

Cancer Survival in Ohio

More people than ever are surviving cancer. In 2016, there were an estimated 15.5 million cancer survivors in the United States, according to the American Cancer Society, and the number of cancer survivors is expected to increase to more than 20 million by the mid 2020's. Overall, 67.1 percent of people in the United States survive five years or more after being diagnosed with cancer, based on the latest available data from the National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) Program. Improvements in survival are, in large part, the result of general advances in treatments and specific breakthroughs in treatments for some cancers, including non-Hodgkin lymphoma and some types of leukemia. An individual's chances of surviving cancer depend on many factors in addition to treatment, including cancer site/type, age at diagnosis, stage at diagnosis, sex, race, ethnicity, socioeconomic status and place of residence.

In general, cancer survival is estimated as the proportion of people alive at some point after cancer diagnosis, usually five years. **Five-year relative survival, the estimate used in this document, compares the survival of people diagnosed with cancer with the survival of people in the general population who are the same age, race, and sex and who have not been diagnosed with cancer.** For example, if the five-year relative survival for a specific cancer is 90 percent, it means that people who have that cancer are, on average, about 90 percent as likely as people who do not have that cancer to live at least five years after their diagnosis. Because survival statistics are based on large groups of people, they cannot be used to predict exactly what will happen to an individual person.

Key Findings

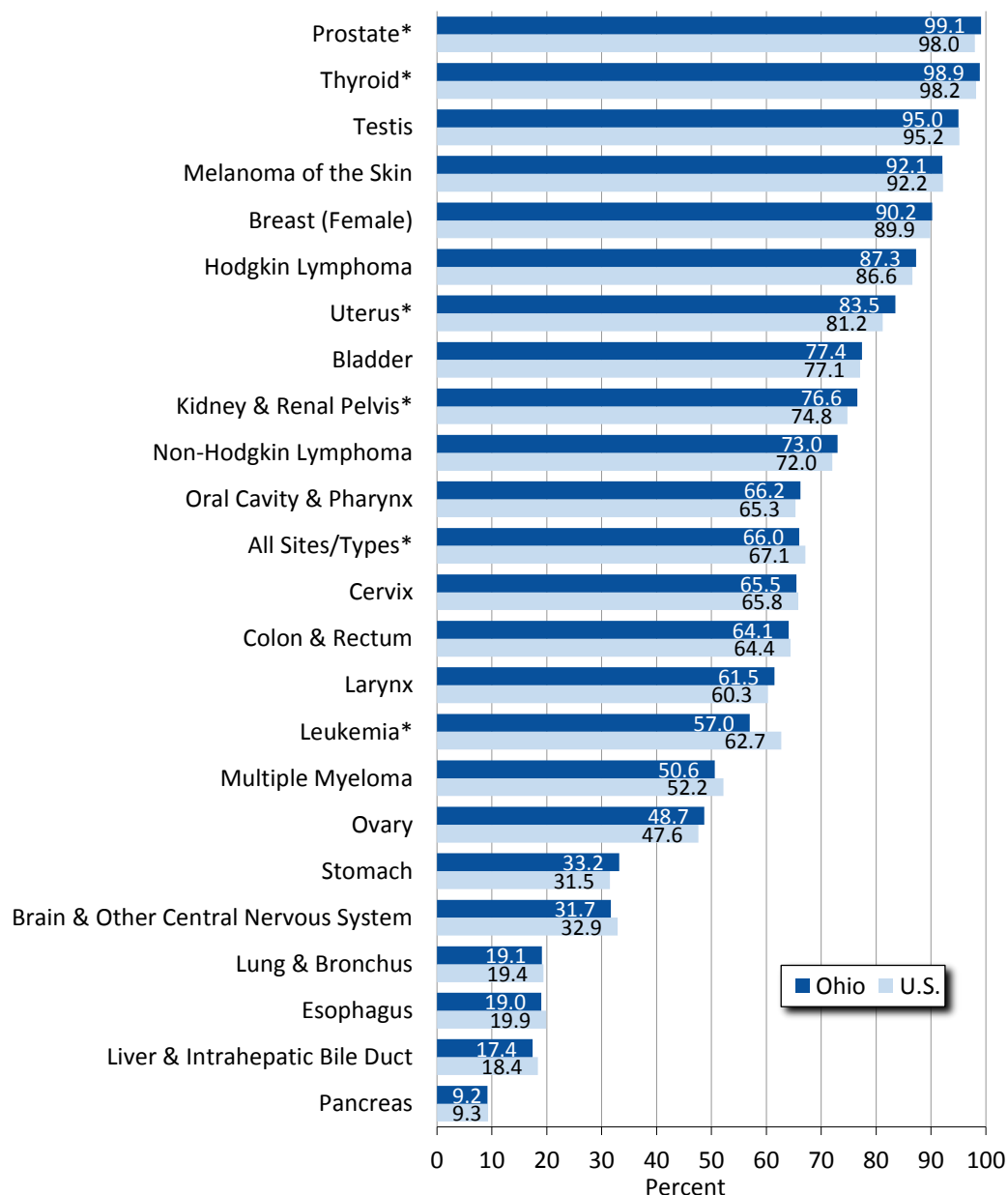
- Five-year relative survival in Ohio was highest for prostate, thyroid, testis, melanoma of the skin and female breast cancer, and lowest for cancers of the pancreas, liver and intrahepatic bile duct, esophagus, lung and bronchus, and brain and other central nervous system.
- Ohio's five-year relative survival for all cancer sites/types combined (66.0 percent) was statistically significantly lower than that of the United States (67.1 percent).
- The counties with the lowest five-year relative survival were located mostly in southern and southeastern Ohio.
- Females had higher five-year relative survival than males, and blacks typically had lower five-year relative survival than whites.
- In general, survival decreased with advancing age in Ohio.
- Overall, five-year relative survival was 91.4 percent when cancers were diagnosed at an early (local) stage but only 24.9 percent when diagnosed at the distant (latest) stage.
- Cancer patients in Ohio with private insurance at diagnosis had better survival outcomes than those who were uninsured or had other types of health insurance.
- Cancer survival in Ohio has been improving since 1996 for all cancers combined and most cancer sites/types except cancers of the bladder, cervix, larynx and uterus.
- In Ohio, cancer survival was generally lower in the poorest counties than the most affluent counties, lower in rural counties than in urban counties and lower in Appalachian counties than in non-Appalachian counties.
- In Ohio, overall five-year relative survival among children and adolescents (ages 0-19) increased from 73.9 percent to 82.8 percent from 1996 to 2011.

This is the first Ohio-specific report to provide a comprehensive examination of five-year relative cancer survival using data from the Ohio Cancer Incidence Surveillance System (OCISS). Five-year relative survival is presented by cancer site/type, county, sex, race, age at diagnosis, stage at diagnosis, primary payer at diagnosis and county type (poorest versus most affluent, rural versus urban and Appalachian versus non-Appalachian). In addition, this report includes comparisons of five-year relative cancer survival in Ohio and the United States, trends in five-year relative survival for 23 primary cancers and all cancers combined, five-year relative survival among children and adolescents diagnosed with cancer, late effects of cancer and information on cancer survivorship care plans.

Cancer Survival by Site/Type

Ohio's five-year relative survival for all cancer sites/types combined (66.0 percent) was statistically significantly lower than that of the United States (67.1 percent) for cancer cases diagnosed from 2009 to 2015 with follow-up through December 2016. For most cancer sites/types, the five-year relative survival in Ohio was similar to that of the United States (Figure 1). Cancer sites/types with a statistically significant difference are indicated with an asterisk. For both Ohio and the United States, the five cancers with the highest five-year relative survival were prostate, thyroid, testis, melanoma of the skin and female breast cancer, while the cancer with the lowest five-year relative survival was pancreatic cancer. Appendix A-1 provides Ohio's five-year relative survival data by cancer site/type, race and sex.

Figure 1. Five-Year Relative Survival by Cancer Site/Type, Ohio and the United States, 2009-2015



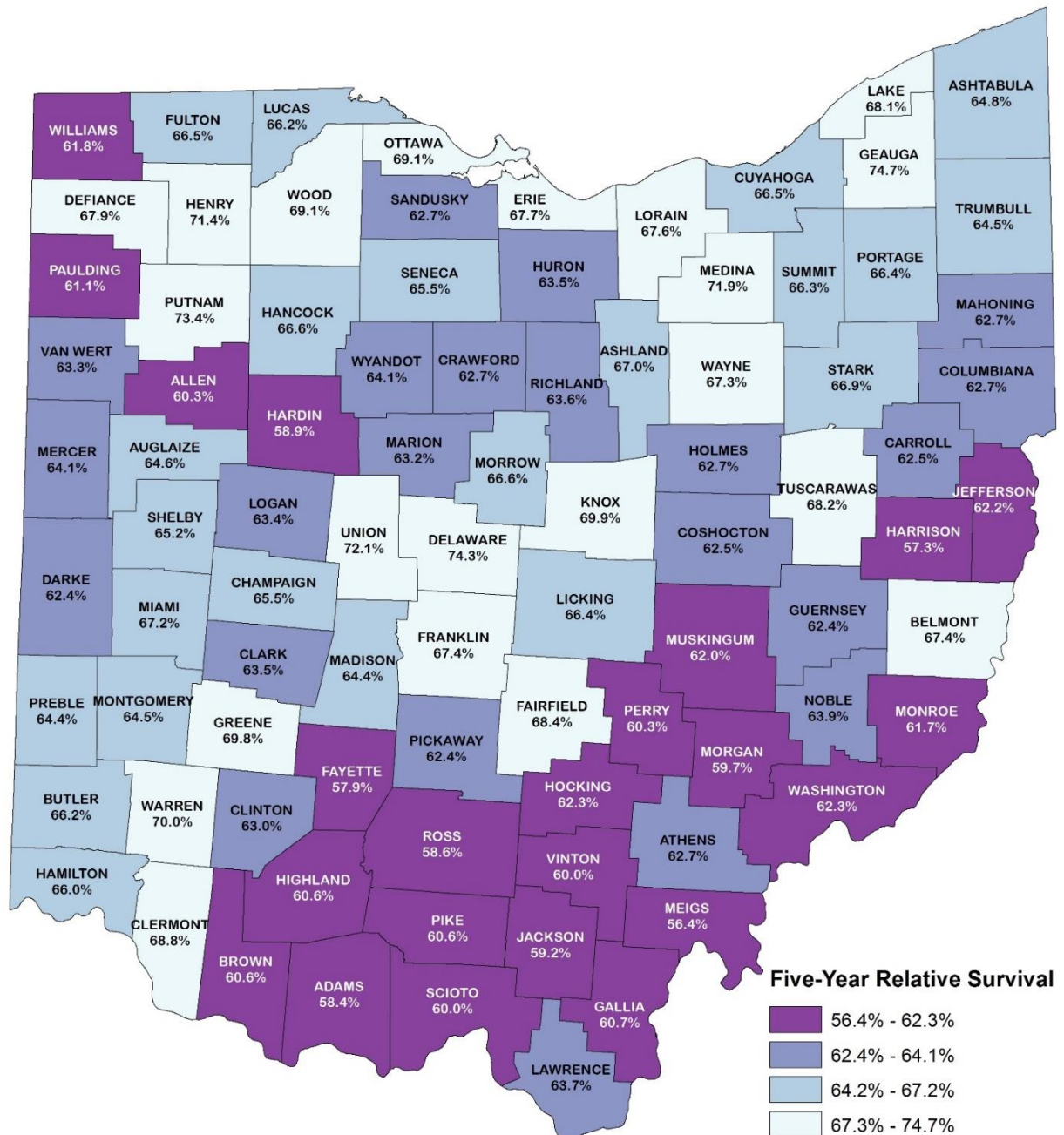
Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019; Surveillance, Epidemiology and End Results (SEER) Program, National Cancer Institute, 2019.

* Statistically significant difference between Ohio and the United States at the 95 percent confidence level.

Cancer Survival by County

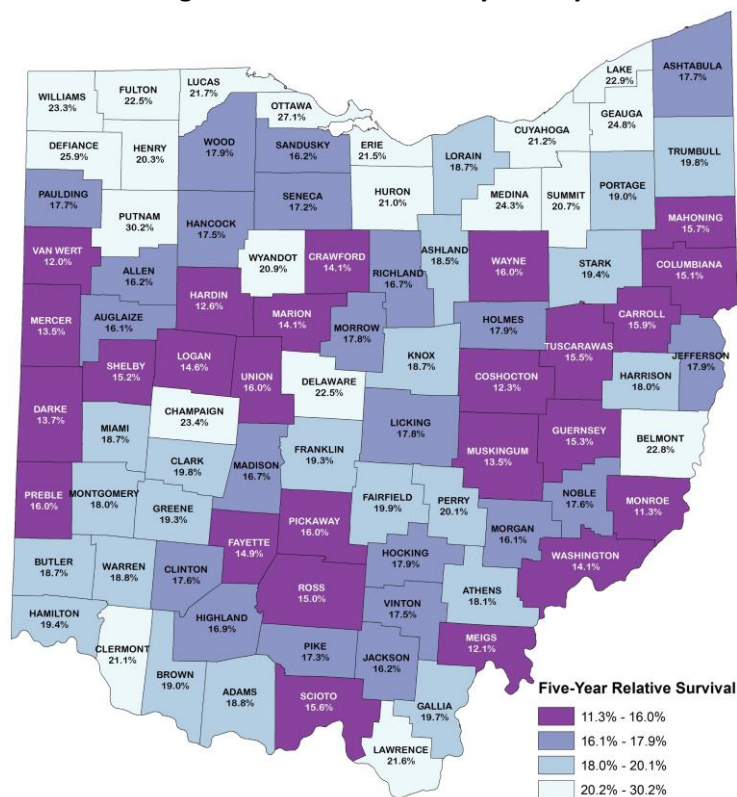
Figure 2 shows five-year relative survival for all cancer sites/types combined by county of residence during 2009-2015. County-specific five-year relative survival in Ohio ranged from 56.4 percent to 74.7 percent, compared to 66.0 percent in Ohio during 2009-2015. The counties with the lowest five-year relative survival were located mostly in southern and southeastern Ohio. Figures 3 through 6 on pages 4 and 5 show five-year relative survival for the most common cancers in Ohio by county.

Figure 2. Five-Year Relative Survival for All Cancer Sites/Types Combined by County of Residence, Ohio, 2009-2015



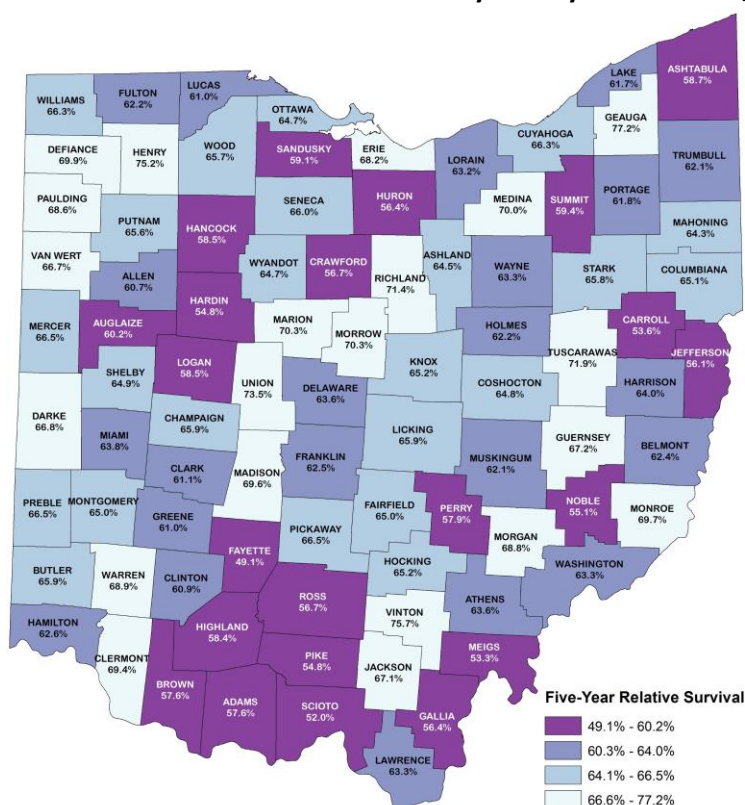
Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

Figure 3. Five-Year Relative Survival for Lung and Bronchus Cancer by County of Residence, Ohio, 2009-2015



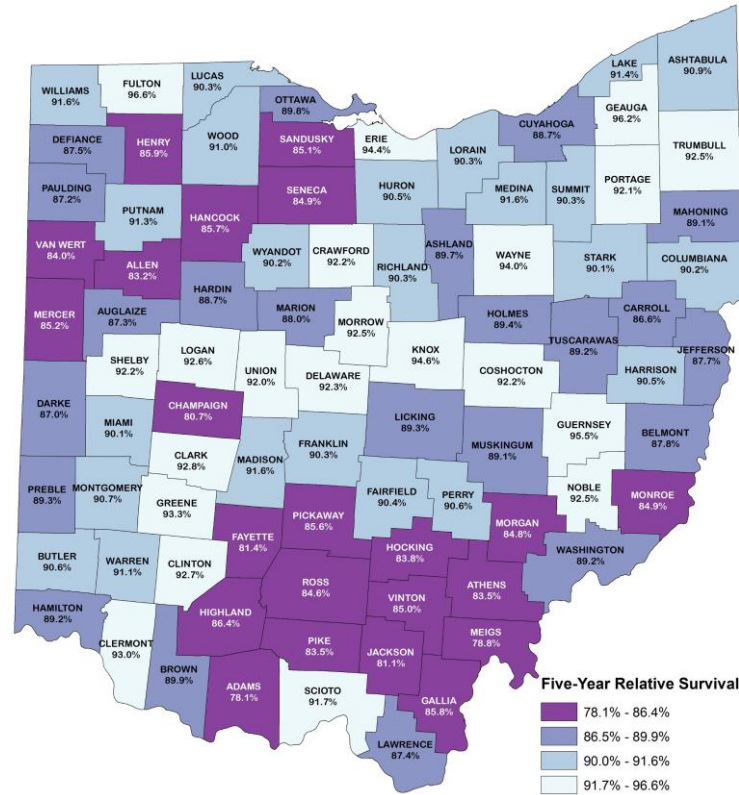
Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

Figure 4. Five-Year Relative Survival for Colon and Rectum Cancer by County of Residence, Ohio, 2009-2015



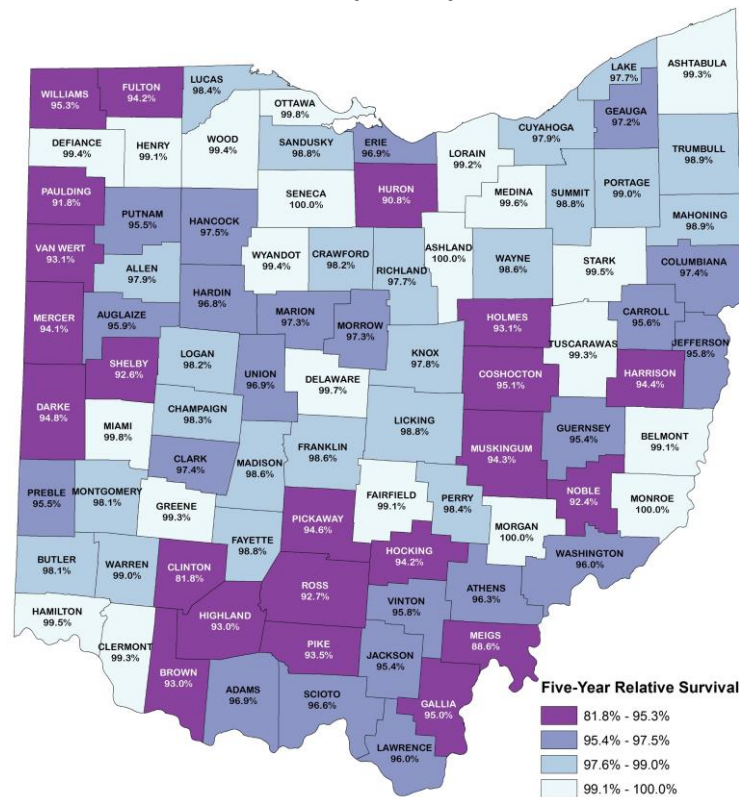
Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

Figure 5. Five-Year Relative Survival for Female Breast Cancer by County of Residence, Ohio, 2009-2015



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

Figure 6. Five-Year Relative Survival for Prostate Cancer by County of Residence, Ohio, 2009-2015

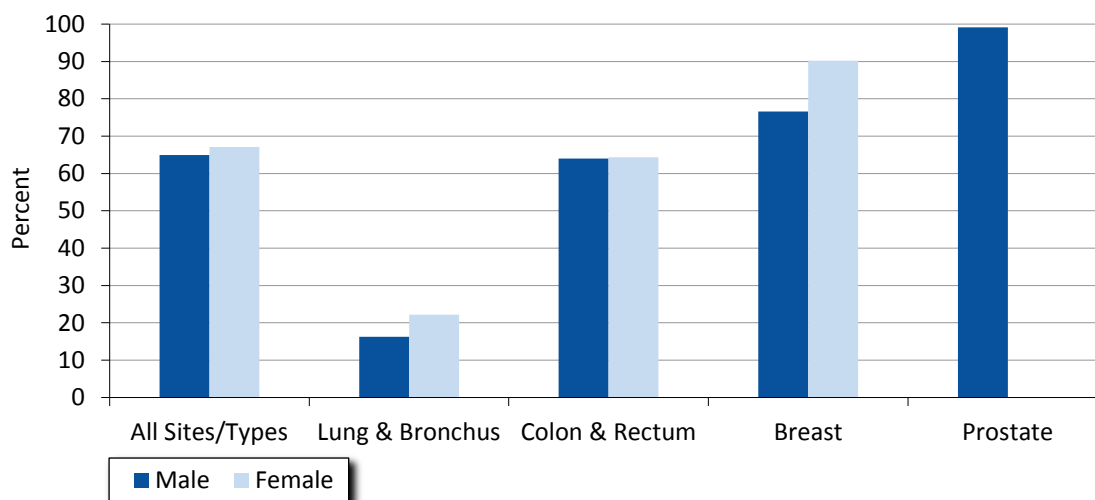


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

Cancer Survival by Sex

Figure 7 shows five-year relative survival for all cancer sites/types combined and the most common cancers by sex in 2009-2015. Among the cancer sites/types shown, lung and bronchus and breast cancer showed higher five-year relative survival among females compared to males. See Appendix A-1 for additional five-year relative survival data by cancer site/type and sex.

Figure 7. Five-Year Relative Survival by Sex for All Cancer Sites/Types and the Most Common Cancers, Ohio, 2009-2015

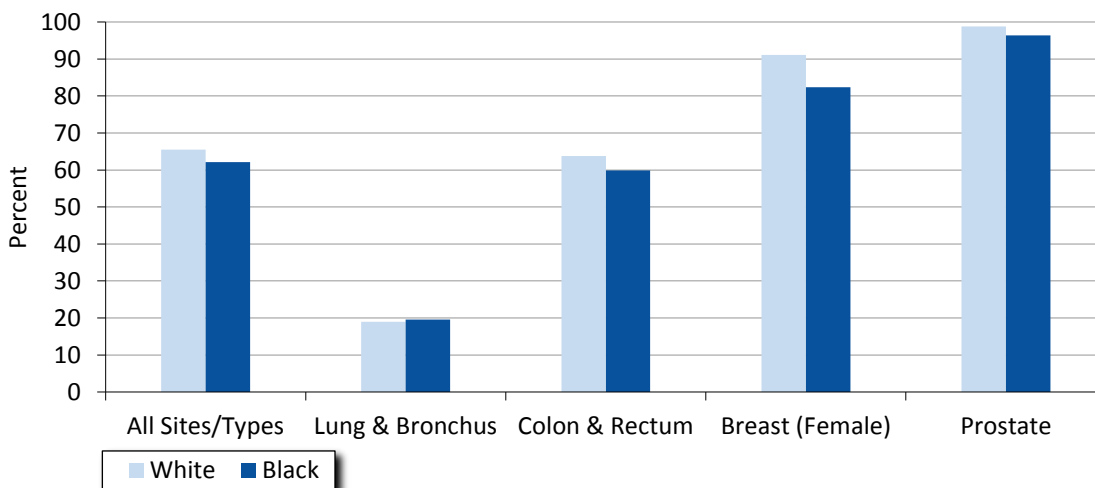


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

Cancer Survival by Race

Five-year relative survival for blacks was lower than whites for all cancer sites/types combined and the most common cancers, except for lung and bronchus cancer (Figure 8). See Appendix A-1 for additional five-year relative survival data by cancer site/type and race.

Figure 8. Five-Year Relative Survival by Race for All Cancer Sites/Types and the Most Common Cancers, Ohio, 2009-2015

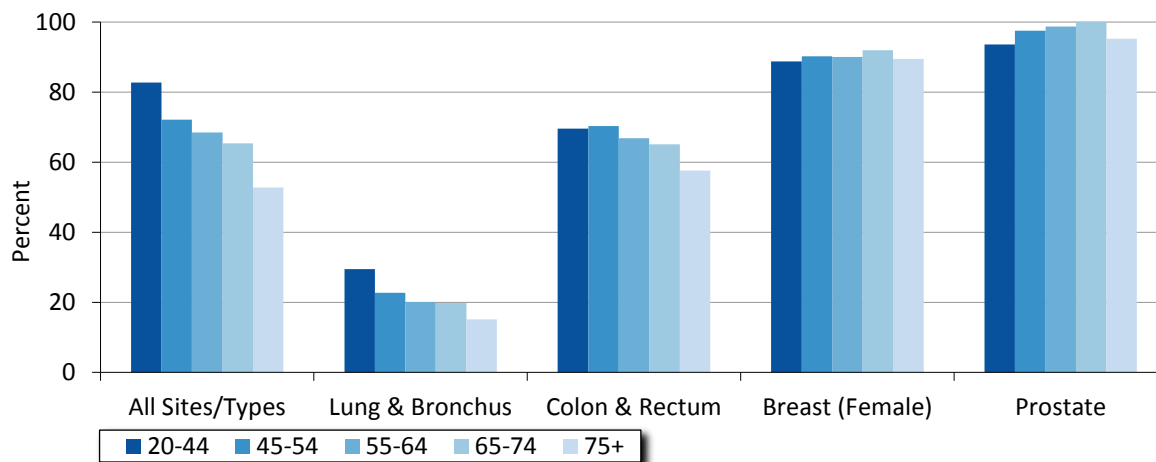


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

Cancer Survival by Age Group

Five-year relative survival for all cancer sites/types combined decreased with advancing age in Ohio in 2009-2015, from 82.7 percent among adults age 20-44 to 52.8 percent among those age 75 and older (Figure 9). However, the trends for female breast cancer and prostate cancer in Ohio did not follow this same pattern.

Figure 9. Five-Year Relative Survival by Age Group for All Cancer Sites/Types and the Most Common Cancers, Ohio, 2009-2015

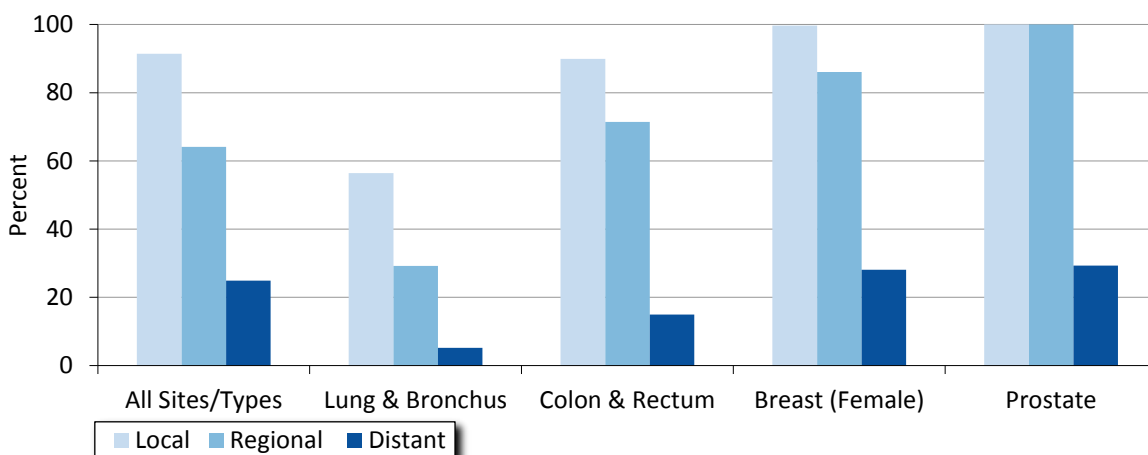


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

Cancer Survival by Stage at Diagnosis

Cancer stage at diagnosis refers to the extent or spread of a cancer in the body and is an important determinant of survival. The stages of invasive cancer, in order of increasing spread, are local, regional and distant. In Ohio, five-year relative survival for all cancer sites/types combined was 91.4 percent when diagnosed at the local stage and only 24.9 percent when diagnosed at the distant stage (Figure 10). Of the most common cancers, lung and bronchus cancer had the lowest five-year relative survival at each stage.

Figure 10. Five-Year Relative Survival by Stage at Diagnosis for All Cancer Sites/Types and the Most Common Cancers, Ohio, 2009-2015

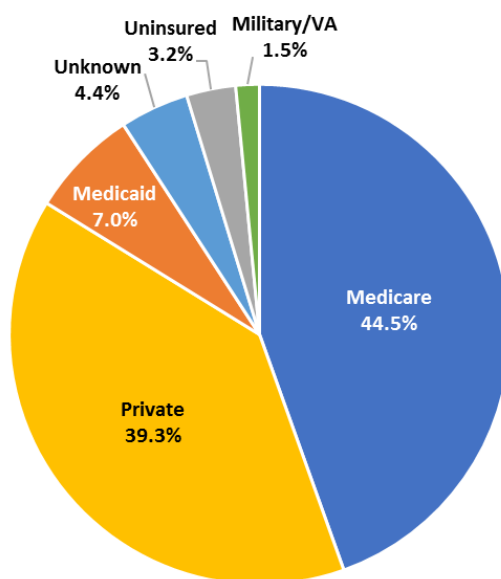


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

Cancer Survival by Primary Payer at Diagnosis

Primary payer at diagnosis (health insurance status) plays a role in cancer disparities. In this document, primary payer was categorized as Uninsured, Private, Medicaid, Medicare, Military/Veterans Affairs (VA) and Unknown (see technical notes on page 18). Most cancer patients diagnosed in 2009-2015 had a primary payer of Medicare (44.5 percent) or private insurance (39.3 percent) at the time of diagnosis (Figure 11).

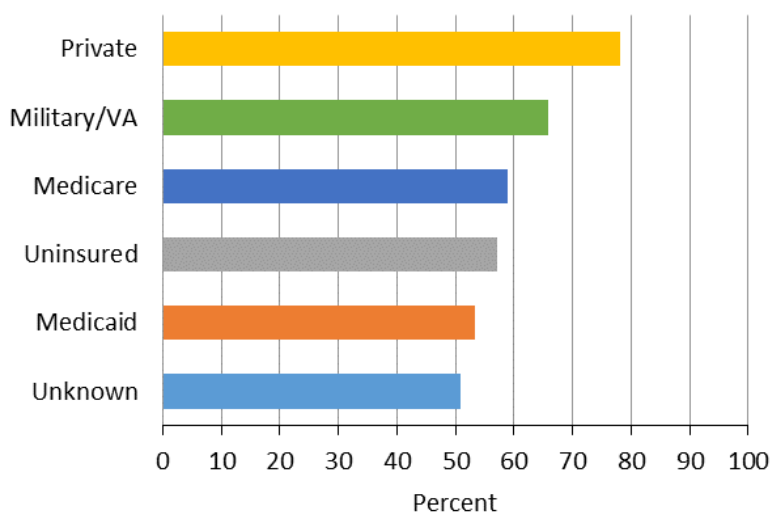
Figure 11. Distribution of Primary Payer at Diagnosis for All Cancer Sites/Types Combined, Ohio, 2009-2015



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.
VA = Veterans Affairs

Ohio cancer patients with private insurance had a higher five-year relative survival compared to those with any other type of primary payer at the time of their cancer diagnosis in 2009-2015 (Figure 12).

Figure 12. Five-Year Relative Survival by Primary Payer for All Cancer Sites/Types Combined, Ohio, 2009-2015

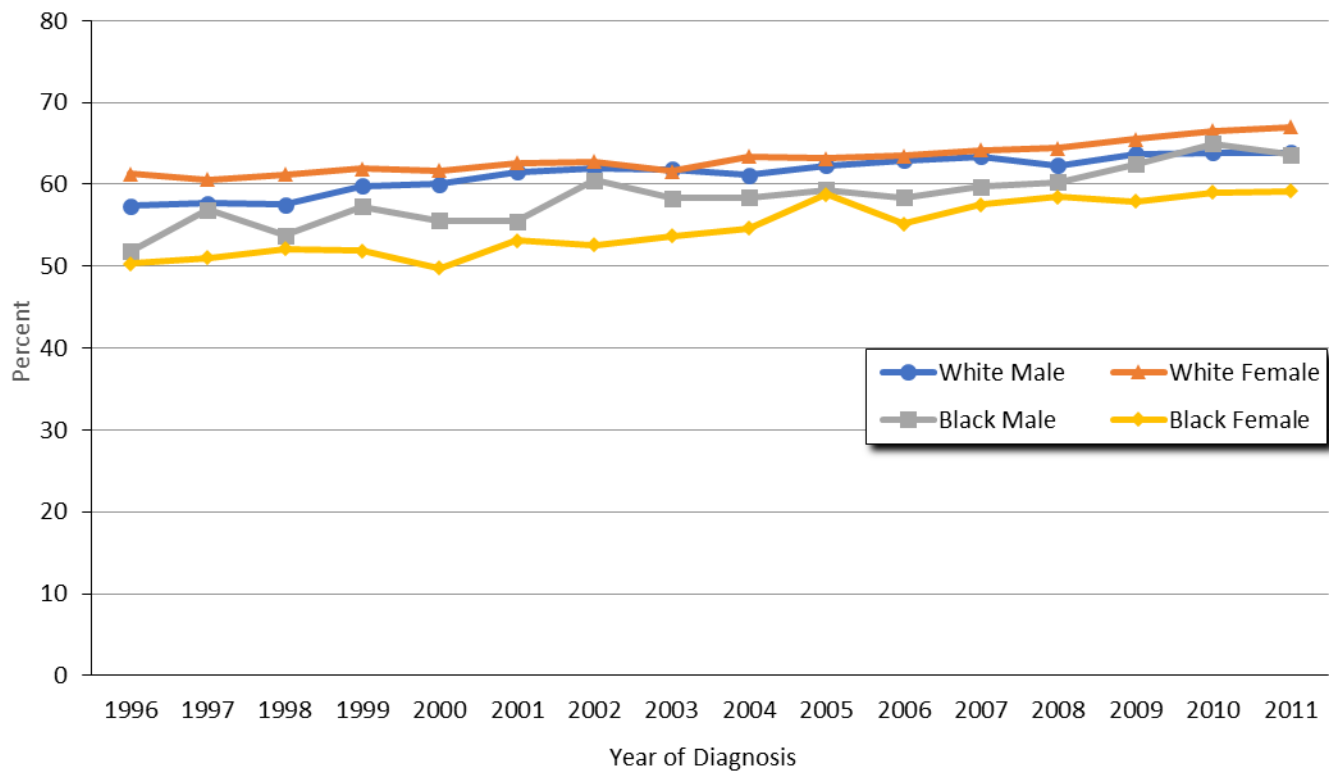


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.
VA = Veterans Affairs

Cancer Survival Trends

Figure 13 shows that five-year relative survival increased for all cancer sites/types combined for all sex and race groups from 1996 to 2011, the latest diagnosis year examined for trends. White females had the highest five-year relative survival for each year except 2003, while black females had the lowest five-year relative survival from 1996 to 2011. Black males had the greatest increase in five-year relative survival, from 51.8 percent in 1996 to 63.6 percent in 2011.

Figure 13. Trends in Five-Year Relative Survival for All Cancer Sites/Types Combined by Sex and Race, Ohio, 1996-2011

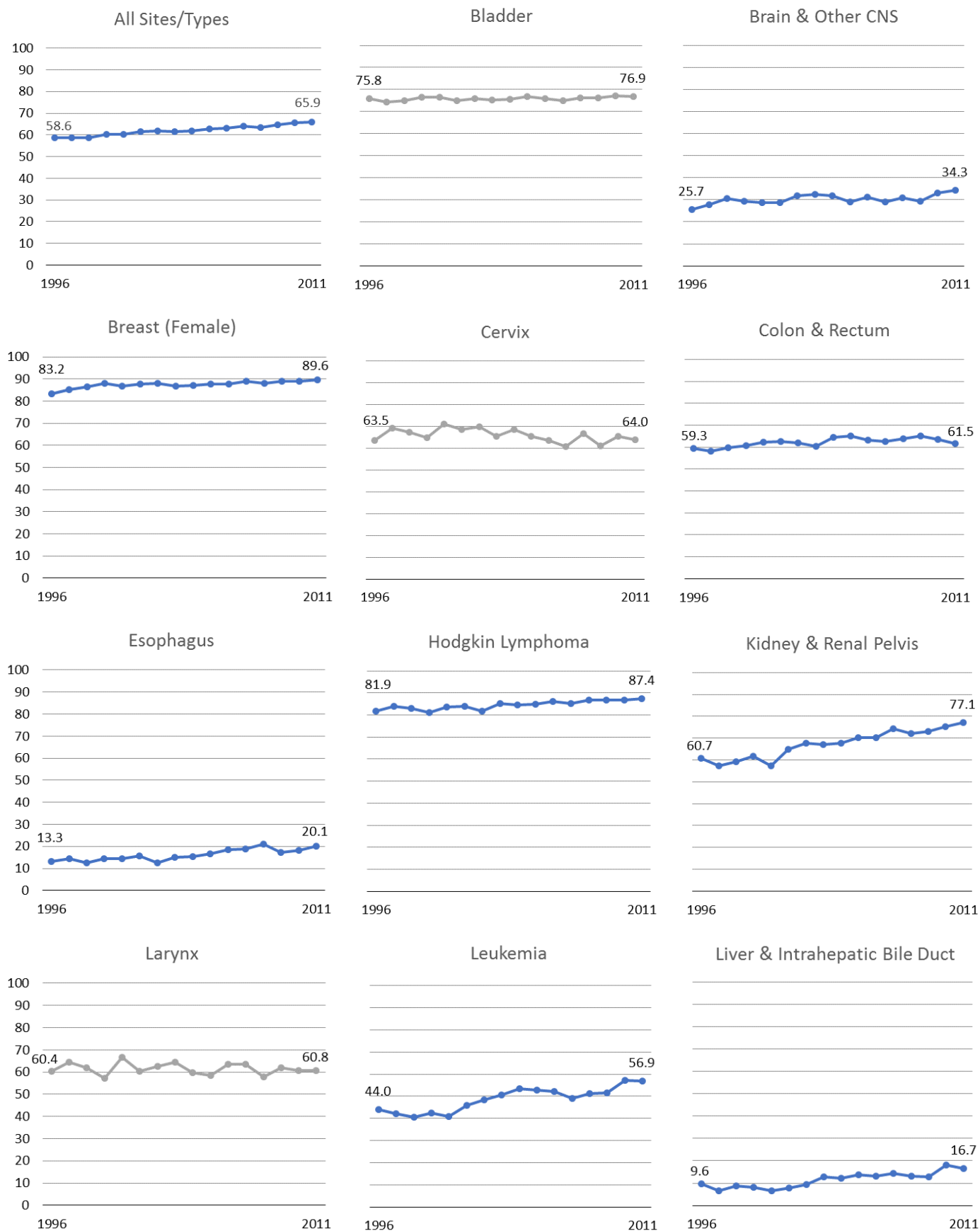


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

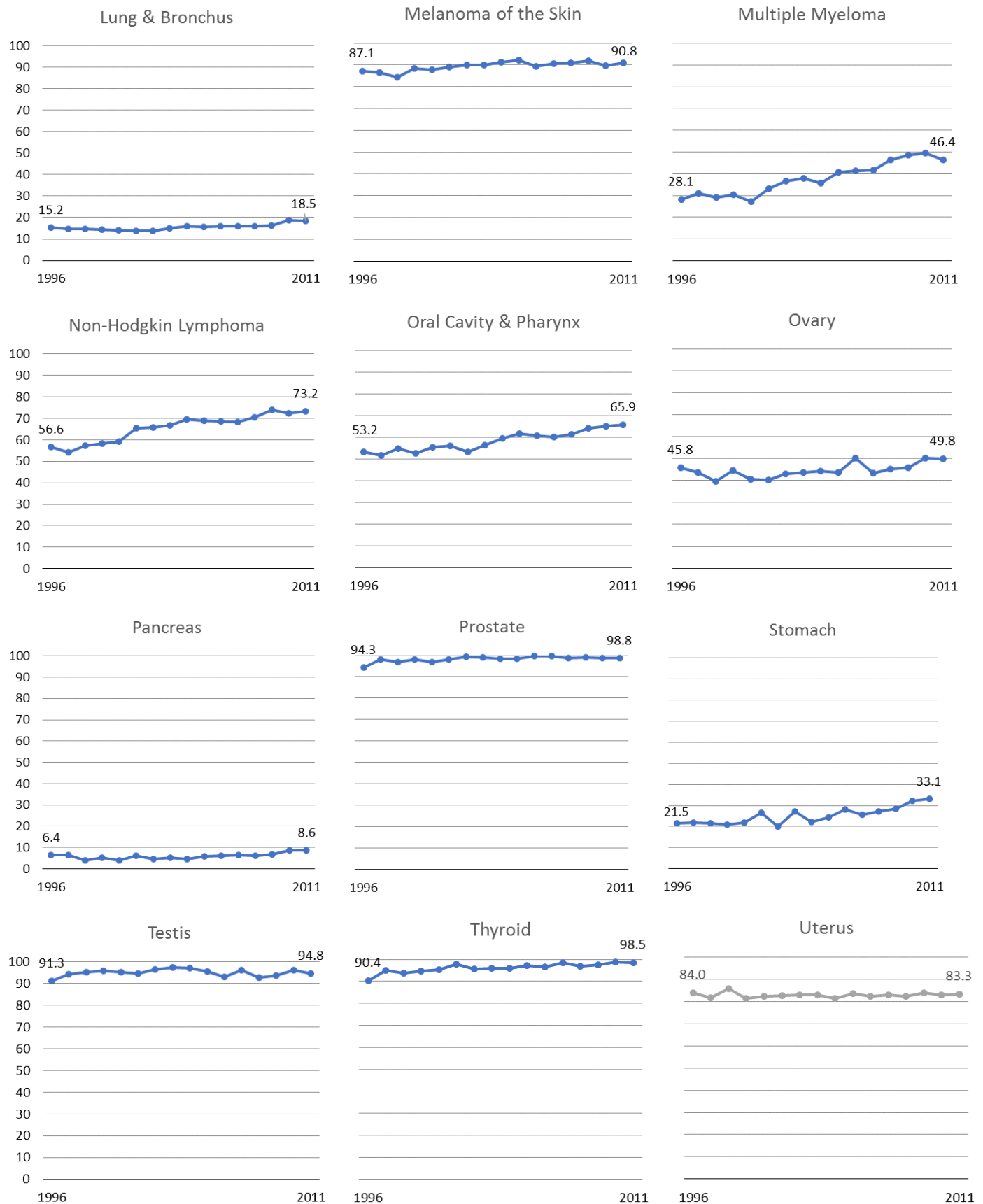
As shown in the figures on pages 10 and 11, cancer survival in Ohio has been improving since 1996 for most cancer sites/types. These trends are shown in blue. Overall, five-year relative survival for all cancer sites/types combined increased from 58.6 percent in 1996 to 65.9 percent in 2011. The five-year relative survival for the blood-related cancers, including leukemia, non-Hodgkin lymphoma and multiple myeloma, substantially improved during this time period, due in part to specific advances in the treatment of these cancers. Cancers of the kidney and renal pelvis, oral cavity and pharynx, liver and intrahepatic bile duct, and stomach also had substantive increases in five-year relative survival from 1996 to 2011.

Cancers that had relatively stable trends in five-year relative survival in Ohio during 1996 to 2011 (bladder, cervix, larynx and uterus) are shown in gray.

Trends in Five-Year Relative Survival by Cancer Site/Type, Ohio, 1996-2011



Trends in Five-Year Relative Survival by Cancer Site/Type, Ohio, 1996-2011, continued



Cancer Survival: Poorest versus Most Affluent Counties

Figure 14 shows the difference in five-year relative survival for cases diagnosed in 2009-2015 between the poorest and most affluent counties in Ohio. The percent of the population in poverty was based on the 2011-2015 American Community Survey from the U.S. Census Bureau. Counties with poverty rates of 20 percent or more were defined as the poorest counties and those with poverty rates of less than 10 percent were defined as the most affluent counties (see map at right). Five-year relative survival for all but one of the 23 primary cancer sites/types (liver and intrahepatic bile duct) was lower among residents in the poorest counties compared to the most affluent counties. The cancers that had a statistically significantly lower five-year relative survival in the poorest counties in Ohio included colon and rectum cancer and all sites/types combined. For all cancers combined, residents in the poorest counties had a five-year relative survival that was 6.8 percentage points lower than those in the most affluent counties (see Appendix A-2).

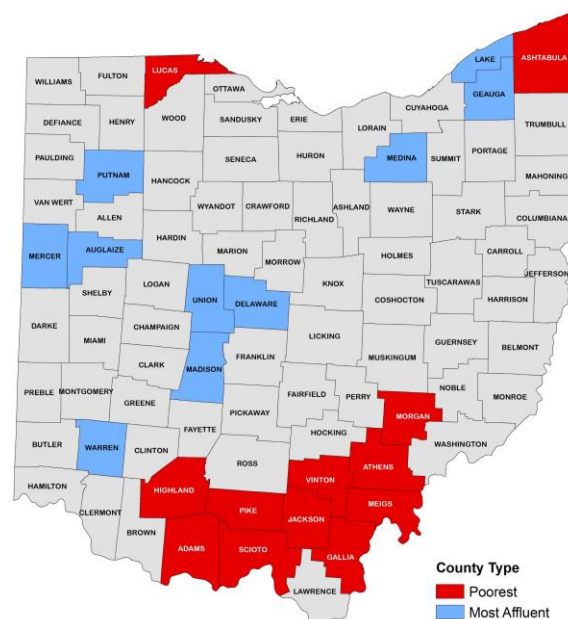
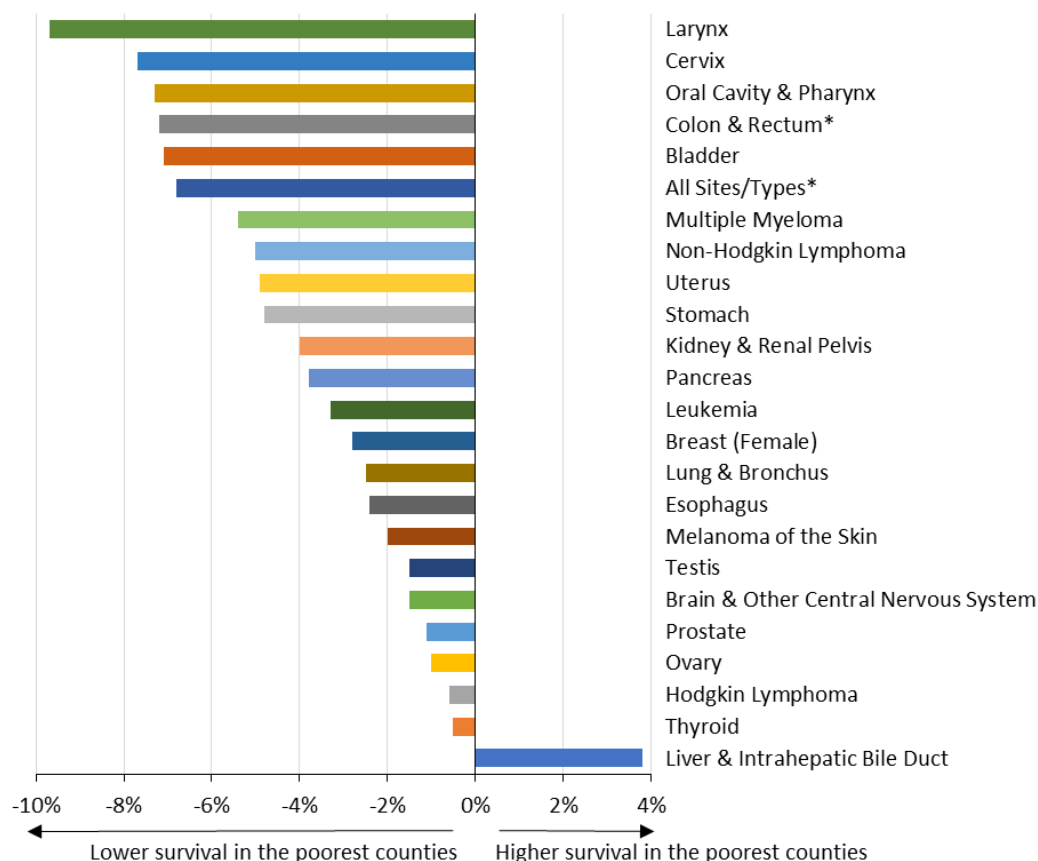


Figure 14. Difference in Five-Year Relative Survival by Cancer Site/Type Between the Poorest and Most Affluent Counties, Ohio, 2009-2015



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

* Statistically significantly lower survival in the poorest counties compared to the most affluent counties.

Cancer Survival: Rural versus Urban Counties

Figure 15 shows the difference in five-year relative survival for cases diagnosed in 2009-2015 between rural (non-metropolitan) counties and urban (metropolitan) counties in Ohio, based on the 2013 Rural-Urban Continuum Codes (see map at right). Five-year relative survival for all but three of the 23 primary cancer sites/types was lower among residents in the rural counties compared to the urban counties. The cancers that had a statistically significantly lower five-year relative survival in rural counties in Ohio included multiple myeloma, brain and other central nervous system (CNS) cancer, all sites/types combined, and lung and bronchus cancer. For all cancers combined, rural residents had a five-year relative survival that was 2.7 percentage points lower than urban residents (see Appendix A-3).

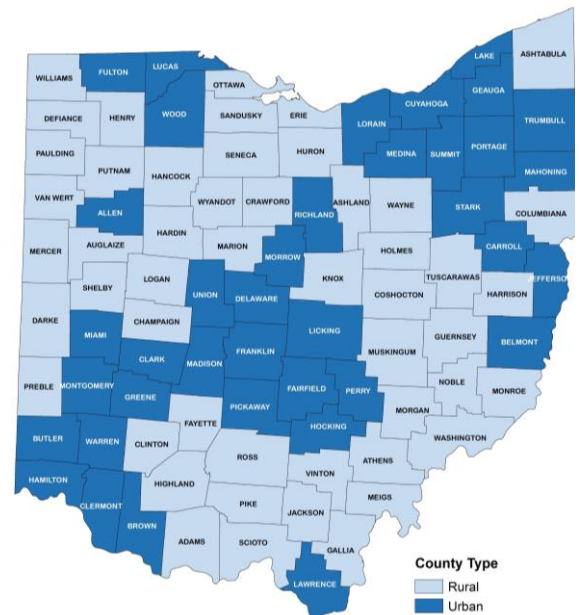
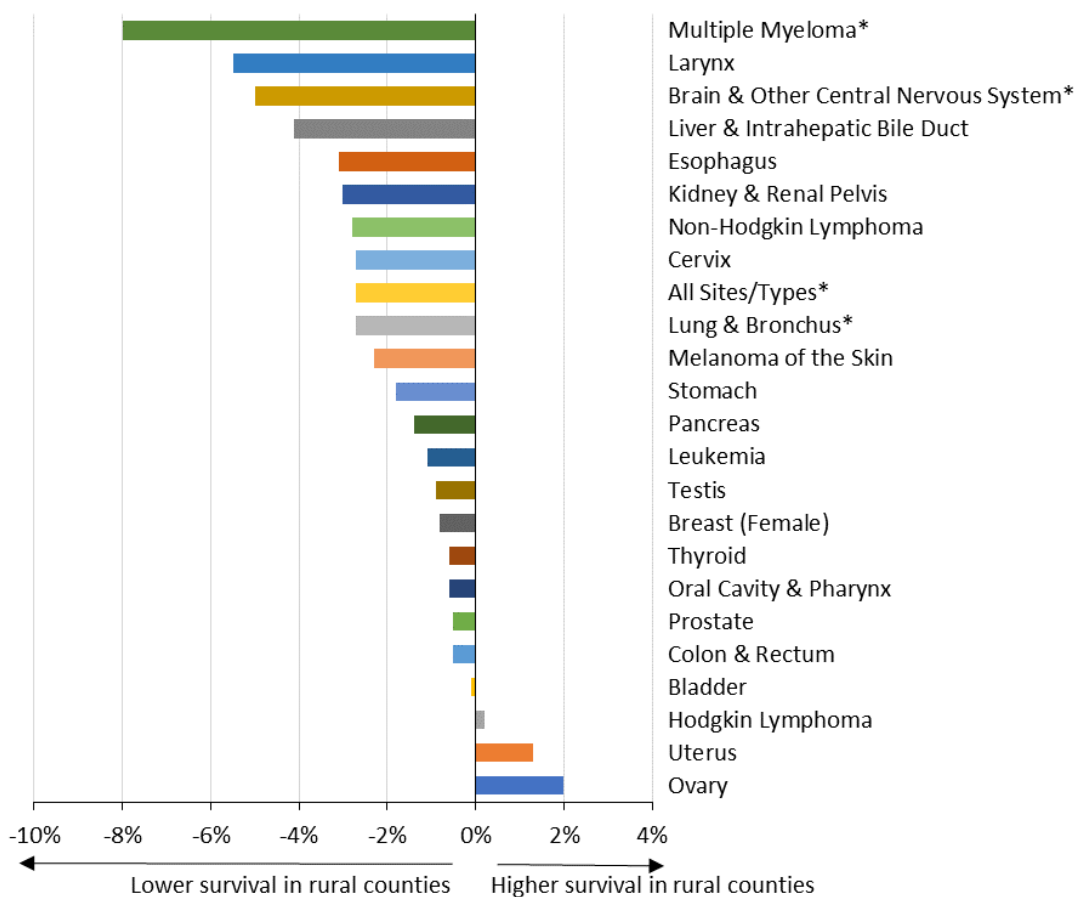


Figure 15. Difference in Five-Year Relative Survival by Cancer Site/Type Between Rural and Urban Counties, Ohio, 2009-2015



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

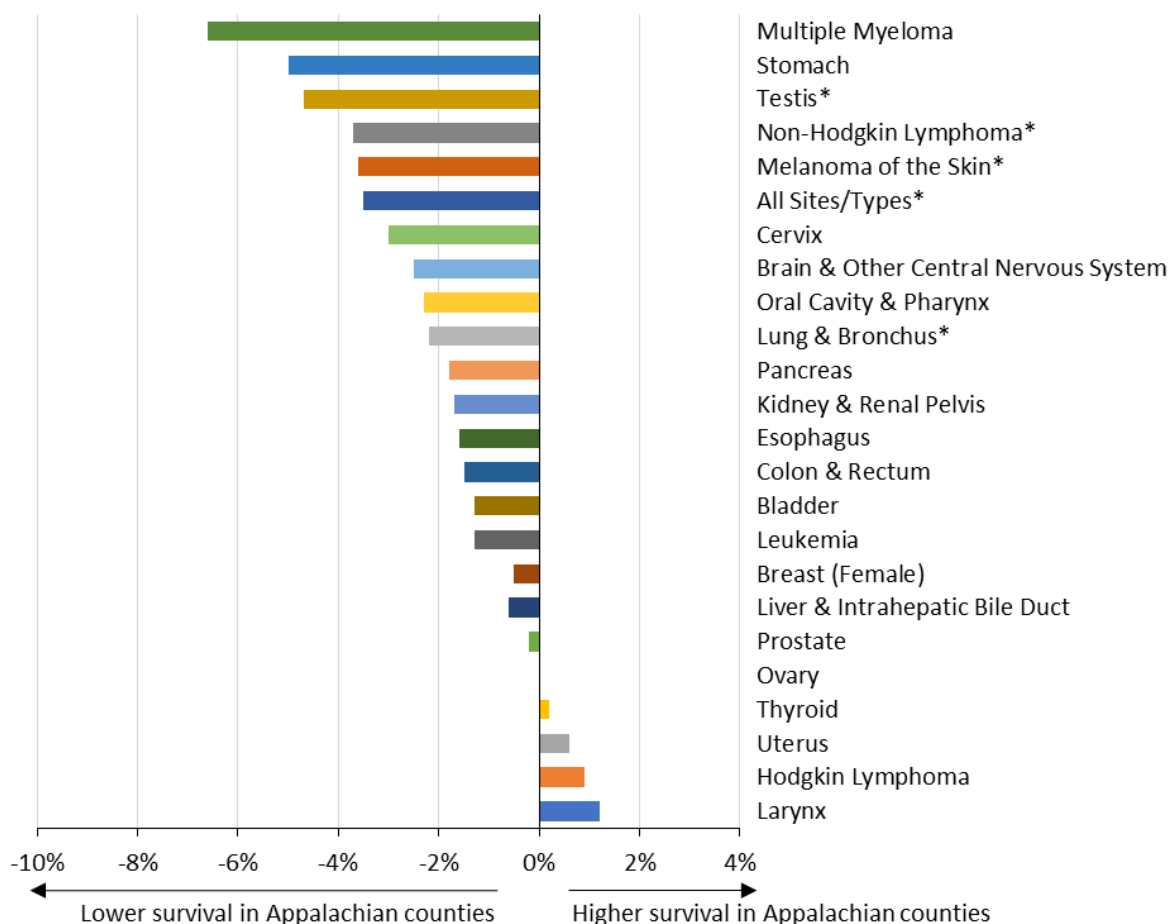
* Statistically significantly lower survival in rural counties than in urban counties.

Cancer Survival: Appalachian versus non-Appalachian Counties

Figure 16 shows the difference in five-year relative survival for cases diagnosed in 2009-2015 between Appalachian and non-Appalachian counties in Ohio (see map at right). Five-year relative survival for all but five of the 23 primary cancer sites/types was lower among residents in the Appalachian counties compared to the non-Appalachian counties. The cancer sites/types that had a statistically significantly lower five-year relative survival in Appalachian counties in Ohio included testis, non-Hodgkin lymphoma, melanoma of the skin, all cancer sites/types combined, and lung and bronchus. For all cancers combined, Appalachian residents had a five-year relative survival that was 3.5 percentage points lower than non-Appalachian residents (see Appendix A-4).



Figure 16. Difference in Five-Year Relative Survival by Cancer Site/Type Between Appalachian and non-Appalachian Counties, Ohio, 2009-2015



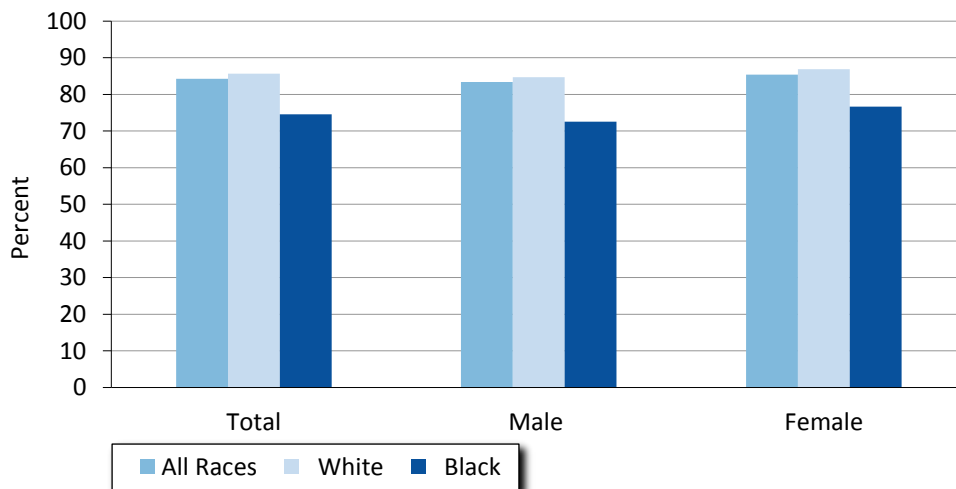
Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

* Statistically significantly lower survival in Appalachian counties than in non-Appalachian counties.

Cancer Survival Among Children and Adolescents

The types of cancer that develop in children and adolescents (ages 0-19) differ from those that develop in adults. The most common cancer sites/types among children and adolescents include leukemia and brain and other CNS. Five-year relative survival for children and adolescents was 84.3 percent for all cancer sites/types combined, 84.3 percent for leukemia and 77.4 percent for brain and other CNS cancer. Five-year relative survival was 13.0 percent lower among black children and adolescents (74.6 percent), compared to whites (85.7 percent). In addition, five-year relative survival was 2.3 percent lower among boys (83.4 percent), compared to girls (85.4 percent) (Figure 17).

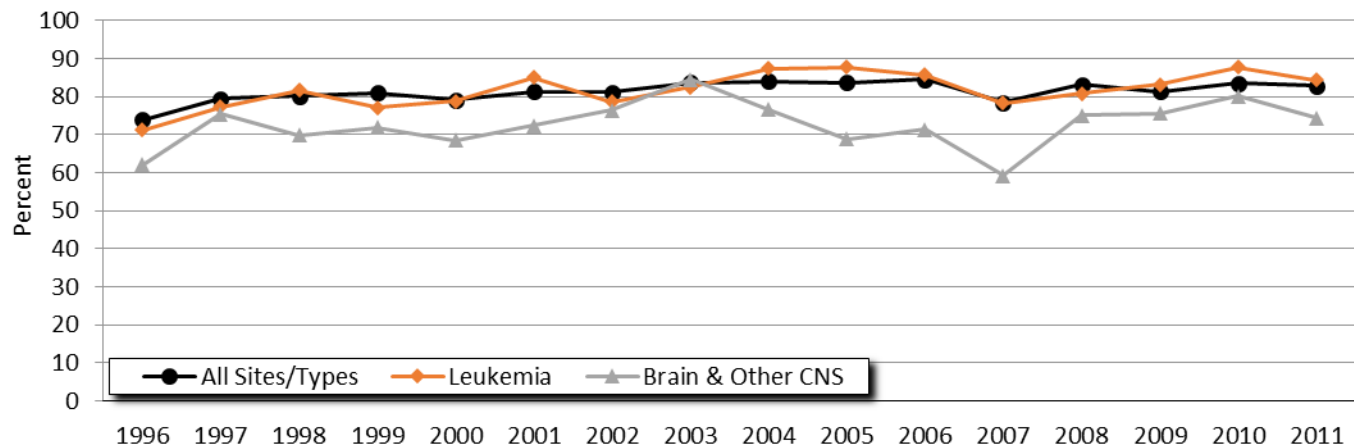
Figure 17. Five-Year Relative Survival by Race and Sex among Children and Adolescents (Ages 0-19), Ohio, 2009-2015



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

In Ohio, the overall five-year relative survival among children and adolescents increased from 73.9 percent in 1996 to 82.8 percent in 2011. There was an increase in five-year relative survival for leukemia from 1996 (71.2 percent) to 2011 (84.4 percent), while five-year relative survival for brain and other CNS cancer was variable during this time period (Figure 18).

Figure 18. Trends in Five-Year Relative Survival for All Cancer Sites/Types Combined and the Most Common Cancers among Children and Adolescents (Ages 0-19), Ohio, 1996-2011



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

CNS = Central Nervous System

Late Effects

Many cancer survivors experience late effects, which are health problems that occur months or years after cancer is diagnosed or after treatment has ended. Late effects are related to many factors, including the cancer site/type, treatment received (including dose and location) and characteristics of the survivor (including sex, age at diagnosis, genetics, family history and health-related behaviors). Late effects include:

- **Emotional/Psychological difficulties:** These may include anxiety, depression and fear of recurrence.
 - **Secondary cancers:** Cancer treatment can sometimes cause a new cancer many years after treatment is complete. Radiation therapy and some types of chemotherapy have the strongest links to secondary cancers.
 - **Brain changes and learning and memory problems:** Some chemotherapy drugs and radiation therapy to the brain can cause memory loss, problems concentrating and processing information, personality changes and movement problems. Children who received radiation therapy to the brain or high doses of certain drugs may be more likely to have these problems.
 - **Bone loss and joint changes:** Some chemotherapy drugs, steroid medicines, hormonal therapy and radiation therapy may cause thinning or loss of the bones. These problems can lead to loss of motion in some joints.
 - **Heart problems:** Certain chemotherapy drugs and radiation therapy to the chest may cause heart problems, including abnormal heart rhythms, leaky heart valves, congestive heart failure and coronary artery disease.
 - **Lung and breathing problems:** Chemotherapy and radiation therapy to the chest may damage the lungs. Children who received cancer treatment at a younger age have a greater risk of lung and breathing problems.
 - **Dental problems:** Radiation therapy to the mouth, head or neck may cause dry mouth, gum disease and cavities. Chemotherapy, especially when given to a child whose adult teeth have not formed, may affect tooth development.
 - **Digestive system problems:** Abdominal or pelvic surgery and radiation therapy to the neck, chest, abdomen or pelvis can result in gastrointestinal problems.
 - **Hearing loss:** Treatment with certain chemotherapy drugs and high doses of radiation to the brain can cause hearing loss. Younger children have a higher risk.
 - **Vision and eye problems:** Chemotherapy, hormone therapy, immunotherapy and steroid medicines may increase the risk of cataracts, a clouding of the lens in the eye that affects vision. Some chemotherapy drugs and bone marrow/stem cell transplants increase the risk for dry eyes. Radioiodine treatment for thyroid cancer may cause the overproduction of tears.
 - **Lymphedema:** Lymphedema, a problem in which the lymph fluid does not drain properly, builds up in tissues and causes swelling, can result from surgery to remove lymph nodes or by radiation therapy to areas with large numbers of lymph nodes.
 - **Endocrine/Hormone problems:** In boys, some chemotherapy drugs and radiation therapy to the lower abdomen, pelvis or testicles may cause infertility. In girls, chemotherapy and radiation therapy to the abdomen, pelvis or lower spine can cause infertility, irregular periods and early menopause. In boys and girls, treatments also change levels of hormones, which can affect puberty and sexual functioning. In addition, radiation therapy to the brain can affect the pituitary glands and the endocrine system, potentially affecting fertility, growth and puberty. Many cancer treatments may cause women to have menopausal symptoms, including hot flashes and changes in mood or sexual desire. Among men, hormone therapy for prostate cancer or surgery to remove testicles may also result in hormone-related changes to sexual desire, hot flashes and osteoporosis.
 - **Peripheral neuropathy:** Some chemotherapy drugs can cause nerve damage, resulting in weakness, numbness, tingling or pain, especially in the hands or feet.
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Cancer Survivorship Care Plans

In 2006, the Institute of Medicine released a report recommending all cancer patients receive an individualized survivorship care plan to provide guidelines for monitoring and maintaining their health after completing their cancer treatment. Survivorship care plans generally include a medical history and summary of cancer treatment; information about cancer screening guidelines and prevention; risks from treatment; and resources for health care and support services. Survivorship care plans help the patient advocate for their care and provide a roadmap for their health care providers after cancer treatment. Several groups have developed survivorship care plan templates including:

- *What's Next?: Life After Cancer Treatment*, Minnesota Cancer Alliance
http://mncanceralliance.org/wp-content/uploads/2013/07/SurvivorCarePlan3202012_Final.pdf
- *Journey Forward*, National Coalition for Cancer Survivorship, UCLA's Cancer Survivorship Center, Wellpoint, Inc., Genetech
<https://www.journeyforward.org/>
- *American Society of Clinical Oncology Cancer Treatment Summaries*
<https://www.cancer.net/survivorship>
- *OncoLife Survivorship Care Plan*
<https://oncolife.oncolink.org/>
- *Long-Term Follow-Up Guidelines for Survivors of Childhood, Adolescent, and Young Adult Cancers*, Children's Oncology Group
http://www.survivorshipguidelines.org/pdf/2018/COG_LTFU_Guidelines_v5.pdf

The American College of Surgeons Commission on Cancer requires institutions to offer survivorship care plans to at least 75 percent of eligible patients in order to maintain their accreditation. Eligible patients include those with initial stage I, II or III cancer occurrences treated with curative intent.

https://www.facs.org/~media/files/quality%20programs/cancer/coc/2016%20coc%20standards%20manual_interactive%20pdf.ashx

Survivorship Supplemental Funding for Comprehensive Cancer Control Programs

The Ohio Comprehensive Cancer Control Program (CCCP) at the Ohio Department of Health (ODH) was recently awarded supplemental funding from the Centers for Disease Control and Prevention (CDC) to support the implementation of specific activities to increase the duration and quality of life of cancer survivors. These activities include the following evidence-based survivorship strategies:

- Implement surveillance strategies to drive initiatives for cancer survivors.
- Identify and partner with health systems to use Electronic Health Record (EHR) data for survivorship care planning.
- Develop and implement strategies that facilitate community-clinical linkages to access community resources to support survivorship initiatives.
- Promote and disseminate resources to increase knowledge among cancer survivors and physicians of guidelines for follow-up care.

This is the first time the CCCP has received supplemental funding dedicated to cancer survivorship.

Technical Notes

Confidence Interval (CI): An estimated range of values for a measure (e.g., relative survival) constructed so that the range has a specified probability of including the true value of the measure in the population. Estimates of five-year relative survival are presented with 95 percent confidence intervals in Appendices A-2 to A-4.

Invasive Cancer: A malignant tumor that has spread beyond the layer of tissue in which it developed and is growing into surrounding, healthy tissues. Survival statistics in this report include all invasive cancer cases with the addition of *in situ* bladder cancer cases.

Primary Payer at Diagnosis: A cancer patient's insurance status the first time they are seen or present at a facility. Using codes from the North American Association of Central Cancer Registries (NAACCR), primary payer was recoded into in the following groups:

- **Uninsured:** Not insured; Not insured, self-pay
- **Private:** Insurance, NOS (not otherwise specified); Private insurance (Managed Care, HMO, PPO); Private insurance, fee-for-service
- **Medicaid:** Medicaid; Medicaid - Administered through a Managed Care plan
- **Medicare:** Medicare/Medicare, NOS; Medicare with supplement, NOS; Medicare - Administered through a Managed Care plan; Medicare with private supplement; Medicare with Medicaid eligibility
- **Military/VA:** TRICARE; Military; Veterans Affairs (VA)
- **Unknown:** Insurance status unknown

Relative Survival: The percentage of people alive at a designated time point after a cancer diagnosis (usually five years) divided by the percentage expected to be alive in the absence of cancer based on normal life expectancy. Relative survival is also called the relative survival probability or the relative survival rate. The OCIS database (January 2019) was used in the analysis with the following criteria: (1) All Ohio invasive and *in situ* bladder cases diagnosed in 2009-2015 with a follow-up cutoff of December 2016; (2) first primary cancer diagnosis only (sequence number 0 or 1); and (3) all ages at diagnosis included. The survival duration in months was calculated with all patients presumed alive if not known to be deceased. Expected survival was estimated using the Ederer II method. Relative survival statistics were calculated using life tables based on county-level socioeconomic status, geography and race. Survival calculations were conducted using the actuarial method on monthly intervals. Relative survival data in this report were calculated using SEER*Stat software version 8.3.5. Where the relative cumulative survival was more than 100 percent or increased from a prior interval, it was adjusted by SEER*Stat. For more information on survival analysis using SEER*Stat, see: <https://seer.cancer.gov/seerstat/tutorials/survival1>.

Statistical Significance: In this document, statistical significance describes a mathematical measure of difference between groups. The difference is said to be significant if it is greater than what might be expected to happen by chance alone at a specified level. For each cancer site/type, the 95 percent confidence intervals between the two groups were compared to determine if the estimates of five-year relative survival were significantly different. The difference was considered statistically significant if the confidence intervals did not overlap.

Stage at Diagnosis: The extent or spread of the disease from the site of origin, often classified into the following stages:

- ***in situ*:** Noninvasive cancer that has not penetrated surrounding tissue.
 - **Local:** A malignant tumor confined entirely to the organ of origin.
 - **Regional:** A malignant tumor that has extended beyond the organ of origin directly into surrounding organs or tissues or into regional lymph nodes.
 - **Distant:** A malignant tumor that has spread to parts of the body (distant organs, tissues and/or lymph nodes) remote from the primary tumor.
 - **Unstaged/Missing:** Insufficient information is available to determine the stage or extent of the disease at diagnosis.
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References

American Cancer Society. *Cancer Facts & Figures 2019*. Atlanta, GA: American Cancer Society; 2019.

<https://www.cancer.org/research/cancer-facts-statistics/all-cancer-facts-figures/cancer-facts-figures-2019.html>

National Cancer Institute. Surveillance, Epidemiology and End Results (SEER) Program. *SEER Cancer Statistics Review (CSR)*, 1975-2016, April 2019. https://seer.cancer.gov/csr/1975_2016/

Sources of Data and Additional Information

Ohio Cancer Incidence Surveillance System:

<https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/ohio-cancer-incidence-surveillance-system/welcome-to>

National Cancer Institute:

<https://www.cancer.gov/>

American Cancer Society:

<https://www.cancer.org/>

United States Cancer Statistics (USCS):

<https://www.cdc.gov/cancer/uscs/>

Appendices

Table A-1. Five-Year Relative Survival (Percent) by Cancer Site/Type, Race and Sex, Ohio, 2009-2015

Cancer Site/Type	All Races			White			Black		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
All Sites/Types	66.0	64.9	67.1	65.5	63.7	67.4	62.1	64.0	60.1
Bladder	77.4	79.0	72.4	76.9	78.4	71.9	66.7	68.6	63.2
Brain & Other CNS	31.7	30.4	33.4	30.4	29.1	32.1	39.9	38.8	40.6
Breast	90.1	76.6	90.2	90.9	74.9	91.1	82.4	81.1	82.4
Cervix	NA	NA	65.5	NA	NA	65.6	NA	NA	59.5
Colon & Rectum	64.1	64.0	64.3	63.8	63.8	63.9	59.9	58.4	61.3
Esophagus	19.0	19.2	18.3	19.2	19.5	18.0	12.4	11.2	15.2
Hodgkin Lymphoma	87.3	87.1	87.3	86.8	86.6	86.8	88.2	87.7	88.1
Kidney & Renal Pelvis	76.6	76.1	77.4	76.2	75.7	77.0	78.6	77.3	79.7
Larynx	61.5	61.8	60.5	61.7	62.5	59.4	58.7	55.0	68.0
Leukemia	57.0	58.2	55.5	56.3	57.5	54.6	53.7	55.1	52.3
Liver & Intrahepatic Bile Duct	17.4	16.4	19.7	16.8	15.6	19.5	17.0	16.9	17.2
Lung & Bronchus	19.1	16.3	22.2	19.0	16.2	22.1	19.6	16.8	22.6
Melanoma of the Skin	92.1	90.5	93.7	90.7	88.8	92.8	72.2	76.1	69.4
Multiple Myeloma	50.6	51.4	49.7	49.1	50.3	47.7	55.3	55.1	55.3
Non-Hodgkin Lymphoma	73.0	71.7	74.5	72.6	71.1	74.3	71.1	70.3	71.8
Oral Cavity & Pharynx	66.2	64.6	70.1	66.7	65.2	70.6	57.2	55.0	61.5
Ovary	NA	NA	48.7	NA	NA	48.2	NA	NA	48.4
Pancreas	9.2	8.8	9.7	9.1	8.7	9.5	8.5	7.0	9.6
Prostate	NA	99.1	NA	NA	98.8	NA	NA	96.4	NA
Stomach	33.2	30.0	39.0	32.0	29.0	38.1	35.1	32.9	37.3
Testis	NA	95.0	NA	NA	95.1	NA	NA	85.4	NA
Thyroid	98.9	96.0	99.3	98.9	95.9	99.3	98.4	92.2	99.2
Uterus	NA	NA	83.5	NA	NA	85.3	NA	NA	64.2

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

Five-year relative survival data were calculated using SEER*Stat software version 8.3.5.

CNS = Central Nervous System

NA = Not applicable

Table A-2. Five-Year Relative Survival (Percent), 95 Percent Confidence Intervals (95% CI) and Difference in Survival in the Poorest Counties Compared to the Most Affluent Counties by Cancer Site/Type, Ohio, 2009-2015

Cancer Site/Type	Poorest Counties		Most Affluent Counties		Difference
	Relative Survival	95% CI	Relative Survival	95% CI	
All Sites/Types*	63.6	62.8 - 64.4	70.4	69.8 - 71.1	-6.8
Bladder	73.1	69.0 - 76.7	80.2	76.4 - 83.4	-7.1
Brain & Other CNS	30.2	25.0 - 35.5	31.7	27.2 - 36.2	-1.5
Breast (Female)	89.1	87.3 - 90.7	91.9	90.4 - 93.1	-2.8
Cervix	61.4	54.7 - 67.4	69.1	60.6 - 76.1	-7.7
Colon & Rectum*	60.0	57.3 - 62.7	67.2	64.6 - 69.6	-7.2
Esophagus	21.4	16.4 - 26.9	23.8	18.6 - 29.4	-2.4
Hodgkin Lymphoma	89.7	82.5 - 94.0	90.3	84.3 - 94.1	-0.6
Kidney and Renal Pelvis	73.2	69.2 - 76.7	77.2	73.8 - 80.3	-4.0
Larynx	61.5	53.7 - 68.4	71.2	63.1 - 77.8	-9.7
Leukemia	59.3	54.5 - 63.7	62.6	58.3 - 66.6	-3.3
Liver & Intrahepatic Bile Duct	17.6	13.3 - 22.5	13.8	9.7 - 18.6	3.8
Lung & Bronchus	18.9	17.5 - 20.4	21.4	19.9 - 23.1	-2.5
Melanoma of the Skin	91.0	87.4 - 93.6	93.0	90.5 - 94.8	-2.0
Multiple Myeloma	50.1	42.6 - 57.1	55.5	48.5 - 61.9	-5.4
Non-Hodgkin Lymphoma	70.1	66.1 - 73.8	75.1	71.7 - 78.2	-5.0
Oral Cavity & Pharynx	64.9	60.2 - 69.2	72.2	67.8 - 76.1	-7.3
Ovary	50.0	43.4 - 56.3	51.0	45.5 - 56.2	-1.0
Pancreas	7.3	4.9 - 10.2	11.1	8.5 - 14.0	-3.8
Prostate	98.4	96.7 - 99.2	99.5	97.9 - 99.9	-1.1
Stomach	29.5	23.6 - 35.6	34.3	28.5 - 40.1	-4.8
Testis	94.0	86.5 - 97.4	95.5	90.6 - 97.9	-1.5
Thyroid	98.5	97.2 - 99.3	99.0	98.0 - 99.5	-0.5
Uterus	82.2	78.6 - 85.4	87.1	84.2 - 89.4	-4.9

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

Five-year relative survival data were calculated using SEER*Stat software version 8.3.5.

* Statistically significantly lower five-year relative survival in the poorest counties than in the most affluent counties

CNS = Central Nervous System

95% CI = 95 percent confidence interval

A negative difference indicates lower five-year relative survival in the poorest counties.

Table A-3. Five-Year Relative Survival (Percent), 95 Percent Confidence Intervals (95% CI) and Difference in Survival in Rural Counties Compared to Urban Counties by Cancer Site/Type, Ohio, 2009-2015

Cancer Site/Type	Rural Counties		Urban Counties		Difference
	Relative Survival	95% CI	Relative Survival	95% CI	
All Sites/Types*	63.9	63.4 - 64.4	66.6	66.4 - 66.8	-2.7
Bladder	77.3	74.9 - 79.5	77.4	76.1 - 78.6	-0.1
Brain & Other CNS*	27.8	24.8 - 30.8	32.8	31.1 - 34.4	-5.0
Breast (Female)	89.6	88.5 - 90.5	90.4	89.8 - 90.8	-0.8
Cervix	63.4	58.9 - 67.6	66.1	63.8 - 68.4	-2.7
Colon & Rectum	63.7	62.1 - 65.3	64.2	63.4 - 65.1	-0.5
Esophagus	16.6	13.6 - 19.7	19.7	18.0 - 21.5	-3.1
Hodgkin Lymphoma	87.4	83.1 - 90.7	87.2	85.0 - 89.1	0.2
Kidney & Renal Pelvis	74.3	72.0 - 76.5	77.3	76.1 - 78.4	-3.0
Larynx	57.3	52.6 - 61.7	62.8	60.2 - 65.3	-5.5
Leukemia	56.2	53.3 - 59.1	57.3	55.7 - 58.8	-1.1
Liver & Intrahepatic Bile Duct	14.0	11.3 - 17.0	18.1	16.6 - 19.6	-4.1
Lung & Bronchus*	17.0	16.2 - 17.9	19.7	19.2 - 20.2	-2.7
Melanoma of the Skin	90.2	88.3 - 91.9	92.5	91.5 - 93.3	-2.3
Multiple Myeloma*	44.2	39.6 - 48.8	52.2	49.9 - 54.5	-8.0
Non-Hodgkin Lymphoma	70.8	68.5 - 73.0	73.6	72.4 - 74.7	-2.8
Oral Cavity & Pharynx	65.7	62.8 - 68.4	66.3	64.8 - 67.8	-0.6
Ovary	50.3	46.4 - 54.0	48.3	46.3 - 50.3	2.0
Pancreas	8.1	6.7 - 9.8	9.5	8.7 - 10.4	-1.4
Prostate	98.6	97.6 - 99.2	99.1	98.8 - 99.4	-0.5
Stomach	31.8	27.8 - 35.8	33.6	31.6 - 35.5	-1.8
Testis	94.3	90.7 - 96.5	95.2	93.6 - 96.4	-0.9
Thyroid	98.4	96.4 - 99.3	99.0	98.7 - 99.2	-0.6
Uterus	84.5	82.5 - 86.4	83.2	82.2 - 84.3	1.3

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

Five-year relative survival data were calculated using SEER*Stat software version 8.3.5.

* Statistically significantly lower five-year relative survival in rural counties than in urban counties.

CNS = Central Nervous System

95% CI = 95 percent confidence interval

A negative difference indicates lower five-year relative survival in rural counties.

Table A-4. Five-Year Relative Survival (Percent), 95 Percent Confidence Intervals (95% CI) and Difference in Survival in Appalachian Counties Compared to Non-Appalachian Counties by Cancer Site/Type, Ohio, 2009-2015

Cancer Site/Type	Appalachian Counties		Non-Appalachian Counties		
	Relative Survival	95% CI	Relative Survival	95% CI	Difference
All Sites/Types*	63.2	62.7 - 63.7	66.7	66.4 - 66.9	-3.5
Bladder	76.3	73.8 - 78.7	77.6	76.4 - 78.8	-1.3
Brain & Other CNS	29.6	26.4 - 33.0	32.1	30.5 - 33.8	-2.5
Breast (Female)	89.8	88.6 - 90.8	90.3	89.8 - 90.8	-0.5
Cervix	63.2	58.6 - 67.4	66.2	63.8 - 68.4	-3.0
Colon & Rectum	62.9	61.2 - 64.6	64.4	63.6 - 65.2	-1.5
Esophagus	17.7	14.3 - 21.3	19.3	17.6 - 21.1	-1.6
Hodgkin Lymphoma	88.0	82.7 - 91.7	87.1	85.0 - 89.0	0.9
Kidney & Renal Pelvis	75.2	72.8 - 77.5	76.9	75.7 - 78.0	-1.7
Larynx	62.4	57.5 - 66.9	61.2	58.6 - 63.7	1.2
Leukemia	56.0	52.7 - 59.1	57.3	55.8 - 58.7	-1.3
Liver & Intrahepatic Bile Duct	16.9	14.0 - 20.1	17.5	16.0 - 19.0	-0.6
Lung & Bronchus*	17.4	16.5 - 18.4	19.6	19.1 - 20.1	-2.2
Melanoma of the Skin*	89.1	86.8 - 90.9	92.7	91.8 - 93.5	-3.6
Multiple Myeloma	45.1	40.0 - 50.1	51.7	49.4 - 53.9	-6.6
Non-Hodgkin Lymphoma*	70.0	67.5 - 72.4	73.7	72.5 - 74.8	-3.7
Oral Cavity & Pharynx	64.3	61.3 - 67.2	66.6	65.1 - 68.1	-2.3
Ovary	48.7	44.4 - 52.9	48.7	46.7 - 50.6	0.0
Pancreas	7.8	6.3 - 9.5	9.6	8.7 - 10.4	-1.8
Prostate	98.9	97.8 - 99.4	99.1	98.7 - 99.4	-0.2
Stomach	29.2	25.4 - 33.1	34.2	32.2 - 36.1	-5.0
Testis*	91.2	86.8 - 94.2	95.9	94.4 - 97.0	-4.7
Thyroid	99.1	98.3 - 99.5	98.9	98.5 - 99.1	0.2
Uterus	84.0	81.8 - 86.0	83.4	82.4 - 84.4	0.6

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

Five-year relative survival data were calculated using SEER*Stat software version 8.3.5.

* Statistically significantly lower five-year relative survival in Appalachian counties than in non-Appalachian counties.

CNS = Central Nervous System

95% CI = 95 percent confidence interval

A negative difference indicates lower five-year relative survival in Appalachian counties.

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