591.5 per 100,000). Among Hispanic females, however, the all-site cancer incidence rate (427.8 per 100,000) is not significantly different from the comparable rate for Delaware females (446.5 per 100,000).

### Cancer Mortality among Persons of Hispanic Ethnicity (Table C-2)

- During 2007-2011, 140 deaths from cancer occurred among Delawareans known to be of Hispanic ethnicity: 82 male (58.6 percent) and 58 female (41.4 percent).
- The 2007-2011 all-site cancer mortality rate for Hispanic Delawareans was 124.1 per 100,000 and this mortality rate is significantly lower than the rate for the state of Delaware (184.2 per 100,000).
- The mortality rate among Hispanic males (148.9 per 100,000) is significantly lower than the comparable rate for Delaware males (221.2 per 100,000). The mortality rate for Hispanic females (104.8 per 100,000) is significantly lower than the comparable rate for Delaware females (157.9 per 100,000).

**Table C-1. Cancer Cases, Population Size and Age-Adjusted Cancer Incidence Rates;  
Delaware Hispanic Population, 2007-2011**

Cancer Site and Sex	Number of Cases	Five-Year Population	Age-Adjusted Incidence Rate and 95% Confidence Interval
All-Site: Both Sexes	638	370,980	425.9 (392.8 , 458.9)
All-Site: Males Only	307	186,065	438.0 (389.0 , 487.0)
All-Site: Females Only	331	165,749	427.9 (381.8 , 474.0)
Breast (Female)	109	165,749	135.4 (110.0 , 160.9)
Colorectal: Both Sexes	44	370,980	29.7 (21.6 , 39.9)
Colorectal: Males Only	27	186,065	36.6 (24.1 , 53.2)
Colorectal: Females Only	17	165,749	---
Lung: Both Sexes	50	370,980	41.1 (30.5 , 54.2)
Lung: Males Only	23	186,065	---
Lung: Females Only	27	165,749	46.7 (30.8 , 68.0)
Prostate (Male)	98	186,065	163.7 (132.9 , 199.5)

\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

--- = Rate not shown when fewer than 25 cases.

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

**Table C-2. Cancer Deaths, Population Size and Age-Adjusted Cancer Mortality Rates;  
Delaware Hispanic Population, 2007-2011**

Cancer Site and Sex	Number of Deaths	Five-Year Population	Age-Adjusted Mortality Rate and 95% Confidence Interval
All-Site: Both Sexes	140	370,980	124.1 (103.5 , 144.6)
All-Site: Males Only	82	186,065	148.9 (118.4 , 184.8)
All-Site: Females Only	58	165,749	104.8 (79.6 , 135.5)
Breast (Female)	8	165,749	---
Colorectal: Both Sexes	12	370,980	---
Colorectal: Males Only	8	186,065	---
Colorectal: Females Only	4	165,749	---
Lung: Both Sexes	25	370,980	22.3 (14.4 , 32.9)
Lung: Males Only	17	186,065	---
Lung: Females Only	8	165,749	---
Prostate (Male)	9	186,065	---

\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

--- = Rate not shown when fewer than 25 deaths.

**SOURCE:** Delaware Health Statistics Center, 2014

## Appendix D: Behavioral Risk Factors

The Behavioral Risk Factor Surveillance System (BRFSS) system is the world's largest, on-going telephone health survey system, tracking health conditions and risk behaviors in the United States yearly since 1984. Currently, monthly data are collected in all 50 states, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, and Guam. The survey was developed to monitor the statewide prevalence of behavioral risk factors that influence premature morbidity and mortality. The BRFSS survey includes a core set of questions developed by the Centers for Disease Control and Prevention (CDC) and is administered to adults ages 18 and older. Delaware's BRFSS system is a collaborative effort between Delaware's Division of Public Health (DPH) and the CDC. BRFSS survey questions target lifestyle behaviors (including tobacco use, fruit and vegetable consumption, exercise, and weight control), cancer screening practices, health status, and health care access and use.<sup>76</sup>

Technological and cultural changes are posing challenges to survey research. One of the most significant challenges has been the rapid increase in households in which telephone service is provided primarily or only via cell phone service. These "cell phone only" households are, at least currently, more common among young adults and minority populations.

Originally, the BRFSS survey was administered by random-digit-dial telephone survey. Starting with reporting of 2011 data, the BRFSS became a "multi-mode survey," using several modes of data collection—including landline telephone interviews, cell phone interviews, and online follow-up surveys for some respondents who don't want to respond by phone. The BRFSS now also uses a new method for weighting data called raking that more accurately reflects the actual population of each state.<sup>77</sup>

Because cell phones are so quickly replacing landline phones, it was difficult to obtain a true representative sample of some population subgroups during the late 2000s. The response rate problems likely resulted in less accurate prevalence estimates for some behaviors or conditions more prevalent in populations who primarily use cell phones. For example, the prevalence of cigarette smoking, which is known to be more prevalent among young adults, may have been under-estimated for several years.

The data below relate to cancer screening and risk factor prevalence among Delawareans for 2012. Data on breast, colorectal, and prostate cancer screening patterns among Delawareans are provided in relevant cancer site chapters earlier in this document. Cervical cancer screening data are provided below.<sup>78</sup>

### Cervical Cancer Screening

The Behavioral Risk Factor Surveillance System (BRFSS) has collected data on cervical cancer screening in Delaware annually from 1995 to 2000, and biannually since then. As mentioned above, the BRFSS 2012 and 2013 prevalence data are not directly comparable to previous years of data because of changes in weighting methodology and the addition of the cell phone sampling frame.

- In 2012, Delaware women age 18 and older were tied with Maryland for the highest prevalence nationally of having had a Pap test within the previous three years (82.2 percent). In the U.S., 78.0 percent of U.S. women age 18 and older reported having had a Pap test within the previous three years.
- In Delaware, African American females were more likely to have had a Pap test within the previous three years than Caucasian females (87.5 percent vs. 82.0 percent, respectively). However, this difference in prevalence rates did not meet the threshold of statistical significance.
- In 2012, significantly fewer Delaware women ages 18-24 reported having had a Pap test in the last three years (61.1 percent) than women in all other age groups, with the exception of women age 65 and older.

<sup>76</sup> Behavioral Risk Factor Surveillance System <http://www.cdc.gov/brfss/>

<sup>77</sup> Behavioral Risk Factor Surveillance System (BRFSS) Fact Sheet: Raking— Changing Weighting Methodology. [http://www.dhss.delaware.gov/dph/dpc/files/rakingweights\\_info.pdf](http://www.dhss.delaware.gov/dph/dpc/files/rakingweights_info.pdf)

<sup>78</sup> Delaware Behavioral Risk Factor Survey – Measuring Behaviors that Affect Health. <http://www.dhss.delaware.gov/dph/dpc/brfsurveys.html>

Delaware women ages 35-44 had the highest cervical cancer screening prevalence of all age groups (94.9 percent) and this prevalence was significantly higher than the three oldest age groups.

- In Delaware, the prevalence of having had a Pap test within the previous three years was significantly higher among women earning \$50,000 (88.8 percent) than among those in the \$15,000 - \$24,999 income bracket (72.2 percent).
- In Delaware, there was a direct relationship between level of education and the prevalence of having had a Pap test within the previous three years. Only 73.3 percent of women with less than a high school education had a Pap test, compared to 89.9 percent of women who completed college (a statistically significant difference).

### **Overweight/Obesity**

Being overweight or obese is a risk factor for numerous cancers, including female breast, colorectal, kidney, and uterine cancers. In addition, being overweight or obese is a major risk factor for other chronic diseases including coronary heart disease, type 2 diabetes, and stroke.

The CDC defines overweight as a body mass index (BMI) from 25 to less than 30; and obese as a BMI equal to or greater than 30. BMI is calculated using an individual's height and weight.<sup>79</sup> The following data are specific to the 2012 BRFSS:

- In Delaware, 66.0 percent of adults ages 18 and over were overweight or obese in 2012 compared to 63.4 percent of adults in the U.S.
- In 2012, the prevalence of overweight in Delaware differed significantly by sex: 45.9 percent of males were overweight vs. 32.5 percent of females.
- The prevalence of obesity among adult Delawareans did not, however, differ by sex: 26.0 percent of males and 27.8 percent of females were obese in 2012.
- In 2012, the prevalence of overweight did not differ significantly between Caucasian and African American Delawareans (39.7 percent vs. 35.0 percent, respectively). However, in Delaware significantly more African Americans (34.5 percent) than Caucasians in Delaware were obese (25.6 percent).
- The prevalence of being overweight was highest among college graduates (43.2 percent) and differed significantly from those with some education after high school (35.0 percent).
- The prevalence of obesity was statistically significantly higher among adults with some education after high school (31.2 percent) than among college graduates (20.5 percent).
- The prevalence of obesity was lowest among adults with an income level of more than \$50,000 (25.0 percent) and significantly lower than the obesity prevalence rate among those earning \$25,000-\$34,999 (35.5 percent).
- Among Delawareans, the prevalence of obesity was highest among those ages 55-64 (34.7 percent) and differed significantly from those less than 35 or ages 65 and over.
- Delawareans ages 45-54 had the highest prevalence of overweight (45.3 percent) and differed significantly from those less than 35.

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<sup>79</sup> About BMI for Adults [http://www.cdc.gov/healthyweight/assessing/bmi/adult\\_bmi/index.html](http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html)

## Physical Activity

Lack of physical activity is a substantiated risk factor for colorectal cancer and a suspected risk factor for other cancers (e.g., prostate cancer). The benefits of regular sustained physical activity also include reduction in risk for other chronic diseases including coronary heart disease, type 2 diabetes, and stroke, and improved overall well-being.

Respondents in the 2012 BRFSS survey are considered “physically active” if they respond ‘yes’ to the question: “During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?”

- In Delaware, 76.5 percent of adults ages 18 and older were considered physically active compared with 77.1 percent at the national level.
- In Delaware, the prevalence of adults who reported they were physically active was significantly higher among men (79.4 percent) than women (73.9 percent).
- African American Delawareans were less likely to be physically active than Caucasians (74.7 percent and 76.8 percent, respectively); however, the difference was not statistically significant.
- Delawareans ages 25-34 had the highest prevalence of physical activity (84.3 percent), followed by ages 18-24 (83.1 percent). Among Delawareans ages 65 and older, 66.0 percent reported being physically active.
- The prevalence of physical activity was significantly lower among Delawareans earning less than \$15,000 per year (67.2 percent) compared to Delawareans in the two highest income categories, \$35,000-\$49,000 per year (77.5 percent) and \$50,000 or more per year (84.4 percent).
- In Delaware, significantly more college graduates (88.0 percent) were physically active than those with less education. By education level, physical activity prevalence rates among Delawareans were: among those with less than a high school diploma, 61.1 percent; among those with a high school diploma or GED, 73.0 percent; among those with some post high school education, 77.4 percent.

## Dietary Fruits and Vegetables

A diet high in fruits and vegetables is a protective factor against numerous cancers, including cancers of the breast, cervix, colon/rectum, uterus, esophagus, oral cavity, ovary, pancreas, prostate and stomach. The following data are from the 2012 BRFSS:

- In Delaware, 25.0 percent of adults consumed five or more servings of fruit and/or vegetables a day compared to 23.4 percent of adults in the U.S. (non-significant difference).
- Significantly fewer Delaware males (21.7 percent) consumed five or more servings of fruits and vegetables daily than females (28.0 percent).
- In Delaware, a larger percentage of Caucasians (24.9 percent) than African Americans (20.6 percent) consumed five or more servings of fruits and vegetables daily; however, this difference was not statistically significant.

## Appendix E: Title 16 Chapter 292 of the Delaware Code

CHAPTER 292  
FORMERLY  
SENATE BILL NO. 235  
AS AMENDED BY  
SENATE AMENDMENT NO. 2  
AND  
HOUSE AMENDMENT NO. 1

AN ACT TO AMEND TITLE 16 OF THE DELAWARE CODE RELATING TO UNIFORM HEALTH DATA REPORTING.  
BE IT ENACTED BY THE GENERAL ASSEMBLY OF THE STATE OF DELAWARE:

WHEREAS, the State of Delaware traditionally has one of the highest rates of cancer incidence and mortality in the United States;

WHEREAS, identification of clusters of certain types of cancers in specific locations can help public health agencies develop intervention strategies leading to early detection when cancer is more easily cured;

WHEREAS, providing such data to medical researchers outside state government may assist in the process of both identifying cancer clusters and developing intervention strategies;

WHEREAS, the public good is served by allowing citizens to know of potential hazards in their communities so they can take actions to preserve their health;

WHEREAS, it is equally important to preserve the privacy and dignity of people afflicted with cancer, and

WHEREAS, the Department of Health and Social Services, Division of Public Health has opted to err on the side of cancer patient privacy by withholding even generic data on cancer clusters from other researchers and the public;

NOW THEREFORE:

BE IT ENACTED BY THE GENERAL ASSEMBLY OF THE STATE OF DELAWARE:

Section 1. Amend Chapter 20, Title 16 of the Delaware Code by renumbering §2005 through 2008 as §2006 through 2009, respectively.

Section 2. Amend Chapter 20, Title 16 of the Delaware Code by inserting a new §2005 to read as follows:

“§2005(a). Cancer incidence data.

Notwithstanding any provisions in this Title to the contrary, the agency shall make available as public records cancer incidence by census tract and by type of cancer. Such released data shall be assigned consensus tract geography from the most recent decennial census. If release of such information by census tract will explicitly or implicitly identify any individual, the agency may combine data among contiguous census tracts, but only insofar as is necessary to protect patient confidentiality.

(b) The agency shall create a detailed map of each county in Delaware that graphically illustrates the overall incidence of cancer in each census tract. The census tracts will be identified on the maps and shall be color-coded to designate the degree of cancer incidence in each tract. These maps shall be created within 90 days of the agency receiving the cancer incidence data.

(c) The agency shall post the maps created under the subsection above on their website in a format that can be easily accessed and read by the public.”

Section 3. Amend §1232(d) Title 16 of the Delaware Code by deleting the word “or” at the end of paragraph (6) and by inserting the word “or” at the end of paragraph 7 and by adding a new paragraph “(8)” to read as follows:

“(8) Pursuant to Title 16 §2005.”

Section 4. Amend Subchapter III of Chapter 12 of Title 16 of the Delaware Code by inserting a new section §1233 to read as follows:

“§1233. Regulations.

The Department of Health and Social Services shall enforce this subchapter and shall from time to time promulgate any additional forms and regulations that are necessary for this purpose.”

Approved July 3, 2008

## Appendix F: Cancer Incidence by Census Tract: Methodology

### Geocoding Validation Process

Accurate census tract assignment is necessary for valid rate calculation at the census tract level. The accuracy of census tract assignment is entirely dependent on the accuracy and quality of patient address data. To assure accuracy and quality, cancer cases submitted to the Delaware Cancer Registry (DCR) undergo quality assurance review of the data fields for each patient's address. The case-level quality review of street address data includes correction of misspellings, incomplete addresses, and address formats. Accurint<sup>®</sup>, a Lexis Nexis<sup>®</sup> service, is used to assign a valid physical street address to P.O. Box addresses where possible. DCR staff also use Accurint<sup>®</sup> to assign a valid physical street address to rural addresses where possible.

Geocoding software is then used to assign cases to a census tract based on the patient's address at time of diagnosis. Some cases may not be coded to the street address level in this step, due to recently created streets that are not yet embedded within the geocoding software. For these cases, further manual review and census tract assignment is conducted using the American Factfinder<sup>®</sup> and Google Maps<sup>®</sup> online databases.

### Preliminary Analyses

Cancer case files created for DPH by the DCR include all eligible<sup>80</sup> cancer cases diagnosed among Delawareans from January 1, 2007 through December 31, 2011. Within this time period, 100 percent of the cases (all but one case) were successfully geocoded; i.e. the residential census tract of the individual was identified. The table below shows the percentage level of certainty of the census tract assignments in each time period. The level of certainty code shown in the table below indicates the basis of the assignment of census tract for each individual. More than 99 percent of cases were assigned a census tract based on a complete and valid address of residence.

Census tract based on level of certainty:	2007-2011
1 – complete & valid street address of residence	25,313 (99.4%)
2 – residence ZIP + 4	7 (.03%)
3 – residence ZIP + 2	60 (.24%)
4 – residence ZIP code only	78 (.31%)
5 – ZIP code of P.O. Box	17 (.07%)
9 – address missing	1 (.00%)
<b>Total number of cases:</b>	<b>25,476</b>

### Five-Year Population Estimates by Census Tract

As of the 2000 U.S. Census, Delaware was comprised of 197 census tracts and census tract analyses through 2003-2007 used the 2000 Census tract designations. As of the 2010 Census, however, Delaware was realigned into 214 census tracts. These new census tract subdivisions became available beginning with the 2004-2008 analyses. Approximately half of the 2010 Census tracts remained the same as in the 2000 Census and the rest have either combined with others or split into two or more new census tracts.

Note that census tracts do not follow a consecutive numbering scheme. New Castle County contains 129 census tracts numbered 2.00 through 169.04, Kent County is comprised of 32 tracts numbered 401.00 through 434.00. Sussex County includes 53 tracts numbered 501.01 through 519.00.

Census tract populations for 2007-2011 were calculated using estimates from the Delaware Population Consortium (DPC) and both the 2000 Census and 2010 Census. Population data specific for each five-year age category and census tract from both the 2000 and 2010 Census were used to calculate the proportion that each of the 18 age groups contributed to the overall census tract population. For intervening years, age-specific population estimates were obtained by extrapolating between the 2000 and 2010 Census population data.

<sup>80</sup> Excludes benign tumors, non-urinary bladder in situ tumors, and basal and squamous cell cancers per reporting guidelines mandated by the Surveillance, Epidemiology, and End Results Program of the National Cancer Institute.

For each census tract, denominators for each year within the five-year study period were summed to obtain the total population for the five-year study period. Five-year population estimates for the 2007-2011 study period range in size from 3,468 for census tract 511.01 in Sussex county to 50,241 for census tract 402.02 in Kent county.

### Age-Adjusted and Crude Incidence Rates, by Census Tract

For each census tract, cross-tabulations (age group x census tract) were created to determine the number of cancer cases diagnosed by census tract and age group. These frequencies were used to calculate crude incidence rates at the census tract level.

Crude incidence rates represent the total number of new cancer diagnoses divided by the total population at risk, without consideration of any age-related characteristics of the population. To calculate a crude incidence rate by census tract, the number of cancer cases diagnosed in each age group is divided by the population size for that specific age group. These values were then multiplied by 100,000 ( Equation 1).

#### Equation 1: 2007-2011 Crude All-Site Incidence Rate, 45-49 year olds, census tract 999.99

$$\frac{(\text{No. cancer cases (2006 - 2010) among 45 - 49 year olds in CT999.99})}{(\text{2006 - 2010 population, 45 - 49 year olds in CT999.99})} = \frac{(5)}{(929)} \times 100,000 = 538.2 \text{ per } 100,000$$

Age-adjusted incidence rates were then calculated to take into account the different age distributions for the populations at risk. To calculate age-adjusted incidence rates, crude incidence rates for each age group were multiplied by the appropriate 2000 U.S. Standard Population weight for that age group (Appendix A). Age-adjusted incidence rates for each of the 18 age groups were then summed to yield the age-adjusted incidence rate for an entire census tract.

### 95% Confidence Intervals

Confidence intervals represent the range of values in which the cancer rate could reasonably fall. Our best estimate of the cancer rate in a particular census tract is the incidence rate, itself. However, the rate could reasonably lie anywhere between the lower confidence limit (LCL) and the upper confidence limit (UCL). Because of this, a confidence interval is sometimes called the “margin of error.”

**When incidence rates are based on more than 100 cases**, 95% confidence intervals are calculated using the following formulas:

$$\text{Lower Confidence Limit} = \text{AA Rate} - 1.96 \left( \frac{(\text{AA Rate})}{\sqrt{\# \text{ Cases}}} \right)$$

$$\text{Upper Confidence Limit} = \text{AA Rate} + 1.96 \left( \frac{(\text{AA Rate})}{\sqrt{\# \text{ Cases}}} \right),$$

- where AA Rate is the age-adjusted incidence rate for a particular census tract.

**When incidence rates are based on fewer than 100 cases**, 95% confidence intervals are calculated using the following formulas:

$$\text{Lower Confidence Limit} = \text{AA Rate} \times L$$

$$\text{Upper Confidence Limit} = \text{AA Rate} \times U,$$

Where:

- AA Rate is the age-adjusted incidence rate for a particular census tract, and
- L and U are values published by the National Center for Health Statistics for the specific purpose of calculating 95% confidence intervals for rates based on fewer than 100 cases.<sup>81</sup>

<sup>81</sup> Martin JA, Hamilton BE, Ventura SJ, Menacker F, Park MM, Sutton PD. Births: Final data for 2001. National vital statistics reports; vol 51 no. 2. Hyattsville, Maryland: National Center for Health Statistics. 2002.

## Comparing Census Tract Rates to the State Rate

The level of uncertainty associated with an incidence rate is reflected in the width of its confidence interval. Very wide confidence intervals mean that the incidence rate is estimated with a small degree of certainty. Smaller intervals indicate an incidence rate estimate with a greater level of certainty.\

The width of a confidence interval is influenced by two factors: (a) the number of cancer cases in the population and (b) the size of the population under consideration. When a cancer rate is calculated for a small population in which only a handful of cases were diagnosed, we would expect the confidence interval for the rate to be very wide. On the other hand, when a cancer rate is calculated for a large population in which many cases were diagnosed, we expect the confidence interval for the rate to be narrower.

The width of a confidence interval is important because it is used to determine if the amount by which two incidence rates differ is statistically significant. If the confidence interval for an incidence rate in one area overlaps with the confidence interval for a rate in another area, the rates are said to be “not statistically significantly different from one another.” Even though the two rates may look very different, if the cancer rate for one area is NOT statistically significantly different from the cancer rate for another area, researchers cannot say that one rate is truly different from the other rate.

On the other hand, if the confidence interval for the incidence rate in one area does NOT overlap with the confidence interval for an incidence rate in another area, the two rates are statistically significantly different. When the rate for one area is significantly different from the rate for another area, the difference between the rates is greater than would be expected by chance alone.

For each census tract, the all-site incidence rate is compared to the all-site incidence rate for the state of Delaware. This allows DPH to identify any census tracts that have a cancer incidence rate that is statistically significantly higher or lower than the incidence rate for Delaware as a whole. If the confidence interval for an incidence rate overlaps with the confidence interval for the state incidence rate, the census tract rate is not statistically significantly different from the state rate. If the confidence interval for a census tract rate does not overlap with the confidence interval for the state rate, the census tract rate is said to be statistically significantly different from the state rate. Census tracts with significantly higher or lower cancer rates compared to the state are denoted in the rate table in Appendix H and in all color-coded maps in Appendices I and J.

## Supplemental Information

For 2007-2011 there were three census tracts with less than 25 cancer cases (census tracts 145.01, 145.02, and 411.00; denoted by the symbol “§” in Appendix H). When incidence rates are computed for an entire geographic area based on a very small number of cases, rates are estimated with a larger degree of uncertainty. This uncertainty is represented by a wide confidence interval which is more likely to overlap with the confidence intervals of incidence rates from other areas. This means that it is more difficult to establish a significant difference between incidence rates. For this reason, rates based on fewer than 25 cases are denoted in both the rate table and color-coded maps since they should be interpreted with caution.

## Appendix G: Cancer Incidence Rates by Census Tract: Interpretation

In brief:

- A cancer rate in a census tract will change year to year because of the relatively small population in each of the census tracts. For this reason, the incidence rates are uncertain, subject to wide variation, and difficult to interpret.
- To help understand how much confidence we should have in a cancer rate for a census tract, we calculated a confidence interval. A confidence interval represents the range of values in which the cancer incidence rate could reasonably fall. It is sometimes referred to as the “margin of error.”
- If the confidence interval of a cancer incidence rate in a census tract does not overlap with the confidence interval for the state, we say that there is enough confidence to call the incidence rate in the census tract significantly different from the state rate.
- Appendix H shows the confidence intervals for the cancer rates in each census tract and for the state as a whole. These data will help you determine if the incidence rate in a particular census tract is significantly different from the state rate.

Analysis of disease rates for small areas, such as census tracts, is difficult to interpret and can be misleading if not considered carefully. The following information is presented to help interpret the information on “Cancer Rates by Census Tract.”

To understand cancer in Delaware, researchers need to track the number of all newly diagnosed cancer cases each year. Researchers use different types of information to calculate cancer rates. This information includes estimates of the number of people living in Delaware and data on the cancer cases diagnosed in our state.

Even though researchers calculate cancer rates using the best possible information, cancer rates still have some amount of uncertainty. The rate of any disease in a population provides a snapshot of the impact of that disease for a specific time period. Because Delaware is a small state, must interpret this snapshot carefully.

In a small group, such as a census tract, the snapshot changes a lot from year to year. If one case of cancer is diagnosed in a census tract one year, and three cases of cancer are diagnosed in the same census tract the next year, the cancer rate for that census tract will change dramatically from one year to the next. These big fluctuations do not typically occur in larger populations. If we compare the cancer rate for a census tract to the cancer rate for the whole state of Delaware for a given time period, it would not be unusual to find the comparison different (perhaps even reversed) the following year. In Delaware, we publish five-year cancer incidence rates to allow for better understanding cancer patterns among small populations. Cancer rates for five-year time periods are less vulnerable to the yearly fluctuations of cancer cases diagnosed in small populations.

We can tell how much uncertainty there is in cancer rate by looking at its confidence interval. A confidence interval is a range of values that shows where the cancer rate could reasonably be. This means that the cancer rate could be anywhere between the lower confidence limit and the upper confidence limit.

If the difference between the upper confidence limit and lower confidence limit is wide, there is greater uncertainty in the reliability of the cancer incidence rate. If the difference between the upper confidence limit and lower confidence limit is very narrow, there is much less uncertainty in the cancer rate.

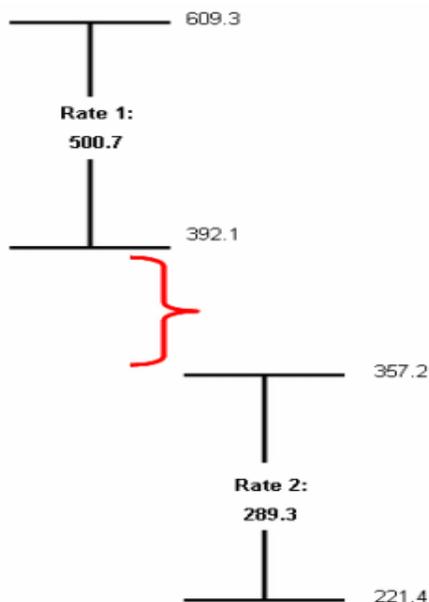
The width of a confidence interval depends on two things: (a) the number of people living in that area and (b) the number of cancer cases diagnosed in that area.

When a cancer rate is calculated for a small area (like a census tract or a neighborhood block), usually a small number of people live in that area. A much smaller number of people in that area will have been diagnosed with cancer. When a cancer rate is calculated for a small area, the cancer rate has a lot of uncertainty because researchers do not have very much information. Cancer rates based on small numbers of cases or deaths will typically have very wide confidence intervals.

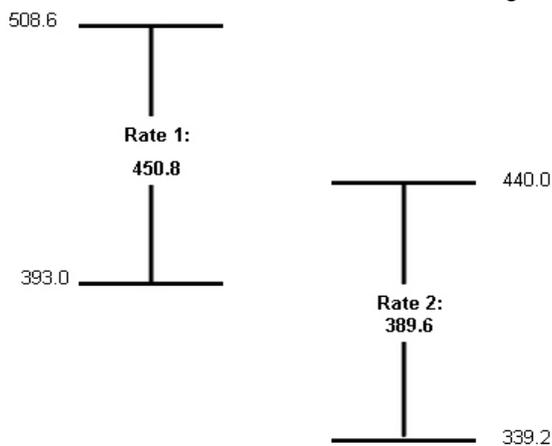
On the other hand, when a cancer rate is calculated for a large area (like a state or a country) with a large population, the odds are that more people will have been diagnosed with cancer compared to a smaller area. When a cancer rate is calculated based on a large number of cases or deaths, researchers are more certain of the level of cancer in that area. This means that cancer rates for large areas will usually have narrow confidence intervals.

Confidence intervals are important for another reason, too. They help researchers determine if differences in cancer rates for two different areas are statistically significant. If the confidence interval for the incidence rate in one area does NOT overlap with the confidence interval for an incidence rate in another area, the two rates are significantly different. The figure below shows what non-overlapping confidence intervals look like.

If “Rate 1” is significantly higher than “Rate 2,” the lower confidence limit for “Rate 1” is greater than the upper confidence limit for “Rate 2”. When one rate is significantly different from another rate, the difference between the two rates is larger than we would expect by chance alone.



If the confidence interval for the incidence rate in one area overlaps with the confidence interval for an incidence rate in another area, the two rates are NOT significantly different. The figure below shows how the confidence intervals look when the cancer rates for two areas are NOT significantly different from one another.



If “Rate 1” is NOT significantly greater than “Rate 2”, the lower confidence limit for “Rate 1” is less than the upper confidence limit for “Rate 2”. Even though the numbers may look very different, if the cancer rate for one area is not significantly different from the cancer rate for another area, researchers cannot say that one rate is truly different from the other rate.

DPH compared cancer incidence rates for each census tract to the cancer rate for the state of Delaware. This means that we were able to tell if any census tracts had a significantly higher-than-expected or lower-than-expected overall cancer rate compared to the whole state.

When interpreting the cancer rates for any census tract, review the maps, plus the table in appendix H that lists the actual rate and the confidence intervals for both the state as a whole and for each census tract. When viewing the cancer rate in a census tract, it is important to look at the confidence interval. If a cancer rate has a relatively wide confidence interval, the cancer rate has a lot of uncertainty. When cancer rates have a lot of uncertainty, conclusions should be drawn cautiously. Even our best guess may overestimate or underestimate the actual rate of cancer in a census tract.

## Appendix H: Age-Adjusted 2007-2011 All-Site Cancer Incidence Rates by Census Tract

Blue = Incidence rate is significantly **higher** than the state rate.

Yellow = Incidence rate is significantly **lower** than the state rate.

2010 Census Tract ID	Delaware: 510.5 (504.3, 516.7)		2010 Census Tract ID	Delaware: 510.5 (504.3, 516.7)	
	Age-Adjusted Rate (95% confidence Interval)			Age-Adjusted Rate (95% confidence Interval)	
2.00	535.3	(449.6 , 620.9)	111.00	480.9	(388.0 , 573.8)
3.00	514.2	(407.7 , 639.9)	112.01	491.4	(373.1 , 635.2)
4.00	420.5	(333.4 , 523.4)	112.02	563.9	(474.0 , 653.9)
5.00	480.6	(383.9 , 594.3)	112.03	449.2	(366.8 , 531.7)
6.01	540.1	(419.4 , 684.7)	112.04	445.4	(364.0 , 526.8)
6.02	512.5	(404.4 , 640.5)	112.05	422.2	(321.4 , 544.6)
9.00	510.1	(372.1 , 682.6)	112.06	458.5	(384.4 , 532.6)
11.00	372.5	(305.3 , 439.8)	113.00	537.4	(435.3 , 656.3)
12.00	580.3	(429.3 , 767.2)	114.00	433.0	(357.7 , 508.3)
13.00	433.4	(353.8 , 512.9)	115.00	440.5	(352.4 , 544.0)
14.00	470.4	(361.5 , 601.9)	116.00	399.0	(320.0 , 491.6)
15.00	422.6	(323.3 , 542.9)	117.00	399.4	(336.1 , 462.7)
16.00	403.6	(290.9 , 545.6)	118.00	453.9	(385.3 , 522.6)
19.02	452.5	(305.3 , 646.0)	119.00	481.3	(394.4 , 568.1)
21.00	397.0	(279.5 , 547.3)	120.00	569.2	(482.8 , 655.5)
22.00	395.6	(293.6 , 521.5)	121.00	505.8	(406.7 , 604.9)
23.00	587.7	(458.1 , 742.5)	122.00	534.8	(439.1 , 630.4)
24.00	495.0	(406.8 , 583.2)	123.00	542.9	(424.0 , 684.9)
25.00	566.2	(451.6 , 700.9)	124.00	544.7	(448.4 , 641.0)
26.00	515.5	(411.8 , 637.5)	125.00	490.2	(410.4 , 570.0)
27.00	424.6	(284.4 , 609.8)	126.00	601.6	(488.4 , 733.2)
28.00	453.9	(322.8 , 620.5)	127.00	535.3	(453.8 , 616.7)
29.00	564.8	(454.1 , 675.5)	129.00	471.3	(381.6 , 561.0)
30.02	394.6	(262.2 , 570.3)	130.00	533.6	(408.2 , 685.4)
101.01	549.6	(450.5 , 648.8)	131.00	554.3	(438.9 , 690.8)
101.04	579.0	(469.5 , 706.3)	132.00	475.9	(370.3 , 602.2)
102.00	567.9	(441.0 , 720.0)	133.00	497.8	(390.2 , 625.9)
103.00	493.2	(390.4 , 614.6)	134.00	522.7	(424.1 , 621.3)
104.00	575.0	(483.3 , 666.7)	135.01	449.5	(396.1 , 502.9)
105.02	494.1	(418.2 , 570.0)	135.03	500.1	(433.1 , 567.1)
107.02	421.2	(340.6 , 501.7)	135.05	503.5	(407.4 , 615.5)
108.00	494.8	(421.2 , 568.3)	135.06	525.1	(434.5 , 615.7)
109.00	532.5	(432.1 , 633.0)	136.04	578.6	(483.5 , 673.8)
110.00	449.2	(361.6 , 536.8)	136.07	445.0	(375.6 , 514.3)

§ Age-adjusted incidence rate is based on fewer than 25 cases.

\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

### Age-Adjusted 2007-2011 All-Site Cancer Incidence Rates by Census Tract, continued

Blue = Incidence rate is significantly **higher** than the state rate.

Yellow = Incidence rate is significantly **lower** than the state rate.

2010 Census Tract ID	Delaware: 510.5 (504.3, 516.7)		2010 Census Tract ID	Delaware: 510.5 (504.3, 516.7)	
	Age-Adjusted Rate (95% confidence Interval)			Age-Adjusted Rate (95% confidence Interval)	
136.08	404.6	(295.1 , 541.4)	149.07	523.8	(425.5 , 622.2)
136.10	416.6	(345.5 , 487.7)	149.08	417.0	(297.9 , 567.9)
136.11	396.4	(326.9 , 465.9)	149.09	504.6	(412.3 , 596.8)
136.12	381.9	(320.4 , 443.4)	150.00	490.2	(410.1 , 570.2)
136.13	537.5	(457.2 , 617.8)	151.00	562.2	(466.3 , 658.1)
136.14	474.8	(374.1 , 594.3)	152.00	533.5	(447.5 , 619.4)
136.15	545.3	(462.4 , 628.3)	154.00	485.3	(391.7 , 594.5)
137.00	529.1	(423.8 , 652.6)	155.02	556.0	(443.5 , 688.4)
138.00	533.9	(448.8 , 619.1)	156.00	612.9	(490.9 , 756.0)
139.01	514.0	(404.3 , 644.4)	158.02	425.7	(312.8 , 566.1)
139.03	532.5	(430.3 , 651.6)	159.00	627.6	(515.8 , 739.4)
139.04	500.3	(415.3 , 585.3)	160.00	528.6	(418.5 , 658.8)
140.00	422.6	(341.4 , 503.9)	161.00	533.5	(423.0 , 664.0)
141.00	552.5	(454.1 , 650.9)	162.00	618.2	(501.9 , 753.3)
142.00	453.3	(331.9 , 604.6)	163.01	638.0	(540.4 , 735.7)
143.00	454.5	(378.9 , 530.1)	163.02	580.9	(493.1 , 668.8)
144.02	448.1	(351.2 , 563.4)	163.05	536.0	(454.7 , 617.3)
144.03	428.7	(337.2 , 537.4)	164.01	561.6	(465.8 , 657.4)
144.04	436.9	(351.3 , 537.0)	164.04	542.6	(437.4 , 665.5)
145.01 <sup>§</sup>	288.3	(105.8 , 627.5)	166.01	554.7	(490.8 , 618.7)
145.02 <sup>§</sup>	534.7	(196.2 , 1163.8)	166.02	475.4	(392.1 , 558.8)
147.02	478.1	(360.2 , 622.3)	166.04	582.1	(504.5 , 659.7)
147.03	508.3	(424.7 , 591.9)	166.08	604.7	(497.8 , 711.6)
147.05	505.1	(423.4 , 586.7)	168.01	435.5	(352.2 , 518.8)
147.06	446.8	(322.0 , 604.0)	168.04	517.6	(430.3 , 604.9)
148.03	450.0	(367.8 , 532.3)	169.01	620.3	(493.3 , 770.0)
148.05	574.0	(493.1 , 655.0)	169.04	533.4	(426.0 , 659.5)
148.07	561.9	(473.2 , 650.7)	401.00	637.7	(550.0 , 725.4)
148.08	595.9	(498.9 , 692.9)	402.01	613.3	(506.6 , 720.0)
148.09	532.4	(455.0 , 609.7)	402.02	514.2	(459.4 , 569.0)
148.10	610.9	(521.1 , 700.6)	402.03	536.5	(441.3 , 631.7)
149.03	597.9	(490.4 , 705.3)	405.01	486.2	(403.9 , 568.5)
149.04	507.8	(416.2 , 599.4)	405.02	471.6	(380.2 , 578.4)
149.06	378.9	(292.4 , 482.9)	407.00	512.9	(434.4 , 591.4)

§ Age-adjusted incidence rate is based on fewer than 25 cases.

\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

### Age-Adjusted 2007-2011 All-Site Cancer Incidence Rates by Census Tract, continued

Blue = Incidence rate is significantly **higher** than the state rate.

Yellow = Incidence rate is significantly **lower** than the state rate.

2010 Census Tract ID	Delaware: 510.5 (504.3, 516.7)		2010 Census Tract ID	Delaware: 510.5 (504.3, 516.7)	
	Age-Adjusted Rate (95% confidence Interval)			Age-Adjusted Rate (95% confidence Interval)	
409.00	484.5	(388.1 , 597.6)	504.05	601.4	(506.1 , 696.7)
410.00	433.2	(356.4 , 510.1)	504.06	517.0	(437.1 , 596.8)
411.00 <sup>§</sup>	251.1	(92.2 , 546.6)	504.07	536.3	(453.7 , 618.8)
412.00	463.8	(373.8 , 553.8)	504.08	569.9	(479.3 , 660.4)
413.00	595.7	(454.5 , 766.7)	505.01	522.3	(423.3 , 621.3)
414.00	540.3	(437.7 , 659.8)	505.03	493.5	(400.2 , 602.0)
415.00	540.5	(447.6 , 633.4)	505.04	509.7	(427.3 , 592.1)
416.00	545.7	(441.5 , 667.0)	506.01	595.2	(502.7 , 687.7)
417.01	595.0	(515.6 , 674.3)	506.02	491.2	(418.2 , 564.2)
417.02	602.5	(505.8 , 699.3)	507.01	526.9	(439.3 , 614.4)
418.01	617.6	(548.0 , 687.3)	507.03	445.5	(354.8 , 552.2)
418.02	542.0	(445.0 , 639.0)	507.04	597.2	(513.8 , 680.6)
419.00	574.6	(487.7 , 661.5)	507.05	532.6	(464.5 , 600.7)
420.00	559.1	(452.9 , 682.8)	507.06	540.1	(439.0 , 657.6)
421.00	610.3	(508.4 , 712.1)	508.01	527.0	(428.1 , 625.9)
422.01	469.5	(402.0 , 537.0)	508.02	510.9	(430.5 , 591.4)
422.02	612.3	(538.7 , 685.8)	508.03	567.1	(502.7 , 631.5)
425.00	516.8	(415.6 , 635.3)	509.01	419.3	(326.9 , 529.8)
428.00	673.7	(590.5 , 756.9)	509.02	562.4	(495.8 , 629.0)
429.00	516.8	(433.0 , 600.7)	510.03	524.9	(450.2 , 599.5)
430.00	615.2	(524.8 , 705.6)	510.04	531.9	(456.0 , 607.7)
431.00	457.6	(360.0 , 573.7)	510.05	497.8	(427.2 , 568.3)
432.02	602.9	(503.4 , 702.4)	510.06	489.1	(407.8 , 570.4)
433.00	562.3	(470.1 , 654.4)	510.07	472.8	(406.1 , 539.5)
434.00	536.3	(450.5 , 622.1)	511.01	615.7	(452.4 , 818.8)
501.01	457.5	(374.2 , 540.7)	511.02	460.9	(348.2 , 598.6)
501.03	628.8	(539.2 , 718.5)	511.03	369.6	(257.5 , 514.1)
501.04	465.3	(381.3 , 549.2)	512.01	343.4	(260.1 , 445.0)
501.05	596.3	(503.3 , 689.3)	512.02	257.3	(179.2 , 357.9)
502.00	434.6	(340.1 , 547.3)	512.03	353.3	(252.4 , 481.0)
503.01	502.7	(436.1 , 569.2)	512.04	385.9	(273.1 , 529.7)
503.02	559.3	(466.3 , 652.3)	512.05	300.1	(194.2 , 443.0)
504.01	633.7	(529.1 , 738.3)	513.01	476.1	(415.6 , 536.6)
504.03	452.0	(359.0 , 561.9)	513.02	559.8	(453.3 , 666.4)

§ Age-adjusted incidence rate is based on fewer than 25 cases.

\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

**Age-Adjusted 2007-2011 All-Site Cancer Incidence Rates by Census Tract, continued**

Blue = Incidence rate is significantly **higher** than the state rate.

Yellow = Incidence rate is significantly **lower** than the state rate.

2010 Census Tract ID	Delaware: 510.5 (504.3, 516.7)		2010 Census Tract ID	Delaware: 510.5 (504.3, 516.7)
	AAR ( 95% CI )			AAR ( 95% CI )
513.03	512.3 (444.5 , 580.2)			
513.05	474.5 (397.3 , 551.8)			
513.06	496.7 (410.0 , 583.5)			
514.00	519.4 (424.9 , 614.0)			
515.00	473.7 (398.9 , 548.5)			
517.01	596.4 (496.5 , 696.2)			
517.02	575.7 (492.8 , 658.7)			
518.01	595.1 (504.0 , 686.1)			
518.02	507.0 (415.1 , 598.9)			
519.00	452.1 (372.2 , 532.0)			

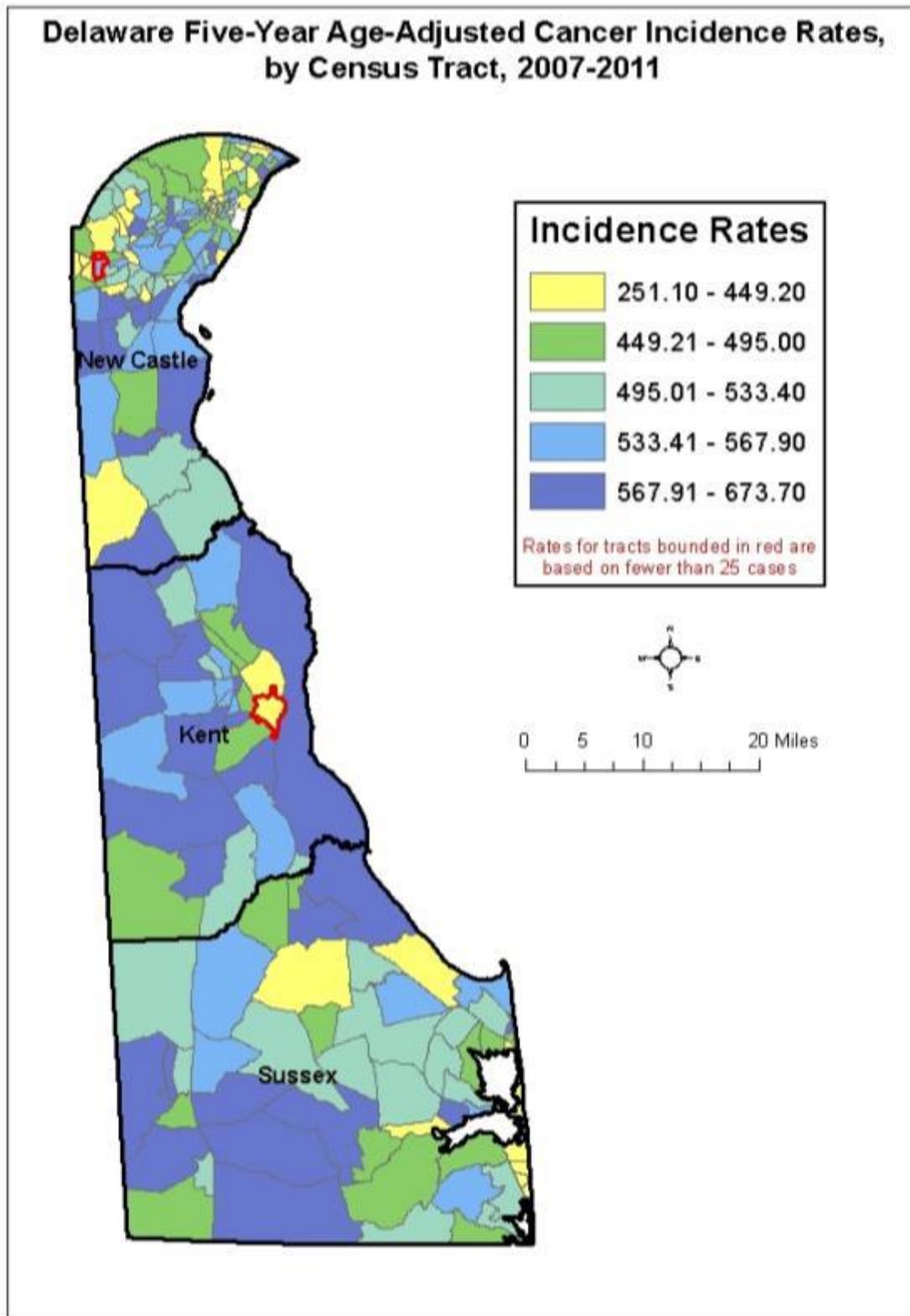
§ Age-adjusted incidence rate is based on fewer than 25 cases.

\* = Rates are per 100,000 population and age-adjusted to the 2000 U.S. standard population.

**SOURCE:** Delaware Cancer Registry, Delaware Health and Social Services, Division of Public Health, 2014.

Appendix I:

Maps of Delaware Census Tracts by 2007-2011 Cancer incidence Rate Quintiles

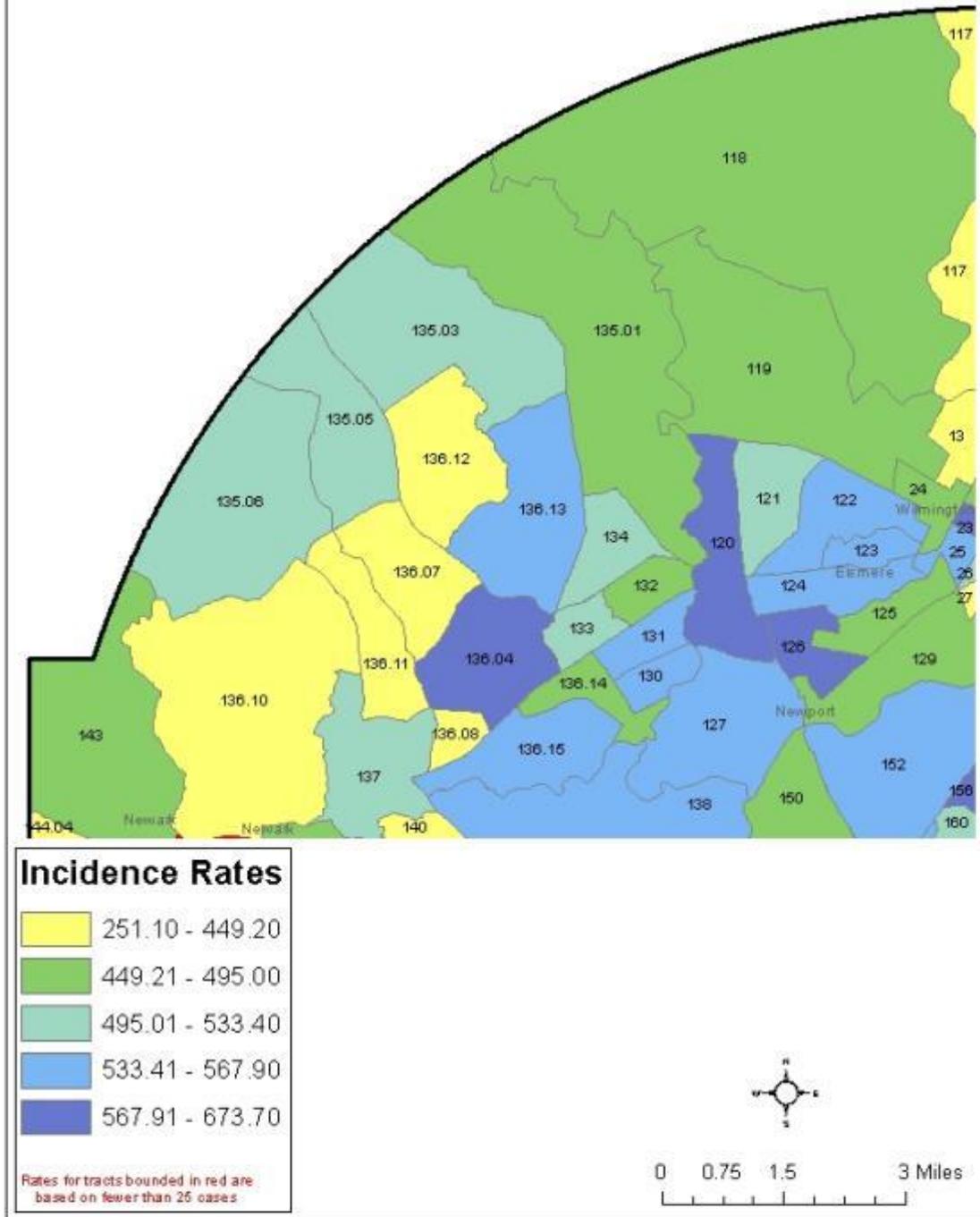


Source: Delaware Cancer Registry

shb:1/29/2015



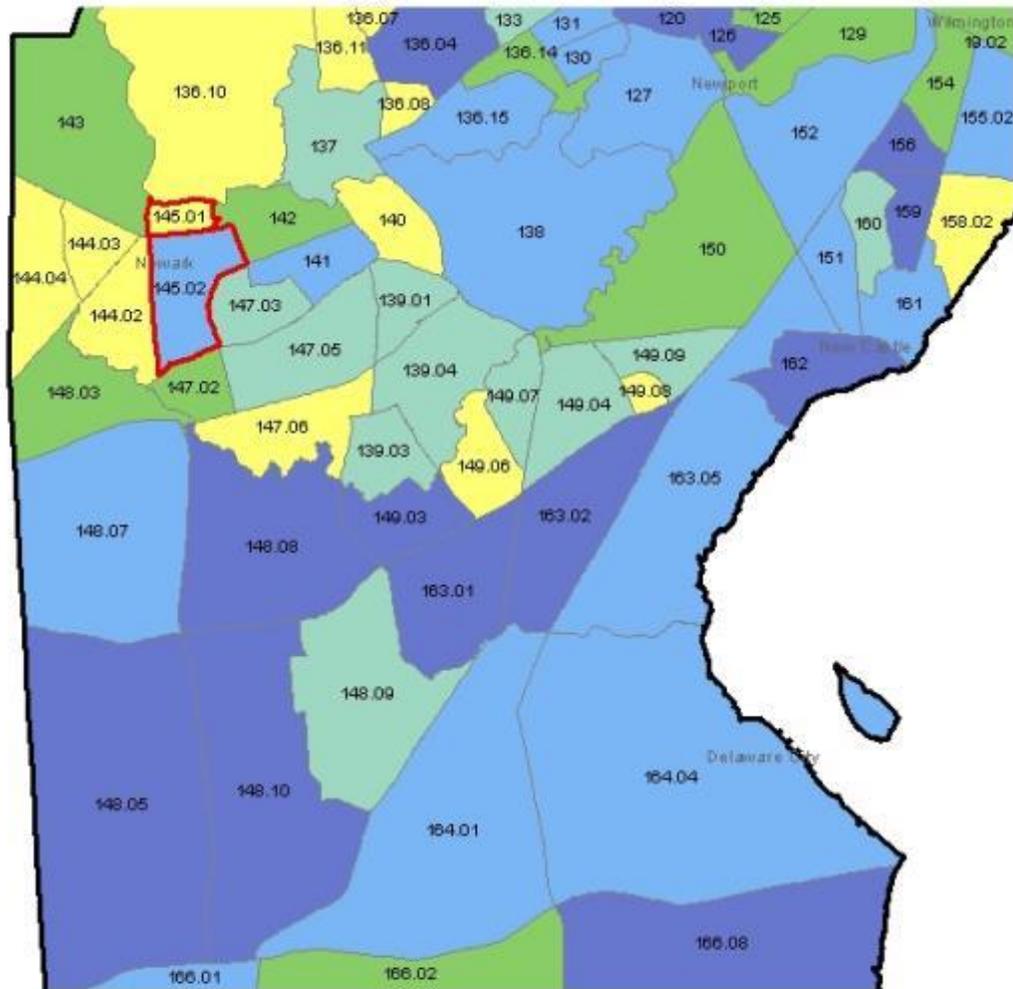
## Delaware Five-Year Age-Adjusted Cancer Incidence Rates, by Census Tract, 2007-2011 Hockessin and Northwestern New Castle County



Source: Delaware Cancer Registry

shb: 2/4/2015

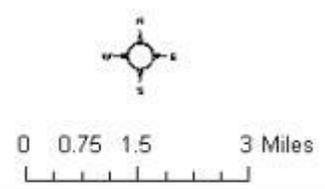
## Delaware Five-Year Age-Adjusted Cancer Incidence Rates, by Census Tract, 2007-2011 Newark, New Castle, and Central New Castle County



**Incidence Rates**

	251.10 - 449.20
	449.21 - 495.00
	495.01 - 533.40
	533.41 - 567.90
	567.91 - 673.70

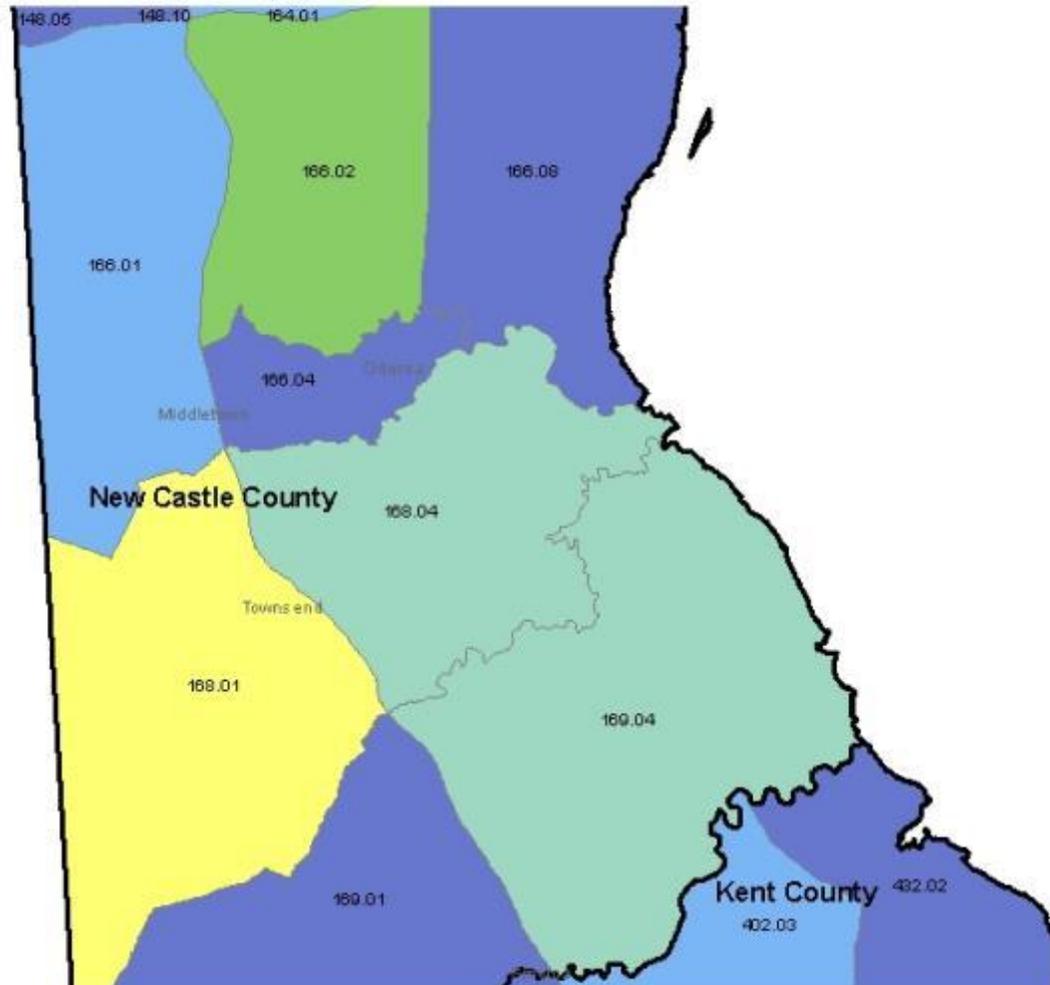
Rates for tracts bounded in red are based on fewer than 25 cases.



Source: Delaware Cancer Registry

shb: 2/4/2015

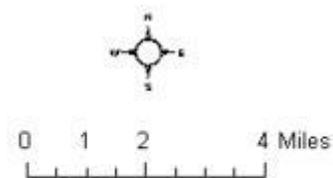
## Delaware Five-Year Age-Adjusted Cancer Incidence Rates, by Census Tract, 2007-2011 Southern New Castle County



**Incidence Rates**

	251.10 - 449.20
	449.21 - 495.00
	495.01 - 533.40
	533.41 - 567.90
	567.91 - 673.70

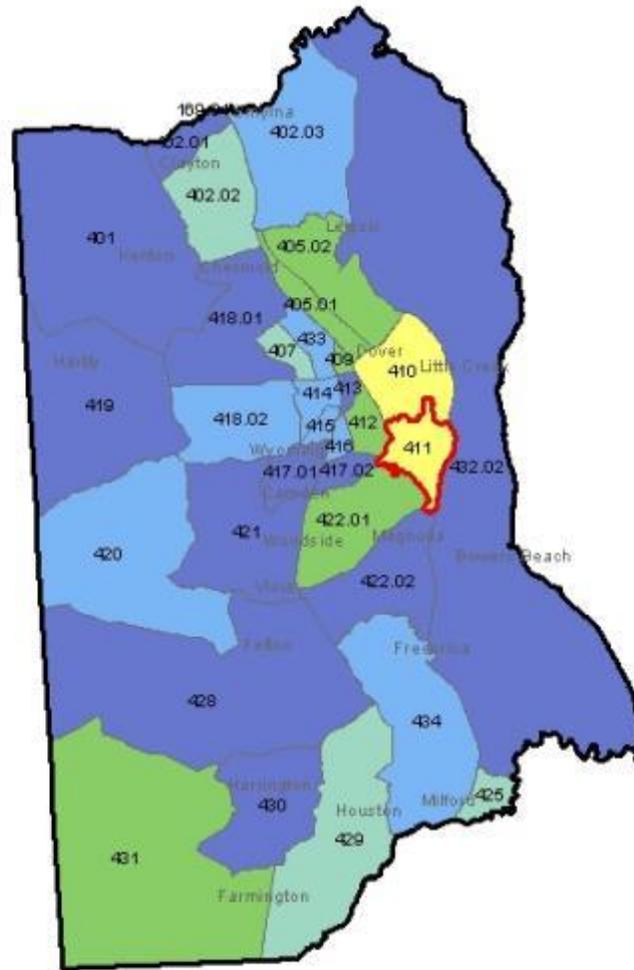
Rates for tracts bounded in red are based on fewer than 25 cases.



Source: Delaware Cancer Registry

shb: 2/4/2015

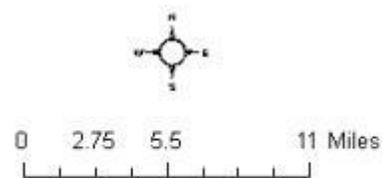
## Delaware Five-Year Age-Adjusted Cancer Incidence Rates, by Census Tract, 2007-2011 Kent County



**Incidence Rates**

- 251.10 - 449.20
- 449.21 - 495.00
- 495.01 - 533.40
- 533.41 - 567.90
- 567.91 - 673.70

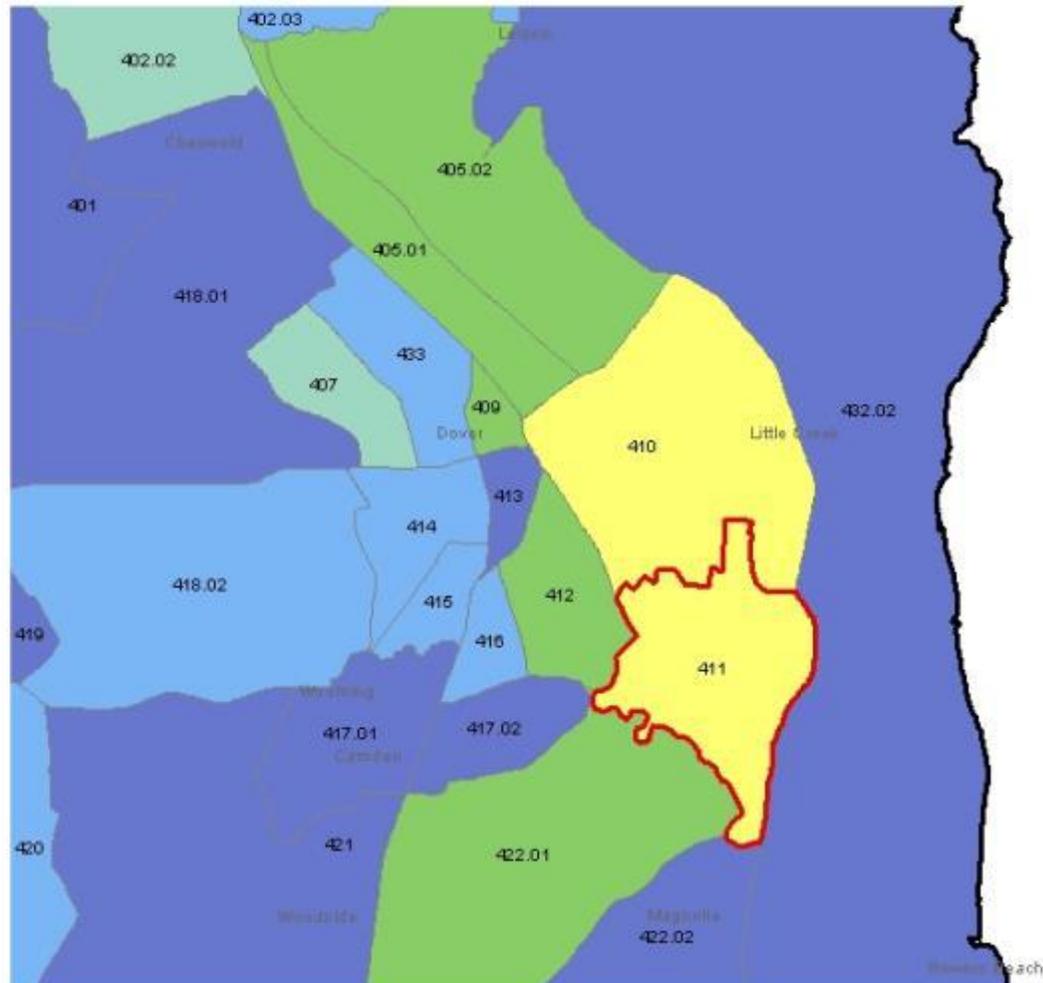
Rates for tracts bounded in red are based on fewer than 25 cases.



Source: Delaware Cancer Registry

shb: 2/4/2015

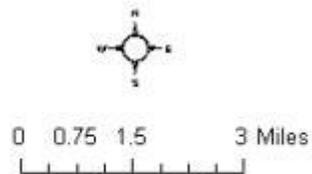
## Delaware Five-Year Age-Adjusted Cancer Incidence Rates, by Census Tract, 2007-2011 Greater Dover



**Incidence Rates**

	251.10 - 449.20
	449.21 - 495.00
	495.01 - 533.40
	533.41 - 567.90
	567.91 - 673.70

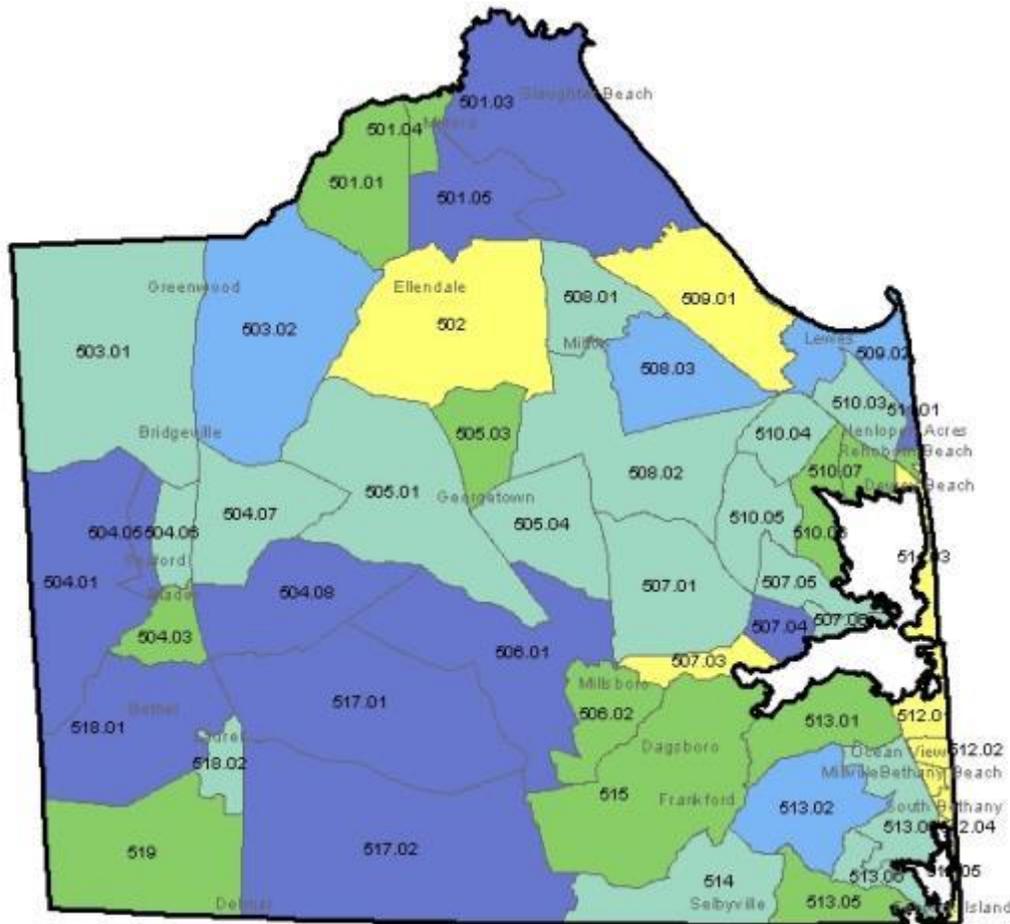
Rates for tracts bounded in red are based on fewer than 25 cases.



Source: Delaware Cancer Registry

shb: 2/4/2015

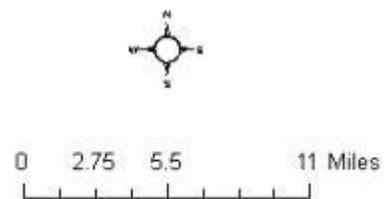
## Delaware Five-Year Age-Adjusted Cancer Incidence Rates, by Census Tract, 2007-2011 Sussex County



**Incidence Rates**

	257.30 - 449.20
	449.21 - 495.00
	495.01 - 553.40
	553.41 - 567.90
	567.91 - 673.70

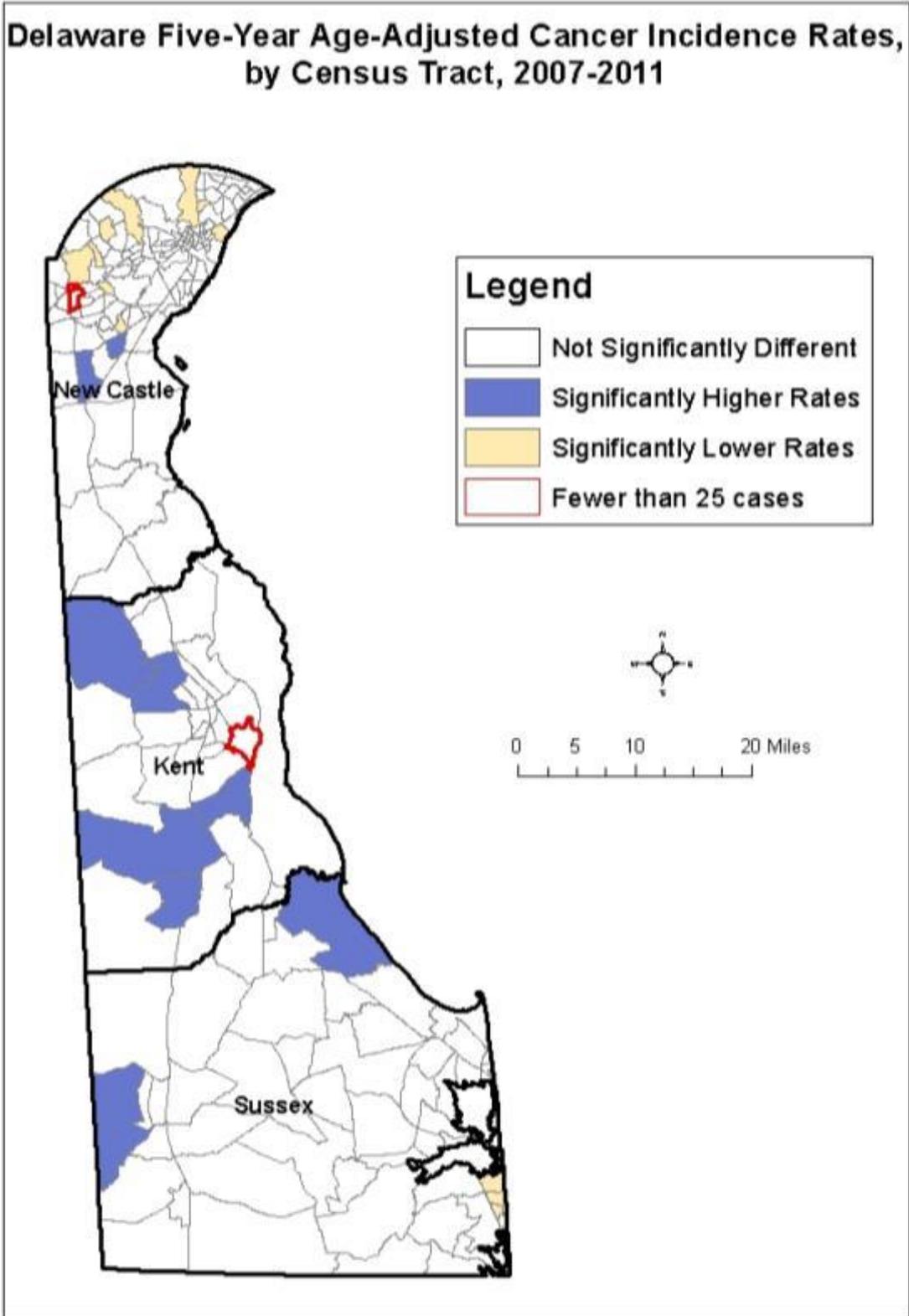
*Rates for tracts bounded in red are based on fewer than 25 cases*



Source: Delaware Cancer Registry

shb:2/4/2015

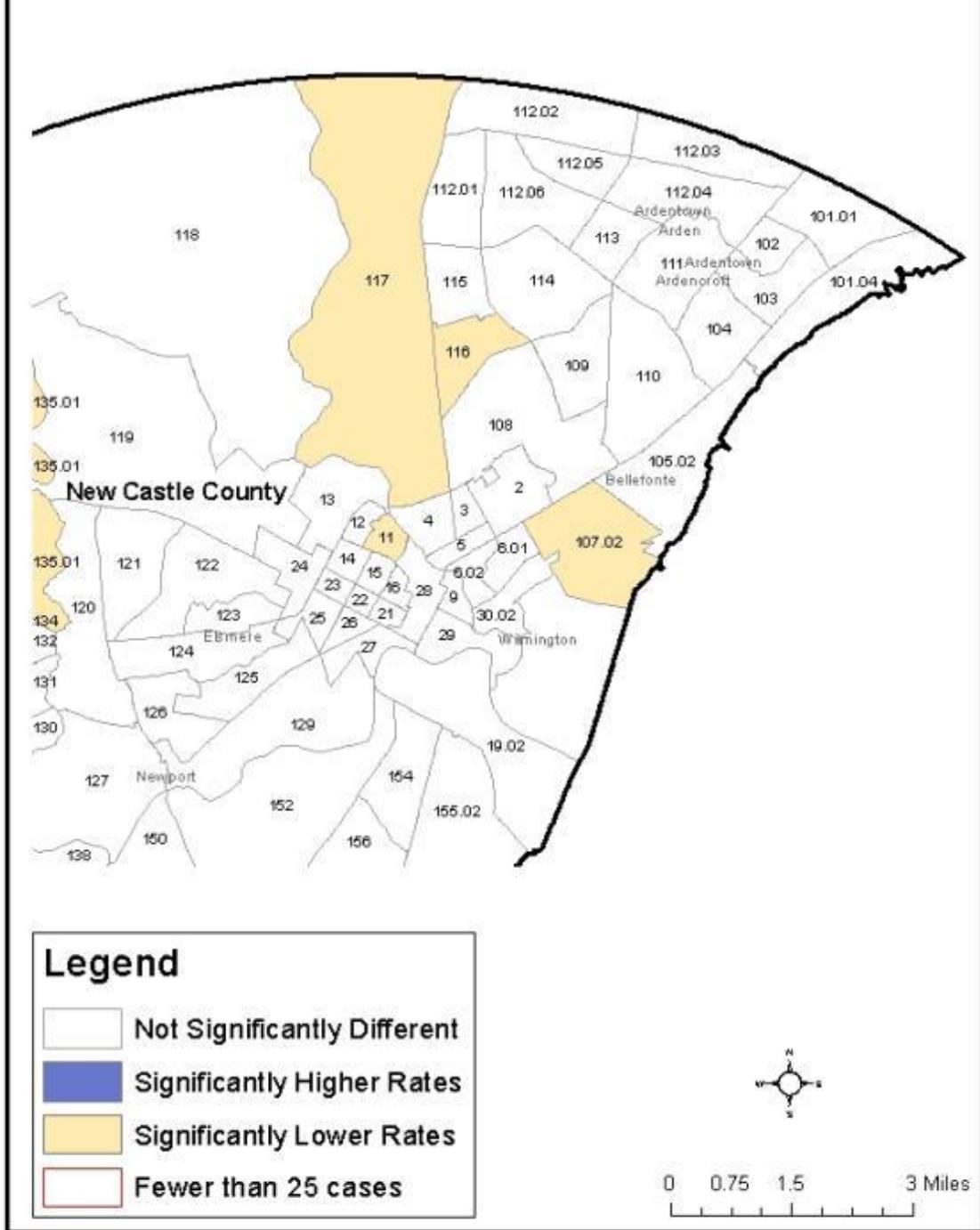
Appendix J:  
Maps of Delaware Census Tracts by 2007-2011 High / Low Cancer Incidence Rates



Source: Delaware Cancer Registry

shb:1/29/2015

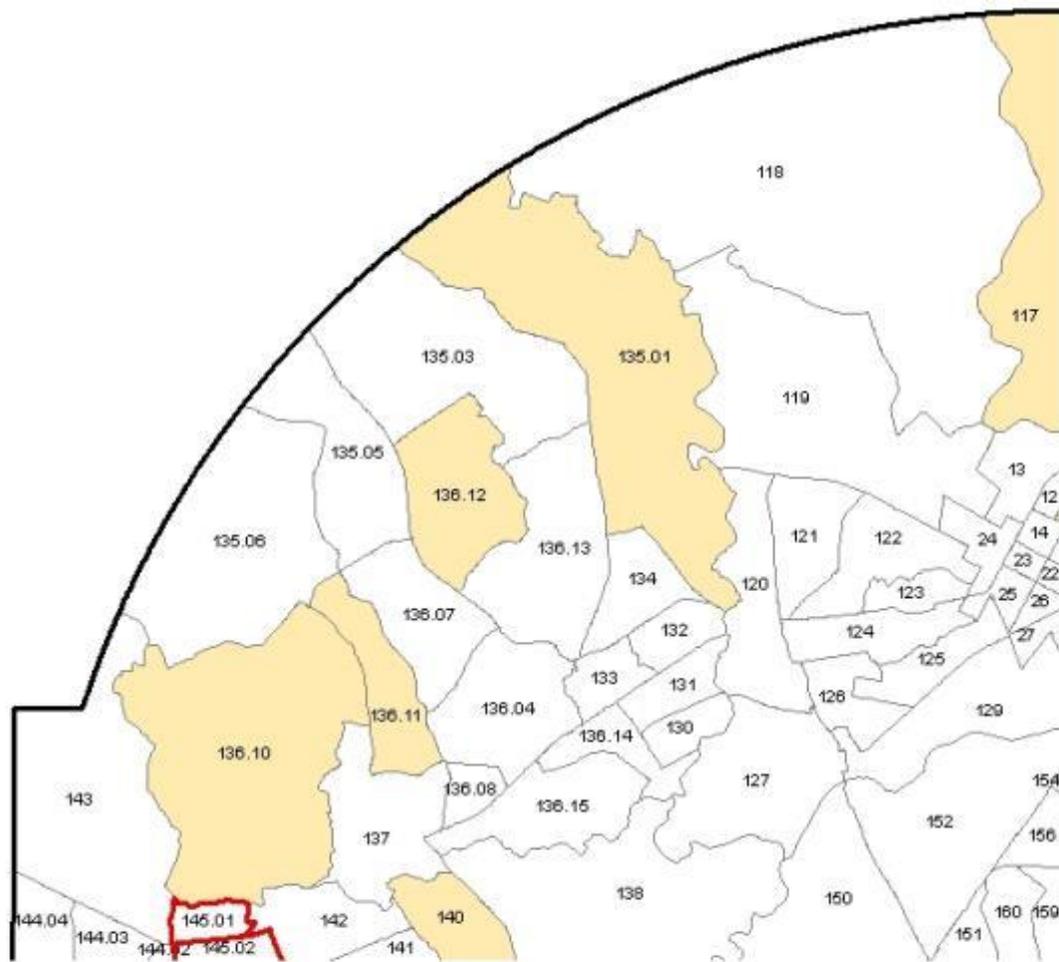
## Delaware Five-Year Age-Adjusted Cancer Incidence Rates, by Census Tract, 2007-2011 Wilmington and Northeastern New Castle County



Source: Delaware Cancer Registry

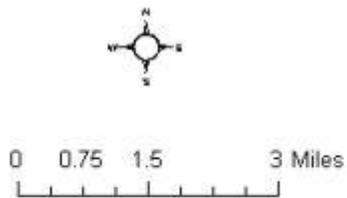
shb:2/4/2015

## Delaware Five-Year Age-Adjusted Cancer Incidence Rates, by Census Tract, 2007-2011 Hockessin and Northwestern New Castle County



**Legend**

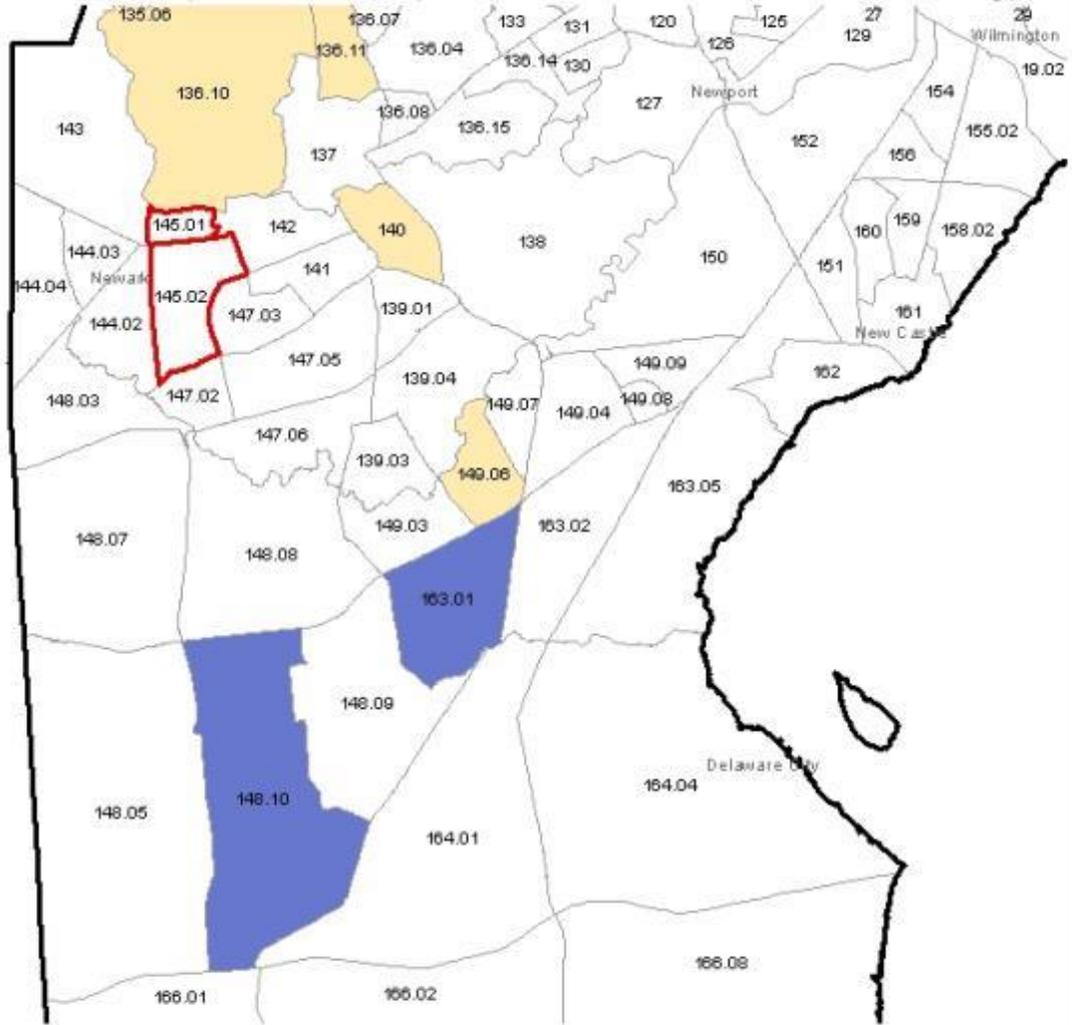
- Not Significantly Different
- Significantly Higher Rates
- Significantly Lower Rates
- Fewer than 25 cases



Source: Delaware Cancer Registry

shb:2/4/2015

## Delaware Five-Year Age-Adjusted Cancer Incidence Rates, by Census Tract, 2007-2011 Newark, New Castle, and Central New Castle County



### Legend

- Not Significantly Different
- Significantly Higher Rates
- Significantly Lower Rates
- Fewer than 25 cases

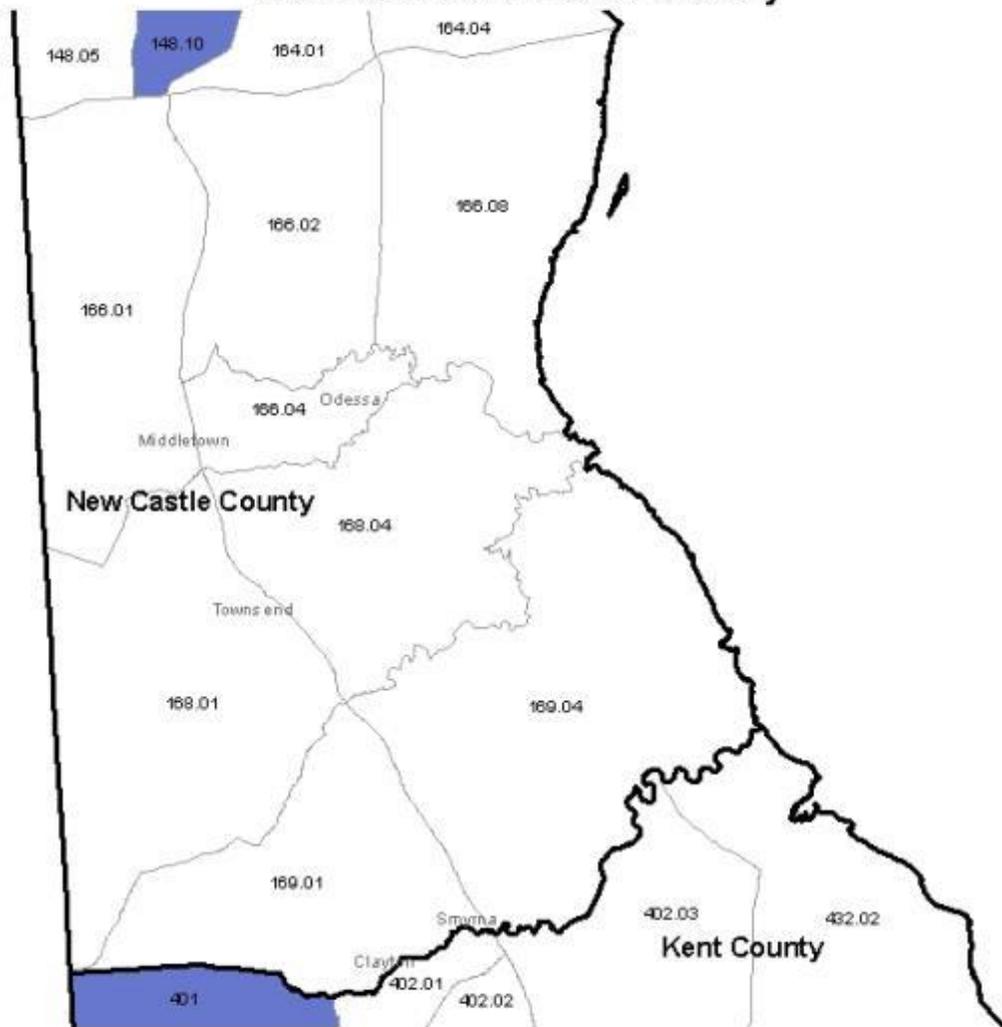


0 0.75 1.5 3 Miles

Source: Delaware Cancer Registry

shb:2/4/2015

## Delaware Five-Year Age-Adjusted Cancer Incidence Rates, by Census Tract, 2007-2011 Southern New Castle County



### Legend

- Not Significantly Different
- Significantly Higher Rates
- Significantly Lower Rates
- Fewer than 25 cases

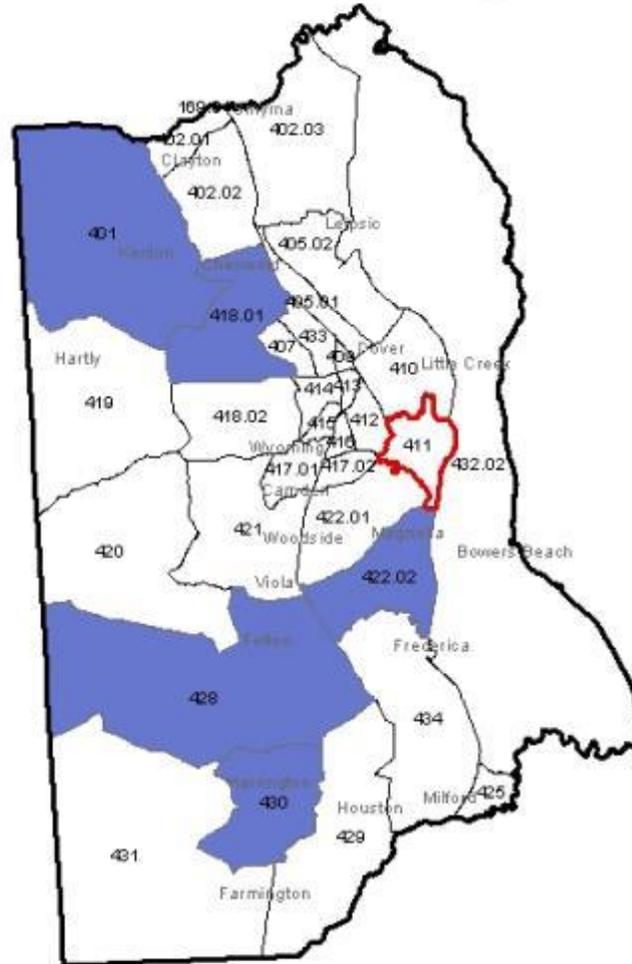


0 1.25 2.5 5 Miles

Source: Delaware Cancer Registry

shb:2/4/2015

## Delaware Five-Year Age-Adjusted Cancer Incidence Rates, by Census Tract, 2007-2011 Kent County



### Legend

- Not Significantly Different
- Significantly Higher Rates
- Significantly Lower Rates
- Fewer than 25 cases

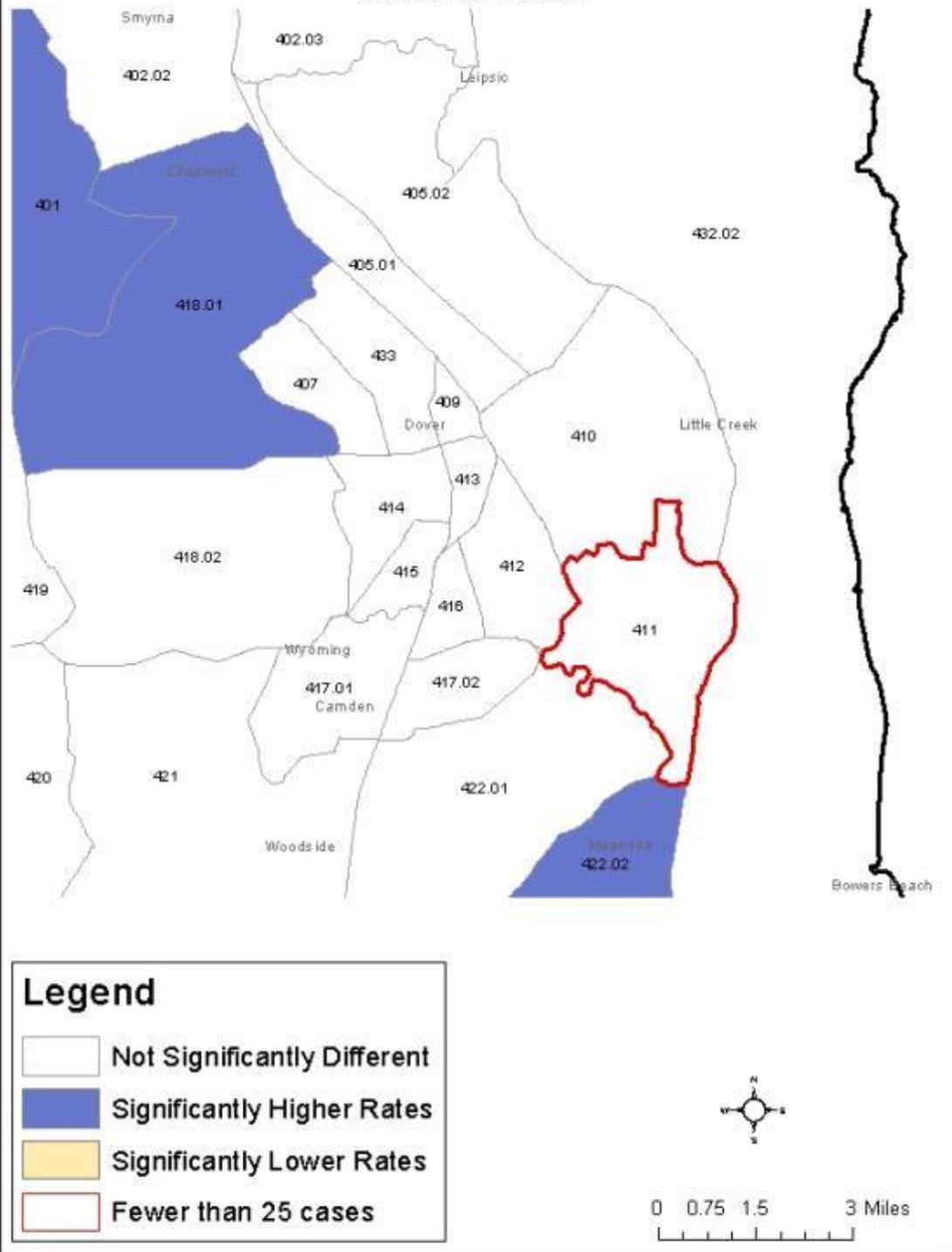


0 2.75 5.5 11 Miles

Source: Delaware Cancer Registry

shb:2/4/2015

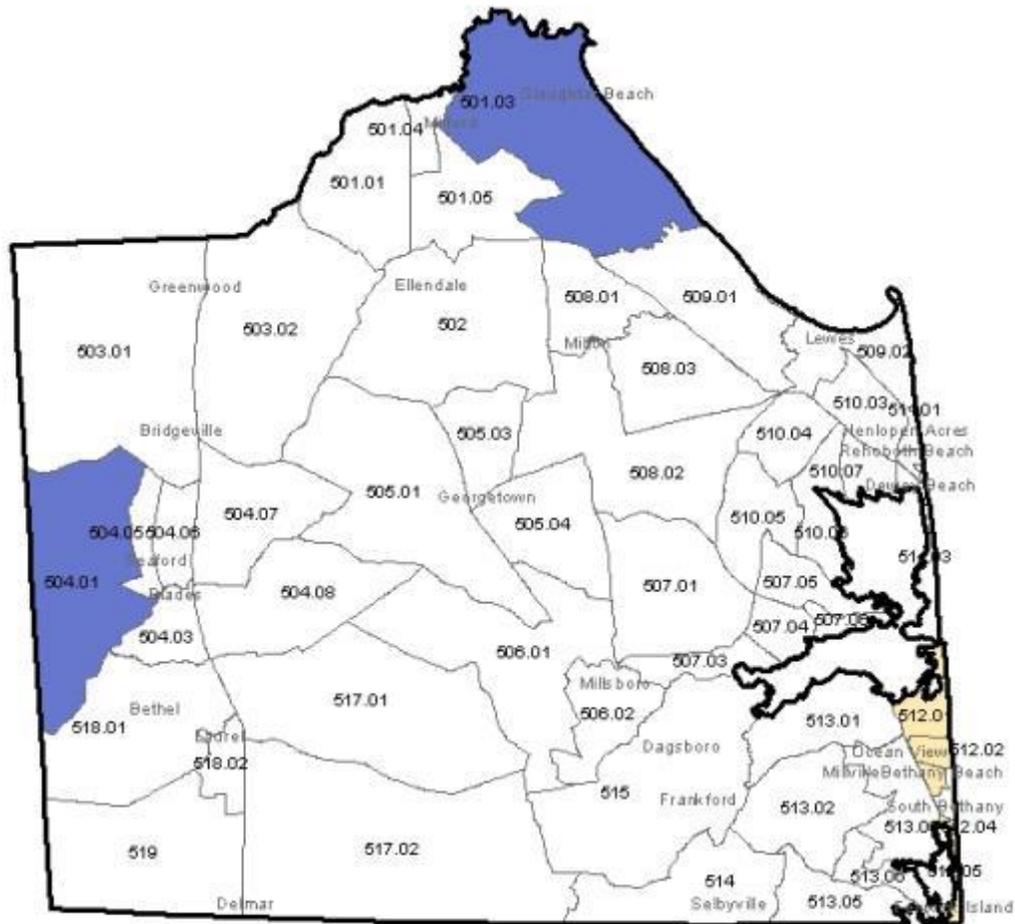
## Delaware Five-Year Age-Adjusted Cancer Incidence Rates, by Census Tract, 2007-2011 Greater Dover



Source: Delaware Cancer Registry

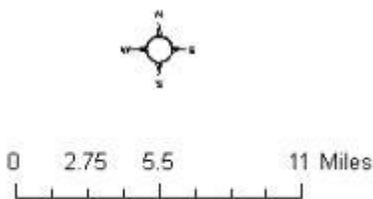
shb:2/4/2015

## Delaware Five-Year Age-Adjusted Cancer Incidence Rates, by Census Tract, 2007-2011 Sussex County



### Legend

- Not Significantly Different
- Significantly Higher Rates
- Significantly Lower Rates
- Fewer than 25 cases



Source: Delaware Cancer Registry

shb:2/4/2015