CANCER INCIDENCE AND MORTALITY IN DELAWARE, 2012-2016

DELAWARE DEPARTMENT OF HEALTH AND SOCIAL SERVICES
DIVISION OF PUBLIC HEALTH
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This report was prepared by the Delaware Department of Health and Social Services, Division of Public Health, Comprehensive Cancer Control Program.

For more information, contact:
Delaware Comprehensive Cancer Program
Division of Public Health
Thomas Collins Building, Suite 11
540 S. DuPont Highway
Dover, DE 19901
Phone: 302-744-1020
Fax: 302-739-2545
http://www.dhss.delaware.gov/dhss/dph/dpc/cancer.html

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CHAPTER 1: EXECUTIVE SUMMARY

This report presents the 2012-2016 cancer incidence and mortality data and statistics for Delaware. The Delaware Department of Health and Social Services (DHSS), Division of Public Health (DPH), in conjunction with the Delaware Cancer Consortium (DCC), publishes this report as a source of cancer incidence and mortality information. DPH and other stakeholders also use this report to inform decisions on outreach and program strategies to combat cancer incidence and mortality in Delaware.

Cancer incidence (the number of new cases of cancer in a population over a time period)[1] and mortality (the number of deaths from cancer in a population over a time period)[2] rates and other analysis are performed by the Delaware Comprehensive Cancer Control Program staff. Incidence data are obtained from the Delaware Cancer Registry (DCR) and mortality data are obtained from the Delaware Health Statistics Center.

This report includes cancer statistics for all cancer sites combined (all-site cancer), as well as eight site-specific cancer types. These cancer statistics reflect incidence and mortality data for 2012-2016. DPH compares Delaware's cancer incidence and mortality trends for 2012-2016 to those of the U.S. over the same period. DPH also summarizes how Delaware and U.S. cancer rates have changed from the five-year periods of 2002-2006 to 2012-2016.

From 2002-2006 to 2012-2016, Delaware's all-site cancer incidence rate decreased 4%. During the same time period, the comparable U.S. all-site cancer incidence rate fell 7%. While progress continues to be made, Delaware's 2012-2016 all-site cancer incidence rate (491.5 per 100,000) remains 13% higher than the comparable U.S. rate (435.1 per 100,000).

From 2002-2006 to 2012-2016, the all-site cancer incidence rate decreased by 11% among Delaware males but rose 3% among Delaware females. During the same time period, the all-site cancer incidence rate decreased by 9% in non-Hispanic Caucasian males, decreased by 17% in non-Hispanic African American males, and decreased 5% in Hispanic males in Delaware. **While there was a decrease in all male race groups, the all-site cancer incidence rate increased 5% in non-Hispanic Caucasian females, increased 2% in non-Hispanic African American females, and increased 4% in Hispanic females in Delaware.**

Delaware's 2012-2016 all-site cancer mortality rate of 174.0 per 100,000 was 8% higher than the U.S. rate of 161.1 per 100,000. This difference in all-site cancer mortality 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 strides in reducing the cancer mortality rate through cancer screening and early detection. **Delaware's current ranking of 15th among the states for highest all-site cancer mortality is higher than the ranking of 18th in the 2019 report, which looked at the 2011-2015 time period. Though the ranking increased between these two periods, it still represents considerable continued progress since the 1990s, when the state ranked second. From 2002-2006 to 2012-2016, Delaware's cancer death rate decreased 10%, while the U.S. death rate decreased 14%.**

From 2002-2006 to 2012-2016, the all-site cancer mortality rate among non-Hispanic African American male Delawareans declined 29%, compared to a 16% decline among non-Hispanic Caucasian male Delawareans. There was a 19% increase in the all-site cancer mortality rate among Hispanic male Delawareans during the same time period. Among female Delawareans, the all-site cancer mortality rate decreased 13% in non-Hispanic African Americans, declined 11% in non-Hispanic Caucasians, and declined 4% in Hispanics. There were larger declines in rates among males compared to females among non-Hispanic Caucasian and non-Hispanic African American Delawareans.

[1] https://seer.cancer.gov/statistics/types/incidence.html
[2] https://seer.cancer.gov/statistics/types/mortality.html

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

BREAST CANCER

- The 2012-2016 breast cancer incidence rate for Delaware (136.5 per 100,000) was statistically significantly higher than the U.S. rate (126.0 per 100,000). **Delaware was ranked sixth nationally in 2012-2016 compared to ninth nationally in 2011-2015.**
- From 2002-2006 to 2012-2016, Delaware's breast cancer incidence rate increased by 12% while the comparable U.S. rate increased 1%. During this time period, the breast cancer incidence rate increased by 9% among non-Hispanic African American females, by 12% among non-Hispanic Caucasian females, and by 4% among Hispanic females.
- The proportion of 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 local stage increased from 42% in 1980-1984, to 68% in 2012-2016.
- The difference between Delaware's 2012-2016 breast cancer mortality rate (22.1 per 100,000) and the U.S. rate (20.6 per 100,000) was not statistically significant. Similarly, the difference between non-Hispanic African American females in Delaware (24.9 per 100,000) and non-Hispanic African American females in the U.S. (28.9 per 100,000), as well as between non-Hispanic Caucasian females in Delaware (21.3 per 100,000) and non-Hispanic Caucasian females in the U.S. (20.6 per 100,000) was not statistically significant.
- From 2002-2006 to 2012-2016, Delaware's decline in breast cancer mortality (6%) was less than the decline seen nationally (16%). Delaware's breast cancer mortality rate was ranked 20th nationally in 2012-2016 compared to 21st nationally in 2011-2015.
- From 2002-2006 to 2012-2016, Delaware's female breast cancer mortality rate decreased 11% among non-Hispanic African Americans and 10% among non-Hispanic Caucasians.
- It is highly likely that improvements in the early detection of breast cancer contributed to Delaware's progress in reduced breast cancer mortality. Data from the 2018 Behavioral Risk Factor Survey (BRFS) showed that Delaware females ranked third highest nationally in the prevalence of females 40 years of age and older who have had a mammogram within the past two years (79%).

COLORECTAL CANCER

- **From 2002-2006 to 2012-2016, Delaware's colorectal cancer incidence rate decreased 28% while the comparable U.S. rate fell 22%.** For both males and females, Delaware's colorectal cancer incidence rates declined more than the U.S. rates. Among males, Delaware's incidence rate declined 30% while the U.S. incidence rate declined 24%. Among females, Delaware's incidence rate declined 26% while the U.S. incidence rate declined 21%.
- From 2002-2006 to 2012-2016, Delaware's greatest improvements in colorectal cancer incidence rates were observed among non-Hispanic African American males and non-Hispanic Caucasian males; incidence rates for non-Hispanic African American males and non-Hispanic Caucasian males declined by 32% and 30%, respectively.

- For the 2012-2016 time period, 56% 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 2% decline since 2002-2006 in the percentage of regional and distant stage colorectal cancer diagnoses (58%). Relatedly, the percentage of local stage colorectal cancer diagnoses increased from 36% in 2002-2006 to 40% in 2012-2016.
- **Historically, Delaware's colorectal cancer mortality rate has been higher than the U.S. rate. However, for 2012-2016, Delaware's colorectal cancer mortality rate (13.7 per 100,000) was lower than that of the U.S. (14.2 per 100,000) but this difference was not statistically significant.**
- From 2002-2006 to 2012-2016, Delaware's colorectal cancer mortality rate decreased 26% while the national rate decreased 22%. Delaware ranked 35th nationally in 2012-2016, an increase in rank from 41st in 2011-2015.
- **The reduction in colorectal cancer mortality rates is especially noteworthy among non-Hispanic African American Delawareans.** From 2002-2006 to 2012-2016, Delaware's colorectal cancer mortality rates declined 45% among non-Hispanic African American males, compared to 26% among non-Hispanic Caucasian males. During the same time period, colorectal cancer mortality declined 24% among non-Hispanic African American females, compared to 32% among non-Hispanic 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 2018 BRFS showed that **Delaware ranked 11th highest in prevalence in the U.S. for meeting the U.S. Preventive Services Task Force (USPSTF) recommendations for colorectal screening.** Nearly 73% of Delawareans age 50-74 years reported meeting the USPSTF recommendations for colorectal screening. The U.S. national median for meeting these recommendations was 70%.

LUNG CANCER

- **Lung cancer continues to account for an enormous share of Delaware's overall cancer burden**. For the 2012-2016 time period, lung cancer accounted for 15% of all newly diagnosed cancer cases and 28% of all cancer deaths in Delaware.
- **According to the U.S. Department of Health and Human Services, tobacco use causes an estimated 85% to 90% of all lung cancer cases.** Delaware has reaped the benefits of statewide reductions in tobacco use that began decades ago. According to the 2018 Delaware BRFS, there is no statistically significant difference in current smoking prevalence between males and 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). For the 2012-2016 time period, Delaware and the U.S. had a similar proportion of lung cancers diagnosed at distant stage (50% in Delaware and 52% in the U.S.). Additionally, treatment options that are effective for some other forms of cancer are not as effective for lung cancer.
- DPH's Screening for Life Program began covering lung cancer screenings for qualified Delawareans in 2015. 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.
- Delaware ranked 10th in the nation for lung cancer incidence, a decrease from 9th as seen in 2011-2015. From 2002-2006 to 2012-2016, lung cancer incidence rates declined 18% for Delaware males, compared to 24% for U.S. males. The lung cancer incidence rate for Delaware females decreased 9% during the same time period, compared to a 12% decline in the U.S. female 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 male lung cancer mortality rate for 1980-1984 was 19% greater than the U.S. rate, compared to 2012-2016, when the rate was 16% higher than the U.S. rate.
- **For 2012-2016, Delaware females ranked 13th highest in the nation in lung cancer mortality while Delaware males ranked 16th.**
- Between 2002-2006 and 2012-2016, Delaware's lung cancer mortality rate fell 19% while the U.S. rate dropped 22%.
- **Delaware's lung cancer mortality rates have declined noticeably among non-Hispanic African Americans.** From 2002-2006 to 2012-2016, Delaware's lung cancer mortality rates declined 35% among non-Hispanic African American males and 23% among non-Hispanic African American females.
- Among non-Hispanic Caucasian Delawareans, males experienced greater reductions in lung cancer mortality compared to females. From 2002-2006 to 2012-2016, Delaware's lung cancer mortality rate decreased 25% among non-Hispanic Caucasian males and decreased 15% among non-Hispanic Caucasian females.

PROSTATE CANCER

- From 2002-2006 to 2012-2016, Delaware's prostate cancer incidence rate decreased 27% while the U.S. rate fell 34%. Delaware's 2012-2016 prostate cancer incidence rate (129.1 per 100,000) was statistically significantly higher than the U.S. (106.8 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 2018 BRFS show that Delaware ranked eighth in the nation in the prevalence of males 40 years of age and older who have had a PSA (protein-specific antigen) test within the past two years.**
- In 2012-2016, Delawareans ranked third in the nation for prostate cancer incidence, unchanged from its ranking in 2011-2015.
- 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 2012-2016, Delaware's percentage of prostate cancer cases diagnosed in the local stage increased substantially, from 50% to 76%.
- **The prostate cancer incidence rate among non-Hispanic African American Delawareans continues to be statistically significantly higher than the comparable prostate cancer incidence rate for non-Hispanic Caucasians and Hispanics. Delaware's 2012-2016 prostate cancer incidence rate was 214.4 per 100,000 for non-Hispanic African Americans, compared to 113.2 per 100,000 for non-Hispanic Caucasians, and 120.9 per 100,000 for Hispanics. This same trend is observed in the U.S.**
- Delaware's mortality rate for prostate cancer was ranked 46th in 2012-2016, compared to 43rd in 2011-2015.
- The prostate cancer mortality rate for non-Hispanic African American Delawareans remains nearly double the comparable rate for non-Hispanic Caucasians. Delaware's 2012-2016 prostate cancer mortality rate was 33.8 per 100,000 for non-Hispanic African Americans, compared to 15.3 per 100,000 for non-Hispanic Caucasians. There was a decline in prostate cancer mortality by 35% among non-Hispanic African American Delawareans and a similar decline by 38% among non-Hispanic Caucasian Delawareans between 2002-2006 and 2012-2016.

TRENDS IN CANCER INCIDENCE

For 2012-2016, Delaware's all-site cancer incidence was statistically significantly higher than the U.S. Delaware's incidence rates were also statistically significantly higher than the U.S. for female breast, lung, prostate, malignant melanoma of the skin, Non-Hodgkin Lymphoma, uterine, and thyroid cancers among sites included in this report.

Delaware's all-site cancer incidence rate decreased from 2002-2006 to 2012-2016. During the same time period, incidence rates for several cancer sites also experienced fluctuations.

Table 1-1 summarizes 2012-2016 age-adjusted incidence rates and 95% confidence intervals for Delaware and the U.S. for all-site cancer and the eight individual cancer sites included in this report. Included in the table is the percentage change in rates (both for Delaware and the U.S.) from 2002-2006 to 2012-2016.

TABLE 1-1: AVERAGE ANNUAL AGE-ADJUSTED CANCER INCIDENCE RATES WITH 95% CONFIDENCE INTERVALS; DELAWARE VS. U.S., 2012-2016

Cancer Site	DE Incidence Rate 2012-2016	U.S. Incidence Rate 2012-2016	DE % Change: 02-06 to 12-16	U.S. % Change: 02-06 to 12-16
All-Site*	491.5 (485.7, 497.4)	435.1 (434.5, 435.7)	-4	-7
Female breast*	136.5 (132.2, 140.8)	126.0 (125.5, 126.4)	+12	+1
Colorectal	37.5 (35.9, 39.2)	38.8 (38.7, 39)	-28	-22
Lung/bronchus*	69.7 (67.5, 71.9)	53.4 (53.2, 53.7)	-13	-18
Prostate*	129.1 (124.9, 133.4)	106.8 (106.4, 107.3)	-27	-34
Malignant Melanoma of the Skin*	29.9 (28.4, 31.4)	23.2 (23.1, 23.4)	+35	+17
Non-Hodgkin Lymphoma*	21.1 (19.9, 22.3)	19.3 (19.2, 19.5)	+8	-2
Uterine*	30.1 (28.2, 32.2)	26.4 (26.2, 26.6)	+7	+17
Thyroid*	16.7 (15.5, 17.9)	14.5 (14.4, 14.7)	+55	+51

Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
* = Delaware incidence rate is statistically significantly higher than the U.S. rate at the 95% confidence level.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

TRENDS IN CANCER MORTALITY

Although Delaware's 2012-2016 all-site cancer mortality rate was significantly greater than the U.S., Delaware's rate for the 2002-2006 to 2012-2016 time period declined 10%. From 2002-2006 to 2012-2016, Delaware made great strides in reducing its cancer mortality burden for several cancer types (especially female breast, colorectal, lung, prostate, and Non-Hodgkin Lymphoma).

TABLE 1-2: AVERAGE ANNUAL AGE-ADJUSTED CANCER MORTALITY RATES WITH 95% CONFIDENCE INTERVALS; DELAWARE VS. U.S., 2012-2016

Cancer Site	DE Mortality Rate 2012-2016	U.S. Mortality Rate 2012-2016	DE % Change: 02-06 to 12-16	U.S. % Change: 02-06 to 12-16
All-Site*	174.0 (170.6, 177.5)	161.1 (160.9, 161.3)	-10	-14
Female breast	22.1 (20.4, 23.8)	20.6 (20.5, 20.7)	-6	-16
Colorectal	13.7 (12.7, 14.7)	14.2 (14.1, 14.2)	-26	-22
Lung/bronchus*	48.4 (46.6, 50.3)	41.9 (41.8, 42.0)	-19	-22
Prostate	17.8 (16.1, 19.7)	19.3 (19.2, 19.4)	-34	-26
Malignant Melanoma of the Skin	2.9 (2.5, 3.4)	2.5 (2.5, 2.5)	0	-7
Non-Hodgkin Lymphoma*	6.4 (5.8, 7.1)	5.6 (5.6, 5.7)	-6	-21
Uterine*	6.2 (5.4, 7.2)	4.7 (4.7, 4.8)	+32	+12
Thyroid	-	0.5 (0.5, 0.5)	-	0

Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
* = Delaware mortality rate is statistically significantly higher than the U.S. rate at the 95% confidence level.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

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 2012-2016. Census tracts were determined by the 2010 U.S. Census designations since they were in effect at the time of analysis. The 2010 Census subdivided Delaware into 214 census tracts rather than the 197 census tracts in the 2000 Census.

Results for 2012-2016 show that:

- In 18 of Delaware's 214 census tracts, the all-site cancer incidence rate was statistically significantly higher than Delaware's average 2012-2016 incidence rate (491.5 per 100,000).
- In 12 of Delaware's 214 census tracts, the all-site cancer incidence rate was statistically significantly lower than Delaware's average 2012-2016 incidence rate (491.5 per 100,000).
- All-site cancer incidence rates for the remaining 184 census tracts were not significantly different from the state's average rate for the 2012-2016 period, or did not have enough cases to be able to calculate a rate (n=2).
- Age-adjusted five-year cancer incidence rates for 2012-2016 by census tract with 95% confidence intervals are presented in Appendix H. 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 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 the cancer rate for a census tract is compared 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 5% of all comparisons would be significantly different due to chance alone.

CHAPTER 2: INTRODUCTION

DELAWARE CANCER REGISTRY

The Delaware Cancer Registry (DCR) is managed by the Delaware Department of Health and Social Services (DHSS), Division of Public Health (DPH) and serves as the state's central cancer information center. The DCR was founded in 1972 and was legally established in 1980 under the Delaware Cancer Control Act[3]. 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 46 states whose central cancer registry is supported by the National Program of Cancer Registries (NPCR) of the Centers for Disease Control and Prevention (CDC).[4] The DCR ensures accurate, timely, and routine surveillance of cancer trends among Delawareans.

REPORTING FACILITIES

Eight Delaware hospitals currently report cancer cases to the DCR. Non-hospital offices that submit data to the DCR include 14 diagnostic laboratories, 14 freestanding ambulatory surgery centers, and at least 15 physicians. Additionally, the DCR has reciprocal data exchange agreements with Alaska, Arkansas, California, Colorado, Florida, Idaho, Louisiana, Maryland, Massachusetts, Michigan, Montana, Nebraska, Nevada, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Puerto Rico, Rhode Island, South Carolina, Tennessee, Texas, Virginia, Washington, Wisconsin, 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.

DATA CONFIDENTIALITY

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 all personal identifiers are removed. 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.

DATA QUALITY

The DCR implements internal quality control procedures to verify the consistency of cancer data continually throughout the year as data is submitted by reporting facilities. In addition, the DCR strives to meet data consistency standards set by the North American Association of Central Cancer Registries (NAACCR). Data is submitted by DCR to NAACCR annually. 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.

[3] http://delcode.delaware.gov/title16/c032/index.shtml
[4] https://nccd.cdc.gov/dcpc_Programs/index.aspx#/3

NAACCR CERTIFICATION AND NPCR STANDARD STATUS

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[5]. 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 in 1999, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, and 2016 (the 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 the CDC. Delaware's data submissions for diagnosis years 2000 through 2018 surpassed all standard levels for quality, completeness, and timeliness.

USES OF DATA

DPH uses DCR data to support various programs and initiatives, including the Screening for Life (SFL) 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 (DCC) rely heavily on DCR data to monitor cancer trends across the state, promote research, and guide policy planning.

ORGANIZATION OF THIS REPORT

This report includes cancer statistics for all cancer sites combined (all-site cancer), as well as eight site-specific cancer types. These cancer statistics reflect incidence and mortality data for 2012-2016. We compare Delaware's cancer incidence and mortality trends for 2012-2016 to those of the U.S. over the same time period. We also summarize how Delaware and U.S. cancer rates have changed from 2002-2006 to 2012-2016. 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.

Additional behavioral risk factor data relevant to adult Delawareans are presented throughout the report and in Appendix D.

Delaware's 2012-2016 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 and mortality were obtained from the U.S. Cancer Statistics Working Group[6].

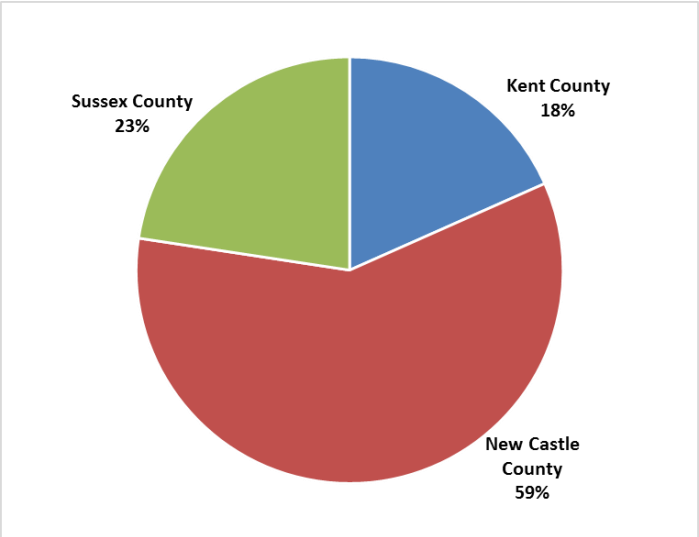
DELAWARE'S POPULATION

In 2012-2016, census data estimated Delaware's total average population at 934,695. The majority of Delawareans – 59% – reside in New Castle County. Kent and Sussex Counties are home to 18% and 23% of Delawareans, respectively (Figure 2-1).

[5] https://www.naaccr.org/certification-criteria/

[6] U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on November 2018 submission data (1999-2016): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, June 2019.

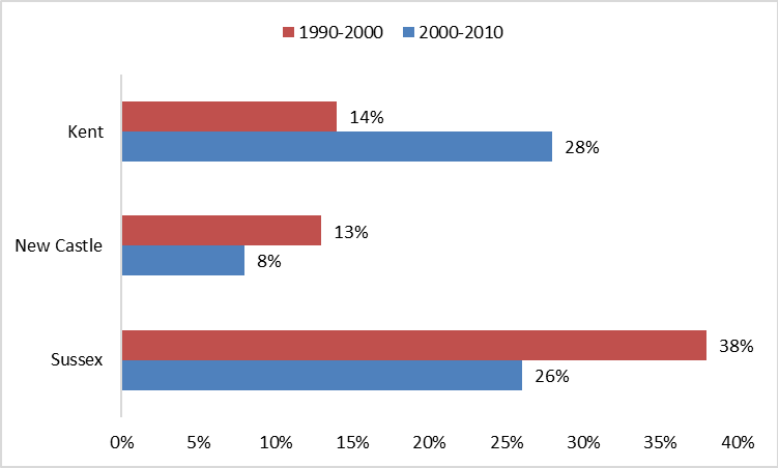
FIGURE 2-1: PERCENTAGE OF POPULATION BY COUNTY, DELAWARE, 2012-2016



Source: U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates, https://data.census.gov/.

Since 1990, population growth rates have varied across Delaware counties (Figure 2-2). New Castle County – the most populated of Delaware's three counties – demonstrated the smallest population growth, increasing its total population by 13% from 1990-2000 and just 8% from 2000-2010. Kent County grew in total population by 14% from 1990-2000, and by 28% from 2000-2010. Sussex County – Delaware's southernmost county – experienced the largest population growth of 38% from 1990-2000, a rate that slowed to 26% from 2000-2010.

FIGURE 2-2: PERCENTAGE OF POPULATION GROWTH BY COUNTY AND DECADE, DELAWARE, 1990-2000 AND 2000-2010



Source: U.S. Census Bureau 2010, https://data.census.gov/

Census data from 2012-2016 show that 64% of all Delawareans are non-Hispanic Caucasian. Non-Hispanic Caucasians are a majority of the population in all three Delaware counties: 64% in Kent County, 59% in New Castle County, and 75% in Sussex County (Table 2-1). Non-Hispanic African Americans comprise 21% of Delaware's population. The distribution varies by county: 24% in Kent County, 24% in New Castle County, and 12% in Sussex County. Four percent of Delawareans are Asians. Another 2% of Delawareans are considered "other" race, which is defined as: (a) any other race group that was too small to enumerate separately; (b) unknown race; or (c) mixed race (i.e., two or more races). Regardless of race, persons of Hispanic ethnicity make up just over 9% of Delaware's population.

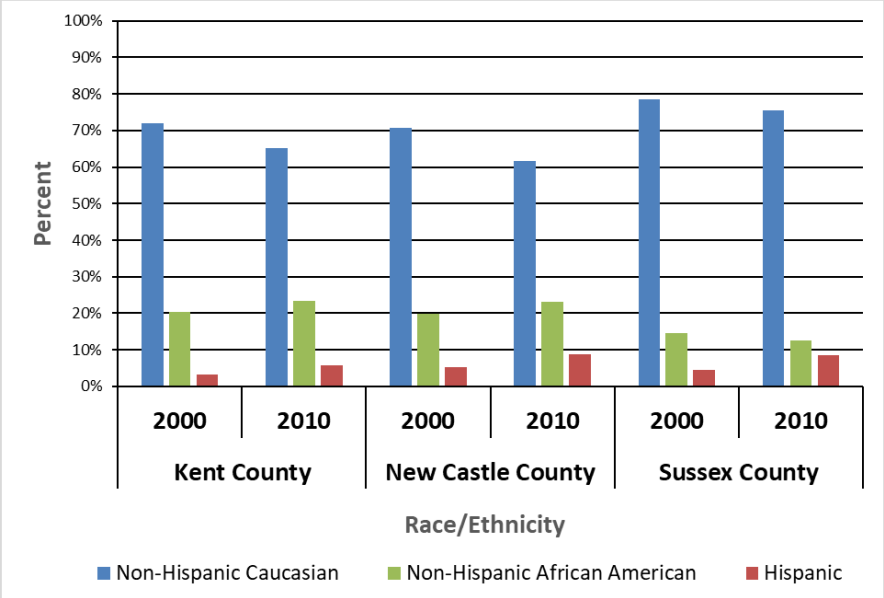
TABLE 2-1: PERCENTAGE OF POPULATION BY RACE/ETHNICITY AND COUNTY, DELAWARE, 2012-2016

Race/Ethnicity	Delaware	Kent	New Castle	Sussex
Not Hispanic or Latino				
Caucasian	64	63	59	75
African American	21	24	24	12
American Indian and Alaska Native	0	1	0	0
Asian	4	2	5	1
Native Hawaiian and Other Pacific Islander	0	0	0	0
Other race	0	0	0	0
Two or more races	2	4	2	2
Hispanic or Latino	9	7	9	9

Source: U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates, https://data.census.gov/.

Since 2000, racial diversity has expanded at different rates across Delaware's counties. Both Kent and New Castle counties experienced substantial increases in the proportion of non-Hispanic African American and Hispanic residents (and concurrent decreases in the proportion of non-Hispanic Caucasian residents) from 2000 to 2010 (Figure 2-3). In Kent County, the non-Hispanic African American population increased from 20% in 2000 to 23% in 2010; the non-Hispanic Caucasian population declined from 72% to 65%; and the Hispanic population increased from 3% to 6%. In New Castle County, the non-Hispanic African American population increased from 20% in 2000 to 23% in 2010; the non-Hispanic Caucasian population declined from 71% to 62%; and the Hispanic population increased from 5% to 9%. A different trend was observed in Sussex County, where the non-Hispanic African American population decreased from 15% in 2000 to 12% in 2010. However, similar to the trends in the other counties, the non-Hispanic Caucasian population declined from 78% to 76%, and the Hispanic population increased from 4% to 9%.

FIGURE 2-3: PERCENTAGE OF RESIDENTS BY RACE/ETHNICITY, DELAWARE AND COUNTIES, 2000 AND 2010



Source: U.S. Census Bureau 2010, https://data.census.gov/

GUIDELINES FOR INTERPRETATION OF INCIDENCE AND MORTALITY RATES

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% 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, meaning it is statistically significant. If the confidence interval for one rate overlaps with the confidence interval for another rate, the two rates are not statistically significantly different, commonly referred to as "no meaningful difference" between rates.

For this report, cancer frequencies and rates were suppressed according to the DPH's Policy Memorandum 49 (Data and Data Release Standards):

- Incidence and mortality frequencies of fewer than 11 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.[7,8]
- 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.

[7] Coughlin SS, Clutter GG, Hutton M. Ethics in Cancer Registries. *Journal of Cancer Registry Management, 2:* 5-10, 1999.
[8] McLaughlin CC. Confidentiality protection in publicly released central registry data. *Journal of Cancer Registry Management, 2:* 84-88, 2002.

CHAPTER 3: ALL-SITE CANCER

INCIDENCE

For 2012-2016, Delaware ranked 2nd in the U.S. for all-site cancer incidence (2nd in 2011-2015); males ranked 3rd (3rd in 2011-2015) and females ranked 5th (5th in 2011-2015)[9].

2012-2016 DATA

TABLE 3-1: NUMBER OF ALL-SITE CANCER CASES, BY SEX AND RACE/ETHNICITY; DELAWARE AND COUNTIES, 2012-2016

	All Races			Non-Hispanic Caucasian			Non-Hispanic African American			Hispanic		
	All	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female
Delaware	28,581	14,619	13,962	22,329	11,504	10,825	4,861	2,441	2,420	805	395	410
Kent	5,251	2,676	2,575	3,939	1,970	1,969	1,060	581	479	162	88	74
New Castle	15,098	7,539	7,559	11,032	5,568	5,464	3,166	1,528	1,638	513	257	256
Sussex	8,221	4,397	3,824	7,349	3,961	3,388	635	332	303	130	50	80

Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.

- In 2012-2016, 28,581 new all-site cancer cases were diagnosed in Delaware, an average of 5,716 per year.
- Males accounted for 51% of all-site cancer cases.
- Non-Hispanic Caucasians accounted for 78% of all-site cancer cases.

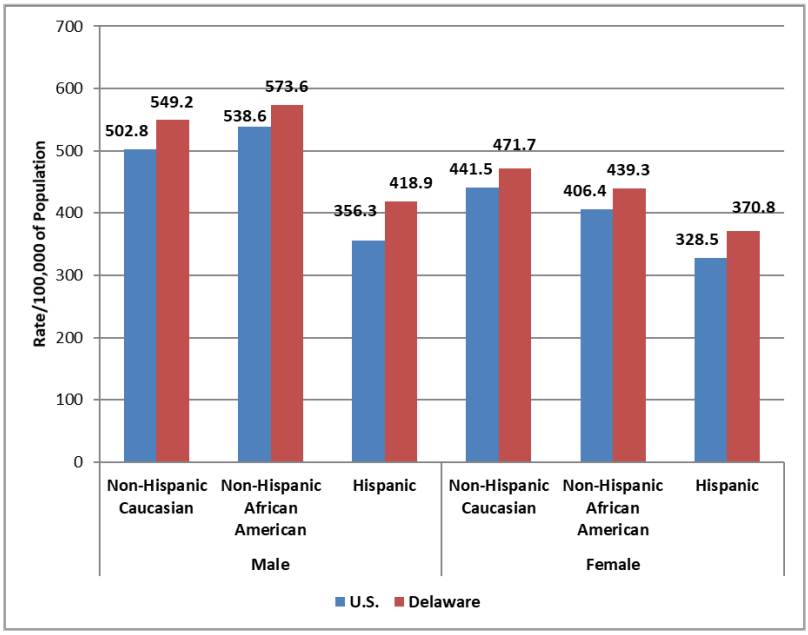
TABLE 3-2: FIVE-YEAR AVERAGE AGE-ADJUSTED ALL-SITE CANCER INCIDENCE RATES OVERALL AND BY SEX; U.S., DELAWARE AND COUNTIES, 2012-2016

	Overall	Male	Female
U.S.	435.1	474.3	409.6
Delaware	491.5	542.9	455.4
Kent	524.8	580.4	484.4
New Castle	485.3	536.7	452.1
Sussex	482.1	533.2	442.2

Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

[9] U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on November 2018 submission data (1999-2016): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, June 2019.

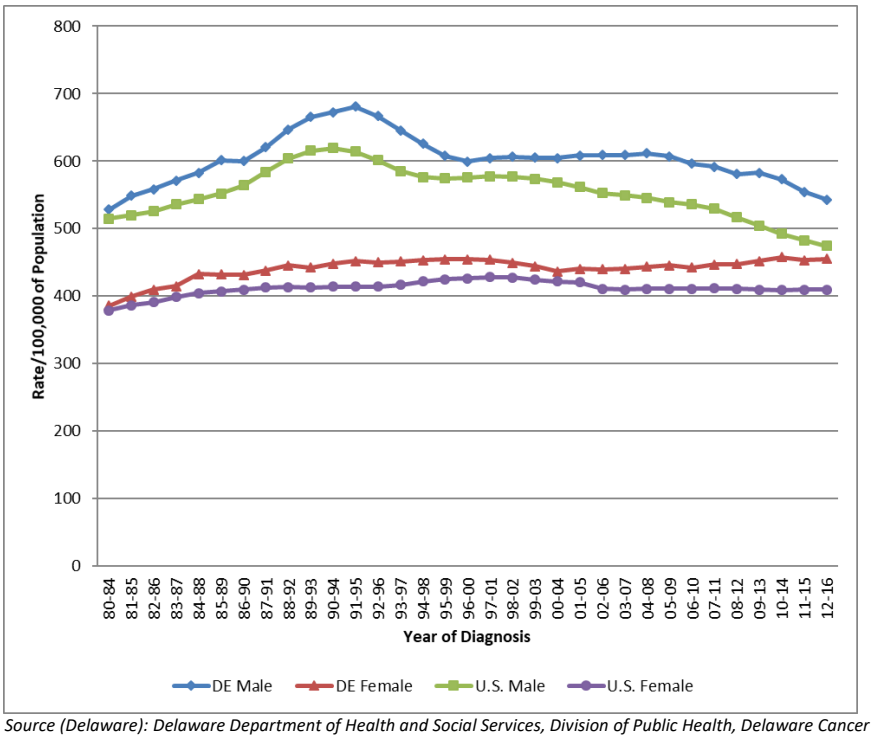
FIGURE 3-1: FIVE-YEAR AVERAGE AGE-ADJUSTED ALL-SITE CANCER INCIDENCE RATES BY SEX AND RACE/ETHNICITY; U.S. AND DELAWARE, 2012-2016



Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 Sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- In Delaware
  - Males (542.9 per 100,000) had a statistically significantly higher all-site cancer incidence rate compared to females (455.4 per 100,000).
  - The difference in all-site cancer incidence rates between non-Hispanic Caucasians (503.3 per 100,000) and non-Hispanic African Americans (493.7 per 100,000) was not statistically significant.
  - Hispanics (390.2 per 100,000) had a statistically significantly lower all-site cancer incidence rate compared to both non-Hispanic Caucasians (503.3 per 100,000) and non-Hispanic African Americans (493.7 per 100,000).
- Comparing Delaware and the U.S.
  - Delaware (491.5 per 100,000) had a statistically significantly higher all-site cancer incidence rate compared to the U.S. (435.1 per 100,000).
  - Delaware males (542.9 per 100,000) had a statistically significantly higher all-site cancer incidence rate compared to U.S. males (474.3 per 100,000).
  - Delaware females (455.4 per 100,000) had a statistically significantly higher all-site cancer incidence rate compared to U.S. females (409.6 per 100,000).
  - Non-Hispanic Caucasians in Delaware (503.3 per 100,000) had a statistically significantly higher all-site cancer incidence rate compared to non-Hispanic Caucasians in the U.S. (465.6 per 100,000).
  - Non-Hispanic African Americans in Delaware (493.7 per 100,000) had a statistically significantly higher all-site cancer incidence rate compared to non-Hispanic African Americans in the U.S. (459.9 per 100,000).
  - Hispanics in Delaware (390.2 per 100,000) had a statistically significantly higher all-site cancer incidence rate compared to Hispanics in the U.S. (336.4 per 100,000).

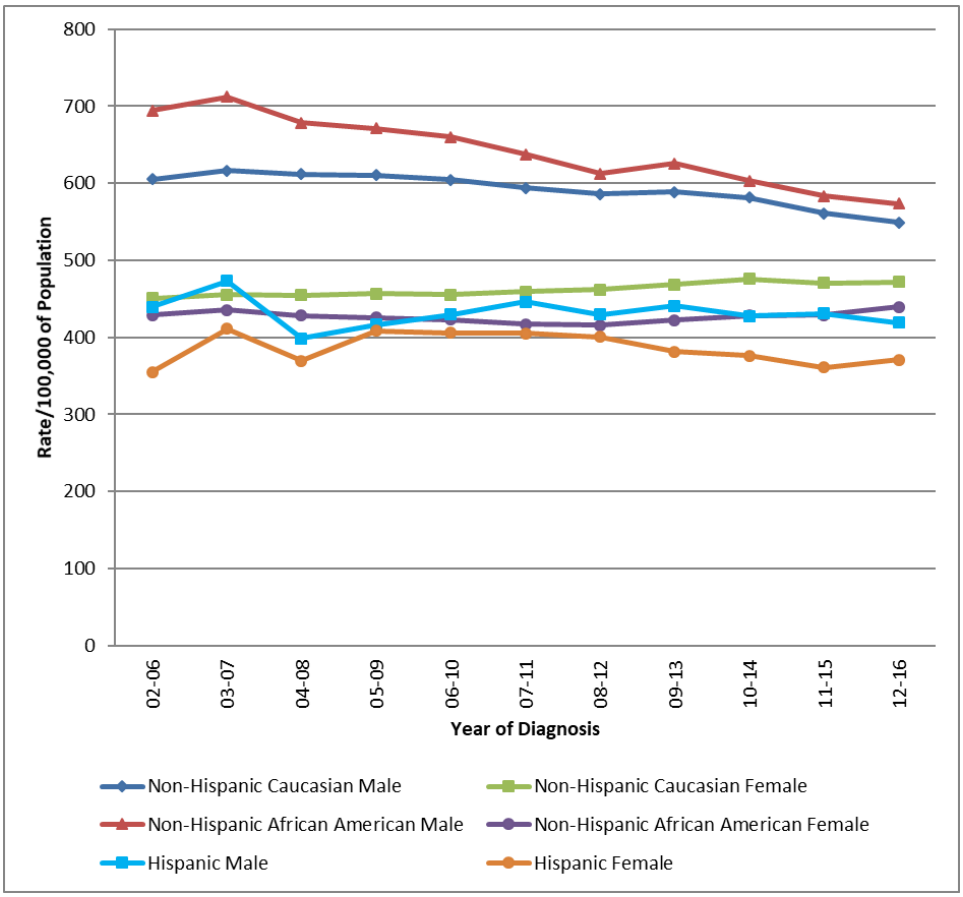
FIGURE 3-2: FIVE-YEAR AVERAGE AGE-ADJUSTED ALL-SITE CANCER INCIDENCE RATES BY SEX; U.S. AND DELAWARE, 1980-2016



Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 Sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- From 2002-2006 to 2012-2016
  - Incidence rates for all-site cancer decreased 4% in Delaware and decreased 7% in the U.S.
  - Incidence rates for all-site cancer decreased 11% in Delaware males and decreased 14% in U.S. males.
  - Incidence rates for all-site cancer increased 3% in Delaware females and remained the same in U.S. females.

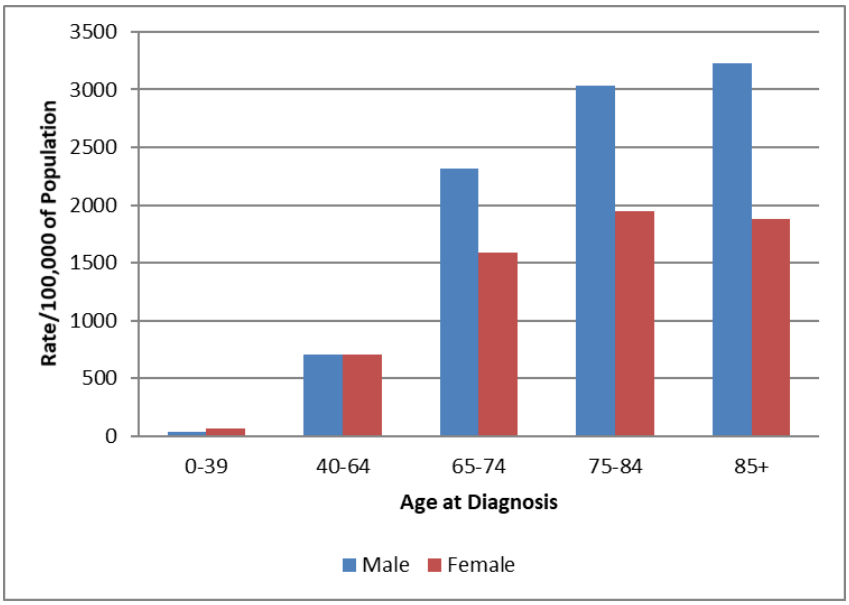
FIGURE 3-3: FIVE-YEAR AVERAGE AGE-ADJUSTED ALL-SITE CANCER INCIDENCE RATES BY SEX AND RACE/ETHNICITY; DELAWARE, 2002-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- From 2002-2006 to 2012-2016 in Delaware
  - Incidence rates for all-site cancer decreased 9% in non-Hispanic Caucasian males and increased 5% in non-Hispanic Caucasian females.
  - Incidence rates for all-site cancer decreased 17% in non-Hispanic African American males and increased 2% in non-Hispanic African American females.
  - Incidence rates for all-site cancer decreased 5% in Hispanic males and increased 4% in Hispanic females.

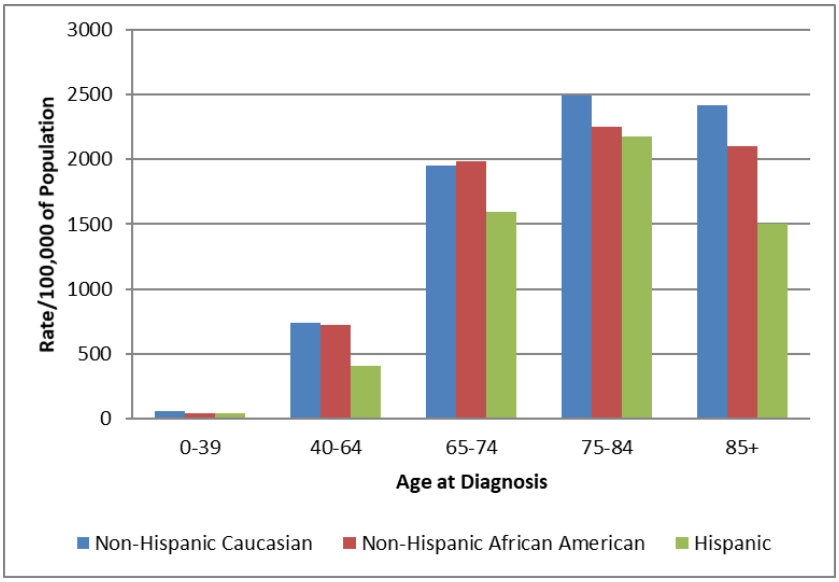
FIGURE 3-4: AGE-SPECIFIC ALL-SITE CANCER INCIDENCE RATES BY SEX; DELAWARE, 2012-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- The all-site cancer incidence rate was highest for males 85 years of age and older and for females between 75 and 84 years of age.

FIGURE 3-5: AGE-SPECIFIC ALL-SITE CANCER INCIDENCE RATES BY RACE/ETHNICITY; DELAWARE, 2012-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- The all-site cancer incidence rate was highest for non-Hispanic Caucasians, non-Hispanic African Americans, and Hispanics between 75 and 84 years of age.

TABLE 3-3: AGE-SPECIFIC ALL-SITE CANCER INCIDENCE RATES BY SEX AND RACE/ETHNICITY; DELAWARE, 2012-2016

Age at Diagnosis	Non-Hispanic Caucasian			Non-Hispanic African American			Hispanic		
	All	Male	Female	All	Male	Female	All	Male	Female
0-39	61.4	47.0	75.9	45.9	25.2	66.0	43.6	43.9	43.2
40-64	743.4	733.5	752.6	726.8	800.7	666.1	411.5	350.0	476.8
65-74	1,948.6	2,296.9	1,640.1	1,982.2	2,639.5	1,480.2	1,597.2	1,869.9	1,365.9
75-84	2,494.0	3,104.4	1,999.3	2,251.7	2,818.9	1,873.5	2,173.9	2,589.9	1,822.6
85+	2,418.9	3,336.4	1,915.3	2,101.0	2,684.6	1,826.0	1,500.5	---	---

Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.
--- Rates based on less than 25 cases are not shown.

- The all-site cancer incidence rate was highest for non-Hispanic Caucasian males 85 years of age and older and for non-Hispanic African American and Hispanic males between 75 and 84 years of age.
- The all-site cancer incidence rate was highest for non-Hispanic Caucasian, non-Hispanic African American, and Hispanic females between 75 and 84 years of age.

MORTALITY

For 2012-2016, Delaware ranked 15th in the U.S. for all-site cancer mortality (18th in 2011-2015); males ranked 18th (22nd in 2011-2015) and females ranked 14th (14th in 2011-2015)[10].

2012-2016 DATA

TABLE 3-4: NUMBER OF ALL-SITE CANCER DEATHS, BY SEX AND RACE/ETHNICITY; DELAWARE AND COUNTIES, 2012-2016

	All Races			Non-Hispanic Caucasian			Non-Hispanic African American			Hispanic		
	All	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female
Delaware	9,945	5,188	4,757	7,935	4,207	3,728	1,643	783	860	218	124	94
Kent	1,850	955	895	1,457	756	701	316	163	153	47	26	21
New Castle	5,161	2,625	2,536	3,856	2,009	1,847	1,075	485	590	143	81	62
Sussex	2,934	1,608	1,326	2,622	1,442	1,180	252	135	117	28	17	11

Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.

- In 2012-2016, there were 9,945 deaths from cancer in Delaware, an average of 1,989 per year.
- Males accounted for 52% of all-site cancer deaths.
- Non-Hispanic Caucasians accounted for 80% of all-site cancer deaths.

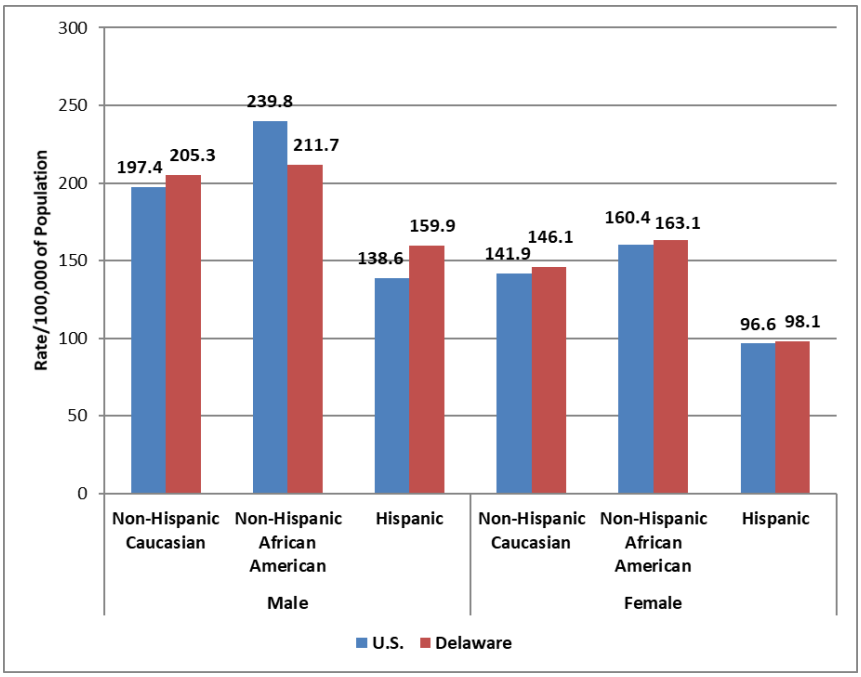
TABLE 3-5: FIVE-YEAR AVERAGE AGE-ADJUSTED ALL-SITE CANCER MORTALITY RATES OVERALL AND BY SEX; U.S., DELAWARE AND COUNTIES, 2012-2016

	Overall	Male	Female
U.S.	161.1	193.3	137.8
Delaware	174.0	206.8	150.1
Kent	189.1	222.0	165.7
New Castle	172.6	206.5	149.4
Sussex	168.4	199.8	143.3

Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

[10] U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on November 2018 submission data (1999-2016): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, June 2019.

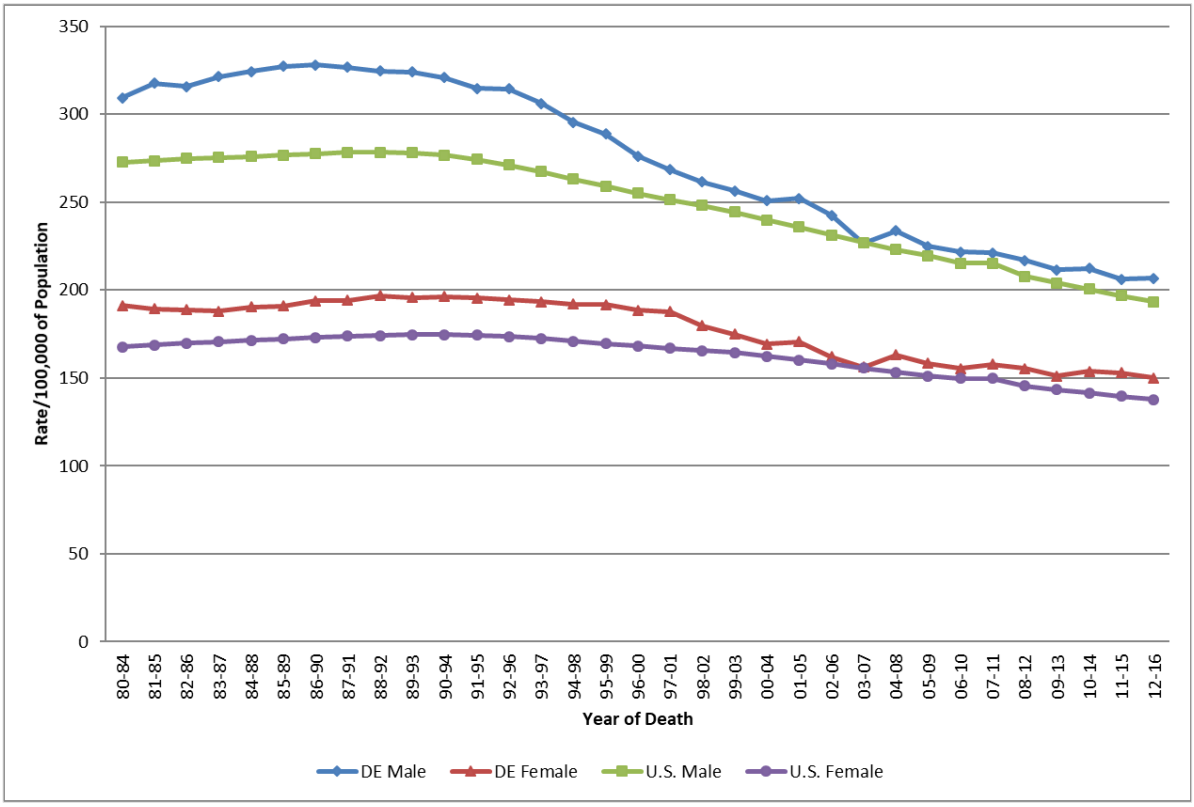
FIGURE 3-6: FIVE-YEAR AVERAGE AGE-ADJUSTED ALL-SITE CANCER MORTALITY RATES BY SEX AND RACE/ETHNICITY; U.S. AND DELAWARE, 2012-2016



Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- In Delaware
  - Males (206.8 per 100,000) had a statistically significantly higher all-site cancer mortality rate compared to females (150.1 per 100,000).
  - Non-Hispanic African Americans (181.6 per 100,000) had a statistically significantly higher all-site cancer mortality rate compared to Hispanics (126.4 per 100,000), but they did not significantly differ compared to non-Hispanic Caucasians (171.4 per 100,000).
  - Non-Hispanic Caucasians (171.4 per 100,000) had a statistically significantly higher all-site cancer mortality rate compared to Hispanics (126.4 per 100,000).
- Comparing Delaware and the U.S.
  - Delaware (174.0 per 100,000) had a statistically significantly higher all-site cancer mortality rate compared to the U.S. (161.1 per 100,000).
  - Delaware males (206.8 per 100,000) had a statistically significantly higher all-site cancer mortality rate compared to U.S. males (193.3 per 100,000).
  - Delaware females (150.1 per 100,000) had a statistically significantly higher all-site cancer mortality rate compared to U.S. females (137.8 per 100,000).
  - Non-Hispanic Caucasians in Delaware (171.4 per 100,000) had a statistically significantly higher all-site cancer mortality rate compared to non-Hispanic Caucasians in the U.S. (165.5 per 100,000).
  - The difference in all-site cancer mortality rates between non-Hispanic African Americans in Delaware (181.6 per 100,000) and the U.S. (190.7 per 100,000) was not statistically significant.
  - The difference in all-site cancer mortality rates between Hispanics in Delaware (126.4 per 100,000) and the U.S. (113.9 per 100,000) was not statistically significant.

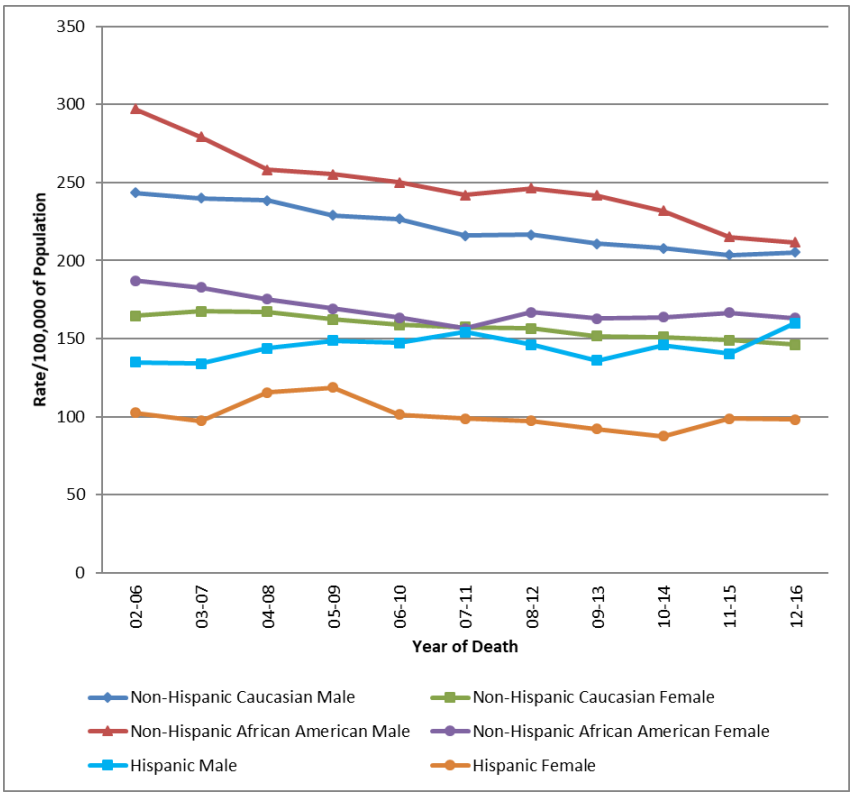
FIGURE 3-7: FIVE-YEAR AVERAGE AGE-ADJUSTED ALL-SITE CANCER MORTALITY RATES BY SEX; U.S. AND DELAWARE, 1980-2016



Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- From 2002-2006 to 2012-2016
  - Mortality rates for all-site cancer decreased 10% in Delaware and 14% in the U.S.
  - Mortality rates for all-site cancer decreased 15% in Delaware males and decreased 16% in U.S. males.
  - Mortality rates for all-site cancer decreased 7% in Delaware females and decreased 13% in U.S. females.

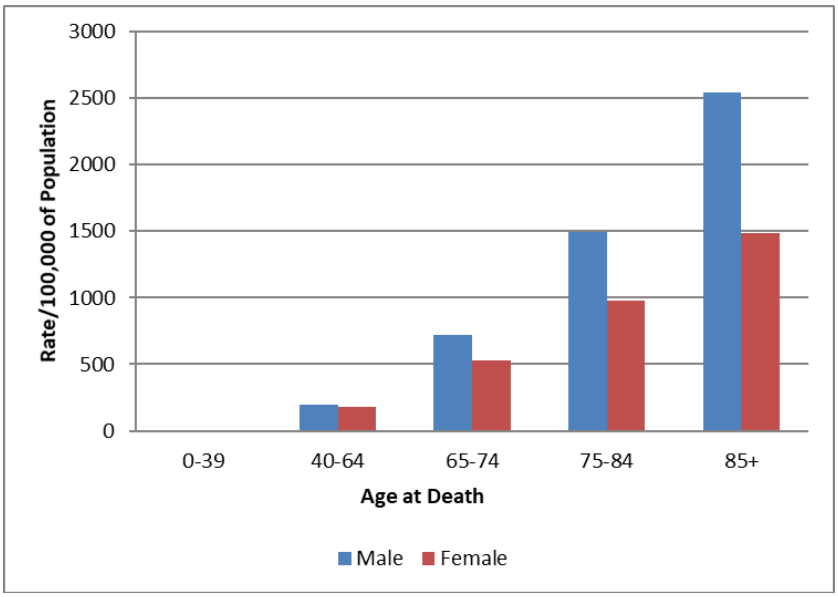
FIGURE 3-8: FIVE-YEAR AVERAGE AGE-ADJUSTED ALL-SITE CANCER MORTALITY RATES BY SEX AND RACE/ETHNICITY; DELAWARE, 2002-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- From 2002-2006 to 2012-2016 in Delaware
  - Mortality rates for all-site cancer decreased 16% in non-Hispanic Caucasian males and decreased 11% in non-Hispanic Caucasian females.
  - Mortality rates for all-site cancer decreased 29% in non-Hispanic African American males and decreased 13% in non-Hispanic African American females.
  - Mortality rates for all-site cancer increased 19% in Hispanic males and decreased 4% in Hispanic females.

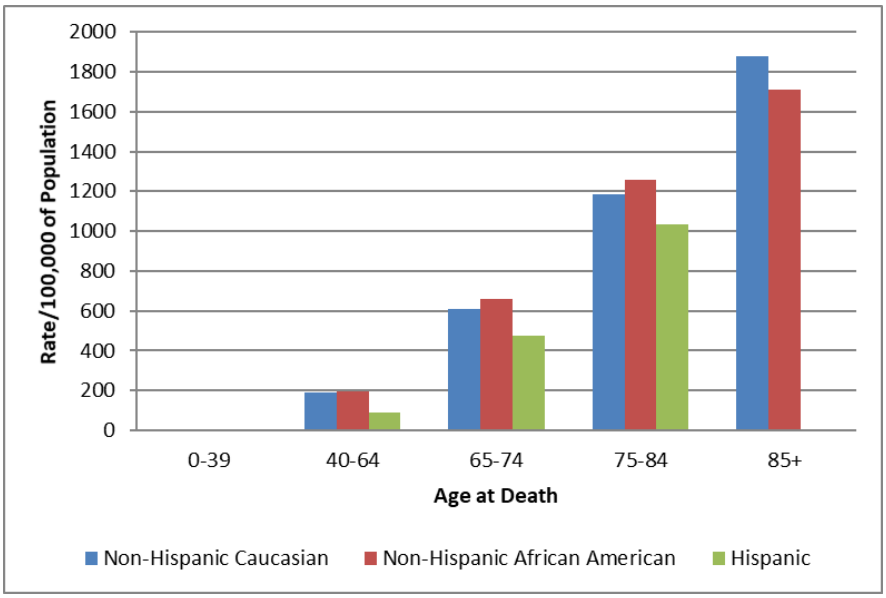
FIGURE 3-9: AGE-SPECIFIC ALL-SITE CANCER MORTALITY RATES BY SEX; DELAWARE, 2012-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- The all-site mortality rate was highest for both males and females 85 years of age and older.

FIGURE 3-10: AGE-SPECIFIC ALL-SITE CANCER MORTALITY RATES BY RACE/ETHNICITY; DELAWARE, 2012-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- The all-site mortality rate was highest for non-Hispanic Caucasians and non-Hispanic African Americans 85 years of age and older and highest for Hispanics 75-84 years of age.

TABLE 3-6: AGE-SPECIFIC ALL-SITE CANCER MORTALITY RATES BY SEX AND RACE/ETHNICITY; DELAWARE, 2012-2016

Age at Death	Males			Females		
	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
0-39	5.9	---	---	6.4	---	---
40-64	203.6	197.6	98.8	175.5	188.7	84.4
65-74	702.2	794.6	596.8	522.3	551.5	---
75-84	1,473.5	1,481.9	1,438.8	948.0	1,112.8	---
85+	2,570.2	2,349.0	---	1,494.6	1,409.1	---

Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.
---Rates based on less than 25 cases are not shown.

- The all-site mortality rate was highest for non-Hispanic Caucasians and non-Hispanic African American males 85 years of age and older.
- The all-site mortality rate was highest for non-Hispanic Caucasians and non-Hispanic African American females 85 years of age and older.

CHAPTER 4: BREAST CANCER (FEMALE)

RISK FACTORS

Most females who have one or more breast cancer risk factors never develop the disease. Some females who develop breast cancer 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.

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 females who have never had children or who had their first child after 30 years of age)
- High-fat diet with low intake of fruits and vegetables
- Smoking and exposure to secondhand smoke

Environmental and medically-related causes of female breast cancer:

- Birth control use in the past 10 years
- Combined hormone therapy (estrogen and progesterone) for two or more years after menopause – 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
- Exposure to chemical compounds in the environment which may have estrogen-like properties (pesticides like Dichlorodiphenyldichloroethylene (DDE), polychlorinated biphenyls (PCBs), and substances found in some plastics, cosmetics, and personal care products

Non-modifiable risk factors (these cannot be changed) for getting female breast cancer:

- Gender – Breast cancer is 100 times more common in females than in males.
- Increasing age – Only one out of eight invasive breast cancers are diagnosed in females under 45 years of age; two-thirds of invasive cancers are in females 55 years of age and older.
- Family history – Having one first-degree relative (mother, sister, or daughter) with breast cancer doubles a woman's risk of developing breast cancer; having two first-degree relatives triples the risk.
- Gene defects or mutations – Five to 10% of breast cancer cases may result from gene defects or mutations inherited from a parent; the most common inherited mutation is the BRCA1 or BRCA2 gene found mostly in Jewish females of Eastern European origin.
- Personal history of breast cancer – This triples the risk of developing a new cancer in another part of the body, another part of the previously affected breast, or the other breast.
- Race – Non-Hispanic Caucasian females 45 years of age and older are more likely to develop breast cancer when compared to non-Hispanic African American females. Non-Hispanic African American females are more likely to be diagnosed at a younger age and more likely to die from breast cancer when compared to non-Hispanic Caucasian females.
- Dense breast tissue is thought to increase risk because it is more difficult to detect potential problems on mammograms.
- Personal history of benign breast conditions
- Early age at menarche (before 12 years of age) and/or later age at menopause (55 years of age and older)

To protect against breast cancer, individuals should maintain a healthy weight; consume a diet high in fruits, vegetables, and whole grains; limit calcium intake; and engage in regular physical activity.

EARLY DETECTION

A screening mammogram (x-ray of the breast) is used to detect breast disease in females who appear to have no breast problems. For early breast cancer detection in females without breast symptoms, the DCC recommends that:[11]

- Females 40 years of age and older should get a mammogram and clinical breast exam annually.
- Females 18-39 years of age should get a clinical breast exam annually.

Also, as females should know how their breasts normally look and feel, they should report any breast change promptly to their health care provider. Breast self-exam is encouraged for females starting in their 20s[11]. Females 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.

FEMALE BREAST CANCER SCREENING IN DELAWARE

The Behavioral Risk Factor Survey (BRFS) has collected yearly mammogram use data through 2000; after 2000, mammogram use data are collected biennially. The BRFS asks a female respondent's mammogram use during the previous two years (as opposed to the annual mammogram screening schedule recommended by the DCC) 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 2018 BRFS provides information on breast cancer screening among Delaware females:

- Of Delaware females 40 years of age and older, 79% reported having a mammogram within the previous two years, compared to a national median of 72%. Delaware females ranked third highest nationally for this response.
- In Delaware, the percentage of non-Hispanic Caucasian females 40 years of age and older who reported having a mammogram in the past two years was slightly lower compared to non-Hispanic African American females. The difference was not significantly different (79% vs. 81%, respectively).
- Females 40 years of age and older in the three highest income categories had the highest percentages of mammography use (83% for females with an annual income of $50,000-$74,999 and 83% for females with an annual income of $75,000 and over).
- Delaware females (40 years of age and older) who were college graduates (80.7%) had a higher prevalence of having had a mammogram in the past two years, compared to Delaware females who had less than a high school diploma (65.9%); this difference was statistically significant.

[11] American Cancer Society recommendations for early breast cancer detection in women without breast symptoms. Accessed March 15, 2016. http://www.cancer.org/Cancer/BreastCancer/MoreInformation/BreastCancerEarlyDetection/breast-cancer-early-detection-acs-recs

INCIDENCE

For 2012-2016, Delaware ranked 6th in the U.S. for female breast cancer incidence (9th in 2011-2015)[12].

2012-2016 DATA

TABLE 4-1: NUMBER OF FEMALE BREAST CANCER CASES, BY RACE/ETHNICITY; DELAWARE AND COUNTIES, 2012-2016

	All Females	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
Delaware	4,146	3,162	769	110
Kent	716	538	141	23
New Castle	2,306	1,637	526	68
Sussex	1,124	987	102	19

Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.

- Female breast cancer is the most commonly diagnosed cancer among females in the U.S. and Delaware.
- There was a total of 35 breast cancers diagnosed in males; 71% were in non-Hispanic Caucasian males. While these data are collected, only breast cancer in females will be addressed in this section.
- In 2012-2016, 4,146 female breast cancer cases (30% of all female cancers) were diagnosed in Delaware.
- Non-Hispanic Caucasians accounted for 76% of female breast cancer cases.

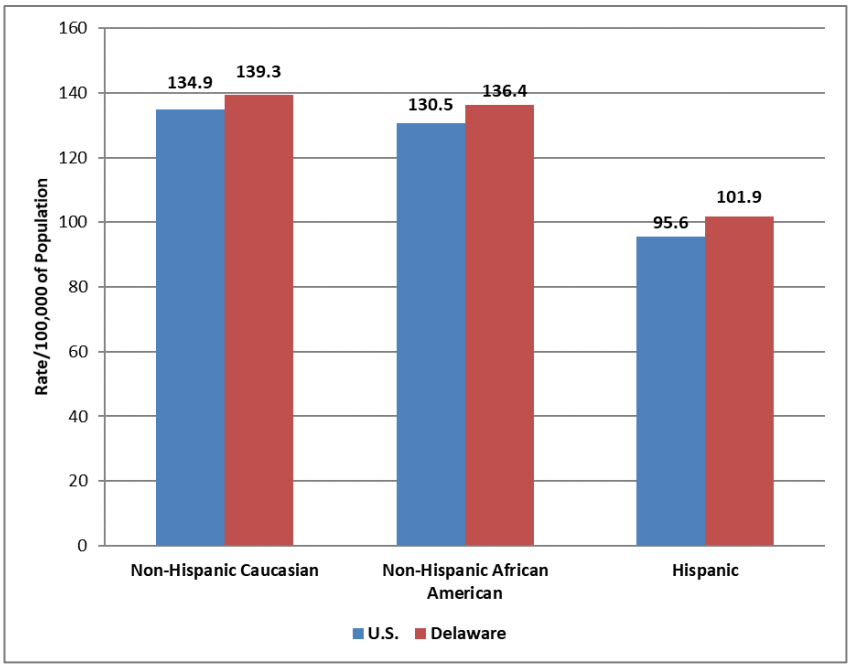
TABLE 4-2: FIVE-YEAR AVERAGE AGE-ADJUSTED FEMALE BREAST CANCER INCIDENCE RATES BY RACE/ETHNICITY; U.S., DELAWARE AND COUNTIES, 2012-2016

	All Females	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
U.S.	126.0	134.9	130.5	95.6
Delaware	136.5	139.3	136.4	101.9
Kent	134.8	139.8	125.4	---
New Castle	139.1	143.4	140.3	96.2
Sussex	130.6	130.6	137.2	---

Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.
---Rates based on less than 25 cases are not shown.

[12] U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on November 2018 submission data (1999-2016): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, June 2019.

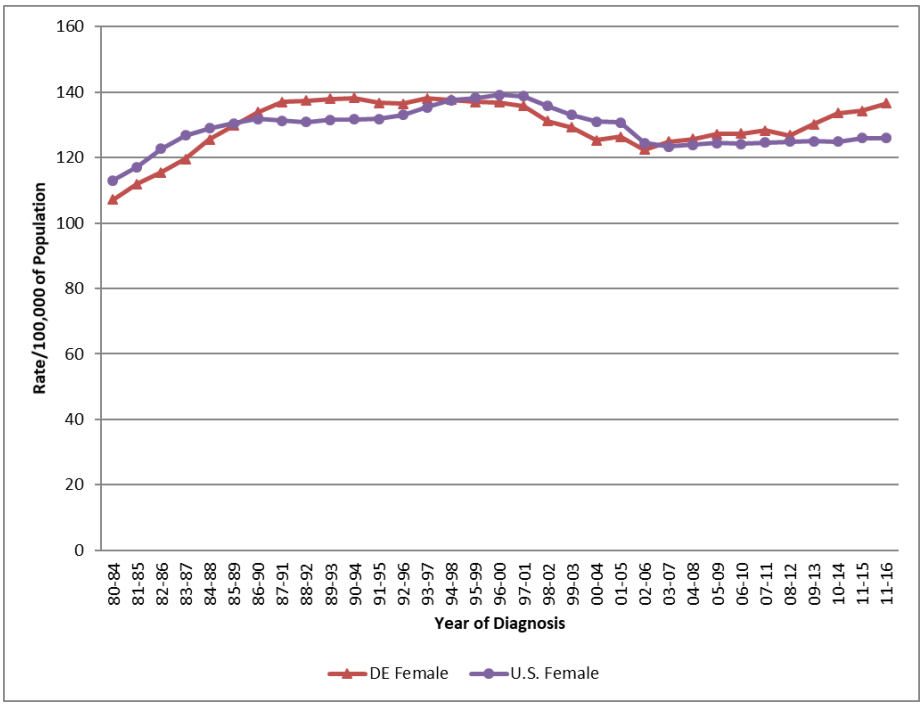
FIGURE 4-1: FIVE-YEAR AVERAGE AGE-ADJUSTED FEMALE BREAST CANCER INCIDENCE RATES BY RACE/ETHNICITY; U.S. AND DELAWARE, 2012-2016



Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- In Delaware
  - The difference in female breast cancer incidence rates between non-Hispanic Caucasians (139.3 per 100,000) and non-Hispanic African Americans (136.4 per 100,000) was not statistically significant.
  - Hispanics (101.9 per 100,000) had a statistically significantly lower female breast cancer incidence rate compared to both non-Hispanic Caucasians and non-Hispanic African Americans.
- Comparing Delaware and the U.S.
  - Delaware (136.5 per 100,000) had a statistically significantly higher female breast cancer incidence rate compared to the U.S. (126.0 per 100,000).
  - The difference in female breast cancer incidence rates between non-Hispanic Caucasians in Delaware (139.3 per 100,000) and the U.S. (134.9 per 100,000) was not statistically significant.
  - The difference in female breast cancer incidence rates between non-Hispanic African Americans in Delaware (136.4 per 100,000) and the U.S. (130.5 per 100,000) was not statistically significant.
  - The difference in female breast cancer incidence rates between Hispanics in Delaware (101.9 per 100,000) and the U.S. (95.6 per 100,000) was not statistically significant.

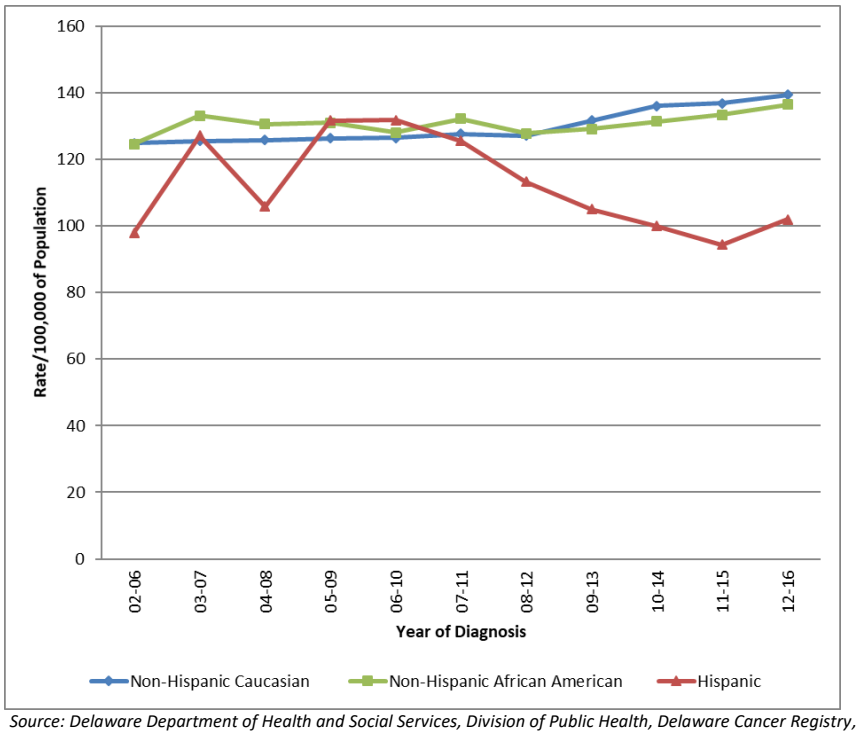
FIGURE 4-2: FIVE-YEAR AVERAGE AGE-ADJUSTED FEMALE BREAST CANCER INCIDENCE RATES; U.S. AND DELAWARE, 1980-2016



Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- From 2002-2006 to 2012-2016
  - Incidence rates for female breast cancer increased 12% in Delaware and increased 1% in the U.S.

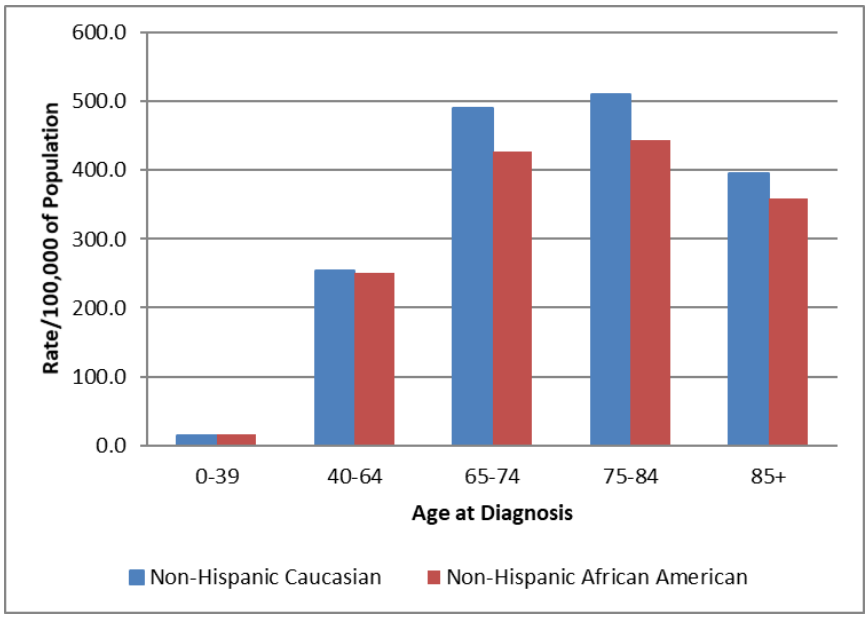
FIGURE 4-3: FIVE-YEAR AVERAGE AGE-ADJUSTED FEMALE BREAST CANCER INCIDENCE RATES BY RACE/ETHNICITY; DELAWARE, 2002-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- From 2002-2006 to 2012-2016 in Delaware
  - Incidence rates for female breast cancer increased 12% in non-Hispanic Caucasians.
  - Incidence rates for female breast cancer increased 9% in non-Hispanic African Americans.
  - Incidence rates for female breast cancer increased 4% in Hispanics.

FIGURE 4-4: AGE-SPECIFIC FEMALE BREAST CANCER INCIDENCE RATES BY RACE/ETHNICITY; DELAWARE, 2012-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- The incidence rate for female breast cancer is highest for non-Hispanic Caucasians and for non-Hispanic African Americans 75 to 84 years of age (based on the rates that could be calculated). Due to small numbers, incidence rates could not be calculated for Hispanics.

TABLE 4-3: AGE-SPECIFIC FEMALE BREAST CANCER INCIDENCE RATES BY RACE/ETHNICITY; DELAWARE, 2012-2016

Age at Diagnosis	All Females	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
0-39	13.7	14.0	16.7	---
40-64	246.1	253.6	251.5	150.6
65-74	472.6	490.7	427.4	---
75-84	491.8	509.6	442.8	---
85+	382.8	396.1	359.5	---

Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.
---Rates based on less than 25 cases are not shown.

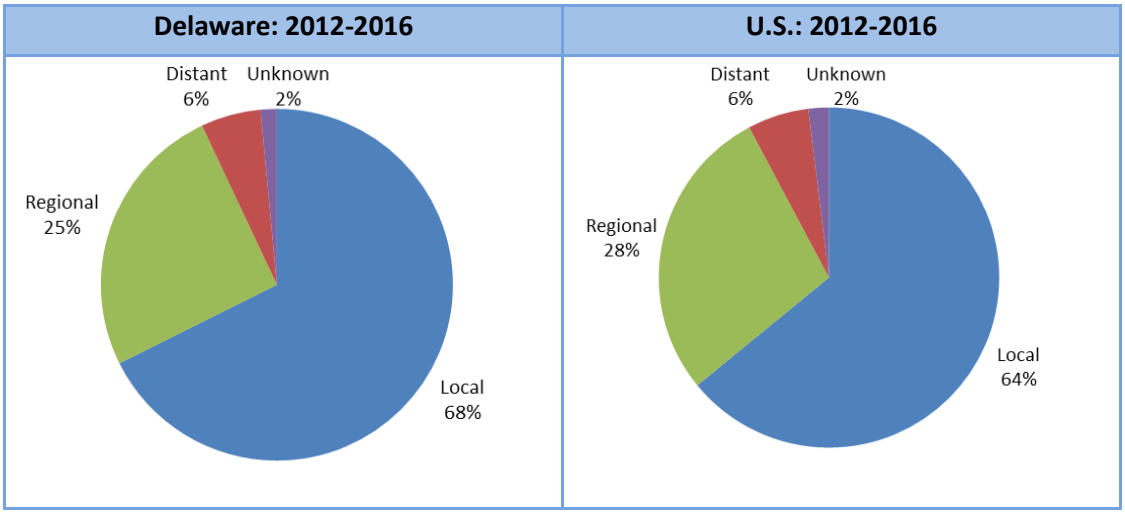
TABLE 4-4: NUMBER AND PERCENTAGE OF FEMALE BREAST CANCER CASES BY STAGE AT DIAGNOSIS BY RACE/ETHNICITY; DELAWARE, 2012-2016

Stage at Diagnosis	All Females	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
Local	2,805 (68)	2,203 (70)	468 (61)	66 (60)
Regional	1,052 (25)	748 (24)	243 (32)	31 (28)
Distant	227 (6)	165 (5)	47 (6)	---
Unknown	62 (2)	46 (2)	11 (1)	---
Total	4,146	3,162	769	110

Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
---Counts less than 11 are not shown to protect patient privacy.

- In 2012-2016, there were 2,805 (68%) female breast cancers diagnosed at local stage; 1,052 (25%) at regional stage; 227 (6%) at distant stage; and 62 (2%) had an unknown stage.
- Non-Hispanic Caucasians (70%) had a higher proportion of female breast cancer diagnosed at local stage compared to both non-Hispanic African Americans (61%) and Hispanics (60%).

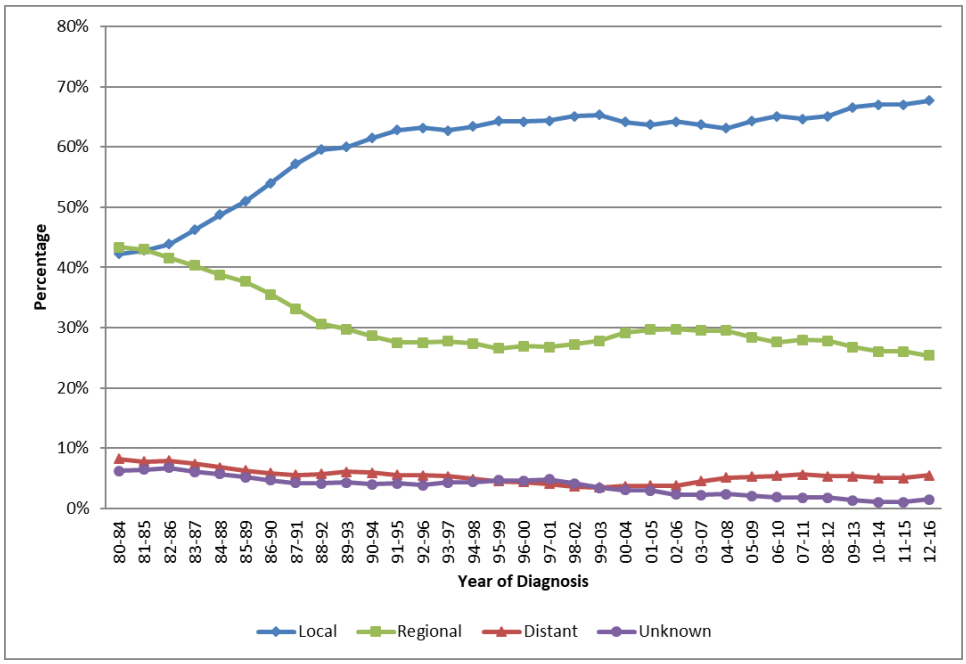
FIGURE 4-5: PERCENTAGE OF FEMALE BREAST CANCER CASES BY STAGE AT DIAGNOSIS, U.S. AND DELAWARE, 2012-2016



Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.

- In comparing U.S. and Delaware breast cancer data, the proportion of female breast cancer cases diagnosed at each of the stages is similar.

FIGURE 4-6: FIVE-YEAR PERCENTAGE OF STAGE OF DIAGNOSIS FOR FEMALE BREAST CANCER CASES, DELAWARE, 1980-2016



Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.

- From 1980-1984 to 2012-2016 in Delaware
  - The percent of female breast cancer cases diagnosed at local stage increased from 42% to 68%.
  - Cases diagnosed at distant stage decreased from 8% to 6%.

MORTALITY

For 2012-2016, Delaware ranked 20th in the U.S. for female breast cancer mortality (21st in 2011-2015)[13].

2012-2016 DATA

TABLE 4-5: NUMBER OF FEMALE BREAST CANCER DEATHS, BY RACE/ETHNICITY; DELAWARE AND COUNTIES, 2012-2016

	All Females	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
Delaware	686	527	139	15
Kent	135	94	33	---
New Castle	348	252	88	---
Sussex	203	181	18	---

Source: Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
---Counts less than 11 are not shown to protect patient privacy

- Female breast cancer is the second most common cause of cancer death among females in the U.S. and Delaware.
- Eight males died from breast cancer from 2012 through 2016, compared to seven deaths in 2011-2015. Male deaths due to breast cancer are not included in this section, as the low counts prevent the calculation of a stable mortality rate.
- In 2012-2016, there were 686 female deaths (14% of all female cancer deaths) from breast cancer in Delaware.
- Non-Hispanic Caucasian females accounted for 77% of breast cancer deaths.

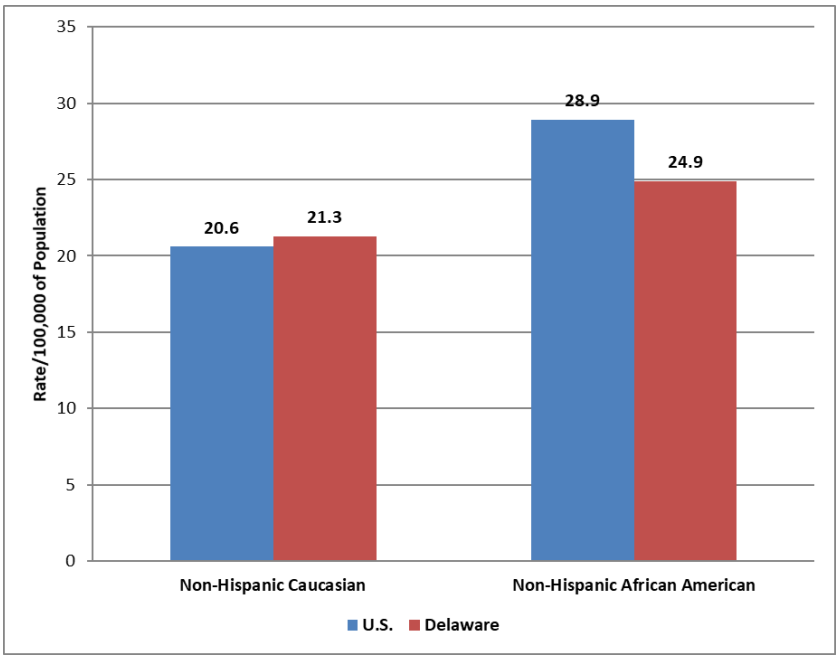
TABLE 4-6: FIVE-YEAR AVERAGE AGE-ADJUSTED FEMALE BREAST CANCER MORTALITY RATES BY RACE/ETHNICITY; U.S., DELAWARE AND COUNTIES, 2012-2016

	All Females	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
U.S.	20.6	20.6	28.9	14.3
Delaware	22.1	21.3	24.9	---
Kent	25.8	23.6	29.7	---
New Castle	20.3	19.4	23.8	---
Sussex	23.5	23.4	---	---

Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.
---Rates based on less than 25 cases are not shown.

[13] U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on November 2018 submission data (1999-2016): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, June 2019.

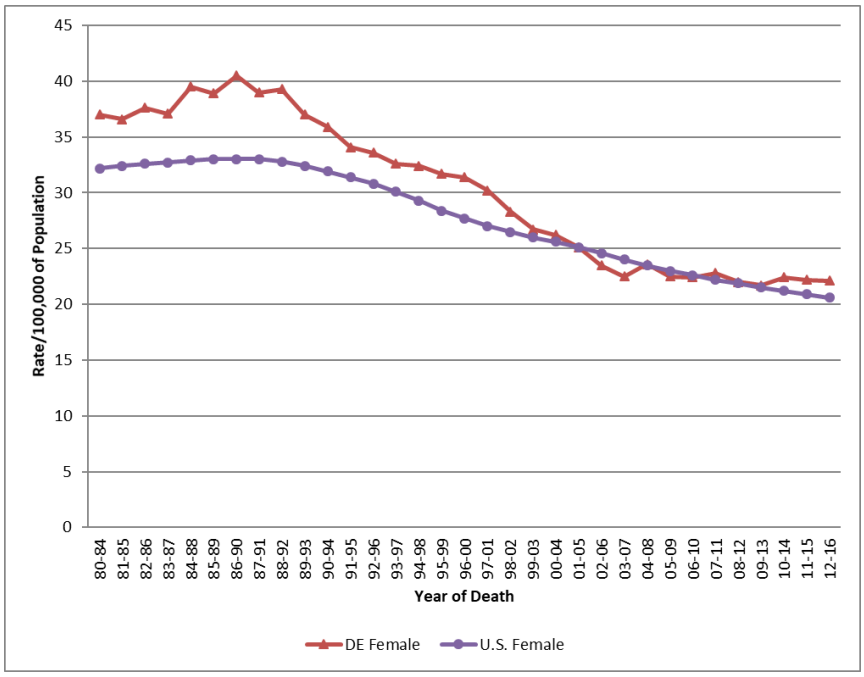
FIGURE 4-7: FIVE-YEAR AVERAGE AGE-ADJUSTED FEMALE BREAST CANCER MORTALITY RATES BY RACE/ETHNICITY; U.S. AND DELAWARE, 2012-2016



Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- In Delaware
  - The difference in female breast cancer mortality rates between non-Hispanic Caucasians (21.3 per 100,000) and non-Hispanic African Americans (24.9 per 100,000) was not statistically significant.
  - Female breast cancer mortality rates for Hispanics could not be calculated due to the small number of deaths.
- Comparing Delaware and the U.S.
  - The difference in female breast cancer mortality rates between Delaware (22.1 per 100,000) and the U.S. (20.6 per 100,000) was not statistically significant.
  - The difference in female breast cancer mortality rates between non-Hispanic Caucasians in Delaware (21.3 per 100,000) and the U.S (20.6 per 100,000) was not statistically significant.
  - The difference in female breast cancer mortality rates between non-Hispanic African Americans in Delaware (24.9 per 100,000) and the U.S. (28.9 per 100,000) was not statistically significant.

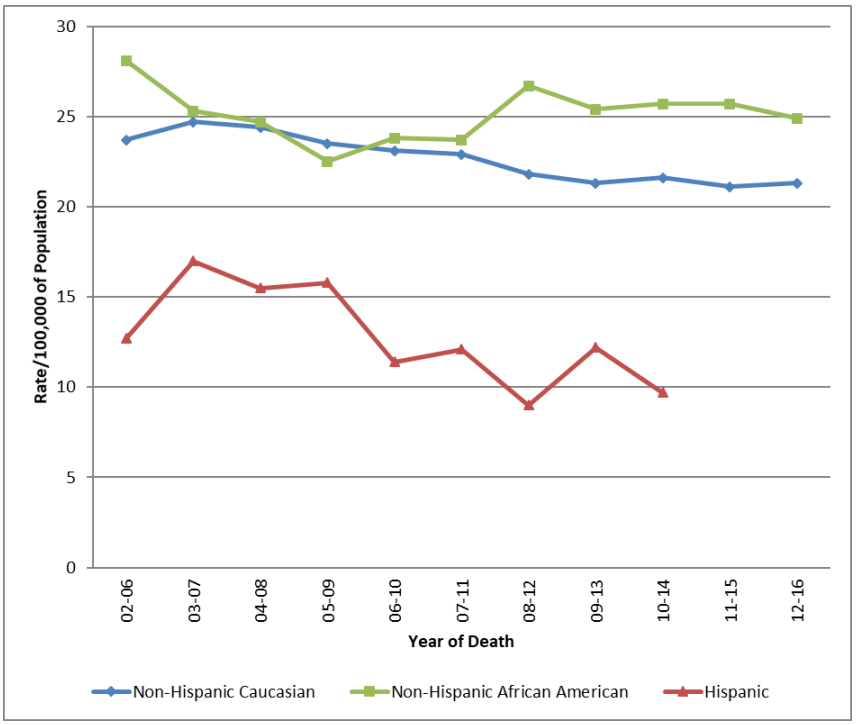
FIGURE 4-8: FIVE-YEAR AVERAGE AGE-ADJUSTED FEMALE BREAST CANCER MORTALITY RATES; U.S. AND DELAWARE, 1980-2016



Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- From 2002-2006 to 2012-2016
  - Mortality rates for female breast cancer decreased 6% in Delaware and decreased 16% in the U.S.

FIGURE 4-9: FIVE-YEAR AVERAGE AGE-ADJUSTED FEMALE BREAST CANCER MORTALITY RATES BY RACE/ETHNICITY; DELAWARE, 2002-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- From 2002-2006 to 2012-2016 in Delaware
  - Mortality rates for female breast cancer decreased 10% in non-Hispanic Caucasians.
  - Mortality rates for female breast cancer decreased 11% in non-Hispanic African Americans.
  - Mortality rates for female breast cancer in Hispanics could not be calculated due to the small number of deaths.

TABLE 4-7: AGE-SPECIFIC FEMALE BREAST CANCER MORTALITY RATES BY RACE/ETHNICITY; DELAWARE, 2012-2016

Age at Diagnosis	All Females	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
0-39	---	---	---	---
40-64	34.8	33.0	42.7	---
65-74	64.4	64.3	71.2	---
75-84	116.9	117.9	---	---
85+	188.6	189.9	---	---

Source: Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.
---Rates based on less than 25 cases are not shown.

- The incidence rate for female breast cancer was highest for non-Hispanic Caucasian females 85 years of age and older. Due to small numbers, mortality rates could not be calculated for Hispanics or for some non-Hispanic Caucasian and non-Hispanic African American age groups.

CHAPTER 5: COLORECTAL CANCER

RISK FACTORS

Lifestyle risk factors for colorectal cancer:

- A diet high in red and processed meats
- Heavy alcohol consumption
- Lack of physical activity/obesity
- Long-term tobacco use
- Type 2 diabetes

Environmental and medically-related causes of colorectal cancer:

- Personal history of testicular cancer (possibly due to testicular cancer treatment strategies)
- History of radiation treatment for prostate cancer
- Night-shift work may increase risk among females (limited data on this factor)

Non-modifiable risk factors (these cannot be changed) for getting colorectal cancer:

- Age (risk increases after 50 years of age)
- Race (non-Hispanic African Americans are at greater risk compared to non-Hispanic Caucasians)
- Ethnicity (Jewish males and females of Eastern European descent are at 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
- Familial adenomatous polyposis (FAP) is responsible for 1% of colorectal cancers.
- Family history of colorectal cancer or adenomatous polyps in one or more first-degree relatives

To protect against colorectal cancer, individuals should get regular screenings because the early removal of colorectal polyps can prevent colorectal cancer from developing. People should also manage lifestyle risk factors: eat a healthy diet, limit alcohol use (two drinks a day for males and one drink a day for females), increase physical activity, and take a daily multivitamin (studies have shown that a multivitamin containing folic acid, vitamin D and/or magnesium could decrease colorectal cancer risk).

People who use aspirin and other anti-inflammatory drugs (i.e. ibuprofen) show a lower risk of colorectal cancer but long-term use may lead to other side effects. Combined hormone replacement therapy (including both estrogen and progesterone) may reduce a woman's postmenopausal risk of colorectal cancer.

EARLY DETECTION

The American Cancer Society (ACS) and DCC colorectal cancer screening guidelines recommend that at 50 years of age, males and females at average risk of developing colorectal cancer should use one of the following screening options[14]:

a. Fecal occult blood tests (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. Computed tomography (CT) colonography (virtual colonoscopy) every five years
f. Colonoscopy every 10 years

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

COLORECTAL CANCER SCREENING IN DELAWARE

Data from the 2018 BRFS provides information on colorectal cancer screening patterns among Delawareans:

- Delaware ranked 11th highest in the prevalence (73%) of adults 50-74 years of age who reported meeting the U.S. Preventive Services Task Force (USPSTF) recommendations for colorectal screening. The U.S. national median for meeting the USPSTF recommendation for colorectal cancer screening was 70%.
- The percentage of Delawareans who met the USPSTF recommendation for colorectal cancer screening increased by age group. Significantly more Delawareans 60-69 years of age and 70 years of age and older (77% and 80%, respectively) reported meeting the recommendation, compared to those 50-59 years of age (66%).
- The prevalence of non-Hispanic Caucasians 50-74 years of age in Delaware who met the USPSTF recommendation for colorectal cancer screening (75%) was higher compared to the prevalence for non-Hispanic African Americans in Delaware (71%). However, this difference was not statistically significant.
- In Delaware, the prevalence of adults 50-74 years of age who met the USPSTF colorectal cancer screening increased by education level.
- As income increases, so does the prevalence of meeting the USPSTF recommendation for colorectal cancer screening. Delawareans who reported having the recommended colorectal cancer screenings differed significantly between income levels: 59% were in the lowest income category (less than $15,000 annual household income) and 77% were in the highest income category ($50,000 or more).

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

INCIDENCE

For 2012-2016, Delaware ranked 31st in the U.S. for colorectal cancer incidence (38th in 2011-2015); males ranked 27th (32nd in 2011-2015) and females ranked 33rd (38th in 2011-2015).[15]

2012-2016 DATA

TABLE 5-1: NUMBER OF COLORECTAL CANCER CASES, BY SEX AND RACE/ETHNICITY; DELAWARE AND COUNTIES, 2012-2016

	All Races			Non-Hispanic Caucasian			Non-Hispanic African American			Hispanic		
	All	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female
Delaware	2,154	1,135	1019	1,635	874	761	412	205	207	76	37	39
Kent	398	196	202	291	142	149	85	42	43	---	---	---
New Castle	1,165	601	564	825	433	392	267	128	139	53	26	27
Sussex	591	338	253	519	299	220	60	35	25	---	---	---

Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
---Counts less than 11 are not shown to protect patient privacy.

- Colorectal cancer is the fourth most commonly diagnosed cancer in the U.S. and Delaware.
- In 2012-2016, 2,154 colorectal cancer cases (8% of all cancer cases) were diagnosed in Delaware.
- Males accounted for 53% of colorectal cancer cases.
- Non-Hispanic Caucasians accounted for 76% of colorectal cancer cases.

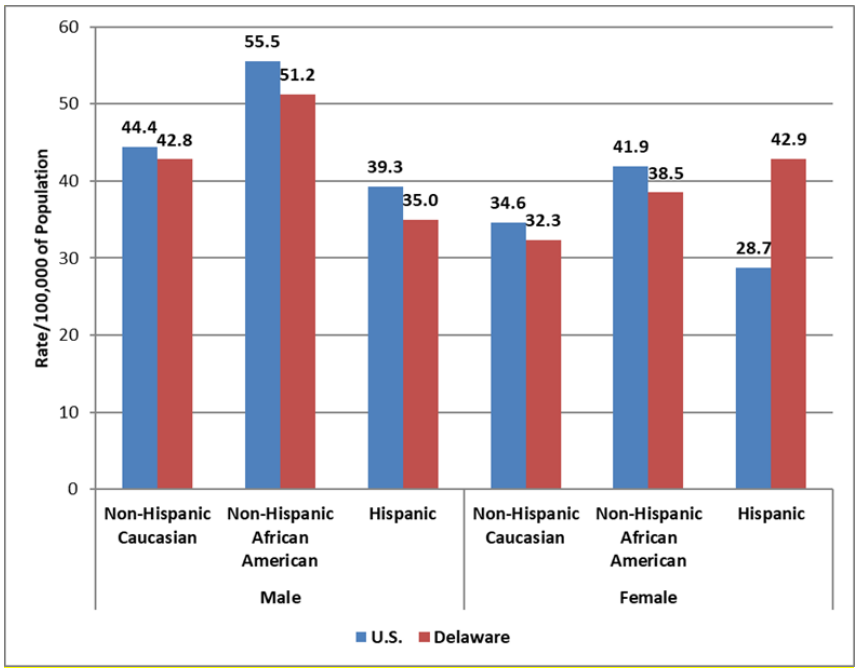
TABLE 5-2: FIVE-YEAR AVERAGE AGE-ADJUSTED COLORECTAL CANCER INCIDENCE RATES OVERALL AND BY SEX; U.S., DELAWARE AND COUNTIES, 2012-2016

	Overall	Male	Female
U.S.	38.8	44.5	34.1
Delaware	37.5	43.3	33.0
Kent	40.9	44.7	38.1
New Castle	37.7	42.9	33.8
Sussex	35.6	44.3	27.7

Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

[15] U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on November 2018 submission data (1999-2016): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, June 2019.

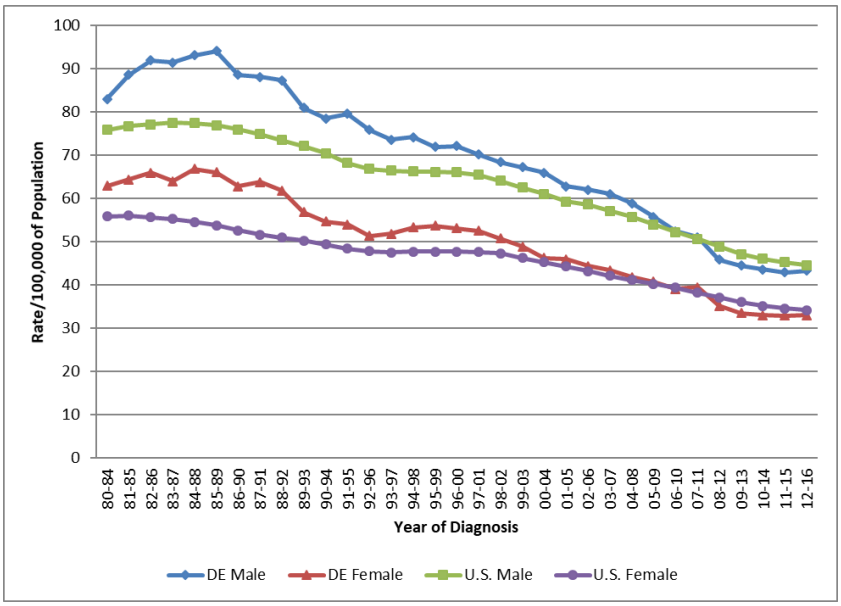
FIGURE 5-1: FIVE-YEAR AVERAGE AGE-ADJUSTED COLORECTAL CANCER INCIDENCE RATES BY SEX AND RACE/ETHNICITY; U.S. AND DELAWARE, 2012-2016



Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- In Delaware
  - Males (43.3 per 100,000) had a statistically significantly higher colorectal cancer incidence rate compared to females (33.0 per 100,000).
  - The difference in colorectal cancer incidence rates between non-Hispanic Caucasians (37.0 per 100,000) and non-Hispanic African Americans (43.6 per 100,000) was statistically significant, but the rates for both compared to Hispanics (39.6 per 100,000) was not statistically significant.
- Comparing Delaware and the U.S.
  - The difference in colorectal cancer incidence rates between Delaware (37.5 per 100,000) and the U.S. (38.8 per 100,000) was not statistically significant.
  - The difference in colorectal cancer incidence rates between males in Delaware (43.3 per 100,000) and the U.S. (44.5 per 100,000) was not statistically significant.
  - The difference in colorectal cancer incidence rates between females in Delaware (33.0 per 100,000) and the U.S. (34.1 per 100,000) was not statistically significant.
  - The difference in colorectal cancer incidence rates between Non-Hispanic Caucasians in Delaware (37.0 per 100,000) and Non-Hispanic Caucasians in the U.S. (39.2 per 100,000) was not statistically significant.
  - The difference in colorectal cancer incidence rates between Non-Hispanic African Americans in Delaware (43.6 per 100,000) and non-Hispanic African Americans in the U.S. (47.7 per 100,000) was not statistically significant.
  - The difference in colorectal cancer incidence rates between Hispanics in Delaware (39.6 per 100,000) and the U.S. (33.4 per 100,000) was not statistically significant.

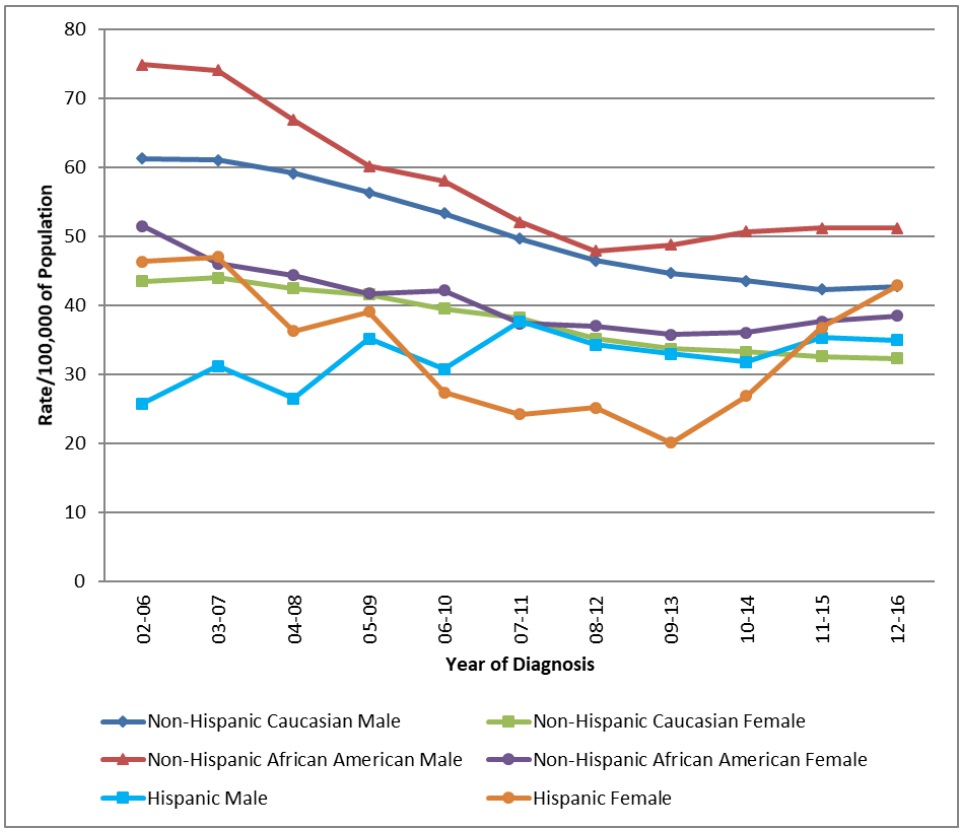
FIGURE 5-2: FIVE-YEAR AVERAGE AGE-ADJUSTED COLORECTAL CANCER INCIDENCE RATES BY SEX; U.S. AND DELAWARE, 1980-2016



Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- From 2002-2006 to 2012-2016
  - Incidence rates for colorectal cancer decreased 28% in Delaware and decreased 22% in the U.S.
  - Incidence rates for colorectal cancer decreased 30% in Delaware males and decreased 24% in U.S. males.
  - Incidence rates for colorectal cancer decreased 26% in Delaware females and decreased 21% in U.S. females.

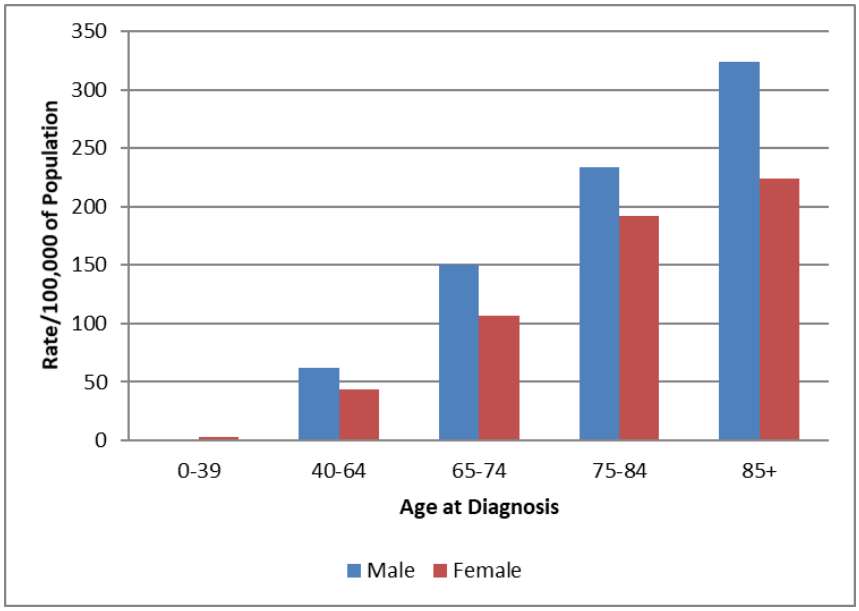
FIGURE 5-3: FIVE-YEAR AVERAGE AGE-ADJUSTED COLORECTAL CANCER INCIDENCE RATES BY SEX AND RACE/ETHNICITY; DELAWARE, 2002-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- From 2002-2006 to 2012-2016 in Delaware
  - Incidence rates for colorectal cancer decreased 30% in non-Hispanic Caucasian males and decreased 26% in non-Hispanic Caucasian females.
  - Incidence rates for colorectal cancer decreased 32% in non-Hispanic African American males and decreased 25% in non-Hispanic African American females.
  - Incidence rates for colorectal cancer increased 36% in Hispanic males and decreased 8% in Hispanic females.

FIGURE 5-4: AGE-SPECIFIC COLORECTAL CANCER INCIDENCE RATES BY SEX; DELAWARE, 2012-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- The incidence rate for colorectal cancer was highest for both males and females 85 years of age and older.

TABLE 5-3: AGE-SPECIFIC COLORECTAL CANCER INCIDENCE RATES BY SEX AND RACE/ETHNICITY; DELAWARE, 2012-2016

Age at Diagnosis	Males			Females		
	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
0-39	---	---	---	---	---	---
40-64	63.7	65.7	---	42.2	53.8	---
65-74	145.1	196.9	---	103.6	126.6	---
75-84	234.4	281.0	---	187.1	215.7	---
85+	327.3	---	---	228.7	---	---

Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.
---Rates based on less than 25 cases are not shown.

- The incidence rate for colorectal cancer was highest for both non-Hispanic Caucasian males and females 85 years of age and older. Due to small numbers, incidence rates could not be calculated for Hispanics or for some combinations of sex and age group for non-Hispanic Caucasians and non-Hispanic African Americans.

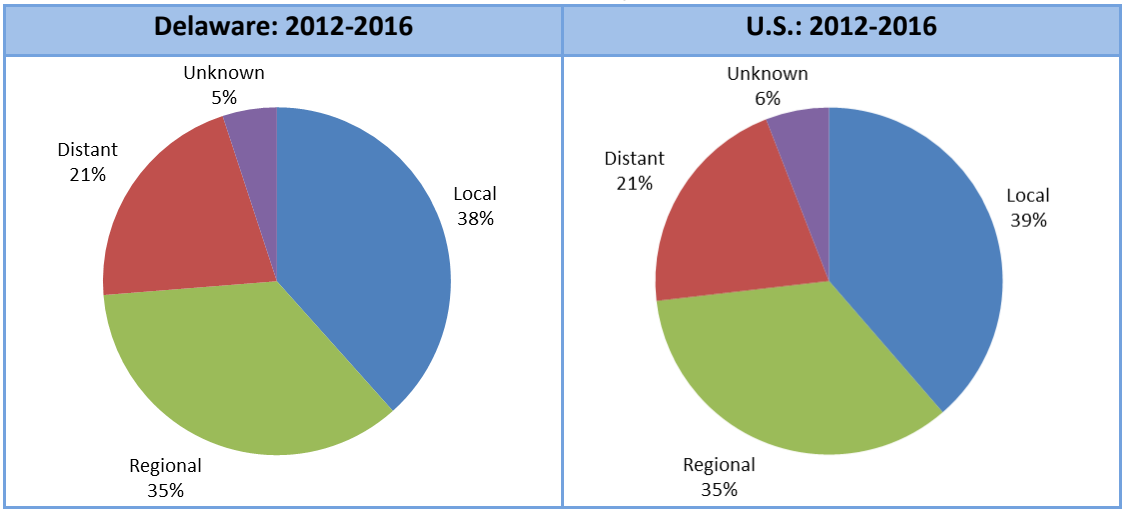
TABLE 5-4: NUMBER AND PERCENTAGE OF COLORECTAL CANCER CASES BY STAGE AT DIAGNOSIS BY SEX AND RACE/ETHNICITY, DELAWARE, 2012-2016

Stage at Diagnosis	All Races			Non-Hispanic Caucasian			Non-Hispanic African American			Hispanic		
	All	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female
Local	858 (40)	438 (39)	420 (41)	654 (40)	335 (38)	319 (42)	160 (39)	82 (40)	78 (38)	32 (42)	14 (38)	18 (46)
Regional	753 (35)	411 (36)	342 (34)	578 (35)	324 (37)	254 (33)	133 (32)	66 (32)	67 (32)	32 (42)	16 (43)	16 (41)
Distant	444 (21)	244 (22)	200 (20)	328 (20)	183 (21)	145 (19)	97 (24)	---	49 (24)	---	---	---
Unknown	99 (5)	4 (4)	57 (6)	75 (5)	32 (4)	43 (6)	22 (5)	---	13 (6)	---	---	---
Total	2,154	1,135	1,019	1,635	874	761	412	205	207	76	37	39

Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
---Counts less than 11 are not shown to protect patient privacy.

- In 2012-2016, there were 858 (40%) colorectal cancers diagnosed at local stage; 753 (35%) at regional stage; 444 (21%) at distant stage; and 99 (5%) had an unknown stage.
- Hispanics (42%) had a higher proportion of colorectal cancers diagnosed at local stage compared to both non-Hispanic Caucasians (40%) and non-Hispanic African Americans (39%).
- Males (39%) had a lower proportion of colorectal cancers diagnosed at local stage compared to females (41%).

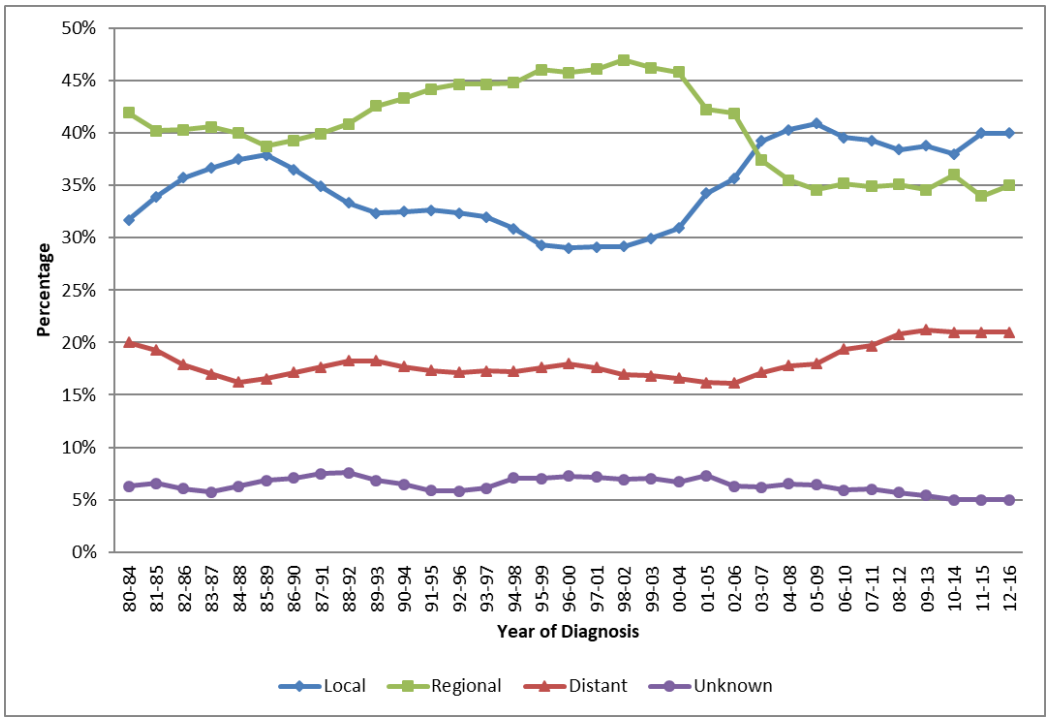
FIGURE 5-5: PERCENTAGE OF COLORECTAL CANCER CASES BY STAGE AT DIAGNOSIS, U.S. AND DELAWARE, 2012-2016



Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.

- In comparing U.S. and Delaware colorectal cancer data, percentages showing the stage of colorectal cancer at diagnosis are similar.

FIGURE 5-6: FIVE-YEAR PERCENTAGE OF STAGE OF DIAGNOSIS FOR COLORECTAL CANCER CASES, DELAWARE, 1980-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.

- From 1980-1984 to 2012-2016 in Delaware
  - The percentage of colorectal cancer cases diagnosed at local stage increased from 32% to 40%.
  - Colorectal cancer cases diagnosed at distant stage increased slightly, from 20% to 21%.

MORTALITY

For 2012-2016, Delaware ranked 35th in the U.S. for colorectal cancer mortality (41st in 2011-2015); males ranked 30th (36th in 2011-2015) and females ranked 45th (41st in 2011-2015)[16].

2012-2016 DATA

TABLE 5-5: NUMBER OF COLORECTAL CANCER DEATHS, BY SEX AND RACE/ETHNICITY; DELAWARE AND COUNTIES, 2012-2016

	All Races			Non-Hispanic Caucasian			Non-Hispanic African American			Hispanic		
	All	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female
Delaware	769	423	346	599	335	264	140	67	73	22	14	---
Kent	150	86	64	109	63	46	31	---	---	---	---	---
New Castle	409	213	196	299	161	138	93	38	55	---	---	---
Sussex	210	124	86	191	111	80	16	---	---	---	---	---

Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
---Counts less than 11 are not shown to protect patient privacy.

- Colorectal cancer is the fourth most common cause of cancer death in the U.S. and Delaware.
- In 2012-2016, there were 769 deaths (8% of all cancer deaths) from colorectal cancer in Delaware.
- Males accounted for 55% of colorectal cancer deaths.
- Non-Hispanic Caucasians accounted for 78% of colorectal cancer deaths.

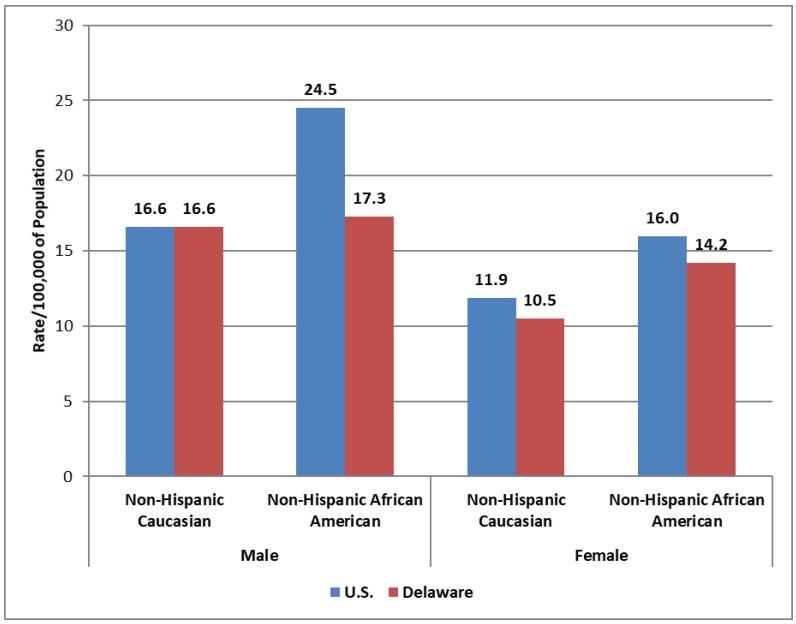
TABLE 5-6: FIVE-YEAR AVERAGE AGE-ADJUSTED COLORECTAL CANCER MORTALITY RATES OVERALL AND BY SEX; U.S., DELAWARE AND COUNTIES, 2012-2016

	Overall	Male	Female
U.S.	14.2	16.9	12.0
Delaware	13.7	17.0	11.0
Kent	15.5	20.1	11.8
New Castle	13.7	16.5	11.7
Sussex	12.4	16.1	8.9

Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

[16] U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on November 2018 submission data (1999-2016): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, June 2019.

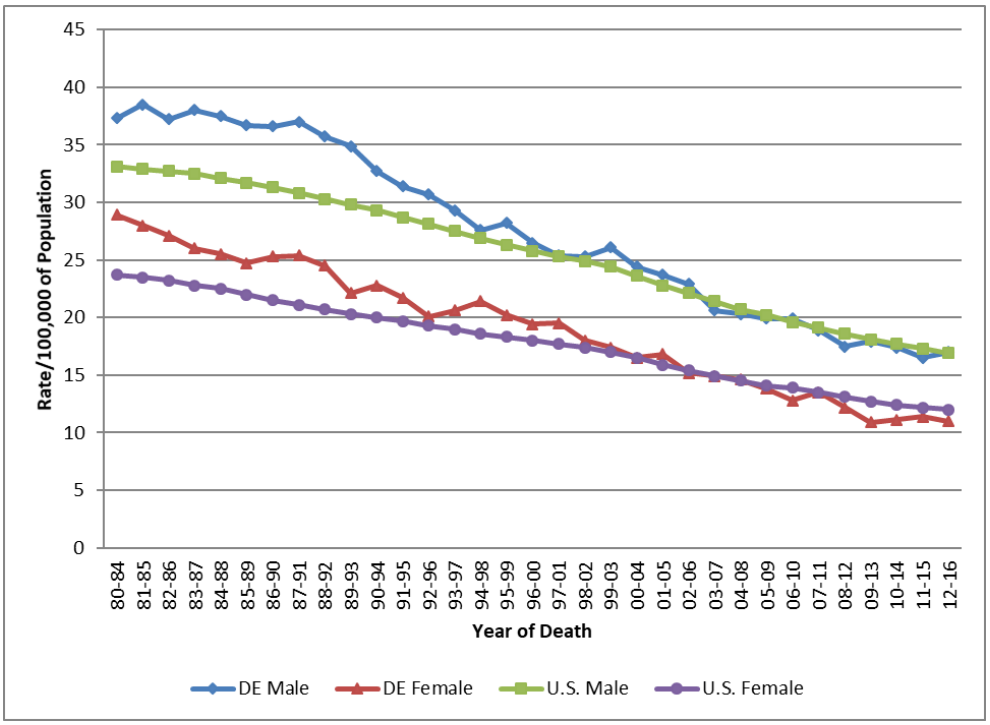
FIGURE 5-7: FIVE-YEAR AVERAGE AGE-ADJUSTED COLORECTAL CANCER MORTALITY RATES BY SEX AND RACE/ETHNICITY; U.S. AND DELAWARE, 2012-2016



Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- In Delaware
  - Males (17.0 per 100,000) had a statistically significantly higher colorectal cancer mortality rate compared to females (11.0 per 100,000).
  - The difference in colorectal cancer mortality rates between non-Hispanic Caucasians (13.2 per 100,000) and non-Hispanic African Americans (15.6 per 100,000) was not statistically significant.
  - Colorectal cancer mortality rates for Hispanics could not be calculated due to the small number of deaths.
- Comparing Delaware and the U.S.
  - The difference in colorectal cancer mortality rates between Delaware (13.7 per 100,000) and the U.S. (14.2 per 100,000) was not statistically significant.
  - The difference in colorectal cancer mortality rates between males in Delaware (17.0 per 100,000) and the U.S. (16.9 per 100,000) was not statistically significant.
  - The difference in colorectal cancer mortality rates between females in Delaware (11.0 per 100,000) and the U.S. (12.0 per 100,000) was not statistically significant.
  - The difference in colorectal cancer mortality rates between non-Hispanic Caucasians in Delaware (13.2 per 100,000) and the U.S (14.1 per 100,000) was not statistically significant.
  - Non-Hispanic African Americans in Delaware (15.6 per 100,000) had a statistically significantly lower colorectal cancer mortality rate compared to non-Hispanic African Americans in the U.S. (19.4 per 100,000).

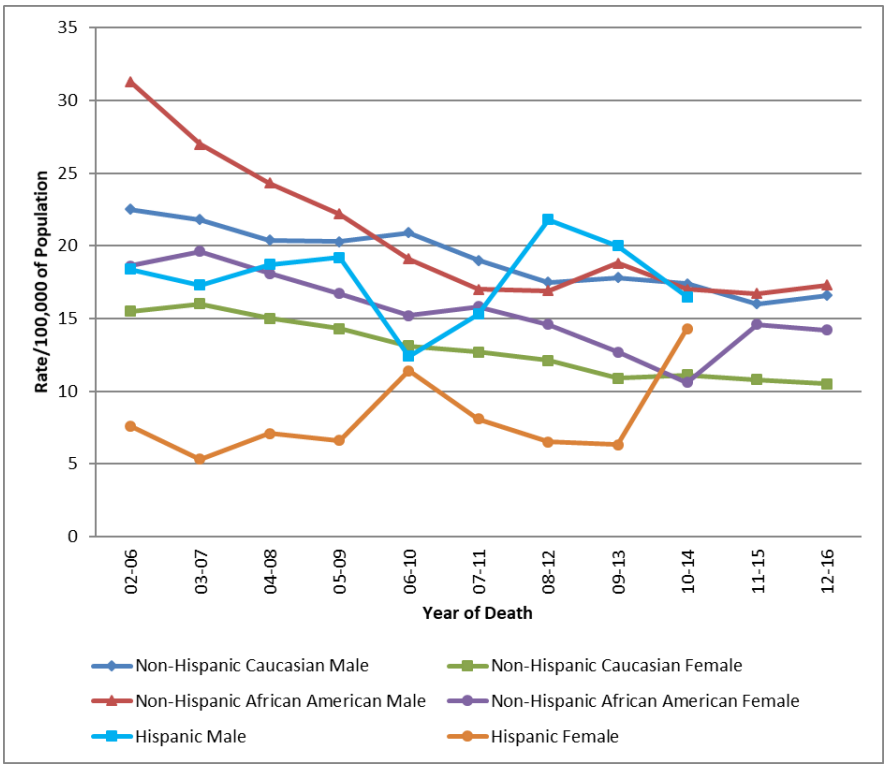
FIGURE 5-8: FIVE-YEAR AVERAGE AGE-ADJUSTED COLORECTAL CANCER MORTALITY RATES BY SEX; U.S. AND DELAWARE, 1980-2016



Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- From 2002-2006 to 2012-2016
  - Mortality rates for colorectal cancer decreased 26% in Delaware and decreased 22% in the U.S.
  - Mortality rates for colorectal cancer decreased 26% in Delaware males and decreased 24% in U.S. males.
  - Mortality rates for colorectal cancer decreased 28% in Delaware females and decreased 22% in U.S. females.

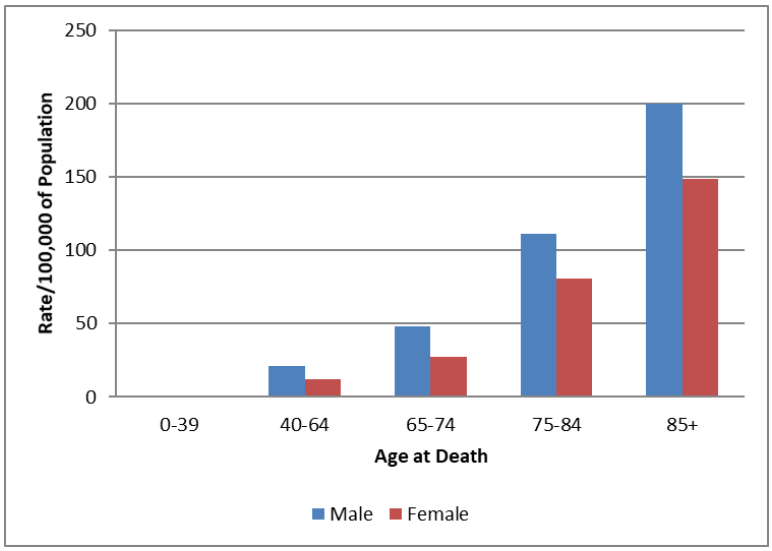
FIGURE 5-9: FIVE-YEAR AVERAGE AGE-ADJUSTED COLORECTAL CANCER MORTALITY RATES BY SEX AND RACE/ETHNICITY; DELAWARE, 2002-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- From 2002-2006 to 2012-2016 in Delaware
  - Mortality rates for colorectal cancer decreased 26% in non-Hispanic Caucasian males and decreased 32% in non-Hispanic Caucasian females.
  - Mortality rates for colorectal cancer decreased 45% in non-Hispanic African American males and decreased 24% in non-Hispanic African American females.
  - Mortality rates for colorectal cancer in Hispanics could not be calculated due to the small number of deaths.

FIGURE 5-10: AGE-SPECIFIC COLORECTAL CANCER MORTALITY RATES BY SEX; DELAWARE, 2012-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- The mortality rate for colorectal cancer is highest for both males and females 85 years of age and older. Due to small numbers, mortality rates could not be calculated by sex for the 0-39 age group.

TABLE 5-7: AGE-SPECIFIC COLORECTAL CANCER MORTALITY RATES BY SEX AND RACE/ETHNICITY; DELAWARE, 2012-2016

Age at Death	Males			Females		
	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
0-39	---	---	---	---	---	---
40-64	20.7	20.3	---	11.9	13.9	---
65-74	46.2	---	---	24.9	---	---
75-84	111.8	---	---	74.0	---	---
85+	204.6	---	---	145.0	---	---

Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, Division of Public Health, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.
---Rates based on less than 25 cases are not shown.

- The mortality rate for colorectal cancer was highest for non-Hispanic Caucasian males and females in Delaware 85 years of age and older. Due to small numbers, mortality rates could not be calculated for Hispanics or for most sex and age combinations for non-Hispanic African Americans.

CHAPTER 6: LUNG AND BRONCHUS CANCER[17]

RISK FACTORS

Lifestyle risk factors for lung cancer:

- The use of tobacco products. An estimated 85 to 90% of all lung cancer cases are caused by tobacco use, according to the U.S. Department of Health and Human Services.
- Exposure to secondhand smoke. When a person breathes in secondhand smoke, it is like he or she is smoking.
- Other suspected lifestyle risk factors include a diet low in fruits and vegetables, a diet high in cholesterol, heavy alcohol use, and smoking marijuana.

Environmental and medically-related causes of lung cancer:

- Occupational exposures: asbestos, mustard gas, radioactive ores, metals (chromium, cadmium, arsenic), certain organic chemicals, paint
- Environmental exposures: radon gas released from soil or building materials, asbestos (among smokers), air pollution, high levels of arsenic in drinking water
- Radiation therapy to the chest (especially for people who smoke)

Non-modifiable risk factors (these cannot be changed) for getting lung cancer:

- Family history of lung cancer
- Personal history of tuberculosis

To protect against lung cancer, individuals should avoid tobacco and secondhand smoke, consume a diet rich in fruits and vegetables, engage in recommended levels of physical activity, and maintain a healthy weight.

EARLY DETECTION

In January 2013, the American Cancer Society (ACS) published new lung cancer screening guidelines[18] 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:

- Are 55 -74 years of age and in fairly good health
- Have a smoking history equivalent to a pack a day for 30 years or longer
- 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 takes 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 BRFS 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 BRFS data show that in 1982, 30% of adult Delawareans smoked cigarettes. By the 1990s, Delaware's smoking rate among adults had declined to approximately 25%.

[17] "Lung cancer" is used instead of "lung and bronchus cancer" throughout this section.

[18] Wender, R., Fontham, E. T., Barrera, E., Jr, Colditz, G. A., Church, T. R., Ettinger, D. S., … Smith, R. A. (2013). American Cancer Society lung cancer screening guidelines. CA: a cancer journal for clinicians, 63(2), 107–117. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3632634/

In recent years, tobacco use prevalence has leveled off among adult Delawareans, while continuing to decline among high school students. In 2018, 17% of adult Delawareans smoked cigarettes regularly. The following are some highlights of smoking trends in Delaware in 2018:

- The prevalence rate for current smokers in Delaware (17%) is almost the same as the 2017 U.S. median prevalence of 16%.
- There is no statistically significant difference in current smoking prevalence between males and females.
- There were no differences in current smoking prevalence between non-Hispanic Caucasians and non-Hispanic African Americans.
- When smoking prevalence rates were stratified by age group, Delawareans 25-34 and 35-44 years of age reported the highest prevalence of current smoking (22% and 23%, respectively). This prevalence was statistically significantly higher compared to that for Delawareans 65 years of age and older.
- Current smoking prevalence changed with education level. In Delaware, 29% of residents who did not complete their high school education said they were current smokers. As education level increased, smoking prevalence decreased. Of adults who reported currently smoking, 22% had a high school diploma or equivalent, 15% had some post-high school education, and 8% had completed college.
- Current smoking prevalence also decreased with higher income levels. In Delaware, 32% of those earning less than $15,000 were current smokers. The lowest smoking prevalence was among those who earned $75,000 or more per year (12%).

INCIDENCE

For 2012-2016, Delaware ranked 10th in the U.S. for lung cancer incidence (9th in 2011-2015); males ranked 16th (15th in 2011-2015) and females ranked 6th (7th in 2011-2015).[19]

2012-2016 DATA

TABLE 6-1: NUMBER OF LUNG CANCER CASES, BY SEX AND RACE/ETHNICITY; DELAWARE AND COUNTIES, 2012-2016

	All Races			Non-Hispanic Caucasian			Non-Hispanic African American			Hispanic		
	All	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female
Delaware	4,168	2,103	2,065	3,422	1,733	1,689	634	307	327	53	27	26
Kent	811	404	407	653	325	328	132	65	67	---	---	---
New Castle	2,037	990	1,047	1,573	772	801	405	185	220	31	14	17
Sussex	1,316	709	607	1,192	636	556	97	57	40	---	---	---

Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
---Counts less than 11 are not shown to protect patient privacy.

- Lung cancer is the most frequently diagnosed cancer in the U.S. and Delaware of cancers that affect both men and women.
- In 2012-2016, 4,168 lung cancer cases (15% of all cancer cases) were diagnosed in Delaware.
- Males and females each accounted for 50% of lung cancer cases.
- Non-Hispanic Caucasians accounted for 82% of lung cancer cases.

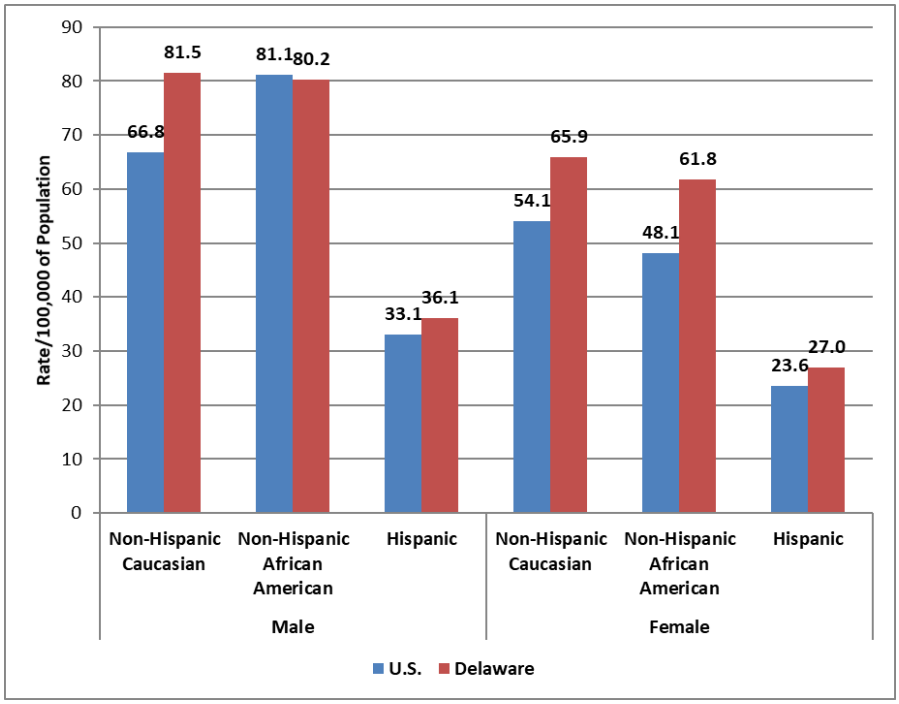
[19] U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on November 2018 submission data (1999-2016): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, June 2019.

TABLE 6-2: FIVE-YEAR AVERAGE AGE-ADJUSTED LUNG CANCER INCIDENCE RATES OVERALL AND BY SEX; U.S., DELAWARE AND COUNTIES, 2012-2016

	Overall	Male	Female
U.S.	53.4	61.9	47.0
Delaware	69.7	79.1	62.9
Kent	78.8	89.5	71.5
New Castle	65.8	73.5	60.7
Sussex	71.5	83.3	61.9

Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

FIGURE 6-1: FIVE-YEAR AVERAGE AGE-ADJUSTED LUNG CANCER INCIDENCE RATES BY SEX AND RACE/ETHNICITY; U.S. AND DELAWARE, 2012-2016



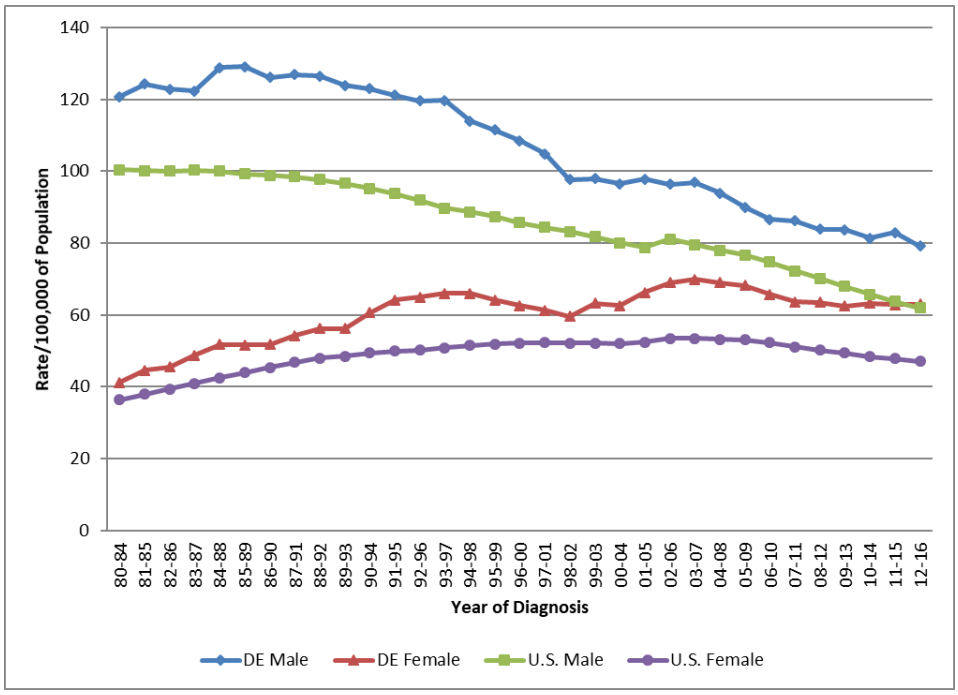
Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- In Delaware
  - Males (79.1 per 100,000) had a statistically significantly higher lung cancer incidence rate compared to females (62.9 per 100,000).
  - Hispanics (30.8 per 100,000) had a statistically significantly lower lung cancer incidence rate compared to both non-Hispanic Caucasians (72.5 per 100,000) and non-Hispanic African Americans (69.2 per 100,000).
  - The difference in lung cancer incidence rates between non-Hispanic Caucasians (72.5 per 100,000) and non-Hispanic African Americans (69.2 per 100,000) was not statistically significant.

- Comparing Delaware and the U.S.
  - Delaware (69.7 per 100,000) had a statistically significantly higher lung cancer incidence rate compared to the U.S. (53.4 per 100,000).
  - Delaware males (79.1 per 100,000) had a statistically significantly higher lung cancer incidence rate compared to U.S. males (61.9 per 100,000).
  - Delaware females (62.9 per 100,000) had a statistically significantly higher lung cancer incidence rate compared to U.S. females (47.0 per 100,000).
  - Non-Hispanic Caucasians in Delaware (72.5 per 100,000) had a statistically significantly higher lung cancer incidence rate compared to non-Hispanic Caucasians in the U.S. (59.5 per 100,000).
  - Non-Hispanic African Americans in Delaware (69.2 per 100,000) had a statistically significantly higher lung cancer incidence rate compared to Non-Hispanic African Americans in the U.S. (61.5 per 100,000).
  - The difference in lung cancer incidence rates between Hispanics in Delaware (30.8 per 100,000) and the U.S. (27.5 per 100,000) was not statistically significant.

TRENDS OVER TIME - DELAWARE AND U.S.

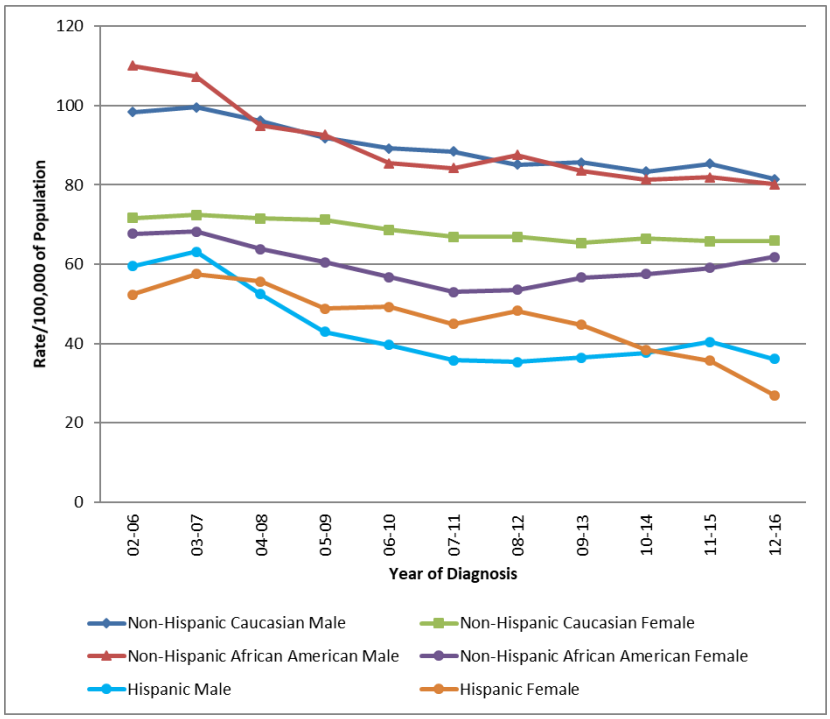
FIGURE 6-2: FIVE-YEAR AVERAGE AGE-ADJUSTED LUNG CANCER INCIDENCE RATES BY SEX; U.S. AND DELAWARE, 1980-2016



Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- From 2002-2006 to 2012-2016
  - Incidence rates for lung cancer decreased 13% in Delaware and decreased 18% in the U.S.
  - Incidence rates for lung cancer decreased 18% in Delaware males and decreased 24% in U.S. males.
  - Incidence rates for lung cancer decreased 9% in Delaware females and decreased 12% in U.S. females.

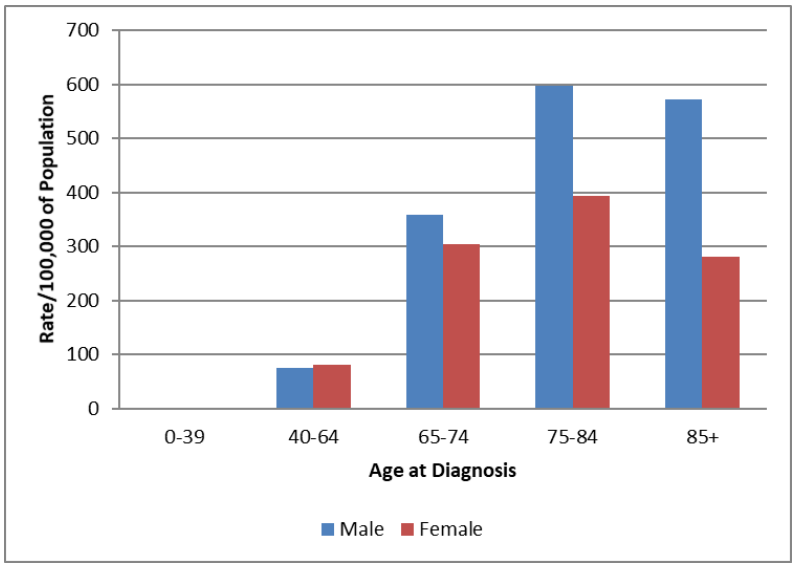
FIGURE 6-3: FIVE-YEAR AVERAGE AGE-ADJUSTED LUNG CANCER INCIDENCE RATES BY SEX AND RACE/ETHNICITY; DELAWARE, 2002-2016



Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- From 2002-2006 to 2012-2016 in Delaware
  - Incidence rates for lung cancer decreased 17% in non-Hispanic Caucasian males and decreased 8% in non-Hispanic Caucasian females.
  - Incidence rates for lung cancer decreased 27% in non-Hispanic African American males and decreased 9% in non-Hispanic African American females.
  - Incidence rates for lung cancer decreased 39% in Hispanic males and decreased 48% in Hispanic females.

FIGURE 6-4: AGE-SPECIFIC LUNG CANCER INCIDENCE RATES BY SEX; DELAWARE, 2012-2016



Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- The incidence rate for lung cancer was highest for both males and females 75-84 years of age. Due to small numbers, incidence rates could not be calculated by sex for the 0-39 age group.

TABLE 6-3: AGE-SPECIFIC LUNG CANCER INCIDENCE RATES BY SEX AND RACE/ETHNICITY; DELAWARE, 2012-2016

Age at Diagnosis	Males			Females		
	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
0-39	---	---	---	---	---	---
40-64	84.4	69.7	---	90.4	70.5	---
65-74	366.3	390.4	---	330.6	248.0	---
75-84	615.3	587.6	---	402.4	431.5	---
85+	565.4	---	---	273.6	---	---

Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.
---Rates based on less than 25 cases are not shown.

- The incidence rate for lung cancer was highest for both non-Hispanic Caucasian and non-Hispanic African American males 75-84 years of age (based on the rates that could be calculated).
- The incidence rate for lung cancer was highest for non-Hispanic Caucasian and non-Hispanic African American females 75-84 years of age (based on the rates that could be calculated).

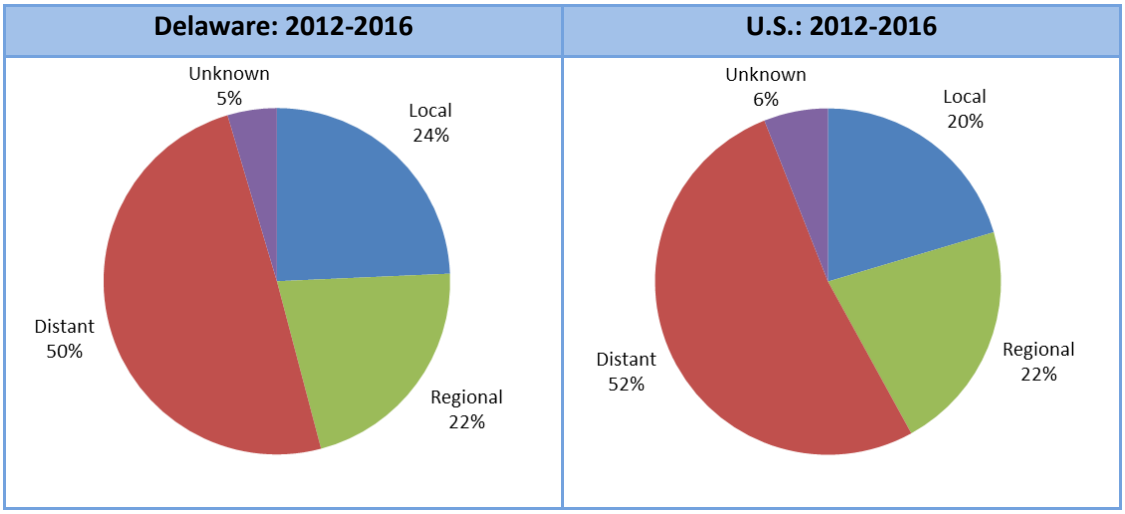
TABLE 6-4: NUMBER AND PERCENTAGE OF LUNG CANCER CASES BY STAGE AT DIAGNOSIS BY SEX AND RACE/ETHNICITY; DELAWARE, 2012-2016

Stage at Diagnosis	All Races			Non-Hispanic Caucasian			Non-Hispanic African American			Hispanic		
	All	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female
Local	1,014 (24)	469 (22)	545 (26)	831 (24)	378 (22)	453 (27)	152 (24)	70 (23)	82 (25)	14 (26)	---	---
Regional	899 (22)	455 (22)	444 (22)	745 (22)	379 (22)	366 (22)	129 (20)	62 (20)	---	---	---	---
Distant	2,064 (50)	1,071 (51)	993 (48)	1,692 (49)	891 (51)	801 (47)	325 (51)	157 (51)	168 (51)	24 (45)	12 (44)	12 (46)
Unknown	191 (5)	108 (5)	83 (4)	154 (5)	85 (5)	69 (4)	28 (4)	18 (6)	---	---	---	---
Total	4,168	2,103	2,065	3,422	1,733	1,689	634	307	327	53	27	26

Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
---Counts less than 11 are not shown to protect patient privacy.

- In 2012-2016, there were 1,014 (24%) lung cancers diagnosed at local stage; 899 (22%) at regional stage; 2,064 (50%) at distant stage; and 191 (5%) with an unknown stage.
- Non-Hispanic Caucasians (49%) had a slightly higher proportion of lung cancers diagnosed at distant stage compared to Hispanics (45%). However, non-Hispanic Caucasians (49%) had a slightly lower proportion of lung cancers diagnosed at distant stage compared to non-Hispanic African Americans (51%).
- Males (51%) had a higher proportion of lung cancers diagnosed at distant stage compared to females (48%).

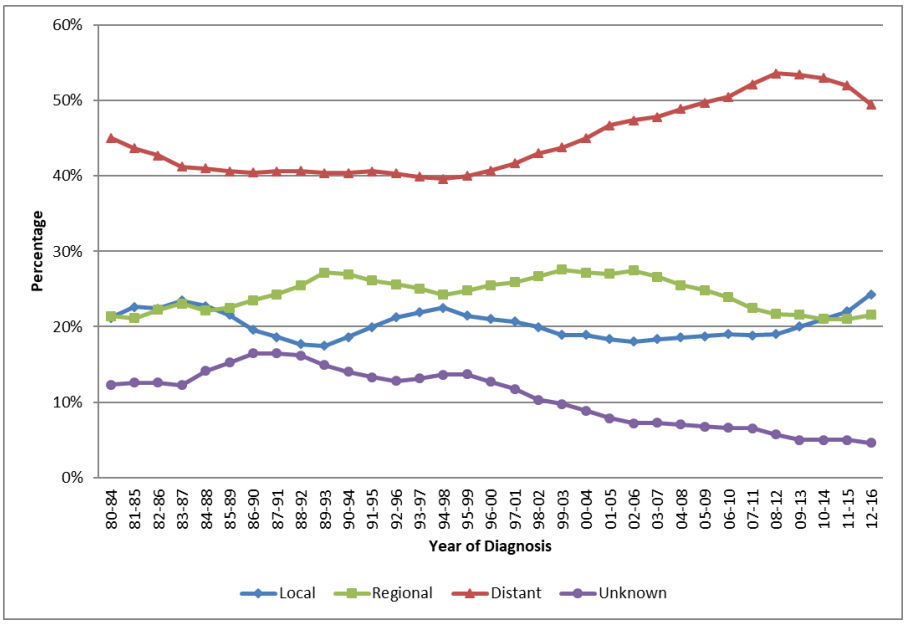
FIGURE 6-5: PERCENTAGE OF LUNG CANCER CASES BY STAGE AT DIAGNOSIS, U.S. AND DELAWARE, 2012-2016



Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.

- In comparing U.S. and Delaware lung cancer data, percentages of the stage at diagnosis for lung cancer are similar, with Delaware having slightly more lung cancers diagnosed at local stage.

FIGURE 6-6: FIVE-YEAR PERCENTAGE OF LUNG CANCER CASES BY STAGE AT DIAGNOSIS, DELAWARE, 1980-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.

- From 1980-1984 to 2012-2016 in Delaware
  - The percent of lung cancer cases diagnosed at local stage slightly increased from 21% to 24%.
  - Lung cancer cases diagnosed at distant stage increased from 45% to 50%.

MORTALITY

For 2012-2016, Delaware ranked 14th in the U.S. for lung cancer mortality (14th in 2011-2015); males ranked 16th (16th in 2011-2015) and females ranked 13th (11th in 2011-2015).[20]

2012-2016 DATA

TABLE 6-5: NUMBER OF LUNG CANCER DEATHS, BY SEX AND RACE/ETHNICITY; DELAWARE AND COUNTIES, 2012-2016

	All Races			Non-Hispanic Caucasian			Non-Hispanic African American			Hispanic		
	All	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female
Delaware	2,799	1,483	1,316	2,313	1,236	1,077	412	211	201	40	23	17
Kent	530	277	253	437	233	204	79	36	43	---	---	---
New Castle	1,363	699	664	1065	557	508	256	124	132	29	14	15
Sussex	906	507	399	811	446	365	77	51	26	---	---	---

Source: Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
---Counts less than 11 are not shown to protect patient privacy.

- Lung cancer is the most common cause of cancer death in the U.S. and Delaware.
- In 2012-2016, there were 2,799 deaths (28% of all cancer deaths) from lung cancer in Delaware.
- Males accounted for 53% of lung cancer deaths.
- Non-Hispanic Caucasians accounted for 83% of lung cancer deaths.

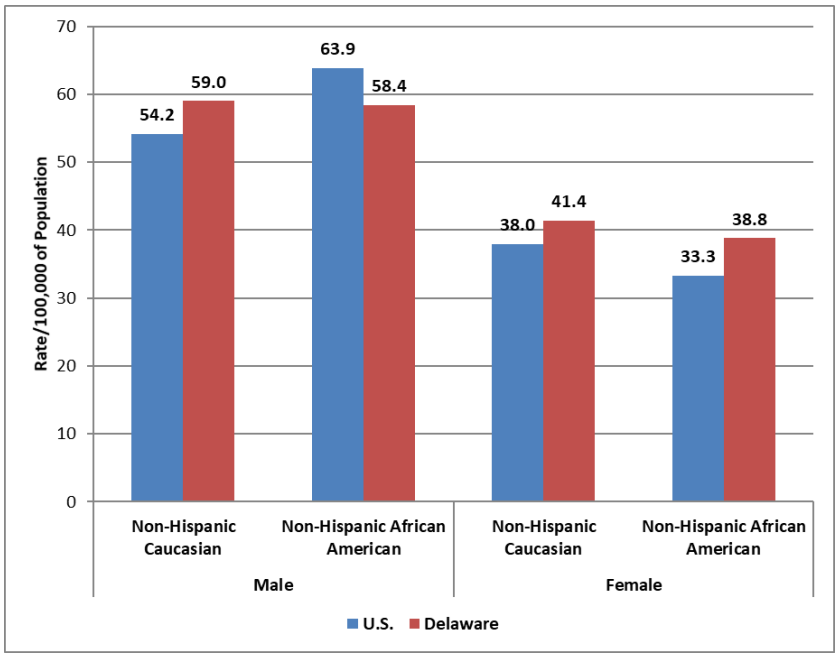
TABLE 6-6: FIVE-YEAR AVERAGE AGE-ADJUSTED LUNG CANCER MORTALITY RATES OVERALL AND BY SEX; U.S., DELAWARE AND COUNTIES, 2012-2016

	Overall	Male	Female
U.S.	41.9	51.7	34.4
Delaware	48.4	58.4	41.0
Kent	52.9	63.8	45.4
New Castle	46.0	55.1	39.4
Sussex	50.0	61.1	41.0

Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

[20] U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on November 2018 submission data (1999-2016): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, June 2019.

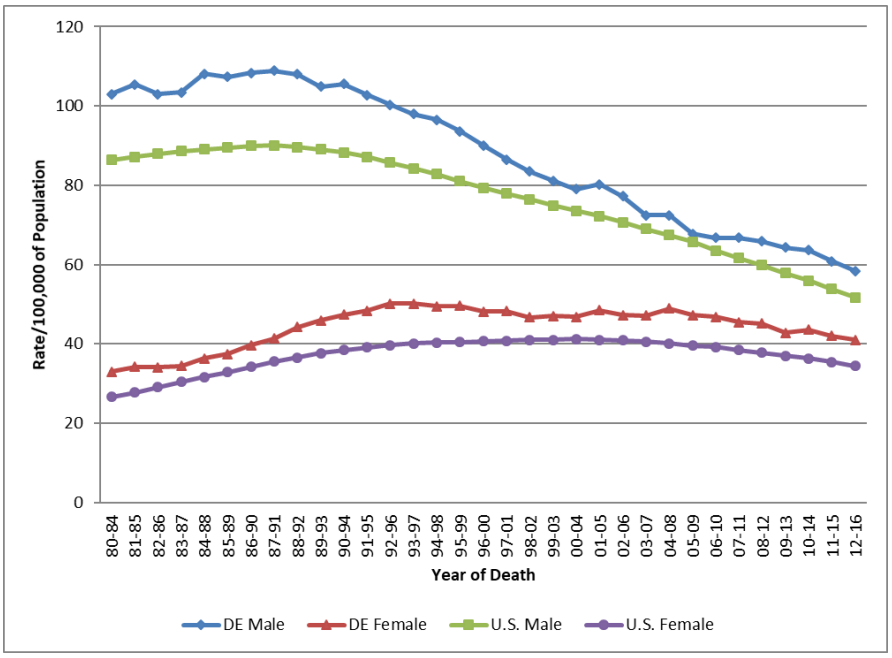
FIGURE 6-7: FIVE-YEAR AVERAGE AGE-ADJUSTED LUNG CANCER MORTALITY RATES BY SEX AND RACE/ETHNICITY; U.S. AND DELAWARE, 2012-2016



Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- In Delaware
  - Males (58.4 per 100,000) had a statistically significantly higher lung cancer mortality rate compared to females (41.0 per 100,000).
  - Hispanics (24.8 per 100,000) had a statistically significantly lower lung cancer mortality rate compared to both non-Hispanic Caucasians (49.1 per 100,000) and non-Hispanic African Americans (46.5 per 100,000).
  - The difference in lung cancer mortality rates between non-Hispanic Caucasians and non-Hispanic African Americans was not statistically significant.
- Comparing Delaware and the U.S.
  - Delaware (48.4 per 100,000) had a statistically higher lung cancer mortality rate compared to the U.S. (41.9 per 100,000).
  - Delaware males (58.4 per 100,000) had a statistically higher lung cancer mortality rate compared to U.S. males (51.7 per 100,000).
  - Delaware females (41.0 per 100,000) had a statistically significantly higher lung cancer mortality rate compared to U.S. females (34.4 per 100,000).
  - Non-Hispanic Caucasians in Delaware (49.1 per 100,000) had a statistically higher lung cancer mortality rate compared to non-Hispanic Caucasians in the U.S (45.0 per 100,000).
  - The difference in lung cancer mortality rates between non-Hispanic African Americans in Delaware (46.5 per 100,000) and the U.S. (45.6 per 100,000) was not statistically significant.
  - The difference in lung cancer mortality rates between Hispanics in Delaware (24.8 per 100,000) and the U.S. (18.3 per 100,000) was not statistically significant.

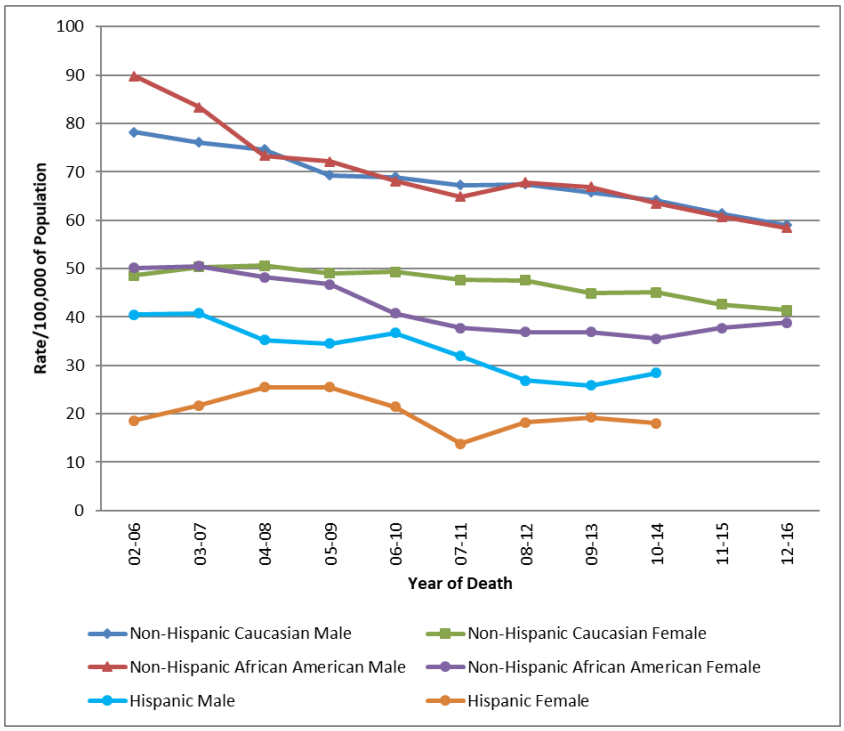
FIGURE 6-8: FIVE-YEAR AVERAGE AGE-ADJUSTED LUNG CANCER MORTALITY RATES BY SEX; U.S. AND DELAWARE, 1980-2016



Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- From 2002-2006 to 2012-2016
  - Mortality rates for lung cancer decreased 19% in Delaware and decreased 22% in the U.S.
  - Mortality rates for lung cancer decreased 24% in Delaware males and decreased 27% in U.S. males.
  - Mortality rates for lung cancer decreased 13% in Delaware females and decreased 16% in U.S. females.

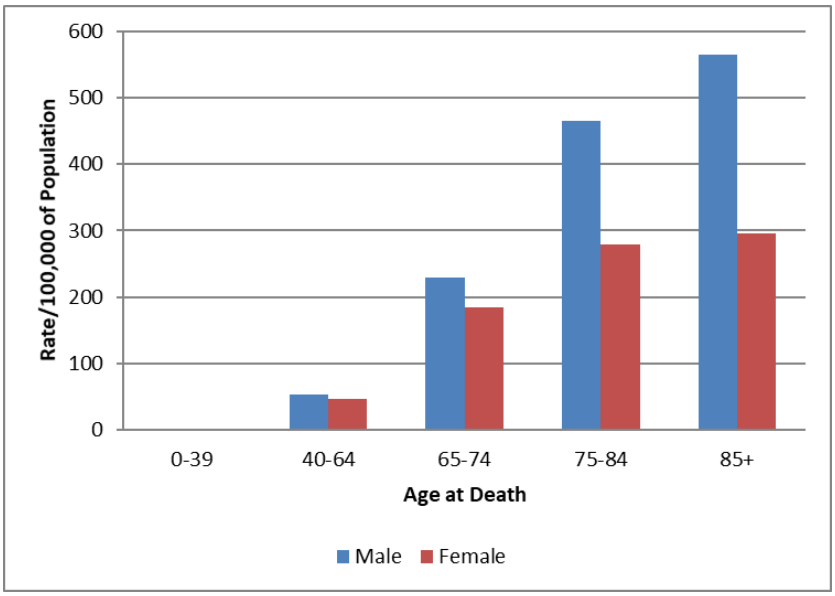
FIGURE 6-9: FIVE-YEAR AVERAGE AGE-ADJUSTED LUNG CANCER MORTALITY RATES BY SEX AND RACE/ETHNICITY; DELAWARE, 2002-2016



Source: Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- From 2002-2006 to 2012-2016 in Delaware
  - Mortality rates for lung cancer decreased 25% in non-Hispanic Caucasian males and decreased 15% in non-Hispanic Caucasian females.
  - Mortality rates for lung cancer decreased 35% in non-Hispanic African American males and decreased 23% in non-Hispanic African American females.
  - Mortality rates for lung cancer in Hispanics could not be calculated due to the small number of deaths.

FIGURE 6-10: AGE-SPECIFIC LUNG CANCER MORTALITY RATES BY SEX; DELAWARE, 2012-2016



Source: Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- The mortality rate for lung cancer was highest in males and females 85 years of age and older. Due to low numbers, mortality rates could not be calculated for the 0-39 age group.

TABLE 6-7: AGE-SPECIFIC LUNG CANCER MORTALITY RATES BY SEX AND RACE/ETHNICITY; DELAWARE, 2012-2016

Age at Death	Males			Females		
	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
0-39	---	---	---	---	---	---
40-64	57.1	49.4	---	49.2	41.1	---
65-74	236.4	217.7	---	194.8	137.2	---
75-84	459.1	502.5	---	275.7	300.9	---
85+	569.1	---	---	294.0	---	---

Source: Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.
---Rates based on less than 25 cases are not shown.

- The mortality rate for lung cancer was highest for non-Hispanic Caucasian males 85 years of age and for non-Hispanic African American males 75-84 years of age (based on the rates that could be calculated).
- The mortality rate for lung cancer was highest for non-Hispanic African American females 75-84 years of age and for non-Hispanic Caucasian females 85 years of age (based on rates that could be calculated).

CHAPTER 7: MALIGNANT MELANOMA OF THE SKIN

RISK FACTORS

Lifestyle risk factors for malignant melanoma:

- Excessive ultraviolet (UV) light from the sun, tanning lamps, or tanning beds
- History of frequent sunburns, especially before 20 years of age

Environmental and medically-related causes of malignant melanoma:

- A weakened immune system (e.g. organ transplant patients)

Non-modifiable risk factors (these cannot be changed) for getting malignant melanoma:

- Having many moles, especially abnormal moles[21]
- Light-colored skin, freckles, light hair, and/or blue/green eyes
- Non-Hispanic Caucasians are 10 times more likely to get melanoma compared to non-Hispanic African Americans
- A family or personal history of melanoma
- Increasing age
- Females have a higher risk of melanoma before 40 years of age and males have a higher risk after 40 years of age
- Having Xeroderma pigmentosum (a rare, inherited condition)

To protect against malignant melanoma, individuals should limit exposure to the sun, avoid tanning beds and sun lamps, protect children from exposure to the sun, and remove any abnormal moles.

EARLY DETECTION

Early detection for malignant melanoma includes monthly self-examination of the skin. High-risk individuals should have their skin thoroughly examined by a health care professional.

[21] More information on abnormal moles can be found at https://www.cancer.org/cancer/skin-cancer/prevention-and-early-detection/what-to-look-for.html

INCIDENCE

For 2012-2016, Delaware ranked 5th in the U.S. for malignant melanoma incidence (3rd in 2011-2015); males ranked 3rd (3nd in 2011-2015) and females ranked 13th (8th in 2011-2015)[22].

2012-2016 DATA

TABLE 7-1: NUMBER OF MALIGNANT MELANOMA CASES, BY SEX AND RACE/ETHNICITY; DELAWARE AND COUNTIES, 2012-2016

	All Races			Non-Hispanic Caucasian			Non-Hispanic African American			Hispanic		
	All	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female
Delaware	1,708	1,043	665	1,662	1,027	635	12	---	---	19	---	---
Kent	256	147	109	247	143	104	---	---	---	---	---	---
New Castle	803	476	327	785	471	314	---	---	---	---	---	---
Sussex	649	420	229	630	413	217	---	---	---	---	---	---

Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
---Counts less than 11 are not shown to protect patient privacy

- In 2012-2016, there were 1,708 malignant melanoma cases (6% of all cancer cases) diagnosed in Delaware.
- Males accounted for 61% of malignant melanoma cases.
- Non-Hispanic Caucasians accounted for 97% of malignant melanoma cases.

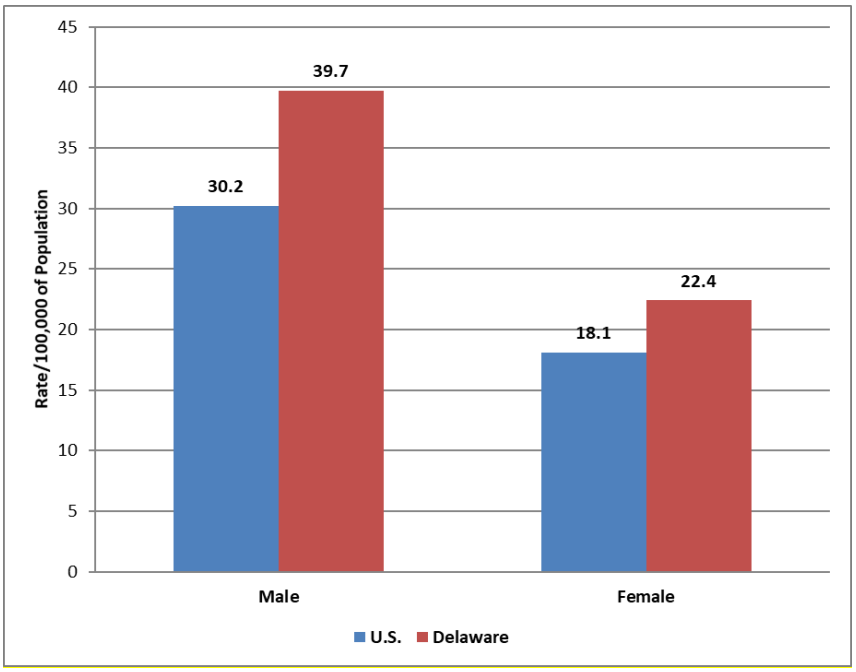
TABLE 7-2: FIVE-YEAR AVERAGE AGE-ADJUSTED MALIGNANT MELANOMA INCIDENCE RATES OVERALL AND BY SEX; U.S., DELAWARE AND COUNTIES, 2012-2016

	Overall	Male	Female
U.S.	23.2	30.2	18.1
Delaware	29.9	39.7	22.4
Kent	26.1	32.5	21.3
New Castle	26.2	35.2	19.9
Sussex	39.1	52.3	28.1

Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

[22] U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on November 2018 submission data (1999-2016): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, June 2019.

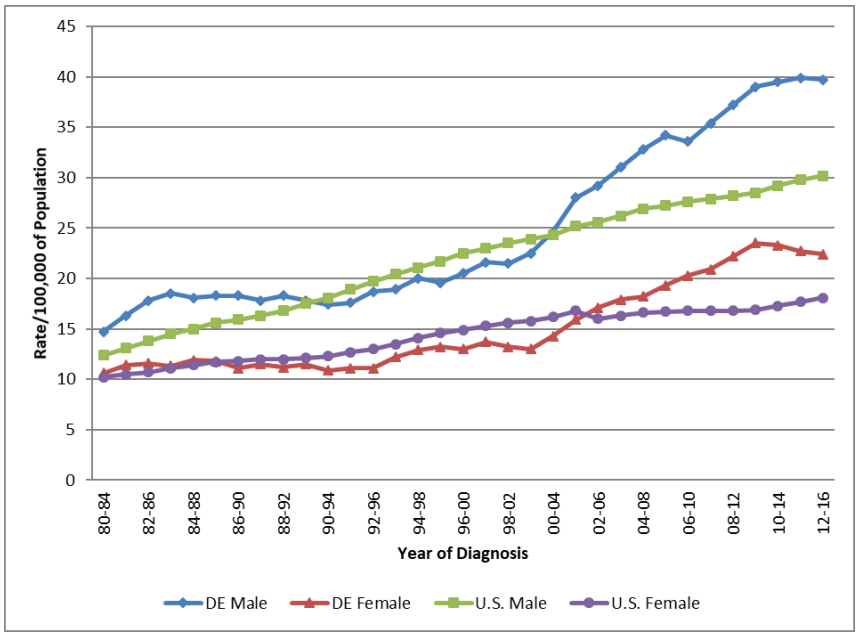
FIGURE 7-1: FIVE-YEAR AVERAGE AGE-ADJUSTED MALIGNANT MELANOMA INCIDENCE RATES BY SEX; U.S. AND DELAWARE, 2012-2016



Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- In Delaware
  - Males (39.7 per 100,000) had a statistically significantly higher malignant melanoma incidence rate compared to females (22.4 per 100,000).
  - Malignant melanoma incidence rates for non-Hispanic African Americans and Hispanics could not be calculated due to an insufficient number of cases.
- Comparing Delaware and the U.S.
  - Delaware (29.9 per 100,000) had a statistically significantly higher malignant melanoma incidence rate compared to the U.S. (23.2 per 100,000).
  - Delaware males (39.7 per 100,000) had a statistically significantly higher malignant melanoma incidence rate compared to U.S. males (30.2 per 100,000).
  - Delaware females (22.4 per 100,000) had a statistically significantly higher malignant melanoma incidence rate compared to U.S. females (18.1 per 100,000).
  - Non-Hispanic Caucasians in Delaware (39.0 per 100,000) had a statistically significantly higher malignant melanoma incidence rate compared to non-Hispanic Caucasians in the U.S. (33.3 per 100,000).

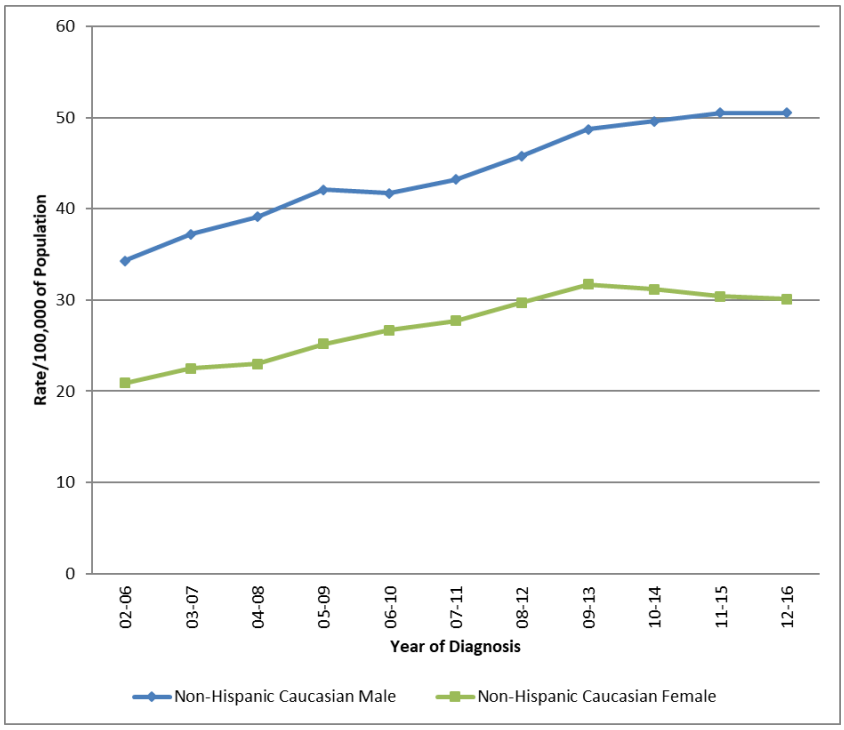
FIGURE 7-2: FIVE-YEAR AVERAGE AGE-ADJUSTED MALIGNANT MELANOMA INCIDENCE RATES BY SEX; U.S. AND DELAWARE, 1980-2016



Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- From 2002-2006 to 2012-2016
  - Incidence rates for malignant melanoma increased 35% in Delaware and increased 17% in the U.S.
  - Incidence rates for malignant melanoma increased 36% in Delaware males and increased 18% in U.S. males.
  - Incidence rates for malignant melanoma increased 31% in Delaware females and increased 13% in U.S. females.

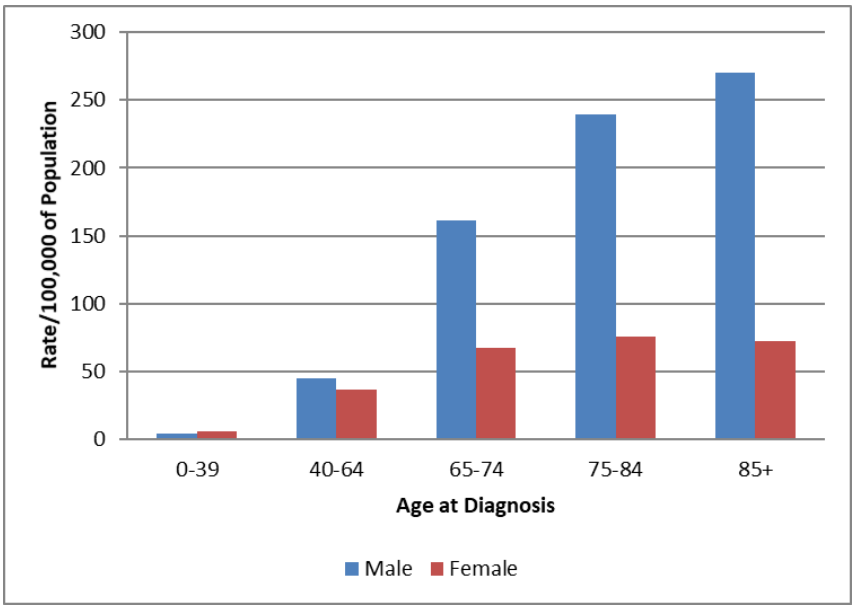
FIGURE 7-3: FIVE-YEAR AVERAGE AGE-ADJUSTED MALIGNANT MELANOMA INCIDENCE RATES BY SEX AND RACE/ETHNICITY; DELAWARE, 2002-2016



Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- From 2002-2006 to 2012-2016 in Delaware
  - Incidence rates for malignant melanoma increased 47% in non-Hispanic Caucasian males and increased 44% in non-Hispanic Caucasian females.

FIGURE 7-4: AGE-SPECIFIC MALIGNANT MELANOMA INCIDENCE RATES BY SEX; DELAWARE, 2012-2016



Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- The peak age range for malignant melanoma incidence is 85 years of age and older for males and 75-84 years of age for females.

TABLE 7-3: AGE-SPECIFIC MALIGNANT MELANOMA INCIDENCE RATES BY SEX AND RACE/ETHNICITY; DELAWARE, 2012-2016

Age at Diagnosis	Males			Females		
	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
0-39	6.8	---	---	10.1	---	---
40-64	62.8	---	---	50.1	---	---
65-74	196.0	---	---	82.4	---	---
75-84	286.0	---	---	89.6	---	---
85+	316.2	---	---	81.7	---	---

Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population
Rates based on less than 25 cases are not shown

- The incidence rate for malignant melanoma was highest for Non-Hispanic Caucasian males 85 years of age and older and for Non-Hispanic Caucasian females 75-84 years of age. Due to small numbers, incidence rates could not be calculated for some groups.

STAGE OF DIAGNOSIS - DELAWARE

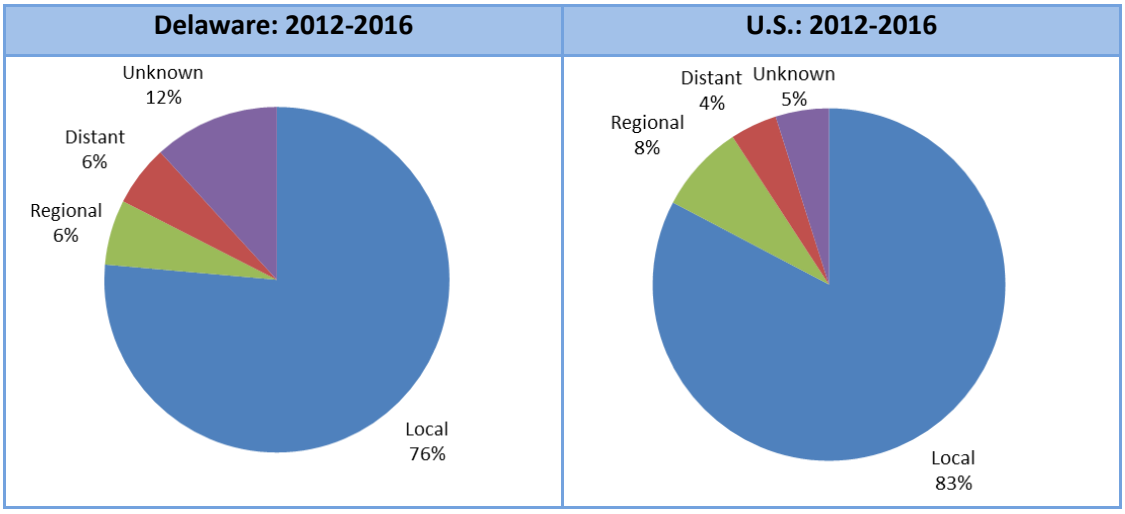
TABLE 7-4: MALIGNANT MELANOMA CASES BY STAGE AT DIAGNOSIS BY SEX AND RACE/ETHNICITY; DELAWARE, 2012-2016

Stage at Diagnosis	All Races			Non-Hispanic Caucasian			Non-Hispanic African American			Hispanic		
	All	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female
Local	1,305 (76)	794 (76)	511 (77)	1,277 (77)	783 (76)	494 (78)	---	---	---	---	---	---
Regional	105 (6)	73 (7)	32 (5)	102 (6)	71 (7)	31 (5)	---	---	---	---	---	---
Distant	97 (6)	61 (6)	36 (5)	90 (5)	60 (6)	30 (5)	---	---	---	---	---	---
Unknown	201 (12)	115 (11)	86 (13)	193 (12)	113 (11)	80 (13)	---	---	---	---	---	---
Total	1,708	1,043	665	1,662	1,027	635	12	---	---	19	---	---

Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
---Counts less than 11 are not shown to protect patient privacy

- In 2012-2016, there were 1,305 (76%) malignant melanomas diagnosed at local stage; 105 (6%) at regional stage; 97 (6%) at distant stage; and 201 (12%) had an unknown stage.
- Males (76%) had fewer diagnosed at local stage compared to females (78%).

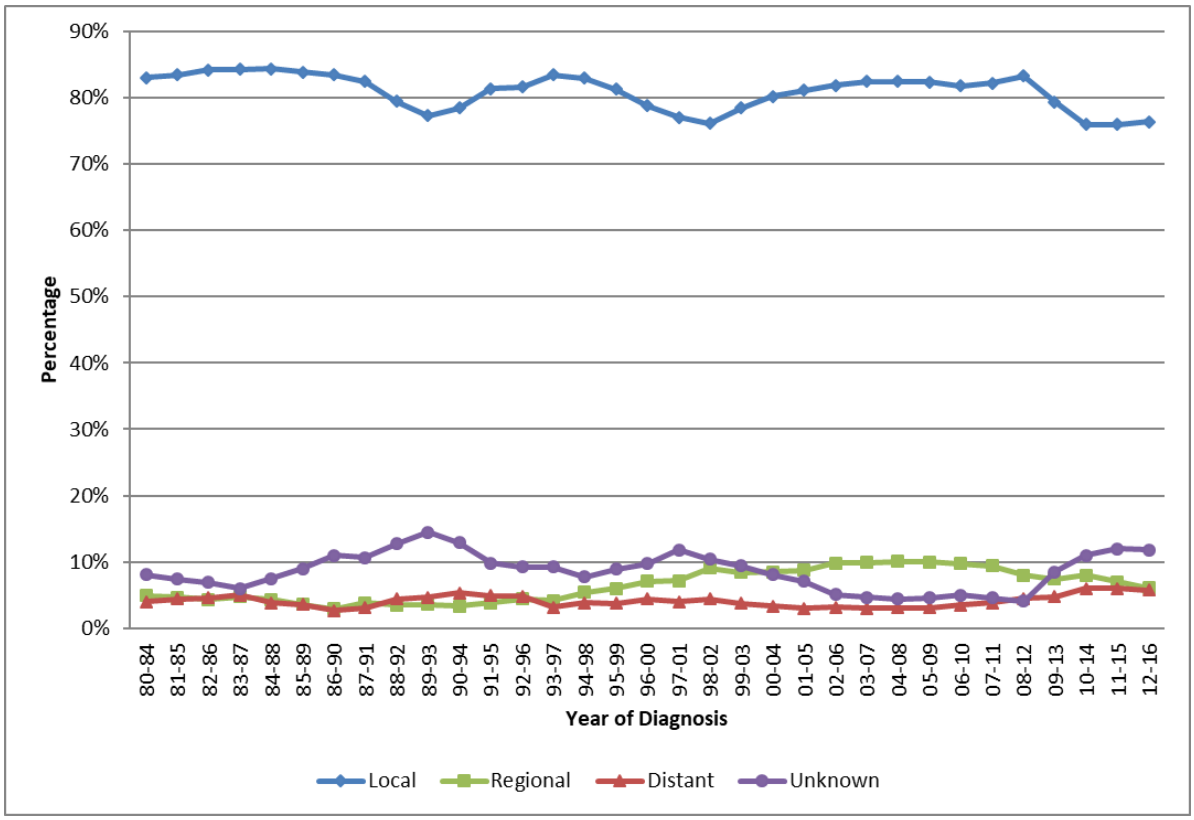
FIGURE 7-5: DISTRIBUTION OF MALIGNANT MELANOMA CASES BY STAGE AT DIAGNOSIS; U.S. AND DELAWARE, 2012-2016



Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.

In comparing U.S. and Delaware malignant melanoma data, the U.S. (83%) has more malignant melanoma diagnosed at local stage compared to Delaware (76%).

FIGURE 7-6: FIVE-YEAR STAGE OF DIAGNOSIS DISTRIBUTIONS FOR MALIGNANT MELANOMA CASES; DELAWARE, 1980-2016



Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.

- From 1980-1984 to 2012-2016 in Delaware
  - The percent of malignant melanoma cases diagnosed at local stage decreased from 83% to 76%.
  - Malignant melanoma cases diagnosed at distant stage increased slightly from 4% to 6%.

MORTALITY

For 2012-2016, Delaware ranked 18th in the U.S. for malignant melanoma mortality (15th in 2011-2015); males ranked 25th (21st in 2011-2015) and females ranked 3rd (6th in 2011-2015)[23].

2012-2016 DATA

TABLE 7-5: NUMBER OF MALIGNANT MELANOMA DEATHS, BY SEX AND RACE/ETHNICITY; DELAWARE AND COUNTIES, 2012-2016

	All Races			Non-Hispanic Caucasian			Non-Hispanic African American			Hispanic		
	All	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female
Delaware	164	103	61	157	100	57	---	---	---	---	---	---
Kent	38	24	14	36	23	13	---	---	---	---	---	---
New Castle	74	47	27	70	45	25	---	---	---	---	---	---
Sussex	52	32	20	51	32	19	---	---	---	---	---	---

Source: Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
---Counts less than 11 are not shown to protect patient privacy.

- In 2012-2016, there were 164 deaths (2% of all cancer deaths) from malignant melanoma in Delaware.
- Males accounted for 63% of malignant melanoma deaths.
- Non-Hispanic Caucasians accounted for 96% of malignant melanoma deaths.

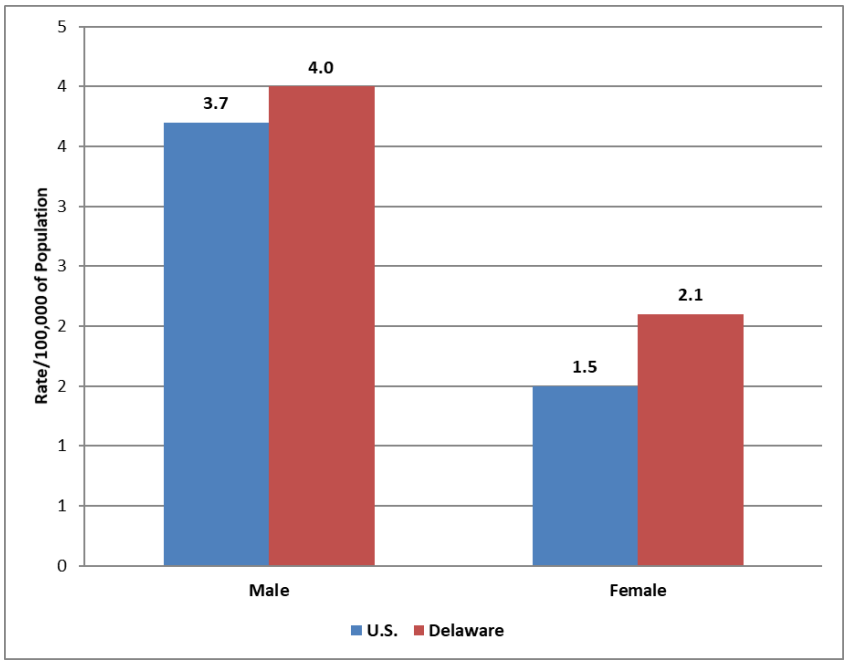
TABLE 7-6: FIVE-YEAR AVERAGE AGE-ADJUSTED MALIGNANT MELANOMA MORTALITY RATES OVERALL AND BY SEX; U.S., DELAWARE AND COUNTIES, 2012-2016

	Overall	Male	Female
U.S.	2.5	3.7	1.5
Delaware	2.9	4.0	2.1
Kent	3.8	---	---
New Castle	2.5	3.7	1.7
Sussex	3.1	3.8	---

Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population
Rates based on less than 25 cases are not shown

[23] U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on November 2018 submission data (1999-2016): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, June 2019.

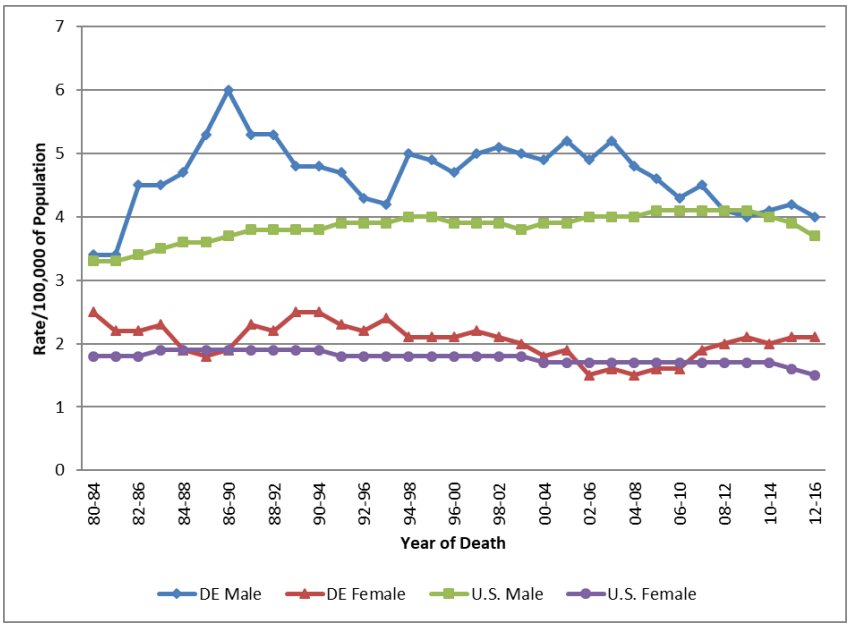
FIGURE 7-7: FIVE-YEAR AVERAGE AGE-ADJUSTED MALIGNANT MELANOMA MORTALITY RATES BY SEX; U.S. AND DELAWARE, 2012-2016



Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- In Delaware
  - Males (4.0 per 100,000) had a statistically significantly higher malignant melanoma mortality rate compared to females (2.1 per 100,000).
  - Malignant melanoma mortality rates for non-Hispanic African Americans and Hispanics could not be calculated due to the low number of deaths.
- Comparing Delaware and the U.S.
  - The difference in melanoma mortality rates between Delaware (2.9 per 100,000) and the U.S. (2.5 per 100,000) was not statistically significant.
  - The difference in melanoma mortality rates between males in Delaware (4.0 per 100,000) and the U.S. (3.7 per 100,000) was not statistically significant.
  - The difference in melanoma mortality rates between females in Delaware (2.1 per 100,000) and the U.S. (1.5 per 100,000) was not statistically significant.
  - The difference in melanoma mortality rates between non-Hispanic Caucasians in Delaware (3.5 per 100,000) and the U.S. (3.2 per 100,000) was not statistically significant.

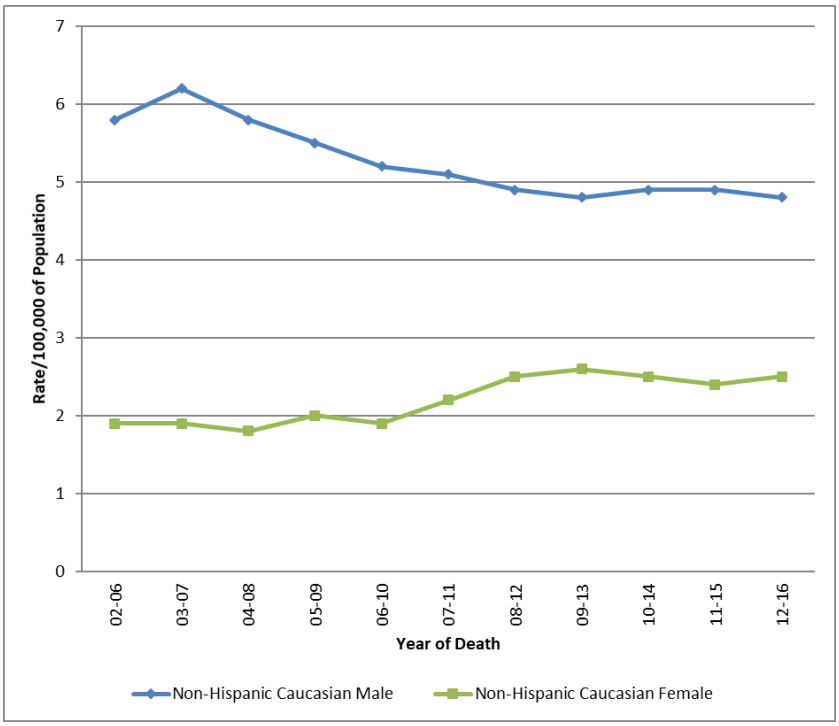
FIGURE 7-8: FIVE-YEAR AVERAGE AGE-ADJUSTED MALIGNANT MELANOMA MORTALITY RATES BY SEX; U.S. AND DELAWARE, 1980-2016



Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- From 2002-2006 to 2012-2016
  - Mortality rates for malignant melanoma remained the same in Delaware and decreased 7% in the U.S.
  - Mortality rates for malignant melanoma decreased 18% in Delaware males and decreased 8% in U.S. males.
  - Mortality rates for malignant melanoma increased 40% in Delaware females and decreased 12% in U.S. females.

FIGURE 7-9: FIVE-YEAR AVERAGE AGE-ADJUSTED MALIGNANT MELANOMA MORTALITY RATES BY SEX AND RACE/ETHNICITY; DELAWARE, 2002-2016



Source: Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- From 2002-2006 to 2012-2016 in Delaware
  - Mortality rates for malignant melanoma decreased 17% in non-Hispanic Caucasian males and increased 32% in non-Hispanic Caucasian females.
  - Malignant melanoma mortality rates for Non-Hispanic African Americans and Hispanics could not be calculated due to the small number of deaths.

TABLE 7-7: AGE-SPECIFIC MALIGNANT MELANOMA MORTALITY RATES BY SEX AND RACE/ETHNICITY; DELAWARE, 2012-2016

Age at Death	Males			Females		
	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
0-39	---	---	---	---	---	---
40-64	4.8	---	---	---	---	---
65-74	19.9	---	---	---	---	---
75-84	30.0	---	---	---	---	---
85+	---	---	---	---	---	---

Source: Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population
---Rates based on less than 25 cases are not shown.

- The peak age range for malignant melanoma mortality in males is 75-84 years of age. Due to small numbers, mortality rates could not be calculated for some groups.
- Non-Hispanic Caucasian males had a peak age range for malignant melanoma mortality at 75-84 years of age.

CHAPTER 8: NON-HODGKIN LYMPHOMA

RISK FACTORS

Lifestyle risk factors for non-Hodgkin Lymphoma:

- Diet high in meat and fats
- Overweight or obesity
- Smoking

Environmental and medically-related causes of non-Hodgkin Lymphoma:

- Exposure to benzene, ethylene oxide, environmental or medical radiation, electromagnetic fields, and certain weed or insect killers
- Chemotherapy (alkylating agents)

Non-modifiable risk factors (these cannot be changed) for getting non-Hodgkin Lymphoma:

- Increasing age – most cases occur at 60 years of age or older (although some types are common in young people)
- The risk is higher in males compared to females, although some types are more common in females.
- Non-Hispanic Caucasians are at higher risk compared to non-Hispanic African Americans.
- A weakened immune system (due to organ transplants, HIV infection); autoimmune diseases
- Infection with *Helicobacter pylori*
- History of other infections (e.g. human T-cell leukemia virus, Epstein-Barr virus, hepatitis C virus)

To protect against non-Hodgkin Lymphoma, individuals should maintain a healthy weight, eat a healthy diet, avoid behaviors that may spread HIV infection, and get treatment for HIV infection and *Helicobacter pylori*.

EARLY DETECTION

There are currently no tests recommended for the screening of non-Hodgkin Lymphoma in the general population. Individuals with known risk factors should have regular check-ups.

INCIDENCE

For 2012-2016, Delaware ranked 12th in the U.S. for Non-Hodgkin Lymphoma incidence (8th in 2011-2015); males ranked 13th (8h in 2011-2015) and females ranked 9th (7th in 2011-2015).[24]

2012-2016 DATA

TABLE 8-1: NUMBER OF NON-HODGKIN LYMPHOMA CASES, BY SEX AND RACE/ETHNICITY; DELAWARE AND COUNTIES, 2012-2016

	All Races			Non-Hispanic Caucasian			Non-Hispanic African American			Hispanic		
	All	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female
Delaware	1,207	649	558	995	541	454	146	72	74	34	16	18
Kent	209	107	102	179	93	86	21	---	11	---	---	---
New Castle	619	349	270	474	273	201	101	49	52	24	13	11
Sussex	379	193	186	342	175	167	24	---	11	---	---	---

Source: Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
---Counts less than 11 are not shown to protect patient privacy

- In 2012-2016, there were 1,207 non-Hodgkin Lymphoma cases (4% of all cancer cases) diagnosed in Delaware.
- Males accounted for 54% of non-Hodgkin Lymphoma cases.
- Non-Hispanic Caucasians accounted for 82% of non-Hodgkin Lymphoma cases.

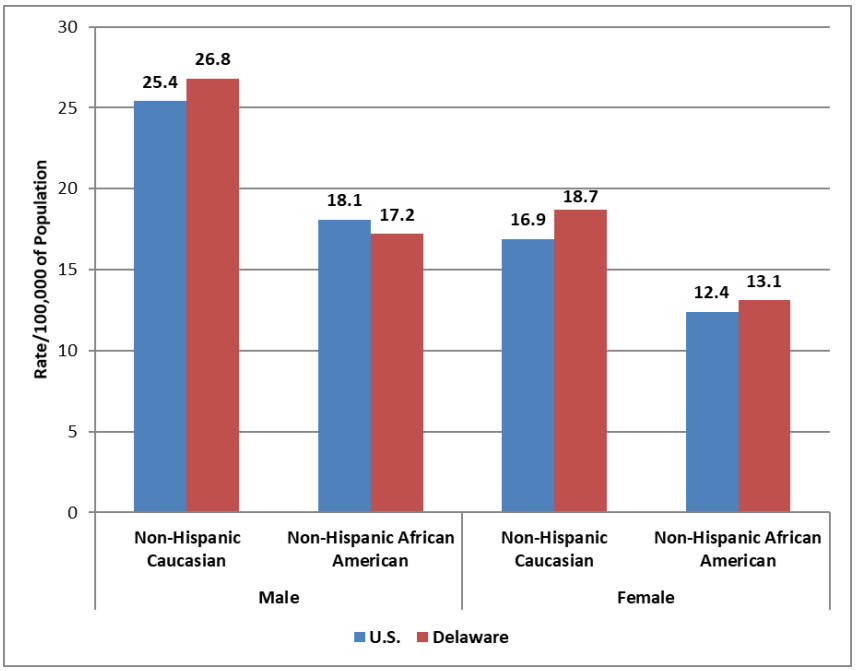
TABLE 8-2: FIVE-YEAR AVERAGE AGE-ADJUSTED NON-HODGKIN LYMPHOMA INCIDENCE RATES OVERALL AND BY SEX; U.S., DELAWARE AND COUNTIES, 2012-2016

	Overall	Male	Female
U.S.	19.3	23.5	15.9
Delaware	21.1	25.2	17.8
Kent	21.3	24.0	18.9
New Castle	20.1	25.9	15.8
Sussex	22.6	24.5	20.9

Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

[24] U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on November 2018 submission data (1999-2016): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, June 2019.

FIGURE 8-1: FIVE-YEAR AVERAGE AGE-ADJUSTED NON-HODGKIN LYMPHOMA BY SEX AND RACE/ETHNICITY; U.S. AND DELAWARE, 2012-2016



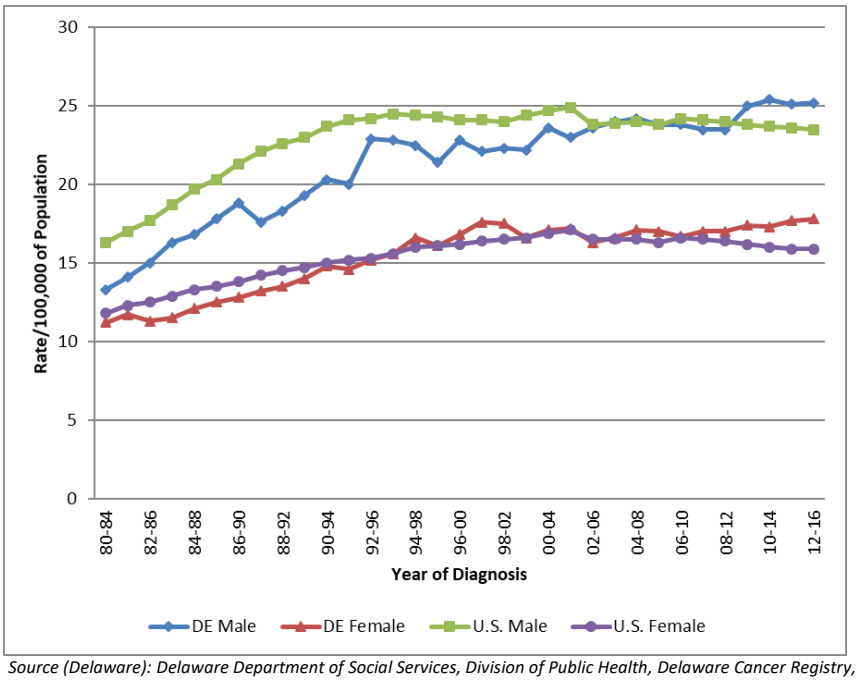
Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- In Delaware
  - Males (25.2 per 100,000) had a statistically significantly higher non-Hodgkin Lymphoma incidence rate compared to females (17.8 per 100,000).
  - The difference in non-Hodgkin Lymphoma incidence rates between non-Hispanic Caucasians (22.3 per 100,000) and Hispanics (17.6 per 100,000) was not statistically significant.
  - The difference in non-Hodgkin Lymphoma incidence rates between non-Hispanic African Americans (14.8 per 100,000) and Hispanics (17.6 per 100,000) was not statistically significant.
  - Non-Hispanic Caucasians (22.3 per 100,000) had a statistically significantly higher non-Hodgkin Lymphoma incidence rate compared to non-Hispanic African Americans (14.8 per 100,000).

- Comparing Delaware and the U.S.
  - Delaware (21.1 per 100,000) had a statistically significantly higher non-Hodgkin Lymphoma incidence rate compared to the U.S. (19.3 per 100,000).
  - The difference in non-Hodgkin Lymphoma incidence rates between males in Delaware (25.2 per 100,000) and the U.S. (23.5 per 100,000) was not statistically significant.
  - Delaware females (17.8 per 100,000) had a statistically significantly higher non-Hodgkin Lymphoma incidence rate compared to U.S. females (15.9 per 100,000).
  - The difference in non-Hodgkin Lymphoma incidence rates between non-Hispanic Caucasians in Delaware (22.3 per 100,000) and the U.S. (20.7 per 100,000) was not statistically significant.
  - The difference in non-Hodgkin Lymphoma incidence rates between non-Hispanic African Americans in Delaware (14.8 per 100,000) and the U.S. (14.9 per 100,000) was not statistically significant.
  - The difference in non-Hodgkin Lymphoma incidence rates between Hispanics in Delaware (17.6 per 100,000) and the U.S. (17.6 per 100,000) was not statistically significant.

TRENDS OVER TIME - DELAWARE AND U.S.

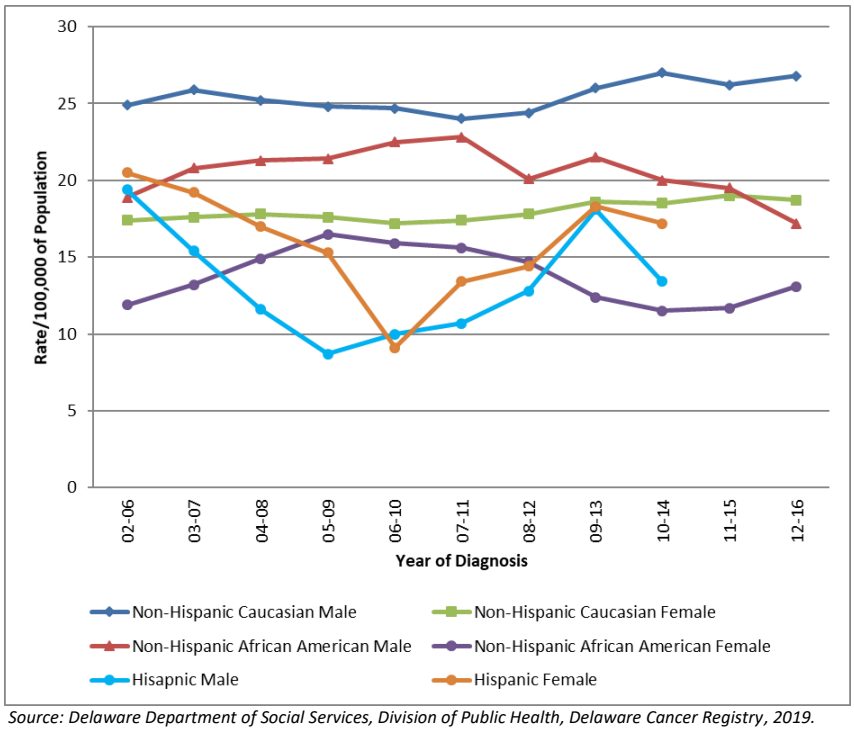
FIGURE 8-2: FIVE-YEAR AVERAGE AGE-ADJUSTED NON-HODGKIN LYMPHOMA INCIDENCE RATES BY SEX; U.S. AND DELAWARE, 1980-2016



Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- From 2002-2006 to 2012-2016
  - Incidence rates for non-Hodgkin Lymphoma increased 8% in Delaware and decreased 2% in the U.S.
  - Incidence rates for non-Hodgkin Lymphoma increased 7% in Delaware males and decreased 1% in U.S. males.
  - Incidence rates for non-Hodgkin Lymphoma increased 9% in Delaware females and decreased 4% in U.S. females.

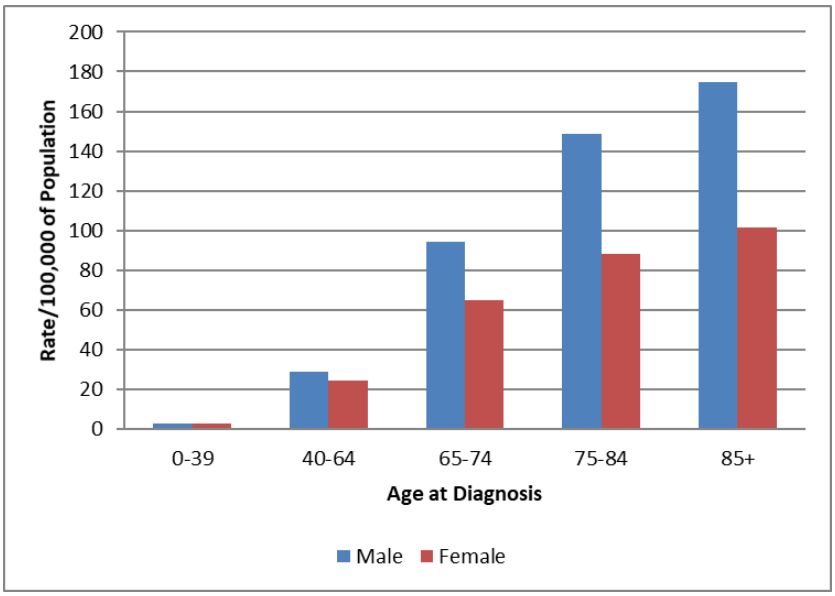
FIGURE 8-3: FIVE-YEAR AVERAGE AGE-ADJUSTED NON-HODGKIN LYMPHOMA INCIDENCE RATES BY SEX AND RACE/ETHNICITY; DELAWARE, 2002-2016



Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- From 2002-2006 to 2012-2016 in Delaware
  - Incidence rates for non-Hodgkin Lymphoma increased 8% in non-Hispanic Caucasian males and increased 7% in non-Hispanic Caucasian females.
  - Incidence rates for non-Hodgkin Lymphoma decreased 9% in non-Hispanic African American males and increased 10% in non-Hispanic African American females.
  - Incidence rates for non-Hodgkin Lymphoma in Hispanics could not be calculated due to small numbers.

FIGURE 8-4: AGE-SPECIFIC NON-HODGKIN LYMPHOMA INCIDENCE RATES BY SEX; DELAWARE, 2012-2016



Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- The peak age range for non-Hodgkin Lymphoma incidence is 85 years of age and older for males and females.

TABLE 8-3: AGE-SPECIFIC NON-HODGKIN LYMPHOMA INCIDENCE RATES BY SEX AND RACE/ETHNICITY; DELAWARE, 2012-2016

Age at Diagnosis	Males			Females		
	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
0-39	---	---	---	---	---	---
40-64	32.7	25.7	---	26.2	22.2	---
65-74	99.5	---	---	73.1	---	---
75-84	159.8	---	---	98.4	---	---
85+	189.7	---	---	110.3	---	---

Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population
Rates based on less than 25 cases are not shown

- Non-Hispanic Caucasians have a peak age range for non-Hodgkin Lymphoma incidence at 85 years of age and older. Due to small numbers, incidence rates could not be calculated for some groups.

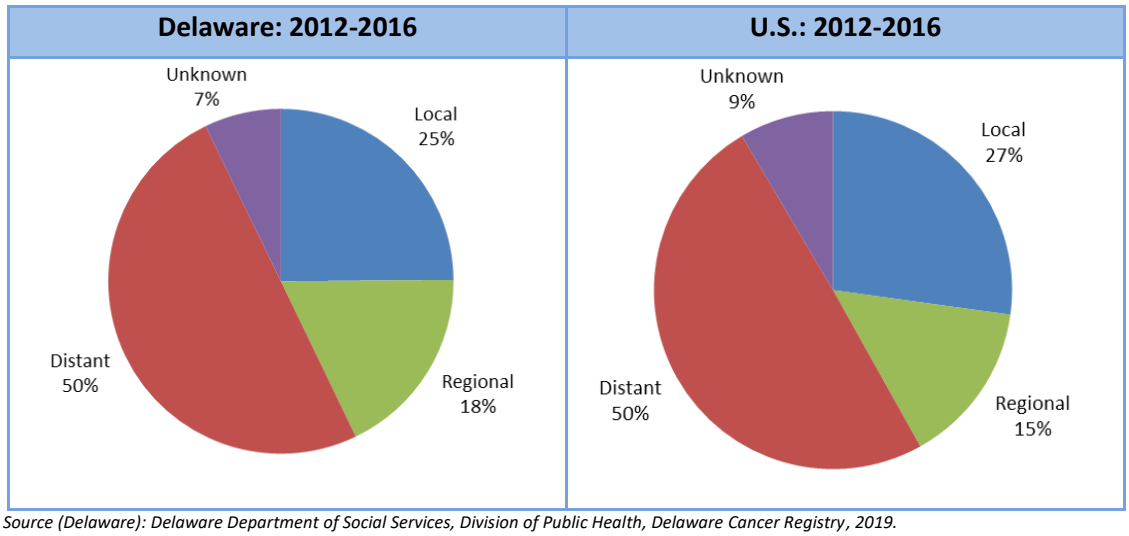
TABLE 8-4: NON-HODGKIN LYMPHOMA CASES BY STAGE AT DIAGNOSIS BY SEX AND RACE/ETHNICITY; DELAWARE, 2012-2016

Stage at Diagnosis	All Races			Non-Hispanic Caucasian			Non-Hispanic African American			Hispanic		
	All	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female
Local	300 (25)	151 (23)	149 (27)	253 (25)	129 (24)	124 (27)	33 (23)	13 (18)	20 (27)	---	---	---
Regional	217 (18)	113 (17)	104 (19)	183 (18)	98 (18)	85 (19)	22 (15)	---	---	---	---	---
Distant	603 (50)	328 (51)	275 (49)	491 (49)	270 (50)	221 (49)	75 (51)	39 (54)	36 (49)	21 (62)	---	13 (72)
Unknown	87 (7)	57 (9)	30 (5)	68 (7)	44 (8)	24 (5)	16 (11)	---	---	---	---	---
Total	1,207	649	558	995	541	454	146	72	74	34	16	18

Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
---Counts less than 11 are not shown to protect patient privacy

- In 2012-2016, there were 300 (25%) non-Hodgkin Lymphomas diagnosed at local stage; 217 (18%) at regional stage; 603 (50%) at distant stage; and 87 (7%) had an unknown stage.
- Non-Hispanic Caucasians (25%) had a higher proportion of non-Hodgkin Lymphoma diagnosed at local stage compared to non-Hispanic African Americans (23%).
- Males (23%) had a lower proportion non-Hodgkin Lymphomas diagnosed at local stage compared to females (27%).

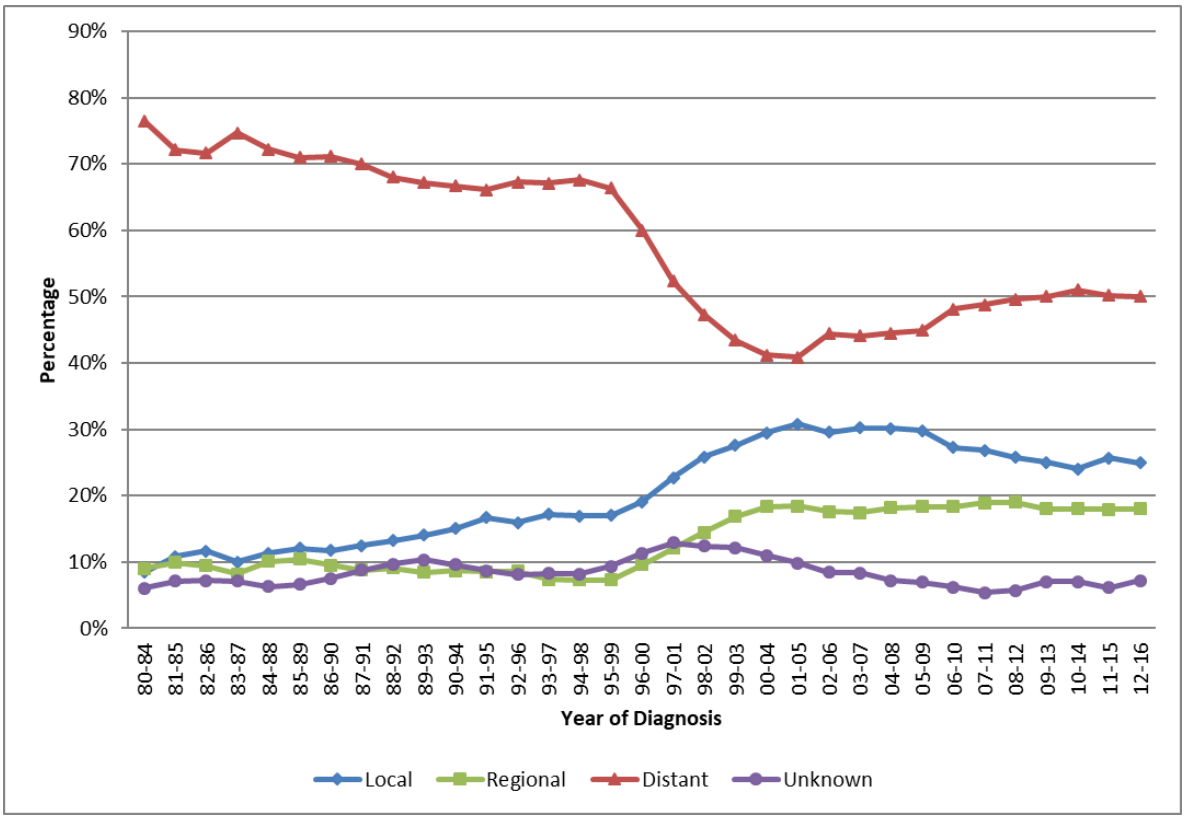
FIGURE 8-5: DISTRIBUTION OF NON-HODGKIN LYMPHOMA CASES BY STAGE AT DIAGNOSIS; U.S. AND DELAWARE, 2012-2016



Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.

- In comparing U.S. and Delaware non-Hodgkin Lymphoma data, more non-Hodgkin Lymphoma cases are diagnosed at local stage in the U.S. (27%) compared to Delaware (25%).

FIGURE 8-6: FIVE-YEAR STAGE OF DIAGNOSIS DISTRIBUTIONS FOR NON-HODGKIN LYMPHOMA CASES; DELAWARE, 1980-2016



Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.

From 1980-1984 to 2010-2016 in Delaware

- The percent of non-Hodgkin Lymphoma cases diagnosed at local stage increased from 8% to 25%.
- Non-Hodgkin Lymphoma cases diagnosed at distant stage decreased from 77% to 50%.

MORTALITY

For 2012-2016, Delaware ranked 8th in the U.S. for non-Hodgkin Lymphoma mortality (20th in 2011-2015); males ranked 6th (19th in 2011-2015) and females ranked 15th (26th in 2011-2015).[25]

2012-2016 DATA

TABLE 8-5: NUMBER OF NON-HODGKIN LYMPHOMA DEATHS, BY SEX AND RACE/ETHNICITY; DELAWARE AND COUNTIES, 2012-2016

	All Races			Non-Hispanic Caucasian			Non-Hispanic African American			Hispanic		
	All	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female
Delaware	361	208	153	295	170	125	51	28	23	---	---	---
Kent	61	42	19	51	34	17	---	---	---	---	---	---
New Castle	194	109	85	144	82	62	38	18	20	---	---	---
Sussex	106	57	49	100	54	46	---	---	---	---	---	---

Source: Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
---Counts less than 11 are not shown to protect patient privacy

- In 2012-2016, there were 361 deaths (4% of all cancer deaths) from non-Hodgkin Lymphoma in Delaware.
- Males accounted for 58% of non-Hodgkin Lymphoma deaths.
- Non-Hispanic Caucasians accounted for 82% of non-Hodgkin Lymphoma deaths.

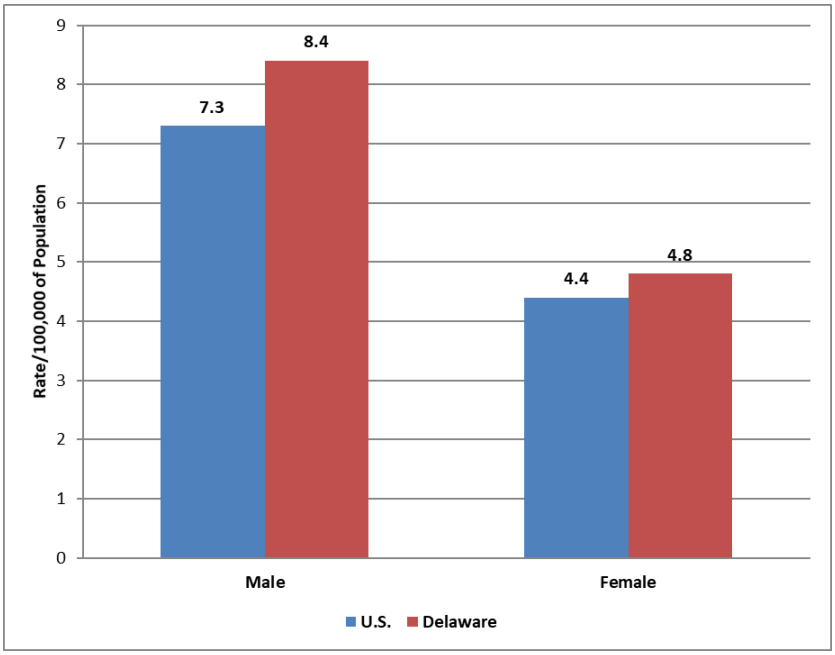
TABLE 8-6: FIVE-YEAR AVERAGE AGE-ADJUSTED NON-HODGKIN LYMPHOMA MORTALITY RATES OVERALL AND BY SEX; U.S., DELAWARE AND COUNTIES, 2012-2016

	Overall	Male	Female
U.S.	5.6	7.3	4.4
Delaware	6.4	8.4	4.8
Kent	6.5	10.2	---
New Castle	6.5	8.6	4.9
Sussex	6.2	7.0	5.5

Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population
---Rates based on less than 25 cases are not shown.

[25] U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on November 2018 submission data (1999-2016): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, June 2019.

FIGURE 8-7: FIVE-YEAR AVERAGE AGE-ADJUSTED NON-HODGKIN LYMPHOMA MORTALITY RATES BY SEX; U.S. AND DELAWARE, 2012-2016

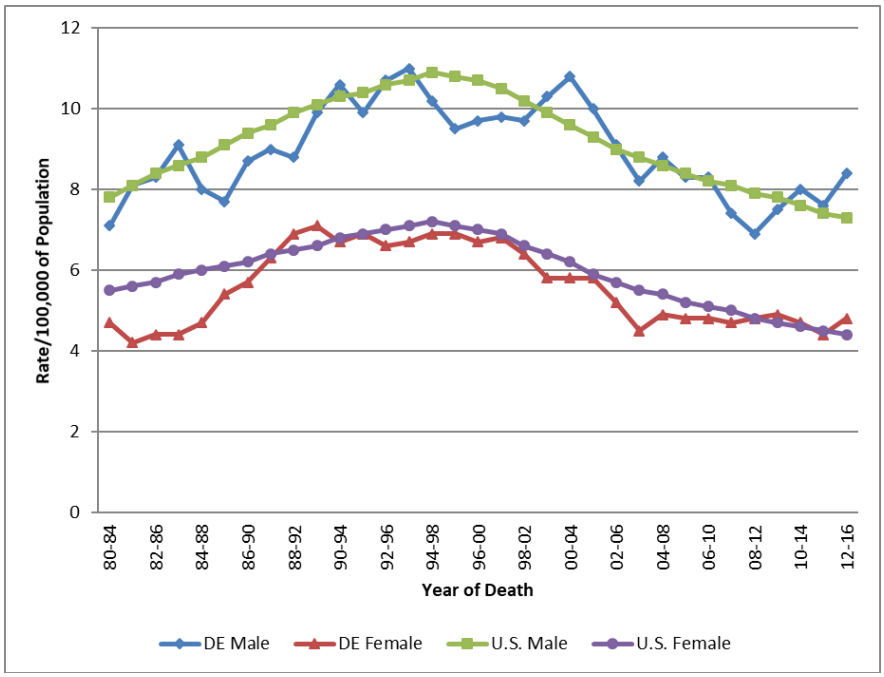


Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- In Delaware
  - Males (8.4 per 100,000) had a statistically significantly higher non-Hodgkin Lymphoma mortality rate compared to females (4.8 per 100,000).
  - The difference in non-Hodgkin Lymphoma mortality rates between non-Hispanic Caucasians (6.4 per 100,000) and non-Hispanic African Americans (5.1 per 100,000) was not statistically significant.
  - Non-Hodgkin Lymphoma mortality rates for Hispanics could not be calculated due to the small number of deaths.

- Comparing Delaware and the U.S.
  - Delaware (6.4 per 100,000) had a statistically higher non-Hodgkin Lymphoma mortality rate compared to the U.S. (5.6 per 100,000).
  - The difference in non-Hodgkin Lymphoma mortality rates between males in Delaware (8.4 per 100,000) and U.S. males (7.3 per 100,000) was not statistically significant.
  - The difference in non-Hodgkin Lymphoma mortality rates between females in Delaware (4.8 per 100,000) and U.S. females (4.4 per 100,000) was not statistically significant.
  - The difference in non-Hodgkin Lymphoma mortality rates between non-Hispanic Caucasians in Delaware (6.4 per 100,000) and non-Hispanic Caucasians in the U.S. (5.9 per 100,000) was not statistically significant.
  - The difference in non-Hodgkin Lymphoma mortality rates between non-Hispanic African Americans in Delaware (5.1 per 100,000) and non-Hispanic African Americans in the U.S. (4.2 per 100,000) was not statistically significant.

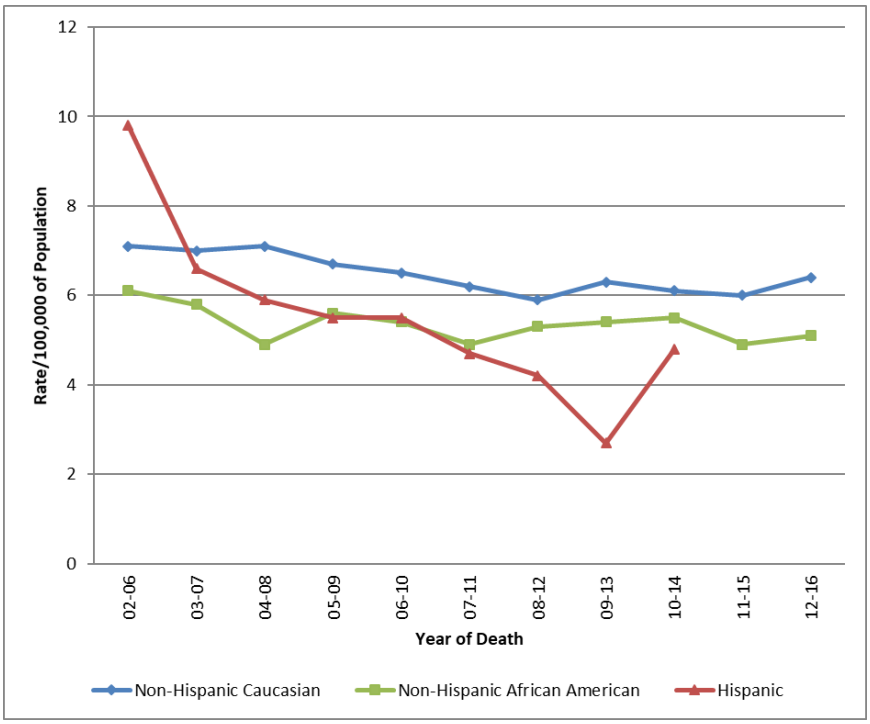
FIGURE 8-8: FIVE-YEAR AVERAGE AGE-ADJUSTED NON-HODGKIN LYMPHOMA MORTALITY RATES BY SEX; U.S. AND DELAWARE, 1980-2016



Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- From 2002-2006 to 2012-2016
  - Mortality rates for non-Hodgkin Lymphoma decreased 6% in Delaware and decreased 21% in the U.S.
  - Mortality rates for non-Hodgkin Lymphoma decreased 8% in Delaware males and decreased 8% in U.S. males.
  - Mortality rates for non-Hodgkin Lymphoma decreased 19% in Delaware females and decreased 23% in U.S. females.

FIGURE 8-9: FIVE-YEAR AVERAGE AGE-ADJUSTED NON-HODGKIN LYMPHOMA MORTALITY RATES BY RACE/ETHNICITY; DELAWARE, 2002-2016



Source: Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- From 2002-2006 to 2012-2016 in Delaware
  - Mortality rates for non-Hodgkin Lymphoma decreased 10% in non-Hispanic Caucasians.
  - Mortality rates for non-Hodgkin Lymphoma decreased 16% in non-Hispanic African Americans.
  - Non-Hodgkin Lymphoma mortality rates for Hispanics could not be calculated due to the small number of deaths.

TABLE 8-7: AGE-SPECIFIC NON-HODGKIN LYMPHOMA MORTALITY RATES BY SEX AND RACE/ETHNICITY; DELAWARE, 2012-2016

Age at Death	Males			Females		
	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
0-39	---	---	---	---	---	---
40-64	6.8	---	---	---	---	---
65-74	25.7	---	---	---	---	---
75-84	58.9	---	---	45.8	---	---
85+	145.1	---	---	96.0	---	---

Source: Delaware Department of Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population
---Rates based on less than 25 cases are not shown.

- The peak age range for non-Hodgkin Lymphoma mortality is 85 years of age and older. Due to small numbers, mortality rates could not be calculated for some groups.

CHAPTER 9: PROSTATE CANCER

RISK FACTORS

Lifestyle risk factors for prostate cancer:

- A diet high in red meat and/or high-fat dairy products
- A diet low in fruits and vegetables
- Obesity
- Tobacco and heavy alcohol use

Environmental and medically-related causes of prostate cancer:

- Employment involving following industries: welding, battery manufacturers, rubber (being a worker), and workers exposed to cadmium

Non-modifiable risk factors (these cannot be changed) for getting prostate cancer:

- Age (risk increases after 50 years of age)
- Race (non-Hispanic African Americans are at higher risk) and ethnicity (Hispanics are at lower risk)
- Nationality (higher risk in males from North America and northwestern Europe)
- Family history of prostate cancer or inherited DNA changes (heredity prostate cancer gene 1)
- Gene mutations that occur during a man's life
- Higher levels of certain male hormones, e.g. testosterone
- Infection and inflammation of the prostate gland (prostatitis)
- Certain genes like the BRCA1 and BRCA2 genes

To protect against prostate cancer, individuals should maintain a healthy weight, consume a diet high in fruits, vegetables, and whole grains; limit calcium intake, and engage in regular physical activity.

EARLY DETECTION

The ACS recommends that males make an informed decision with their health care provider about whether to be screened for prostate cancer. Males should receive information from their doctors about the risks and possible benefits of prostate cancer screening. Males should not be screened unless they receive this information[26].

The DCC 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 in males older than 75 years of age is less desirable; however, screening decisions should be made on an individual basis.
- Screening is not recommended for males with a life expectancy of less than 10 years.
- Offer screening for individuals considered to be at average risk for the disease beginning at 50 years of age, using an informed decision-making process.
- High-risk individuals should be encouraged to be screened starting at 40 years of age if they:
  - Have first-degree relatives with prostate cancer
  - Are non-Hispanic African American males
  - Have family or personal history of BRCA1 or BRCA2 gene.
- Screening at one- to two-year intervals via prostate specific antigen (PSA) test, with or without digital rectal exam (DRE)

PROSTATE CANCER SCREENING IN DELAWARE

Data from the 2018 BRFS provides information on the prevalence of prostate cancer screening among Delaware males:

- Thirty-eight percent of Delaware males 40 years of age and older reported having had a PSA blood test in the past two years, compared to the national median prevalence of 33%.
- The prevalence of Delaware males who received a PSA test within the past two years increased with age: 37% of males 50-59 years of age were tested, compared to 56% of males 65 years of age and older. This difference was statistically significant.
- In Delaware, there was no statistically significant difference in the prevalence of having a PSA test within the past two years between non-Hispanic Caucasian males (40%) and non-Hispanic African American males (32%).
- As the level of education increased, the prevalence of Delaware males who had a PSA test within the past two years increased. Only 14% of Delaware males with less than high school education reported having a PSA test within the past two years, compared to 45% of Delaware males who graduated from college. This difference was statistically significant.
- According to the 2018 BRFS report, 44% of Delaware males reported making the decision together with their health care provider to have the PSA test done. Another 26% of Delaware males made the decision with one or more other person. Only 16% of Delaware males made the decision to have the PSA test done alone.

[26] American Cancer Society; Prostate Cancer: Early Detection. http://www.cancer.org/cancer/prostatecancer/moreinformation/prostatecancerearlydetection/prostate-cancer-early-detection-acs-recommendations

INCIDENCE

For 2012-2016, Delaware ranked 3rd in the U.S. for prostate cancer incidence (3rd in 2011-2015).[27]

2012-2016 DATA

TABLE 9-1: NUMBER OF PROSTATE CANCER CASES, BY RACE/ETHNICITY; DELAWARE AND COUNTIES, 2012-2016

	All Males	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
Delaware	3,749	2,594	980	106
Kent	776	461	282	---
New Castle	1,975	1,266	592	74
Sussex	996	865	106	---

Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
---Counts less than 11 are not shown to protect patient privacy.

- Prostate cancer is the most commonly diagnosed cancer among males in the U.S. and Delaware.
- In 2012-2016, 3,749 prostate cancer cases (26% of all male cancer cases) were diagnosed in Delaware.
- Non-Hispanic Caucasians accounted for 69% of prostate cancer cases.

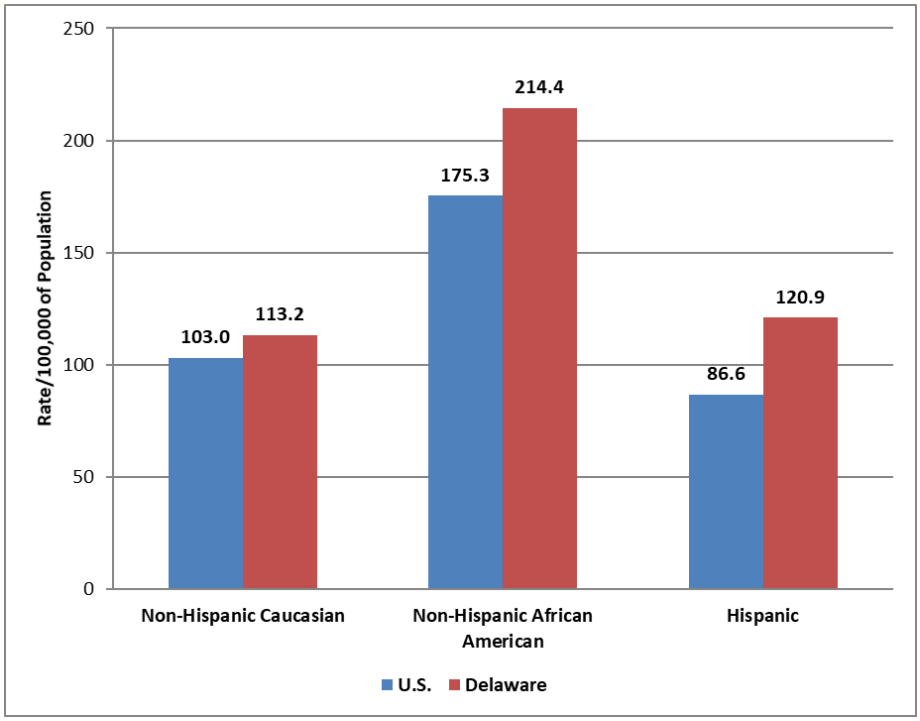
TABLE 9-2: FIVE-YEAR AVERAGE AGE-ADJUSTED PROSTATE CANCER INCIDENCE RATES BY RACE/ETHNICITY; U.S., DELAWARE AND COUNTIES, 2012-2016

	All Males	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
U.S.	106.8	103.0	175.3	86.6
Delaware	129.1	113.2	214.4	120.9
Kent	157.6	123.8	290.2	---
New Castle	131.1	115.1	203.5	132.6
Sussex	109.8	105.7	153.3	---

Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.
---Rates based on less than 25 cases are not shown.

[27] U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on November 2018 submission data (1999-2016): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, June 2019.

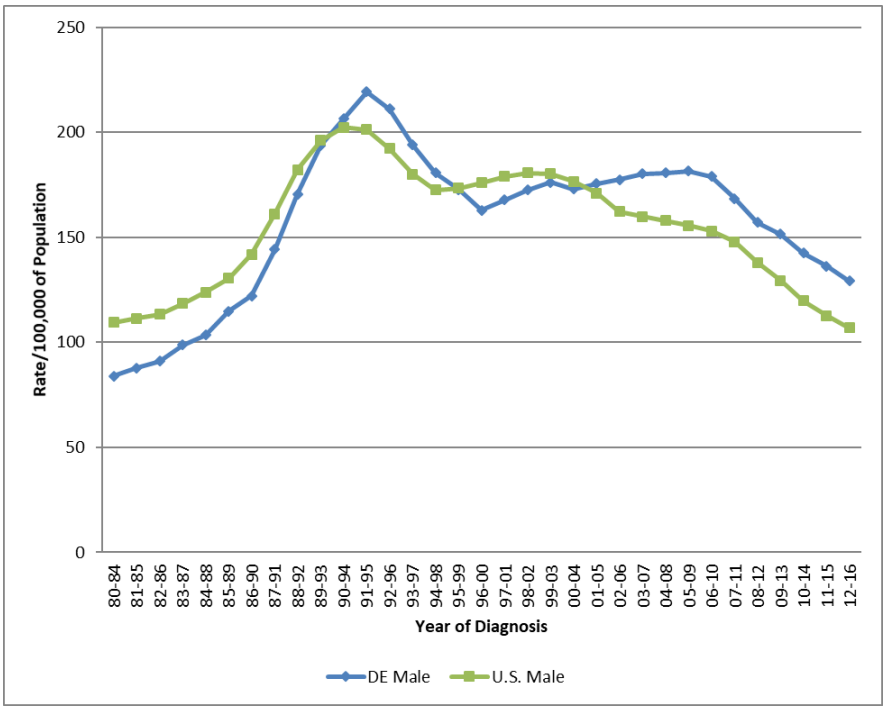
FIGURE 9-1: FIVE-YEAR AVERAGE AGE-ADJUSTED PROSTATE CANCER INCIDENCE RATES BY RACE/ETHNICITY; U.S. AND DELAWARE, 2012-2016



Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- In Delaware
  - Non-Hispanic African Americans (214.4 per 100,000) had a statistically significantly higher prostate cancer incidence rate compared to both non-Hispanic Caucasians (113.2 per 100,000) and Hispanics (120.9 per 100,000).
  - The difference in prostate cancer incidence rates between non-Hispanic Caucasians and Hispanics was not statistically significant.
- Comparing Delaware and the U.S.
  - Delaware (129.1 per 100,000) had a statistically significantly higher prostate cancer incidence rate compared to the U.S. (106.8 per 100,000).
  - Non-Hispanic Caucasians in Delaware (113.2 per 100,000) had a statistically significantly higher prostate cancer incidence rate compared to non-Hispanic Caucasians in the U.S. (103.0 per 100,000).
  - Non-Hispanic African Americans in Delaware (214.4 per 100,000) had a statistically significantly higher prostate cancer incidence rate compared to non-Hispanic African Americans in the U.S. (175.3 per 100,000).
  - Hispanics in Delaware (120.9 per 100,000) had a statistically significantly higher prostate cancer incidence rate compared to Hispanics in the U.S. (86.6 per 100,000).

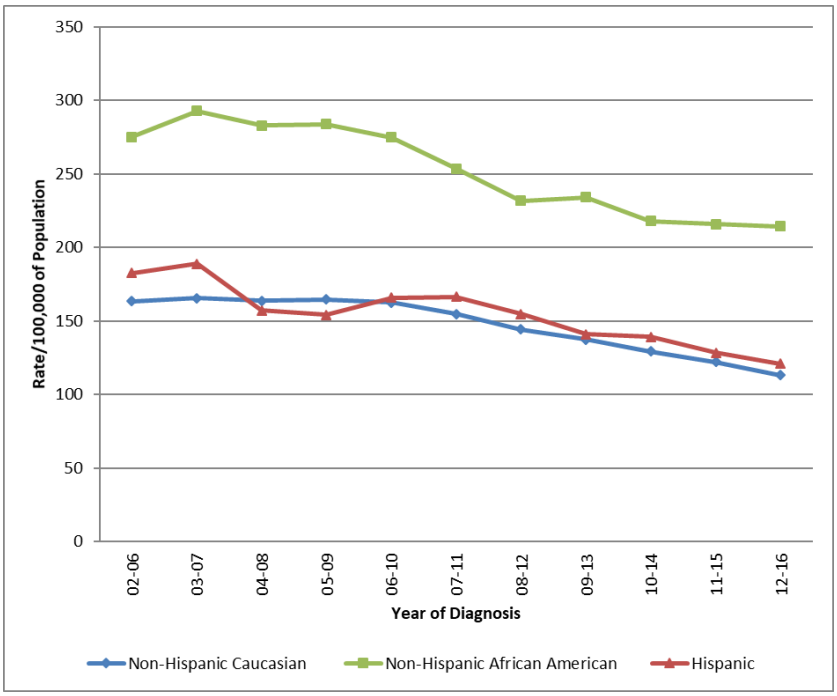
FIGURE 9-2: FIVE-YEAR AVERAGE AGE-ADJUSTED PROSTATE CANCER INCIDENCE RATES; U.S. AND DELAWARE, 1980-2016



Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- From 2002-2006 to 2012-2016
  - Incidence rates for prostate cancer decreased 27% in Delaware and decreased 34% in the U.S.

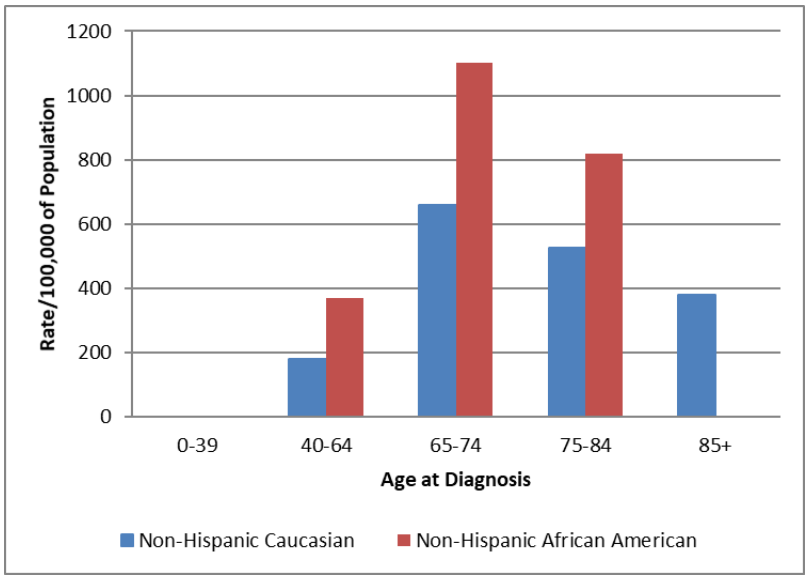
FIGURE 9-3: FIVE-YEAR AVERAGE AGE-ADJUSTED PROSTATE CANCER INCIDENCE RATES BY RACE/ETHNICITY; DELAWARE, 2002-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- From 2002-2006 to 2012-2016
  - Incidence rates for prostate cancer decreased 31% in non-Hispanic Caucasians.
  - Incidence rates for prostate cancer decreased 22% in non-Hispanic African Americans.
  - Incidence rates for prostate cancer decreased 34% in Hispanics.

FIGURE 9-4: AGE-SPECIFIC PROSTATE CANCER INCIDENCE RATES BY RACE/ETHNICITY; DELAWARE, 2012-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- The incidence rate for prostate cancer was highest for both non-Hispanic Caucasians and non-Hispanic African Americans 65-74 years of age. Due to small numbers, incidence rates could not be calculated by race for the 0-39 age group or for Hispanics by age group.

TABLE 9-3: AGE-SPECIFIC PROSTATE CANCER INCIDENCE RATES BY RACE/ETHNICITY; DELAWARE, 2012-2016

Age at Diagnosis	All Males	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
0-39	---	---	---	---
40-64	210.4	179.4	371.6	116.0
65-74	717.2	659.5	1102.1	716.1
75-84	563.5	526.4	817.6	---
85+	387.5	379.4	---	---

Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.
---Rates based on less than 25 cases are not shown.

STAGE OF DIAGNOSIS - DELAWARE

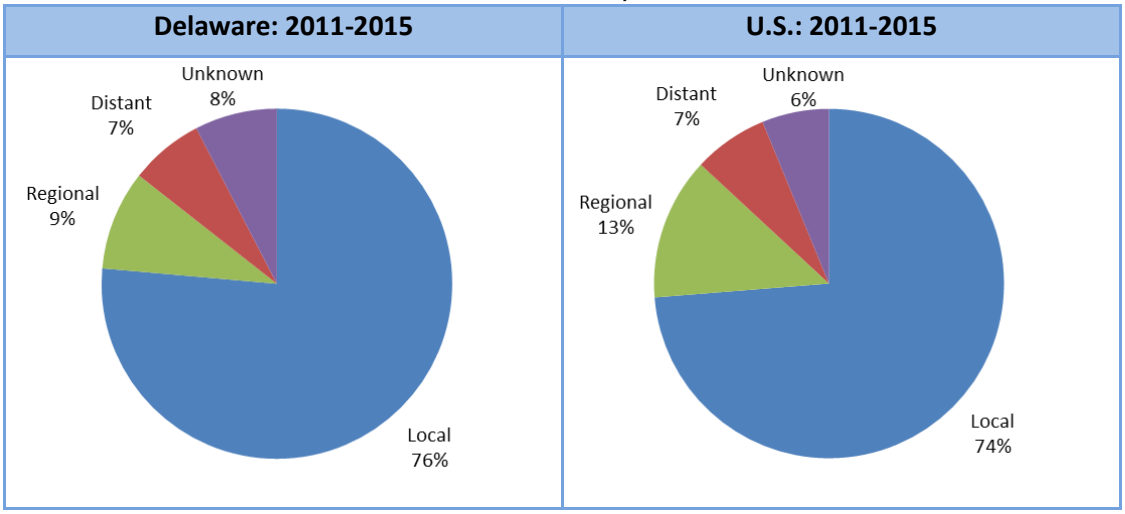
TABLE 9-4: NUMBER AND PERCENTAGE OF PROSTATE CANCER CASES BY STAGE AT DIAGNOSIS BY RACE/ETHNICITY, DELAWARE, 2012-2016

Stage at Diagnosis	All Males	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
Local	2,863 (76)	1,987 (77)	754 (77)	73 (69)
Regional	346 (9)	238 (9)	85 (9)	15 (14)
Distant	254 (7)	172 (7)	71 (7)	--- ---
Unknown	286 (8)	197 (8)	70 (7)	--- ---
Total	3,749	2,594	980	106

Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
---Counts less than 11 are not shown to protect patient privacy

- In 2012-2016, there were 2,863 (76%) prostate cancers diagnosed at local stage; 346 (9%) at regional stage; 254 (7%) at distant stage; and 286 (8%) with an unknown stage.
- Non-Hispanic African Americans (77%) had the same proportion of prostate cancers diagnosed at local stage compared to non-Hispanic Caucasians (77%), which was a higher proportion compared to Hispanics (69%).

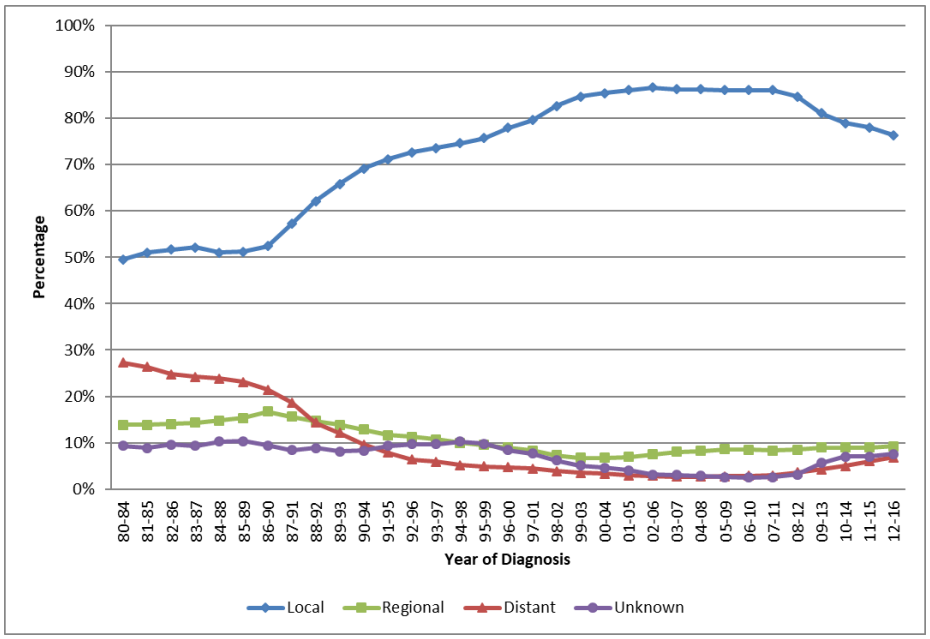
FIGURE 9-5: PERCENTAGE OF PROSTATE CANCER CASES BY STAGE AT DIAGNOSIS, U.S. AND DELAWARE, 2012-2016



Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.

- In comparing U.S. and Delaware prostate cancer data, the proportion of prostate cancer diagnosed at local stage is higher in Delaware (76%) compared to the U.S. (74%).

FIGURE 9-6: FIVE-YEAR PERCENTAGE OF STAGE OF DIAGNOSIS FOR PROSTATE CANCER CASES, DELAWARE, 1980-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.

- From 1980-1984 to 2012-2016 in Delaware
  - The percentage of prostate cancer cases diagnosed at local stage increased from 50% to 76%.
  - Cases diagnosed at distant stage decreased from 27% to 7%.

MORTALITY

For 2012-2016, Delaware ranked 46th in the U.S. for prostate cancer mortality (43rd in 2011-2015).[28]

2012-2016 DATA

TABLE 9-5: NUMBER OF PROSTATE CANCER DEATHS, BY RACE/ETHNICITY; DELAWARE AND COUNTIES, 2012-2016

	All Males	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
Delaware	420	300	104	11
Kent	76	46	25	---
New Castle	223	146	67	---
Sussex	121	108	12	---

Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
---Counts less than 11 are not shown to protect patient privacy.

- Prostate cancer is the second most common cause of cancer deaths among males in the U.S. and Delaware.
- In 2012-2016, there were 420 male deaths (8% of all male cancer deaths) from prostate cancer in Delaware.
- Non-Hispanic Caucasian males accounted for 71% of prostate cancer deaths.

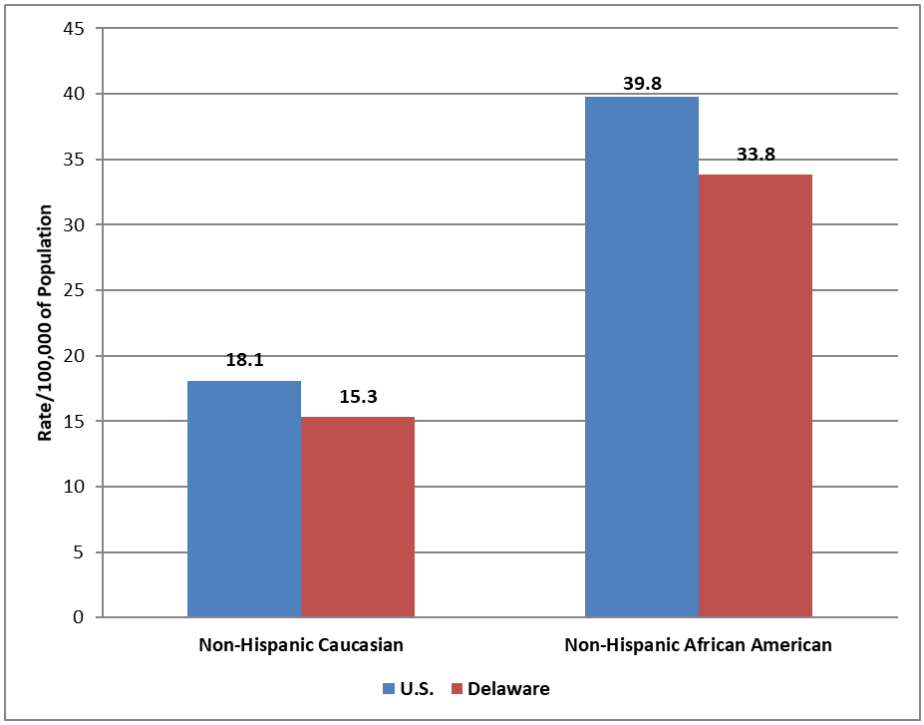
TABLE 9-6: FIVE-YEAR AVERAGE AGE-ADJUSTED PROSTATE CANCER MORTALITY RATES BY RACE/ETHNICITY; U.S., DELAWARE AND COUNTIES, 2012-2016

	All Males	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
U.S.	19.3	18.1	39.8	15.9
Delaware	17.8	15.3	33.8	---
Kent	19.3	14.9	36.0	---
New Castle	18.6	15.0	35.9	---
Sussex	16.0	15.8	---	---

Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.
---Rates based on less than 25 cases are not shown.

[28] U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on November 2018 submission data (1999-2016): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, June 2019.

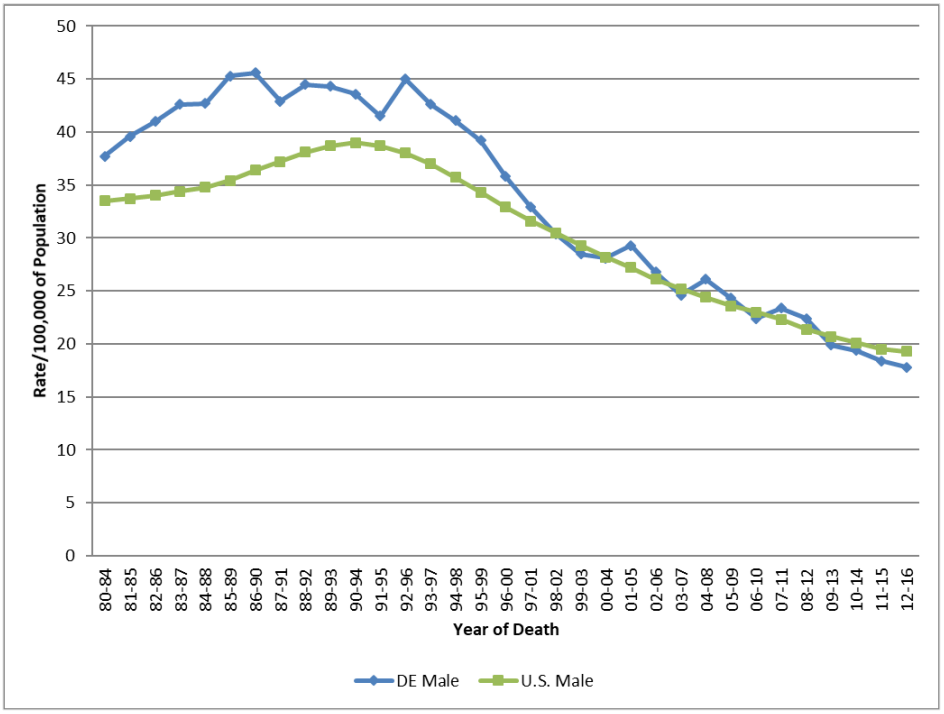
FIGURE 9-7: FIVE-YEAR AVERAGE AGE-ADJUSTED PROSTATE CANCER MORTALITY RATES BY RACE/ETHNICITY; U.S. AND DELAWARE, 2012-2016



Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- In Delaware
  - Non-Hispanic African Americans (33.8 per 100,000) had a statistically significantly higher prostate cancer mortality rate compared to non-Hispanic Caucasians (15.3 per 100,000).
  - Prostate cancer mortality rates for Hispanics could not be calculated due to the small number of deaths.
- Comparing Delaware and the U.S.
  - The difference in the prostate cancer mortality rates between Delaware (17.8 per 100,000) and the U.S. (19.3 per 100,000) was not statistically significant.
  - Non-Hispanic Caucasians in Delaware (15.3 per 100,000) had a statistically significantly lower prostate cancer mortality rate compared to non-Hispanic Caucasians in the U.S (18.1 per 100,000).
  - The difference in prostate cancer mortality rates between non-Hispanic African Americans in Delaware (33.8 per 100,000) and non-Hispanic African Americans in the U.S (39.8 per 100,000) was not statistically significant.

FIGURE 9-8: FIVE-YEAR AVERAGE AGE-ADJUSTED PROSTATE CANCER MORTALITY RATES; U.S. AND DELAWARE, 1980-2016

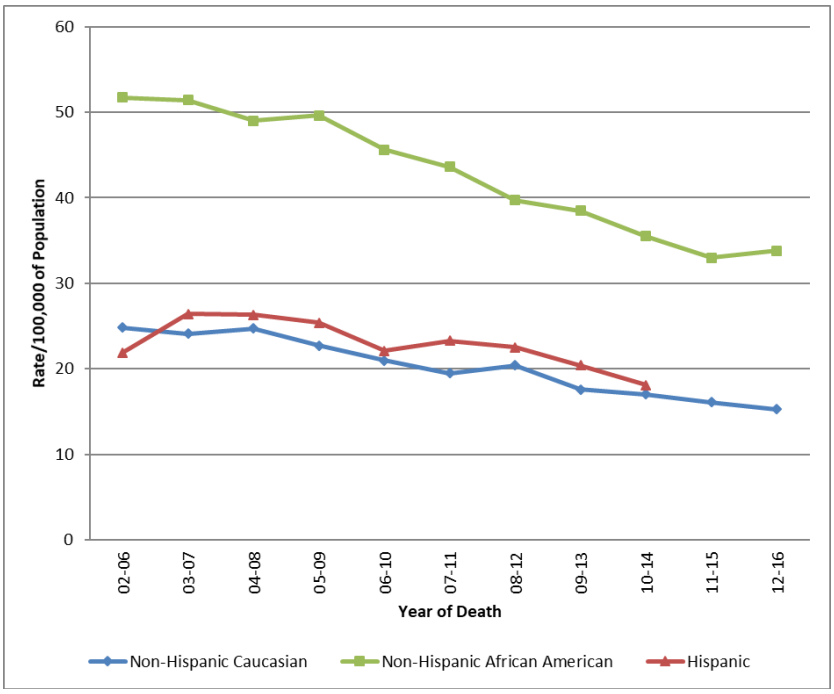


Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- From 2002-2006 to 2012-2016
  - Mortality rates for prostate cancer decreased 34% in Delaware and decreased 26% in the U.S.

TRENDS OVER TIME - DELAWARE

FIGURE 9-9: FIVE-YEAR AVERAGE AGE-ADJUSTED PROSTATE CANCER MORTALITY RATES BY RACE/ETHNICITY; DELAWARE, 2002-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.

- From 2002-2006 to 2012-2016
  - Mortality rates for prostate cancer decreased 38% in non-Hispanic Caucasians.
  - Mortality rates for prostate cancer decreased 35% in non-Hispanic African Americans.
  - Mortality rates for prostate cancer in Hispanics could not be calculated due to the small number of deaths.

AGE-SPECIFIC MORTALITY RATES - DELAWARE

TABLE 9-7: AGE-SPECIFIC PROSTATE CANCER MORTALITY RATES BY RACE/ETHNICITY; DELAWARE, 2012-2016

Age at Death	All Males	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
0-39	---	---	---	---
40-64	6.9	5.8	---	---
65-74	48.7	38.0	110.6	---
75-84	146.8	120.2	306.6	---
85+	409.6	386.8	---	---

Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population.
---Rates based on less than 25 cases are not shown.

- The mortality rate for prostate cancer was highest in males 85 years of age and older. Due to small numbers, prostate cancer mortality rates were not calculated by age group for Hispanics and for non-Hispanic African Americans with the exception of the 65-74 and 75-84 age group.

CHAPTER 10: THYROID CANCER

RISK FACTORS

Lifestyle risk factors for thyroid cancer:

- A diet low in iodine increases the risk for thyroid cancer.

Environmental and medically-related causes of thyroid cancer:

- Radiation fallout from power plants or nuclear weapons
- Exposure to radiation (particularly in childhood and radiation targeting the head and neck area)

Non-modifiable risk factors (these cannot be changed) for getting thyroid cancer:

- Thyroid cancer is three times more likely to develop in females compared to males.
- Females have higher risk at younger ages (40's and 50's), whereas males have higher risk at older ages (60's and 70's).
- Non-Hispanic Caucasians are more likely to develop thyroid cancer compared to other racial/ethnic groups.
- Some thyroid cancers are linked to hereditary conditions (familial medullary thyroid carcinoma (FMTC), familial adenomatous polyposis (FAP), Cowden disease, Carney complex type 1, familial nonmedullary thyroid carcinoma).
- Having a first-degree relative with thyroid cancer

To protect against thyroid cancer, individuals should avoid unnecessary x-rays, have genetic counseling if they have a family history, and for children, removal of the thyroid gland should be considered if they have an abnormal gene.

EARLY DETECTION

There are currently no tests recommended for the screening of thyroid cancer. Individuals at increased risk should have routine checkups by a health care provider and do self-checks of their neck to detect any abnormal lumps. Diagnostic tests can also be performed.

INCIDENCE

For 2012-2016, Delaware ranked 11th in the U.S. for thyroid cancer incidence (13th in 2011-2015); males ranked 34th (32nd in 2011-2015) and females ranked 9th (12th in 2011-2015).[29]

2012-2016 DATA

TABLE 10-1: NUMBER OF THYROID CANCER CASES, BY SEX AND RACE/ETHNICITY; DELAWARE AND COUNTIES, 2012-2016

	All Races			Non-Hispanic Caucasian			Non-Hispanic African American			Hispanic		
	All	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female
Delaware	817	172	645	585	133	452	130	23	107	49	---	41
Kent	150	37	113	112	29	83	22	---	17	---	---	---
New Castle	510	100	410	347	72	275	94	16	78	30	-	25
Sussex	157	35	122	126	32	94	14	---	12	---	---	---

Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
---Counts less than 11 are not shown to protect patient privacy

- In 2012-2016, there were 817 thyroid cancer cases (3% of all cancer cases) diagnosed in Delaware.
- Females accounted for 79% of thyroid cancer cases.
- Non-Hispanic Caucasians accounted for 72% of thyroid cancer cases.

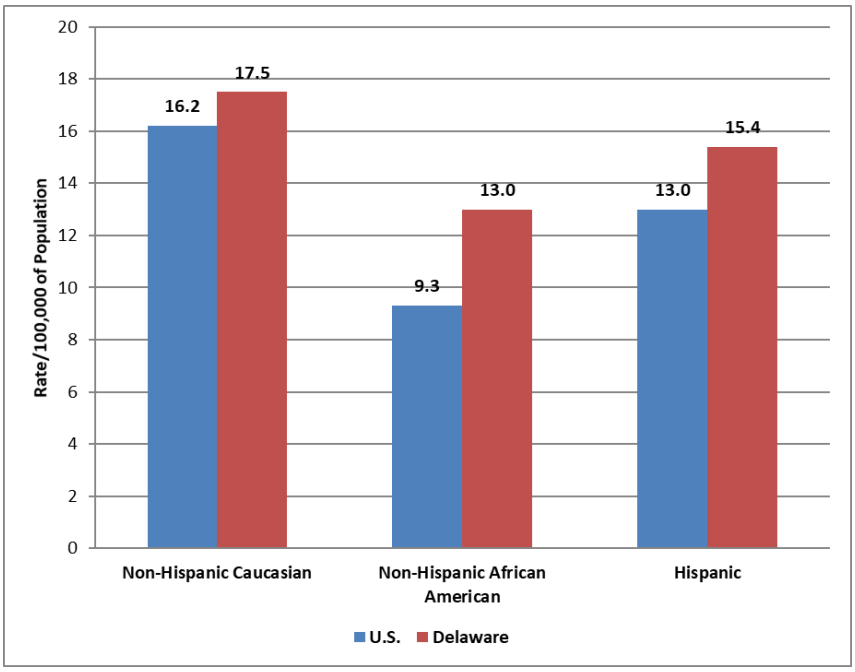
TABLE 10-2: FIVE-YEAR AVERAGE AGE-ADJUSTED THYROID CANCER INCIDENCE RATES OVERALL AND BY SEX; U.S., DELAWARE AND COUNTIES, 2012-2016

	Overall	Male	Female
U.S.	14.5	7.4	21.5
Delaware	16.7	6.9	25.9
Kent	17.9	8.9	26.2
New Castle	17.7	6.8	27.9
Sussex	12.8	5.4	19.9

Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

[29] U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on November 2018 submission data (1999-2016): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, June 2019.

FIGURE 10-1: FIVE-YEAR AVERAGE AGE-ADJUSTED THYROID CANCER INCIDENCE RATES BY RACE/ETHNICITY; U.S. AND DELAWARE, 2012-2016



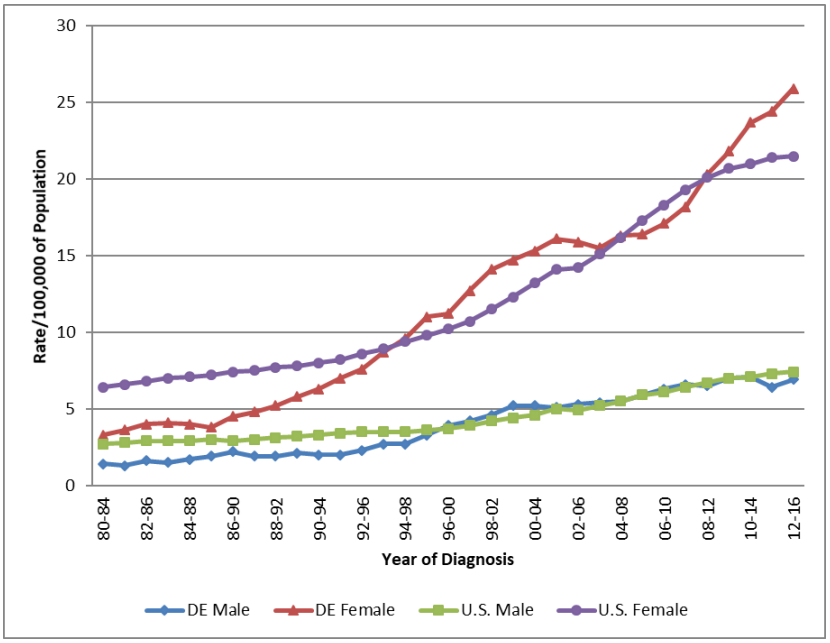
Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- In Delaware
  - Males (6.9 per 100,000) had a statistically significantly lower thyroid cancer incidence rate compared to females (25.9 per 100,000).
  - Non-Hispanic Caucasians (17.5 per 100,000) had a statistically significantly higher thyroid cancer incidence rate compared to non-Hispanic African Americans (13.0 per 100,000).
  - The difference in thyroid cancer incidence rates between non-Hispanic Caucasians (17.5 per 100,000) and Hispanics (15.4 per 100,000) was not statistically significant.
  - The difference in thyroid cancer incidence rates between non-Hispanic African Americans (13.0 per 100,000) and Hispanics (15.4 per 100,000) was not statistically significant.

- Comparing Delaware and the U.S.
  - Delaware (16.7 per 100,000) had a statistically significantly higher thyroid cancer incidence rate compared to the U.S. (14.5 per 100,000).
  - There was no statistically significant difference in thyroid cancer incidence rates between males in Delaware (6.9 per 100,000) and males in the U.S. (7.4 per 100,000).
  - Delaware females (25.9 per 100,000) had a statistically significantly higher thyroid cancer incidence rate compared to U.S. females (21.5 per 100,000).
  - The difference in thyroid cancer incidence rates between non-Hispanic Caucasians in Delaware (17.5 per 100,000) and the U.S. (16.2 per 100,000) was not statistically significant.
  - Non-Hispanic African Americans in Delaware (13.0 per 100,000) had a statistically significantly higher thyroid cancer incidence rate compared to non-Hispanic African Americans in the U.S. (9.3 per 100,000).
  - The difference in thyroid cancer incidence rates between Hispanics in Delaware (15.4 per 100,000) and the U.S. (13.0 per 100,000) was not statistically significant.

TRENDS OVER TIME - DELAWARE AND U.S.

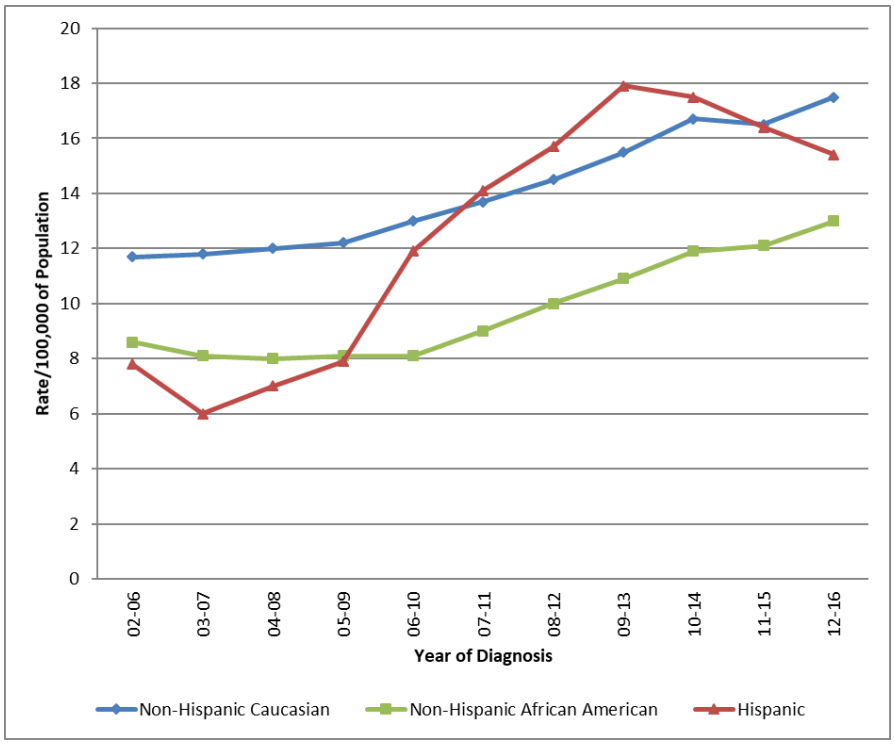
FIGURE 10-2: FIVE-YEAR AVERAGE AGE-ADJUSTED THYROID CANCER INCIDENCE RATES BY SEX; U.S. AND DELAWARE, 1980-2016



Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- From 2002-2006 to 2012-2016
  - Incidence rates for thyroid cancer increased 55% in Delaware and increased 51% in the U.S.
  - Incidence rates for thyroid cancer increased 30% in Delaware males and increased 51% in U.S. males.
  - Incidence rates for thyroid cancer increased 63% in Delaware females and increased 51% in U.S. females.

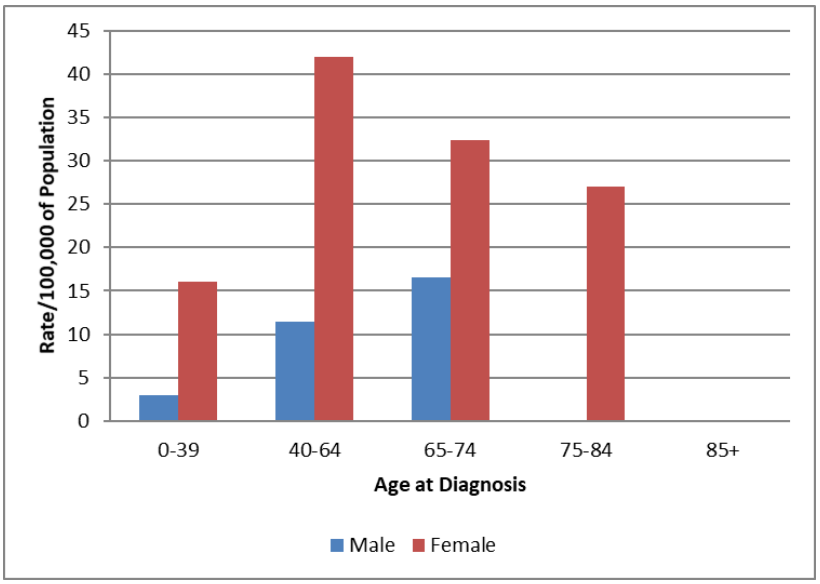
FIGURE 10-3: FIVE-YEAR AVERAGE AGE-ADJUSTED THYROID CANCER INCIDENCE RATES BY RACE/ETHNICITY; DELAWARE, 2002-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- From 2002-2006 to 2012-2016 in Delaware
  - Incidence rates for thyroid cancer increased 50% in non-Hispanic Caucasians.
  - Incidence rates for thyroid cancer increased 51% in non-Hispanic African Americans.
  - Incidence rates for thyroid cancer increased 97% in Hispanics.

FIGURE 10-4: AGE-SPECIFIC THYROID CANCER INCIDENCE RATES BY SEX; DELAWARE, 2012-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- The peak age range for thyroid cancer incidence is 40-64 years of age for females and 65-74 years of age for males. Due to low numbers, incidence rates were not calculated for some groups.

TABLE 10-3: AGE-SPECIFIC THYROID CANCER INCIDENCE RATES BY SEX AND RACE/ETHNICITY; DELAWARE, 2010-2014

Age at Diagnosis	Males			Females		
	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
0-39	---	---	---	17.7	10.1	---
40-64	12.6	---	---	43.5	32.8	---
65-74	17.0	---	---	32.1	---	---
75-84	---	---	---	28.3	---	---
85+	---	---	---	---	---	---

Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population
---Rates based on less than 25 cases are not shown.

- Non-Hispanic Caucasians had a peak age range for thyroid cancer incidence at 40-64 years of age for females and at 65-74 years of age for males.

STAGE OF DIAGNOSIS - DELAWARE

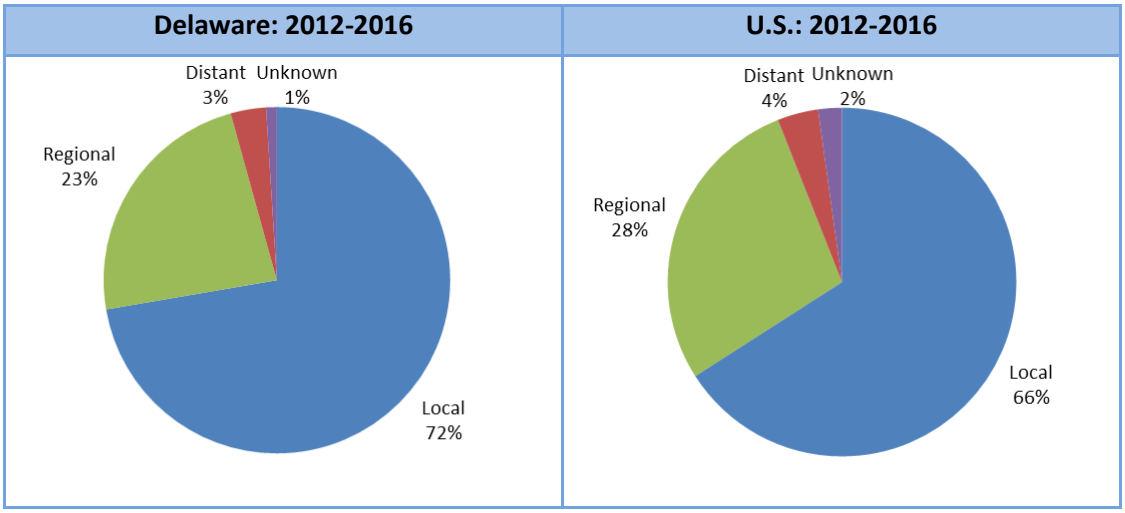
TABLE 10-4: THYROID CANCER CASES BY STAGE AT DIAGNOSIS BY SEX AND RACE/ETHNICITY; DELAWARE, 2012-2016

Stage at Diagnosis	All Races			Non-Hispanic Caucasian			Non-Hispanic African American			Hispanic		
	All	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female
Local	591 (72)	110 (64)	481 (75)	416 (71)	83 (62)	333 (74)	106 (82)	17 (74)	89 (83)	32 (65)	---	26 (63)
Regional	191 (23)	50 (29)	141 (22)	144 (25)	41 (31)	103 (23)	17 (13)	---	14 (13)	15 (31)	---	13 (32)
Distant	---	---	---	---	---	---	---	---	---	---	---	---
Unknown	---	---	---	---	---	---	---	---	---	---	---	---
Total	817	172	645	585	133	452	130	23	107	49	-	41

Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
---Counts less than 11 are not shown to protect patient privacy

- In 2012-2016, there were 591 (72%) thyroid cancers diagnosed at local stage and 191 (23%) at regional stage.
- Non-Hispanic African Americans (82%) had a higher proportion of thyroid cancers diagnosed at local stage compared to both non-Hispanic Caucasians (71%) and Hispanics (65%).
- Females (75%) had a higher proportion of thyroid cancers diagnosed at local stage compared to males (64%).

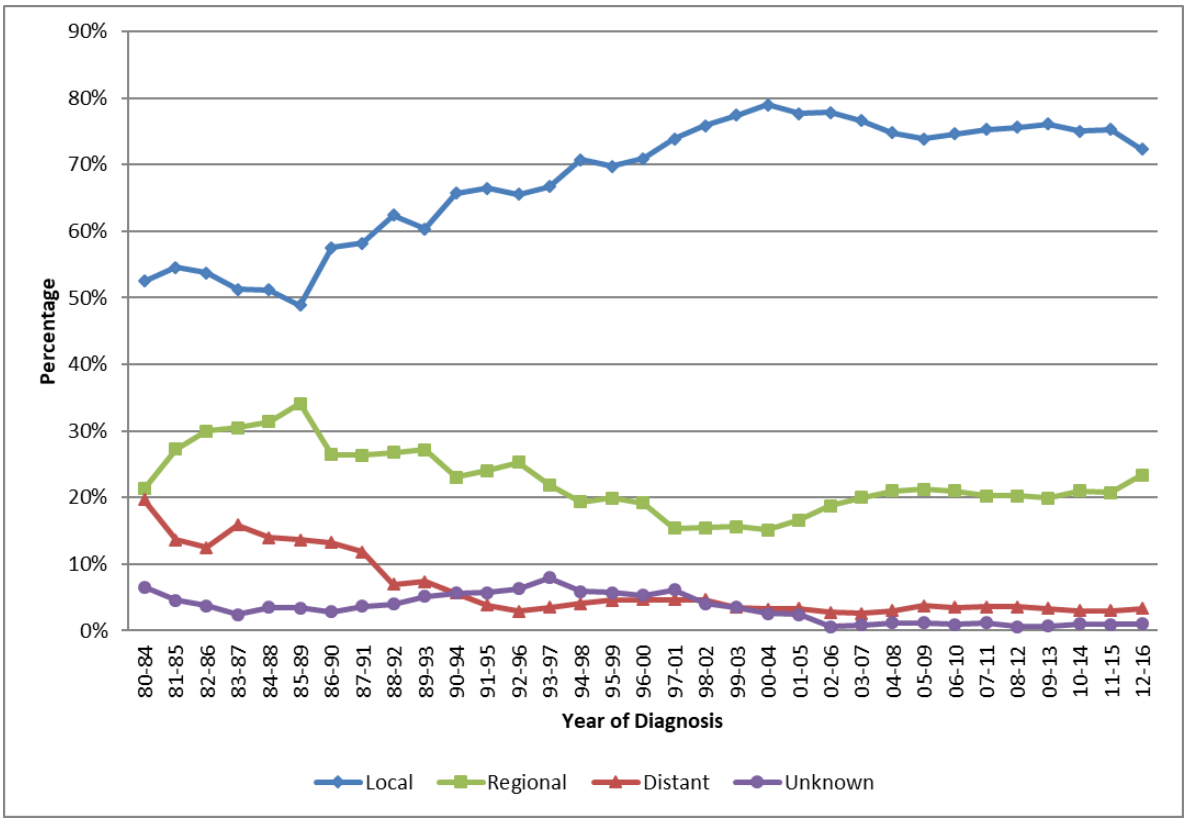
FIGURE 10-5: DISTRIBUTION OF THYROID CANCER CASES BY STAGE AT DIAGNOSIS; U.S. AND DELAWARE, 2012-2016



Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 Sub.

- In comparing U.S. and Delaware thyroid cancer data, Delaware (72%) had a higher proportion of thyroid cancer diagnosed at local stage compared to the U.S. (66%).

FIGURE 10-6: FIVE-YEAR STAGE OF DIAGNOSIS DISTRIBUTIONS FOR THYROID CANCER CASES; DELAWARE, 1980-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.

- From 1980-1984 to 2012-2016 in Delaware
  - The percent of thyroid cancer cases diagnosed at local stage increased from 52% to 72%.

MORTALITY

2012-2016 DATA

In 2012-2016, there were 21 deaths from thyroid cancer in Delaware. Due to the small number of deaths, mortality patterns in Delaware are not presented as low counts prevent the calculation of stable mortality rates.

CHAPTER 11: UTERINE CANCER

RISK FACTORS

Lifestyle risk factors for uterine cancer:

- Overweight or obesity
- A diet high in animal fat

Environmental and medically-related causes of uterine cancer:

- Treatment with the drug Tamoxifen
- Never having children, especially due to fertility issues
- High levels of estrogen (either occurring naturally or via hormone therapy)

Non-modifiable risk factors (these cannot be changed) for getting uterine cancer:

- Risk of uterine cancer increases with age.
- Personal history of any of the following: diabetes, breast cancer, ovarian cancer, benign ovarian tumors, granulosa-theca cell ovarian tumors, polycystic ovarian syndrome (PCOS), atypical endometrial hyperplasia
- Family history of endometrial and colorectal cancers (Lynch syndrome or hereditary nonpolyposis colorectal cancer)
- Having a higher number of menstrual cycles throughout a female's life

Factors known to protect against uterine cancer include having multiple pregnancies, use of oral contraceptives, use of an intrauterine device that does not contain hormones, use of combination hormone therapy, and a complete hysterectomy. In addition, to protect against uterine cancer, females should consume a diet rich in fruits and vegetables, engage in recommended levels of physical activity, and maintain a healthy weight.

EARLY DETECTION

There are currently no tests recommended for the screening of uterine cancer.

INCIDENCE

For 2012-2016, Delaware ranked 13th in the U.S. for uterine cancer incidence (10th in 2011-2015)[9].

2012-2016 DATA

TABLE 11-1: NUMBER OF UTERINE CANCER CASES, BY SEX AND RACE/ETHNICITY; DELAWARE AND COUNTIES, 2012-2016

	All Females	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
Delaware	972	743	177	36
Kent	183	136	41	---
New Castle	521	380	105	24
Sussex	268	227	31	---

Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
---Counts less than 11 are not shown to protect patient privacy

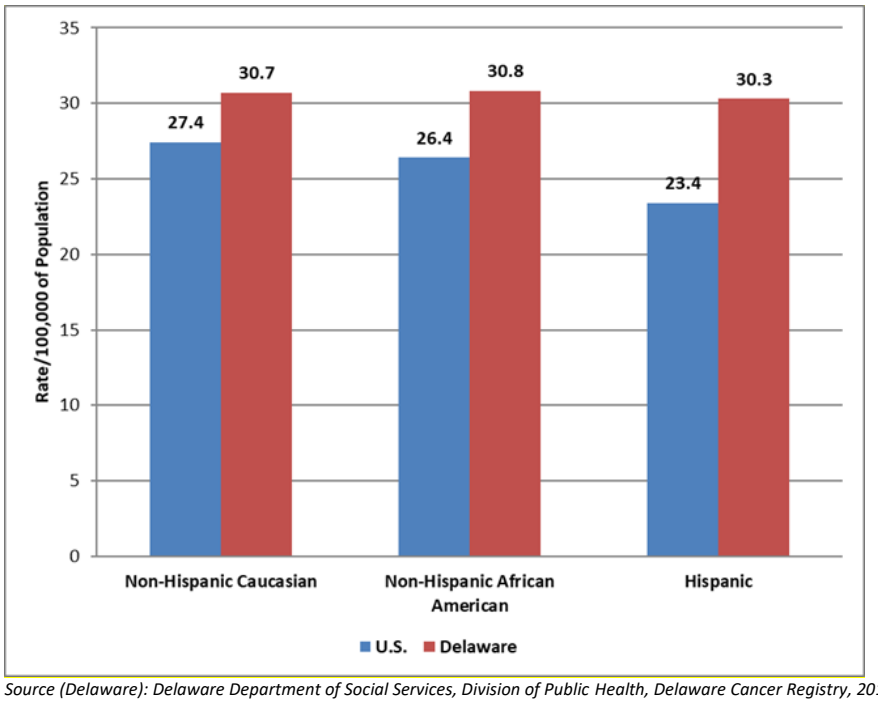
- In 2012-2016, there were 972 uterine cancer cases (7% of all female cancer cases) diagnosed in Delaware.
- Non-Hispanic Caucasians accounted for 76% of uterine cancer cases.

TABLE 11-2: FIVE-YEAR AVERAGE AGE-ADJUSTED UTERINE CANCER INCIDENCE RATES OVERALL AND BY RACE/ETHNICITY; U.S., DELAWARE AND COUNTIES, 2012-2016

	All Females	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
U.S.	26.4	27.4	26.4	23.4
Delaware	30.1	30.7	30.8	30.3
Kent	32.8	34.4	35.0	---
New Castle	29.7	30.9	27.3	---
Sussex	29.9	28.4	41.1	---

Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population
---Rates based on less than 25 cases are not shown.

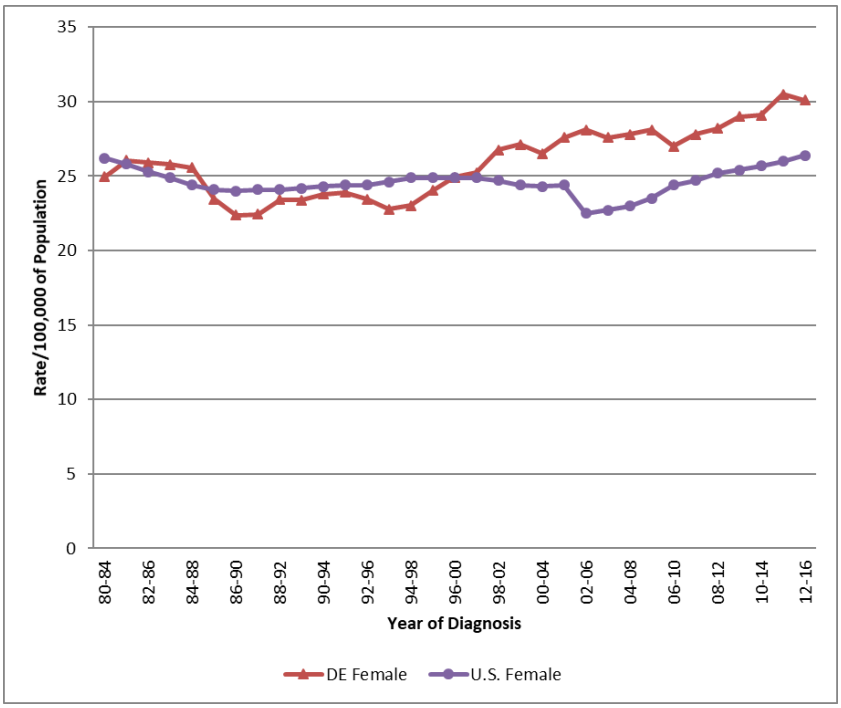
FIGURE 11-1: FIVE-YEAR AVERAGE AGE-ADJUSTED UTERINE CANCER INCIDENCE RATES BY RACE/ETHNICITY; U.S. AND DELAWARE, 2012-2016



Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- In Delaware
  - The difference in uterine cancer incidence rates between non-Hispanic Caucasians (30.7 per 100,000), non-Hispanic African Americans (30.8 per 100,000), and Hispanics (30.3 per 100,000) was not statistically significant.
- Comparing Delaware and the U.S.
  - Delaware (30.1 per 100,000) had a statistically significantly higher uterine cancer incidence rate compared to the U.S. (26.4 per 100,000).
  - Non-Hispanic Caucasians in Delaware (30.7 per 100,000) had a statistically significantly higher uterine incidence rate compared to the U.S. (27.4 per 100,000).
  - The difference in uterine cancer incidence rates between non-Hispanic African Americans in Delaware (30.8 per 100,000) and the U.S. (26.4 per 100,000) was not statistically significant.
  - The difference in uterine cancer incidence rates between Hispanics in Delaware (30.3 per 100,000) and the U.S. (23.4 per 100,000) was not statistically significant.

FIGURE 11-2: FIVE-YEAR AVERAGE AGE-ADJUSTED UTERINE CANCER INCIDENCE RATES; U.S. AND DELAWARE, 1980-2016

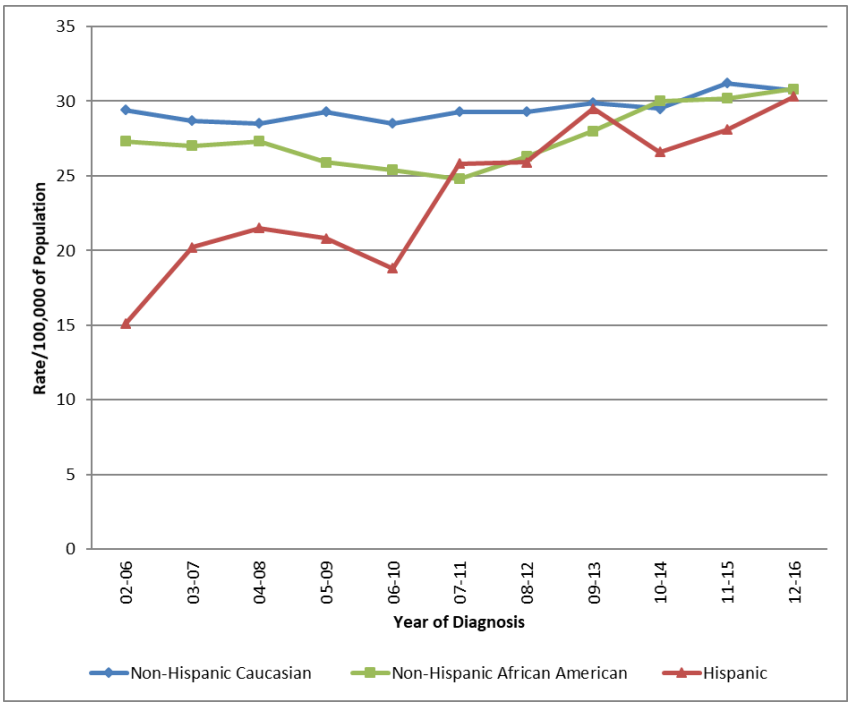


Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- From 2002-2006 to 2012-2016
  - Incidence rates for uterine cancer increased 7% in Delaware and increased 17% in the U.S.

TRENDS OVER TIME - DELAWARE

FIGURE 11-3: FIVE-YEAR AVERAGE AGE-ADJUSTED UTERINE CANCER INCIDENCE RATES BY RACE/ETHNICITY; DELAWARE, 2002-2016



Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- From 2002-2006 to 2012-2016
  - Incidence rates for uterine cancer increased 4% in non-Hispanic Caucasians.
  - Incidence rates for uterine cancer increased 13% in non-Hispanic African Americans.
  - Incidence rates for uterine cancer decreased 101% in Hispanics.

AGE-SPECIFIC INCIDENCE RATES - DELAWARE

TABLE 11-3: AGE-SPECIFIC UTERINE CANCER INCIDENCE RATES BY RACE/ETHNICITY; DELAWARE, 2012-2016

Age at Diagnosis	All Females	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
0-39	2.5	---	---	---
40-64	61.4	68.0	50.0	---
65-74	117.7	115.0	145.1	---
75-84	91.4	91.6	---	---
85+	75.9	73.5	---	---

Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population
---Rates based on less than 25 cases are not shown.

- The peak age range for uterine cancer incidence is 65-74 years of age. Due to small numbers, incidence rates were not calculated for some groups.

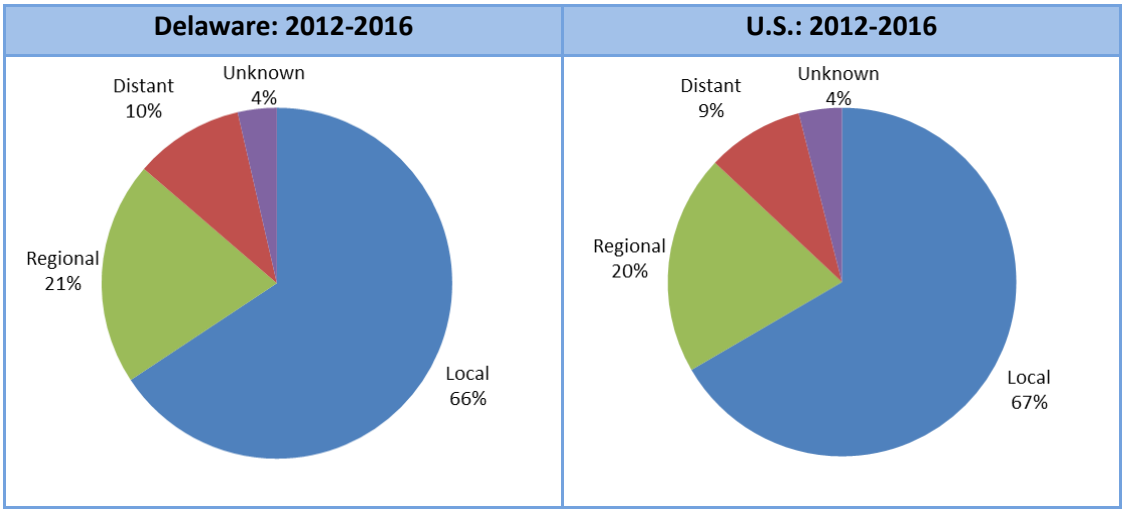
TABLE 11-4: UTERINE CANCER CASES BY STAGE AT DIAGNOSIS BY RACE/ETHNICITY; DELAWARE, 2012-2016

Stage at Diagnosis	All Females	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
Local	639 (66)	504 (68)	102 (58)	25 (69)
Regional	200 (21)	157 (21)	---	---
Distant	98 (10)	61 (8)	35 (20)	---
Unknown	35 (4)	21 (3)	---	---
Total	972	743	177	36

Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
---Counts less than 11 are not shown to protect patient privacy

- In 2012-2016, there were 639 (66%) uterine cancers diagnosed at local stage; 200 (21%) at regional stage; 98 (10%) at distant stage; and 35 (4%) had an unknown stage.
- Hispanics (69%) had a higher proportion of uterine cancers diagnosed at local stage compared to both non-Hispanic Caucasians (68%) and non-Hispanic African Americans (58%).

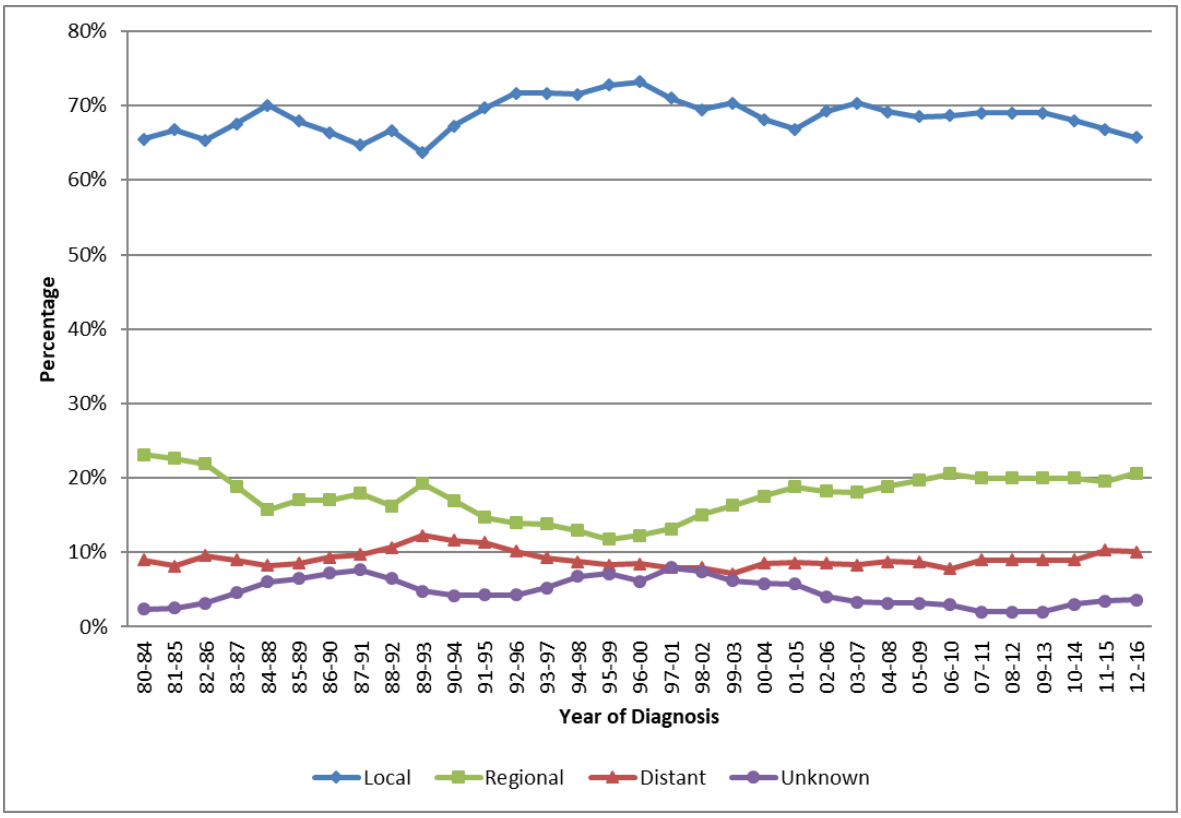
FIGURE 11-4: DISTRIBUTION OF UTERINE CANCER CASES BY STAGE AT DIAGNOSIS; U.S. AND DELAWARE, 2012-2016



Source (Delaware): Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source (U.S.): Surveillance, Epidemiology and End Results Program (SEER 18), National Cancer Institute, Nov 2018 sub.

- In comparing U.S. and Delaware uterine cancer data, Delaware (66%) had a lower proportion of uterine cancer diagnosed at local stage compared to the U.S. (67%).

FIGURE 11-5: FIVE-YEAR STAGE OF DIAGNOSIS DISTRIBUTIONS FOR UTERINE CANCER CASES; DELAWARE, 1980-2016



Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.

- From 1980-1984 to 2012-2016 in Delaware
  - The percent of uterine cancer cases diagnosed at local stage remained the same at 66%.
  - Uterine cancer cases diagnosed at distant stage increased slightly from 9% to 10%.

MORTALITY

For 2012-2016, Delaware ranked 2nd in the U.S. for uterine cancer mortality (2nd in 2011-2015).[30]

2012-2016 DATA

TABLE 11-5: NUMBER OF UTERINE CANCER DEATHS, BY RACE/ETHNICITY; DELAWARE AND COUNTIES, 2012-2016

	All Females	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
Delaware	203	129	66	---
Kent	41	26	14	---
New Castle	113	70	38	---
Sussex	49	33	14	---

Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
---Counts less than 11 are not shown to protect patient privacy

- In 2012-2016, there were 203 deaths (4% of all female cancer deaths) from uterine cancer in Delaware.
- Non-Hispanic Caucasians accounted for 64% of uterine cancer deaths.

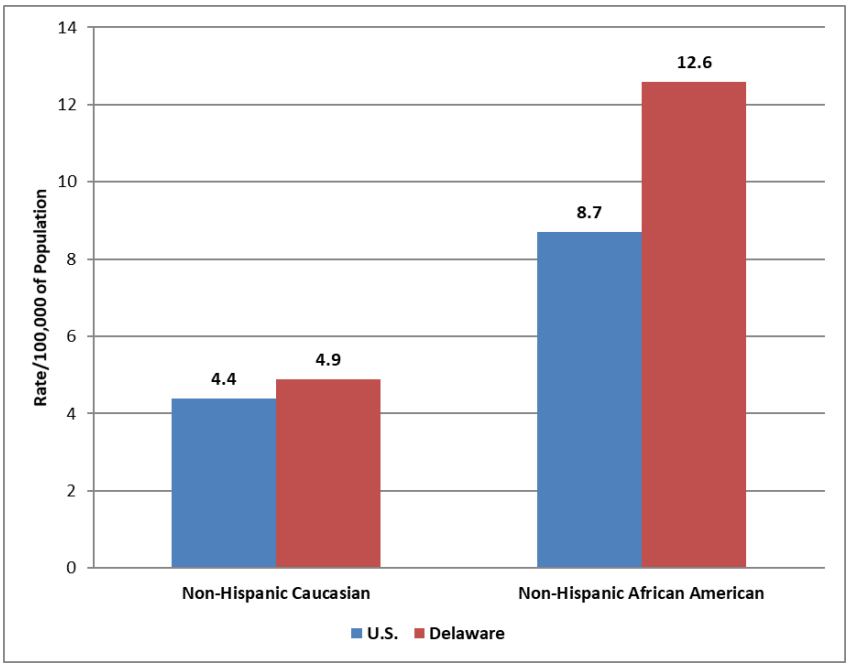
TABLE 11-6: FIVE-YEAR AVERAGE AGE-ADJUSTED UTERINE CANCER MORTALITY RATES OVERALL AND BY RACE/ETHNICITY; U.S., DELAWARE AND COUNTIES, 2012-2016

	All Females	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
U.S.	4.7	4.4	8.7	3.9
Delaware	6.2	4.9	12.6	---
Kent	7.2	6.1	---	---
New Castle	6.6	5.4	10.9	---
Sussex	5.2	3.8	---	---

Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population
---Rates based on less than 25 cases are not shown.

[30] U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on November 2018 submission data (1999-2016): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, June 2019.

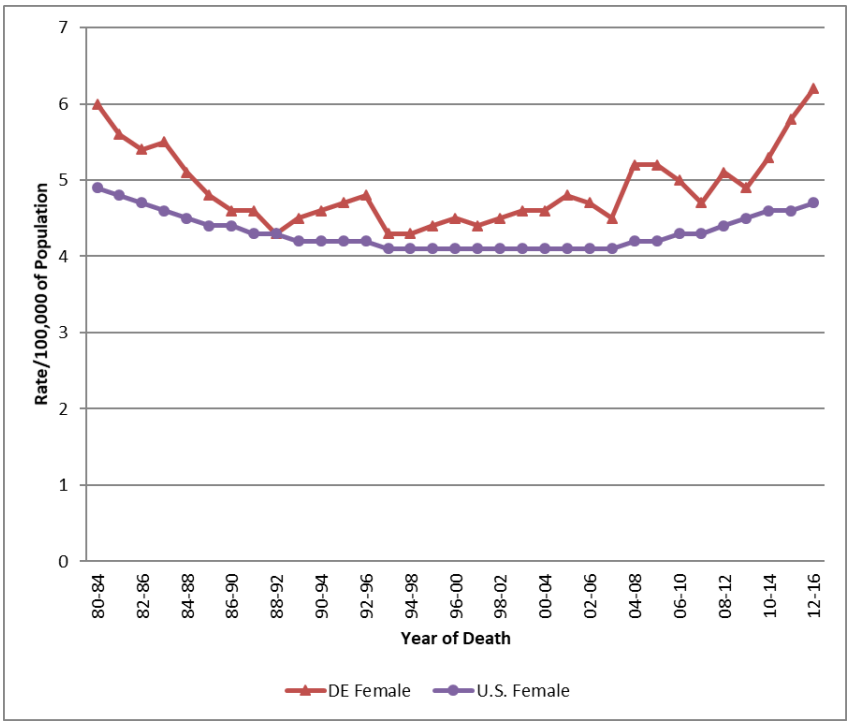
FIGURE 11-6: FIVE-YEAR AVERAGE AGE-ADJUSTED UTERINE CANCER MORTALITY RATES BY RACE/ETHNICITY; U.S. AND DELAWARE, 2012-2016



Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- In Delaware
  - Non-Hispanic Caucasians (4.9 per 100,000) had a statistically significantly lower mortality rate for uterine cancer compared to non-Hispanic African Americans (12.6 per 100,000).
  - Uterine cancer mortality rates for Hispanics could not be calculated due to the small number of deaths.
- Comparing Delaware and the U.S.
  - Delaware (6.2 per 100,000) had a statistically significantly higher mortality rate for uterine cancer compared to the U.S. (4.7 per 100,000).
  - The difference in uterine cancer mortality rates between non-Hispanic Caucasians in Delaware (4.9 per 100,000) and the U.S (4.4 per 100,000) was not statistically significant.
  - Non-Hispanic African Americans in Delaware (12.6 per 100,000) had a statistically significantly higher mortality rate for uterine cancer compared to and the U.S (8.7 per 100,000).

FIGURE 11-7: FIVE-YEAR AVERAGE AGE-ADJUSTED UTERINE CANCER MORTALITY RATES; U.S. AND DELAWARE, 1980-2016

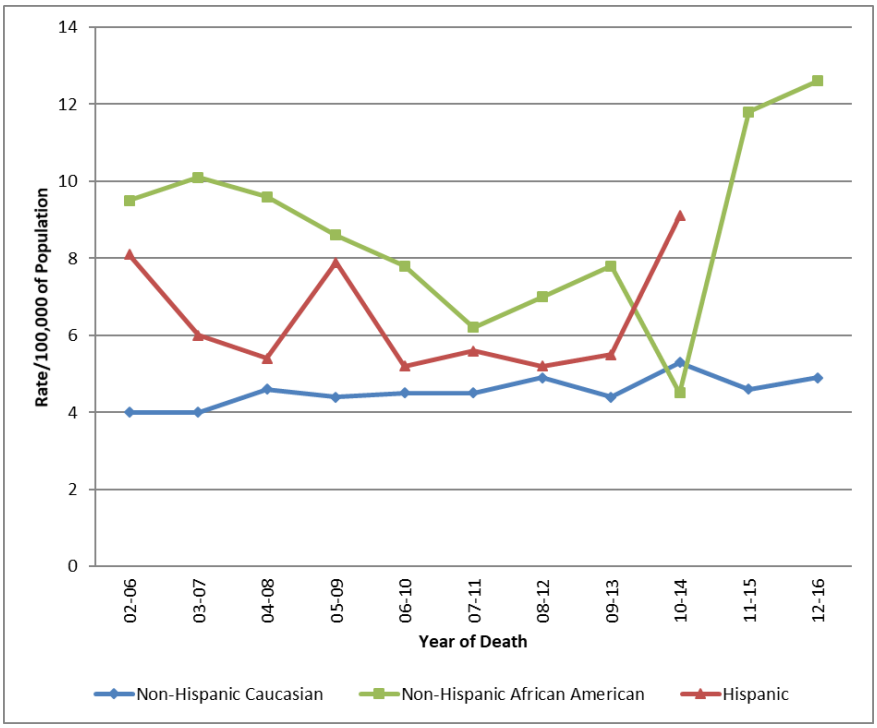


Source (Delaware): Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
*Source (U.S.): National Center for Health Statistics; SEER*Stat Database: Mortality-All COD, released December 2019.*
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- From 2002-2006 to 2012-2016
  - Mortality rates for uterine cancer increased 32% in Delaware and increased 12% in the U.S.

TRENDS OVER TIME - DELAWARE

FIGURE 11-8: FIVE-YEAR AVERAGE AGE-ADJUSTED UTERINE CANCER MORTALITY RATES BY RACE/ETHNICITY; DELAWARE, 2002-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population

- From 2002-2006 to 2012-2016 in Delaware
  - Mortality rates for uterine cancer increased 23% in non-Hispanic Caucasians.
  - Mortality rates for uterine cancer decreased 33% in non-Hispanic African Americans.
  - Mortality rates for uterine cancer in Hispanics could not be calculated due to the small number of deaths.

AGE-SPECIFIC MORTALITY RATES - DELAWARE

TABLE 11-7: AGE-SPECIFIC UTERINE CANCER MORTALITY RATES BY RACE; DELAWARE, 2012-2016

Age at Death	All Females	Non-Hispanic Caucasian	Non-Hispanic African American	Hispanic
0-39	---	---	---	---
40-64	8.5	7.8	---	---
65-74	25.7	17.6	66.0	---
75-84	42.2	32.2	---	---
85+	---	---	---	---

Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Health Statistics Center, 2019.
Rates are per 100,000 of population age-adjusted to the 2000 U.S. standard population
---Rates based on less than 25 cases are not shown.

- The peak age range for uterine cancer mortality is 75-84 years of age. Due to small numbers, mortality rates were not calculated for some groups.

CHAPTER 12: CANCER SURVIVORSHIP

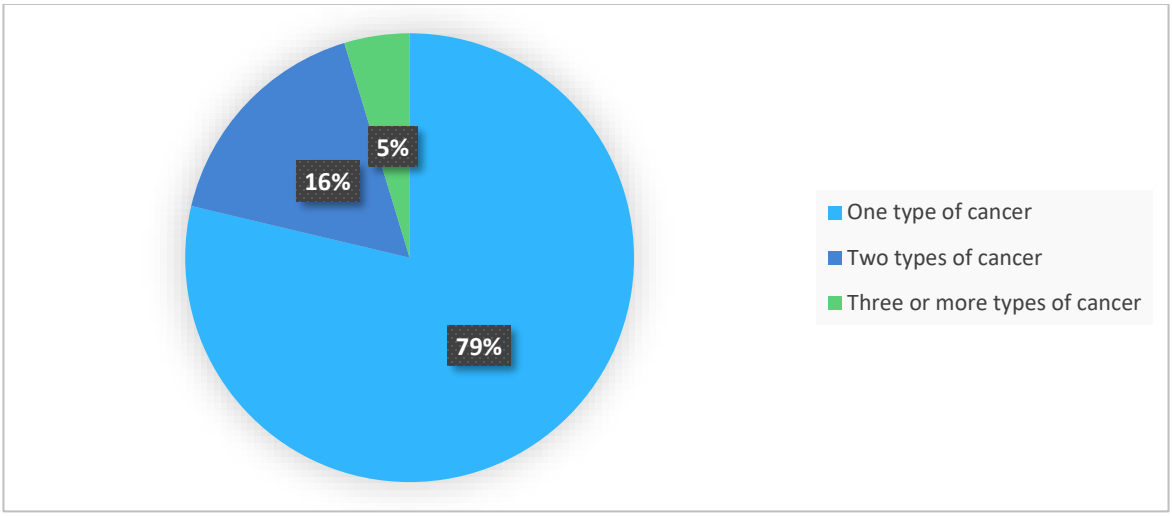
As of January 1, 2016, there were an estimated 50,760 cancer survivors in Delaware.[31] From 2006-2015 there were 62,300 cancers diagnosed in Delaware with an average age at diagnosis of 64.8 years. The overall five-year survival rate for cancer in Delaware was 69.5%.[32] Due to early detection and advanced cancer treatments, survivorship rates are increasing. According to the Delaware news report, Delaware's all-site cancer mortality rate decreased 14% from 2001-2005 to 2011-2015, which is the same percentage decline seen nationally. However, in spite of continuing decreases, the state's mortality rate (175.1 deaths per 100,000 people) was still 7% higher than the U.S. rate of 163.5 for 2011-2015.[33]

Cancer survivorship starts at diagnosis. Identifying and treating the disease at an early stage can considerably increase a person's chance of effective treatment. Continuous coordination and care between cancer specialists and primary care physicians are important for cancer survivors to receive appropriate medical care throughout their lifetime. According to CDC, a survivorship care plan includes important information about cancer and cancer treatment, which helps the patient and doctor communicate better with each other.[34] To describe cancer survivorship based on the Behavioral Risk Factor Surveillance System (BRFSS), Delaware included a cancer survivorship module in 2018 for those respondents who indicated that they had ever been diagnosed with cancer. Significance was assessed by comparing the 95% confidence intervals of different groups. The following was observed:

- Respondents were primarily non-Hispanic white.
- Among the respondents, 78.7% had one type of cancer, 16.6% had two types of cancer, and 4.7% had three or more types of cancers.
- Of Delaware cancer survivor respondents, 30% reported having skin cancer other than melanoma, 14% reported having breast cancer, 12% reported having melanoma, and 11% reported having prostate cancer, according to the 2018 Behavioral Risk Factor Survey (BRFS).
- In Delaware, 58% of cancer survivor respondents reported that the majority of their health care was provided by family practice or an internist. 18% of cancer survivor respondents had a urologist or other cancer-specific doctor, 12% had a cancer surgeon or general surgeon, 6% had a gynecologic oncologist, 5% had a medical or radiation oncologist, and 1% had a plastic or reconstructive surgeon provide the majority of their health care.

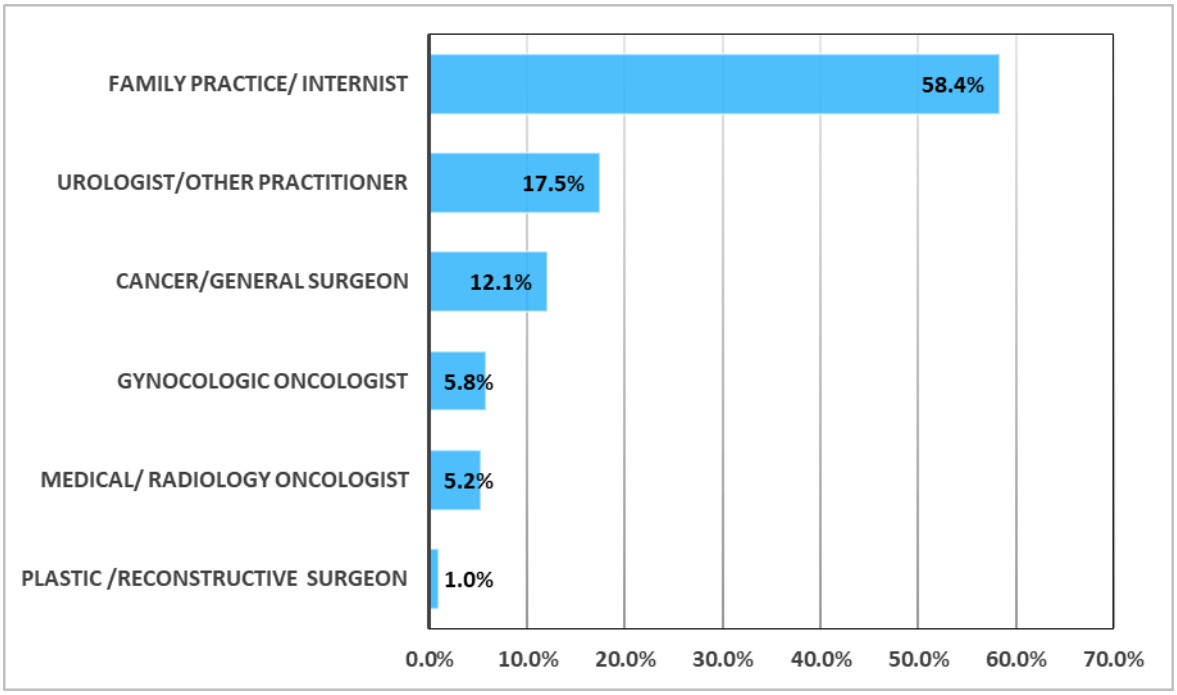
[31] American Cancer society. Cancer Treatment and Survivorship facts & figures 2016-2017. Atlanta: American Cancer Society.
[32] Zeinab Baba, Heather Brown. Cancer Survivorship in Delaware: What We Know?. 2017 Delaware NPCR Success Story
[33] Delaware Cancer Mortality Rate Continues to Decline; Public health Releases Latest Cancer Report. Delaware news. https://news.delaware.gov/2019/07/08/delaware-cancer-mortality-rate-continues-to-decline-public-health-releases-latest-cancer-report/. Retrieved July 13, 2020.
[34] Division of Cancer Prevention and Control, Centers for Disease Control and Prevention. Cancer Survivorship Care Plans. https://www.cdc.gov/cancer/survivors/life-after-cancer/survivorship-care-plans.htm. Retrieved July 14, 2020.

Figure 12-1: Percentage of cancer among cancer survivors, Delaware, 2018



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Behavioral Risk Factor Survey (BRFS), 2018.

Figure 12-2: Type of doctor providing majority of health care for cancer survivors, Delaware, 2018



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Behavioral Risk Factor Survey (BRFS), 2018.

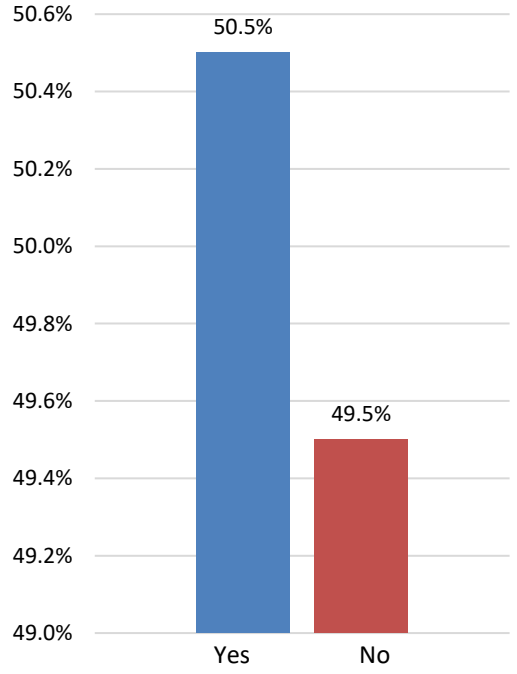
SURVIVORSHIP CARE PLAN

A survivorship care plan is a document that includes a summary of cancer treatments and a coordinated follow-up plan of care.[35] It helps the survivor and their doctors to have better communication regarding the survivor's cancer and treatments. Delaware 2018 BRFS data showed the following about the cancer survivor respondents:

Follow-up

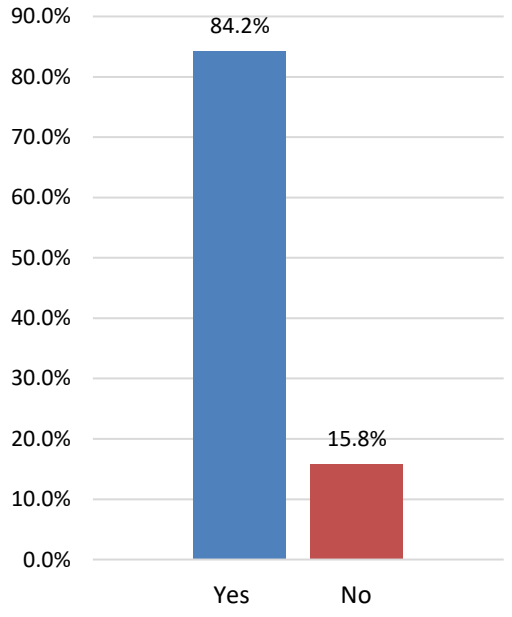
- Of the survivors, 50.5% reported receiving a written summary of all their cancer treatment while 49.5% of the survivors reported that they did not receive a written summary of all their cancer treatment from any doctor, nurse, or other health professional.
- Of the survivors, 84.2% were given written instructions from a doctor, nurse, or other health professional about where they should return or whom they should see for routine cancer check-ups after completing treatment for cancer, while 15.8% of the respondents were not given any instructions.

Figure 12-3: Received a Written Summary of All the Cancer Treatment Received, Delaware, 2018



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Behavioral Risk Factor Survey (BRFS), 2018.

Figure 12-4: Received Written Instructions About Where to Return or Who to See for Routine Cancer Check-Ups after Completing Cancer Treatment, Delaware, 2018

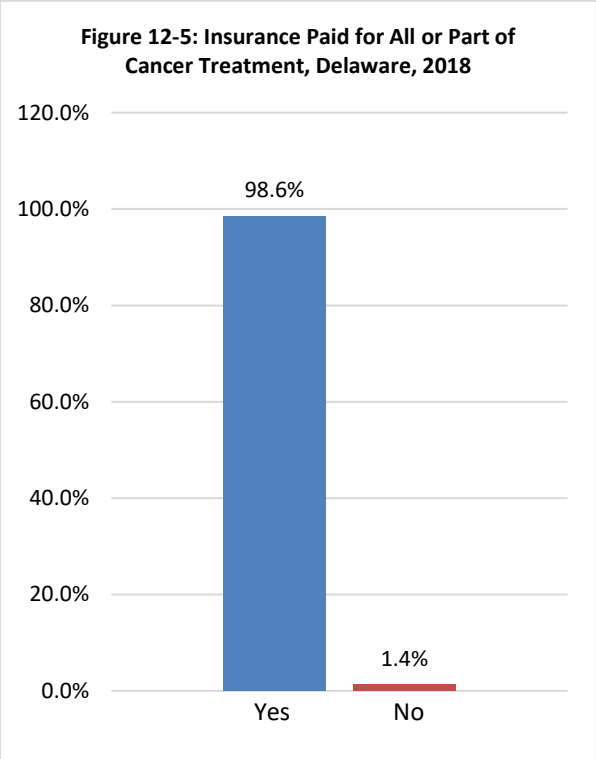


Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Behavioral Risk Factor Survey (BRFS), 2018.

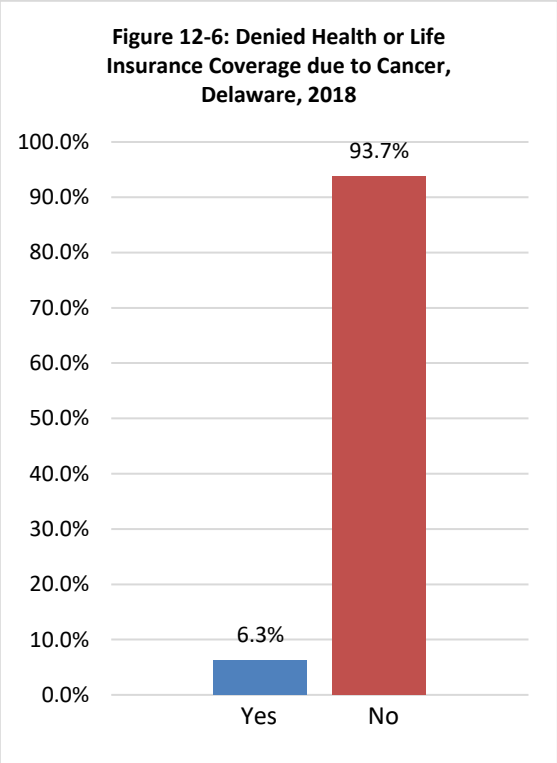
[35] Centers for Disease Control and Prevention. Cancer Survivorship Care plans. https://www.cdc.gov/cancer/survivors/life-after-cancer/survivorship-care-plans.htm. Retrieved July 14, 2020.

Insurance

- Of the survivors, 98.6% had health insurance (includes Medicare, Medicaid, or other types of state health programs) that paid for all or part of their cancer treatment, while 1.4% of the respondents did not have health insurance that paid for all or part of the cancer treatment.
- Of the survivors, 6.3% were denied health insurance or life insurance coverage because of their cancer.



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Behavioral Risk Factor Survey (BRFS), 2018.



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Behavioral Risk Factor Survey (BRFS), 2018.

DELAWARE PROGRAMS

As the number of cancer survivors has increased, the importance of understanding the needs of this population has also grown. The objective is to raise awareness of Delaware resources that can support patients, caregivers, and health care providers in navigating treatment and recovery from cancer. Delaware has developed various types of programs available to help improve the quality of care of survivors as they move beyond their cancer treatment.

- The Screening for Life Program provides payment for cancer screening tests to qualified Delaware adults. Testing is available for breast and cervical cancer for women, prostate cancer for men, and colorectal cancer for men and women.
- Delaware's Cancer Treatment Program for the uninsured provides eligible Delaware residents free cancer treatment for up to 2 years.
- Cancer care coordinators are on staff in every hospital in the state, ready to coordinate appointments, provide emotional support, and arrange transportation. Services are free to all Delaware residents.

- The Health Care Connection (HCC) ensures access by uninsured individuals to primary care doctors, medical specialists, health promotion and disease prevention services; and helps with access to other health resources including prescription programs and laboratory and radiology services. HCC program staff are available to assist individuals with establishing a health care home, scheduling appointments, and removing barriers to obtaining health care and health promotion services.
- Cancer: Thriving and Surviving program provides tools to live a healthier life. It is a six-week self-management program that teaches real-life skills for living a full, healthy life for people affected by cancer.
- The Livestrong® at the YMCA of Delaware program supports cancer survivors who are completing their treatment, so they are physically and emotionally fit.
- The Delaware Tobacco Prevention and Control Program offers two programs to help smokers quit, conducts media campaigns, and funds youth-led campaigns and peer-education groups.

NEXT: PROGRAM DEVELOPMENT AND PARAMETERS

According to the National Cancer Institute (NCI), cancer survivorship covers the physical, mental, emotional, social, and financial effects of cancer that begin at diagnosis and continue through treatment and beyond.[36] Survivorship care plans are needed to assist cancer survivors and primary care physicians to focus on the health and well-being of cancer patients beyond diagnosis and treatment. It is important that survivorship care plans include the patient's cancer medical history, a treatment plan summary, and a follow-up care plan. It is important for the health care team to effectively deliver survivorship care plans to survivors that include imperative information regarding their cancer and treatment, which help primary care providers and specialists coordinate with each other and ensure that all of the cancer survivor patients understand their next recommended steps. Ongoing goals in developing and improving Delaware programs should be the development of clinical follow-up care guidelines for primary care providers; better access to quality medical care, especially for people with insufficient health insurance or without health insurance; and continuing to offer cancer survivors information about adopting and maintaining healthy lifestyles.

[36] Survivorship. NCI Dictionary of Cancer terms. https://www.cancer.gov/publications/dictionaries/cancer-terms/search/survivorship. Retrieved July 15, 2020.

CHAPTER 13: CANCER INCIDENCE BY CENSUS TRACT

BACKGROUND

As required by Title 16, Chapter 292 of the *Delaware Code* (Appendix E), DHSS, 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 2012-2016, the least populated census tract (511.01 in Sussex County) had an annual average of 730 residents. The most populous census tract (402.02 in Kent County) had an annual average population of 13,471 residents. The average annual number of residents per census tract was 4,339.
- For 2012-2016 census tract analyses, 28,495 Delaware cancer cases diagnosed during the period were included in the analyses.

RESULTS OF CENSUS TRACT ANALYSES

Cancer incidence rates by census tract (with confidence intervals) are shown in Appendix H for the 2012-2016 period. Census tracts shaded in yellow have statistically significantly higher incidence rates and those shaded in blue have statistically significantly lower incidence rates (when compared to the overall state incidence rate).

Results for 2012-2016 show that:

- In 18 of Delaware's 214 census tracts (8%), the all-site cancer incidence rate was statistically significantly higher than Delaware's average 2012-2016 incidence rate (491.5 per 100,000).
- In 12 of Delaware's 214 census tracts (6%), the all-site cancer incidence rate was statistically significantly lower than Delaware's average 2012-2016 incidence rate (491.5 per 100,000).
- All-site cancer incidence rates for the remaining 184 census tracts (86%) were not significantly different from the state's average rate for the 2012-2016 period or could not be calculated.

Appendix I shows maps of Delaware census tracts grouped by 2012-2016 all-site cancer incidence quintile. Appendix J shows maps of Delaware census tracts in which census tracts with 2012-2016 all-site cancer incidence rates are significantly different from the state average. These are shaded for ease of identification.

DISCUSSION OF RESULTS OF CENSUS TRACT ANALYSES

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, exposure to environmental or occupational carcinogens is often limited to a defined geographic area. Also, residents in certain geographic areas may be more impoverished than other residents, which affects their health insurance coverage and their level of access to health care, particularly cancer screening

services. Finally, chance or random variation can play a role, since approximately 5% of all comparisons will be significantly different due to chance alone.

Additional caution is needed when comparing results from the 2012-2016 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 all-site cancer cases were diagnosed in census tract 513.02 and its all-site cancer incidence rate (823.3 per 100,000) was significantly elevated, compared to the all-site cancer incidence rate for Delaware (510.6 per 100,000). In 2004-2008, 123 all-site cancer cases were diagnosed in census tract 513.02 – 11 fewer than in the previous period. However, despite the decrease in the number of cases, the all-site cancer incidence rate (649.2 per 100,000) for 2004-2008 remained significantly elevated, compared to the all-site cancer incidence rate for Delaware (515.1 per 100,000). For the most recent time period, 2012-2016, 124 all-site cancer cases were diagnosed in census tract 513.02, yielding an all-site cancer incidence rate (487.9 per 100,000) which was not statistically significantly different from the all-site cancer incidence rate for Delaware (491.5 per 100,000).

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*"[37]. Because population estimates for census tracts in analyses during the three initial time periods (2001-2005, 2002-2006, and 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, reducing the accuracy of geographic data.

[37] Thun M., Sinks T. Understanding Cancer Clusters. Cancer: A Cancer Journal for Clinicians, 54(5), 273-280 (2004). Retrieved from https://onlinelibrary.wiley.com/doi/full/10.3322/canjclin.54.5.273

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, 2012 to December 31, 2016 and that were reported to the Delaware Cancer Registry (DCR) by November 2019. Trends in incidence rates are based on cancers diagnosed from January 1, 1980 to December 31, 2016.

During 2012-2016, there were 28,581 cancer cases diagnosed among Delawareans, which includes individuals with cancers diagnosed at more than one site (known as multiple primaries). With the exception of urinary bladder cancer, only malignant tumors are included in the analyses. *In situ* urinary 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)[38]. 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 the CDC's publication of the *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 (NCI) 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 (known as SEER-9) were Connecticut, Iowa, New Mexico, Utah, and Hawaii; and the metropolitan areas of Detroit, Michigan; San Francisco-Oakland, California; Atlanta, Georgia; and Seattle-Puget Sound, Washington. 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.[39] The current analysis used data from SEER-18 that includes available cases diagnosed from 2000 through the current year and is representative of the demographics of the entire U.S. population; the following registry areas were added between SEER-9 and SEER-18: Alaska Native, Rural Georgia, Greater Georgia, San Jose-Monterey, Greater California, Kentucky, Los Angeles, Louisiana and New Jersey.

Historically, Delaware's cancer incidence rates have been compared to cancer incidence rates calculated using data from the SEER-9 registries that provided data to SEER beginning in 1974 and 1975. In 2009, the Division of Public Health (DPH) and the Delaware Cancer Consortium (DCC) 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% 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

[38] 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.
[39] Surveillance, Epidemiology and End Results (SEER) Program, National Cancer Institute. http://seer.cancer.gov/about/

cancer surveillance statistics that is consistent with those of other population-based registries throughout the U.S.

CANCER MORTALITY DATA

DELAWARE HEALTH STATISTICS CENTER

Mortality data are provided by the Delaware Health Statistics Center (DHSC) for all death certificates filed in Delaware from 2012 through 2016. Five-year average annual age-adjusted cancer mortality rates are based on deaths that occurred in the five-year period from January 1, 2012 to December 31, 2016. Trends in cancer mortality are presented for deaths that occurred from 1980 through 2015.

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 (NCHS). 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 NCHS. U.S. mortality data are compiled from all death certificates filed in the 50 states and the District of Columbia from 1980 through 2017. 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[40].

POPULATION ESTIMATES, 2012-2016

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 U.S. Census Bureau.

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); and (2) NCI (www.cancer.gov).

The Behavioral Risk Factor Survey (BRFS) provides estimates of the prevalence of risk factors across Delaware and nationally. The most recently available risk factor data from BRFS are from 2018. Risk factor data are included in appropriate chapters for site-specific cancers. Supplemental data on cervical cancer screening, overweight and obesity, physical inactivity, and nutrition 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

[40] Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Mortality - All COD, Aggregated Total U.S. (1990-2017) <Katrina/Rita Population Adjustment>, National Cancer Institute, DCCPS, Surveillance Research Program, released December 2019. Underlying mortality data provided by NCHS (www.cdc.gov/nchs).

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 in time or one population at two or more points in time[41]. 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)[42]. 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: U.S. Census 2000, accessed from SEER, http://seer.cancer.gov/stdpopulations/19ages.proportions.html.

The formula for an age-adjusted rate can be presented as follows:

$$\textit{Age-Adjusted Rate} = \text{sum}\ (w_i \times ((c_i/n_i) \times 100{,}000))$$

- 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 are expressed per 100,000 of the population.

RACE/ETHNICITY- AND SEX-SPECIFIC INCIDENCE AND MORTALITY RATES

Race/ethnicity- 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/ethnic and/or sex group by the total population in the corresponding race/ethnic and/or sex group over the same time period. As with other rates, these rates were adjusted to the 2000 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.

[41] Anderson RN, Rosenberg HM. Report of the second workshop on age adjustment. National Center for Health Statistics. Vital Health Stat 4(30). 1998.
[42] 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

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[43] by methodology shown here:[44]

$$\text{Lower Confidence Limit} = \text{AA Rate} - 1.96\left[\frac{\text{AA Rate}}{\sqrt{\#\text{ Cases}}}\right]$$

$$\text{Upper Confidence Limit} = \text{AA Rate} + 1.96\left[\frac{\text{AA Rate}}{\sqrt{\#\text{ Cases}}}\right]$$

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:

Lower Confidence Limit (LCL) = AA Rate x L

Upper Confidence Limit (LCL) = AA Rate x U

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[45].

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 schema, is used. The Collaborative Staging schema captures information such as tumor size, extension, lymph nodes, and metastasis at time of diagnosis, and is an alternative method of staging cancer.

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[46,47]. Furthermore, a cancer rate based on a very small number of cases is inherently unstable and cannot be reliably interpreted.

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[43] Surveillance, Epidemiology and End Results (SEER) Program, National Cancer Institute. SEER*Stat Software, Version 8.3.5, http://seer.cancer.gov/seerstat/index.html

[44] Tiwari RC, Clegg LX, Zou Z. Efficient interval estimation for age-adjusted cancer rates. Stat Methods Med Res 2006;15(6):547-69.

[45] 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.

[46] Coughlin SS, Clutter GG, Hutton M. Ethics in Cancer Registries. *Journal of Cancer Registry Management, 2:* 5-10, 1999.

[47] McLaughlin CC. Confidentiality protection in publicly released central registry data. *Journal of Cancer Registry Management, 2:* 84-88, 2002.

DEFINITION OF RACE/ETHNICITY

In this report, the race/ethnicity category is defined as follows:

1. **Non-Hispanic Caucasian** – cases who are reported to have Caucasian race and not of Hispanic/Latino ethnicity.
2. **Non-Hispanic African American** – cases who are reported to have African American race and not of Hispanic/Latino ethnicity.
3. **Hispanic** – cases who are reported to be of Hispanic/Latino ethnicity regardless of race.

APPENDIX B: PRIMARY CANCER SITE DEFINITIONS

TABLE B-1: PRIMARY CANCER SITE DEFINITIONS

Cancer Site Group	ICD-O-3 Site (Topography)	ICD-O-3 Histology (Morphology)
All malignant cancers	C000–C809	
Female Breast	C500–C509	excludes 9050–9055, 9140 and 9590–9992
Colon and Rectum	C180–C189, C260, C199, C209	excludes 9050–9055, 9140 and 9590–9992
Lung and Bronchus	C340–C349	excludes 9050–9055, 9140 and 9590–9992
Melanoma of the Skin	C440-C449	8720-8790
Non-Hodgkin Lymphoma (NHL)		
NHL - Nodal	C024, C098, C099, C111, C142, C379, C422, C770-C779	9590-9597, 9670-9671, 9673, 9675, 9678-9680, 9684, 9687-9691, 9695, 9698-9702, 9705, 9708-9709, 9712, 9714-9719, 9724-9729, 9735, 9737-9738, 9811-9818, 9823, 9827, 9837
NHL - Extranodal	All sites except C024, C098-C099, C111, C142, C379, C422, C770-C779	9590-9597, 9670-9671, 9673, 9675, 9678-9680, 9684, 9687, 9688, 9689-9691, 9695, 9698-9702, 9705, 9708-9709, 9712, 9714-9719, 9724-9729, 9735, 9737, 9738
	All sites except C024, C098-C099, C111, C142, C379, C420-C422, C424, C770-C779	9811-9818, 9823, 9827, 9837
Prostate	C619	excludes 9050–9055, 9140 and 9590–9992
Corpus and Uterus, Not Otherwise Specified (NOS) (i.e., Uterine)	C540-C549, C559	excluding 9050-9055, 9140, 9590-9992
Thyroid	C739	excluding 9050-9055, 9140, 9590-9992

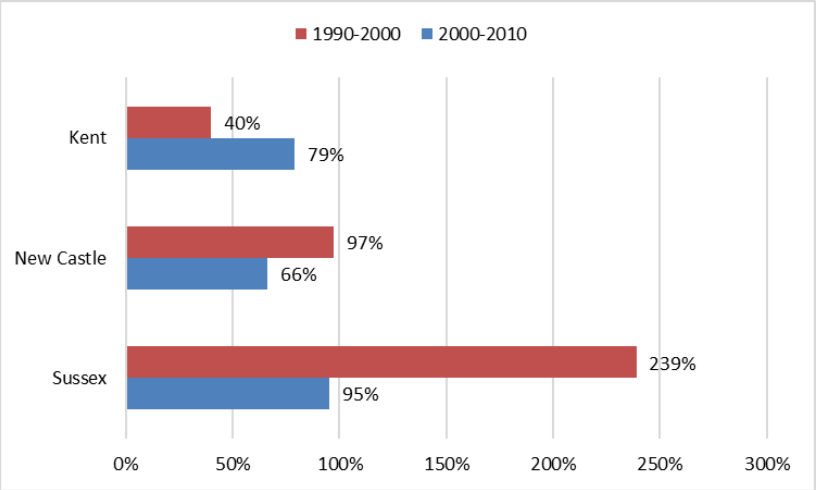
Source: Site Recode ICD-O-3/WHO 2008 Definition http://seer.cancer.gov/siterecode/icdo3_dwhoheme/index.html.

APPENDIX C: HISPANIC ETHNICITY

The U.S. 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."[48] According to the Census Bureau, in 1990, persons of Hispanic ethnicity comprised 2% of Delaware's population. By 2000, Delaware's Hispanic population increased to 5%. As of the 2010 U.S. Census, persons of Hispanic origin comprise 8% of Delaware's population.

The largest growth in the Hispanic population occurred in Sussex County, where the Hispanic prevalence grew from 1% in 1990 to 4% in 2000, and to 9% 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 3% in 1990, to 5% in 2000, and to 9% in 2010. Among Kent County residents, the Hispanic population grew from 2% in 1990, to 3% in 2000, and to 6% in 2010.

FIGURE C-1: PERCENTAGE OF CHANGES IN HISPANIC POPULATION BY COUNTY AND DECADE, DELAWARE, 1990-2000 AND 2000-2010



Source: U.S. Census Bureau 2010, https://data.census.gov/

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 and a final adjustment 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.
- **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 DCR, 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. In this report, NHIA is used to identify Delawareans

[48] Grieco, EM, Cassidy RC. (2001-03). "Overview of Race and Hispanic Origin: Census 2000 Brief" U.S. Census Bureau. Accessed May 26, 2011.

of Hispanic origin. To minimize misclassification, the expert panel continues to evaluate the NHIA while considering the possibility of the under- or over-estimation of Hispanic cancer incidence.

- **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 the 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% of the time.

APPENDIX D: BEHAVIORAL RISK FACTORS

The BRFS is the world's largest ongoing telephone health survey tracking health conditions and risk behaviors in the United States yearly since 1984. Currently, data are collected in all 50 states and four territories. The survey was developed to monitor the statewide prevalence of behavioral risk factors influencing premature morbidity and mortality. The BRFS includes a core set of questions developed by the CDC and is administered to adults 18 years of age and older. Delaware's BRFS is a collaborative effort between DPH and the CDC. BRFS 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[49].

Technological and cultural changes are posing challenges to survey research. One of the most significant challenges has been the rapid increase in households where telephone service is provided primarily, or only, via cell phone service. These "cell phone" households are, at least currently, more common among young adults and minority populations.

Originally, the BRFS survey was administered by a random-digit-dial telephone survey. Starting with reporting 2011 data, the BRFS 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 did not want to respond by phone. Also, the BRFS uses a new method for weighting data, called "raking," which more accurately reflects the actual population of each state[50].

Because cell phones are 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, 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. Data on breast, cervical, colorectal, and prostate cancer screening patterns among Delawareans are provided in relevant cancer site chapters earlier in this document. Data on overweight and obesity, physical activity, and consumption of dietary fruits and vegetables are provided below[51].

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[52]. The following data are specific to the 2018 Delaware BRFS:

- In Delaware, 68% of adults 18 years of age and older were overweight or obese in 2018, compared to the national median of 67%.
- In 2018, the prevalence of being overweight in Delaware differed significantly by sex: 40% of males and 29% of females were overweight.

[49] Behavioral Risk Factor Surveillance System, http://www.cdc.gov/BRFS/
[50] Behavioral Risk Factor Surveillance System (BRFS) Fact Sheet: Raking– Changing Weighting Methodology, http://www.dhss.delaware.gov/dph/dpc/files/rakingweights_info.pdf
[51] Delaware Behavioral Risk Factor Survey – Measuring Behaviors that Affect Health, http://www.dhss.delaware.gov/dph/dpc/brfsurveys.html
[52] About BMI for Adults, http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html

- The prevalence of obesity among adult Delawareans did not differ by sex: 34% of males and 33% of females were obese in 2018.
- In 2018, the prevalence of being overweight did not differ significantly between non-Hispanic Caucasians (34%) and non-Hispanic African American (35%) Delawareans.
- In Delaware, significantly more non-Hispanic African Americans (41%) than non-Hispanic Caucasians (32%) were obese in 2018.
- In 2018, the prevalence of being overweight was highest among Delaware high school graduates (36%).
- In 2018, the prevalence of obesity was statistically significantly higher among Delaware adults with a less than high school diploma (42%) than among college graduates (28%).
- In 2018, there were no significant differences in obesity among those with different annual household income levels. Adult with an annual household income of less than $15,000 had the highest prevalence of obesity (38%).
- Among Delawareans in 2018, the prevalence of obesity was highest among those 45-64 years of age (41%).
- Delaware adults 18-24 years of age had the lowest prevalence of obesity (17%), a statistically significant difference compared to all other age groups, in 2018.

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, stroke, type 2 diabetes, and improved overall well-being.

Respondents in the 2017 Delaware BRFS answer a series of questions to determine what percentage of respondents met aerobic guidelines, strengthening guidelines, both, or neither[53]. These questions are asked every other year. The most recent year asked was 2017.

The following data are from the 2017 Delaware BRFS:

- In Delaware, 44% of adults 18 years of age and older did not meet either aerobic or strengthening guidelines, similar to the national median of 39%.
- In Delaware, the prevalence of adults who reported they did not meet aerobic or strengthening guidelines was statistically significantly higher among females (47%) than males (40%).
- African American Delawareans (48%) had a lower prevalence of meeting aerobic or strengthening guidelines than Caucasians (42%). This difference was not statistically significant.
- Delawareans 45-54 years of age (46%) had the lowest prevalence of meeting either aerobic or strengthening guidelines. However, this was not statistically significant compared to any other age group.
- Delawareans in lower income categories reported a statistically significantly lower prevalence of levels of physical activity which meet recommended guidelines (57% of those earning less than $15,000 did not meet the guidelines; 52% of those earning $15,000-$24,999 did not meet the guidelines). This compares

[53]U.S. Department of Health and Human Services. 2008 Physical Activity Guidelines for Americans. Hyattsville, MD: U.S. Department of Health and Human Services; 2008. https://health.gov/paguidelines/

to Delawareans in the highest income category, where 36% of those earning $50,000 or more per year did not meet the guidelines.

- Delawareans in lower education levels reported a statistically significantly lower prevalence of meeting the physical activity guidelines. In Delaware, 54% of adults with less than a high school diploma and 50% of adults with a high school education or GED did not meet the physical activity guidelines, compared to 42% of adults with some post high school education, or 35% of adults who were college graduates.

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. These questions are asked every other year. The most recent year asked was 2017.

The following data are from the 2017 Delaware BRFS:

- In Delaware, 16% of adults consumed five or more servings of fruits and/or vegetables a day, compared to the national median of 16% of adults.
- Significantly fewer Delaware males (12%) consumed five or more servings of fruits and vegetables daily than females (18%).
- In Delaware, 15% of non-Hispanic Caucasians, 17% of non-Hispanic African Americans, and 14% of Hispanics consumed five or more servings of fruits and vegetables daily. This difference was not statistically significant.

APPENDIX E: TITLE 16, CHAPTER 20 OF THE DELAWARE CODE (76 DEL. LAWS., C 292 §1)[54]

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

[54] https://delcode.delaware.gov/title16/c032/index.shtml

APPENDIX F: CANCER INCIDENCE BY CENSUS TRACT

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 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®, a Lexis Nexis® service, is used to assign a valid physical street address to post office box addresses where possible. DCR staff also use Accurint® 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® and Google Maps® online databases.

PRELIMINARY ANALYSES

Cancer case used for analysis include all eligible[55] cancer cases diagnosed among Delawareans from January 1, 2012 through December 31, 2016. Within this time period, 99.7% of the cases were successfully geocoded; i.e. the residential census tract of the individual was identified. Table F-1 shows the percentage level of certainty of the census tract assignments for each individual. More than 99% of cases were assigned a census tract based on a complete and valid address of residence.

TABLE F-1: NUMBER OF CASES AND PERCENTAGE OF CENSUS TRACT CERTAINTY FOR CANCER INCIDENCE DATA, DELAWARE, 2012-2016

Census Tract Based on Level of Certainty	n (%)
Complete & valid street address of residence	28,422 (99.4%)
Residence ZIP + 4	0 (0.0%)
Residence ZIP + 2	0 (0.0%)
Residence ZIP code only	27 (0.1%)
ZIP code of P.O. Box	44 (0.2%)
Not assigned, geocoding attempted or blank	88 (0.3%)
Total Number of Cases	**28,581**

Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.

FIVE-YEAR POPULATION ESTIMATES BY CENSUS TRACT

As of the 2000 U.S. Census, Delaware was comprised of 197 census tracts. 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.

[55] 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.

Census tract populations for 2012-2016 were calculated using estimates from Woods & Poole Economics, Inc. Population data specific for each five-year age category and census tract were provided from the SEER Program from the NCI, made available through a database in SEER*Stat.[56]

Five-year population estimates for the 2012-2016 study period range from 3,650 for census tract 511.01 in Sussex County to 67,353 for census tract 402.02 in Kent County.

AGE-ADJUSTED INCIDENCE RATES, BY CENSUS TRACT

For each census tract, age-adjusted incidence rates were calculated at the census tract level.

Age-adjusted incidence rates 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 are 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 are then summed to yield the age-adjusted incidence rate for an entire census tract. All age-adjusted incidence rates were calculated for each census tract using SEER*Stat.

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 equation F-2.

EQUATION F-1: CONFIDENCE LIMIT EQUATIONS FOR 100 OR MORE CASES

$$\text{Lower Confidence Limit} = \text{AA Rate} - 1.96\left[\frac{\text{AA Rate}}{\sqrt{\#\text{ Cases}}}\right]$$

$$\text{Upper Confidence Limit} = \text{AA Rate} + 1.96\left[\frac{\text{AA Rate}}{\sqrt{\#\text{ Cases}}}\right]$$

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 equation F-3.

EQUATION F-2: CONFIDENCE LIMIT EQUATIONS FOR FEWER THAN 100 CASES

Lower Confidence Limit (LCL) = AA Rate x L

Upper Confidence Limit (LCL) = AA Rate x 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[57].

[56] Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Populations - Total U.S. (2000-2016), Census Tract Estimates Controlling to Vintage 2016 <2000/2010 Mixed Tract Geographies>, National Cancer Institute, DCCPS, Surveillance Research Program, released May 2019. Source: Woods & Poole Economics, Inc. Washington, D.C. Copyright 2018.

[57] 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. Retrieved from https://www.cdc.gov/nchs/data/nvsr/nvsr51/nvsr51_02.pdf

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 cancer incidence rate is compared to the all-site cancer incidence rate for the state. This allows DPH to identify census tracts with cancer incidence rates that are statistically significantly higher or lower than the incidence rate for Delaware. 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 statistically 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 2012-2016, two census tracts had fewer than 25 cancer cases: census tracts 145.01 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 that 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 should be interpreted with caution; they are denoted in both the rate table and color-coded maps.

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. 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. 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 have some 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, researchers must interpret this snapshot carefully.

In a small group, such as a census tract, the snapshot changes much 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. DPH publishes five-year cancer incidence rates to better understand cancer patterns among small populations. Cancer rates for five-year time periods are less vulnerable to yearly fluctuations of cancer cases diagnosed in small populations.

DPH can tell how much uncertainty there is in a cancer rate by studying 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 the 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 the 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.

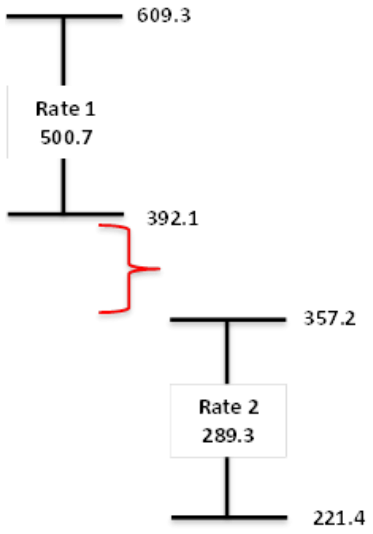
When a cancer rate is calculated for a small area (like a census tract or a neighborhood block), usually a small number of people live in that area. A much smaller number of people in that area will have been diagnosed with cancer. When a cancer rate is calculated for a small area, the cancer rate has 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.

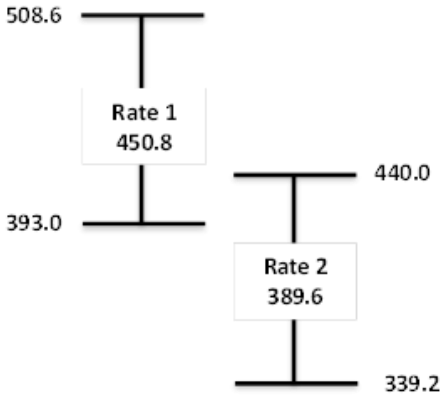
On the other hand, when a cancer rate is calculated for a large area (like a state or a country) with a large population, the odds are that more people will have been diagnosed with cancer compared to a smaller area. When a cancer rate is calculated based on a large number of cases or deaths, researchers 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 statistically 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 to tell if any census tracts had a statistically 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 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: FIVE-YEAR AGE-ADJUSTED 2012-2016 ALL-SITE CANCER INCIDENCE RATES BY CENSUS TRACT, DELAWARE

TABLE H-1: FIVE-YEAR AGE-ADJUSTED ALL-SITE CANCER INCIDENCE RATES BY CENSUS TRACT; DELAWARE, 2012-2016

Blue = Incidence rate is statistically significantly lower than the state rate.
Yellow = Incidence rate is statistically significantly higher than the state rate.

2010 Census Tract ID	Delaware: 491.5 (485.7, 497.4) Age-Adjusted Rate (95% confidence Interval)
2.00	512.0 (431.9, 603.1)
3.00	504.6 (398.4, 630.4)
4.00	524.0 (429.9, 635.0)
5.00	466.2 (365.7, 586.2)
6.01	475.6 (364.9, 608.8)
6.02	560.0 (442.7, 699.5)
9.00	620.2 (464.3, 809.9)
11.00	472.6 (382.5, 596.7)
12.00	498.4 (344.5, 708.9)
13.00	550.1 (463.3, 651.7)
14.00	408.0 (303.9, 538.7)
15.00	456.5 (349.7, 587.3)
16.00	587.7 (448.6, 755.5)
19.02	617.7 (401.2, 898.2)
21.00	667.4 (506.8, 862.5)
22.00	442.3 (326.6, 583.8)
23.00	485.5 (371.7, 621.8)
24.00	423.5 (346.1, 513.3)
25.00	508.6 (399.2, 638.4)
26.00	476.3 (374.7, 596.0)
27.00	635.5 (447.8, 869.7)
28.00	468.9 (310.1, 678.6)
29.00	649.3 (528.8, 788.5)
30.02	481.8 (308.3, 709.3)
101.01	420.7 (340.2, 514.3)
101.04	463.4 (366.6, 578.3)
102.00	509.7 (389.5, 658.7)
103.00	556.2 (447.4, 684.2)
104.00	477.3 (397.5, 569.3)
105.02	477.1 (403.6, 560.6)
107.02	551.6 (462.4, 653.0)
108.00	378.6 (318.6, 449.0)

2010 Census Tract ID	Delaware: 491.5 (485.7, 497.4) Age-Adjusted Rate (95% confidence Interval)
109.00	454.9 (371.8, 555.6)
110.00	493.5 (405.7, 597.2)
111.00	423.9 (341.4, 525.3)
112.01	499.9 (379.2, 647.9)
112.02	509.8 (425.3, 608.3)
112.03	544.2 (457.0, 643.8)
112.04	470.4 (389.9, 565.8)
112.05	380.1 (287.2, 499.5)
112.06	425.7 (354.7, 509.1)
113.00	359.4 (274.4, 467.3)
114.00	463.7 (379.7, 563.9)
115.00	555.0 (457.9, 669.2)
116.00	403.8 (320.3, 503.7)
117.00	428.8 (344.2, 530.9)
118.00	456.3 (380.5, 545.2)
119.00	419.1 (341.0, 514.1)
120.00	391.1 (324.3, 469.0)
121.00	420.9 (333.2, 525.7)
122.00	441.8 (361.2, 535.3)
123.00	570.0 (448.8, 714.1)
124.00	489.0 (403.9, 586.9)
125.00	526.0 (447.5, 614.7)
126.00	576.6 (466.4, 706.5)
127.00	490.2 (415.1, 576.3)
129.00	475.3 (393.2, 569.8)
130.00	455.4 (340.2, 599.6)
131.00	468.5 (366.1, 592.0)
132.00	447.3 (347.1, 568.2)
133.00	480.8 (369.7, 619.3)
134.00	536.6 (435.5, 657.5)
135.01	386.3 (325.9, 455.9)
135.03	447.5 (386.5, 516.2)

Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
* 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.

TABLE H-1: FIVE-YEAR AGE-ADJUSTED ALL-SITE CANCER INCIDENCE RATES BY CENSUS TRACT; DELAWARE, 2012-2016 (CONTINUED)

Blue = Incidence rate is statistically significantly lower than the state rate.
Yellow = Incidence rate is statistically significantly higher than the state rate.

2010 Census Tract ID	Delaware: 491.5 (485.7, 497.4) Age-Adjusted Rate (95% confidence Interval)
135.05	633.7 (513.9, 775.0)
135.06	567.4 (469.5, 681.4)
136.04	486.8 (407.6, 578.3)
136.07	381.1 (319.7, 451.6)
136.08	499.7 (375.1, 653.8)
136.10	529.0 (450.0, 618.0)
136.11	482.1 (398.1, 578.2)
136.12	384.2 (323.3, 454.3)
136.13	437.7 (367.3, 518.2)
136.14	490.7 (390.7, 608.8)
136.15	527.1 (443.1, 625.3)
137.00	500.8 (399.9, 618.9)
138.00	459.6 (384.1, 546.0)
139.01	480.9 (371.3, 613.0)
139.03	624.5 (489.9, 781.8)
139.04	516.1 (434.1, 608.4)
140.00	536.7 (453.1, 631.4)
141.00	585.1 (487.8, 695.7)
142.00	631.8 (482.3, 816.4)
143.00	383.8 (312.7, 469.5)
144.02	304.3 (223.1, 408.9)
144.03	406.3 (319.1, 510.6)
144.04	493.3 (402.6, 599.7)
145.01	*
145.02	725.5 (475.7, 1065.7)
147.02	507.2 (380.8, 663.4)
147.03	490.9 (414.0, 578.7)
147.05	501.6 (424.6, 588.8)
147.06	575.4 (425.8, 758.7)
148.03	427.0 (351.6, 515.4)
148.05	634.2 (542.8, 735.5)
148.07	440.2 (365.4, 525.1)

2010 Census Tract ID	Delaware: 491.5 (485.7, 497.4) Age-Adjusted Rate (95% confidence Interval)
148.08	548.1 (440.2, 672.5)
148.09	533.6 (456.4, 619.9)
148.10	504.7 (422.7, 597.7)
149.03	670.5 (544.7, 814.0)
149.04	603.3 (499.9, 721.1)
149.06	567.8 (426.6, 736.5)
149.07	486.6 (398.5, 588.4)
149.08	549.3 (406.4, 723.8)
149.09	591.9 (488.0, 710.0)
150.00	548.2 (461.9, 646.2)
151.00	532.8 (443.5, 636.5)
152.00	463.1 (388.1, 548.3)
154.00	434.0 (346.6, 537.9)
155.02	515.7 (409.4, 641.9)
156.00	515.0 (402.2, 651.4)
158.02	544.1 (415.7, 699.3)
159.00	497.9 (406.0, 605.5)
160.00	457.0 (356.2, 578.6)
161.00	500.7 (388.0, 641.5)
162.00	467.8 (367.9, 588.2)
163.01	609.9 (520.2, 711.2)
163.02	507.0 (429.1, 594.7)
163.05	533.4 (453.8, 622.6)
164.01	604.6 (506.9, 715.3)
164.04	488.7 (392.0, 603.7)
166.01	515.3 (458.7, 577.0)
166.02	679.0 (575.1, 795.8)
166.04	623.4 (546.7, 707.3)
166.08	626.1 (519.8, 748.0)
168.01	550.0 (462.7, 648.9)
168.04	627.0 (524.5, 742.7)
169.01	620.6 (492.1, 774.3)

Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
* 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.

TABLE H-1: FIVE-YEAR AGE-ADJUSTED ALL-SITE CANCER INCIDENCE RATES BY CENSUS TRACT; DELAWARE, 2012-2016 (CONTINUED)

Blue = Incidence rate is statistically significantly lower than the state rate.

Yellow = Incidence rate is statistically significantly higher than the state rate.

2010 Census Tract ID	Delaware: 491.5 (485.7, 497.4) Age-Adjusted Rate (95% confidence Interval)
169.04	387.7 (288.4, 517.7)
401.00	644.1 (561.5, 735.8)
402.01	551.8 (459.3, 657.0)
402.02	525.5 (475.1, 580.1)
402.03	655.5 (560.3, 762.3)
405.01	501.2 (420.8, 592.8)
405.02	574.1 (452.1, 722.6)
407.00	425.8 (358.8, 502.9)
409.00	441.2 (330.8, 580.4)
410.00	440.9 (370.9, 520.4)
411.00	*
412.00	580.4 (488.5, 685.2)
413.00	472.2 (354.2, 617.6)
414.00	473.2 (380.9, 581.2)
415.00	561.9 (469.0, 668.5)
416.00	503.8 (400.0, 632.2)
417.01	604.0 (528.8, 687.7)
417.02	488.8 (407.9, 582.4)
418.01	548.6 (488.4, 614.5)
418.02	482.8 (398.0, 580.0)
419.00	544.9 (464.2, 636.0)
420.00	587.2 (483.7, 707.5)
421.00	512.3 (424.7, 614.0)
422.01	558.7 (490.2, 634.0)
422.02	566.1 (501.1, 637.4)
425.00	554.6 (453.1, 672.3)
428.00	536.0 (468.0, 611.5)
429.00	470.2 (396.7, 554.6)
430.00	474.5 (400.5, 558.7)
431.00	589.0 (471.9, 727.7)
432.02	517.9 (430.5, 619.0)

2010 Census Tract ID	Delaware: 491.5 (485.7, 497.4) Age-Adjusted Rate (95% confidence Interval)
433.00	472.2 (388.6, 569.0)
434.00	551.7 (467.7, 647.8)
501.01	478.3 (398.5, 571.1)
501.03	438.2 (368.2, 519.5)
501.04	508.1 (424.2, 604.3)
501.05	535.3 (452.9, 628.4)
502.00	516.2 (417.7, 632.0)
503.01	536.0 (471.6, 607.4)
503.02	505.3 (424.3, 597.6)
504.01	418.6 (340.3, 510.7)
504.03	458.2 (369.8, 562.5)
504.05	506.8 (422.7, 604.1)
504.06	385.7 (319.0, 462.9)
504.07	496.8 (420.7, 583.8)
504.08	555.9 (472.2, 651.0)
505.01	497.6 (411.0, 598.5)
505.03	418.5 (335.2, 515.3)
505.04	419.7 (353.3, 495.4)
506.01	534.5 (454.2, 625.6)
506.02	480.7 (411.9, 558.4)
507.01	498.4 (422.7, 586.8)
507.03	411.4 (316.4, 532.3)
507.04	534.7 (454.9, 627.8)
507.05	499.9 (427.2, 585.1)
507.06	480.7 (339.1, 675.1)
508.01	549.3 (458.0, 654.7)
508.02	654.2 (568.3, 750.6)
508.03	612.3 (543.8, 688.9)
509.01	481.1 (384.5, 600.3)
509.02	508.7 (436.3, 594.6)
510.03	460.4 (395.1, 536.0)

Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.

* 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.

TABLE H-1: FIVE-YEAR AGE-ADJUSTED ALL-SITE CANCER INCIDENCE RATES BY CENSUS TRACT; DELAWARE, 2012-2016 (CONTINUED)

Blue = Incidence rate is statistically significantly lower than the state rate.
Yellow = Incidence rate is statistically significantly higher than the state rate.

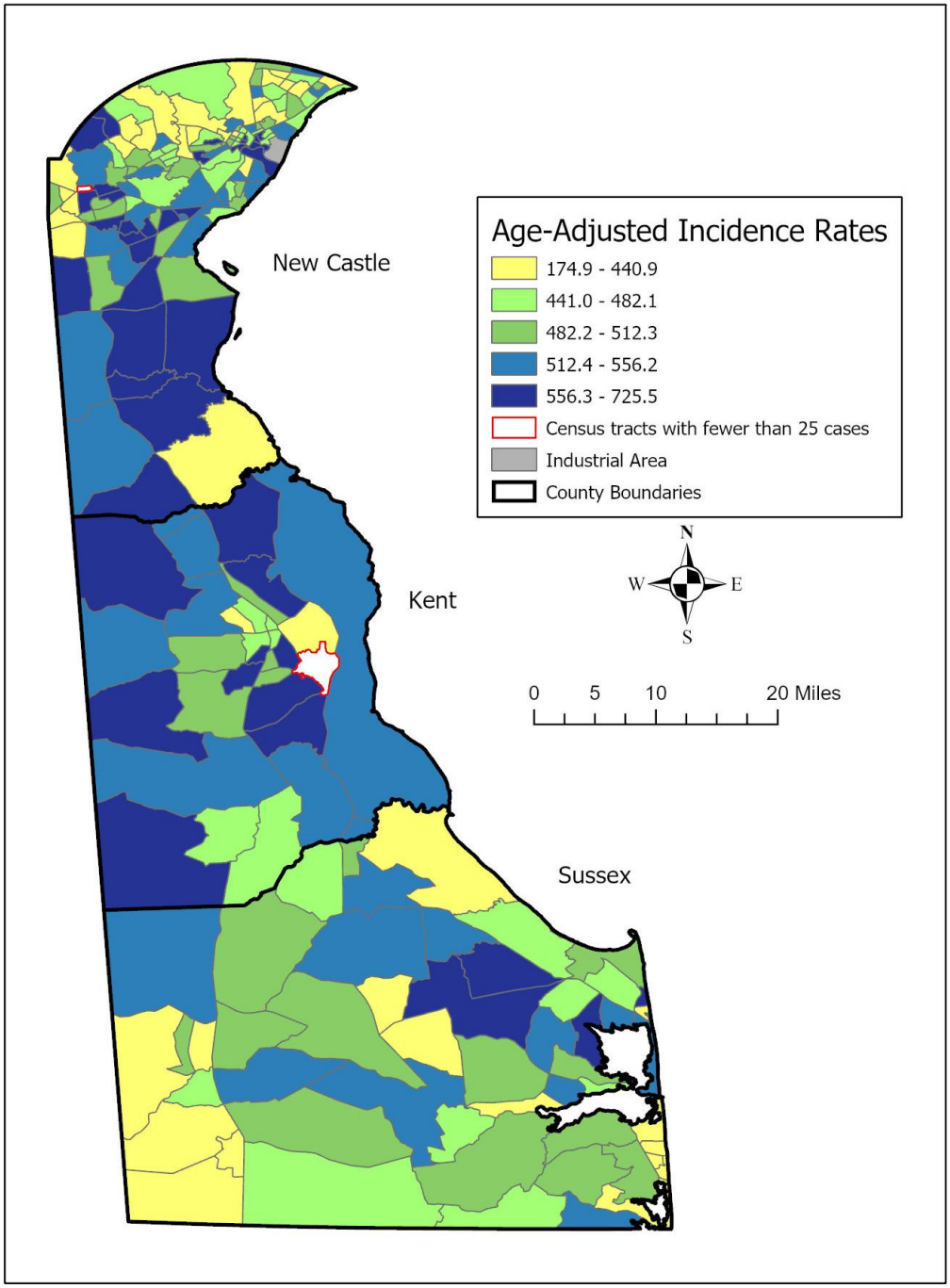
2010 Census Tract ID	Delaware: 491.5 (485.7, 497.4) Age-Adjusted Rate (95% confidence Interval)
510.04	455.7 (388.8, 534.7)
510.05	525.7 (450.5, 613.3)
510.06	606.3 (496.1, 739.8)
510.07	528.6 (449.9, 620.6)
511.01	597.4 (354.3, 1029.1)
511.02	273.1 (201.4, 424.3)
511.03	515.0 (366.6, 740.0)
512.01	419.4 (299.4, 603.1)
512.02	310.1 (194.8, 580.7)
512.03	174.9 (115.3, 369.6)
512.04	401.6 (287.4, 834.0)
512.05	338.5 (148.7, 735.1)

2010 Census Tract ID	Delaware: 491.5 (485.7, 497.4) Age-Adjusted Rate (95% confidence Interval)
513.01	494.4 (428.3, 571.3)
513.02	487.9 (401.6, 591.6)
513.03	487.3 (415.6, 571.0)
513.05	523.7 (436.9, 630.4)
513.06	369.9 (295.2, 474.5)
514.00	465.6 (380.3, 565.4)
515.00	497.8 (426.1, 579.3)
517.01	501.9 (417.8, 599.2)
517.02	465.8 (396.9, 544.0)
518.01	416.1 (346.1, 496.7)
518.02	437.1 (358.1, 528.8)
519.00	425.8 (354.6, 508.2)

Source: Delaware Department of Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
* 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.

APPENDIX I: MAPS OF CANCER INCIDENCE RATES QUINTILES BY CENSUS TRACTS, DELAWARE, 2012-2016

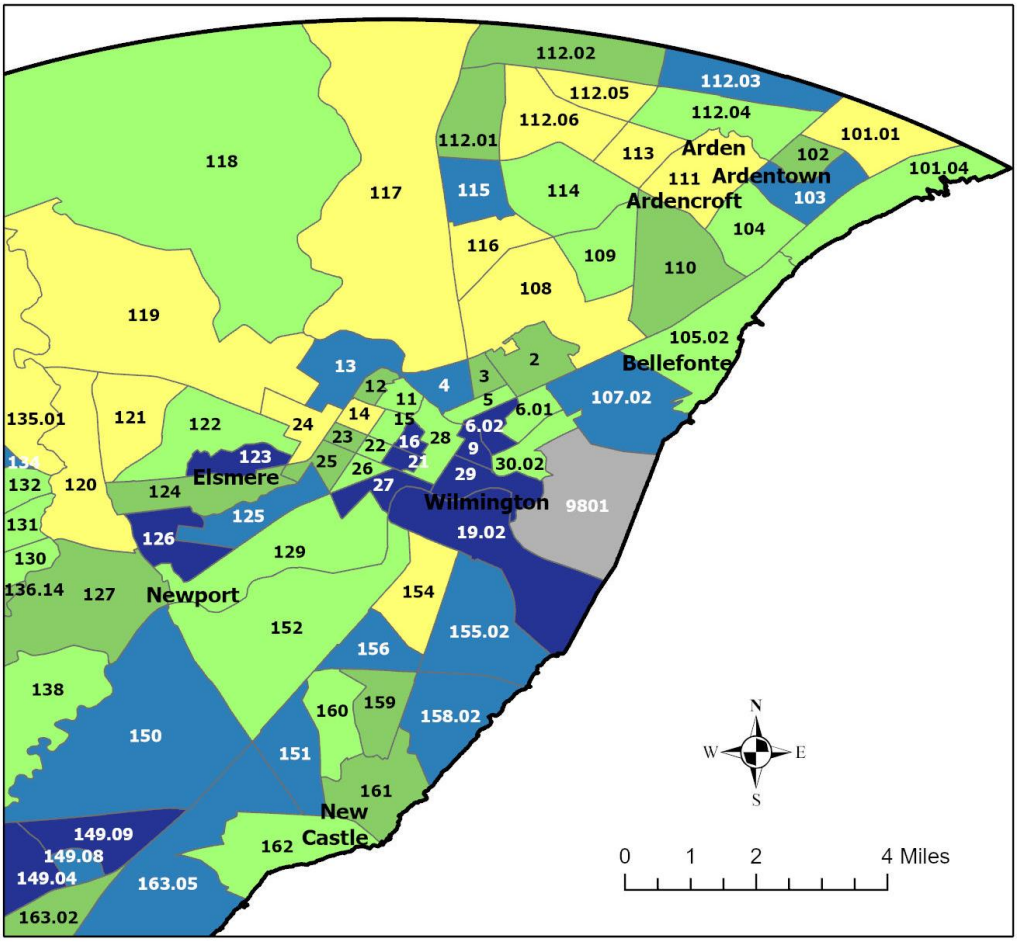
Five-Year Age-Adjusted Cancer Incidence Rates by Census Tract, Delaware, 2012-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019
Source: 2010 U.S. Census county and tract shapefiles: https://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.2010.html

Five-Year Age-Adjusted Cancer Incidence Rates by Census Tract, Delaware, 2012-2016

Wilmington and Northeastern New Castle County



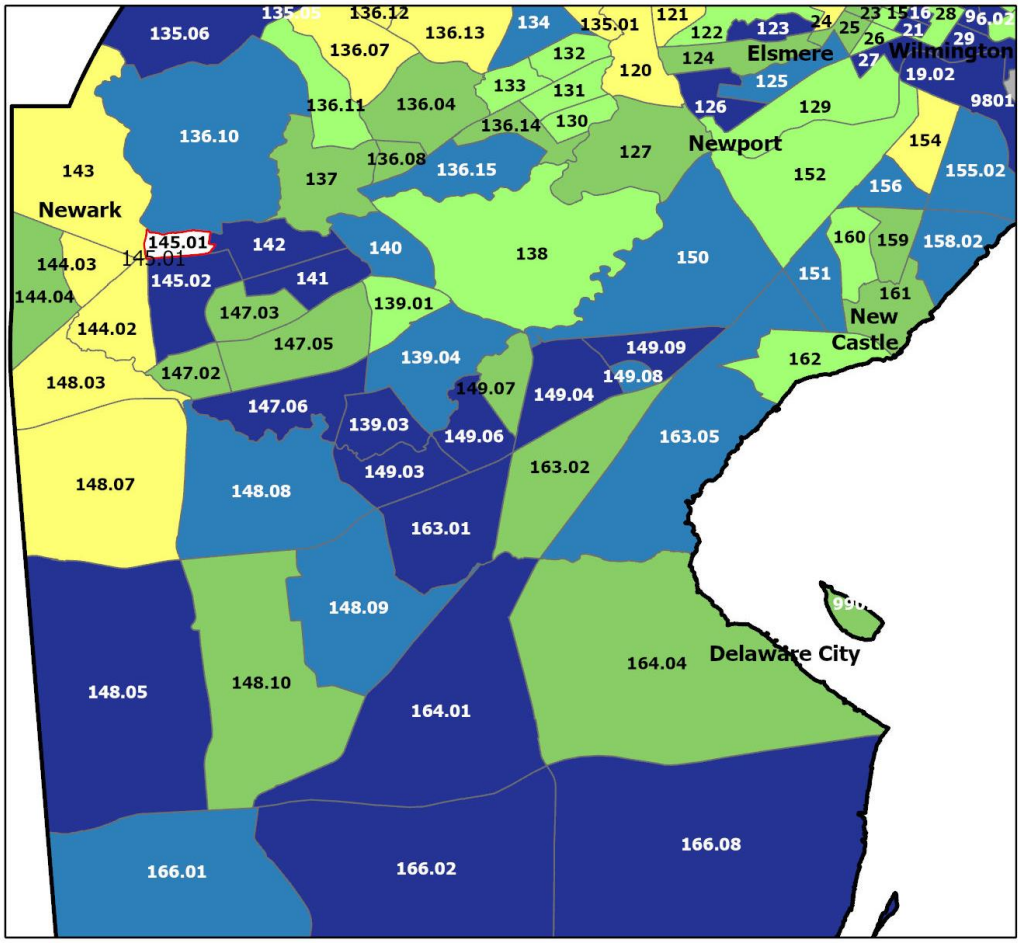
Age-Adjusted Incidence Rates

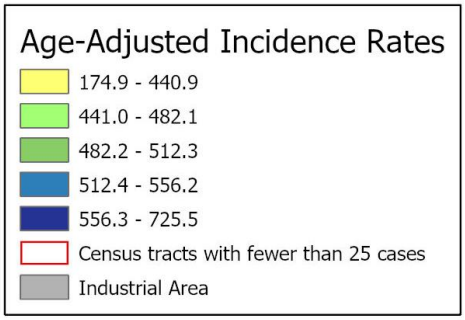
- 174.9 - 440.9
- 441.0 - 482.1
- 482.2 - 512.3
- 512.4 - 556.2
- 556.3 - 725.5
- Census tracts with fewer than 25 cases
- Industrial Area

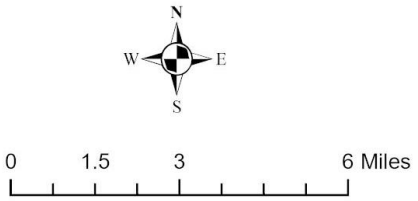
Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source: 2010 U.S. Census county and tract shapefiles: https://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.2010.html

Five-Year Age-Adjusted Cancer Incidence Rates by Census Tract, Delaware, 2012-2016

Newark, New Castle, and Central New Castle County



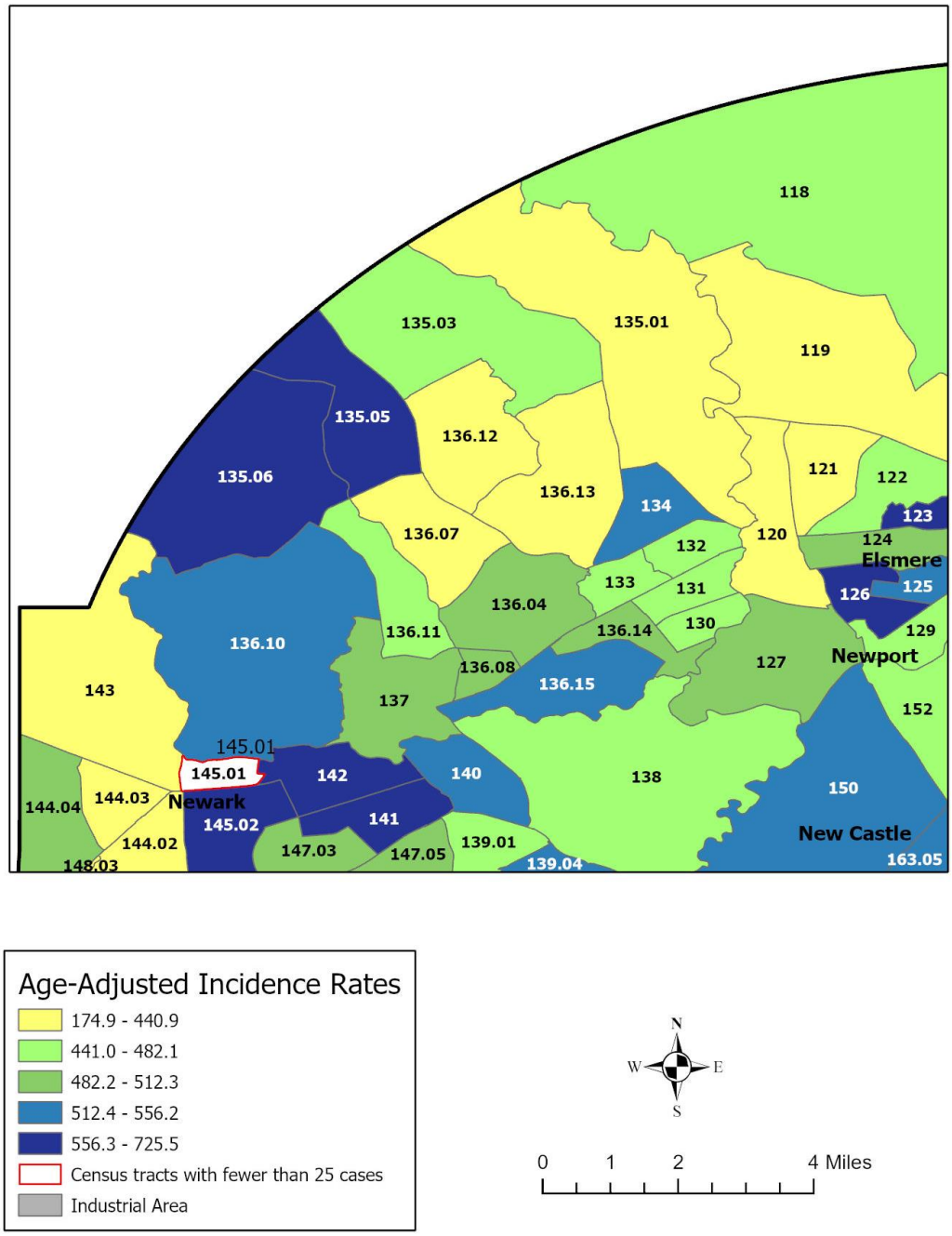




Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source: 2010 U.S. Census county and tract shapefiles: https://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.2010.html

Five-Year Age-Adjusted Cancer Incidence Rates by Census Tract, Delaware, 2012-2016

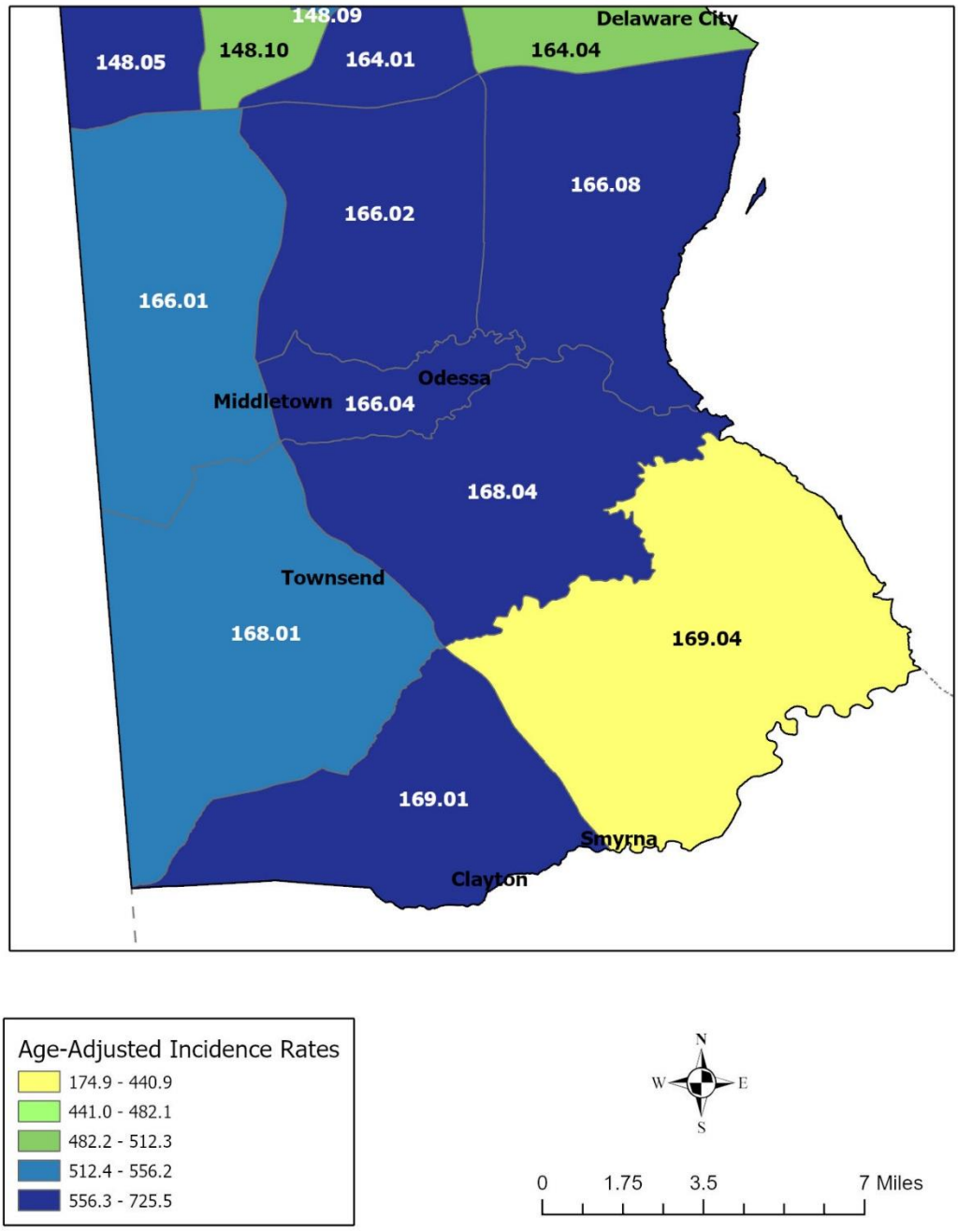
Hockessin and Northwestern New Castle County



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source: 2010 U.S. Census county and tract shapefiles: https://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.2010.html

Five-Year Age-Adjusted Cancer Incidence Rates by Census Tract, Delaware, 2012-2016

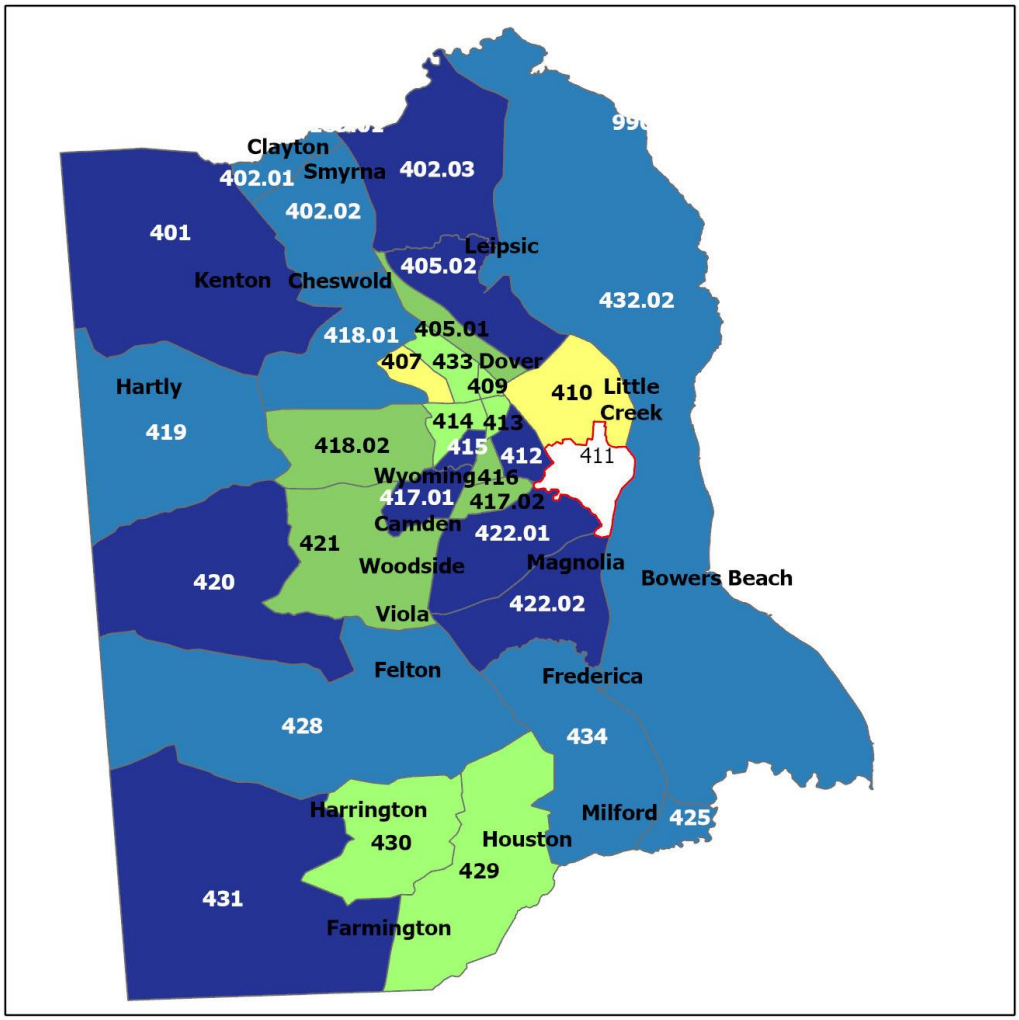
Southern New Castle County

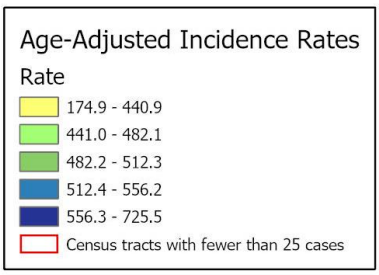


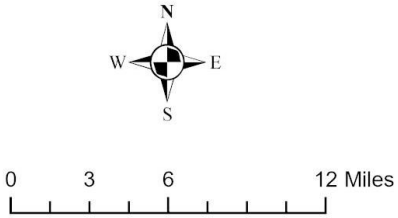
Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source: 2010 U.S. Census county and tract shapefiles: https://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.2010.html

Five-Year Age-Adjusted Cancer Incidence Rates by Census Tract, Delaware, 2012-2016

Kent County



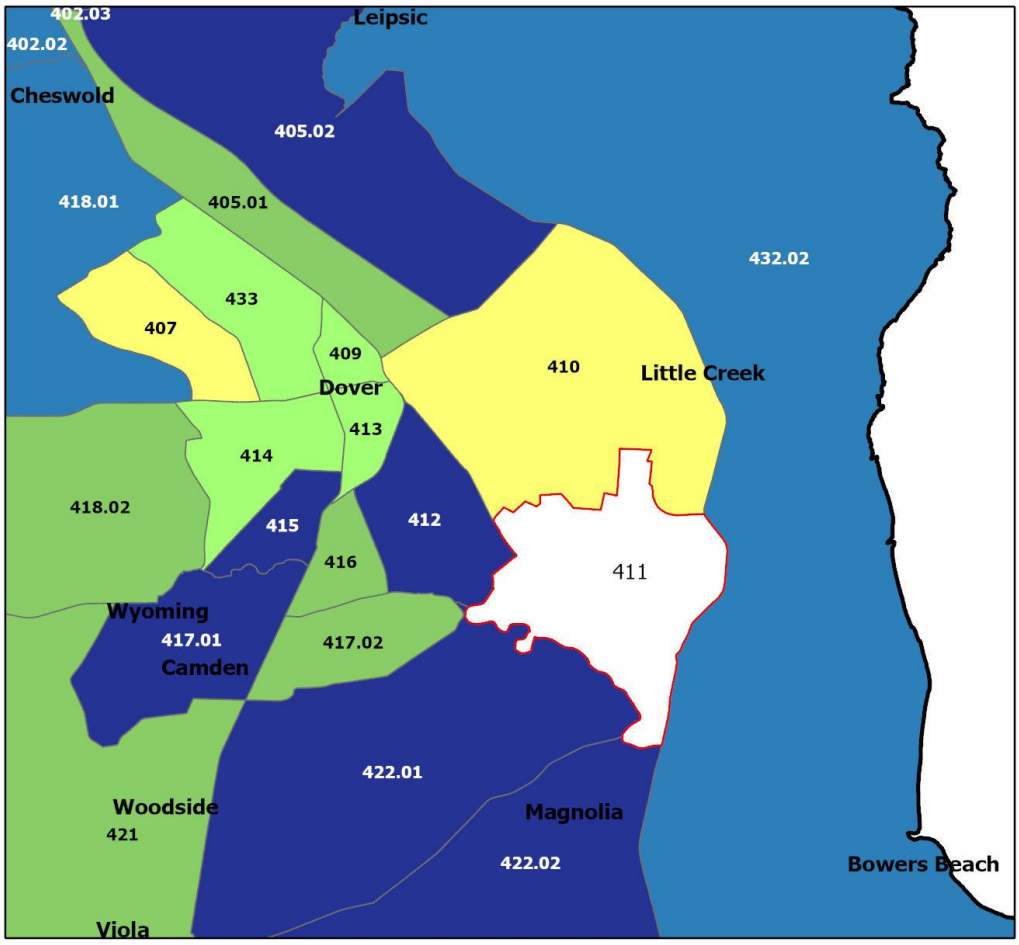


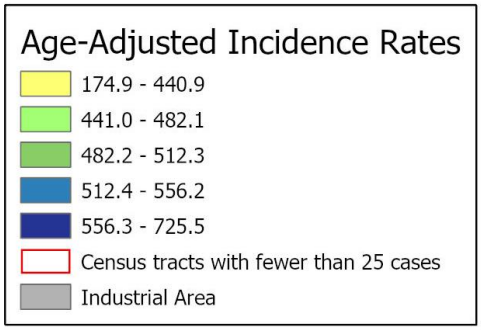


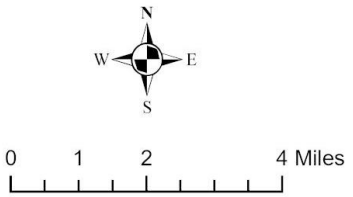
Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source: 2010 U.S. Census county and tract shapefiles: https://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.2010.html

Five-Year Age-Adjusted Cancer Incidence Rates by Census Tract, Delaware, 2012-2016

Greater Dover



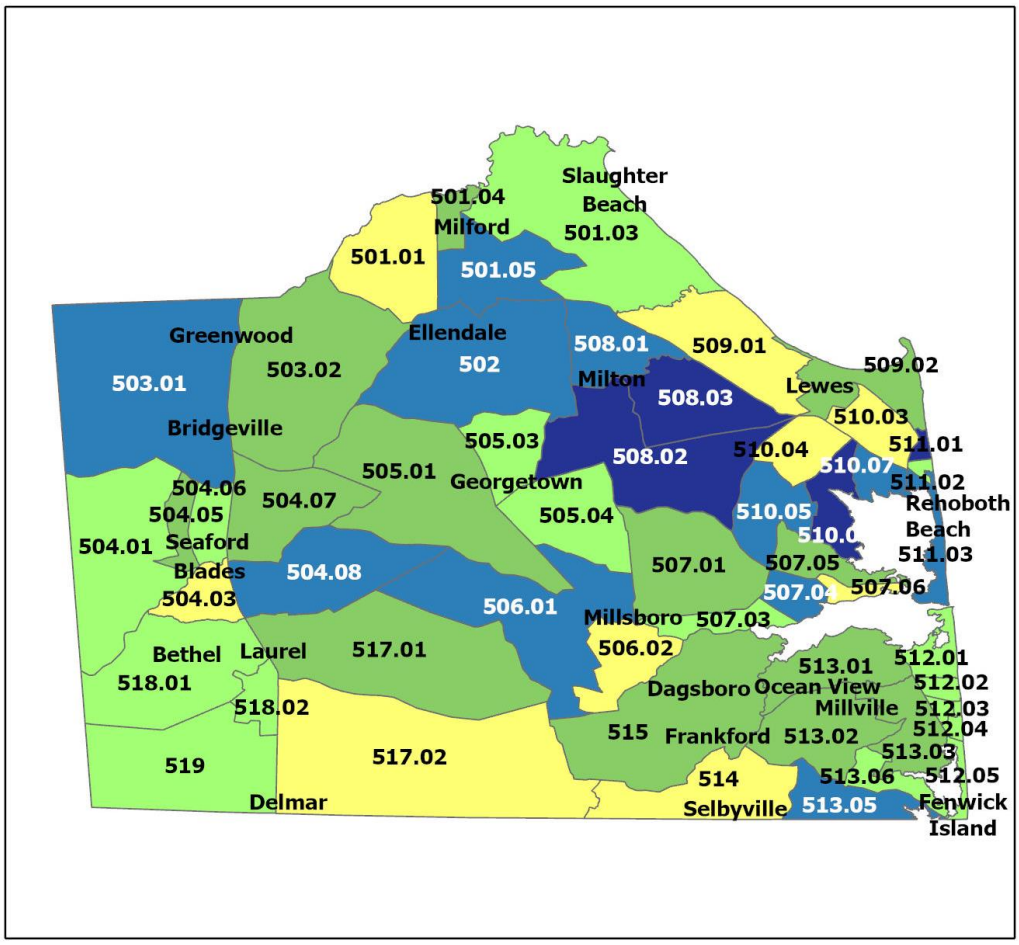




Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source: 2010 U.S. Census county and tract shapefiles: https://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.2010.html

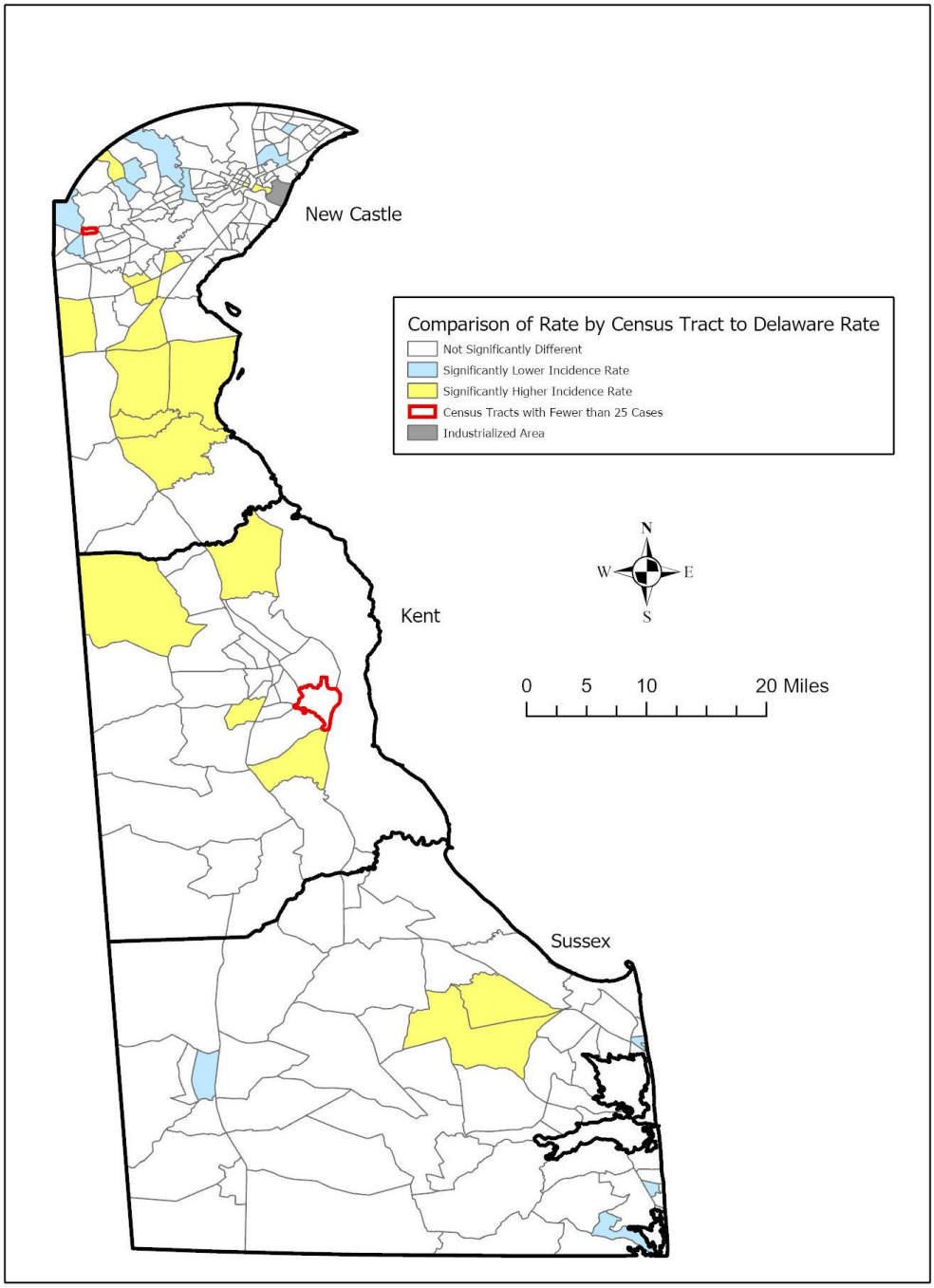
Five-Year Age-Adjusted Cancer Incidence Rates by Census Tract, Delaware, 2012-2016

Sussex County



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source: 2010 U.S. Census county and tract shapefiles: https://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.2010.html

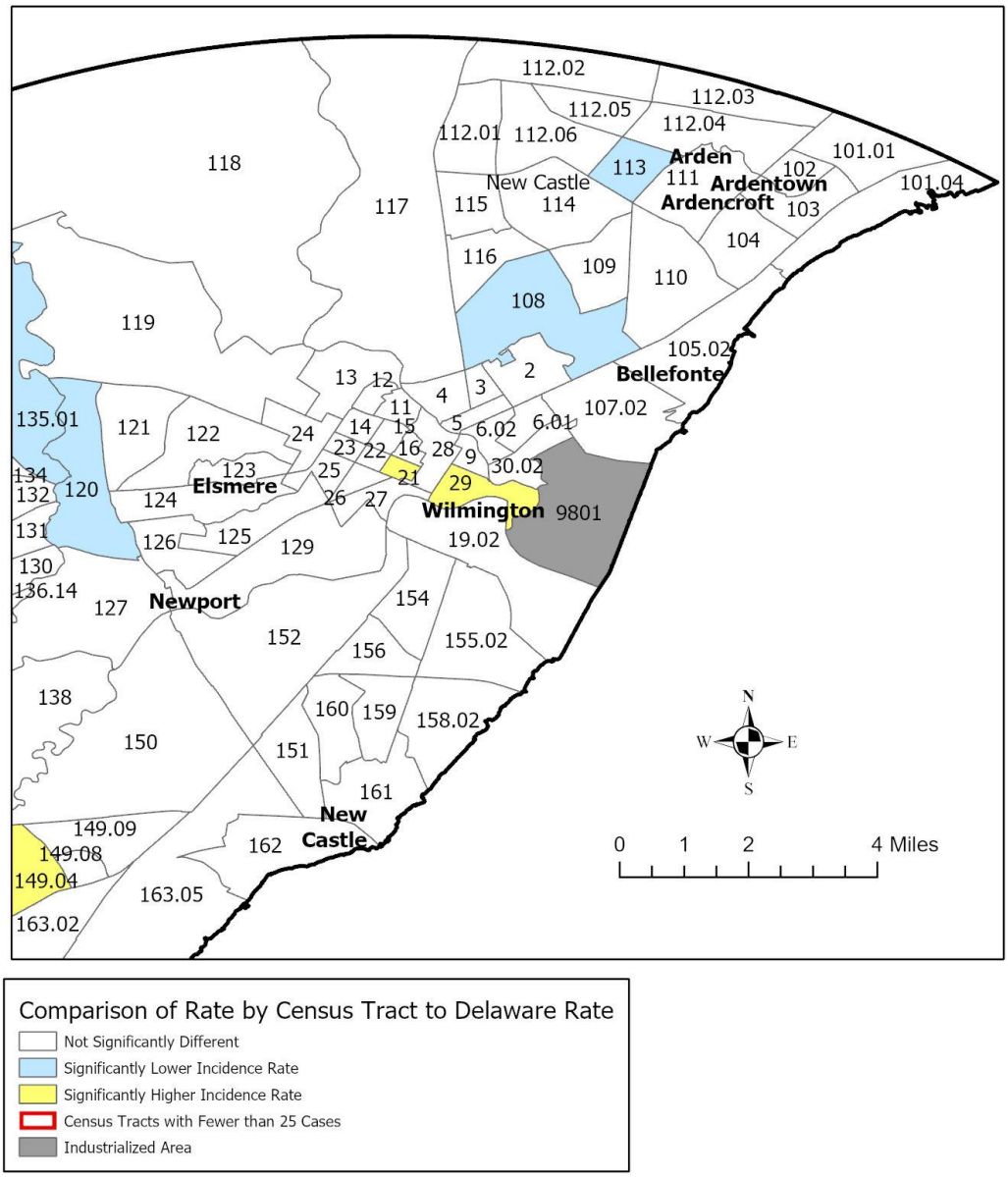
Five-Year Age-Adjusted Cancer Incidence Rates by Census Tract, Delaware, 2012-2016



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source: 2010 U.S. Census county and tract shapefiles: https://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.2010.html

Five-Year Age-Adjusted Cancer Incidence Rates by Census Tract, Delaware, 2012-2016

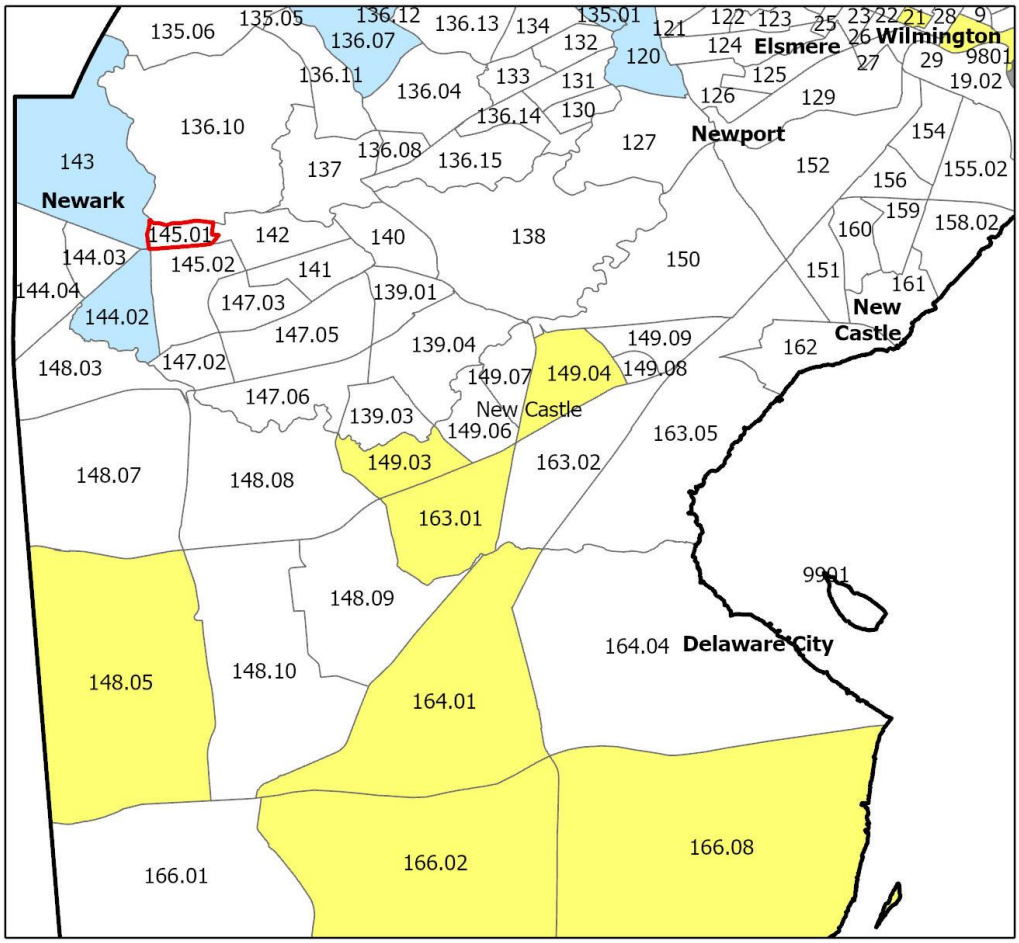
Wilmington and Northeastern New Castle County



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source: 2010 U.S. Census county and tract shapefiles: https://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.2010.html

Five-Year Age-Adjusted Cancer Incidence Rates by Census Tract, Delaware, 2012-2016

Newark, New Castle, and Central New Castle County



Comparison of Rate by Census Tract to Delaware Rate

- Not Significantly Different
- Significantly Lower Incidence Rate
- Significantly Higher Incidence Rate
- Census Tracts with Fewer than 25 Cases
- Industrialized Area

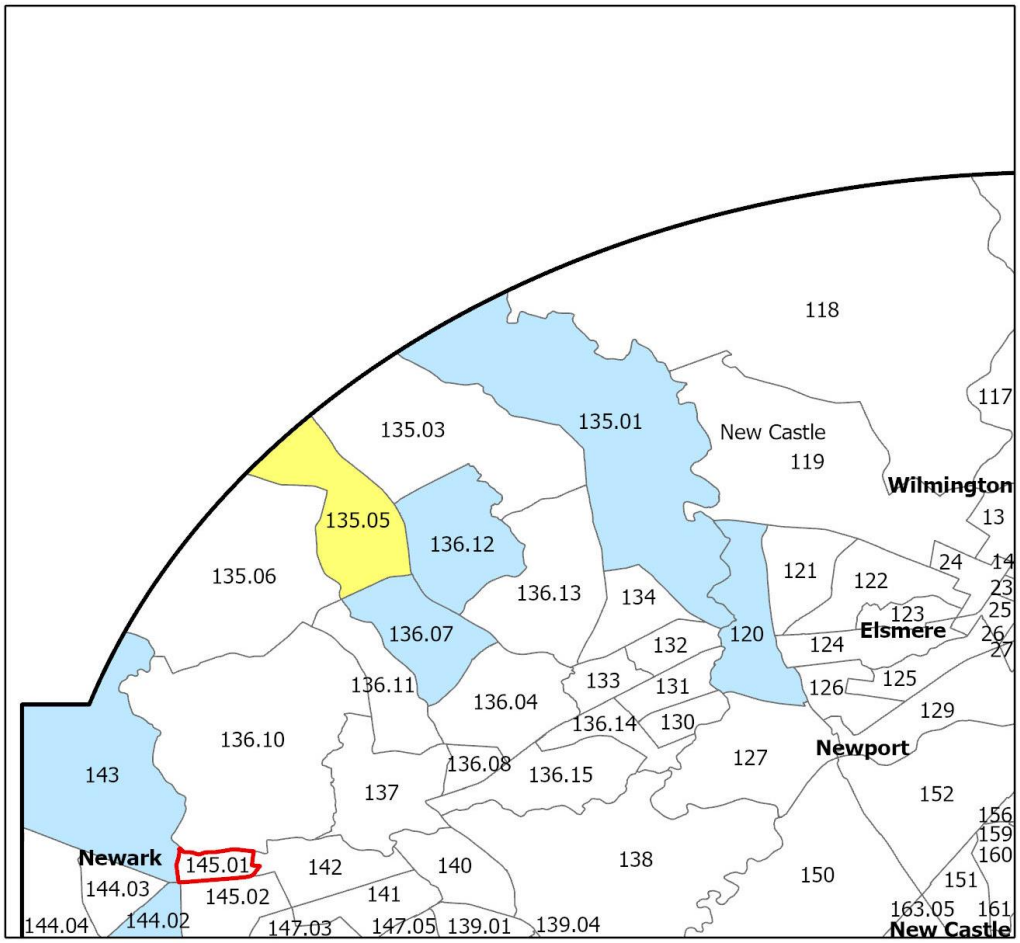
N
W E
S

0 1.5 3 6 Miles

Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source: 2010 U.S. Census county and tract shapefiles: https://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.2010.html

Five-Year Age-Adjusted Cancer Incidence Rates by Census Tract, Delaware, 2012-2016

Hockessin and Northwestern New Castle County



Comparison of Rate by Census Tract to Delaware Rate

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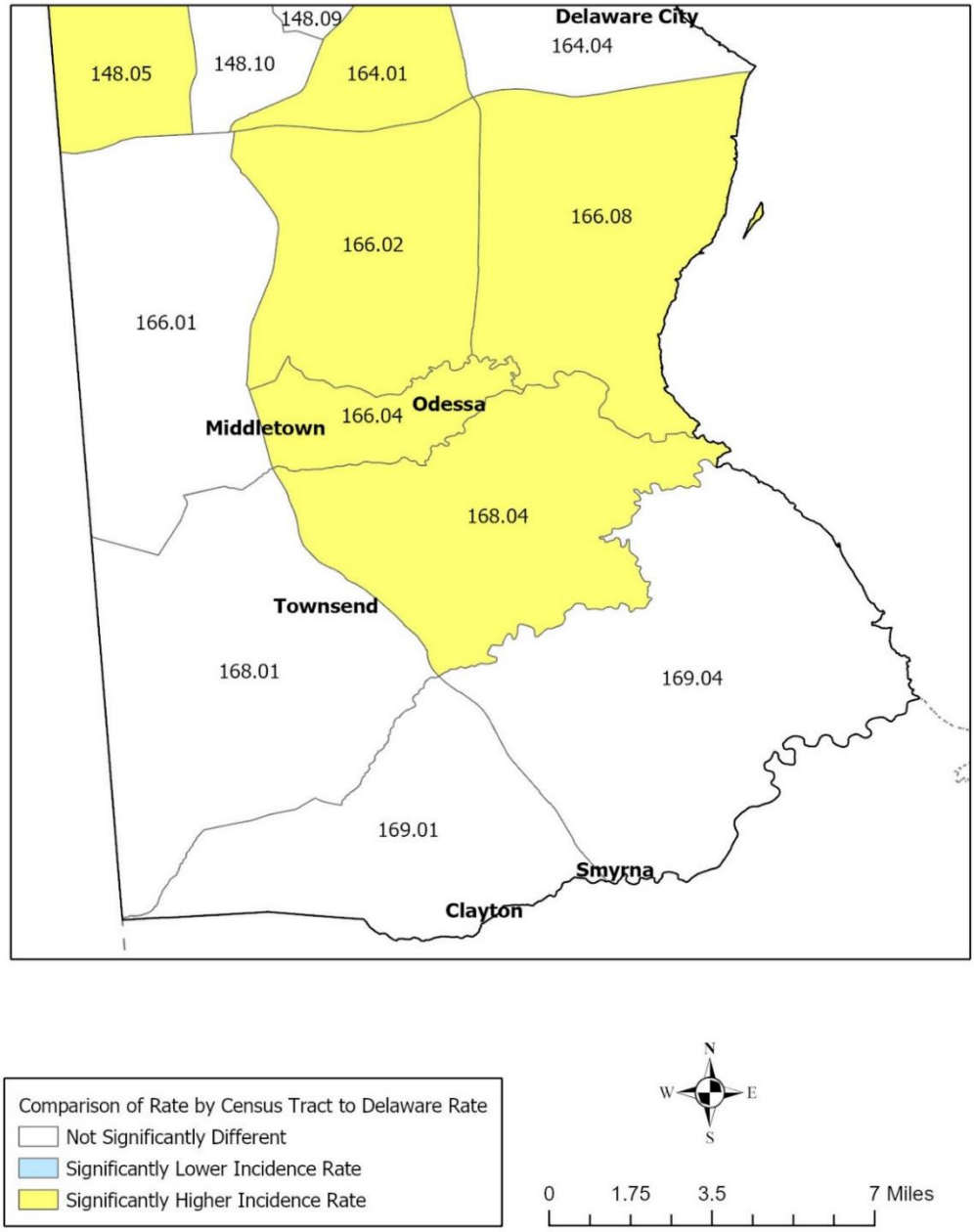
N W E S

0 1 2 4 Miles

Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source: 2010 U.S. Census county and tract shapefiles: https://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.2010.html

Five-Year Age-Adjusted Cancer Incidence Rates by Census Tract, Delaware, 2012-2016

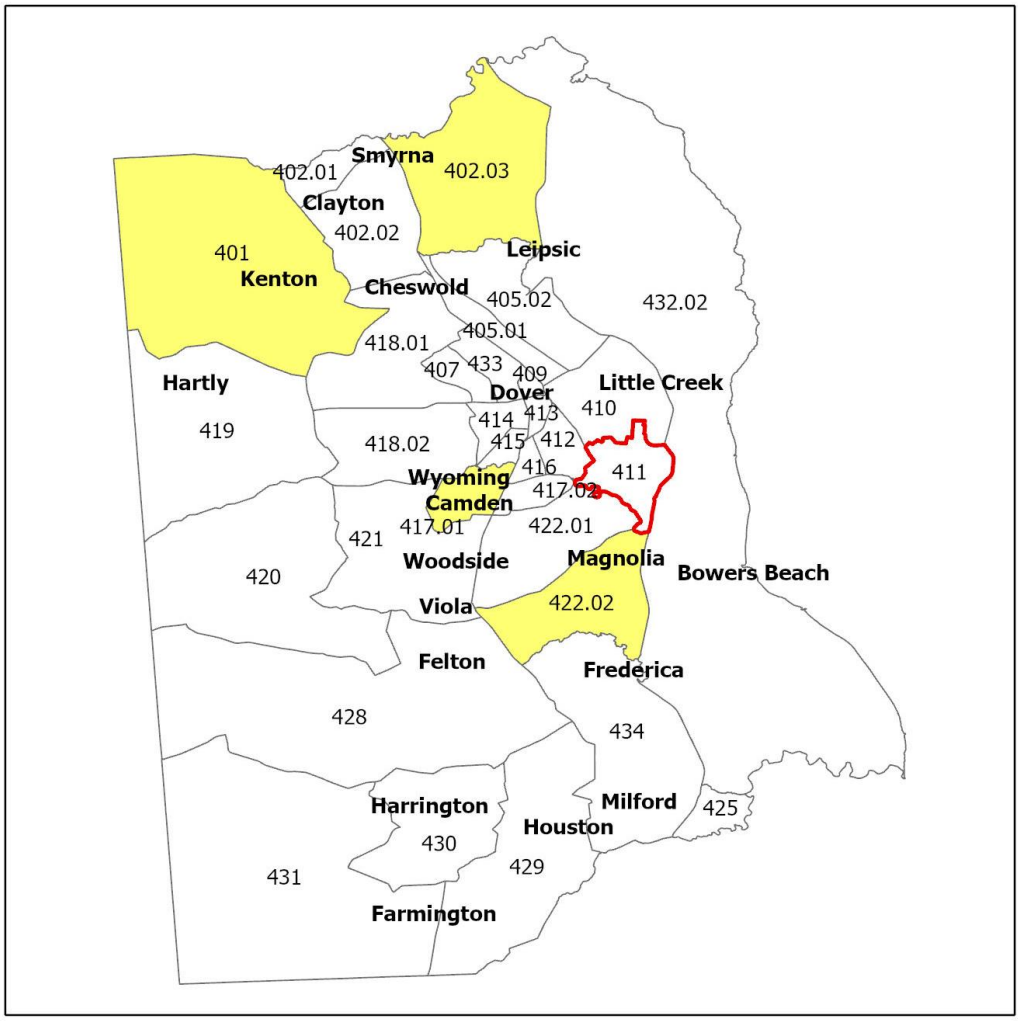
Southern New Castle County



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source: 2010 U.S. Census county and tract shapefiles: https://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.2010.html

Five-Year Age-Adjusted Cancer Incidence Rates by Census Tract, Delaware, 2012-2016

Kent County



Comparison of Rate by Census Tract to Delaware Rate

- Not Significantly Different
- Significantly Lower Incidence Rates
- Significantly Higher Incidence Rates
- Census tract with fewer than 25 cases

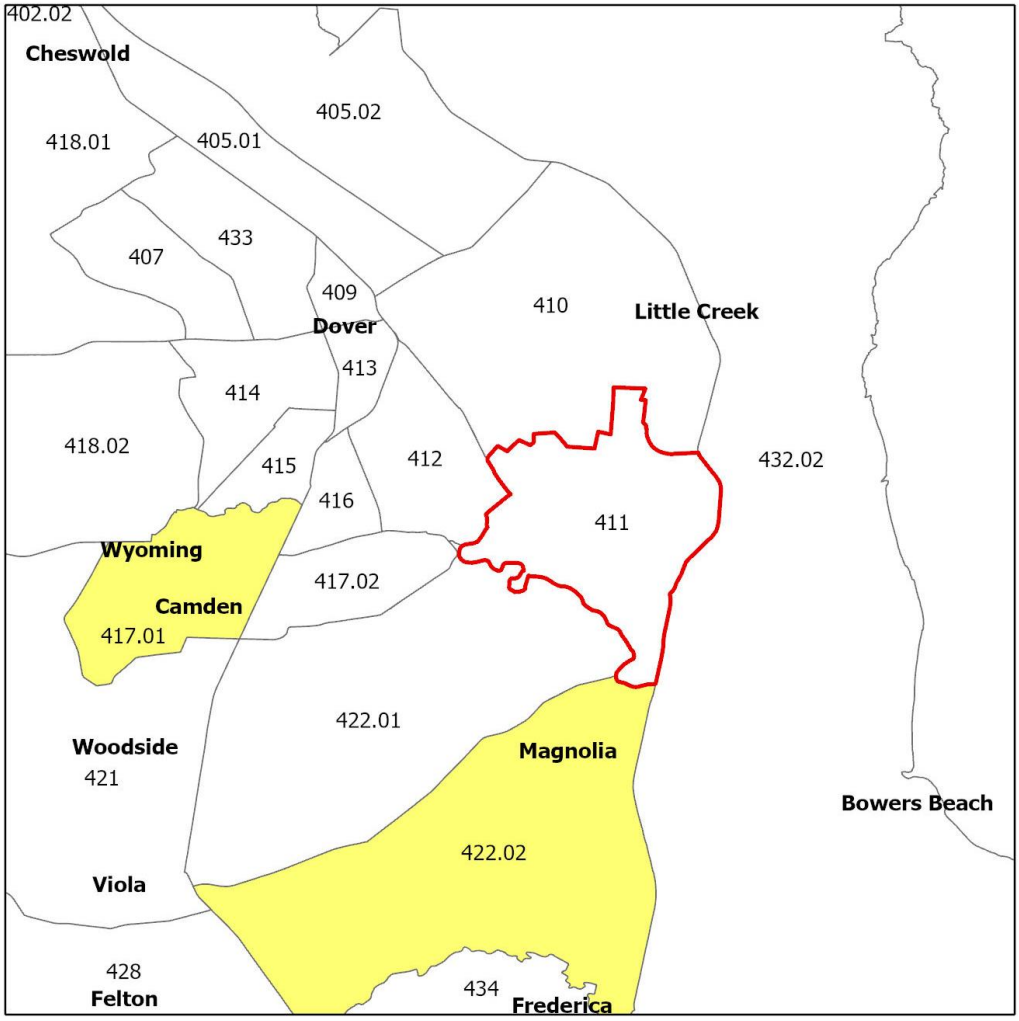
N W E S

0 2.7 5.4 10.8 Miles

Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source: 2010 U.S. Census county and tract shapefiles: https://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.2010.html

Five-Year Age-Adjusted Cancer Incidence Rates by Census Tract, Delaware, 2012-2016

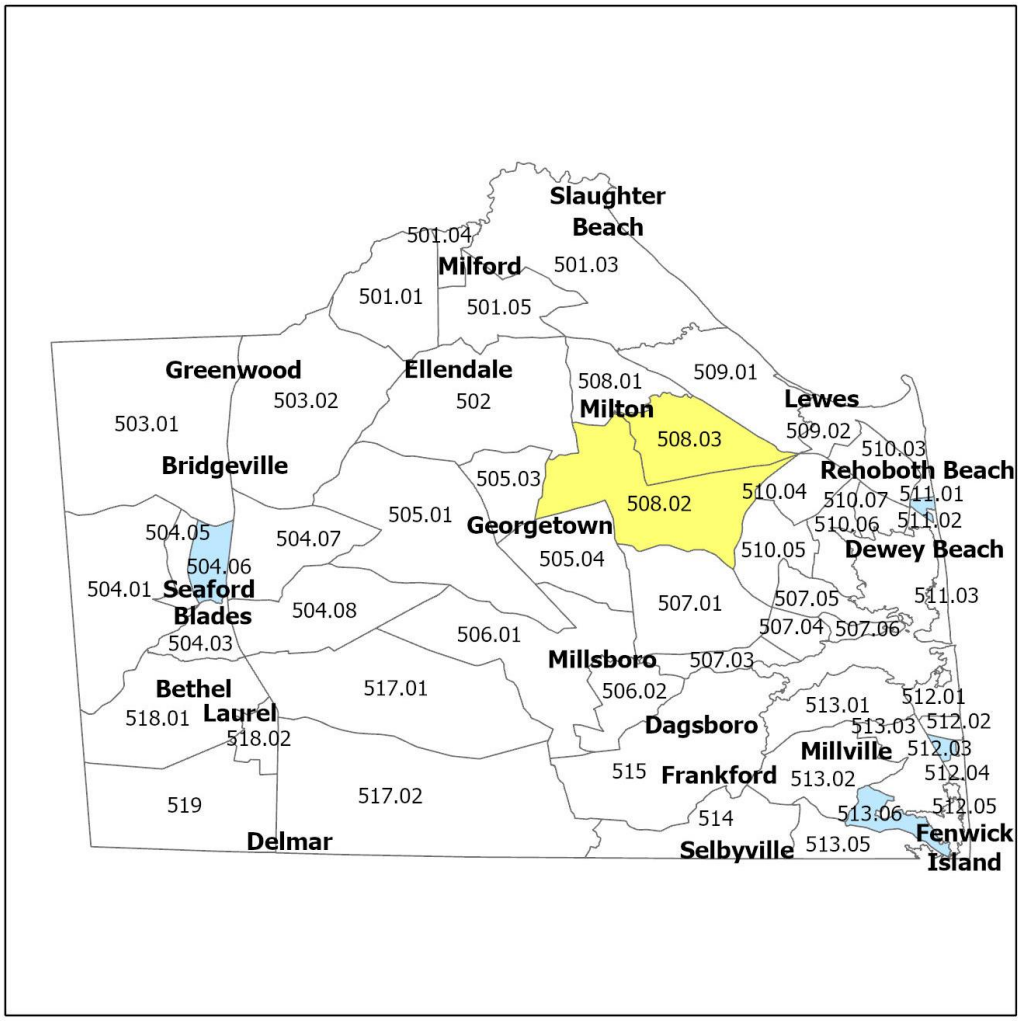
Greater Dover



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source: 2010 U.S. Census county and tract shapefiles: https://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.2010.html

Five-Year Age-Adjusted Cancer Incidence Rates by Census Tract, Delaware, 2012-2016

Sussex County



Source: Delaware Department of Health and Social Services, Division of Public Health, Delaware Cancer Registry, 2019.
Source: 2010 U.S. Census county and tract shapefiles: https://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.2010.html