# CANCER IN OHIO 2025

The James
The Ohio State University
Comprehensive Cancer Center

Ohio Department of Health

The James

The Ohio State University
Comprehensive Cancer Center

The OSUCCC – James vision is to create a cancer-free world, one person, one discovery at a time.

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# BASIC INFORMATION ABOUT CANCER

## What is Cancer[1,2]

Cancer is a group of many diseases characterized by cells growing uncontrollably and spreading to other parts of the body. There are more than 100 types of cancer. Each has different, and often unknown, causes and risk factors. Sometimes the orderly process of cells growing and multiplying breaks down, and abnormal or damaged cells grow and multiply when they shouldn't. These cells may form tumors, which are lumps of tissue. Some tumors are cancerous (malignant), and some are not cancerous (benign). Cancerous or malignant tumors spread into, or invade, nearby tissues and can travel to distant places in the body. Benign tumors do not spread into nearby tissues.

## Cancer Risk Factors and Cancer Prevention[2,3,4]

Many factors increase the risk of developing cancer. However, the cause(s) of most cancers are not fully understood. Factors that increase the chance of developing cancer are called cancer risk factors; those that decrease the chance of developing cancer are called cancer protective factors. Some risk factors, such as tobacco use and sun exposure, can be avoided, but many other risk factors, such as family history of cancer, cannot. Risk factors that a person can control are called modifiable risk factors. Both modifiable and non-modifiable risk factors may act at the same time or in sequence to alter cancer risk.

Cancer risk factors include age, sex, race, ethnicity, socioeconomic status (SES) (e.g., income, education), genetic and biologic factors (e.g., genetic mutations, family history, immunosuppression, chronic inflammation, endogenous hormones), health behaviors and lifestyle factors (e.g., tobacco and alcohol use, sun exposure, diet, obesity), and environmental factors (e.g., radiation, infectious agents, workplace exposures).

Cancer prevention is action taken to lower the chance of getting cancer. Scientists are studying many different ways to help prevent cancer, including avoiding or controlling things known to cause cancer, encouraging changes in diet and lifestyle, finding precancerous conditions early when they can be removed prior to becoming cancer, chemoprevention (medicines to treat precancerous conditions or to keep cancer from starting), and risk-reducing surgery (e.g., prophylactic mastectomy).

A substantial proportion of cancers could be prevented. A study from the American Cancer Society (ACS) found that, in 2019, 40.0% of incident cancers and 44.0% of cancer deaths among those ages 30 years and older in the United States could be attributed to the modifiable risk factors of cigarette smoking; second-hand smoke; excess body weight; alcohol consumption; consumption of red and processed meat; low consumption of fruits and vegetables, dietary fiber, and dietary calcium; physical inactivity; ultraviolet radiation; and seven carcinogenic infections. Cigarette smoking was the leading risk factor contributing to cancer cases and deaths overall (19.3% and 28.5%, respectively), followed by excess body weight (7.6% and 7.3%, respectively), and alcohol consumption (5.4% and 4.1%, respectively). Lung cancer had the highest number of cancer cases attributable to the evaluated risk factors, followed by female breast cancer, melanoma of the skin, and colon and rectum cancer. Lung cancer also had the highest number of deaths attributable to these risk factors, followed by cancers of the colon and rectum, liver, and esophagus.

## Lifetime Risk

Everyone is at risk of developing cancer. However, cancer usually develops in older people; 88.2% of all cancers in the United States are diagnosed in people 50 years of age or older.[5] Lifetime cancer risk refers to the probability that an individual will develop or die from cancer over the course of a lifetime. In the United States, the lifetime risk of developing cancer from birth to age 85 is 35.5% (one in three) in men and 34.0% (one in three) in women **(Table 1)**.[6] These probabilities are estimated based on the overall experience of the general population and may overestimate or underestimate individual risk because of differences in exposures (e.g., smoking), family history, and/or genetic susceptibility.

**TABLE 1.** Lifetime Risk of Being Diagnosed With Invasive Cancer for Selected Sites/Types in the United States, 2018-2021[1,2,3]

| | SEX | APPROXIMATE RISK FROM BIRTH TO AGE 85 |
|---|---|---|
| All Sites / Types* | Male | 1 in 3 (35.5%) |
| | Female | 1 in 3 (34.0%) |
| Bladder | Male | 1 in 37 (2.7%) |
| | Female | 1 in 123 (0.8%) |
| Breast | Female | 1 in 8 (11.9%) |
| Cervix | Female | 1 in 163 (0.6%) |
| Colon and Rectum | Male | 1 in 28 (3.5%) |
| | Female | 1 in 33 (3.0%) |
| Hodgkin Lymphoma | Male | 1 in 467 (0.2%) |
| | Female | 1 in 563 (0.2%) |
| Kidney and Renal Pelvis | Male | 1 in 49 (2.0%) |
| | Female | 1 in 85 (1.2%) |
| Leukemia | Male | 1 in 66 (1.5%) |
| | Female | 1 in 95 (1.0%) |
| Liver and Intrahepatic Bile Duct | Male | 1 in 75 (1.3%) |
| | Female | 1 in 172 (0.6%) |
| Lung and Bronchus | Male | 1 in 20 (4.9%) |
| | Female | 1 in 21 (4.7%) |
| Melanoma of the Skin | Male | 1 in 47 (2.1%) |
| | Female | 1 in 66 (1.5%) |
| Non-Hodgkin Lymphoma | Male | 1 in 52 (1.9%) |
| | Female | 1 in 64 (1.6%) |
| Oral Cavity and Pharynx | Male | 1 in 67 (1.5%) |
| | Female | 1 in 165 (0.6%) |
| Pancreas | Male | 1 in 71 (1.4%) |
| | Female | 1 in 79 (1.3%) |
| Prostate | Male | 1 in 8 (11.8%) |
| Thyroid | Male | 1 in 167 (0.6%) |
| | Female | 1 in 61 (1.6%) |
| Uterus | Female | 1 in 34 (2.9%) |

[1] Source: DevCan: Probability of Developing or Dying of Cancer Software, Version 6.7. Surveillance Research Program, Statistical Methodology and Applications, National Cancer Institute, accessed 2024. http://surveillance.cancer.gov/devcan/.

[2] 2020 incidence data have been excluded from the risks of developing cancer. Refer to the Impact of COVID on SEER Cancer Incidence Data for details.

[3] Numbers are rounded to the nearest whole person.

* Excludes basal and squamous cell skin cancer and *in situ* carcinomas except bladder.

## Stage at Diagnosis and Early Detection[7]

Staging describes the extent or spread of cancer at the time of diagnosis. Proper staging is essential for optimizing therapy, assessing prognosis, and identifying clinical trials that may include treatment options. For most cancers, stage is based on the size or extent of the primary (initial) tumor and whether the cancer has spread to nearby lymph nodes or other areas of the body. A system of summary staging is typically used for descriptive and statistical analysis of population-based tumor registry data and is particularly useful for looking at trends over time. According to this system, if cancer cells are present only in the layer of cells where they developed and have not spread, the stage is *in situ*. If cancer cells have penetrated beyond the original layer of tissue, the cancer has become invasive and is categorized as local, regional, or distant based on the extent of spread. For some types of cancer, staging systems have been developed to better characterize aspects of stage which are specific to cancer types.

***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 Stage** – Insufficient information is available to determine the stage or extent of the disease at diagnosis.

**** Early stage includes tumors diagnosed at the in situ and local stages, and late stage includes tumors diagnosed at the regional and distant stages.***

Screening can help prevent colon and rectum and cervical cancers by detecting precancerous lesions that can be removed. It can also detect some cancers early when treatment is more often successful. Screening is known to help reduce mortality for cancers of the breast, lung (among those with a history of heavy smoking), and prostate. In addition, a heightened awareness of changes in certain parts of the body such as the breast, skin, mouth, eyes, or genitalia may also result in the early detection of cancer. Screening recommendations from ACS and the U.S. Preventive Services Task Force (USPSTF) are shown on page **105**.

## Cost[8]

The National Cancer Institute (NCI) estimates that costs for cancer care were $208.9 billion in 2020, and this cost was likely underestimated because growth in cancer treatment costs for medical services and oral prescription drugs outpaced expectations. Costs to patients were estimated at $21.1 billion, including $16.2 billion in out-of-pocket costs, as many costs are not covered by insurance.

## Cancer Treatment[2]

There are many types of cancer treatment. The best treatment for cancer is individualized and will depend on the type of cancer, the stage of disease, and other factors. Some people with cancer will have only one treatment but most people will have a combination of treatments such as surgery with chemotherapy and radiation.

When recommending treatment, a doctor will also keep in mind the patient's age and other health problems. Sometimes treatment is meant to cure the cancer. Other times the goal is to stop the cancer from spreading further. Some treatments are given to reduce the side effects of other treatments and relieve symptoms caused by the cancer or the treatment itself. This is called palliative care and can be given at any stage of cancer treatment. The treatment plan may change over time.

**The following are common types of cancer treatment:**

- **Surgery:** Surgery is a procedure in which a surgeon removes cancer from the body. There are many types of surgery that differ based on the purpose of surgery, the part of the body that requires surgery, the amount of tissue to be removed, and, in some cases, patient preference.
- **Chemotherapy:** Chemotherapy uses special medicines to shrink or kill the cancer. The drugs can be pills you take, or medicines given intravenously (IV) (in your veins), or sometimes both. Treatment can also be in the form of a topical cream that is rubbed onto the skin.
- **Radiation therapy:** Radiation therapy is a type of cancer treatment that uses high-energy rays (similar to x-rays) to kill cancer cells and shrink tumors. Radiation is administered either externally, in which an external beam aims radiation at the cancer, or internally, in which the source of radiation is put inside the body.
- **Hormonal therapy:** Hormonal therapy blocks cancer cells from getting the hormones they need to grow. Hormone therapy falls into two broad groups: those that block the body's ability to produce hormones and those that interfere with how hormones behave in the body. Hormone therapy can be given orally, by injection, or surgically in which organs that produce hormones are removed.
- **Immunotherapy:** Immunotherapy works with your body's immune system to help it fight cancer cells or to control side effects from other cancer treatments. The immune system is made up of white blood cells, organs, and tissues of the lymph system that help your body fight infections and other diseases. Different forms of immunotherapy may be given in different ways, including IV, oral, topical, or intravesical (directly into the bladder).
- **Stem cell transplant (bone marrow transplant):** Stem cell transplants replace bone marrow cells lost due to very high doses of chemotherapy or radiation therapy. They are most commonly used to treat blood cancers and cancers that start in the lymph nodes.

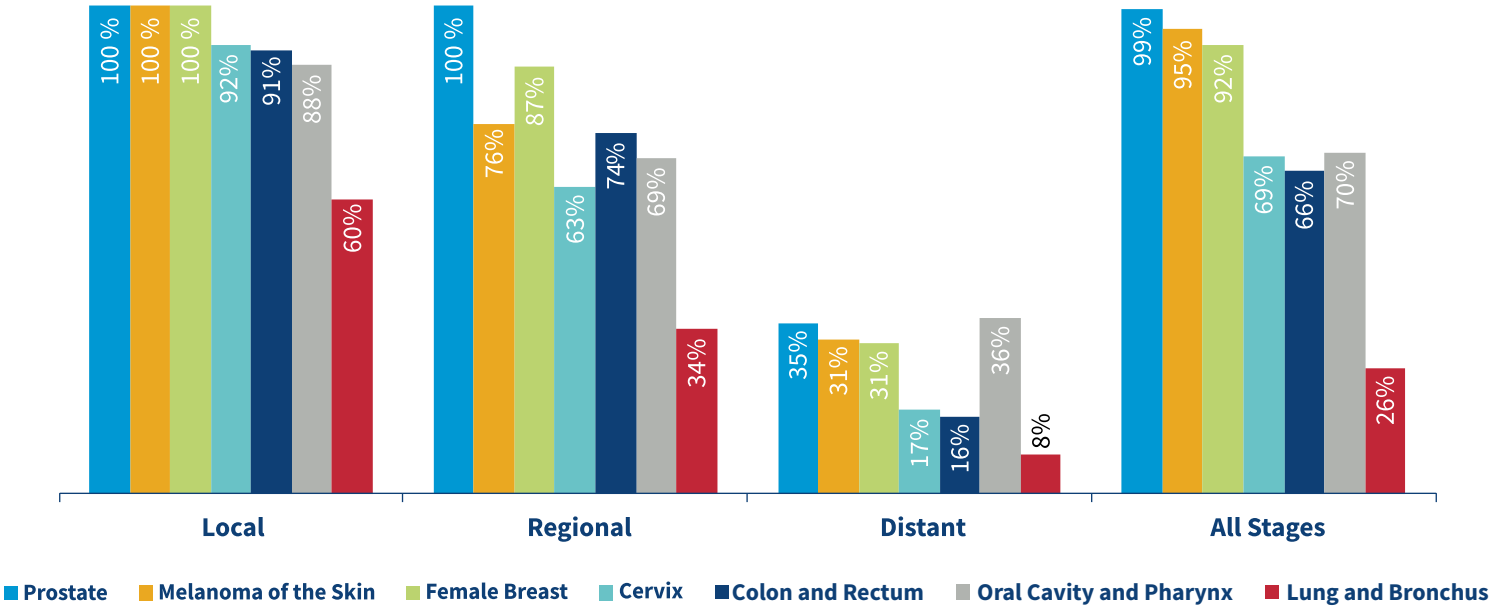
## Survival

Relative survival is the proportion of people who are alive for a designated time (usually five years) after a cancer diagnosis divided by the proportion of people of similar age, race, etc. expected to be alive in the absence of cancer based on normal life expectancy. The five-year relative survival for all cancers combined has increased since the mid-1970s, from 50% to 73% among White people and from 40% to 69% among Black people.[9] Improvements in survival reflect advances in treatment as well as earlier diagnosis for some cancers.

In Ohio, the five-year relative survival for those diagnosed with cancer from 2014 to 2020 was 68% compared with 69% in the United States.[10,11] Survival varies by cancer type and stage at diagnosis. For example, in Ohio, the overall five-year relative survival for colon and rectum cancer is 66%.[10] If all colon and rectum cancers were diagnosed at a local stage through regular cancer screenings, the five-year relative survival would increase to 91% **(Figure 1, Table A-1)**.[10]

An estimated 606,406 Ohioans diagnosed with cancer from 1996 to 2020 were alive as of Jan. 1, 2021, according to data from the Ohio Cancer Incidence Surveillance System (OCISS).[10] Some of these individuals were cancer free, while others may have been receiving ongoing treatment.

**FIGURE 1.** Five-Year Relative Survival by Selected Cancer Sites/Types and Stage at Diagnosis in Ohio, 2014-2020[1,2]




[1] Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

[2] Percentages are adjusted for normal life expectancy and are based on cases diagnosed from 2014 to 2020, followed through Dec. 31, 2021.

# CANCER INCIDENCE AND MORTALITY

## Understanding Incidence and Mortality

The cancer rates in this document represent the number of new invasive cancer cases (incidence) or cancer deaths (mortality) per 100,000 population during a specific time period. In accordance with the methods used by the NCI's Surveillance, Epidemiology, and End Results (SEER) Program, incidence rates are calculated using invasive cancers only, with the addition of *in situ* bladder cancers.

The number of cancers diagnosed in a demographic subgroup or geographic area can be determined from a rate if the population is known. Rates provide a useful way to measure the cancer burden irrespective of the actual population size. For example, if a county's average annual lung and bronchus cancer incidence rate is 80.0 per 100,000 population, this means an average of 80 new cases of lung and bronchus cancer were diagnosed in the county per year for every 100,000 people. If the county's population is 25,000, then an average of 20 new cases of lung and bronchus cancer were diagnosed in the county per year:

$$\frac{\text{80 New Cases Per Year}}{\text{100,000 Population}} = \frac{\text{20 New Cases Per Year}}{\text{25,000 Population}}$$

A statistical method called "age adjustment" is used to compare rates among groups of people with different age compositions. Age adjustment removes the impact of different age distributions between populations. It also allows for comparisons within a single population over time. This is especially important when examining cancer rates because cancer is generally a disease of older people. Rates in this document are age adjusted to the 2000 U.S. Standard Population.[12]

## Trends

In this report, trends over time intervals were analyzed using Joinpoint software.[13] A "joinpoint" is an inflection point (or year) at which the trend changes. Joinpoint software identifies the line or line segments that fit best over the period. More detailed information about Joinpoint software is available at: **https://surveillance.cancer.gov/joinpoint/**.[13] In this report, trends are shown by race/sex groups (e.g., White females), and only statistically significant trends identified using Joinpoint software are described in text. Note that 2020 incidence rates are shown but not included in analyses because of the substantive impact of the Coronavirus (COVID-19) pandemic on cancer screening and diagnosis.

## Ohio Cancer Incidence Surveillance System

Cancer incidence data for Ohio were provided by the OCISS at the Ohio Department of Health (ODH). OCISS, the central cancer registry for Ohio, collects and analyzes cancer incidence data for all Ohio residents.

All Ohio medical providers who diagnose or treat patients with cancer are required, by law, to report each newly diagnosed and/ or treated case of cancer to OCISS within six months of diagnosis or first contact for cancer treatment. A reportable cancer is any primary malignancy, with the exception of basal and squamous cell carcinoma of the skin and carcinoma *in situ* of the cervix. Benign brain tumors are also reportable. Information on OCISS and reporting Ohio cancer incidence data is available at: **https://odh.ohio.gov/know-our-programs/ohio-cancer-incidence-surveillance-system/welcome**.

Due to the complexity of the cancer data collection and quality control process, there is a delay between the time a new cancer is diagnosed and the time the data are ready for analysis. The typical delay is about 24 months after the end of the calendar year of diagnosis. Incidence data presented in this report are for cancer cases diagnosed through Dec. 31, 2021.

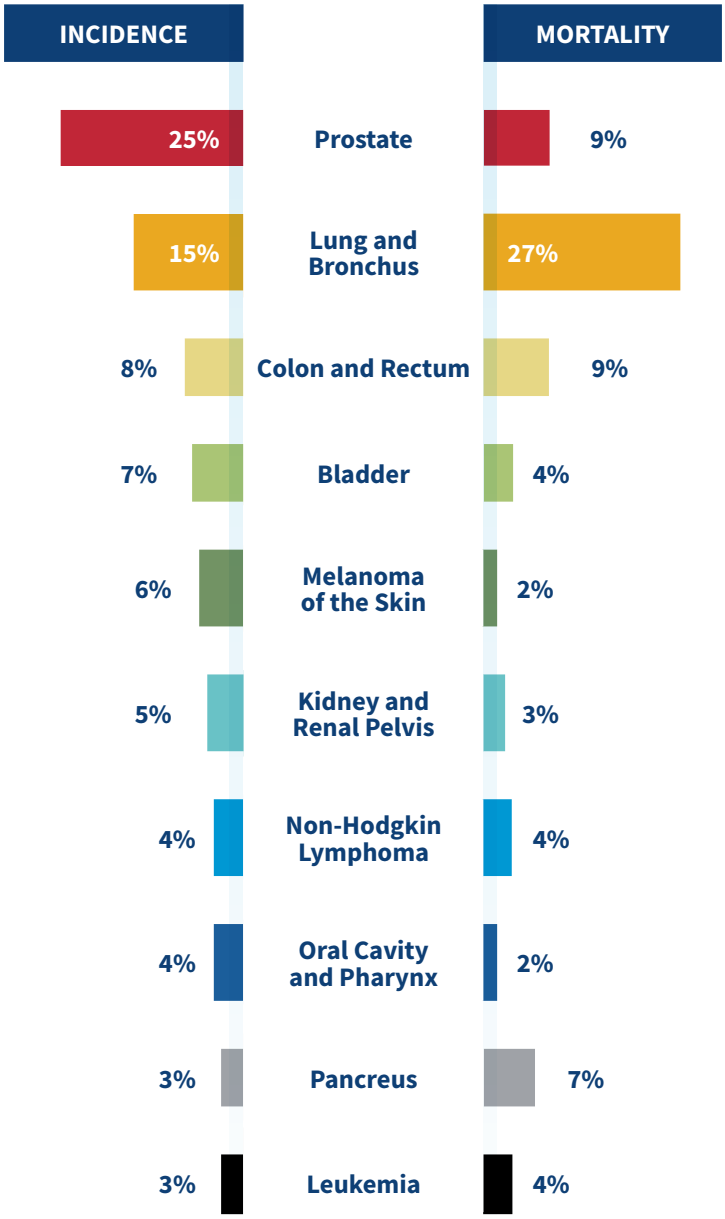
OCISS data quality, completeness, and timeliness are evaluated annually by CDC's National Program of Cancer Registries (NPCR) and the North American Association of Central Cancer Registries (NAACCR). The data included in this report met CDC's National Data Quality Standard and NAACCR's Gold Standard for Registry Certification; these are the highest data quality standards set by each of these organizations for 24-month data. However, completeness may be higher or lower for specific cancer sites/types, geographic areas, and demographic subgroups, which can influence the incidence rate observed. Estimated completeness of reporting by cancer site/type is presented in **Appendix A-2** and completeness by county is presented in **Appendix A-3**.

## Incidence (New Cases) and Mortality (Deaths)

**Figures 2** and **3** display leading cancer sites/types in Ohio by the percentage of new invasive cancer cases and cancer deaths for males and females, respectively. Prostate cancer is the most frequently diagnosed cancer in men.[10] Prostate cancer represented 25% of all cancers diagnosed in male Ohioans between 2017 and 2021 **(Figure 2)**.[10] Breast cancer remains the most frequently diagnosed cancer in Ohio women, representing 29% of cancer diagnoses **(Figure 3)**.[10]

### FIGURE 2. Selected Cancer Sites/Types: Average Annual Number and Percentage of New Invasive Cancer Cases and Cancer Deaths Among Males in Ohio, 2017-2021

| Primary Cancer Site/Type | CASES<br>Average Annual | DEATHS<br>Average Annual |
|---|---|---|
| Prostate | 9,032 | 1,227 |
| Lung and Bronchus | 5,224 | 3,539 |
| Colon and Rectum | 3,001 | 1,140 |
| Bladder | 2,552 | 530 |
| Melanoma of the Skin | 2,104 | 241 |
| Kidney and Renal Pelvis | 1,651 | 374 |
| Non-Hodgkin Lymphoma | 1,563 | 478 |
| Oral Cavity and Pharynx | 1,383 | 314 |
| Pancreas | 1,156 | 991 |
| Leukemia | 1,051 | 547 |
| Liver and Intrahepatic Bile Duct | 851 | 662 |
| Esophagus | 715 | 614 |
| Stomach | 537 | 209 |
| Myeloma | 531 | 285 |
| Brain and Other CNS* | 500 | 374 |
| Thyroid | 481 | 32 |
| Larynx | 442 | 143 |
| Testis | 311 | 15 |
| Hodgkin Lymphoma | 179 | 23 |



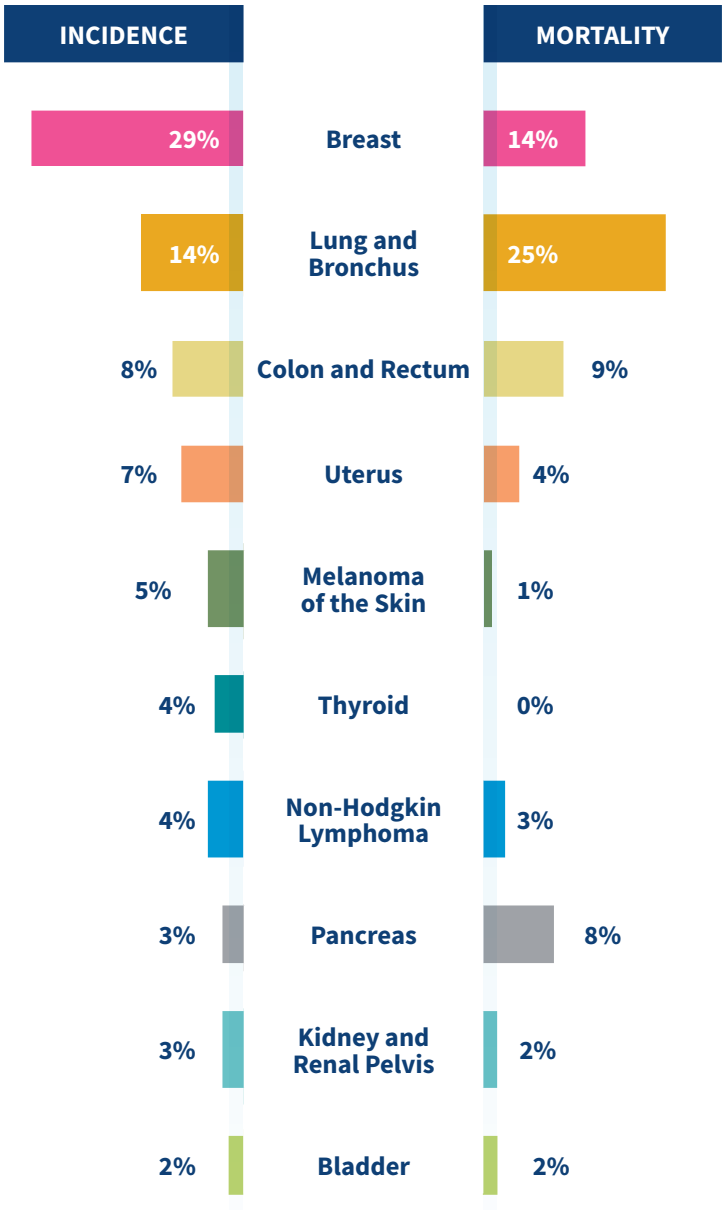

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024; Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

Figure 2 presents the top cancer sites/types among males according to incidence.

* Central Nervous System.

## **FIGURE 3.** Selected Cancer Sites/Types: Average Annual Number and Percentage of New Invasive Cancer Cases and Cancer Deaths Among Females in Ohio, 2017-2021

| Primary Cancer Site/Type | CASES<br>Average Annual | DEATHS<br>Average Annual |
|---|---|---|
| Breast | 10,071 | 1,698 |
| Lung and Bronchus | 4,895 | 2,940 |
| Colon and Rectum | 2,706 | 1,009 |
| Uterus | 2,485 | 461 |
| Melanoma of the Skin | 1,577 | 133 |
| Thyroid | 1,326 | 42 |
| Non-Hodgkin Lymphoma | 1,253 | 368 |
| Pancreas | 1,012 | 908 |
| Kidney and Renal Pelvis | 997 | 217 |
| Bladder | 785 | 217 |
| Leukemia | 756 | 414 |
| Ovary | 748 | 505 |
| Oral Cavity and Pharynx | 557 | 136 |
| Cervix | 476 | 160 |
| Myeloma | 435 | 225 |
| Brain and Other CNS* | 409 | 295 |
| Liver and Intrahepatic Bile Duct | 377 | 342 |
| Stomach | 319 | 138 |
| Esophagus | 171 | 139 |
| Hodgkin Lymphoma | 145 | 12 |
| Larynx | 134 | 39 |




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024; Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

Figure 3 presents the top cancer sites/types among females according to incidence.

* Central Nervous System.

**Table 2** provides 2017-2021 average annual numbers of new invasive cancer cases and age-adjusted incidence rates for all cancer sites/types combined and 23 common cancer sites/types by sex with national comparisons. For all cancer sites/types combined, the incidence rate in Ohio (470.0 per 100,000 population) was 6% higher than the national rate (444.6 per 100,000).[5,10] The lung and bronchus cancer incidence rate was 73.2 per 100,000 for Ohio males, which was 23% higher than the national rate of 59.6 per 100,000.[5,10] Similarly, the Ohio female lung and bronchus cancer incidence rate (57.6 per 100,000) was 19% higher than the national rate of 48.5 per 100,000.[5,10] The greatest difference in incidence rates between Ohio and the Unites States was for laryngeal cancer, where the Ohio rate (3.7 per 100,000) was 28% higher than the U.S. rate (2.9 per 100,000).[5,10]

## TABLE 2. Average Annual Number of New Invasive Cancer Cases and Age-Adjusted Incidence Rates by Cancer Site/Type and Sex in Ohio and the United States, 2017-2021

| | MALE | | | FEMALE | | | TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ohio | | U.S. | Ohio | | U.S. | Ohio | | U.S. |
| | Cases | Rate | Rate | Cases | Rate | Rate | Cases | Rate | Rate |
| **All Cancer Sites/Types** | **35,966** | **511.3** | **481.3** | **34,463** | **444.4** | **421.3** | **70,429** | **470.0** | **444.6** |
| Bladder | 2,552 | 37.7 | 32.5 | 785 | 9.2 | 8.1 | 3,337 | 21.6 | 18.8 |
| Brain and Other CNS** | 500 | 7.8 | 7.4 | 409 | 5.8 | 5.3 | 909 | 6.7 | 6.3 |
| Breast | 84 | 1.2 | 1.3 | 10,071 | 132.3 | 129.8 | 10,155 | 70.1 | 68.5 |
| Cervix | * | * | * | 476 | 7.8 | 7.5 | * | * | * |
| Colon and Rectum | 3,001 | 44.4 | 41.4 | 2,706 | 34.2 | 32.1 | 5,707 | 38.9 | 36.4 |
| Esophagus | 715 | 10.0 | 7.8 | 171 | 2.0 | 1.8 | 885 | 5.7 | 4.5 |
| Hodgkin Lymphoma | 179 | 3.0 | 2.8 | 145 | 2.4 | 2.3 | 324 | 2.7 | 2.5 |
| Kidney and Renal Pelvis | 1,651 | 23.8 | 23.4 | 997 | 13.0 | 12.0 | 2,648 | 18.0 | 17.3 |
| Larynx | 442 | 6.0 | 4.9 | 134 | 1.7 | 1.1 | 576 | 3.7 | 2.9 |
| Leukemia | 1,051 | 16.1 | 17.8 | 756 | 10.0 | 11.0 | 1,807 | 12.7 | 14.1 |
| Liver and Intrahepatic Bile Duct | 851 | 11.4 | 12.8 | 377 | 4.5 | 4.9 | 1,228 | 7.7 | 8.6 |
| Lung and Bronchus | 5,224 | 73.2 | 59.6 | 4,895 | 57.6 | 48.5 | 10,119 | 64.3 | 53.3 |
| Melanoma of the Skin | 2,104 | 31.4 | 28.7 | 1,577 | 22.1 | 18.4 | 3,682 | 25.8 | 22.7 |
| Myeloma | 531 | 7.7 | 8.6 | 435 | 5.2 | 5.8 | 967 | 6.3 | 7.1 |
| Non-Hodgkin Lymphoma | 1,563 | 23.2 | 22.3 | 1,253 | 15.8 | 15.4 | 2,816 | 19.1 | 18.5 |
| Oral Cavity and Pharynx | 1,383 | 19.1 | 18.0 | 557 | 7.1 | 6.6 | 1,940 | 12.8 | 12.0 |
| Ovary | * | * | * | 748 | 9.9 | 10.1 | * | * | * |
| Pancreas | 1,156 | 16.4 | 15.3 | 1,012 | 12.0 | 11.9 | 2,168 | 14.0 | 13.5 |
| Prostate | 9,032 | 118.1 | 113.1 | * | * | * | * | * | * |
| Stomach | 537 | 7.9 | 8.3 | 319 | 4.0 | 4.7 | 856 | 5.7 | 6.3 |
| Testis | 311 | 5.7 | 5.7 | * | * | * | * | * | * |
| Thyroid | 481 | 7.4 | 6.9 | 1,326 | 21.2 | 19.0 | 1,806 | 14.3 | 12.9 |
| Uterus | * | * | * | 2,485 | 31.1 | 27.8 | * | * | * |

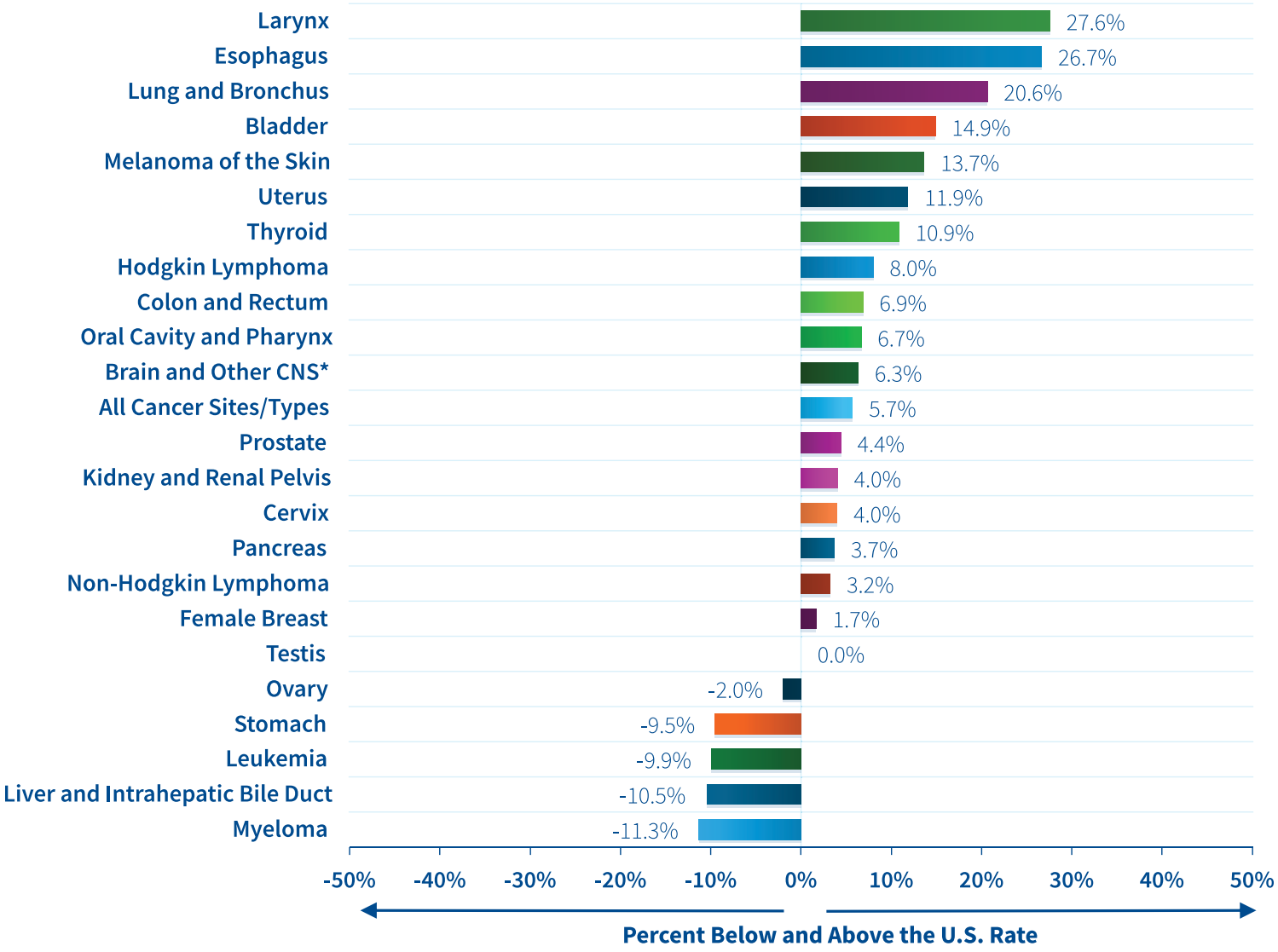
Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024; National Program of Cancer Registries and Surveillance, Epidemiology and End Results Program SEER*Stat Database: NPCR and SEER Incidence - U.S. Cancer Statistics Public Use Research Database, 2023 Submission (2001-2021). United States Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. Released June 2024.

* Not Applicable.

** Central Nervous System.

**Figure 4** presents a visual comparison of Ohio and U.S. 2017-2021 incidence rates by cancer site/type. The top 10 sites/types with the highest percent differences between Ohio and national cancer incidence rates were, in descending order: larynx, esophagus, lung and bronchus, bladder, melanoma of the skin, uterus, thyroid, Hodgkin lymphoma, colon and rectum, and oral cavity and pharynx.[5,10] Ohio incidence rates were lower than the U.S. rates for some specific cancers; however, this may be due, in part, to delayed or incomplete reporting of some cancer sites/types from 2017 to 2021.

## FIGURE 4. Comparison of Ohio and U.S. Average Annual Age-Adjusted Incidence Rates by Cancer Site/Type, 2017-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024; National Program of Cancer Registries and Surveillance, Epidemiology and End Results Program SEER*Stat Database: NPCR and SEER Incidence - U.S. Cancer Statistics Public Use Research Database, 2023 Submission (2001-2021). United States Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. Released June 2024.

* Central Nervous System.

As shown in **Table 3**, the 2017-2021 cancer mortality rate in Ohio for all sites/types combined was 11% higher than the U.S. rate (164.6 per 100,000 and 148.4 per 100,000 population, respectively).[14] Lung and bronchus cancer remains the leading cause of cancer death in Ohio for males, females, and both sexes combined, with a yearly (2017-2021) average of 3,539 males and 2,940 females dying from the disease **(Table 3)**.[14] Prostate cancer is the second leading cause of cancer death for men in Ohio (1,227 deaths per year), followed closely by colon and rectum cancer (1,140 deaths per year), each accounting for about 9% of male cancer deaths **(Table 3, Figure 2)**.[14] Breast cancer is the second leading cause of cancer death for females with a yearly average of 1,698 deaths, accounting for 14% of female cancer deaths, followed by colon and rectum cancer (1,009 deaths, 9%) **(Table 3, Figure 3)**.[14]

## TABLE 3. Average Annual Number of Cancer Deaths and Age-Adjusted Mortality Rates by Cancer Site/Type and Sex in Ohio and the United States, 2017-2021

| | MALE | | | FEMALE | | | TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ohio | | U.S. | Ohio | | U.S. | Ohio | | U.S. |
| | Deaths | Rate | Rate | Deaths | Rate | Rate | Deaths | Rate | Rate |
| **All Cancer Sites/Types** | **13,326** | **198.4** | **176.5** | **11,858** | **140.9** | **128.3** | **25,183** | **164.6** | **148.4** |
| Bladder | 530 | 8.5 | 7.2 | 217 | 2.5 | 2.0 | 747 | 4.9 | 4.2 |
| Brain and Other CNS** | 374 | 5.5 | 5.4 | 295 | 3.8 | 3.6 | 669 | 4.6 | 4.4 |
| Breast | 22 | 0.3 | 0.3 | 1,698 | 20.9 | 19.6 | 1,721 | 11.6 | 10.8 |
| Cervix | * | * | * | 160 | 2.3 | 2.2 | * | * | * |
| Colon and Rectum | 1,140 | 17.2 | 15.6 | 1,009 | 11.9 | 10.9 | 2,149 | 14.3 | 13.1 |
| Esophagus | 614 | 8.8 | 6.6 | 139 | 1.6 | 1.4 | 753 | 4.8 | 3.8 |
| Hodgkin Lymphoma | 23 | 0.4 | 0.3 | 12 | 0.2 | 0.2 | 36 | 0.2 | 0.3 |
| Kidney and Renal Pelvis | 374 | 5.6 | 5.1 | 217 | 2.6 | 2.2 | 591 | 3.9 | 3.5 |
| Larynx | 143 | 1.9 | 1.6 | 39 | 0.5 | 0.3 | 182 | 1.1 | 0.9 |
| Leukemia | 547 | 8.6 | 8.0 | 414 | 4.9 | 4.5 | 961 | 6.5 | 6.0 |
| Liver and Intrahepatic Bile Duct | 662 | 9.1 | 9.6 | 342 | 4.0 | 4.2 | 1,003 | 6.3 | 6.6 |
| Lung and Bronchus | 3,539 | 50.9 | 40.6 | 2,940 | 34.3 | 28.6 | 6,479 | 41.4 | 33.8 |
| Melanoma of the Skin | 241 | 3.7 | 3.0 | 133 | 1.6 | 1.3 | 374 | 2.5 | 2.1 |
| Myeloma | 285 | 4.3 | 3.9 | 225 | 2.6 | 2.4 | 511 | 3.3 | 3.1 |
| Non-Hodgkin Lymphoma | 478 | 7.5 | 6.7 | 368 | 4.3 | 3.8 | 846 | 5.6 | 5.1 |
| Oral Cavity and Pharynx | 314 | 4.4 | 4.0 | 136 | 1.6 | 1.4 | 449 | 2.9 | 2.6 |
| Ovary | * | * | * | 505 | 6.0 | 6.2 | * | * | * |
| Pancreas | 991 | 14.3 | 12.9 | 908 | 10.5 | 9.8 | 1,899 | 12.2 | 11.2 |
| Prostate | 1,227 | 19.7 | 19.2 | * | * | * | * | * | * |
| Stomach | 209 | 3.2 | 3.7 | 138 | 1.7 | 2.1 | 348 | 2.3 | 2.8 |
| Testis | 15 | 0.3 | 0.3 | * | * | * | * | * | * |
| Thyroid | 32 | 0.5 | 0.5 | 42 | 0.5 | 0.5 | 74 | 0.5 | 0.5 |
| Uterus | * | * | * | 461 | 5.4 | 5.2 | * | * | * |

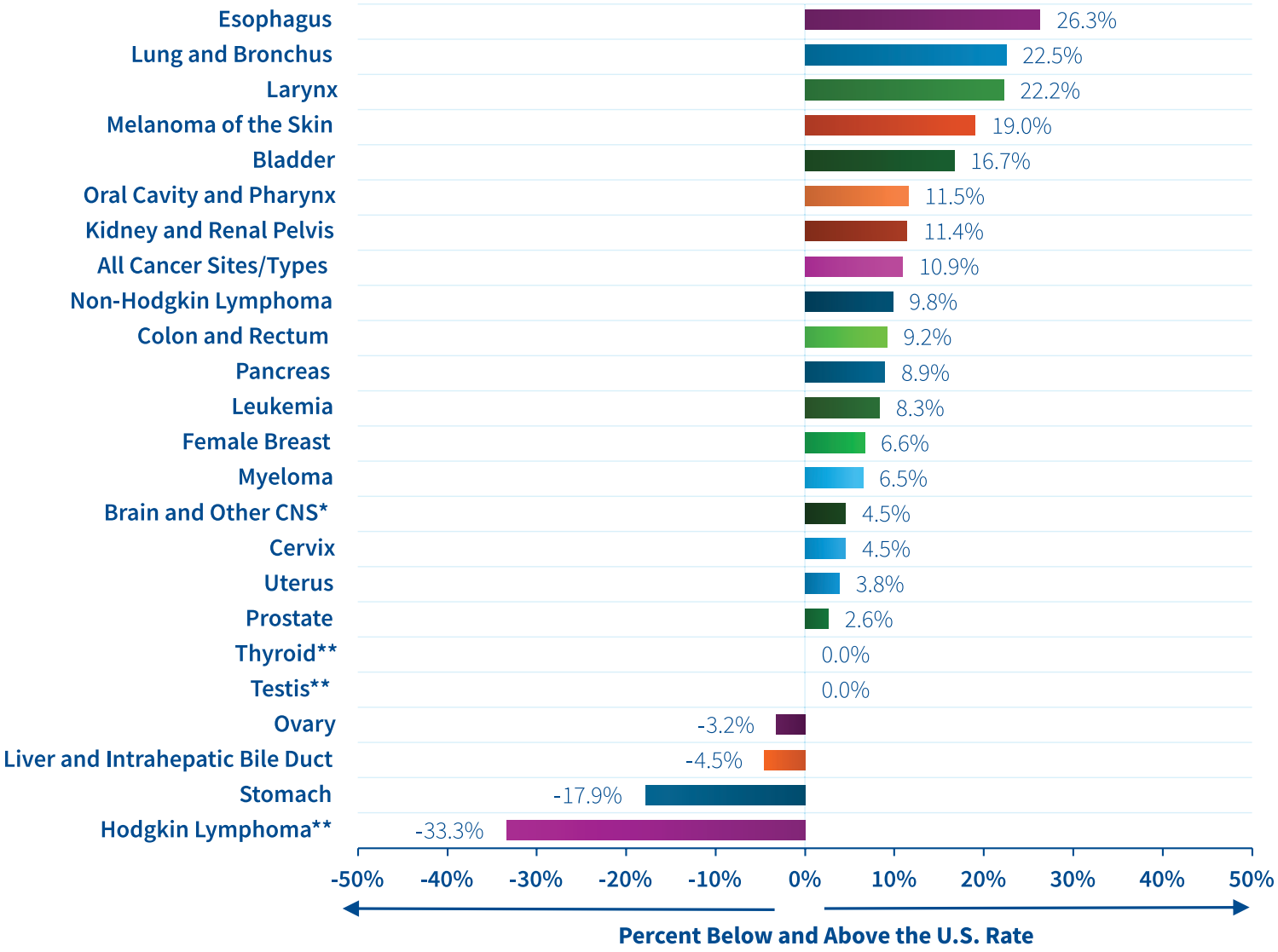
Source: Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

* Not Applicable.

** Central Nervous System.

**Figure 5** presents a visual comparison of Ohio and U.S. 2017-2021 mortality rates by cancer site/type. Ohio cancer mortality rates were higher than the national cancer mortality rates from 2017 to 2021 for 18 of the 24 sites/types of cancer presented (including all cancer sites/types combined).[14] The top 10 sites/types with the highest percent differences between Ohio cancer mortality rates and national cancer mortality rates were, in descending order: esophagus, lung and bronchus, larynx, melanoma of the skin, bladder, oral cavity and pharynx, kidney and renal pelvis, all sites/types combined, non-Hodgkin lymphoma, and colon and rectum.[14] Ohio cancer mortality rates were lower than the U.S. rates for cancers of the ovary, liver and intrahepatic bile duct, and stomach, as well as Hodgkin lymphoma and myeloma.[14]

## FIGURE 5. Comparison of Ohio and U.S. Average Annual Age-Adjusted Mortality Rates by Cancer Site/Type, 2017-2021




Source: Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

* Central Nervous System.

** The comparison should be interpreted with caution due to small numbers.

**Table A-4** shows 2017-2021 average annual numbers of new invasive cancer cases and age-adjusted incidence rates by sex for each county in Ohio for all cancer sites/types combined and cancers of the female breast, colon and rectum, lung and bronchus, and prostate. Please note that low county numbers and rates may reflect delayed or incomplete reporting for that county.

**Table A-5** displays 2017-2021 average annual numbers of cancer deaths and age-adjusted mortality rates by sex for each county in Ohio. Data are provided for all cancer sites/types combined and cancers of the female breast, colon and rectum, lung and bronchus, and prostate.

# CANCER HEALTH DISPARITIES IN SPECIFIC POPULATIONS

NCI defines cancer health disparities as adverse differences in cancer incidence, prevalence, mortality, survivorship, burden of cancer, and quality of life after cancer treatment that exist among specific population groups.[15] These population groups are often defined by demographics such as race, ethnicity, sex, age, SES, and geographic area. Cancer disparities occur when access to care or quality of treatment differ based on patient demographics and non-medical health factors, which include the conditions in which people are born, live, learn, work, play, worship, and age.[16] These disparities are the result of decades of reduced minority opportunities for advancement.[17] In Ohio, cancer health disparities are largely influenced by a combination of racial, socioeconomic, and geographic factors and disproportionately impact minority populations.

## Genetics

Genetic differences are thought to make only a minor contribution to the disparate cancer burden between specific population groups. For instance, women of Ashkenazi Jewish descent have an increased frequency of mutations in the BRCA1 and BRCA2 genes, which increases their risk of breast cancer.[18]

## Cultural Beliefs and Practices

Cultural behaviors may also contribute to cancer health disparities by increasing or decreasing cancer rates within a specific population. For example, women from cultures where early marriage and child-bearing is encouraged often have a lower risk of breast cancer.[8] Similarly, individuals who do not use tobacco or who maintain a vegetarian diet, which is often associated with cultural or religious beliefs, experience a lower risk of many cancers.[8]

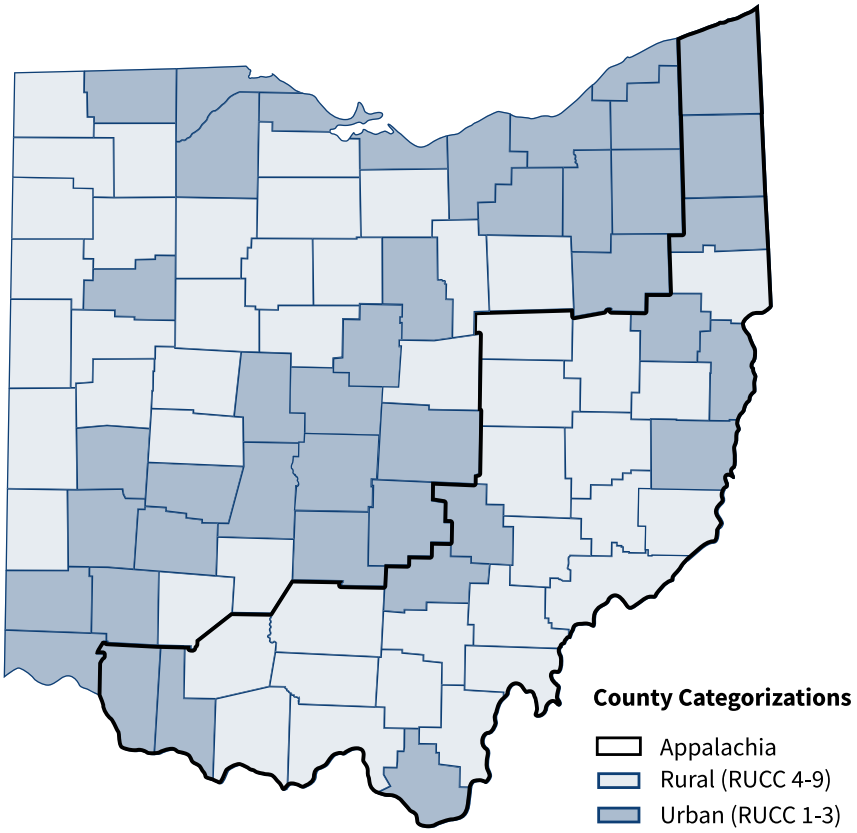
The highest concentration of Amish people in the United States is located in Holmes County, Ohio. Approximately half of Holmes County's total population is Amish. The Amish typically wear wide-brimmed hats and long sleeves to protect from the sun and are less likely to use tobacco products which are protective factors that lower cancer risk.

## Geography

Regional and urban/rural cancer health disparities are also present in Ohio. The Appalachian region of the state is composed of 32 counties along the southern and eastern border of the state **(Figure 6)**. Residents of this region of the state generally have lower education and income levels compared with the state as a whole.[19] Appalachia is characterized by a higher prevalence of cancer-related health behaviors such as obesity, smoking, and physical inactivity, and residents have limited access to quality healthcare and travel greater distances to receive care.[19] The average annual (2017-2021) age-adjusted incidence rate for all sites/types of cancer combined among residents of Appalachia Ohio (480.8 per 100,000 population) was 5.1% higher than the rate among residents of non-Appalachia Ohio (457.4 per 100,000).[10] The average annual (2017-2021) age-adjusted mortality rate for all sites/types of cancer combined among residents of Appalachia Ohio (174.8 per 100,000 population) was 7.8% higher than the rate among residents of non-Appalachia Ohio (162.4 per 100,000).[14]

Urban and rural areas are defined by Rural-Urban Continuum (RUCC) codes, which are a set of nine codes that classify U.S. counties based on population size and adjacency to metropolitan areas.[20] RUCC codes 1-3 are considered urban, and codes 4-9 are considered rural **(Figure 6)**.[20] Urban and rural areas differ in cancer health behaviors, environmental exposures, and access to care.[21] Rural populations are more likely to engage in unhealthy behaviors such as physical inactivity and tobacco use, are less likely to receive cancer screening services and human papillomavirus( HPV) vaccinations, travel greater distances to receive healthcare, and have fewer healthcare options than their urban counterparts.[21] HPV-associated cancers are higher in rural areas, as are lung and colon and rectum cancers.[21] Urban areas have higher incidence rates of all cancers combined, female breast cancer, and prostate cancer, attributable largely to higher prevalence of screening and early diagnosis.[21]

**FIGURE 6.** Appalachian, Rural, and Urban County Categorizations in Ohio




Source: Appalachian Regional Commission (https://www.arc.gov/appalachian-counties-served-by-arc/); U.S. Department of Agriculture, Economic Research Service, Rural-Urban Continuum Codes data product, updated January 2024.

## Socioeconomic Status (SES)

SES is another main contributing factor in cancer health disparities in Ohio. SES relates to a person's income, education, and health insurance status. Lower SES is associated with higher cancer incidence and mortality rates.[17] Individuals with lower income and less education are more likely to engage in riskier health behaviors like smoking and eating a poor diet, which in turn increase the likelihood of developing certain cancers.[17] People of lower SES are more likely to live and work in areas with fewer healthcare providers and reduced access to quality care.[17] These areas also often have reduced access to fresh fruits and vegetables and fewer recreational areas for physical activity.[17]

Health insurance status also plays a role in cancer health disparities. Those who are uninsured or underinsured are less likely to receive paid time off and adequate cancer treatment and care.[22] About half of those diagnosed with cancer experience financial difficulties due to the high cost of treatment, which can be especially burdensome for patients with fewer resources available to them.[23] Furthermore, unequal access to screening may lead to a later stage of disease at diagnosis and a lower chance of survival. In 2023, 7% of Ohioans under the age of 65 years were uninsured.[24]

According to the 2018-2022 American Community Survey five-year estimates of persons below poverty, slightly more than 13% of Ohio's population was below the poverty line compared with slightly less than 13% for the nation.[25] In Ohio, 27% of Black people, 12% of Asians, and 11% of non-Hispanic White people were considered poor by federal standards.[25] Also, 23% of Ohio's Hispanic/Latino community was considered poor.[25] Sixteen of the 20 poorest counties in the state are located in the Appalachian region.[25] Compared to Ohio's most affluent counties, Ohio's poorest counties have higher cancer incidence and mortality rates for several cancers and a higher cancer mortality rate for all cancer sites/types combined.[26]

## Race/Ethnicity

Ohio's population is approximately 81% White race alone, 13% Black race alone, 3% multiracial, 3% Asian alone, and less than 1% American Indian or Alaskan Native alone.[24] **Figure 6** displays 2017-2021 average annual age-adjusted cancer incidence rates by race for the leading sites/types of cancer in Ohio. The average annual age-adjusted cancer incidence rate among Black Ohioans (448.9 per 100,000 population) was lower than White Ohioans (469.0 per 100,000) for all sites/types combined.[10] However, as shown in **Table 4**, Black males and females had higher incidence rates compared with White males and females for the following cancers: kidney and renal pelvis, larynx, liver and intrahepatic bile duct, lung and bronchus, myeloma, pancreas, prostate, and stomach.[10] Black males also experienced higher rates of colon and rectum and prostate cancers.[10] Asians/Pacific Islanders of both sexes in Ohio had lower incidence rates than other races for most cancer sites/types.[10] However, this population had a higher incidence of melanoma of the skin and cancers of the ovary and thyroid compared with Black people and a higher incidence of stomach cancer compared with White people.[10] Male Asians/Pacific Islanders also experienced more cancers of the liver and intrahepatic bile duct compared with White males.[10]

From 2017 to 2021, Black people had the highest mortality rates of any racial group in Ohio for all sites/types of cancer combined (181.3 per 100,000 population).[14] Black males had a 14% higher cancer mortality rate (225.0 per 100,000) compared with White males (197.8 per 100,000), and Black females had a 9% higher cancer mortality rate (153.3 per 100,000) compared with White females (140.8 per 100,000) **(Table 5)**.[14] Asians/Pacific Islanders had the lowest mortality rates of any racial group in Ohio for all sites/types of cancer combined (82.9 per 100,000), with Asian/Pacific Islander males and females having 56% lower and 43% lower cancer mortality rates compared with White males and females, respectively.[14] Black males and females had higher mortality rates compared with White males and females for the following cancers: breast, colon and rectum, larynx, liver and intrahepatic bile duct, pancreas, and stomach.[14] Black males also had higher mortality rates for lung and bronchus and prostate cancer.[14] Black females also had higher rates of thyroid and uterine cancer mortality during this time period.[14]

## Summary of Cancer Health Disparities

Eliminating cancer health disparities begins with increasing access to quality healthcare, implementing targeted outreach and education programs, increasing access to screening and early detection services, and addressing non-medical health factors.[17] Public health initiatives and policies that aim to reduce poverty, improve knowledge, and expand access to care are essential to mitigating cancer health disparities and improving cancer outcomes.[17]

## **TABLE 4.** Average Annual Number of New Invasive Cancer Cases and Age-Adjusted Incidence Rates by Site/Type, Sex, and Race in Ohio, 2017-2021[1,2]

| | ALL RACES | | | | | | WHITE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Total | | Male | | Female | | Total | |
| PRIMARY CANCER SITE/TYPE | Cases | Rate | Cases | Rate | Cases | Rate | Cases | Rate | Cases | Rate | Cases | Rate |
| **All Cancer Sites/Types** | **35,966** | **511.3** | **34,463** | **444.4** | **70,429** | **470.0** | **31,347** | **505.6** | **30,018** | **447.6** | **61,365** | **469.0** |
| Bladder | 2,552 | 37.7 | 785 | 9.2 | 3,337 | 21.6 | 2,373 | 39.3 | 710 | 9.5 | 3,083 | 22.6 |
| Brain and Other CNS** | 500 | 7.8 | 409 | 5.8 | 909 | 6.7 | 453 | 8.2 | 372 | 6.2 | 825 | 7.2 |
| Breast | 84 | 1.2 | 10,071 | 132.3 | 10,155 | 70.1 | 70 | 1.1 | 8,762 | 132.9 | 8,832 | 69.9 |
| Cervix | * | * | 476 | 7.8 | * | * | * | * | 401 | 7.9 | * | * |
| Colon and Rectum | 3,001 | 44.4 | 2,706 | 34.2 | 5,707 | 38.9 | 2,611 | 43.9 | 2,359 | 34.2 | 4,970 | 38.7 |
| Esophagus | 715 | 10.0 | 171 | 2.0 | 885 | 5.7 | 664 | 10.4 | 153 | 2.1 | 817 | 5.9 |
| Hodgkin Lymphoma | 179 | 3.0 | 145 | 2.4 | 324 | 2.7 | 149 | 3.0 | 124 | 2.5 | 272 | 2.7 |
| Kidney and Renal Pelvis | 1,651 | 23.8 | 997 | 13.0 | 2,648 | 18.0 | 1,441 | 23.6 | 865 | 13.1 | 2,306 | 18.0 |
| Larynx | 442 | 6.0 | 134 | 1.7 | 576 | 3.7 | 380 | 5.8 | 117 | 1.7 | 497 | 3.6 |
| Leukemia | 1,051 | 16.1 | 756 | 10.0 | 1,807 | 12.7 | 940 | 16.4 | 653 | 10 | 1,593 | 12.9 |
| Liver and Intrahepatic Bile Duct | 851 | 11.4 | 377 | 4.5 | 1,228 | 7.7 | 679 | 10.3 | 313 | 4.3 | 993 | 7.1 |
| Lung and Bronchus | 5,224 | 73.2 | 4,895 | 57.6 | 10,119 | 64.3 | 4,641 | 73.1 | 4,295 | 57.9 | 8,936 | 64.4 |
| Melanoma of the Skin | 2,104 | 31.4 | 1,577 | 22.1 | 3,682 | 25.8 | 1,926 | 32.6 | 1,387 | 22.7 | 3,312 | 26.7 |
| Myeloma | 531 | 7.7 | 435 | 5.2 | 967 | 6.3 | 417 | 6.8 | 327 | 4.5 | 745 | 5.5 |
| Non-Hodgkin Lymphoma | 1,563 | 23.2 | 1,253 | 15.8 | 2,816 | 19.1 | 1,412 | 23.7 | 1,119 | 16.1 | 2,531 | 19.5 |
| Oral Cavity and Pharynx | 1,383 | 19.1 | 557 | 7.1 | 1,940 | 12.8 | 1,251 | 19.6 | 492 | 7.2 | 1,744 | 13.1 |
| Ovary | * | * | 748 | 9.9 | * | * | * | * | 670 | 10.3 | * | * |
| Pancreas | 1,156 | 16.4 | 1,012 | 12.0 | 2,168 | 14.0 | 1,016 | 16.3 | 861 | 11.6 | 1,877 | 13.8 |
| Prostate | 9,032 | 118.1 | * | * | * | * | 7,459 | 110.1 | * | * | * | * |
| Stomach | 537 | 7.9 | 319 | 4.0 | 856 | 5.7 | 445 | 7.4 | 240 | 3.5 | 685 | 5.2 |
| Testis | 311 | 5.7 | * | * | * | * | 288 | 6.5 | * | * | * | * |
| Thyroid | 481 | 7.4 | 1,326 | 21.2 | 1,806 | 14.3 | 431 | 7.7 | 1,148 | 22.1 | 1,579 | 14.9 |
| Uterus | * | * | 2,485 | 31.1 | * | * | * | * | 2,182 | 31.7 | * | * |

[1] Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

[2] Asian/Pacific Islander case counts are small. Interpret with caution.

* Not Applicable.

** Central Nervous System.

*** Rate not calculated when the case count for 2017-2021 is less than five (i.e., the average annual count is less than one).

## TABLE 4. Average Annual Number of New Invasive Cancer Cases and Age-Adjusted Incidence Rates by Site/Type, Sex, and Race in Ohio, 2017-2021[1,2] (CONTINUED)

| | BLACK | | | | | | ASIAN OR PACIFIC ISLANDER | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Total | | Male | | Female | | Total | |
| PRIMARY CANCER SITE/TYPE | Cases | Rate | Cases | Rate | Cases | Rate | Cases | Rate | Cases | Rate | Cases | Rate |
| **All Cancer Sites/Types** | **3,620** | **514.9** | **3,537** | **402.7** | **7,157** | **448.9** | **260** | **225.4** | **382** | **265.6** | **642** | **245.3** |
| Bladder | 133 | 21.4 | 59 | 6.6 | 192 | 12.6 | 12 | 11.5 | 5 | 4.4 | 17 | 7.6 |
| Brain and Other CNS** | 37 | 5.0 | 28 | 3.2 | 65 | 4.0 | 6 | 4.2 | 4 | 3.0 | 10 | 3.6 |
| Breast | 13 | 2.0 | 1,087 | 126.3 | 1,100 | 71.1 | <1 | *** | 136 | 91.5 | 136 | 48.7 |
| Cervix | * | * | 59 | 7.3 | * | * | * | * | 6 | 3.7 | * | * |
| Colon and Rectum | 308 | 45.3 | 278 | 32 | 587 | 37.7 | 26 | 21.4 | 28 | 19.8 | 54 | 20.6 |
| Esophagus | 41 | 5.9 | 15 | 1.6 | 55 | 3.5 | 4 | 3.2 | 3 | 2.1 | 6 | 2.5 |
| Hodgkin Lymphoma | 25 | 3.3 | 17 | 2.1 | 42 | 2.7 | 3 | 1.6 | 1 | 0.6 | 4 | 1.1 |
| Kidney and Renal Pelvis | 178 | 25.7 | 118 | 13.6 | 296 | 18.9 | 10 | 8.0 | 6 | 4.6 | 17 | 6.3 |
| Larynx | 56 | 8.1 | 16 | 1.8 | 72 | 4.5 | 3 | 2.5 | 1 | 0.4 | 3 | 1.3 |
| Leukemia | 75 | 10.9 | 71 | 8.2 | 146 | 9.4 | 8 | 5.6 | 9 | 6.2 | 17 | 5.9 |
| Liver and Intrahepatic Bile Duct | 146 | 19.0 | 55 | 5.8 | 201 | 11.6 | 17 | 15.3 | 6 | 3.9 | 23 | 9.1 |
| Lung and Bronchus | 524 | 78.4 | 548 | 59.9 | 1,072 | 67.5 | 32 | 31.9 | 35 | 27.9 | 67 | 29.7 |
| Melanoma of the Skin | 7 | 1.0 | 7 | 0.8 | 14 | 0.9 | 2 | 1.6 | 1 | 0.9 | 3 | 1.2 |
| Myeloma | 101 | 15.4 | 96 | 10.9 | 198 | 12.8 | 5 | 4.4 | 3 | 2.1 | 8 | 3.1 |
| Non-Hodgkin Lymphoma | 112 | 16.1 | 99 | 11.4 | 211 | 13.5 | 15 | 13.2 | 15 | 10.8 | 31 | 11.9 |
| Oral Cavity and Pharynx | 100 | 13.7 | 50 | 5.8 | 150 | 9.4 | 16 | 13.3 | 8 | 5.4 | 24 | 8.9 |
| Ovary | * | * | 59 | 6.7 | * | * | * | * | 11 | 7.7 | * | * |
| Pancreas | 124 | 18.6 | 132 | 14.8 | 256 | 16.5 | 8 | 7.6 | 10 | 8.3 | 19 | 8.1 |
| Prostate | 1,267 | 168.5 | * | * | * | * | 49 | 44.2 | * | * | * | * |
| Stomach | 78 | 12.3 | 65 | 7.3 | 142 | 9.4 | 9 | 8.9 | 7 | 5.3 | 17 | 6.8 |
| Testis | 12 | 1.6 | * | * | * | * | 2 | 1.2 | * | * | * | * |
| Thyroid | 30 | 4.3 | 125 | 15.1 | 155 | 10.0 | 10 | 6.4 | 28 | 16.7 | 38 | 11.7 |
| Uterus | * | * | 250 | 27.3 | * | * | * | * | 31 | 20.4 | * | * |

[1] Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

[2] Asian/Pacific Islander case counts are small. Interpret with caution.

* Not Applicable.

** Central Nervous System.

*** Rate not calculated when the case count for 2017-2021 is less than five (i.e., the average annual count is less than one).

## **TABLE 5.** Average Annual Number of Cancer Deaths and Age-Adjusted Mortality Rates by Site/Type, Sex, and Race in Ohio, 2017-2021[1,2]

| | ALL RACES | | | | | | WHITE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Total | | Male | | Female | | Total | |
| PRIMARY CANCER SITE/TYPE | Deaths | Rate | Deaths | Rate | Deaths | Rate | Deaths | Rate | Deaths | Rate | Deaths | Rate |
| **All Cancer Sites/Types** | **13,326** | **198.4** | **11,858** | **140.9** | **25,183** | **164.6** | **11,810** | **197.8** | **10,388** | **140.8** | **22,198** | **164.5** |
| Bladder | 530 | 8.5 | 217 | 2.5 | 747 | 4.9 | 496 | 8.9 | 193 | 2.5 | 689 | 5.1 |
| Brain and Other CNS** | 374 | 5.5 | 295 | 3.8 | 669 | 4.6 | 349 | 5.9 | 272 | 4.0 | 621 | 4.9 |
| Breast | 22 | 0.3 | 1,698 | 20.9 | 1,721 | 11.6 | 20 | 0.3 | 1,446 | 20.3 | 1,466 | 11.2 |
| Cervix | * | * | 160 | 2.3 | 160 | * | * | * | 132 | 2.3 | 132 | * |
| Colon and Rectum | 1,140 | 17.2 | 1,009 | 11.9 | 2,149 | 14.3 | 995 | 16.9 | 884 | 11.9 | 1,879 | 14.1 |
| Esophagus | 614 | 8.8 | 139 | 1.6 | 753 | 4.8 | 573 | 9.2 | 124 | 1.6 | 697 | 5.1 |
| Hodgkin Lymphoma | 23 | 0.4 | 12 | 0.2 | 36 | 0.2 | 21 | 0.4 | 12 | 0.2 | 33 | 0.3 |
| Kidney and Renal Pelvis | 374 | 5.6 | 217 | 2.6 | 591 | 3.9 | 339 | 5.7 | 198 | 2.6 | 537 | 4.0 |
| Larynx | 143 | 1.9 | 39 | 0.5 | 182 | 1.1 | 122 | 1.9 | 32 | 0.5 | 155 | 1.1 |
| Leukemia | 547 | 8.6 | 414 | 4.9 | 961 | 6.5 | 499 | 8.8 | 370 | 5.0 | 869 | 6.6 |
| Liver and Intrahepatic Bile Duct | 662 | 9.1 | 342 | 4.0 | 1,003 | 6.3 | 536 | 8.4 | 286 | 3.9 | 822 | 5.9 |
| Lung and Bronchus | 3,539 | 50.9 | 2,940 | 34.3 | 6,479 | 41.4 | 3,149 | 50.9 | 2,613 | 34.8 | 5,762 | 41.7 |
| Melanoma of the Skin | 241 | 3.7 | 133 | 1.6 | 374 | 2.5 | 238 | 4.1 | 129 | 1.9 | 367 | 2.8 |
| Myeloma | 285 | 4.3 | 225 | 2.6 | 511 | 3.3 | 232 | 4.0 | 181 | 2.4 | 413 | 3.0 |
| Non-Hodgkin Lymphoma | 478 | 7.5 | 368 | 4.3 | 846 | 5.6 | 443 | 7.8 | 339 | 4.4 | 782 | 5.9 |
| Oral Cavity and Pharynx | 314 | 4.4 | 136 | 1.6 | 449.0 | 2.9 | 280 | 4.4 | 123 | 1.7 | 403 | 2.9 |
| Ovary | * | * | 505 | 6.0 | 505 | * | * | * | 460 | 6.2 | 460 | * |
| Pancreas | 991 | 14.3 | 908 | 10.5 | 1,899 | 12.2 | 878 | 14.2 | 787 | 10.4 | 1,666 | 12.1 |
| Prostate | 1,227 | 19.7 | * | * | 1,227 | * | 1,027 | 18.5 | * | * | 1,027 | * |
| Stomach | 209 | 3.2 | 138 | 1.7 | 348 | 2.3 | 166 | 2.8 | 107 | 1.5 | 273 | 2.1 |
| Testis | 15 | 0.3 | * | * | 15 | * | 14 | 0.3 | * | * | 14 | * |
| Thyroid | 32 | 0.5 | 42 | 0.5 | 74 | 0.5 | 29 | 0.5 | 36 | 0.5 | 65 | 0.5 |
| Uterus | * | * | 461 | 5.4 | 461 | * | * | * | 380 | 5.1 | 380 | * |

[1] Source: Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

[2] Asian/Pacific Islander case counts are small. Interpret data with caution.

* Not applicable.

** Central Nervous System.

*** Rate not calculated when the death count for 2017-2021 is less than ten (i.e., the average annual count is less than two).

## **TABLE 5.** Average Annual Number of Cancer Deaths and Age-Adjusted Mortality Rates by Site/Type, Sex, and Race in Ohio, 2017-2021[1,2] (CONTINUED)

| | BLACK | | | | | | ASIAN OR PACIFIC ISLANDER | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Total | | Male | | Female | | Total | |
| PRIMARY CANCER SITE/TYPE | Deaths | Rate | Deaths | Rate | Deaths | Rate | Deaths | Rate | Deaths | Rate | Deaths | Rate |
| **All Cancer Sites/Types** | **1,416** | **225.0** | **1,361** | **153.3** | **2,777** | **181.3** | **85** | **86.5** | **98** | **80.0** | **183** | **82.9** |
| Bladder | 32 | 5.7 | 22 | 2.5 | 54 | 3.7 | * | * | * | * | 3 | 1.6 |
| Brain and Other CNS** | 22 | 3.1 | 20 | 2.3 | 42 | 2.7 | 3 | 2.5 | 3 | 2.6 | 7 | 2.6 |
| Breast | 3 | 0.4 | 236 | 26.9 | 238 | 15.7 | * | * | 15 | 11.3 | 15 | 6.2 |
| Cervix | * | * | 26 | 3.0 | 26 | * | * | * | * | * | * | * |
| Colon and Rectum | 136 | 21.4 | 118 | 13.4 | 254 | 16.7 | 8 | 7.9 | 6 | 4.9 | 14 | 6.2 |
| Esophagus | 37 | 5.6 | 14 | 1.5 | 50 | 3.2 | 3 | 2.8 | 2 | 2.0 | 5 | 2.3 |
| Hodgkin Lymphoma | 2 | 0.4 | * | * | 3 | 0.2 | <2 | *** | <2 | *** | <2 | *** |
| Kidney and Renal Pelvis | 33 | 5.5 | 18 | 2.1 | 51 | 3.5 | <2 | *** | <2 | *** | 2 | 0.9 |
| Larynx | 19 | 2.9 | 7 | 0.8 | 26 | 1.6 | <2 | *** | <2 | *** | <2 | *** |
| Leukemia | 44 | 7.0 | 40 | 4.6 | 84 | 5.6 | 4 | 2.9 | 4 | 3.0 | 7 | 3.0 |
| Liver and Intrahepatic Bile Duct | 114 | 15.5 | 50 | 5.4 | 164 | 9.7 | 11 | 10.1 | 5 | 3.9 | 16 | 6.8 |
| Lung and Bronchus | 364 | 56.7 | 302 | 33.3 | 667 | 42.8 | 20 | 20.6 | 23 | 20.1 | 43 | 20.4 |
| Melanoma of the Skin | 3 | 0.5 | 3 | 0.3 | 6 | 0.4 | <2 | *** | <2 | *** | <2 | *** |
| Myeloma | 51 | 8.5 | 43 | 5.0 | 94 | 6.4 | 2 | 2.2 | <2 | *** | 4 | 1.7 |
| Non-Hodgkin Lymphoma | 31 | 5.2 | 27 | 3.2 | 58 | 4.0 | 4 | 4.1 | 2 | 1.7 | 6 | 2.8 |
| Oral Cavity and Pharynx | 29 | 4.1 | 12 | 1.3 | 40 | 2.5 | 4 | 3.5 | <2 | *** | 5 | 2.2 |
| Ovary | * | * | 42 | 4.6 | 42 | * | * | * | 3 | 2.3 | 3 | * |
| Pancreas | 107 | 16.5 | 112 | 12.7 | 219 | 14.4 | 6 | 5.7 | 7 | 6.6 | 13 | 6.2 |
| Prostate | 194 | 35.2 | * | * | 194 | * | 5 | 5.7 | * | * | 5 | * |
| Stomach | 38 | 6.1 | 26 | 3.1 | 64 | 4.3 | 5 | 5.3 | 5 | 3.8 | 10 | 4.4 |
| Testis | * | * | * | * | * | * | <2 | *** | * | * | * | * |
| Thyroid | 2 | 0.4 | 5 | 0.6 | 7 | 0.5 | * | * | * | * | * | * |
| Uterus | * | * | 76 | 8.4 | 76 | * | * | * | 4 | 3.3 | 4 | * |

[1] Source: Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

[2] Asian/Pacific Islander case counts are small. Interpret with caution.

* Not Applicable.

** Central Nervous System.

*** Rate not calculated when the case count for 2017-2021 is less than ten (i.e., the average annual count is less than two).

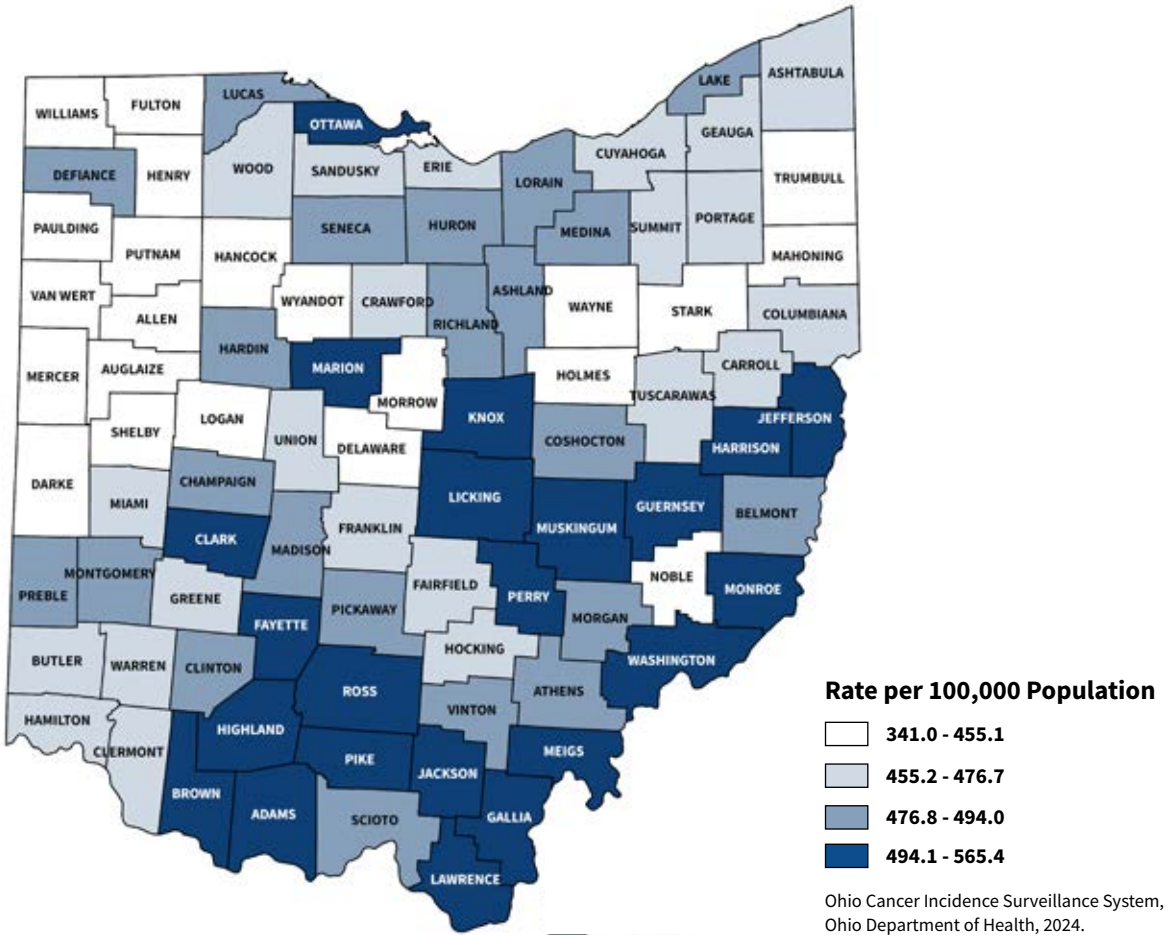
# ALL CANCER SITES/TYPES COMBINED

## New Cases

An average of 70,429 new cases (35,966 men and 34,463 women) of invasive cancer were diagnosed annually in Ohio during the five-year period 2017 through 2021, with a corresponding average annual age-adjusted incidence rate of 470.0 per 100,000 population compared with the U.S. rate of 444.6 per 100,000 **(Table 2)**.[5,10] From 2017 to 2021, Black men had the highest rates of all cancers combined (514.9 per 100,000), followed closely by White men (505.6 per 100,000).[10] White women had a higher incidence rate for all cancers combined (447.6 per 100,000) compared with Black women (402.7 per 100,000) **(Table 4)**.[10] Average annual age-adjusted incidence rates of all cancers combined by Ohio county of residence are shown in **Figure 7**.

**Currently, a man living in the United States has a 1 in 3 lifetime risk of developing an invasive cancer, and a woman has a 1 in 3 lifetime risk of developing an invasive cancer.[6]**

**FIGURE 7.** All Cancer Sites/Types Combined: Quartiles of Average Annual Age-Adjusted Incidence Rates by County in Ohio, 2017-2021




Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

## Deaths

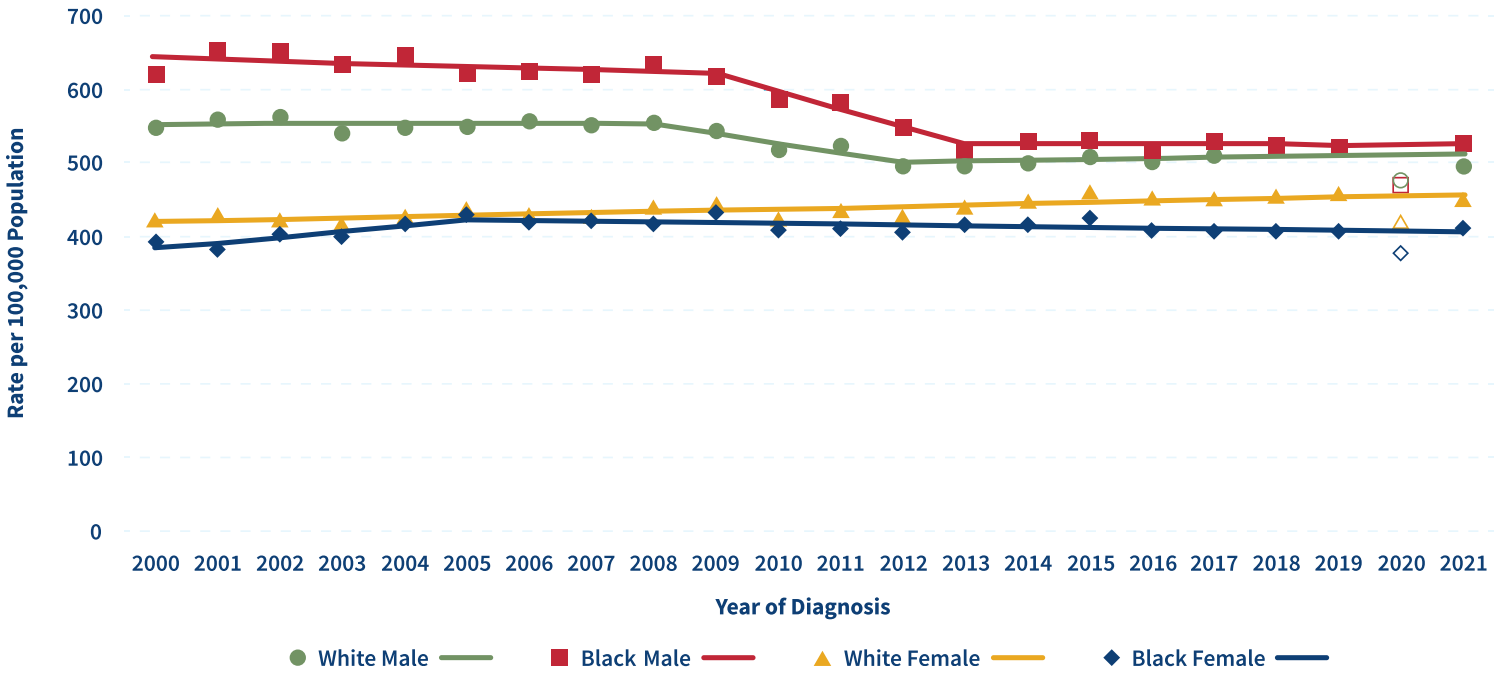
An average of 25,183 deaths (13,326 men and 11,858 women) due to all cancers combined occurred annually in Ohio from 2017 to 2021, with a corresponding average annual age-adjusted mortality rate of 164.6 per 100,000 population compared with the U.S. rate of 148.4 per 100,000 **(Table 3)**.[14] Mortality rates for all cancers combined in Ohio were highest among Black males (225.0) and White males (197.8 per 100,000) **(Table 5)**.[14]

## Trends

Male cancer incidence rates for all sites/types combined were consistently higher than those of females each year from 2000 to 2021.[10] Cancer incidence rates decreased for White males 2.4% per year from 2008 to 2012.[10] Cancer incidence rates also decreased among Black males from 2009 to 2013 by 4.1% per year.[10] Among Black females, incidence rates for all cancers combined increased 1.9% per year from 2000 to 2005, then slightly decreased 0.2% per year from 2005 to 2021.[10] From 2000 to 2021, cancer incidence rates increased 0.4% per year for White females **(Figure 8)**.[10]

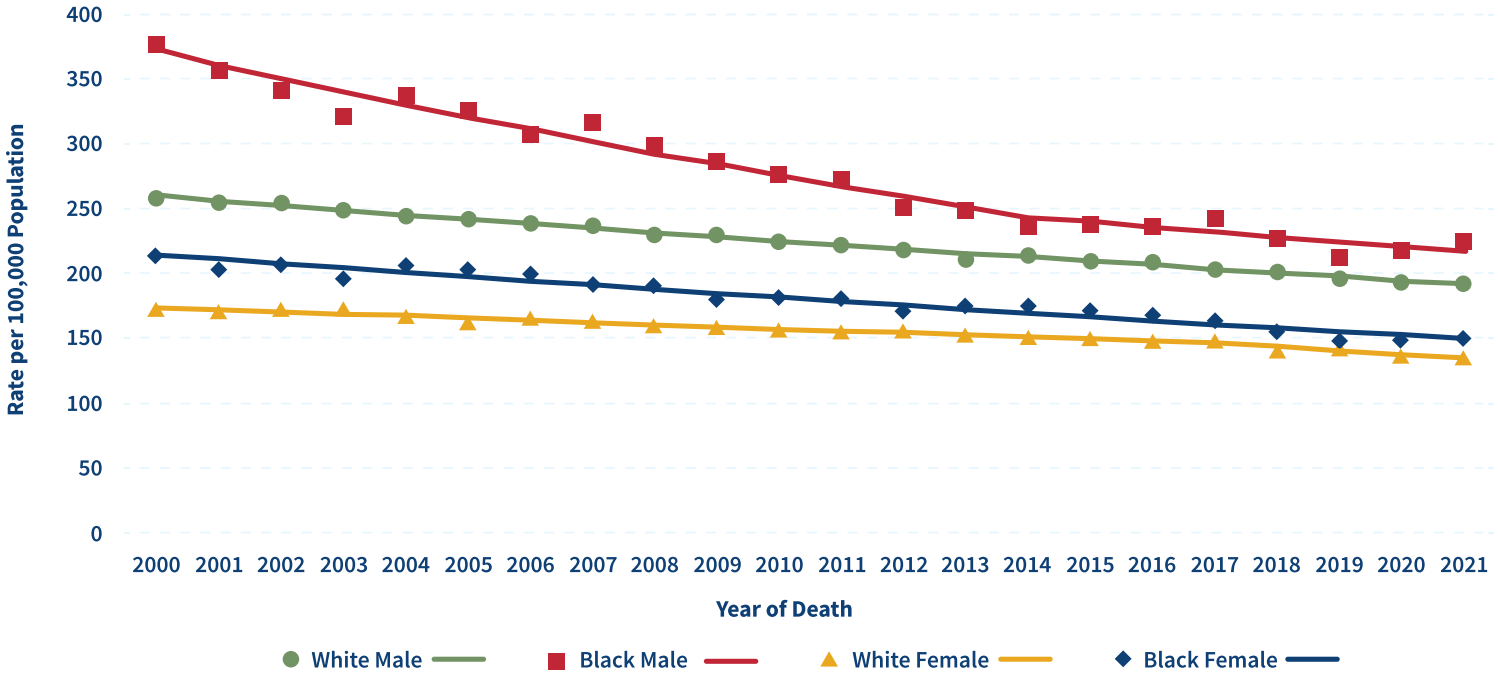
Cancer mortality rates decreased for White males and Black females from 2000 to 2021 by 1.4% and 1.7% per year, respectively.[14] Cancer mortality rates among Black males decreased 3.0% per year from 2000 to 2014.[14] Cancer mortality rates for White females decreased 1.0% per year from 2000 to 2017 and then 2.1% per year from 2017 to 2021 **(Figure 9)**.[14]

**FIGURE 8.** Trends in Age-Adjusted Incidence Rates for All Cancer Sites/Types Combined by Sex and Race in Ohio, 2000-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

**FIGURE 9.** Trends in Age-Adjusted Mortality Rates for All Cancer Sites/Types Combined by Sex and Race in Ohio, 2000-2021




Source: Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

## Stage at Diagnosis and Survival

From 2017 to 2021 in Ohio, 9% of cancer cases were diagnosed at the *in situ* stage, 42% at the local stage, 20% at the regional stage, 21% at the distant stage, and 8% had an unknown stage.[10] The five-year relative survival for all cancers combined from 2014 to 2020 was 68% in Ohio compared with 69% in the United States **(Figure 1, Table A-1, Table A-6)**.[10,11]

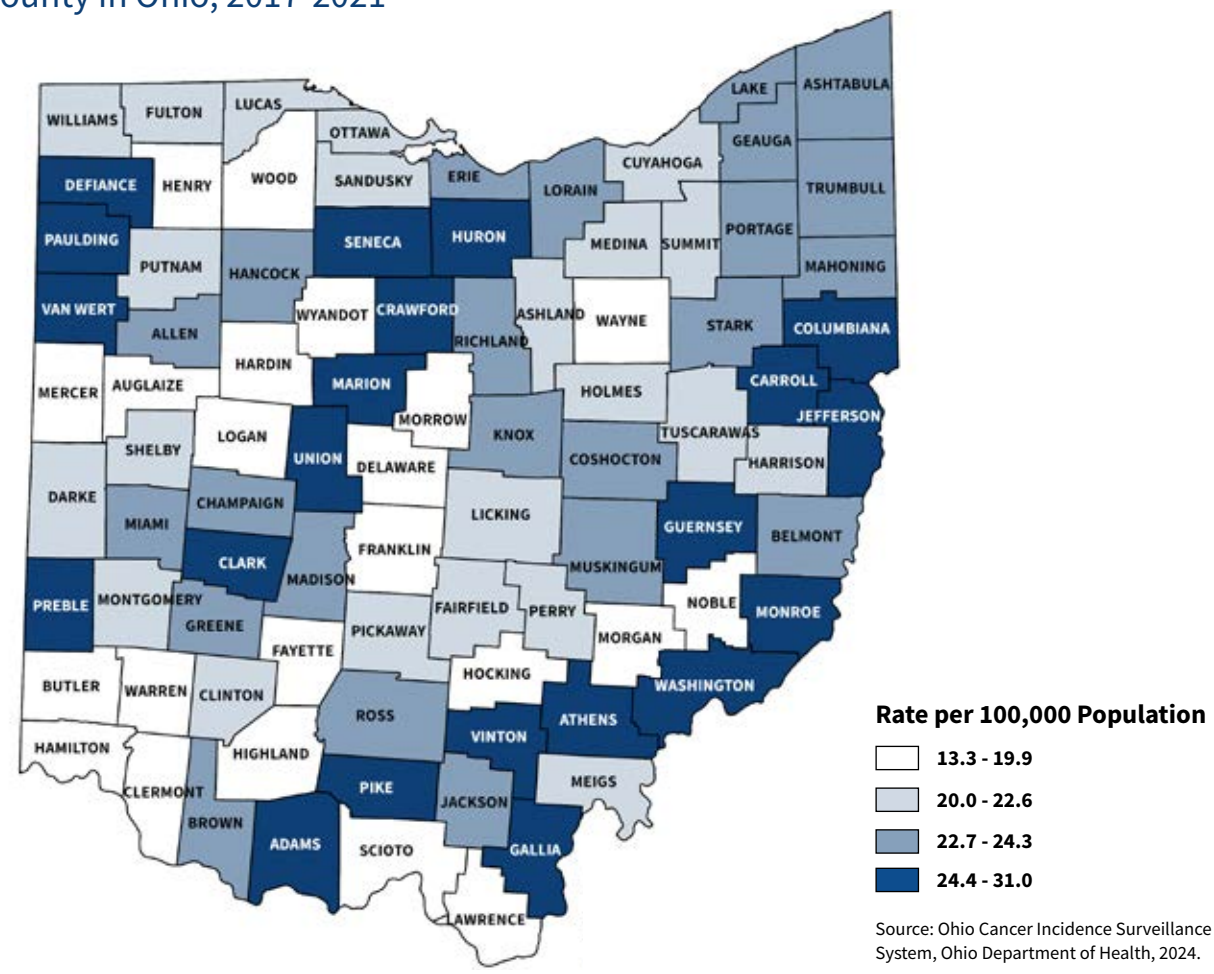
# BLADDER CANCER

## New Cases

An average of 3,337 new cases (2,552 men and 785 women) of bladder cancer were diagnosed annually in Ohio during the period 2017 through 2021, with a corresponding average annual age-adjusted incidence rate of 21.6 per 100,000 population compared with the U.S. rate of 18.8 per 100,000 **(Table 2)**.[5,10] White and Black men had higher incidence rates of bladder cancer compared with White and Black women in Ohio from 2017 to 2021, with White men having the highest incidence rate (39.3 per 100,000) among all sex/race groups **(Table 4)**.[10] Average annual age-adjusted incidence rates of bladder cancer by Ohio county of residence are shown in **Figure 10**.

**Currently, a man living in the United States has a 1 in 37 lifetime risk of developing invasive bladder cancer, and a woman has a 1 in 123 lifetime risk of developing invasive bladder cancer.[6]**

**FIGURE 10.** Cancer of the Bladder: Quartiles of Average Annual Age-Adjusted Incidence Rates by County in Ohio, 2017-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

## Deaths

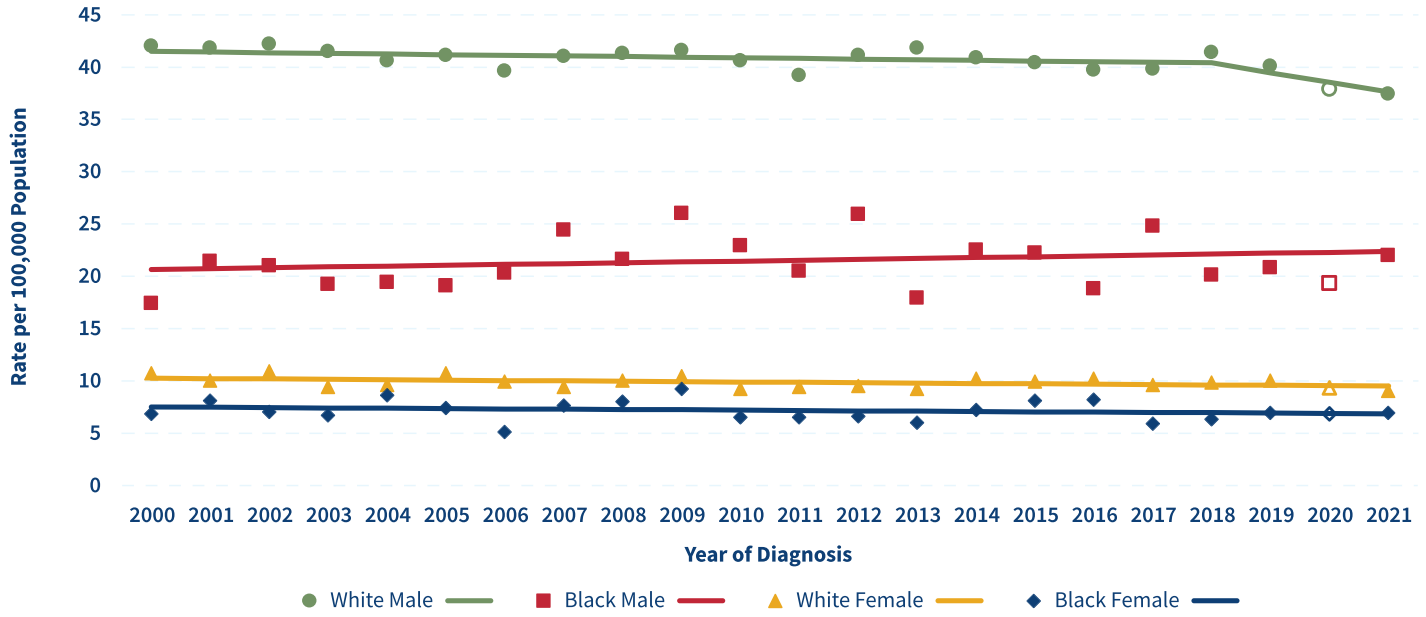
An average of 747 deaths (530 men and 217 women) due to bladder cancer occurred annually in Ohio from 2017 to 2021, with a corresponding average annual age-adjusted mortality rate of 4.9 per 100,000 population compared with the U.S. rate of 4.2 per 100,000 **(Table 3)**.[14] Similar to incidence, the bladder cancer mortality rate in Ohio was highest among White males (8.9 per 100,000) **(Table 5)**.[14]

## Trends

From 2000 to 2021, age-adjusted bladder cancer incidence rates in Ohio were relatively stable for all race/sex groups, with the exception of a significant decline from 2018 to 2021 among White males (2.3% per year) **(Figure 11)**.[10]

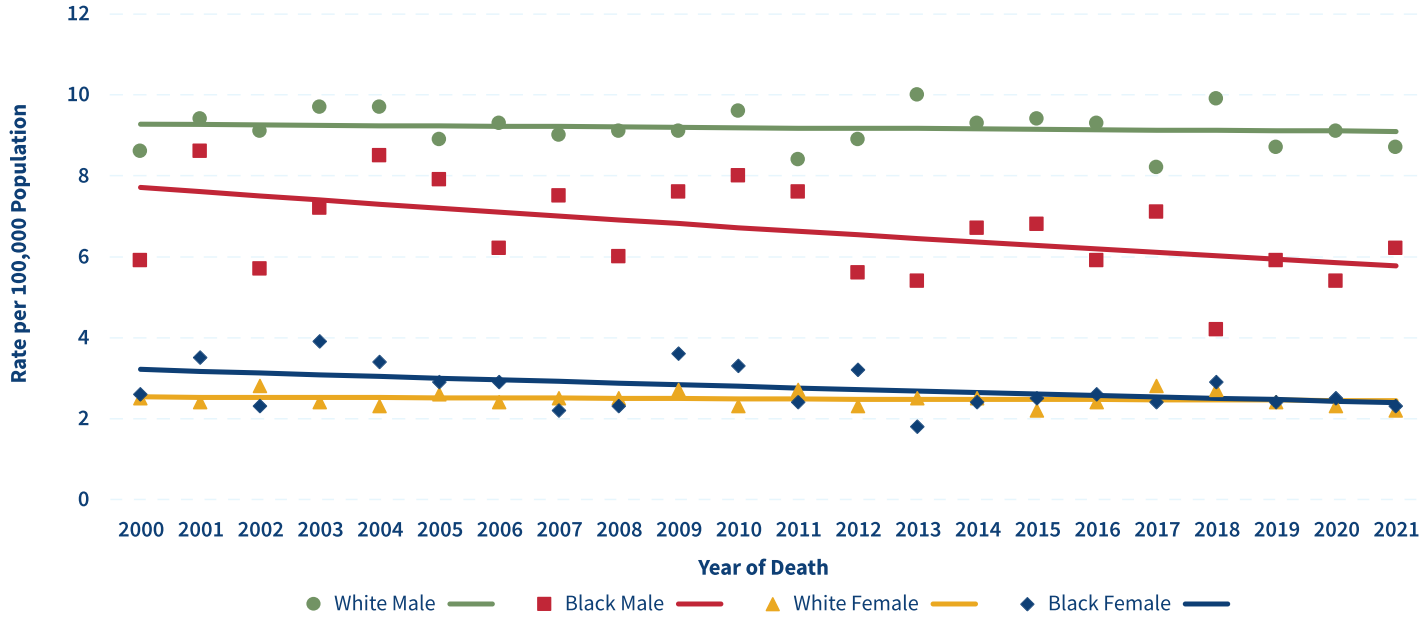
Similar to incidence, age-adjusted bladder cancer mortality rates in Ohio remained relatively stable from 2000 to 2021 for all sex/race groups **(Figure 12)**.[14]

### FIGURE 11. Trends in Age-Adjusted Incidence Rates for Cancer of the Bladder by Sex and Race in Ohio, 2000-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

### FIGURE 12. Trends in Age-Adjusted Mortality Rates for Cancer of the Bladder by Sex and Race in Ohio, 2000-2021




Source: Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

## Risk Factors and Populations with High Rates[27]

### Potentially Modifiable Risk Factors

**Smoking:** Tobacco smoking is the most important risk factor for bladder cancer. Tobacco smoking causes about half of all bladder cancer cases.

**Workplace exposures:** Certain industrial chemicals have been linked with bladder cancer. Being exposed to paints, dyes, metals, or petroleum products in the workplace increases risk.

**Arsenic:** Arsenic, including that in drinking water, has been linked with a higher risk of bladder cancer in some parts of the world.

**Certain by-products in treated water:** Exposure to chlorinated aliphatic hydrocarbons and chlorination by-products in treated water increases bladder cancer risk.

**Aristolochic acid:** Aristolochic acid, a Chinese herb, increases bladder cancer risk.

**Chemotherapy:** Taking the chemotherapy drug cyclophosphamide or ifosfamide increases the risk of bladder cancer.

**Radiation therapy:** People who are treated with radiation to the pelvis are more likely to develop bladder cancer.

### Non-modifiable Risk Factors

**Age:** The risk of bladder cancer increases with age. About nine out of 10 people with bladder cancer are older than 55.

**Sex:** Bladder cancer is much more common in men than in women.

**Race and ethnicity:** White people are about twice as likely to develop bladder cancer as Black people. Non-Hispanics are twice as likely to develop bladder cancer as Hispanics.

**Chronic bladder irritation and infections:** Urinary infections, kidney and bladder stones, bladder catheters left in place for a long time, and other causes of chronic bladder irritation have been linked with bladder cancer.

**Family history:** People who have family members with bladder cancer have a higher risk of getting it themselves. The increased risk among family members may be due to exposure to the same cancer-causing chemicals (such as those in tobacco smoke).

**Genetics:** People with specific genetic characteristics have a higher bladder cancer risk. These include HRAS mutation (Costello Syndrome, Facio-Cutaneous-Skeletal Syndrome), RB1 mutation, PTEN/MMAC1 mutation (Cowden Syndrome), NAT2 slow acetylator phenotype, and GSTM1 null phenotype.

### Signs and Symptoms[28]

- **Blood in the urine.**
- **Frequent urination.**
- **Pain or burning during urination.**
- **Feeling as if you need to urinate even if your bladder isn't full.**
- **Urinating often during the night.**

Bladder cancers that have grown large enough or have spread to other parts of the body can sometimes cause other symptoms such as:

- **Being unable to urinate.**
- **Lower back pain on one side of the body.**
- **Pain in the abdomen.**
- **Bone pain or tenderness.**
- **Unintended weight loss and loss of appetite.**
- **Swelling of the feet.**
- **Feeling tired.**

*Any of these signs/symptoms may be caused by cancer or by other, less serious health problems. If you have any of these signs/symptoms, see your healthcare provider.*

## Early Detection[29]

There is currently no standard screening test recommended for people at average risk of bladder cancer.

Certain tests may be used to screen for bladder cancer in people who have had bladder cancer in the past or who are at an increased risk of developing it. These tests include:

- **Hematuria test:** Hematuria is red blood cells in the urine. It may be caused by cancer or by other conditions. A hematuria test is used to check for blood in a sample of urine by viewing it under a microscope or using a special test strip. The test may be repeated over time.
- **Urine cytology:** Urine cytology is a lab test in which a sample of urine is checked under a microscope for abnormal cells.
- **Urine tumor marker tests:** Urinary tumor markers are substances found in the urine that are either made by bladder cancer cells or that the body makes in response to bladder cancer. For this test, a sample of urine is checked in the lab to detect the presence of these substances. Urine tumor marker tests may also be used to help diagnose some types of bladder cancer.
- **Cystoscopy:** Cystoscopy is a procedure to look inside the bladder and urethra to check for abnormal areas. A cystoscope (a thin, lighted tube) is inserted through the urethra into the bladder. Tissue samples may be taken for biopsy.

## Stage at Diagnosis and Survival

For all stages combined, the five-year relative survival for bladder cancer diagnosed from 2014 to 2020 was 78% in both Ohio and the United States.[10,11] About half of all Ohio bladder cancer patients were diagnosed while the tumor was *in situ*, for which the five-year relative survival was 97%.[10] If the tumor was diagnosed at the distant stage, the five-year relative survival was only 6% **(Table A-1, Table A-6)**.[10]

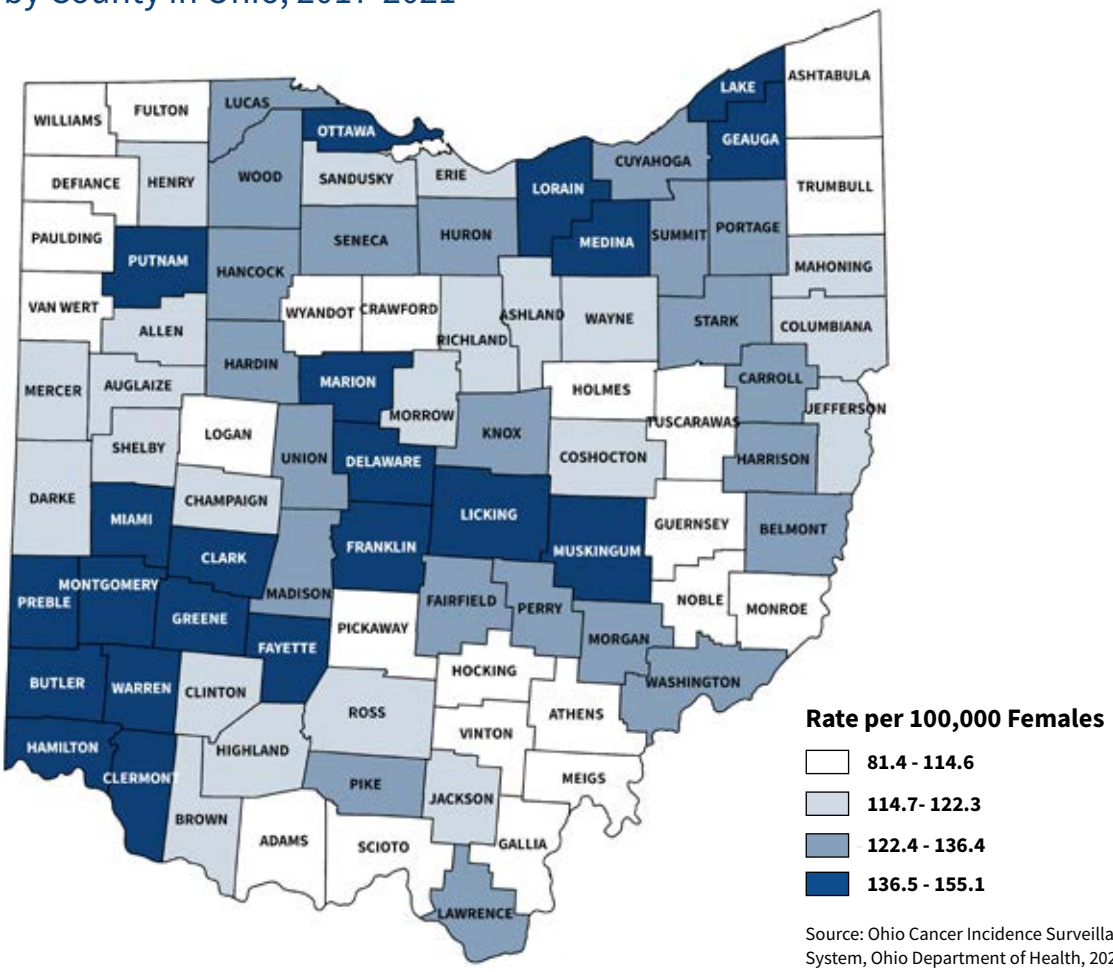
# BREAST CANCER

## New Cases

Breast cancer is the most common reportable cancer among women in Ohio, accounting for 29% of all cancers diagnosed in women.[10] An average of 10,071 new cases of invasive breast cancer were diagnosed among women and 84 cases among men in Ohio each year from 2017 to 2021.[10] The average annual age-adjusted female breast cancer incidence rate in Ohio was 132.3 per 100,000 females, compared with the U.S. rate of 129.8 per 100,000 during this time period **(Table 2)**.[5,10] In addition, an average of 2,028 *in situ* breast cancer cases were diagnosed annually among women and men in Ohio from 2017 to 2021.[10] The breast cancer incidence rate was slightly higher among White females (132.9 per 100,000) compared with Black females (126.3 per 100,000) in Ohio during this time period **(Table 4)**.[10] Average annual age-adjusted incidence rates of female breast cancer by Ohio county of residence are shown in **Figure 13**.

**Currently, a female living in the United States has a 1 in 8 lifetime risk of developing invasive breast cancer.[6]**

**FIGURE 13.** Cancer of the Female Breast: Quartiles of Average Annual Age-Adjusted Incidence Rates by County in Ohio, 2017-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

## Deaths

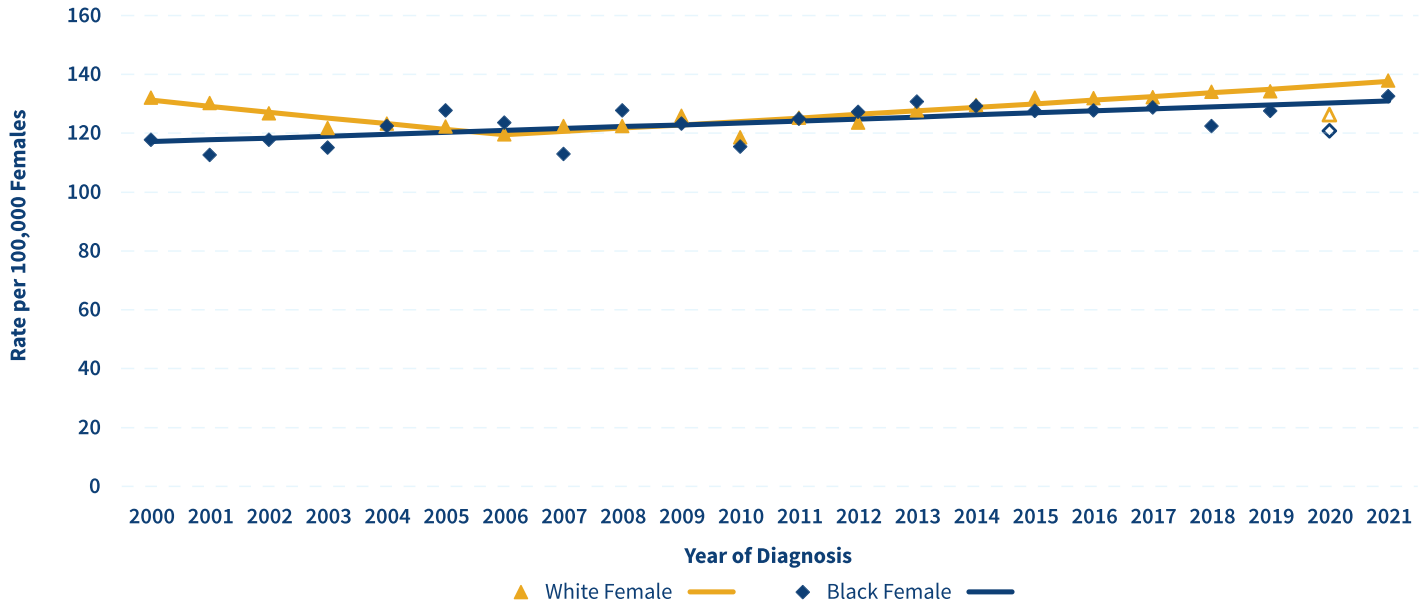
In Ohio, an average of 1,698 deaths occurred each year from breast cancer among women from 2017 to 2021.[14] The average annual age-adjusted mortality rate for breast cancer in Ohio was 20.9 per 100,000 females during this time period compared with 19.6 per 100,000 nationally **(Table 3)**.[14] In Ohio, the mortality rate of breast cancer was higher among Black women (26.9 per 100,000) than White women (20.3 per 100,000) and Asian/Pacific Islander women (11.3 per 100,000) **(Table 5)**.[14]

## Trends

Among White women, age-adjusted breast cancer incidence rates decreased 1.6% per year from 2000 to 2006 and increased 0.9% per year from 2006 to 2021.[10] Breast cancer incidence rates increased 0.5% per year from 2000 to 2021 for Black women **(Figure 14)**.[10]

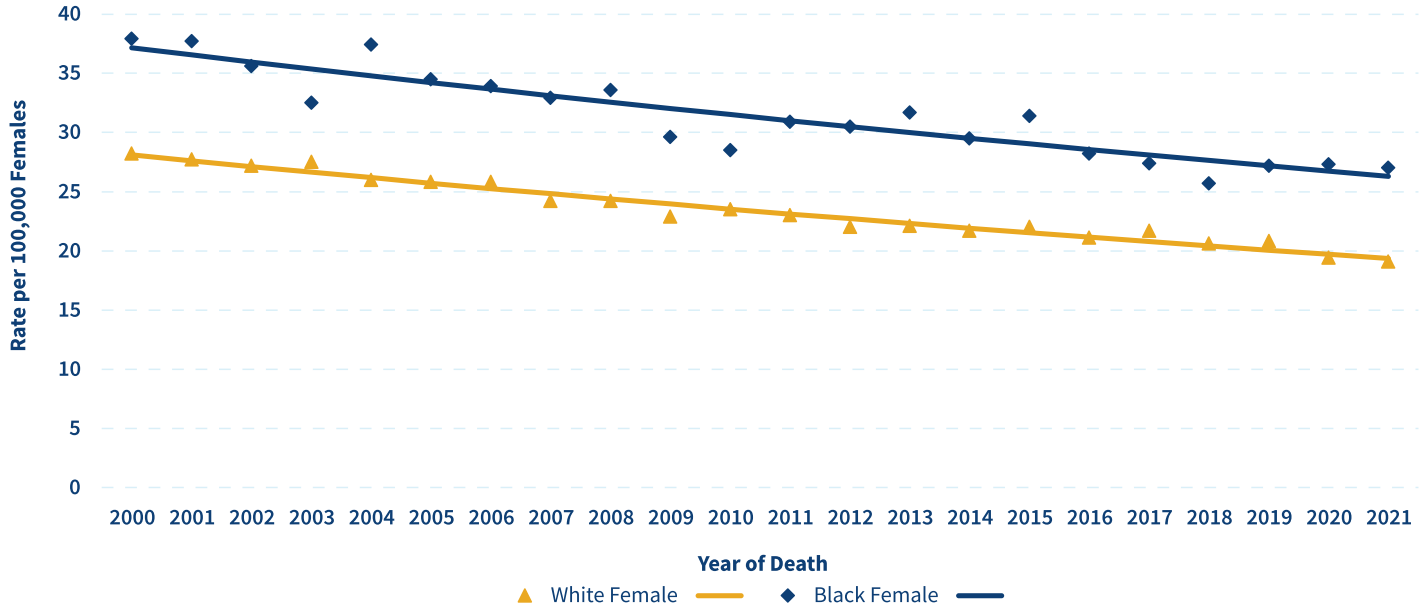
From 2000 to 2021, age-adjusted breast cancer mortality rates were consistently higher for Black women compared with White women.[14] Breast cancer mortality rates decreased for both White and Black women during this time period by 1.8% and 1.6% per year, respectively **(Figure 15)**.[14]

### FIGURE 14. Trends in Age-Adjusted Incidence Rates for Cancer of the Female Breast by Race in Ohio, 2000-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

### FIGURE 15. Trends in Age-Adjusted Mortality Rates for Cancer of the Female Breast by Race in Ohio, 2000-2021




Source: Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

# Risk Factors and Populations with High Rates[30,31]

## Potentially Modifiable Risk Factors

**Older age at birth of first child or never having given birth:** Women who gave birth to their first child after age 35 or women who never gave birth have a slightly higher breast cancer risk.

**Taking hormone therapy for symptoms of menopause:** Estrogen therapy that began close to the time of menopause is associated with an increased risk of developing breast cancer. The risk of breast cancer does not decrease after women stop taking estrogen. Combination hormone therapy (estrogen combined with progestin) increases the risk of breast cancer. When women stop taking estrogen combined with progestin, the risk of breast cancer decreases.

**Not breastfeeding:** Women who have never nursed have a slightly increased risk compared with women who have nursed.

**Obesity:** Obesity increases the risk of breast cancer, especially in postmenopausal women who have not used hormone replacement therapy.

**Alcohol:** Drinking alcohol increases the risk of breast cancer. The level of risk rises as the amount of alcohol rises.

**Radiation therapy to the breast or chest:** Radiation therapy to the chest for the treatment of cancer increases the risk of breast cancer, starting 10 years after treatment. The risk of breast cancer depends on the dose of radiation and the age at which it is given. The risk is highest if radiation treatment was used during puberty, when breasts are forming.

## Non-modifiable Risk Factors

**Age:** Risk of developing breast cancer increases with age. Most breast cancers are found in women ages 55 and older.

**Sex:** Breast cancer is about 100 times more common among women than men.

**Race and ethnicity:** Nationally, White women are slightly more likely to develop breast cancer than Black women. However, Black women are more likely to die from breast cancer. Asian, Hispanic, and Native American women have a lower risk of developing and dying from breast cancer.

**Genetic alterations:** Women who have inherited changes in the BRCA1 and BRCA2 genes or in certain other genes have a higher risk of breast cancer. Ashkenazi Jews are at increased risk due to increased prevalence of BRCA1 and BRCA2 mutations.

**Dense breast tissue:** Having breast tissue that is dense on a mammogram is a factor in breast cancer risk. The level of risk depends on how dense the breast tissue is. Women with very dense breasts have a higher risk of breast cancer than women with low breast density.

**Family history:** Women with a family history of breast cancer in a first-degree relative (mother, sister, or daughter) have an increased risk of breast cancer.

**Personal history:** Women who have had breast cancer have an increased risk of developing a new breast cancer (either in the other breast or a different part of the same breast). In addition, women with ductal carcinoma *in situ* (DCIS), lobular carcinoma *in situ* (LCIS), or benign breast disease are at increased risk.

**Greater exposure to estrogen:** Women who started menstruating before age 12 or who went through menopause at a later age have a higher risk.

**Diethylstilbestrol (DES):** Women who were given DES during pregnancy and women whose mother took DES while pregnant have slightly increased risk.

## Signs and Symptoms[32]

- **Lump or thickening in or near the breast or in the underarm area.**
- **A change in the size or shape of the breast.**
- **A dimple or puckering in the skin of the breast.**
- **A nipple turned inward into the breast.**
- **Fluid, other than breast milk, from the nipple, especially if it's bloody.**
- **Scaly, red, or swollen skin on the breast, nipple, or areola (the dark area of skin around the nipple).**
- **Dimples in the breast that look like the skin of an orange.**
- **Pain in any part of the breast including the nipple.**

*Any of these symptoms may be caused by cancer or by other, less serious health problems. If you have any of these symptoms, see your healthcare provider.*

## Early Detection

The early detection of breast cancer saves lives and increases treatment options. For women at average risk, the ACS recommends mammograms every year for women ages 45-54.[33] Women ages 40-44 have a choice to start annual mammograms if they wish to do so.[33] Women ages 55 and older can continue with yearly mammograms or reduce the frequency of screening to every other year.[33] Women who are at high risk for breast cancer based on certain factors should be screened with magnetic resonance imaging (MRI) and a mammogram every year.[33]

The USPSTF recommends mammography screening every two years for women ages 40-74 who are at average risk.[34]

**Table A-7** on page 105 shows the ACS and USPSTF recommendations for the early detection of breast cancer in average risk, asymptomatic women by age.

According to the 2022 Ohio Behavioral Risk Factor Surveillance System (BRFSS), 75.6% of Ohio women ages 50-74 reported having had a mammogram in the past two years compared with 76.8% in the United States.[35,36] **Table 6** shows the prevalence of Ohio women ages 50-74 who reported having had a mammogram in the past two years by demographic groups. The percentage of Ohio women who reported having had a mammogram in the past two years was lowest for those with less than a high school education (65.0%) and those with the lowest incomes (less than $25,000 per year) (65.4%), and highest for college graduates (83.7%) and those with the highest incomes ($50,000 or more per year) (79.0%).[35]

**TABLE 6.** Prevalence of Women 50-74 Who Reported Having Had a Mammogram in the Past Two Years by Demographics in Ohio, 2022[1,2]

| | Had a Mammogram in the Past Two Years |
|---|---|
| **AGE** | |
| 50-64 | 73.1% |
| 65-74 | 79.7% |
| **RACE** | |
| White | 76.0% |
| Black | 79.9% |
| **EDUCATION** | |
| Less than High School | 65.0% |
| High School or GED* | 73.7% |
| Some College | 72.8% |
| College Graduation | 83.7% |
| **ANNUAL HOUSEHOLD INCOME** | |
| <$25,000 | 65.4% |
| $25,000-$49,999 | 75.3% |
| $50,000+ | 79.0% |
| **TOTAL (WOMEN 50-74)** | **75.6%** |

[1] Source: 2022 Ohio Behavioral Risk Factor Surveillance System, Ohio Department of Health, 2024.
[2] "Don't Know" and "Refused" were excluded from the denominator. This can cause an artificially high percentage.
* General Educational Development.

## Stage at Diagnosis and Survival

In Ohio, the overall five-year relative survival for breast cancer was 92% based on cases diagnosed from 2014 through 2020 compared with 91% in the United States.[10,11] In Ohio, 72% of breast cancers were diagnosed while the tumor was *in situ* or at a local stage, for which the five-year relative survival was 100%.[10] After the cancer has spread regionally to involve adjacent organs or lymph nodes (22% of breast cancers in Ohio), the five-year relative survival was 87%.[10] For the 5% of Ohio women who were diagnosed with breast cancer at the distant stage, the five-year relative survival dropped to 31% **(Figure 1, Table A-1, Table A-6)**.[10]

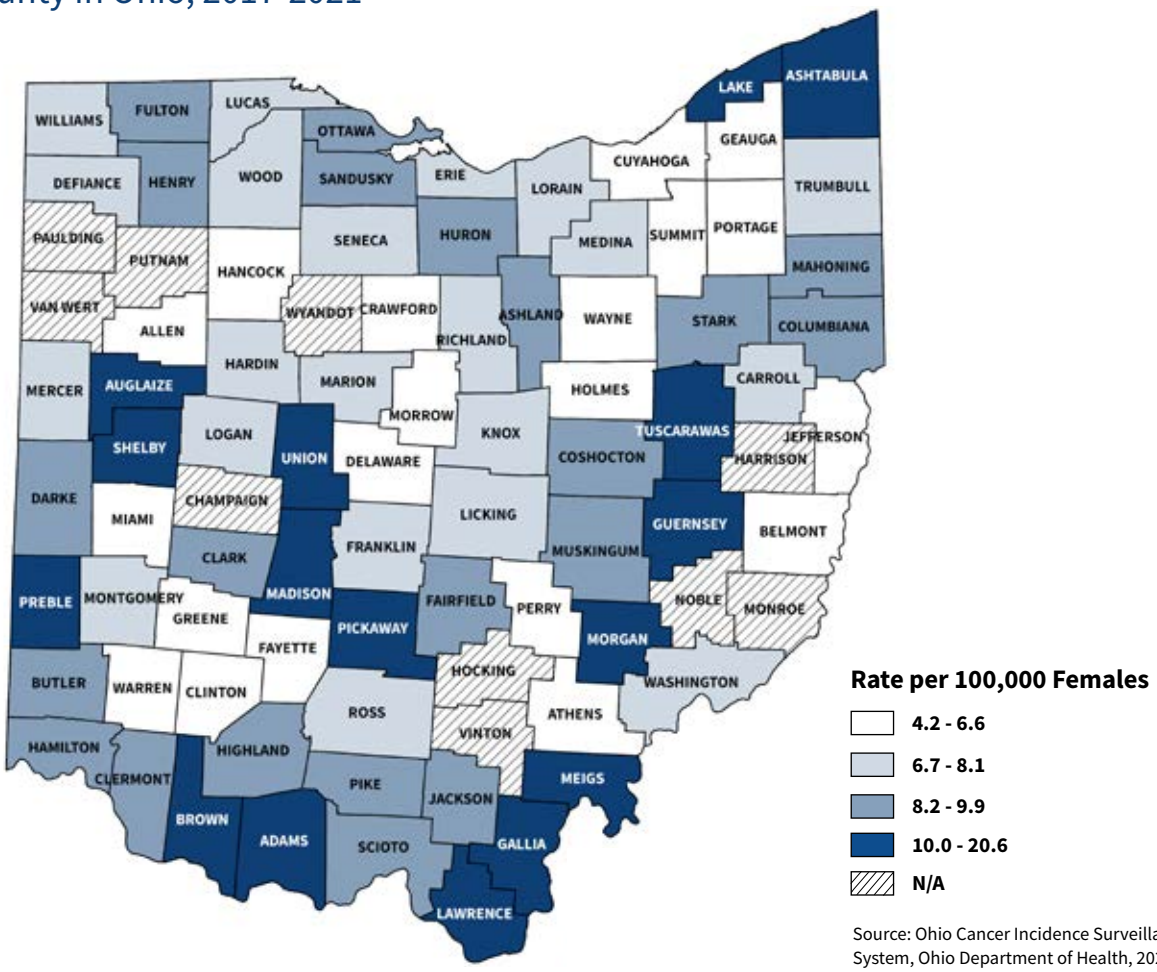
# CERVICAL CANCER

## New Cases

An average of 476 new cases of invasive cervical cancer were diagnosed annually in Ohio from 2017 to 2021, with a corresponding average annual age-adjusted incidence rate of 7.8 per 100,000 females compared with the U.S. rate of 7.5 per 100,000 **(Table 2)**.[5,10] Nearly half of the women diagnosed with cervical cancer in Ohio from 2017 to 2021 were younger than 50 years.[10] The cervical cancer incidence rate was higher among White females (7.9 per 100,000) compared with Black and Asian/Pacific Islander females (7.3 and 3.7 per 100,000, respectively) in Ohio during this time period **(Table 4)**.[10] Average annual age-adjusted incidence rates of cervical cancer by Ohio county of residence are shown in **Figure 16**.

**Currently, a woman living in the United States has a 1 in 163 lifetime risk of developing invasive cervical cancer.[6]**

### FIGURE 16. Cancer of the Cervix: Quartiles of Average Annual Age-Adjusted Incidence Rates by County in Ohio, 2017-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

## Deaths

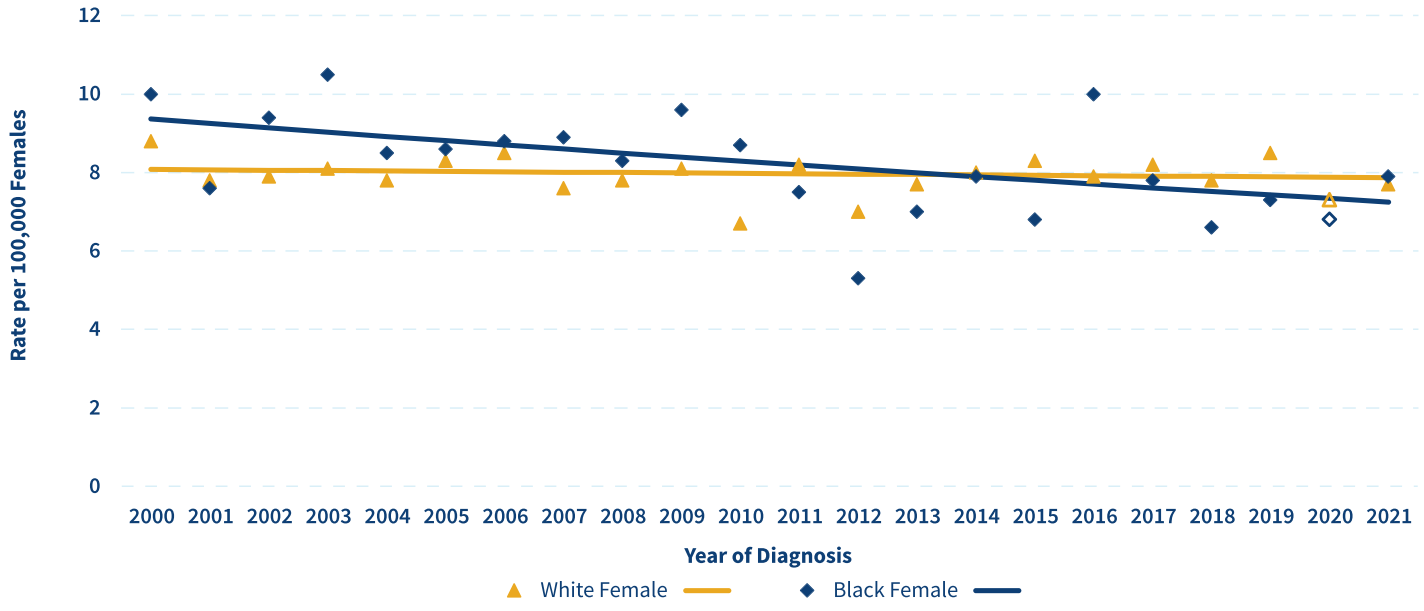
The average annual age-adjusted mortality rate for cervical cancer in Ohio from 2017 to 2021 was 2.3 per 100,000 females compared with the U.S. rate of 2.2 per 100,000.[14] This represents an annual average of 160 deaths in Ohio from cervical cancer during the time period **(Table 3)**.[14] The cervical cancer mortality rate was higher among Black women (3.0 per 1000,00) compared with White women (2.3 per 100,000) in Ohio during this time period **(Table 5)**.[14]

## Trends

From 2000 to 2021, age-adjusted cervical cancer incidence rates among Black females in Ohio decreased 1.2% per year.[10] There is no apparent trend in cervical cancer incidence rates from 2000 to 2021 for White females in Ohio **(Figure 17)**.[10]

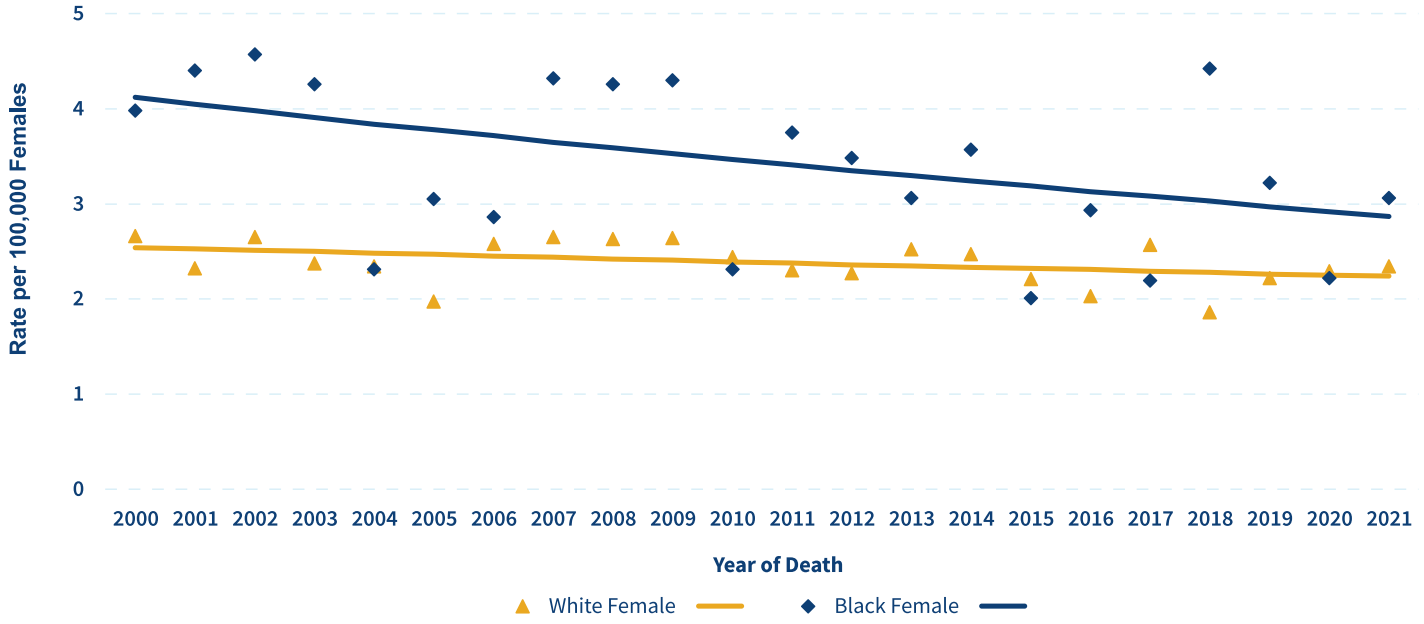
Age-adjusted cervical cancer mortality rates decreased 1.7% per year among Black females in Ohio from 2000 to 2021.[14] There was no evident trend in mortality rates for White females during this time period.[14] For most years the mortality rate was higher for Black females than White females **(Figure 18)**.[14]

**FIGURE 17.** Trends in Age-Adjusted Incidence Rates for Cancer of the Cervix by Race in Ohio, 2000-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

**FIGURE 18.** Trends in Age-Adjusted Mortality Rates for Cancer of the Cervix by Race in Ohio, 2000-2021




Source: Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

## Risk Factors and Populations with High Rates[38]

Infection of the cervix with HPV spread through sexual contact is almost always the cause of cervical cancer. Factors that increase the risk of becoming infected with HPV include being sexually active at a young age, having many sexual partners, and having a weakened immune system caused by immunosuppression. Most women with HPV infection, however, will not develop cervical cancer.[37] Women who do not regularly have tests to detect HPV or abnormal cells in the cervix are at increased risk of cervical cancer. The HPV vaccine helps to prevent diseases caused by certain types of HPV, including cervical cancer, in adolescents and young adults.[37]

### Potentially Modifiable Risk Factors

**Among women who are infected with HPV, the following factors further increase risk:**

**Smoking or breathing in secondhand smoke:** Women who smoke are more likely to develop cervical cancer. Women exposed to secondhand smoke also have increased risk.

**Oral contraceptives:** Long-term use of oral contraceptives increases risk of cervical cancer.

**Giving birth to many children:** Risk of cervical cancer is higher among women who have a high number of childbirths (estimated seven or more).

**Obesity:** Cervical cancer screening may be more difficult in those with obesity, leading to lower detection of precancers and a higher risk of cancer.

### Non-modifiable Risk Factors

**Immunosuppression:** Having a weakened immune system caused by immunosuppression increases the risk of HPV infection. Among women with HPV infection, immunosuppression can lower the body's ability to fight the infection and increase the progression to cancer.

**Diethylstilbestrol (DES):** Being exposed to DES while in the mother's womb increases the risk of cervical dysplasia and clear cell adenocarcinoma of the cervix.

### Signs and Symptoms[39]

Signs and symptoms usually do not appear until abnormal cervical cells become cancerous and invade nearby tissue.

**EARLY STAGE:**

- **Abnormal vaginal bleeding (including bleeding after sexual intercourse, between periods, or after menopause) or having periods that are heavier or longer than normal.**
- **Unusual vaginal discharge.**
- **Pain during intercourse.**
- **Pelvic pain.**

**ADVANCED STAGE:**

- **Difficult or painful bowel movements or bleeding from rectum when having a bowel movement.**
- **Difficult or painful urination or blood in urine.**
- **Dull backache.**
- **Swelling of the legs.**
- **Pain in abdomen.**
- **Feeling tired.**

*Any of these symptoms may be caused by cancer or by other, less serious health problems. If you have any of these symptoms, see your healthcare provider.*

## Early Detection

HPV vaccination is a safe and effective way to help prevent cervical cancer. Gardisil 9 is the FDA-approved vaccine for females and males ages 9 to 45 in the United States.[38] Gardasil 9 is approved to prevent precancers and cancers caused by seven cancer-causing HPV types (16, 18, 31, 33, 45, 52, and 58).[38] The HPV vaccine offers the most protection when given before a person becomes sexually active. Those who are already sexually active may benefit less from the vaccine. This is because sexually active people may have been exposed to some of the HPV types the vaccine targets. The CDC recommends routine HPV vaccination for girls and boys at age 11 or 12, and the vaccine can be given starting at age 9.[40] For young people who weren't vaccinated within the age recommendations, HPV vaccination is recommended up to age 26.[40] Some adults between the ages of 27 and 45 who are not already vaccinated may decide to get the HPV vaccine after talking with their doctor about their risk of new HPV infections.[40] The HPV vaccine is given as a series of two or three doses, depending on age. CDC recommends that children who start the vaccine series before age 15 receive two doses.[40] For people who receive the first dose on or after their 15th birthday, and for people with certain immunocompromising conditions, CDC recommends getting three doses.[40] Data from the National Immunization Survey-Teen indicates that 63% of Ohio 13- to 17-year-olds are up to date on the recommended doses of the HPV vaccine in 2023 compared with 61% in the United States.[41,42]

The ACS recommends the following for the early detection of cervical cancer in average risk women: for women ages 25 to 65 who have a cervix, a primary HPV test every five years; however, only certain HPV tests are approved by the Food and Drug Administration (FDA) for use as a primary test.[8] If a primary HPV test is unavailable, co-testing (HPV testing plus a PAP test) every five years or screening with a Pap test alone every three years is acceptable.[8] The ACS also recommends individuals older than 65 should continue screening if they have not had regular screening with normal results during the past 10 years or have a history of cervical precancer (cervical intraepithelial neoplasia) or a more serious disease within the past 25 years **(Table A-7)**.[8]

The USPSTF recommends the following for the early detection of cervical cancer: for women ages 21 to 29 years, a Pap test alone every three years; for women ages 30 to 65 years, the USPSTF recommends screening every three years with Pap alone, every five years with high-risk human papillomavirus (hrHPV) testing alone, or every five years with hrHPV testing in combination with Pap testing (co-testing) **(Table A-7)**.[8]

**Table A-7** on page 105 shows the ACS and USPSTF recommendations for the early detection of cervical cancer in average risk, asymptomatic women by age.

According to the 2022 BRFSS, 73.7% of adult females in Ohio reported having a cervical cancer screening test within the past three years.[35] The prevalence of having a cervical cancer screening test in the past three years was higher among female Ohioans ages 21 to 40 (81.7%) compared with female Ohioans ages 41 to 65 (69.1%).[35] The prevalence of having a cervical cancer screening test was lowest for those with less than a high school education (61.4%) and those with the lowest household income (less than $25,000 per year) (66.0%), and highest for college graduates (79.6%) and those with the highest household income ($50,000 or more per year) (76.6%) **(Table 7)**.[35]

**TABLE 7.** Prevalence of Women 21-65 Who Reported Having Had a Cervical Cancer Screening Test in the Past Three Years by Demographics in Ohio, 2022[1,2]

| | Had a Cervical Cancer Screening in the Past Three Years |
|---|---|
| **AGE** | |
| 21-40 | 81.7% |
| 41-65 | 69.1% |
| **RACE** | |
| White | 72.9% |
| Black | 75.7% |
| **EDUCATION** | |
| Less than High School | 61.4% |
| High School or GED* | 69.1% |
| Some College | 72.0% |
| College Graduation | 79.6% |
| **ANNUAL HOUSEHOLD INCOME** | |
| <$25,000 | 66.0% |
| $25,000-$49,999 | 72.7% |
| $50,000+ | 76.6% |
| **TOTAL (WOMEN 21-65)** | **73.7%** |

[1] Source: 2022 Ohio Behavioral Risk Factor Surveillance System, Ohio Department of Health, 2024.
[2] "Don't Know" and "Refused" were excluded from the denominator. This can cause an artificially high percentage.
* General Educational Development.

## Stage at Diagnosis and Survival

In Ohio, the overall five-year relative survival for cervical cancer was 69% based on cases diagnosed from 2014 through 2020 compared with 67% in the United States.[10,11] The five-year relative survival was 92% when diagnosed at a local stage (43% of cases); 63% when diagnosed at a regional stage (36% of cases); and dropped to 17% for the 16% of women with distant metastases **(Figure 1, Table A-1, Table A-6)**.[10]

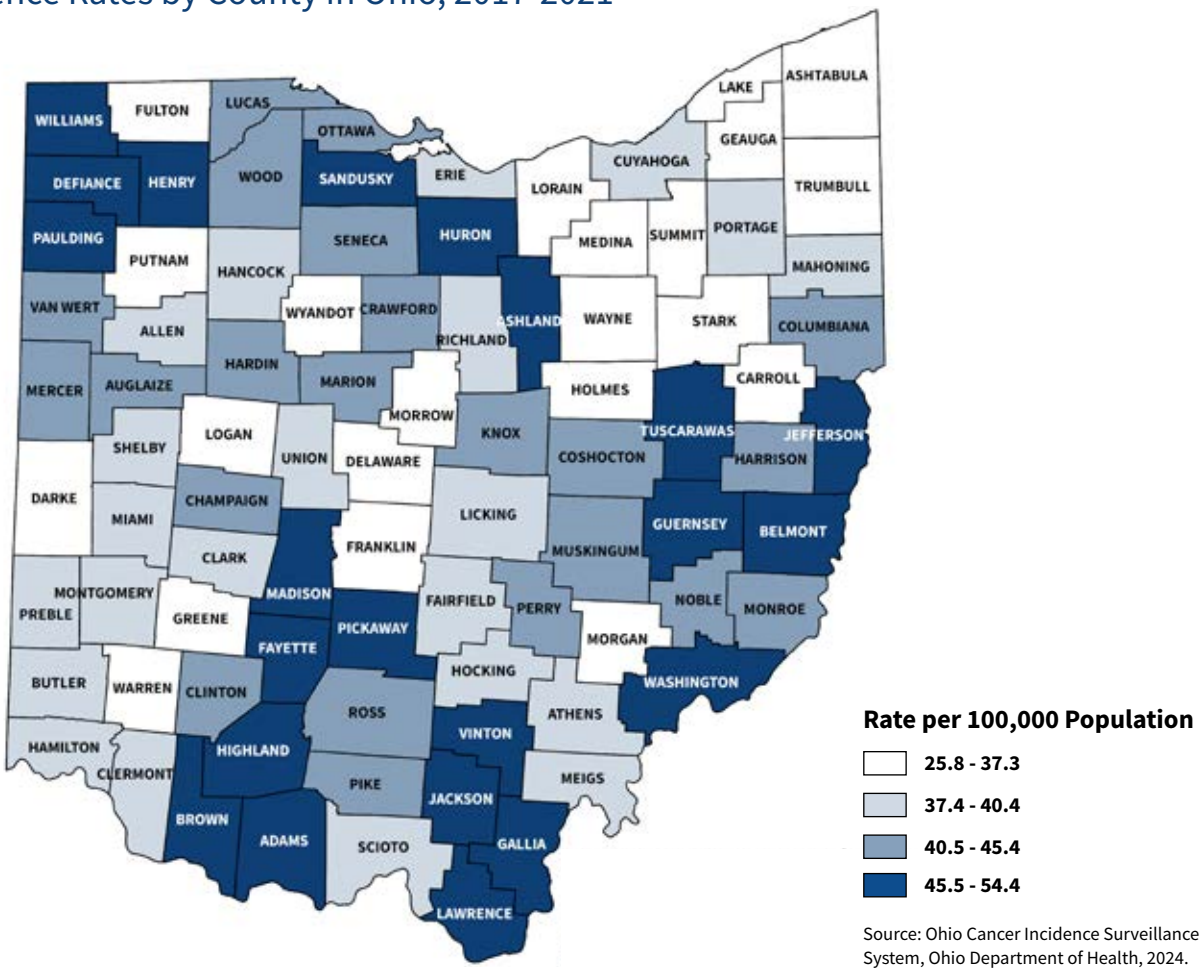
# COLON AND RECTUM CANCER

## New Cases

An average of 5,707 new cases (3,001 men and 2,706 women) of colon and rectum cancer were diagnosed annually between 2017 and 2021 in Ohio, corresponding to an average annual age-adjusted incidence rate of 38.9 per 100,000 population compared with the U.S. rate of 36.4 per 100,000 **(Table 2)**.[5,10] Incidence rates of colon and rectum cancer in Ohio are higher among males (44.4 per 100,000) compared with females (34.2 per 100,000), with Black males having the highest rate among each sex/race category (45.3 per 100,000) **(Table 4)**.[5,10] Average annual age-adjusted incidence rates of colon and rectum cancer by Ohio county of residence are shown in **Figure 19**.

**Currently, a man living in the United States has a 1 in 28 lifetime risk of developing invasive colon and rectum cancer, and a woman has a 1 in 33 lifetime risk of developing invasive colon and rectum cancer.[6]**

**FIGURE 19.** Cancer of the Colon and Rectum: Quartiles of Average Annual Age-Adjusted Incidence Rates by County in Ohio, 2017-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

## Deaths

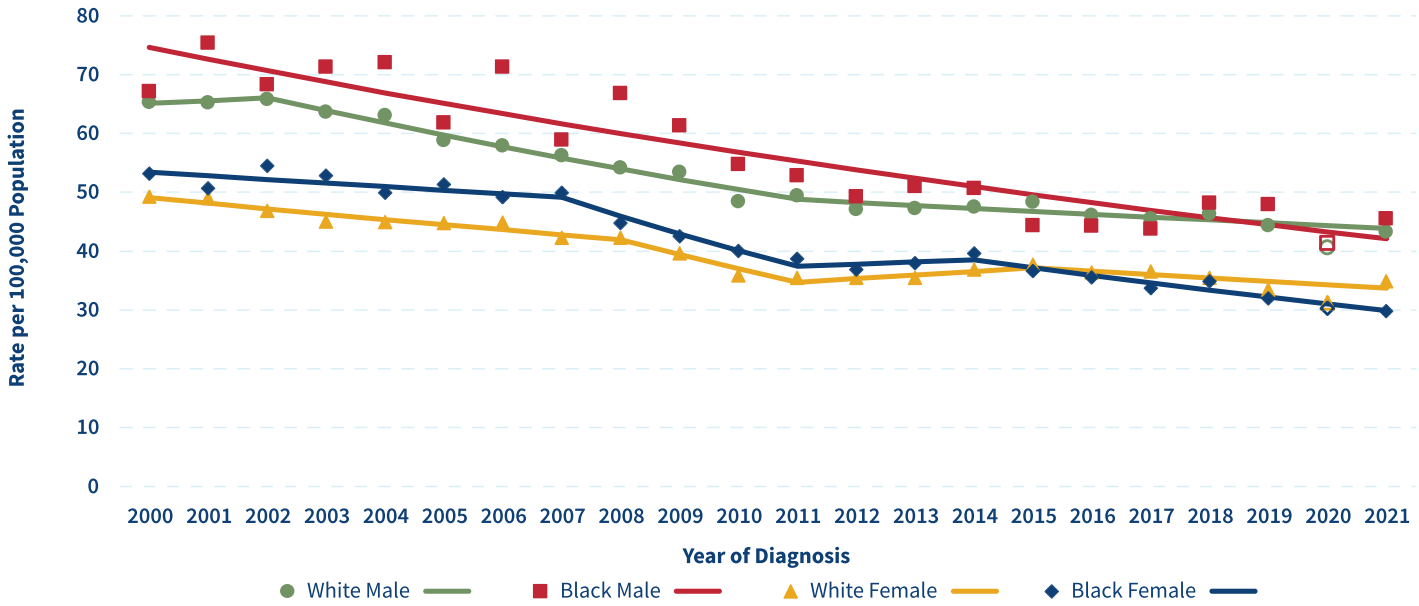
The average annual age-adjusted mortality rate for colon and rectum cancer in Ohio from 2017 to 2021 was 14.3 per 100,000 population compared with 13.1 per 100,000 in the United States.[14] This represents 2,149 average annual deaths in Ohio from colon and rectum cancer during this time period **(Table 3)**.[14] Although colon and rectum cancer mortality rates are decreasing, Black men in Ohio die from colon and rectum cancer at a higher rate (21.4 per 100,000) compared with White men, White women, and Black women **(Table 5)**.[14]

## Trends

From 2000 to 2021, male age-adjusted colon and rectum cancer incidence rates in Ohio were higher than those for females. Incidence rates decreased for White males by 3.3% per year from 2002 to 2011, then by 1.1% per year from 2011 to 2021.[10] For Black males, the colon and rectum cancer incidence rate decreased 2.7% per year from 2000 to 2021.[10] Colon and rectum cancer incidence rates among White females decreased for the following segments: 1.9% per year from 2000 to 2008, 6.1% per year from 2008 to 2011, 1.7% per year from 2011 to 2015, and 1.6% per year from 2015 to 2021.[10] Among Black females, colon and rectum cancer incidence rates decreased 3.6% per year from 2014 to 2021 **(Figure 20)**.[10] It is important to note that the colon and rectum cancer incidence rate among Ohioans less than 40 has increased substantially from 2000 to 2020 by 2.4% per year (data not shown).[10]

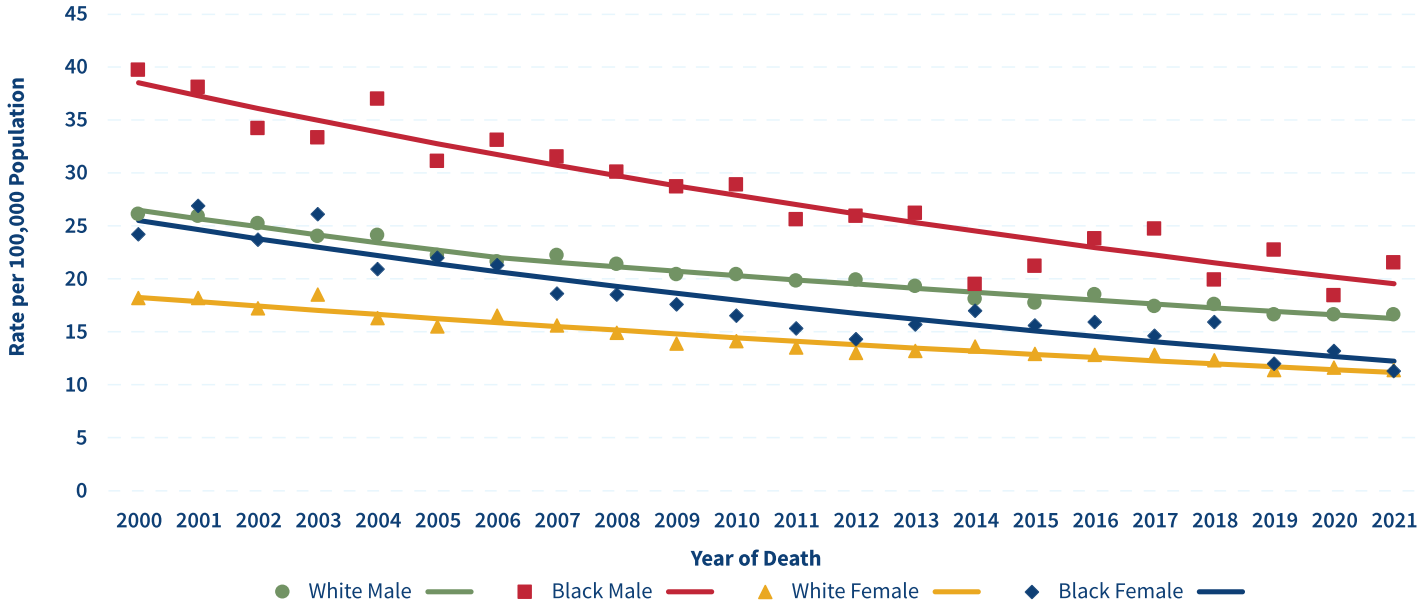
**Figure 21** shows the age-adjusted colon and rectum cancer mortality rates decreased from 2000 to 2021 for each sex/race group.[14] White male colon and rectum cancer mortality rates decreased 3.0% per year from 2000 to 2005.[14] From 2000 to 2021, colon and rectum cancer mortality rates decreased 3.2% per year for Black males, 2.3% per year for White females, and 3.4% per year for Black females.[14]

**FIGURE 20.** Trends in Age-Adjusted Incidence Rates for Cancer of the Colon and Rectum by Sex and Race in Ohio, 2000-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

**FIGURE 21.** Trends in Age-Adjusted Mortality Rates for Cancer of the Colon and Rectum by Sex and Race in Ohio, 2000-2021




Source: Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

## Risk Factors and Populations with High Rates[43,44,45]

### Potentially Modifiable Risk Factors

**Excessive alcohol use:** Excessive alcohol use increases risk of colon and rectum cancer.

**Obesity:** Obesity is linked to an increased risk.

**Smoking:** Cigarette smoking increases the risk of colon and rectum cancer.

### Non-modifiable Risk Factors

**Age:** Risk of colon and rectum cancer increases with age.

**Race:** Black people have the highest incidence rates of colon and rectum cancer.

**Colon and rectum polyps:** Polyps, growths on the inner wall of the colon or rectum, are common in people older than 50. Most polyps are benign, but some polyps (high-risk adenomas) can continue to grow and become cancerous.

**Family history of colon and rectum cancer or adenomatous polyps:** Having a parent, sibling, or offspring who has had colon and rectum cancer or adenomatous polyps increases risk, especially if more than one has been diagnosed or the relative was diagnosed at a young age.

**Hereditary Conditions:** Lynch syndrome, also known as hereditary nonpolyposis colon cancer (HNPCC), is an inherited condition that increases colon and rectum cancer risk. Familial adenomatous polyposis (FAP), caused by a change in a gene called adenomatous polyposis coli (APC), is a rare, inherited condition in which hundreds of polyps form in the colon and rectum, which increases colon and rectum cancer risk.

**Personal history of certain cancers or adenomatous polyps:** A person who has already had colon and rectum cancer has a higher risk of developing colon and rectum cancer a second time. Also, women with a history of cancer of the ovary are at higher risk. A person with a history of adenomatous polyps has an increased risk of colon and rectum cancer, especially if the polyps were numerous or large.

**Ulcerative colitis or Crohn's disease:** A person who has had a condition that causes inflammatory bowel disease (such as ulcerative colitis or Crohn's disease) for many years is at an increased risk of developing colon and rectum cancer.

### Signs and Symptoms[46]

Early stage colon and rectum cancer usually does not have any signs or symptoms. Signs and symptoms of advanced disease may include the following:

- **Blood (either bright red or very dark) in the stool.**
- **A change in bowel habits.**
  - **Diarrhea.**
  - **Constipation.**
  - **Feeling that the bowel does not empty completely.**
  - **Stools that are narrower or have a different shape than usual.**
- **General abdominal discomfort (frequent gas pains, bloating, fullness, or cramps).**
- **Weight loss for no known reason.**
- **Fatigue.**
- **Vomiting.**

*Any of these symptoms may be caused by cancer or by other, less serious health problems. If you have any of these symptoms, see your healthcare provider.*

## Early Detection[8]

Screening can prevent colon and rectum cancer through the detection and removal of precancerous growths, as well as detect cancer at an early stage, when treatment is usually less extensive and more successful. Regular adherence to screening with either a stool test (i.e., fecal immunochemical test (FIT), highly sensitive guaiac-based fecal occult blood test (hsFOTB), a multi-targeted stool DNA test (Cologuard®)), or direct visual exam (i.e., colonoscopy, flexible sigmoidoscopy, or computed tomography colonography) reduces the risk of colon and rectum cancer incidence and death.

The ACS and the USPSTF recommend that individuals at average risk for colon and rectum cancer begin screening at age 45 and continue through age 75, with more individualized decision-making from ages 76-85 based on health status, life expectancy, patient preferences, and prior screening history. People at increased risk because of family history of the disease or other reasons should talk to their doctor about starting screening before age 45.

## Colon and Rectum Cancer Screening Tests[47]

- **Colonoscopy:** A colonoscope, a slender, flexible, hollow, lighted tube about the thickness of a finger, is inserted through the rectum and into the colon to visually examine the inside of the entire colon. If a polyp is found, the physician may remove it by laser or by passing a wire loop through the colonoscope to cut the polyp from the wall of the colon using an electric current.
- **Computed Tomography (CT) Colonography (also referred to as Virtual Colonoscopy):** A CT scan of the colon and rectum is an x-ray test that produces detailed cross-sectional images to allow a doctor to look for polyps or cancer. If polyps or other suspicious areas are detected, this test should be followed up by a colonoscopy.
- **Fecal Immunochemical Test (FIT):** This test, also called an immunochemical fecal occult (hidden) blood test (iFOBT), is used to detect hidden blood in the stool. This test reacts to part of the hemoglobin molecule, which is found on red blood cells. If results are positive, a colonoscopy is required to investigate further.
- **Flexible Sigmoidoscopy:** A sigmoidoscope, an instrument similar to a colonoscope but shorter, is inserted through the rectum and into the colon to view the inside of the rectum and the lower portion of the colon. If a polyp is present, the patient is referred for a colonoscopy so that the colon can be examined further.
- **Guaiac-based Fecal Occult Blood Test (gFOBT):** The gFOBT detects occult blood in the stool through a chemical reaction, in a different way than a FIT. But like the FIT, this test can't tell if the blood is from the colon or from other parts of the digestive tract (such as the stomach). The ACS recommends the more modern, highly sensitive versions of this test for screening. This test must be done every year, unlike some other tests (like the visual tests described above). This test is done with a kit that you can use in the privacy of your own home that allows you to check more than one stool sample. A gFOBT done during a digital rectal exam in the doctor's office (which only checks one stool sample) is not enough for proper screening, as it is likely to miss most colon and rectum cancers. If the test results are positive (that is, if hidden blood is detected), a colonoscopy will be needed to find the reason for the bleeding.
- **Multi-targeted stool DNA (MT-sDNA):** This test is referred to as "multi-targeted" because it not only detects blood in the stool, but also certain genetic mutations in the DNA of cells that are shed into the stool by large adenomas and colon and rectum cancers. Patients with a positive test result are referred for a colonoscopy. Cologuard®, the only MT-sDNA test currently available, tests for both DNA changes and blood in the stool. It has been shown to detect cancer and precancerous lesions more often than FIT, but also results in more false-positive tests, which can lead to unnecessary colonoscopies. In addition, because it is relatively new, the benefits and harms of this test are less well established than for other tests. Although it is recognized as an acceptable screening option by the USPSTF and is covered by Medicare, some private insurance companies may not cover this test.

**Table A-7** on page 105 shows the ACS and USPSTF recommendations for the early detection of colon and rectum cancer in average risk, asymptomatic people by age and sex.

**Table 8** displays the prevalence of having a recommended colon and rectum cancer screening test by demographics.[35] In 2022, 67.6% of Ohio adults ages 45-75 reported having a recommended screening test compared with 66.2% in the United States.[35,36] The percentage of adults ages 45-75 receiving a recommended test was lower for those with less than a high school education (48.8%) compared with college graduates (73.2%).[35] It was also lower among those with an annual household income less than $25,000 (60.7%) compared with those earning $50,000 or more (69.1%).[35]

**TABLE 8.** Prevalence of Adults 45-75 Who Reported Having Had a Recommended Colon and Rectum Cancer Screening Test Within the Recommended Time Interval by Demographics in Ohio, 2022[1,2]

| | Meets Colon and Rectum Cancer Screening Guidelines |
|---|---|
| **SEX** | |
| Male | 67.2% |
| Female | 68.1% |
| **AGE** | |
| 21-40 | 60.6% |
| 41-65 | 81.5% |
| **RACE** | |
| White | 68.2% |
| Black | 68.8% |
| **EDUCATION** | |
| Less than High School | 48.8% |
| High School or GED* | 66.1% |
| Some College | 69.4% |
| College Graduation | 73.2% |
| **ANNUAL HOUSEHOLD INCOME** | |
| <$25,000 | 60.7% |
| $25,000-$49,999 | 67.0% |
| $50,000+ | 69.1% |
| **TOTAL** | **67.6%** |

[1] Source: 2022 Ohio Behavioral Risk Factor Surveillance System, Ohio Department of Health, 2024.

[2] "Don't Know" and "Refused" were excluded from the denominator. This can cause an artificially high percentage.

[3] Recommended screening tests include: High-sensitivity guaiac fecal occult blood test (gFOBT) or fecal immunochemical test (FIT) every year; stool DNA (sDNA) FIT every one to three years; computed tomography (CT) colonography every five years; flexible sigmoidoscopy every five years; flexible sigmoidoscopy every 10 years plus FIT every year; or colonoscopy screening every 10 years.

* General Educational Development.

## Stage at Diagnosis and Survival

The five-year relative survival for patients diagnosed with colon and rectum cancer from 2014 to 2020 was 66% in both Ohio and the United States.[10,11] When colon and rectum cancers were detected at local stage, the five-year relative survival in Ohio was 91%; however, only 30% of colon and rectum cancers were diagnosed at a local stage.[10] After the cancer has spread regionally to involve adjacent organs or lymph nodes (39% of colon and rectum cancers in Ohio), the five-year relative survival in Ohio dropped to 74%, and for persons with distant metastases (20% of Ohio colon and rectum cases), the five-year relative survival was only 16% **(Figure 1, Table A-1, Table A-6)**.[10]

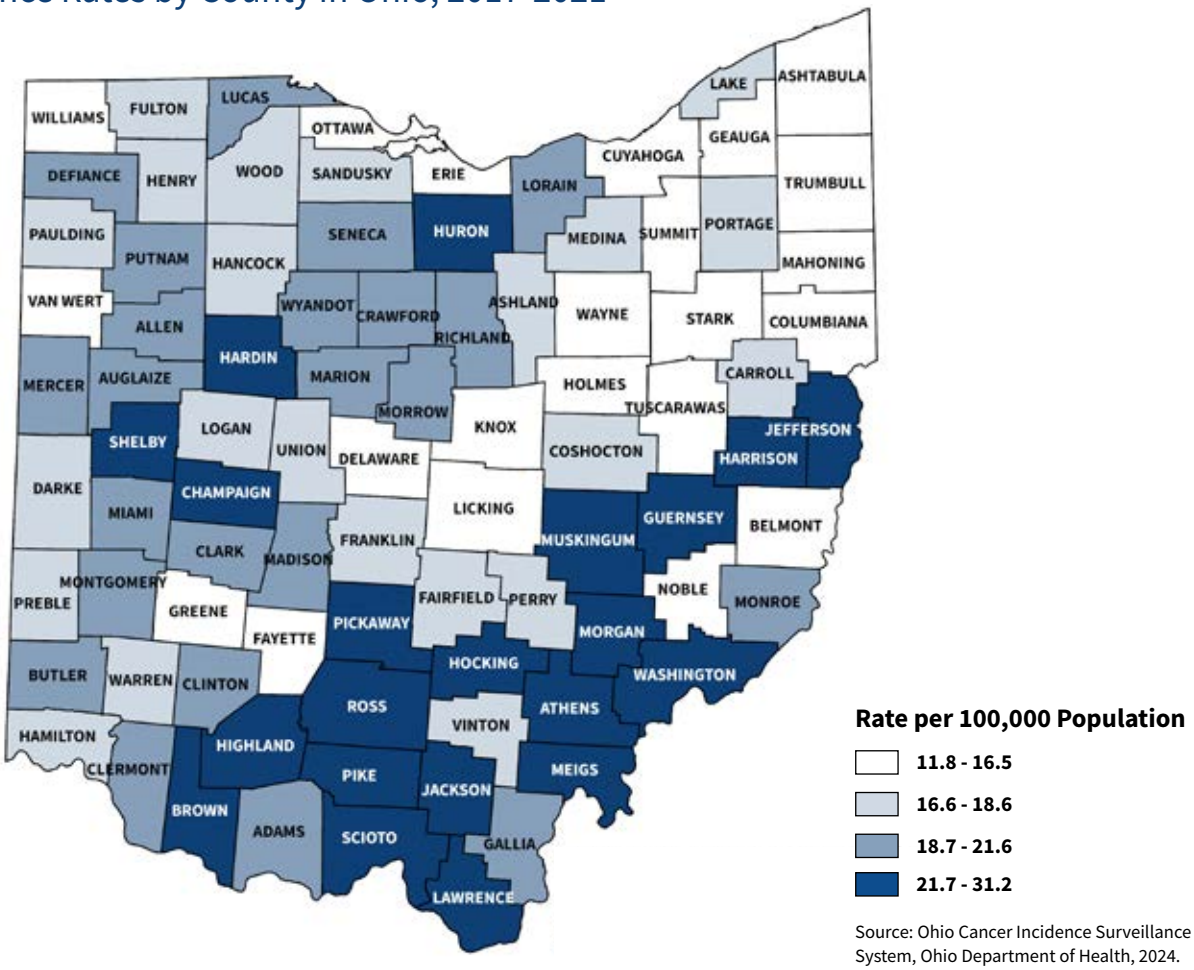
# KIDNEY AND RENAL PELVIS CANCER

## New Cases

An average of 2,648 new cases (1,651 men and 997 women) of kidney and renal pelvis cancer were diagnosed annually from 2017 to 2021 in Ohio, corresponding to an average annual age-adjusted incidence rate of 18.0 per 100,000 population compared with the U.S. rate of 17.3 per 100,000 **(Table 2)**.[5,10] Black males had the highest kidney and renal pelvis cancer incidence rate (25.7 per 100,000 population) compared with White males, White females, and Black females during this time period **(Table 4)**.[10] Average annual incidence rates of kidney and renal pelvis cancer by Ohio county of residence are shown in **Figure 22**.

**Currently, a man living in the United States has a 1 in 49 lifetime risk of developing invasive kidney and renal pelvis cancer, and a woman has a 1 in 85 lifetime risk of developing invasive kidney and renal pelvis cancer.[6]**

**FIGURE 22.** Cancer of the Kidney and Renal Pelvis: Quartiles of Average Annual Age-Adjusted Incidence Rates by County in Ohio, 2017-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

## Deaths

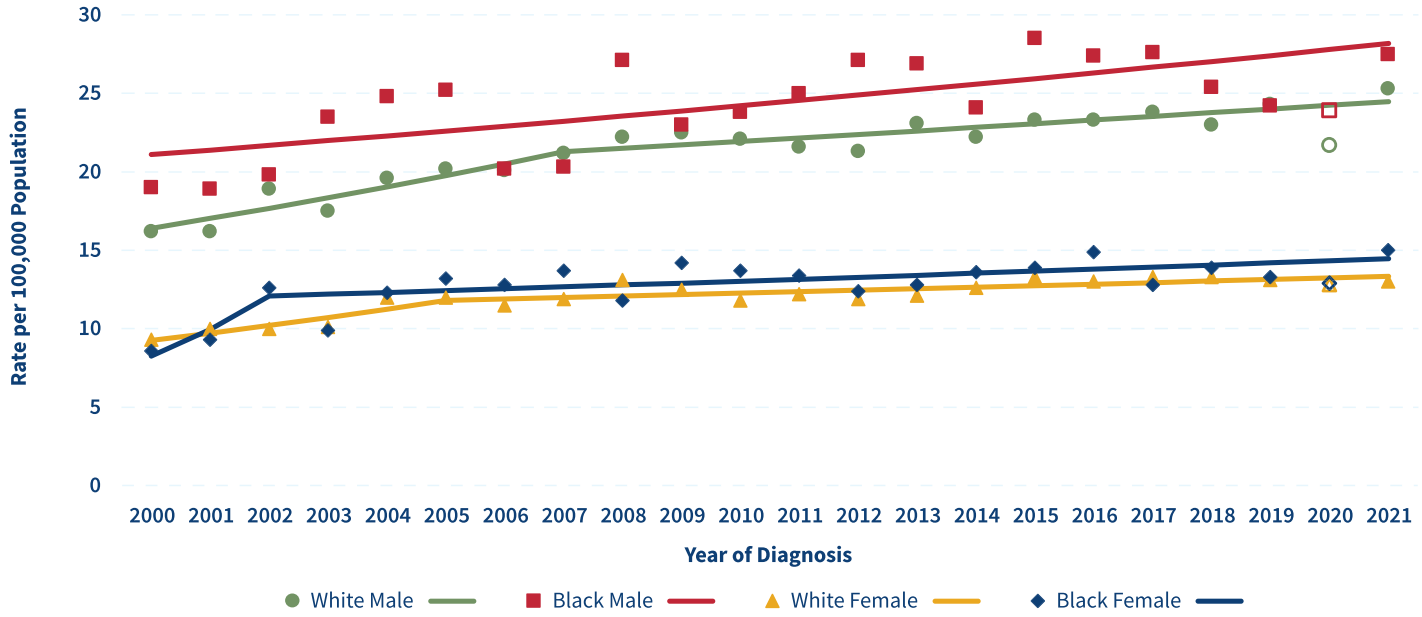
The average annual age-adjusted mortality rate for kidney and renal pelvis cancer in Ohio from 2017 to 2021 was 3.9 per 100,000 population compared with 3.5 per 100,000 nationally.[14] This represents 591 average annual deaths in Ohio from kidney and renal pelvis cancer during the time period **(Table 3)**.[14] In contrast to incidence, White men in Ohio die from kidney and renal pelvis cancer at a higher rate (5.7 per 100,000 population) compared with Black men, Black women, and White women **(Table 5)**.[14]

## Trends

For each year from 2000 to 2021, age-adjusted kidney and renal pelvis cancer incidence rates were higher among males than females in Ohio.[10] Kidney and renal pelvis cancer incidence rates in Ohio among White males increased 3.8% per year from 2000 to 2007 and 1.0% per year from 2007 to 2021, Black males increased 1.4% per year from 2000 to 2021, White females increased 4.9% per year from 2000 to 2005, and Black females increased 21.0% per year from 2000 to 2002 and 1.0% per year from 2002 to 2021 **(Figure 23)**.[10]

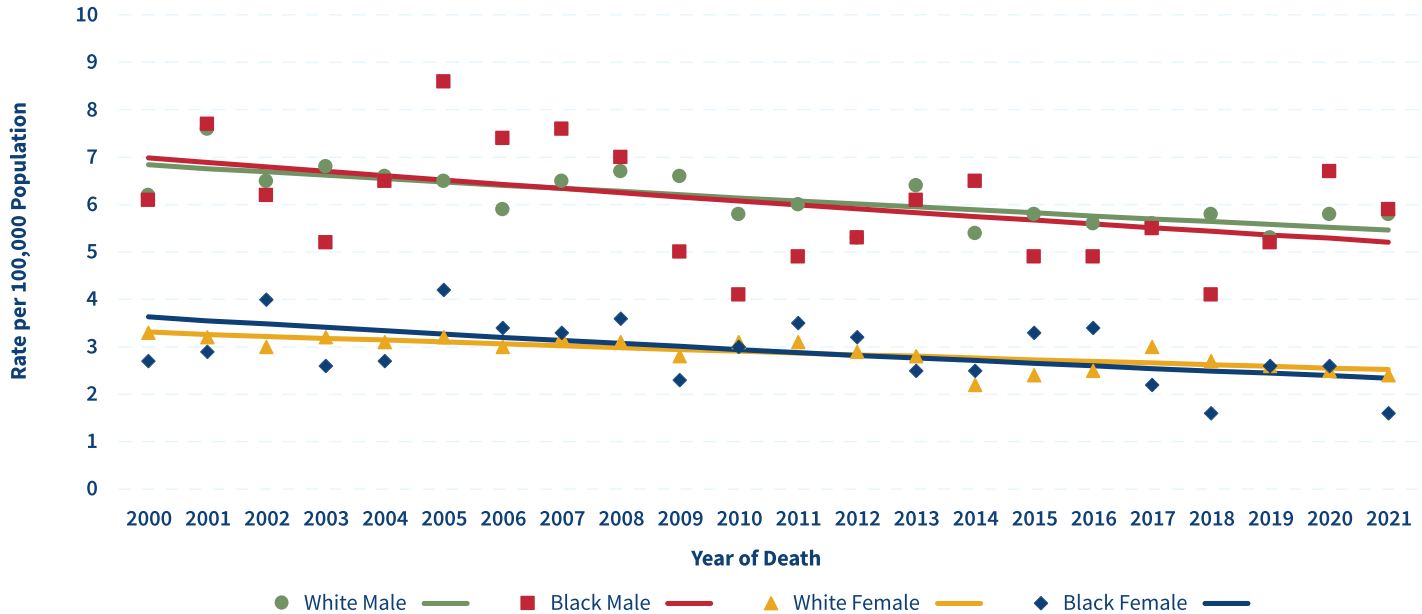
In Ohio from 2000 to 2021, age-adjusted kidney and renal pelvis cancer mortality rates were higher for males than females each year during the time period.[14] Kidney and renal pelvis cancer mortality rates in Ohio decreased from 2000 to 2021 by 1.1% per year for White males, 1.3% per year for White females, and 2.1% per year for Black females **(Figure 24)**.[14]

**FIGURE 23.** Trends in Age-Adjusted Incidence Rates for Cancer of the Kidney and Renal Pelvis by Race in Ohio, 2000-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

**FIGURE 24.** Trends in Age-Adjusted Mortality Rates for Cancer of the Kidney and Renal Pelvis by Race in Ohio, 2000-2021




Source: Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

## Risk Factors and Populations with High Rates[48]

### Potentially Modifiable Risk Factors

**Smoking:** Smoking approximately doubles the risk of developing kidney and renal pelvis cancer.

**Excess body weight:** People who have excess body weight have a higher risk of renal cell carcinoma.

**Overuse of certain medications:** Misusing certain pain medicines, including over-the-counter pain medicines, for a long time increases risk.

**High blood pressure:** High blood pressure increases risk.

### Non-modifiable Risk Factors

**Family history:** People with a strong family history of kidney and renal pelvis cancer have a higher chance of developing this cancer.

**Genetics:** Having certain genetic conditions, such as von Hippel-Lindau disease or hereditary papillary renal cancer increases risk.

### Signs and Symptoms[48]

Early-stage kidney and renal pelvis cancer usually has no symptoms. As the tumor progresses, possible signs and symptoms include:

- **Blood in the urine.**
- **Low back pain on one side (not caused by injury).**
- **A pain or lump on the side or lower back.**
- **Loss of appetite.**
- **Weight loss not caused by dieting.**

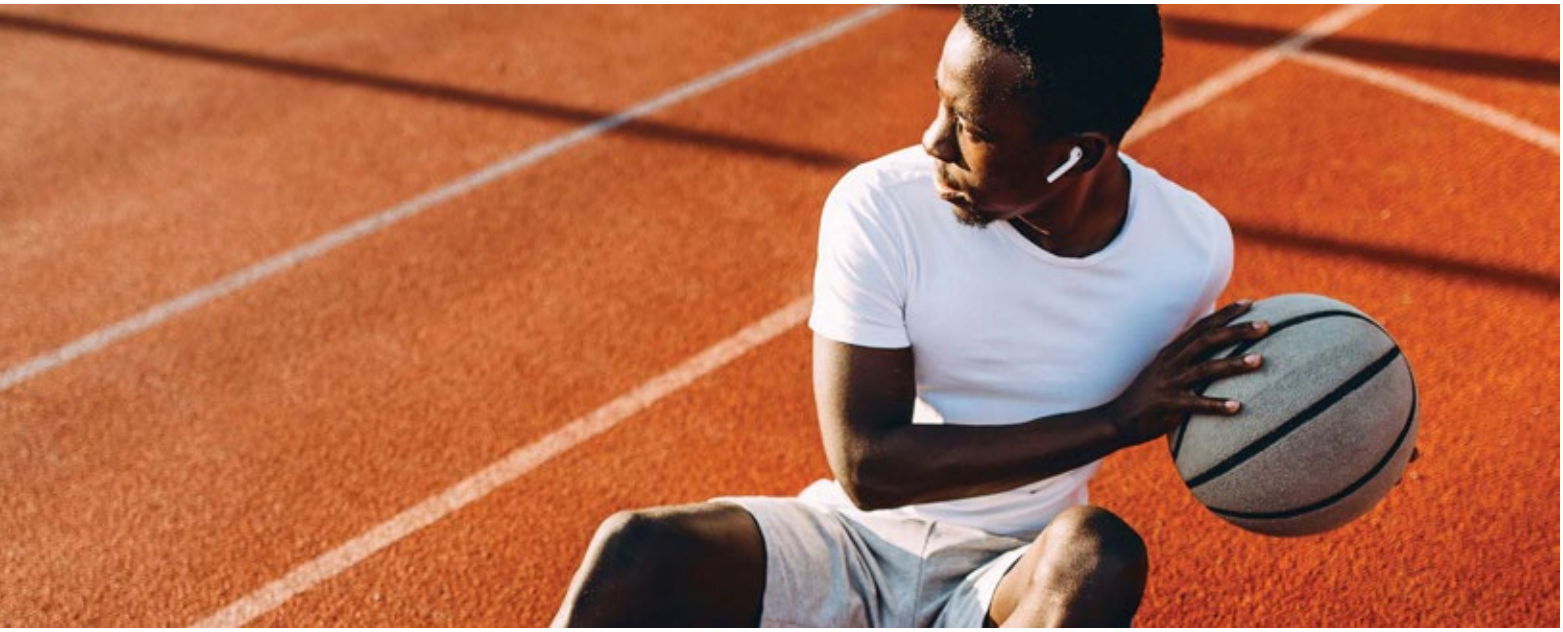
*Any of these signs/symptoms may be caused by cancer or by other, less serious health problems. If you have any of these signs/symptoms, see your healthcare provider.*

## Early Detection[48]

There are no recommended screening tests for the early detection of kidney and renal pelvis cancer among people at average risk.

## Stage at Diagnosis and Survival

The five-year relative survival for kidney and renal pelvis cancer was 79% in Ohio and 78% in the United States based on cases diagnosed from 2014 to 2020.[10,11] Almost two-thirds (65%) of Ohioans with kidney and renal pelvis cancer were diagnosed at the local stage, for which the five-year relative survival was 94%.[10] Five-year relative survival, however, dropped to 16% for Ohioans diagnosed at the distant stage (13% of kidney and renal pelvis cancer cases) **(Table A-1, Table A-6)**.[10]



# LEUKEMIA

Leukemia is a type of cancer that originates in the bone marrow and causes the production of abnormal blood cells, particularly white blood cells. Leukemia is categorized by whether it is acute (the number of leukemia cells increases rapidly and the disease worsens quickly) or chronic (the number of leukemia cells increases slowly and the disease worsens slowly), and by the type of blood cells that are affected (lymphoid cells or myeloid cells).[49] The four primary types of leukemia are acute lymphocytic leukemia (ALL), acute myeloid leukemia (AML), chronic lymphocytic leukemia (CLL), and chronic myeloid leukemia (CML).[49] ALL is the most common leukemia diagnosed among children, and the two most common leukemias diagnosed among adults are AML and CLL.[49]

## New Cases

As shown in **Table 2** and **Table 9**, an average of 1,807 new cases (1,051 males and 756 females) of leukemia were diagnosed among Ohio residents each year from 2017 to 2021.[10] The average annual age-adjusted leukemia incidence rate in Ohio was 12.7 per 100,000 population compared with the U.S. rate of 14.1 per 100,000.[5,10] However, the incidence rate may be underestimated due to delayed or incomplete reporting, as the estimated completeness of case reporting of leukemia in Ohio is 83%.[10] The most common type of leukemia in Ohio was AML, with an average of 606 cases per year from 2017 to 2021.[10] The incidence rate of AML in Ohio (4.2 per 100,000) was the same as that in the United States (4.2 per 100,000).[5,10] Rates of CLL (3.7 per 100,000), CML (1.8 per 100,000), and ALL (1.5 per 100,000) were 20%, 10%, and 12% lower in Ohio compared with the United States, respectively **(Table 9)**.[5,10] Incidence rates of leukemia in Ohio were higher among males compared with females and White Ohioans compared with Black Ohioans from 2017 to 2021 **(Table 2, Table 4)**.[10] The incidence rate was highest among White males in Ohio (16.4 per 100,000) compared with all other sex/race groups **(Table 4)**.[10] Average annual age-adjusted incidence rates of leukemia by Ohio county of residence are shown in **Figure 25**.

**TABLE 9.** Average Annual Number of New Leukemia Cases and Age-Adjusted Incidence Rates and Average Annual Number of Leukemia Deaths and Age-Adjusted Mortality Rates by Histology Type in Ohio and the United States, 2017-2021

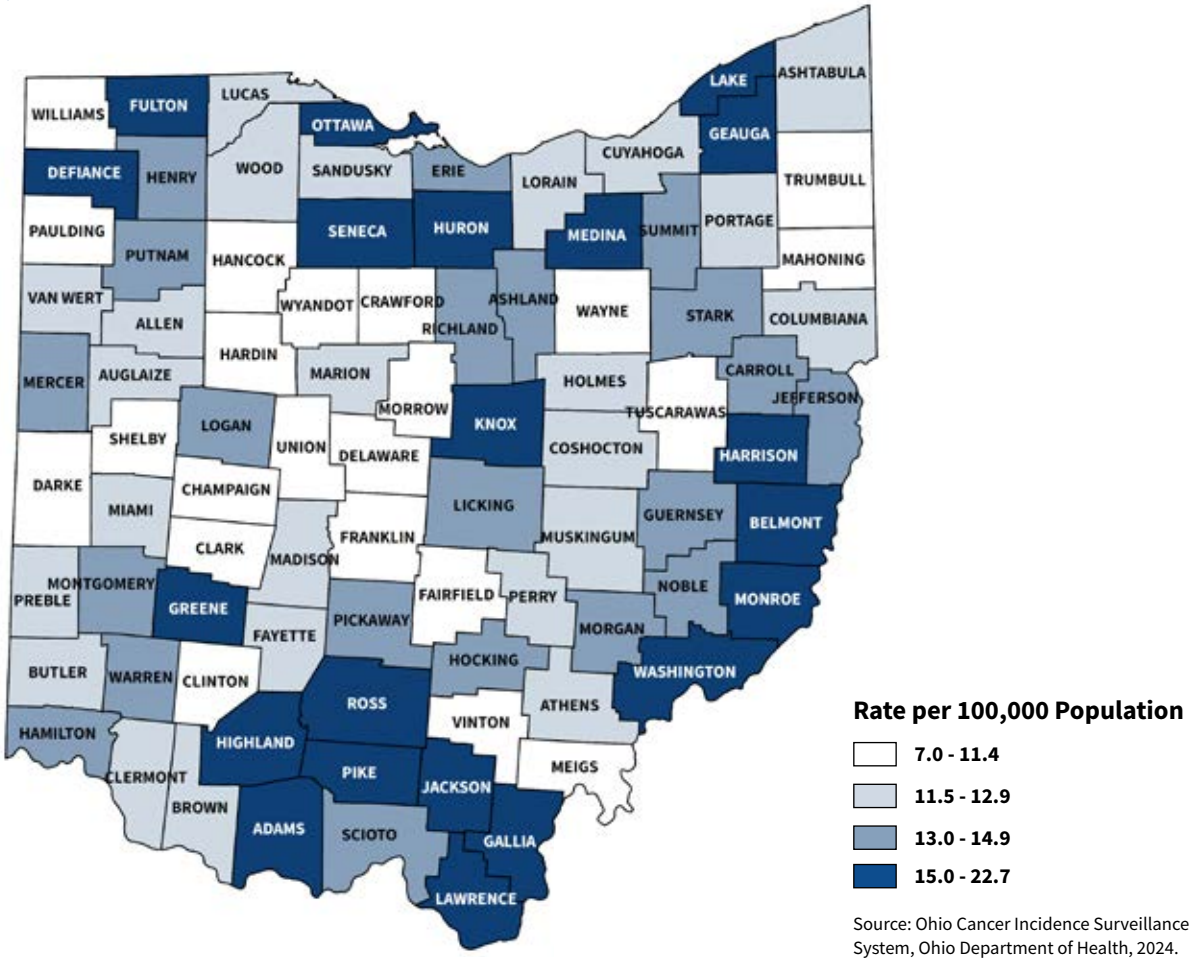
| Histology Type | Incidence | | | Mortality | | |
|---|---|---|---|---|---|---|
| | Ohio Cases | Ohio Rate | National Rate | Ohio Deaths | Ohio Rate | National Rate |
| All Leukemias | 1,807 | 12.7 | 14.1 | 961 | 6.5 | 6.0 |
| Acute Lymphocytic Leukemia (ALL) | 176 | 1.5 | 1.7 | 54 | 0.4 | 0.4 |
| Acute Myeloid Leukemia (AML) | 606 | 4.2 | 4.2 | 449 | 3.0 | 2.7 |
| Chronic Lymphocytic Leukemia (CLL) | 569 | 3.7 | 4.6 | 178 | 1.2 | 1.1 |
| Chronic Myeloid Leukemia (CML) | 246 | 1.8 | 2.0 | 49 | 0.3 | 0.3 |

Source: Ohio Cancer Incidence Surveillance System Ohio Department of Health, 2024; Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

* Along with the four primary histology types (ALL, AML, CLL, and CML), average annual incidence counts for "All Leukemias" include the following histology types: Other Lymphocytic (53 cases); Acute Monocytic (22 cases); Other Myeloid/Monocytic (32 cases); Other Acute (39 cases); and Aleukemic, Subleukemic, and Not Otherwise Specified (64 cases). In addition, these histology types accounted for 232 leukemia deaths per year.

**Currently, a man living in the United States has a 1 in 66 lifetime risk of developing leukemia, and a woman has a 1 in 95 lifetime risk of developing leukemia.[6]**

**FIGURE 25.** Leukemia: Quartiles of Average Annual Age-Adjusted Incidence Rates by County in Ohio, 2017-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

## Deaths

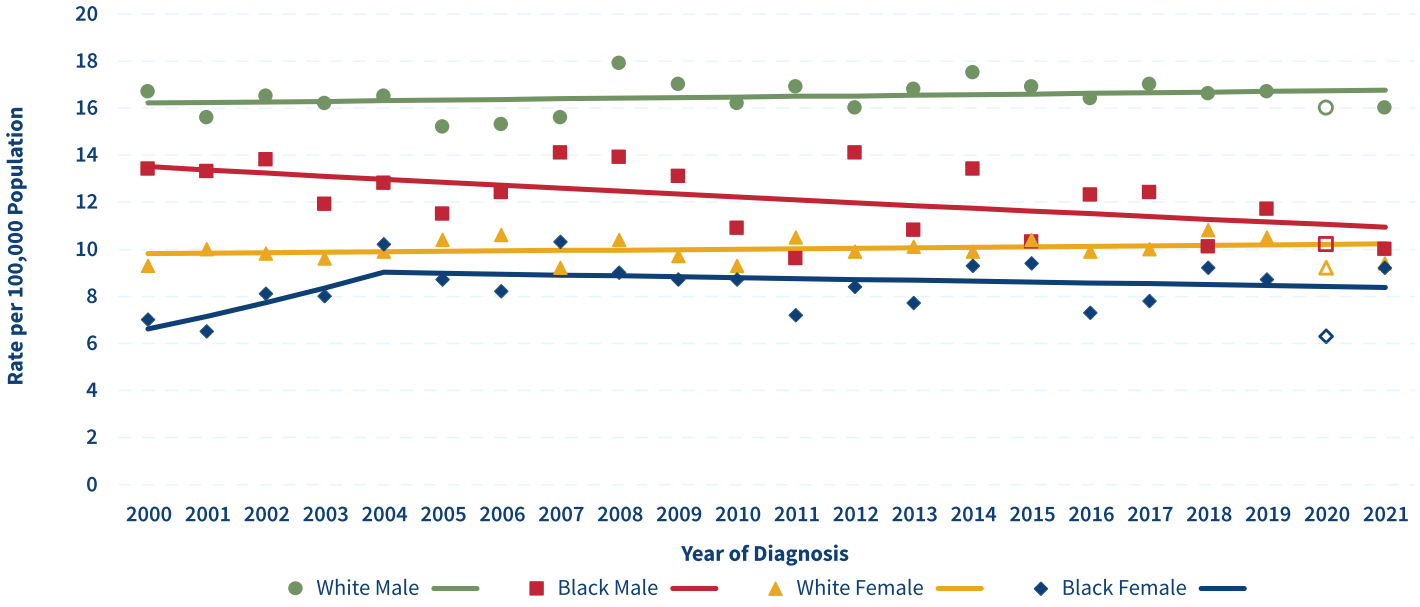
The average annual age-adjusted mortality rate for leukemia in Ohio from 2017 to 2021 was 6.5 per 100,000 population, which is 8% higher than the U.S. rate (6.0 per 100,000) **(Table 3)**.[14] This represents 961 average annual deaths in Ohio from leukemia over the time period.[14] Similar to incidence, White males in Ohio had the highest mortality rate for leukemia (8.8 per 100,000) compared with all other sex/race groups **(Table 5)**.[14] Average annual age-adjusted mortality rates of ALL (0.4 per 100,000) and CML (0.3 per 100,000) are identical to the U.S. rates, while mortality rates of AML (3.0 per 100,000) and CLL (1.2 per 100,000) were slightly higher than those in the United States **(Table 9)**.[14]

## Trends

**Figure 26** shows, for each year from 2000 to 2021, age-adjusted leukemia incidence rates were highest among White males.[10] There was no apparent trend in leukemia incidence rates for any sex/race group, with the exception of an increase among Black females of 8.1% per year from 2000 to 2004.[10]

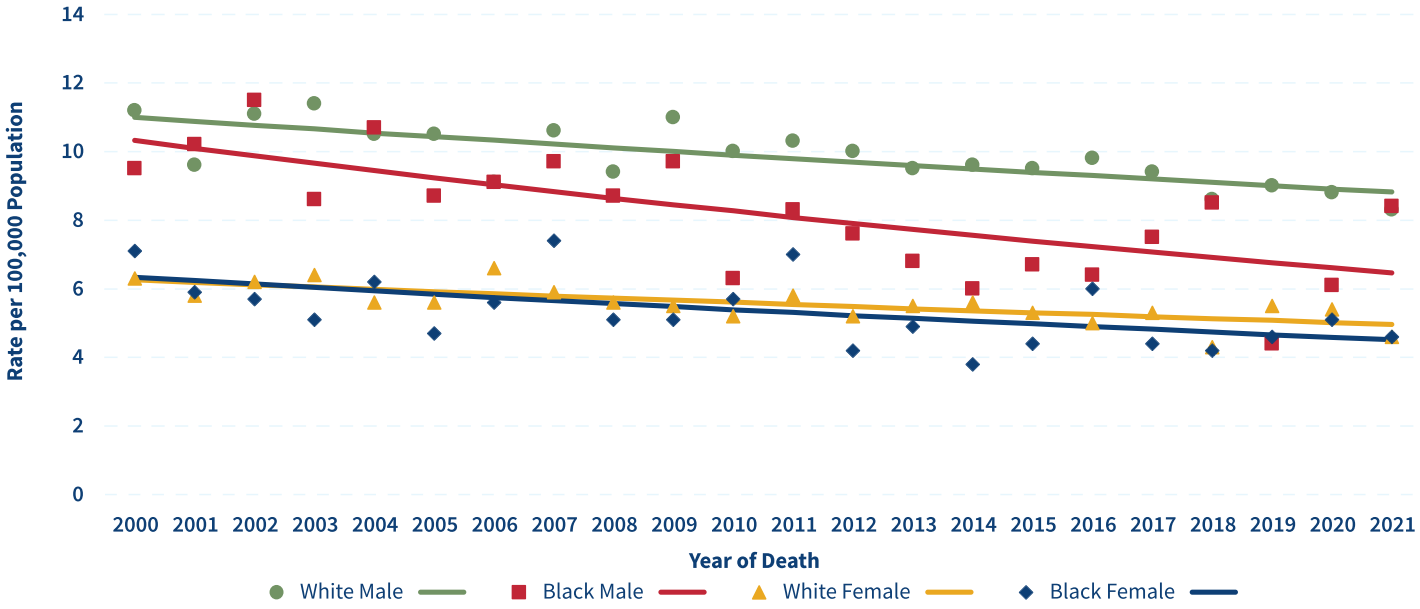
**Figure 27** shows the age-adjusted leukemia mortality rates decreased for each sex/race group; from 2000 to 2021, the mortality rate decreased 1.0% per year among White males, 2.2% per year among Black males, 1.1% per year among White females, and 1.6% per year among Black females.[14]

## **FIGURE 26.** Trends in Age-Adjusted Incidence Rates for Leukemia by Sex and Race in Ohio, 2000-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

## **FIGURE 27.** Trends in Age-Adjusted Mortality Rates for Leukemia by Sex and Race in Ohio, 2000-2021




Source: Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

## Risk Factors and Populations with High Rates[8,50,51]

### Potentially Modifiable Risk Factors

**Radiation:** People exposed to high levels of ionizing radiation, including those resulting from medical treatment, are more likely to get leukemia.

**Chemotherapy:** Cancer patients treated with certain types of cancer treatment drugs have an increased risk of some types of leukemia.

**Benzene:** Exposure to benzene, which is found in gasolene, and which is used in the chemical industry (e.g., oil refining, rubber manufacturing) increases leukemia risk.

**Smoking:** Smoking cigarettes increases risk of AML. In addition, parental smoking before and after childbirth may increase childhood acute leukemia risk.

### Non-modifiable Risk Factors

**Age:** ALL is most commonly diagnosed among children, whereas AML, CLL, and CML occur mainly in adults.

**Sex:** Leukemia is more common among men than women.

**Race:** White people have higher rates of leukemia compared with Black people.

**Family history:** While it is rare for more than one person in a family to have leukemia, having a family history may increase leukemia risk, especially CLL.

**Genetic abnormalities/disorders and inherited diseases/syndromes:** Down syndrome, Li-Fraumeni syndrome, and certain other inherited diseases increase risk of developing leukemia. Other inherited disorders, such as Fanconi anemia, Shwachman-Diamond syndrome and Diamond-Blackfan anemia, may increase risk of leukemia.

### Signs and Symptoms[8]

Symptoms of leukemia vary according to the type of leukemia. In acute leukemia, signs may appear suddenly, while chronic leukemia typically progresses slowly with few symptoms and is often diagnosed during routine blood tests.

**SYMPTOMS MAY INCLUDE:**

- **Persistent fatigue.**
- **Weight loss.**
- **Repeated infections.**
- **Excessive sweating.**
- **Recurring nosebleeds.**
- **Fever or chills.**
- **Bleeding or bruising easily.**
- **Bone or joint pain or tenderness.**
- **Swollen lymph nodes and enlarged liver or spleen.**

*Any of these signs/symptoms may be caused by cancer or by other, less serious, health problems. If you have any of these signs/symptoms, see your healthcare provider.*

## Early Detection

There are no recommended screening tests for the early detection of leukemia. However, it is sometimes diagnosed early because of abnormal results on blood tests performed for other indications.

## Survival

Based on cases diagnosed from 2014 to 2020, the five-year relative survival for leukemia in Ohio (64%) is lower than that for the United States (67%).[10,11] Five-year relative survival for leukemia varies largely by type and ranges from 32% for AML to 89% for CLL in Ohio.[10] Due in large part to advances in treatment, survival probabilities for most types of leukemia have greatly increased during the past 40 years **(Table A-6)**.[10]

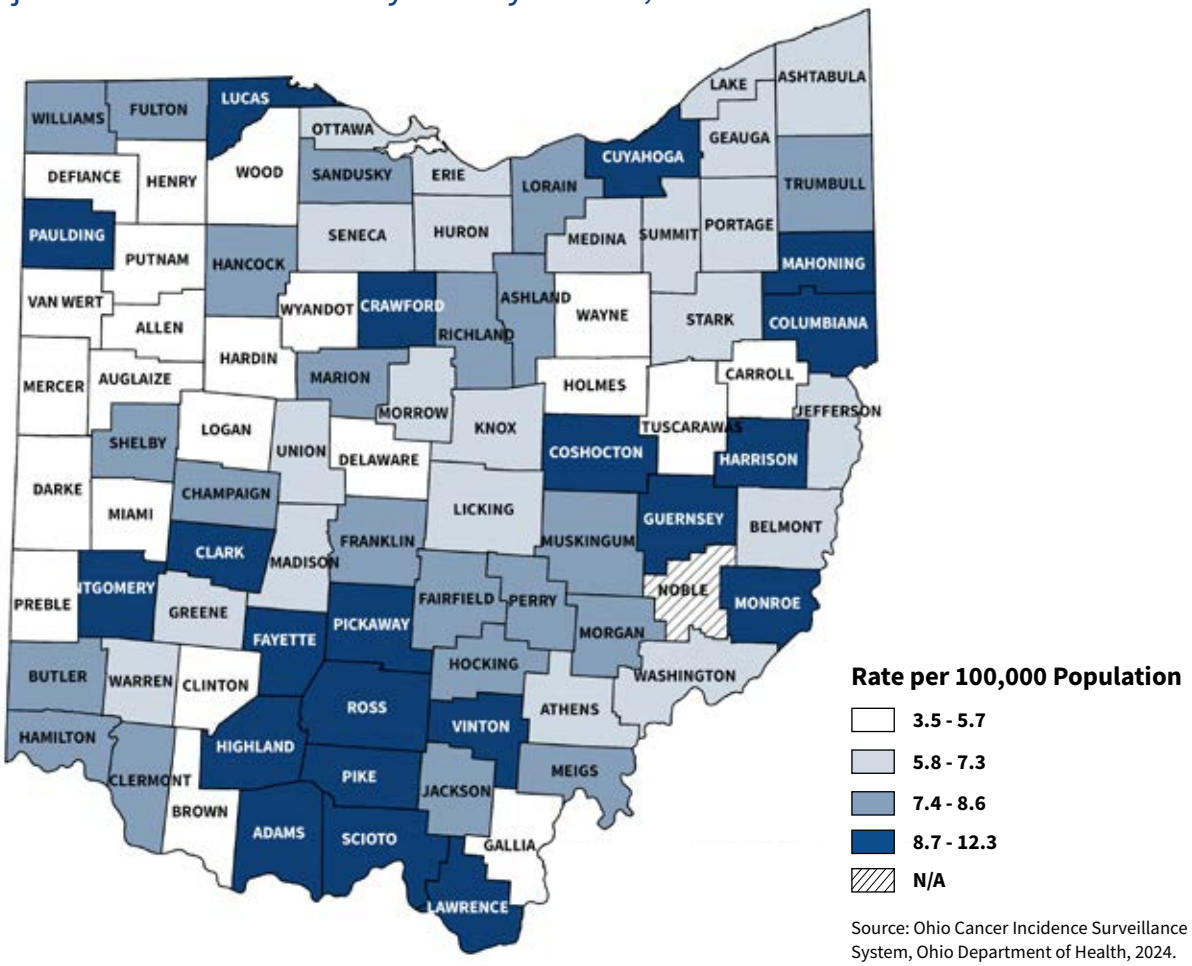
# LIVER AND INTRAHEPATIC BILE DUCT CANCER

## New Cases

An average of 1,228 new cases (851 men and 377 women) of liver and intrahepatic bile duct (IBD) cancer was diagnosed annually from 2017 to 2021 in Ohio with a corresponding average annual age-adjusted incidence rate of 7.7 per 100,000 population.[10] The liver and IBD cancer incidence rate was 10% lower in Ohio compared with the United States (8.6 per 100,000) **(Table 2)**.[5,10] In Ohio males, the average annual incidence rate was 11.4 per 100,000 compared with a rate of 4.5 per 100,000 among Ohio females **(Table 2)**.[10] The liver and IBD cancer incidence rate was highest among Black males (19.0 per 100,000), followed by Asian/Pacific Islander males (15.3 per 100,000) **(Table 4)**.[10] Average annual age-adjusted incidence rates of liver and IBD cancer by Ohio county of residence are shown in **Figure 28**.

**Currently, a man living in the United States has a 1 in 75 lifetime risk of developing invasive liver and IBD cancer, and a woman has a 1 in 172 lifetime risk of developing invasive liver and IBD cancer.[6]**

**FIGURE 28.** Cancer of the Liver and Intrahepatic Bile Duct: Quartiles of Average Annual Age-Adjusted Incidence Rates by County in Ohio, 2017-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

## Deaths

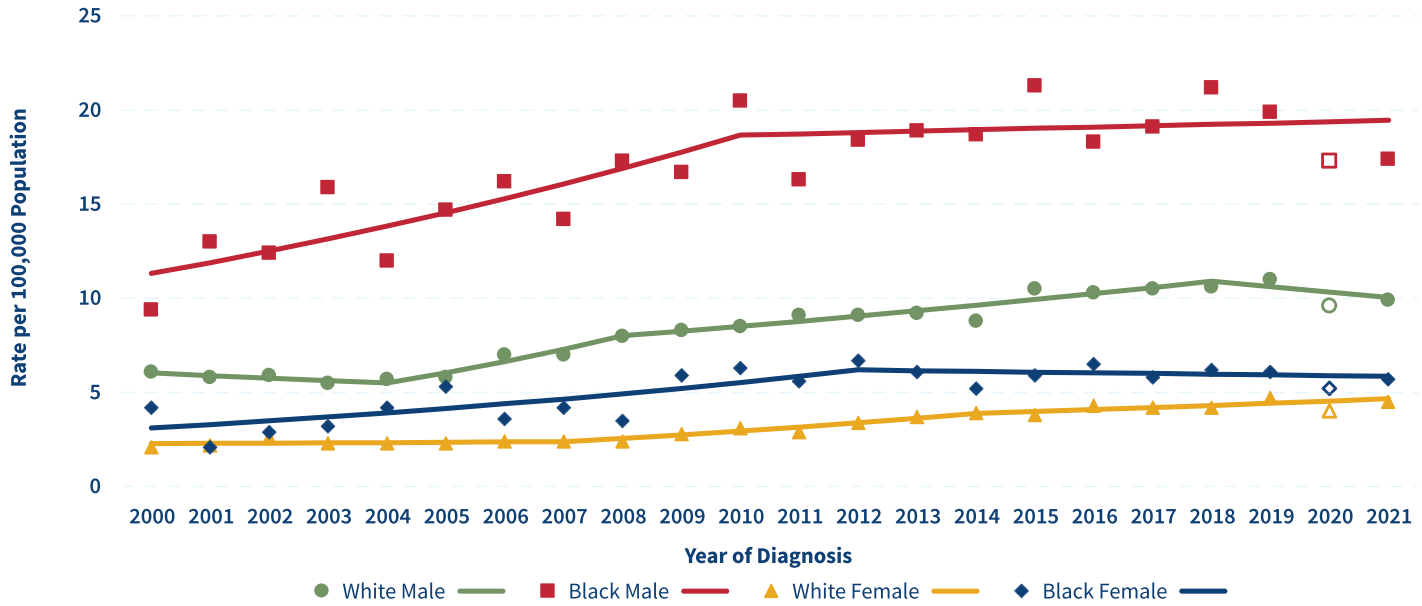
An average of 1,003 deaths occurred annually from liver and IBD cancer among Ohio residents from 2017 to 2021.[14] The average annual age-adjusted mortality rate was 6.3 per 100,000 population (9.1 per 100,000 for males and 4.0 per 100,000 for females) compared with the U.S. rate of 6.6 per 100,000. **(Table 3)**.[14] The mortality rate was highest among Black males (15.5 per 100,000), followed by Asian/Pacific Islander males (10.1 per 100,000) **(Table 5)**.[14]

## Trends

In Ohio, age-adjusted liver and IBD cancer incidence rates where highest for Black males each year from 2000 to 2021.[10] Specifically, the incidence rates increased 9.8% per year from 2004 to 2008 and 3.1% per year from 2008 to 2018 among White males and increased 5.1% per year from 2000 to 2010 per year among Black males.[10] Liver and IBD incidence rates increased 7.2% per year from 2007 to 2014 among White females and increased 5.9% per year from 2000 to 2012 among Black females **(Figure 29)**.[10]

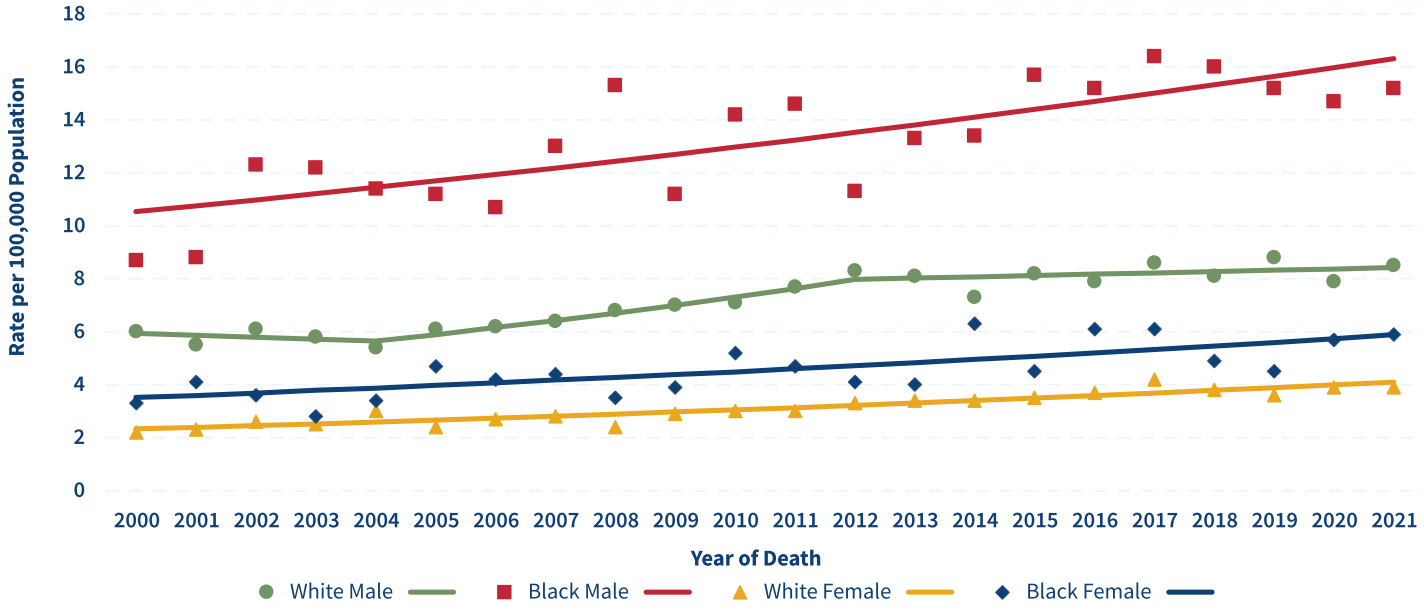
**Figure 30** shows, for each year from 2000 to 2021, Black males had the highest age-adjusted mortality rate of liver and IBD cancer.[14] Liver and IBD cancer mortality rates increased 4.4% per year from 2004 to 2012 among White males and 2.1% per year from 2000 to 2021 among Black males.[14] The liver and IBD rates increased from 2000 to 2021 for both White females (2.7% per year) and Black females (2.5% per year).[14]

**FIGURE 29.** Trends in Age-Adjusted Incidence Rates for Cancer of the Liver and Intrahepatic Bile Duct by Sex and Race in Ohio, 2000-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

**FIGURE 30.** Trends in Age-Adjusted Mortality Rates for Cancer of the Liver and Intrahepatic Bile Duct by Sex and Race in Ohio, 2000-2021




Source: Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

## Risk Factors and Populations with High Rates[52]

### Potentially Modifiable Risk Factors

**Hepatitis B virus (HBV) infection:** HBV can be transmitted in blood, semen, or other body fluids. The infection can be passed from mother to child during childbirth, through sexual contact, or by sharing needles that are used to inject drugs. It can cause inflammation (swelling) of the liver that leads to cancer.

**Hepatitis C virus (HCV) infection:** HCV can be transmitted in the blood. The infection can be spread by sharing needles that are used to inject drugs or, less often, through sexual contact. HCV can cause cirrhosis that may lead to liver cancer. Chronic HCV infection is the leading cause of liver cancer in North America, Europe, and Japan.

**Cirrhosis:** The risk of developing liver cancer is increased for people who have cirrhosis, a disease in which healthy liver tissue is replaced by scar tissue. The scar tissue blocks the flow of blood through the liver and keeps it from working as it should. Chronic alcoholism and chronic hepatitis infections are common causes of cirrhosis. People with HCV-related cirrhosis have a higher risk of developing liver cancer than people with cirrhosis related to HBV or alcohol use.

**Heavy alcohol use:** Heavy alcohol use can cause cirrhosis, which is a risk factor for liver cancer. Liver cancer can also occur in heavy alcohol users who do not have cirrhosis. Heavy alcohol users who have cirrhosis are 10 times more likely to develop liver cancer compared with heavy alcohol users who do not have cirrhosis. Studies have shown there is also an increased risk of liver cancer in people with HBV or HCV infection who use alcohol heavily.

**Aflatoxin B1:** The risk of developing liver cancer may be increased by eating foods that contain aflatoxin B1 (poison from a fungus that can grow on foods, such as corn and nuts, that have been stored in hot, humid places).

**Nonalcoholic steatohepatitis (NASH):** NASH is the most severe form of nonalcoholic fatty liver disease, where there is an abnormal amount of fat in the liver. In some people, this can cause inflammation and injury to the cells of the liver. Having NASH-related cirrhosis increases the risk of developing liver cancer. Liver cancer has also been found in people with NASH who do not have cirrhosis.

**Cigarette smoking:** Cigarette smoking has been linked to a higher risk of liver cancer. The risk increases with the number of cigarettes smoked per day and the number of years the person has smoked.

### Non-modifiable Risk Factors

**Age:** Most liver cancers occur in people who are 60 years of age or older.

**Sex:** Liver cancer is more than twice as common in men as women.

**Race and ethnicity:** In the United States, Asians/Pacific Islanders, American Indians/Alaskan Natives, and Hispanics have the highest rates of liver cancer, followed by Black people. White people have the lowest rates of liver cancer.

**Inherited metabolic diseases:** Certain rare medical and genetic conditions may increase the risk of liver cancer, including untreated hereditary hemochromatosis, alpha-1 antitrypsin deficiency, glycogen storage disease, porphyria cutanea tarda, and Wilson disease.

**Inflammatory bowel disease:** People with ulcerative colitis and Crohn's disease are at increased risk for bile duct cancer.

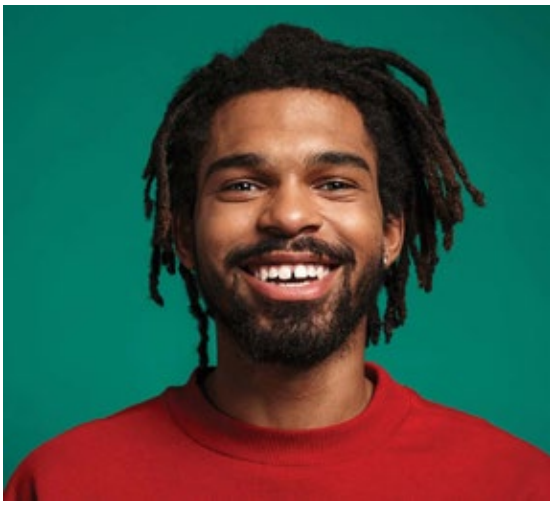
**Chronic inflammation of the bile ducts:** Risk for bile duct cancer increases for individuals who have chronic inflammation of the bile ducts.

### Signs and Symptoms[53]

Signs and symptoms of liver and IBD cancer are often not apparent in the early stages of the disease. Some of the more common symptoms of liver and IBD cancer include:

- **A hard lump on the right side just below the rib cage.**
- **Discomfort in the upper abdomen on the right side.**
- **A swollen abdomen.**
- **Pain near the right shoulder blade or in the back.**
- **Jaundice (yellowing of the skin and whites of the eyes).**
- **Easy bruising or bleeding.**
- **Unusual tiredness or weakness.**
- **Nausea and vomiting.**
- **Loss of appetite or feelings of fullness after eating a small meal.**
- **Weight loss for no known reason.**
- **Pale, chalky bowel movements and dark urine.**
- **Fever.**
- **Itchy skin.**

*Any of these symptoms may be caused by cancer or by other, less serious health problems. If you have any of these symptoms, see your healthcare provider.*



## Early Detection[54]

Although screening for liver cancer is not recommended for most people, many professional societies recommend testing individuals at high risk (e.g., those with cirrhosis) with ultrasound, computed tomography (CT), and/or blood tests.

## Stage at Diagnosis and Survival

The five-year relative survival for liver and IBD cancer for all stages combined was 21% in Ohio and 22% in the United States, based on cases diagnosed from 2014 to 2020.[10,11] In Ohio, five-year relative survival was 35% when the disease was diagnosed at a local stage (43% of cases in Ohio).[10] The five-year relative survival was 14% for those diagnosed at regional stage and only 5% when diagnosed at the distant stage, which accounted for 19% and 21% of cases in Ohio, respectively **(Table A-1, Table A-6)**.[10]

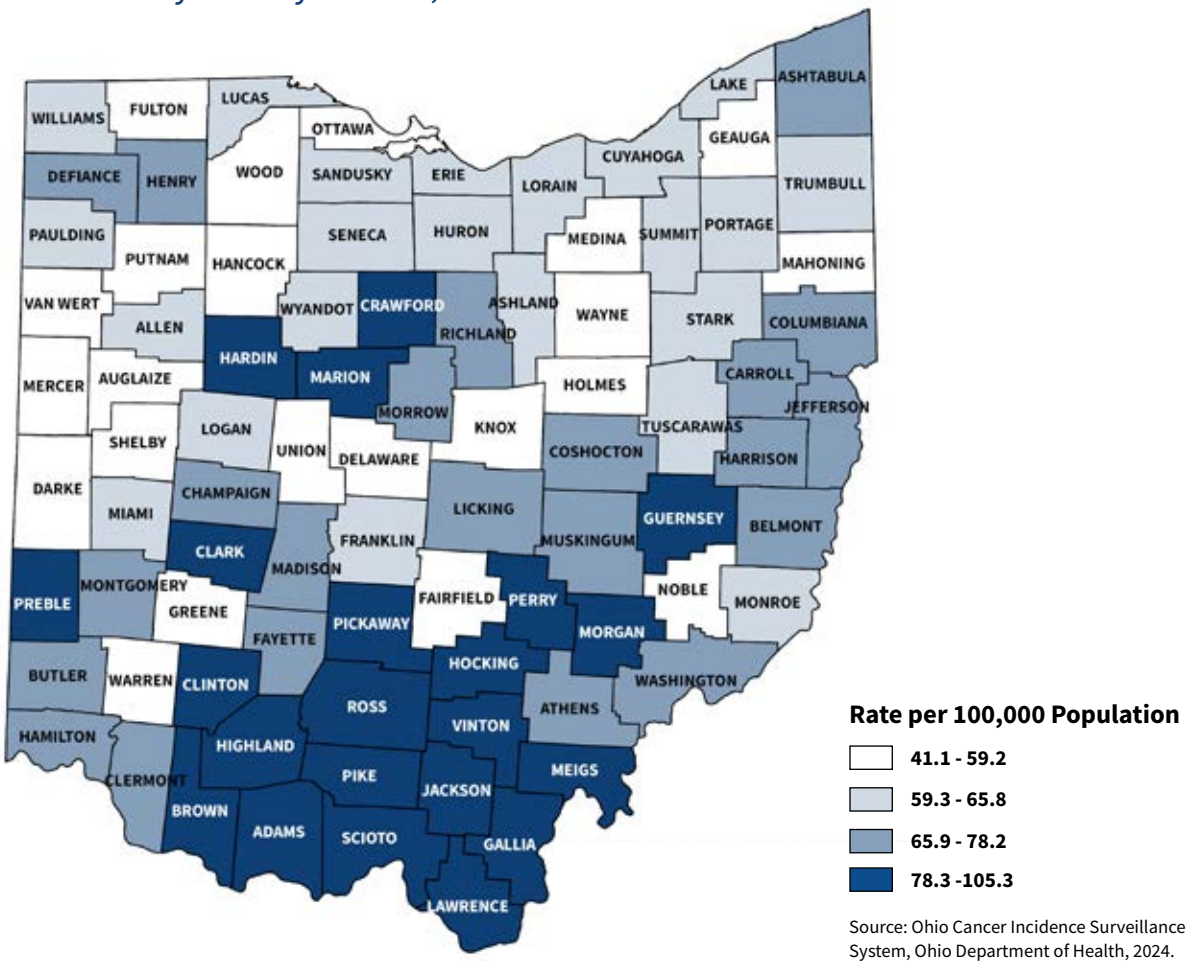
# LUNG AND BRONCHUS CANCER

## New Cases

An average of 10,119 new cases (5,224 men and 4,895 women) of lung and bronchus cancer were diagnosed annually from 2017 to 2021 in Ohio with a corresponding average annual age-adjusted incidence rate of 64.3 per 100,000 population.[10] The lung and bronchus cancer incidence rate was about 21% higher in Ohio compared with the U.S. rate of 53.3 per 100,000).[5,10] The average annual age-adjusted incidence rate among Ohio males was 73.2 per 100,000 compared with a rate of 57.6 per 100,000 among Ohio females **(Table 2)**.[10] Black males in Ohio had the highest incidence rate (78.4 per 100,000) compared with all other sex/race groups **(Table 4)**.[10] Average annual age-adjusted incidence rates of lung and bronchus cancer by Ohio county of residence are shown in **Figure 31**.

**Currently, a man living in the United States has a 1 in 20 lifetime risk of developing invasive lung and bronchus cancer, and a woman has a 1 in 21 lifetime risk of developing invasive lung and bronchus cancer.[6]**

**FIGURE 31.** Cancer of the Lung and Bronchus: Quartiles of Average Annual Age-Adjusted Incidence Rates by County in Ohio, 2017-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

## Deaths

Lung and bronchus cancer is the leading cause of cancer-related death in both men and women. It causes more deaths every year than colon and rectum, breast, and prostate cancers combined.[14]

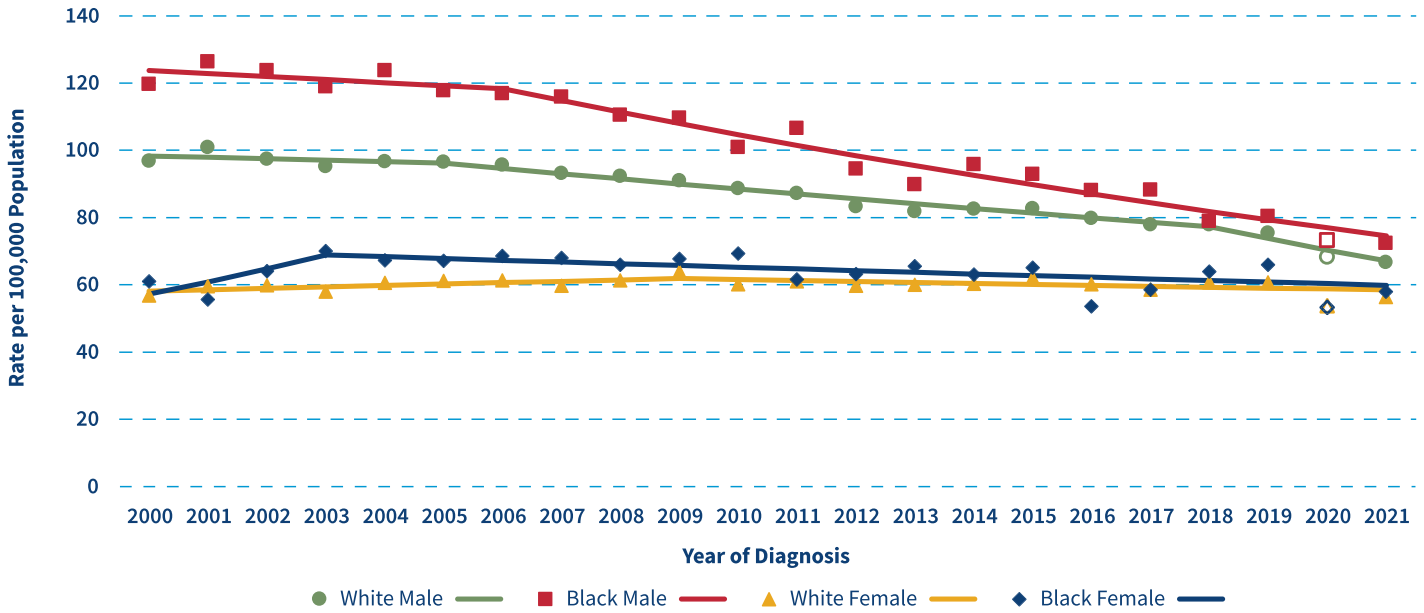
An average of 6,479 (3,539 men and 2,940 women) deaths occurred annually from lung and bronchus cancer among Ohio residents from 2017 to 2021.[14] Ohio's average annual age-adjusted lung and bronchus cancer mortality rate (41.4 per 100,000 population) was 22% higher than the U.S. rate (33.8 per 100,000).[14] The mortality rate among Ohio males was 50.9 per 100,000 compared with a rate of 34.3 per 100,000 among Ohio females **(Table 3)**.[14] Black males in Ohio had the highest lung and bronchus cancer mortality rate (56.7 per 100,000), compared with all other sex/race groups **(Table 5)**.[14]

## Trends

Lung and bronchus cancer incidence rates among White males in Ohio decreased 1.7% per year from 2005 to 2018 then by 4.6% per year from 2018 to 2021 and decreased 3.0% per year from 2006 to 2021 for Black males.[10] Lung and bronchus cancer incidence rates increased 0.7% per year from 2000 to 2009 and then decreased 0.5% per year from 2009 to 2021 among White females, while Black female incidence rates increased 6.4% per year from 2000 to 2003 then decreased 0.8% per year from 2003 to 2021 **(Figure 32)**.[10]

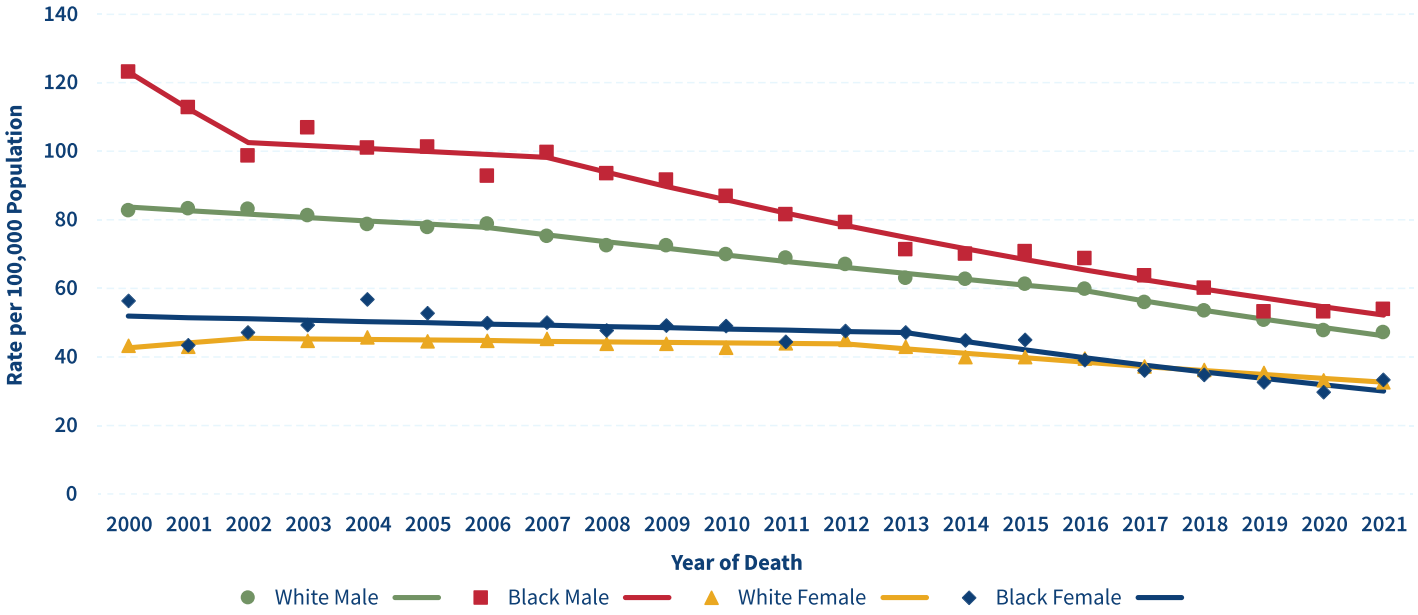
Black males had the highest age-adjusted lung and bronchus cancer mortality rate each year from 2000 to 2021 among each sex/race group.[14] The greatest declines in lung and bronchus cancer mortality rates were from 2016 to 2021 for White males (4.9% per year), from 2000 to 2002 and from 2007 to 2021 for Black males (8.8% and 4.4% per year, respectively), from 2012 to 2021 for White females (3.2% per year), and from 2013 to 2021 for Black females (5.4% per year) **(Figure 33)**.[14]

**FIGURE 32.** Trends in Age-Adjusted Incidence Rates for Cancer of the Lung and Bronchus by Sex and Race in Ohio, 2000-2021




Source: Ohio Cancer Incidence Surveillance System (OCISS), Ohio Department of Health, 2024.

**FIGURE 33.** Trends in Age-Adjusted Mortality Rates for Cancer of the Lung and Bronchus by Sex and Race in Ohio, 2000-2021




Source: Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

## Risk Factors and Populations with High Rates[55]

### Potentially Modifiable Risk Factors

**Smoking:** Tobacco smoking is the most important risk factor for lung cancer. Cigarette, cigar, and pipe smoking all increase the risk of lung cancer. Tobacco smoking causes about nine out of 10 cases of lung cancer in men and about eight out of 10 cases of lung cancer in women. Risk increases with the amount and duration of use.

**Secondhand smoke:** Exposure to secondhand (environmental) tobacco smoke increases risk. Nonsmokers exposed to secondhand smoke have approximately 20% increased risk of lung and bronchus cancer.

**Radon:** Radon is a cancer-causing gas and is the second leading cause of lung cancer. In people who have never smoked, about 26% of deaths caused by lung cancer have been linked to radon exposure.

**Radiation:** Exposure to radiation is a risk factor for lung cancer. Sources include radiation therapy and imaging tests.

**Occupational exposure:** Workplace exposure to asbestos, arsenic, crystalline silica dust, beryllium, cadmium, nickel compounds, chromium (VI) compounds, tar and soot, mustard gas, chloromethyl ethers, and diesel exhaust increase risk.

**Air pollution:** Exposure to outdoor air pollution, specifically small particles, increases risk.

**Human Immunodeficiency virus (HIV) infection:** People with HIV infection have increased risk. Since smoking rates are higher in those infected with HIV than in those not infected, it is not clear whether the increased risk of lung cancer is from HIV infection or from being exposed to cigarette smoke.

**Beta carotene:** Taking beta carotene supplements (pills) increases the risk of lung cancer, especially in smokers who smoke one or more packs a day. The risk is higher in smokers who have at least one alcoholic drink every day.

### Signs and Symptoms[56,57]

Signs and symptoms usually do not occur until the lung and bronchus cancer is advanced and may include:

- **Persistent cough.**
- **Chest discomfort or pain.**
- **Trouble breathing, wheezing, or hoarseness.**
- **Bloody sputum (mucus coughed up from the lungs).**
- **Loss of appetite or weight loss.**
- **Trouble swallowing.**
- **Recurring pneumonia or bronchitis.**

*Any of these symptoms may be caused by cancer or by other, less serious health problems. If you have any of these symptoms, see your healthcare provider.*

### Non-modifiable Risk Factors

**Age:** About two out of three people diagnosed with lung and bronchus cancer are older than 65.

**Sex:** Lung and bronchus cancer is more common among men compared with women.

**Race:** In the United States, lung and bronchus cancer is more common among White and Black people than among Asians or Pacific Islanders.

**Family history:** People with a relative who has had lung cancer may be twice as likely to have lung cancer than those without a relative with lung cancer. This risk may be due to the tendency for cigarette smoking to run in families or because family members are exposed to secondhand smoke.

## Early Detection[58,59]

Lung cancer screening with low-dose spiral computed tomography (LDCT) has been shown to reduce lung cancer mortality in people at high risk.

ACS recommends annual lung cancer screening with low-dose CT among patients who are 50 to 80 years of age in good health who smoke or used to smoke and have at least a 20-pack-year smoking history.

- A pack-year is equal to smoking one pack (or about 20 cigarettes) per day for a year. For example, a person could have a 20-pack-year history by smoking one pack a day for 20 years, or by smoking two packs a day for 10 years.
- Before deciding to be screened, people should have a discussion with a healthcare professional about the purpose of screening and how it is done, as well as the benefits, limits, and possible harms of screening.
- People who still smoke should be counseled about quitting and offered interventions and resources to help them.
- People should not be screened if they have serious health problems that will likely limit how long they will live, or if they won't be able to or won't want to get treatment if lung cancer is found.

The USPSTF recommends annual screening for lung cancer with LDCT in adults ages 50 to 80 years who have a 20-pack-year smoking history and currently smoke or have quit within the past 15 years. Screening should be discontinued once a person has not smoked for 15 years or develops a health problem that substantially limits life expectancy or the ability or willingness to have curative lung surgery. **Table A-7** on page 105 shows the ACS and USPSTF recommendations for the early detection of lung and bronchus cancer by age and sex.

## Stage at Diagnosis and Survival

Based on cases diagnosed from 2014 to 2020, the five-year relative survival for lung and bronchus cancer for all stages combined was 26% in Ohio and 31% in the United States.[10,11] When lung and bronchus cancer was diagnosed at the local stage (28% of cases), the five-year relative survival was 60%.[10] After the cancer has spread regionally to involve adjacent organs or lymph nodes, the five-year relative survival was 34% and only 8% for persons with distant metastases (24% and 42% of cases, respectively) **(Figure 1, Table A-1, Table A-6)**.[10]

# LYMPHOMA

Lymphoma is cancer that results from the abnormal growth and accumulation of cells in the lymphoid tissue of the lymphatic system, which is responsible for filtering germs, cancer cells, and fluids from the extremities and internal organs.[60] Lymphoid tissue is found in many places throughout the body, including the lymph nodes, thymus, spleen, tonsils and adenoids, and bone marrow.[60] Hodgkin lymphoma (HL), also known as Hodgkin disease, is a specialized type of lymphoma in which the cancer cells are mostly Reed-Sternberg cells. All other lymphomas are called non-Hodgkin lymphoma (NHL).[60]

## New Cases

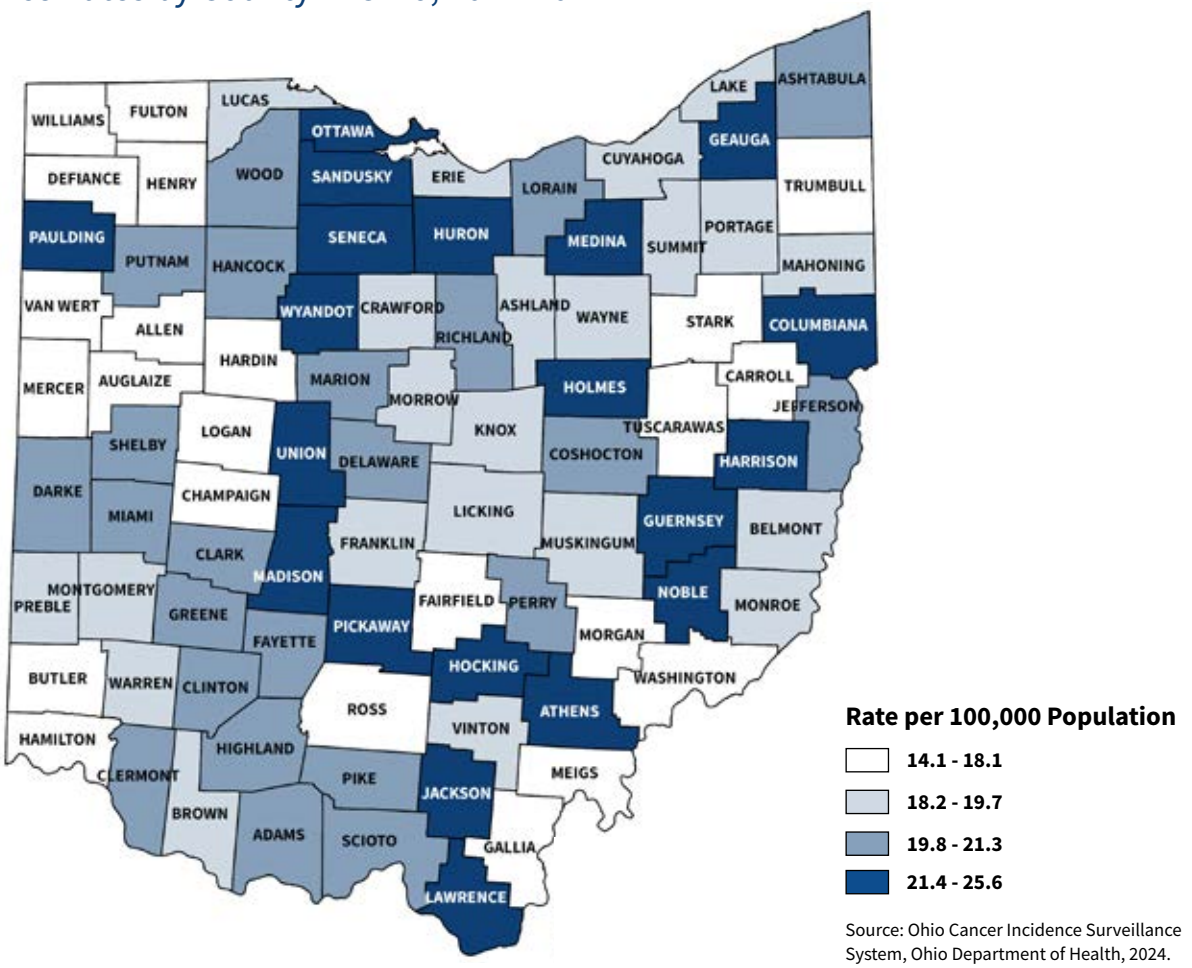
In Ohio from 2017 to 2021, an average of 324 cases of HL and 2,816 cases of NHL were diagnosed per year.[10] The average annual age-adjusted incidence rate of HL in Ohio (2.7 per 100,000 population) was 8% higher than the U.S. rate (2.5 per 100,000); whereas, the incidence rate of NHL was slightly higher in Ohio compared with the United States (19.1 and 18.5 per 100,000, respectively) **(Table 2)**.[5,10]

Incidence rates of both HL and NHL were higher among males compared with females in Ohio from 2017 to 2021.[10] Incidence rates for Black males and White males were similar for HL (3.3 and 3.0 per 100,000, respectively), as were those for Black females and White females (2.1 and 2.5 per 100,000, respectively).[10] Incidence rates for NHL were higher among White males (23.7 per 100,000) compared with Black males (16.1 per 100,000), and among White females (16.1 per 100,000) compared with Black females (11.4 per 100,000) **(Table 4)**.[10] Average annual age-adjusted incidence rates of NHL by Ohio county of residence are shown in **Figure 34**.

**Currently, a man living in the United States has a 1 in 52 lifetime risk of developing NHL, and a woman has a 1 in 64 lifetime risk of NHL.[6]**

**The lifetime risk of developing HL is much lower – approximately 1 in 467 for males and 1 in 563 for females.[6]**

**FIGURE 34.** Non-Hodgkin Lymphoma: Quartiles of Average Annual Age-Adjusted Incidence Rates by County in Ohio, 2017-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

## Deaths

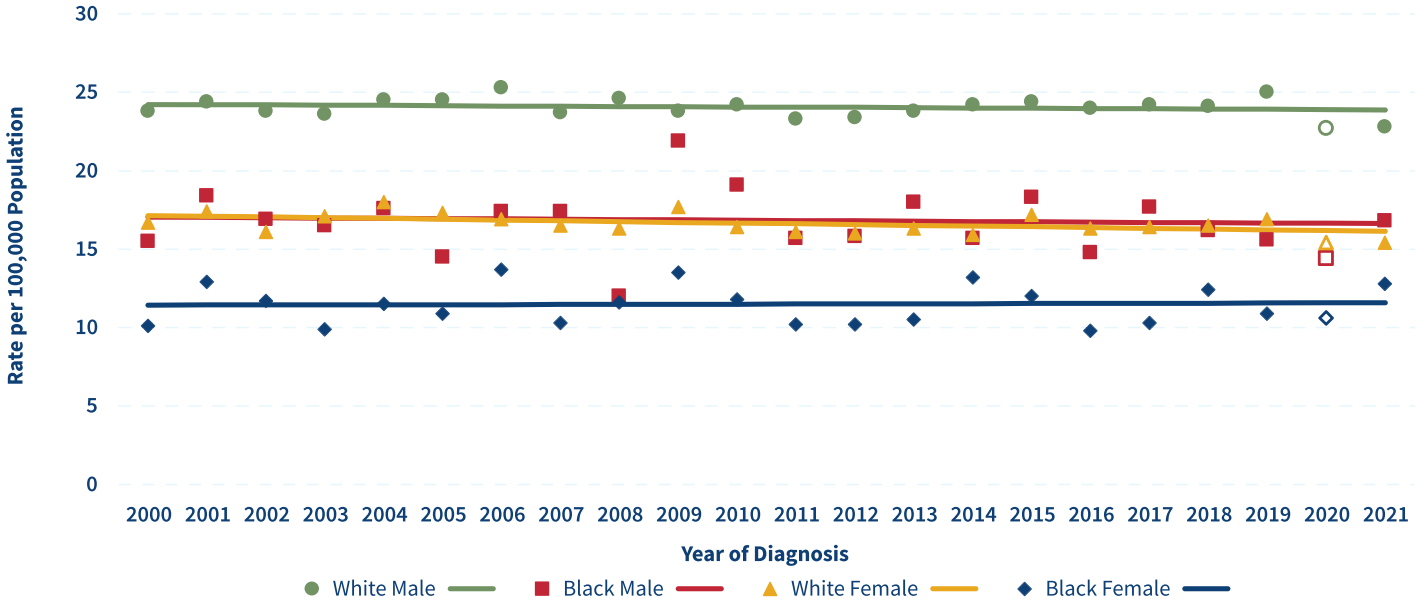
In Ohio, an average of 36 deaths from HL and 846 deaths from NHL occurred each year from 2017 to 2021.[14] The average annual age-adjusted mortality rate for HL in Ohio was 0.2 per 100,000 population compared with the U.S. mortality rate of 0.3 per 100,000, and the Ohio mortality rate was 5.6 per 100,000 for NHL compared with the U.S. rate of 5.1 per 100,000 **(Table 3)**.[14] In Ohio, mortality rates of HL were highest among White and Black males (0.4 per 100,000) and mortality rates of NHL were highest among White males (7.8 per 100,000) compared with the other sex/race groups **(Table 5)**.[14]

## Trends

In Ohio, there were no apparent trends in age-adjusted NHL incidence rates from 2000 to 2021 for any sex/race group.[10] For each year, White males had the highest incidence rate **(Figure 35)**.[10]

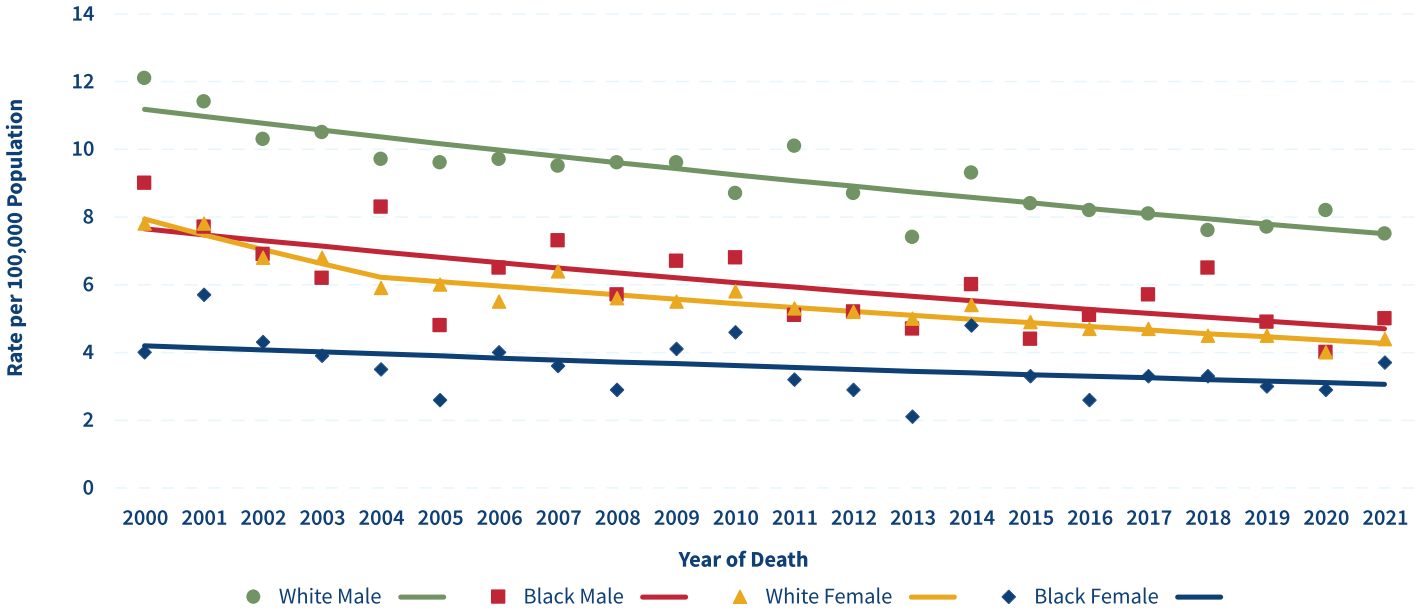
Age-adjusted NHL mortality rates decreased for each sex/race group from 2000 to 2021. The rate decreased 1.9% per year among White males, 2.3% per year among Black males, and 1.5% per year among Black females.[14] Among White females, the NHL mortality rate decreased 5.9% per year from 2000 to 2004, and 2.2% per year from 2004 to 2021. For each year, the mortality rate was highest for White males **(Figure 36)**.[14]

## FIGURE 35. Trends in Age-Adjusted Incidence Rates for Non-Hodgkin Lymphoma by Sex and Race in Ohio, 2000-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

## FIGURE 36. Trends in Age-Adjusted Mortality Rates for Non-Hodgkin Lymphoma by Sex and Race in Ohio, 2000-2021




Source: Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

## Risk Factors and Populations with High Rates[8,61,62,63,64]

### Potentially Modifiable Risk Factors

**Certain viruses:** Having an infection with the Epstein-Barr virus (EBV), HIV, *H. pylori*, human herpesvirus-8 (HHV8), or human T-cell leukemia/lymphoma type I (HTLV-1) increases risk of developing NHL. HIV infection increases HL risk.

**Radiation:** Studies of survivors of atomic bombs and nuclear reactor accidents have shown they have an increased risk of developing NHL. Patients treated with radiation therapy for some other cancers, such as HL, have a slightly higher risk of developing NHL later in life.

### Non-modifiable Risk Factors

**Age:** Risk of NHL increases with advancing age, whereas risk of HL is highest among persons 15-30 and 55 and older.

**Sex:** Overall, risks of NHL and HL are higher in men compared with women.

**Race:** White people are more likely to develop NHL than Black people or Asians/Pacific Islanders.

**Family history:** Brothers and sisters of young people with HL have a higher risk for this disease. The risk is very high for an identical twin of a person with HL. Having a first-degree relative (parent, child, sibling) with NHL increases risk of developing NHL.

**Weakened immune system:** The risks of developing HL and NHL is increased by having a weakened immune system (such as from an inherited condition or certain drugs used after an organ transplant).

**Autoimmune diseases and inherited immune disorders:** Some autoimmune diseases such as rheumatoid arthritis, systemic lupus erythematosus, Sjogren disease, celiac disease, and others have been linked with an increased risk of NHL. NHL risk is also increased as a result of inherited immune disorders such as hypogammaglobulinemia or Wiskott-Aldrich syndrome.

**Weakened immune system:** The risk of developing NHL is increased by having a weakened immune system (such as from an inherited condition or certain drugs used after an organ transplant).

**Autoimmune diseases:** Some autoimmune diseases such as rheumatoid arthritis, systemic lupus erythematosus, Sjogren disease, celiac disease, and others have been linked with an increased risk of NHL.

### Signs and Symptoms[8,60]

In general, symptoms of HL and NHL are non-specific and may include the following:

- **Painless swelling of the lymph nodes in the neck, underarm, or groin.**
- **Unexplained fever.**
- **Night sweats.**
- **Itchy skin.**
- **Unexplained weight loss.**
- **Abdominal fullness.**
- **Loss of appetite.**
- **Coughing, trouble breathing, and chest pain.**
- **Weakness or tiredness that will not go away.**

*Any of these symptoms may be caused by cancer or other, less serious health problems. If you have any of these symptoms, see your healthcare provider.*

## Early Detection

At present, there are no screening tests available for lymphoma to detect the disease early. The best strategy for early diagnosis is prompt attention to signs and symptoms.

## Stage at Diagnosis and Survival

Based on cases diagnosed from 2014 to 2020, the five-year relative survival for HL was 89% in Ohio and 90% in the United States, and the five-year relative survival for NHL was 75% in Ohio and 76% in the United States.[10,11] For cancers diagnosed at the distant stage, the five-year relative survival for HL was 83% (52% of cases) and for NHL was 69% (58% of cases) **(Table A-1, Table A-6)**.[10]

# MELANOMA / SKIN CANCER

Basal cell and squamous cell (nonmelanoma) skin cancers are the most common types of skin cancer. However, the actual number of cases of these types is difficult to estimate because the cases are not required to be reported to cancer registries.[8]

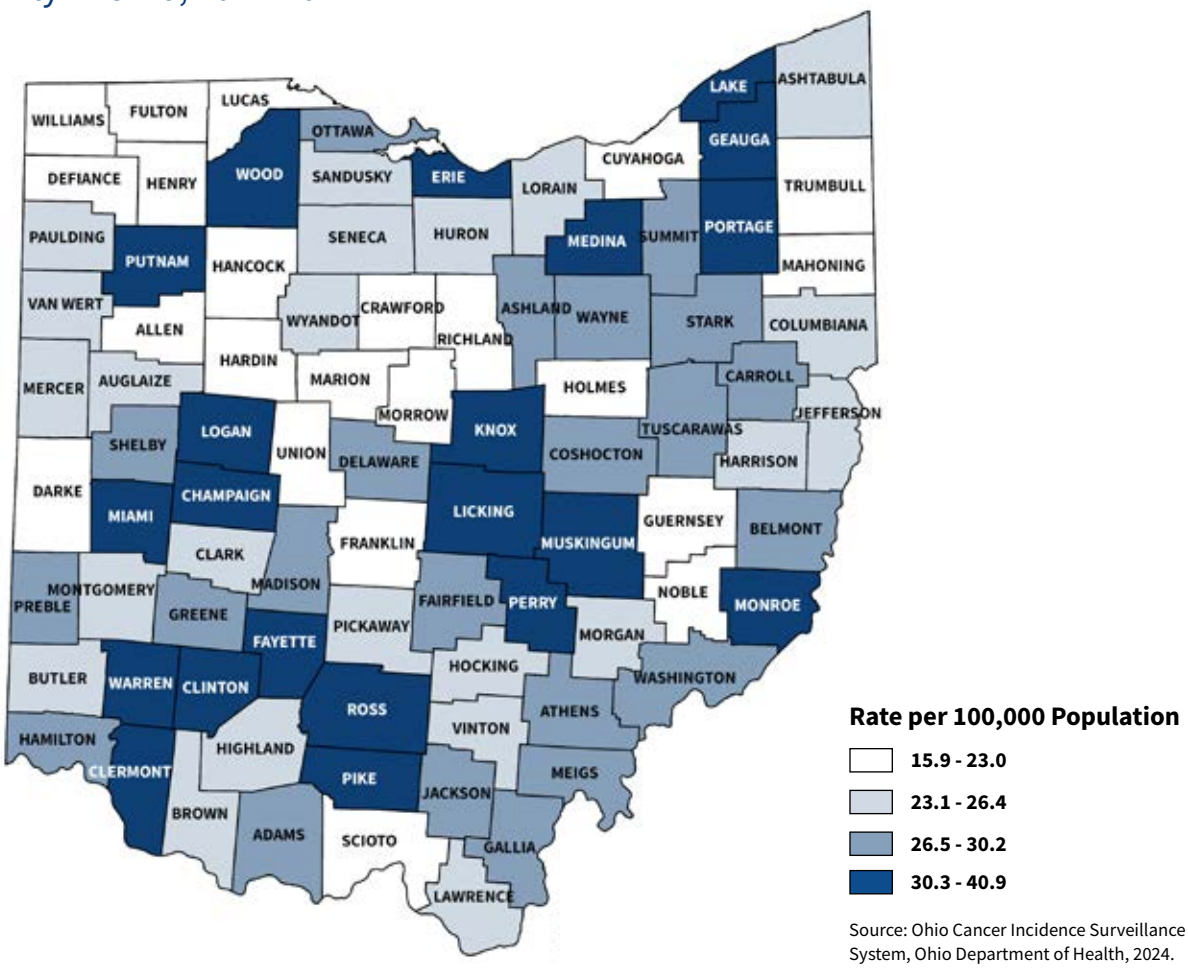
Melanoma of the skin (hereafter, referred to as melanoma) is the most common serious form of skin cancer.[8] Incidence rates are higher in women than in men before the age of 50, likely due to higher use of indoor tanning among young women, but thereafter are much higher in men, presumably reflecting age differences in historical occupational and recreational exposure to ultraviolet (UV) radiation.[8]

## New Cases

An average of 3,682 new cases (2,104 men and 1,577 women) of melanoma were diagnosed annually from 2017 to 2021 in Ohio with a corresponding average annual age-adjusted incidence rate of 25.8 per 100,000 population compared with the U.S. rate of 22.7 per 100,000.[5,10] The rate among Ohio males (31.4 per 100,000) was 42% higher than the rate among females (22.1 per 100,000) during this time period **(Table 2)**.[10] The vast majority (3,312 cases, 90%) of melanoma cases in Ohio were diagnosed among White people **(Table 4)**.[10] Average annual age-adjusted incidence rates of melanoma by Ohio county of residence are presented in **Figure 37**.

**Currently, a man living in the United States has a 1 in 47 lifetime risk of developing invasive melanoma of the skin, and a woman has a 1 in 66 lifetime risk of invasive melanoma of the skin.[6]**

**FIGURE 37.** Melanoma of the Skin: Quartiles of Average Annual Age-Adjusted Incidence Rates by County in Ohio, 2017-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

## Deaths

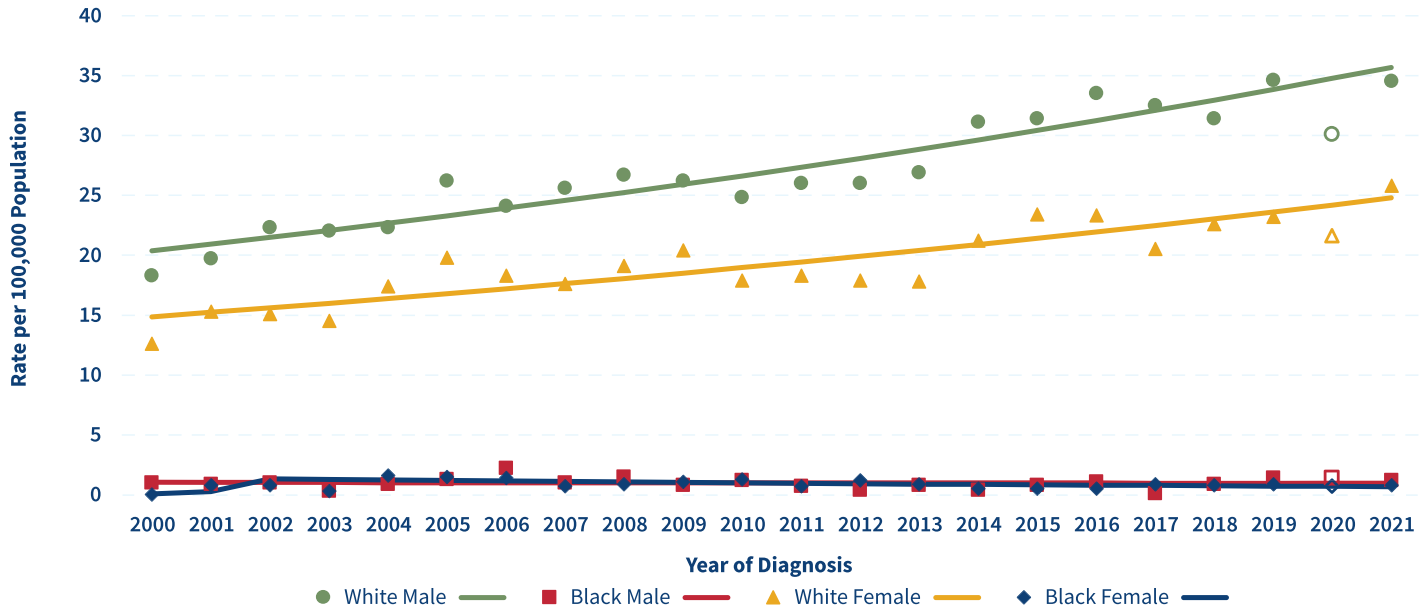
An average of 374 deaths from melanoma occurred each year in Ohio from 2017 to 2021.[14] The average annual age-adjusted melanoma mortality rate in Ohio was 2.5 per 100,000 population compared with the U.S. rate of 2.1 per 100,000.[14] In Ohio, the mortality rate was 2.3 times higher among males (3.7 per 100,000) compared with females (1.6 per 100,000) during this time period **(Table 3)**.[14] White males had a higher melanoma mortality rate (4.1 per 100,000) than all other sex/race groups **(Table 5)**.[14]

## Trends

White males had the highest age-adjusted melanoma incidence rate each year from 2000 to 2021, followed by White females.[10] Melanoma incidence rates increased 2.7% per year from 2000 to 2021 for White males and 2.5% per year for White females.[10] Melanoma incidence rates among Black females decreased 3.5% per year from 2002-2021 **(Figure 38)**.[10]

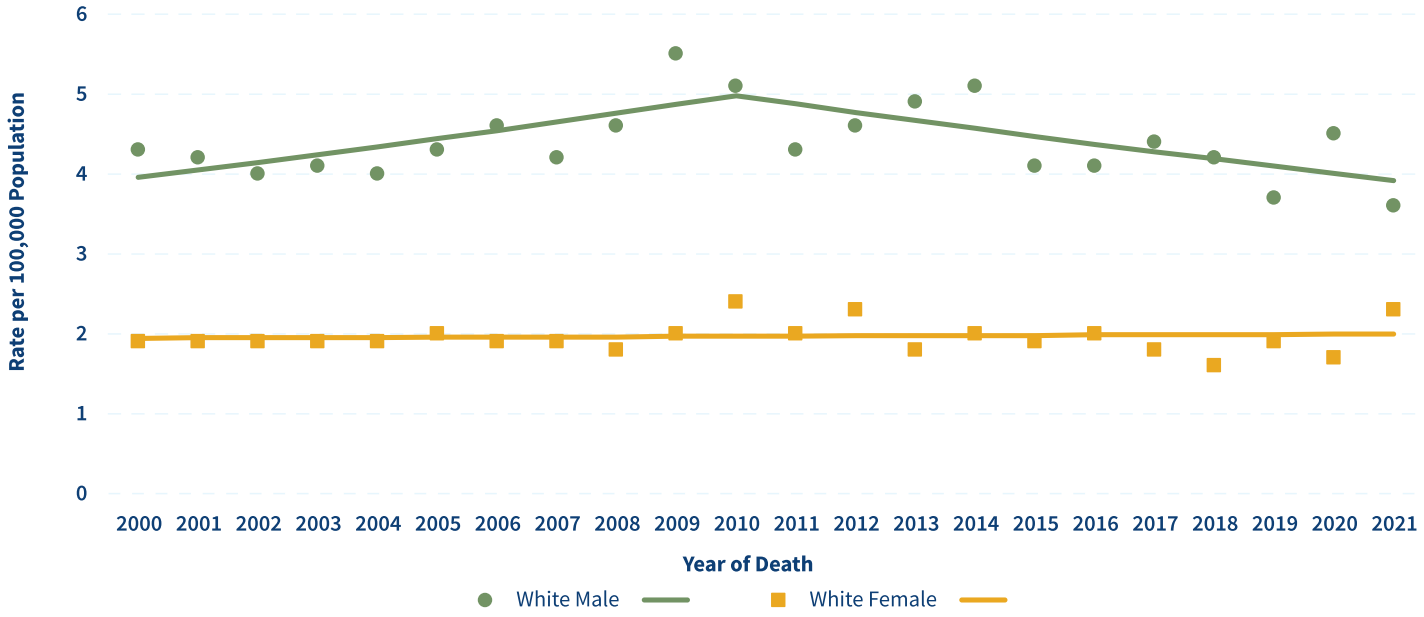
The age-adjusted melanoma mortality rates for White males increased 2.3% per year from 2000 to 2010 and then decreased 2.2% per year from 2010 to 2021.[14] For each year, the mortality rate was higher for White males than White females.[14] Melanoma mortality trends for Black males and females are not shown due to small numbers **(Figure 39)**.

**FIGURE 38.** Trends in Age-Adjusted Incidence Rates for Melanoma of the Skin by Sex and Race in Ohio, 2000-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

**FIGURE 39.** Trends in Age-Adjusted Mortality Rates for Melanoma of the Skin by Sex and Race* in Ohio, 2000-2021




Source: Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

*Melanoma deaths among Black males and Black females were typically less than five per year; therefore, no trends are presented for Black males and females.

## Risk Factors and Populations with High Rates[65,66]

### Potentially Modifiable Risk Factors

**Sun and ultraviolet (UV) radiation exposure (including tanning beds):** High lifetime exposure to UV radiation is a major risk factor for most skin cancers.

**History of sunburns:** People who have a history of many blistering sunburns, especially as a child or teenager, are at an increased risk of melanoma.

**Arsenic:** Arsenic exposure increases the risk of melanoma.

**Therapeutic radiation:** Therapeutic radiation increases the risk of melanoma.

### Non-modifiable Risk Factors

**Fair skin:** Having fair (pale) skin that burns in sun easily.

**Immunosuppression:** Immunosuppressive drugs and individuals with immunosuppressive diseases are at an elevated risk of developing melanoma.

**Family history:** Family history or personal history of melanoma (particularly in one or more first degree relatives).

**Multiple nevi:** Having many small moles or several large ones.

**Personal history of melanoma:** People who have had melanoma have an increased risk of developing other melanomas.

### Signs and Symptoms[67,68]

- **A mole that:**
  - **Changes in size, shape, or color.**
  - **Has irregular edges or borders.**
  - **Is more than one color.**
  - **Is asymmetrical (if the mole is divided in half, the two halves are different in size or shape).**
  - **Itches.**
  - **Oozes, bleeds, or is ulcerated (a hole forms in the skin when the top layer of cells breaks down and the tissue below shows through).**
- **A change in pigmented (colored) skin.**
- **Satellite moles (new moles that grow near an existing mole).**

*Any of these signs/symptoms may be caused by cancer or by other, less serious health problems. If you have any of these signs/symptoms, see your healthcare provider.*

### A simple ABCDE rule outlines the warning signs of the most common type of melanoma:

**A** is for asymmetry. One half of the mole does not match the other half.

**B** is for border irregularity. The edges are irregular, ragged, notched, or blurred.

**C** is for color. The pigmentation is not uniform, with variable degrees of tan, brown or black, or sometimes with patches of red, pink, white, or blue.

**D** is for diameter greater than 6 millimeters (about ¼ inch). Although, some melanomas may be smaller than this.

**E** is for evolving. The mole has changed in size, shape, or color over the past few weeks or months.

## Early Detection[8]

The best way to detect skin cancer early is to check the skin, preferably monthly, for new or changing spots or growths. New spots or those that change in appearance (size, shape, color, new bleeding, etc.) should be evaluated promptly by a healthcare professional.

## Stage at Diagnosis and Survival

In both Ohio and the United States, the five-year relative survival for patients with melanoma was 95% based on cases diagnosed from 2014 to 2020.[10,11] For localized melanoma, the Ohio five-year relative survival was 100%; whereas survival at the regional stage was 76%, and survival at the distant stage was only 31%.[10] In Ohio, 85% of melanomas from 2017 to 2021 were diagnosed at *in situ* or local stages **(Figure 1, Table A-1, Table A-6)**.[10]

# ORAL CAVITY AND PHARYNX CANCER

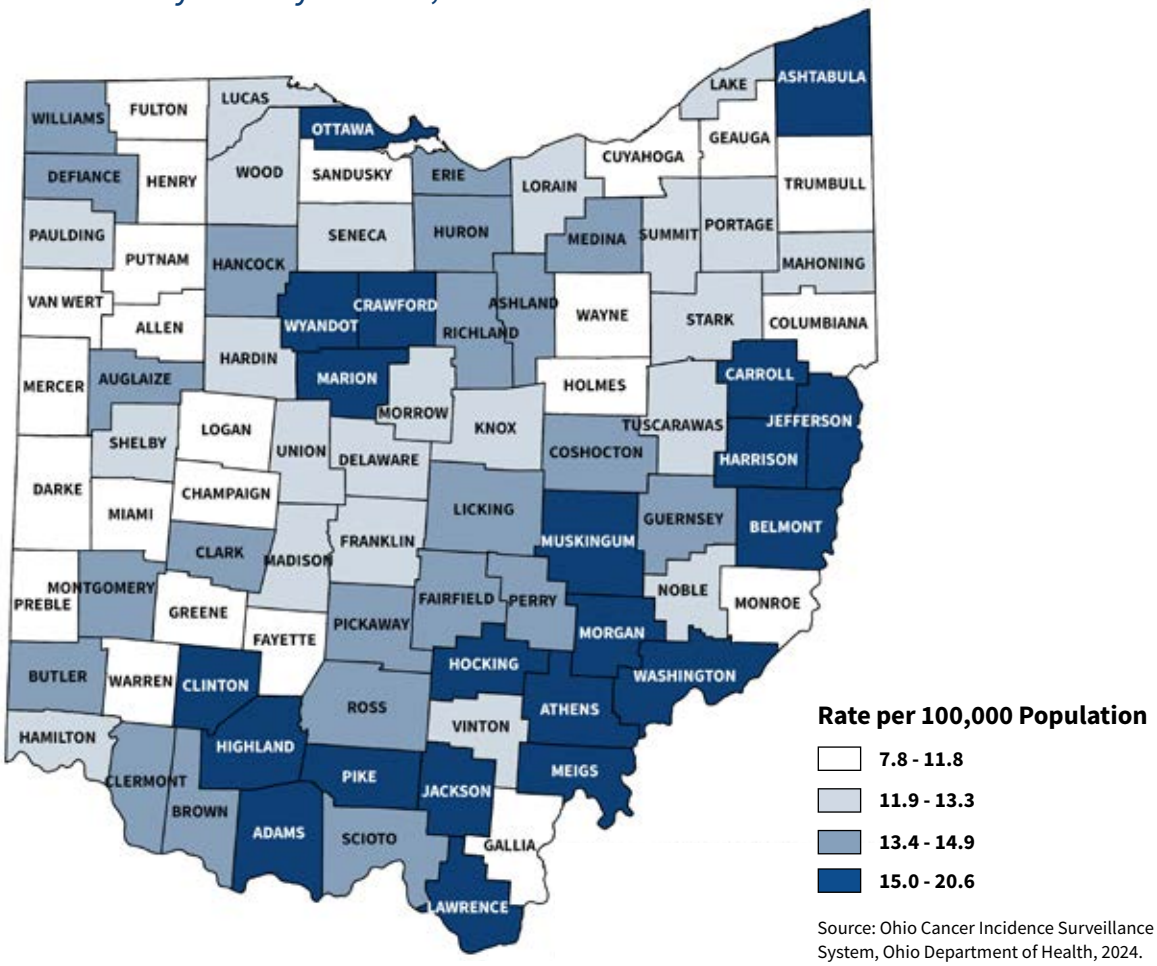
Oral cavity and pharynx cancers are usually grouped together and examined as one site/type of cancer by the NCI. The oral cavity includes the following anatomic sites: lip, tongue, salivary gland, floor of mouth, gum, and other areas of the mouth. The pharynx includes the oropharynx, hypopharynx, nasopharynx, and tonsil.

## New Cases

An average of 1,940 new cases (1,383 men and 557 women) of oral cavity and pharynx cancer were diagnosed annually in Ohio from 2017 to 2021 with a corresponding average annual age-adjusted incidence rate of 12.8 per 100,000 population compared with the U.S. rate of 12.0 per 100,000 **(Table 2)**.[5,10] White and Black men had higher incidence rates of this cancer site/type compared with White and Black women in Ohio during this time period **(Table 4)**.[10] Average annual age-adjusted incidence rates of oral cavity and pharynx cancer by Ohio county of residence are shown in **Figure 40**.

**Currently, a man living in the United States has a 1 in 67 lifetime risk of developing invasive oral cavity and pharynx cancer, and a woman has a 1 in 165 lifetime risk of invasive oral cavity and pharynx cancer.[6]**

**FIGURE 40.** Cancer of the Oral Cavity and Pharynx: Quartiles of Average Annual Age-Adjusted Incidence Rates by County in Ohio, 2017-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

## Deaths

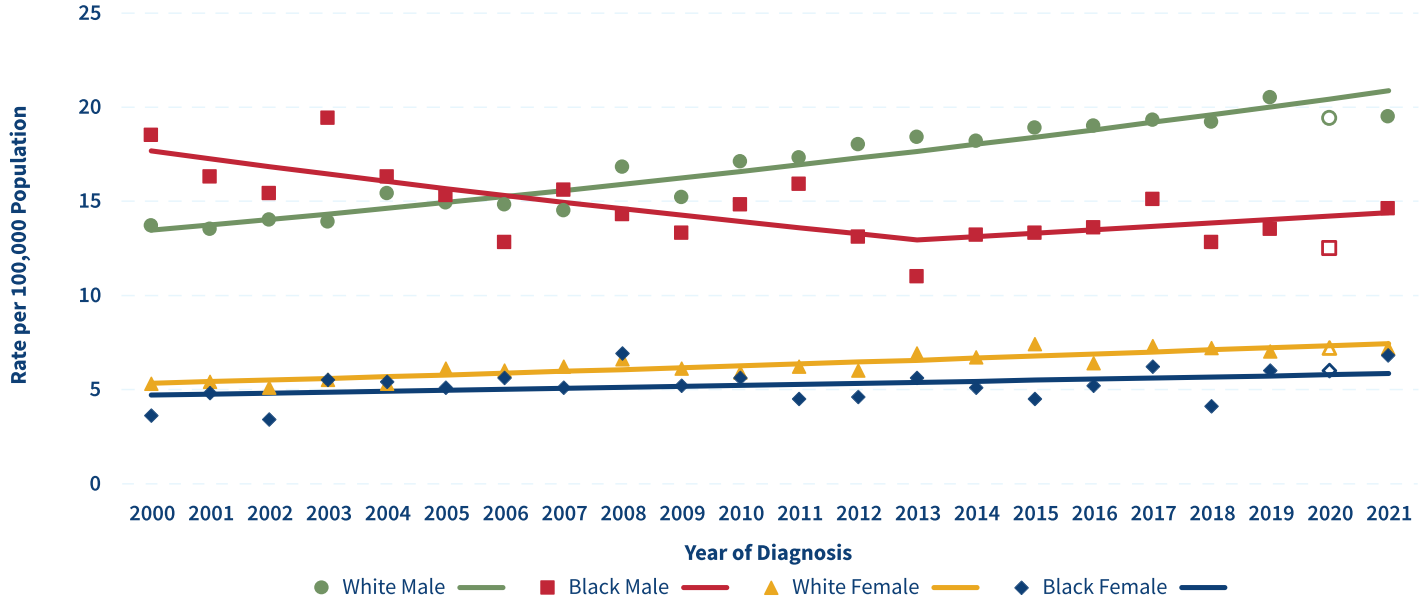
The average annual age-adjusted mortality rate for oral cavity and pharynx cancer in Ohio from 2017 to 2021 was 2.9 per 100,000 population compared with the national rate of 2.6 per 100,000.[14] This represents 449 average annual deaths in Ohio from oral cavity and pharynx cancer during the time period **(Table 3)**.[14] Similar to incidence, White and Black men had higher mortality rates compared with White and Black women in Ohio from 2017 to 2021 **(Table 5)**.[14]

## Trends

Age-adjusted oral cavity and pharynx cancer incidence rates for Black males decreased 2.4% per year from 2000 to 2013.[10] In contrast, incidence rates increased from 2000 to 2021 by 2.1% per year for White males and by 1.6% per year for White females **(Figure 41)**.[10]

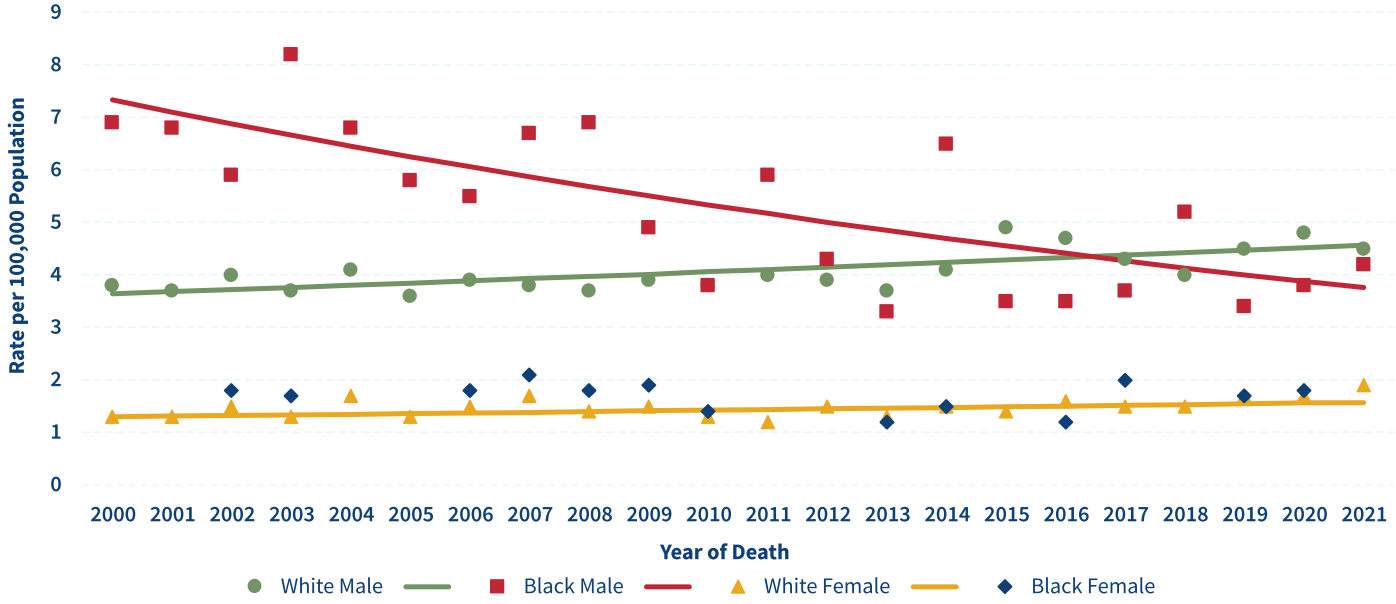
From 2000 to 2021, age-adjusted mortality rates of oral cavity and pharynx cancer in Ohio declined 3.1% per year for Black males, increased 1.1% per year for White males, and increased 0.9% per year for White females **(Figure 42)**.[14] There was no apparent trend in oral cavity and pharynx cancer mortality rates from 2000 to 2021 among Black females.[14]

### FIGURE 41. Trends in Age-Adjusted Incidence Rates for Cancer of the Oral Cavity and Pharynx by Sex and Race in Ohio, 2000-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

### FIGURE 42. Trends in Age-Adjusted Mortality Rates for Cancer of the Oral Cavity and Pharynx by Sex and Race* in Ohio, 2000-2021




Source: Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

*Oral cavity and pharynx deaths among Black females were less than five per year for 10 years from 2000-2021; therefore, no trend is presented for Black females.

## Risk Factors and Populations with High Rates[69]

### Potentially Modifiable Risk Factors

**Tobacco use:** Smoking cigarettes, cigars or pipes causes oral cavity and pharynx cancer, and using smokeless tobacco (such as snuff and chewing tobacco) causes oral cavity cancer. For cigarette smokers, risk increases with the number of cigarettes smoked per day. The risk is greater for people who use both tobacco and alcohol than for those who use either tobacco or alcohol.

**Alcohol use:** People who are heavy drinkers are more likely to develop oral cavity cancer than people who do not drink alcohol. The risk increases with the amount of alcohol that a person drinks.

**Betel nut use:** Most common in Asia, chewing betel nut (a type of palm seed wrapped with a betel leaf and sometimes mixed with spices, sweeteners, and tobacco) causes oral cancer. The risk increases even more if the person also drinks alcohol and uses tobacco.

**HPV infection:** Being infected with certain types of HPV, especially HPV-16, increases the risk of oropharyngeal cancers. The risk of oropharyngeal cancer is about 15 times higher in people who have oral HPV-16 infection compared with people who do not have oral HPV-16 infection. HPV infection may also increase the risk of some oral cavity cancers.

### Non-modifiable Risk Factors

**Age:** Most patients with oral cavity and pharynx cancers are older than 55.

**Sex:** Oral cavity and pharynx cancers are about twice as common in men as in women.

**Race:** Oral cavity and pharynx cancer incidence rates among White people are approximately 50% higher than Black people and more than double those of Asians/Pacific Islanders.

**Personal history of oral cavity and pharynx cancer:** People who have had oral cavity and pharynx cancers are at increased risk of developing another oral cavity and pharynx cancer.

### Signs and Symptoms[70]

- **A sore, irritation, lump or thick patch in your mouth, lip, or throat.**
- **A white or red patch in your mouth.**
- **Persistent sore throat, a feeling that something is caught in your throat, or hoarseness or loss of your voice.**
- **A lump in the neck.**
- **Difficulty chewing, swallowing, or speaking.**
- **Difficulty moving your jaw or tongue.**
- **Swelling of your jaw that causes dentures to fit poorly or become uncomfortable.**
- **Pain or bleeding in the mouth.**
- **Numbness in your tongue or other areas of your mouth.**
- **Ear pain.**

*Any of these signs/symptoms may be caused by cancer or by other, less serious health problems. If you have any of these signs/symptoms, see your healthcare provider or dentist.*

## Early Detection

There is no routine screening test for oral cavity and pharynx cancers, but many are found early through self-exam and during routine oral exams by a dentist, dental hygienist, or doctor.

## Stage at Diagnosis and Survival

Overall, the five-year relative survival for oral cavity and pharynx cancer was 70% in both Ohio and the United States, based on cases diagnosed from 2014 to 2020.[10,11] Oral cavity and pharynx cancer is usually successfully treated if detected at an early stage, with a five-year relative survival of 88% for Ohio patients with local stage tumors.[10] Five-year relative survival for Ohio patients with oral cavity and pharynx cancer diagnosed at the regional and distant stages was 69% and 36%, respectively.[10] From 2017 to 2021, approximately 28% of oral cavity and pharynx cancers in Ohio were diagnosed at a local stage, 59% at a regional stage, and 7% at a distant stage **(Figure 1, Table A-1, Table A-6)**.[10] Survival is higher for HPV-related oral cancers than oral cancers not associated with HPV.[8]

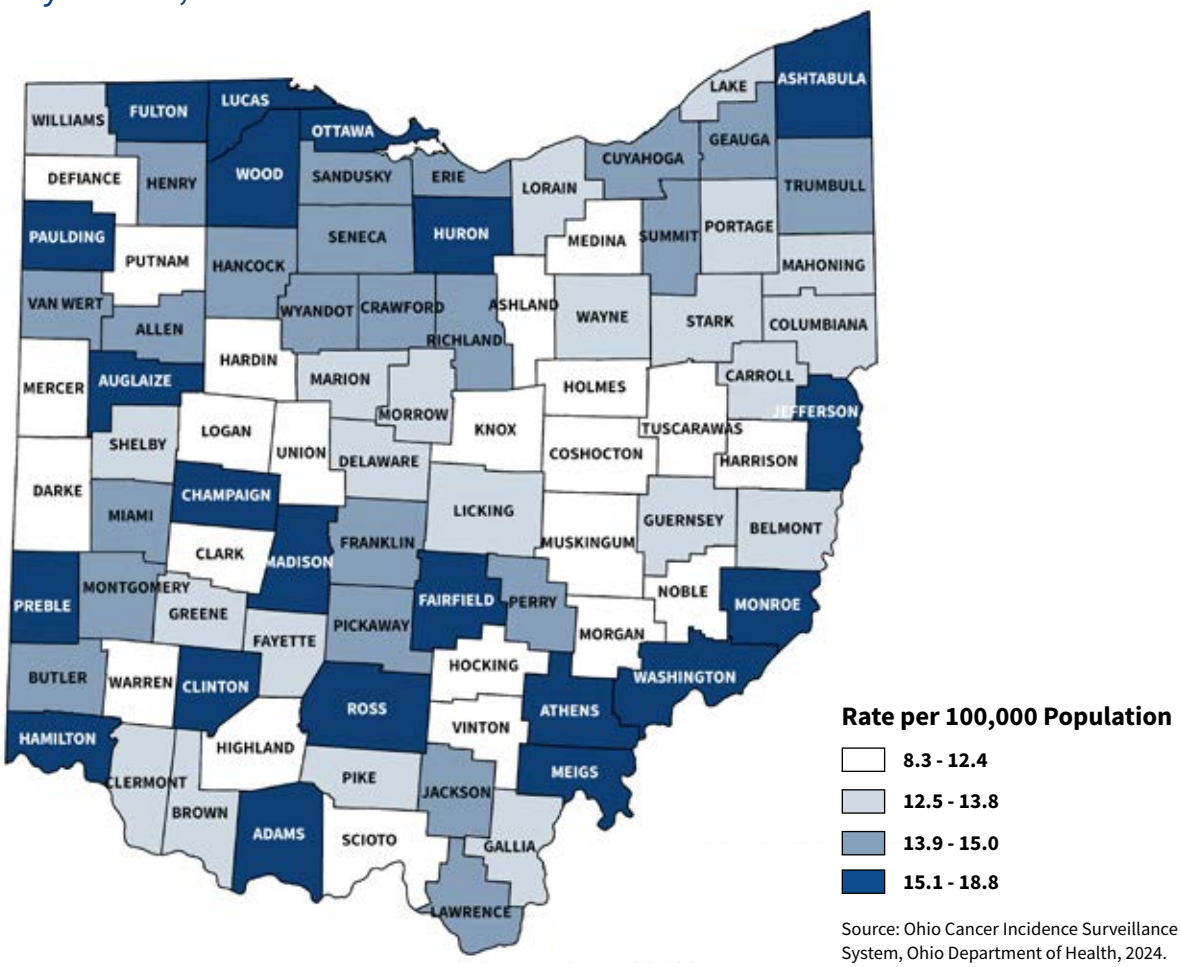
# PANCREATIC CANCER

## New Cases

An average of 2,168 new cases (1,156 men and 1,012 women) of pancreatic cancer were diagnosed annually between 2017 and 2021 in Ohio, corresponding to an average annual age-adjusted incidence rate of 14.0 per 100,000 population compared with the U.S. rate of 13.5 per 100,000. **(Table 2)**.[5,10] Black males had higher incidence rates of pancreatic cancer than White males, and Black females had higher incidence rates of pancreatic cancer than White females in Ohio from 2017 to 2021 **(Table 4)**.[10] Average annual age-adjusted incidence rates of pancreatic cancer by Ohio county of residence are shown in **Figure 43**.

**Currently, a man living in the United States has a 1 in 71 lifetime risk of developing invasive pancreatic cancer, and a woman has a 1 in 79 lifetime risk of developing invasive pancreatic cancer.[6]**

**FIGURE 43.** Cancer of the Pancreas: Quartiles of Average Annual Age-Adjusted Incidence Rates by County in Ohio, 2017-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

## Deaths

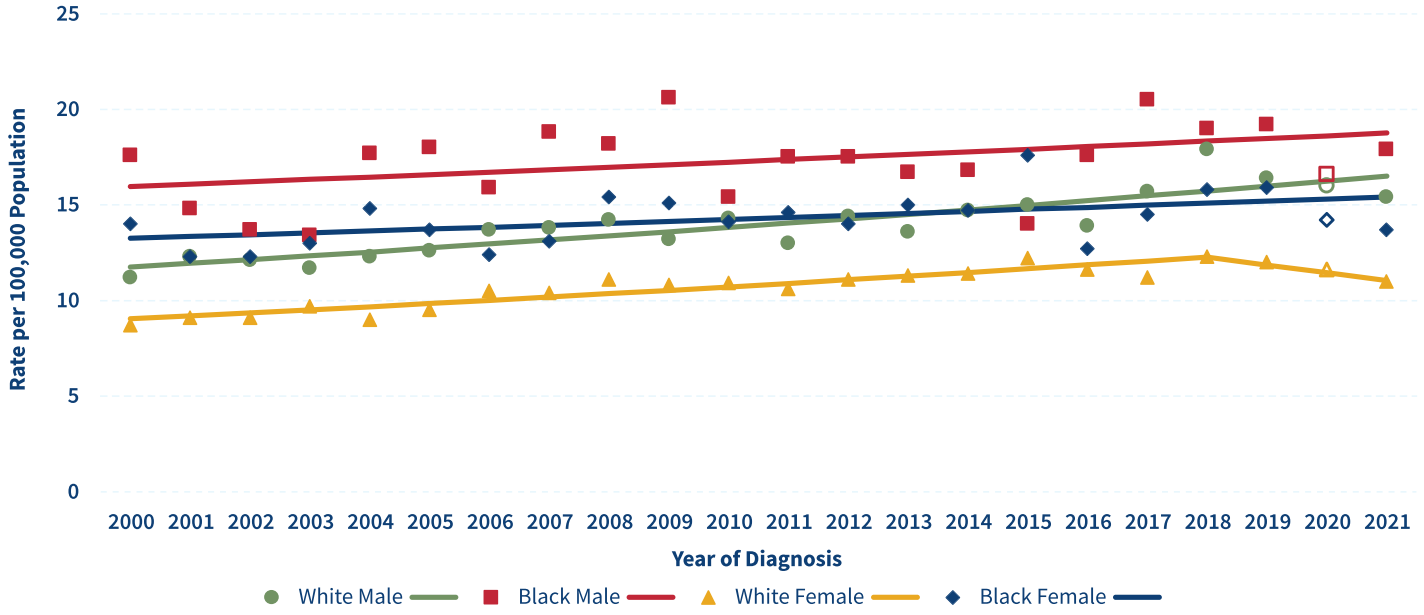
The average annual age-adjusted mortality rate for pancreatic cancer in Ohio from 2017 to 2021 was 12.2 per 100,000 population compared with the U.S. mortality rate of 11.2 per 100,000.[14] This represents 1,899 average annual deaths in Ohio from pancreatic cancer during the time period **(Table 3)**.[14] **Table 5** shows that Black men in Ohio die from pancreatic cancer at a higher rate compared with White men, and Black women die at a higher rate than White women.[14]

## Trends

From 2000 to 2021, the age-adjusted incidence rate of pancreatic cancer among White males increased 1.6% per year and the incidence rate for Black females increased 0.7% per year in Ohio.[10] Pancreatic cancer incidence rates increased 1.7% per year from 2000 to 2018 for White females **(Figure 44)**.[10]

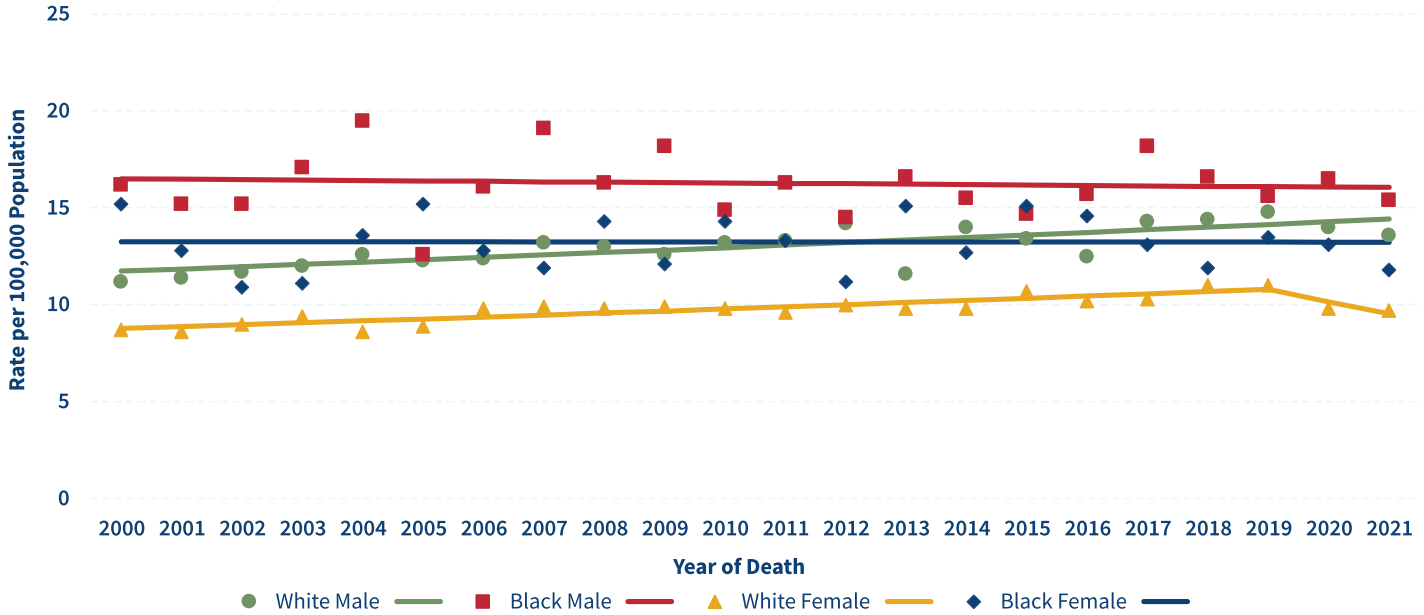
From 2000 to 2021, the age-adjusted pancreatic cancer mortality rate among White males in Ohio increased 1.0% per year.[14] Pancreatic cancer rates among White females in Ohio increased 1.1% per year from 2000 to 2019.[14] White females had the lowest mortality rate of all sex/race groups each year from 2000 to 2021. There was no apparent trend in pancreatic cancer mortality rates from 2000 to 2021 among Black males or females **(Figure 45)**.[14]

### FIGURE 44. Trends in Age-Adjusted Incidence Rates for Cancer of the Pancreas by Sex and Race in Ohio, 2000-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

### FIGURE 45. Trends in Age-Adjusted Mortality Rates for Cancer of the Pancreas by Sex and Race in Ohio, 2000-2021




Source: Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

## Risk Factors and Populations with High Rates[71]

### Potentially Modifiable Risk Factors

**Tobacco use:** The risk of getting pancreatic cancer is about twice as high among smokers compared with those who have never smoked. Use of smokeless tobacco products also increases risk.

**Overweight and obesity:** Being overweight is a risk factor for pancreatic cancer. People who are obese are about 20% more likely to develop pancreatic cancer.

**Type 2 diabetes:** Pancreatic cancer is more common in people with type 2 diabetes.

### Non-modifiable Risk Factors

**Age:** The risk of developing pancreatic cancer increases as people age. About two-thirds of people with pancreatic cancer are 65 or older.

**Sex:** Men are slightly more likely to develop pancreatic cancer than women.

**Race:** Black people are slightly more likely to develop pancreatic cancer than White people.

**Chronic pancreatitis:** Chronic pancreatitis, a long-term inflammation of the pancreas, increases the risk of pancreatic cancer.

**Family history of pancreatic cancer or pancreatitis:** Pancreatic cancer seems to run in some families, possibly due to an inherited genetic syndrome (explained below).

**Inherited genetic syndromes:** Inherited gene changes can be passed from parent to child. Examples of genetic syndromes that can cause exocrine pancreatic cancer include: hereditary breast and ovarian cancer syndrome, familial atypical multiple mole melanoma (FAMMM) syndrome, Lynch syndrome, Peutz-Jeghers syndrome, Von Hippel-Lindau syndrome, neurofibromatosis type 1, multiple endocrine neoplasia type 1 (MEN1), and ataxia-telangiectasia.

### Signs and Symptoms[71]

Early on, pancreatic cancer may not cause any signs or symptoms, making it hard to detect. As the cancer grows, symptoms may include:

- **Jaundice (yellowing of the skin and whites of the eyes).**
- **Light-colored stools.**
- **Dark urine.**
- **Pain in the upper or middle abdomen and back.**
- **Weight loss for no known reason.**
- **Loss of appetite.**
- **Fatigue.**

*Any of these signs/symptoms may be caused by cancer or by other, less serious health problems. If you have any of these signs/symptoms, see your healthcare provider.*

## Early Detection

The USPSTF recommends against screening asymptomatic, average-risk individuals for pancreatic cancer.[8] Studies with long-term follow-up suggest that individuals at high risk for pancreatic cancer due to genetic predisposition or a strong family history can benefit from annual surveillance with endoscopic ultrasound and/or MRI.[8]

## Stage at Diagnosis and Survival

For all stages combined, the five-year relative survival for pancreatic cancer diagnosed from 2014 to 2020 was only 11% in Ohio compared with 13% in the United States.[10,11] In Ohio, the five-year relative survival was 37% among those diagnosed at a local stage; however, only 16% of people were diagnosed at this early stage.[10] In Ohio, nearly half (45%) of patients were diagnosed at the distant stage, for which the five-year relative survival was only 3% **(Table A-1, Table A-6)**.[10]

# PROSTATE CANCER

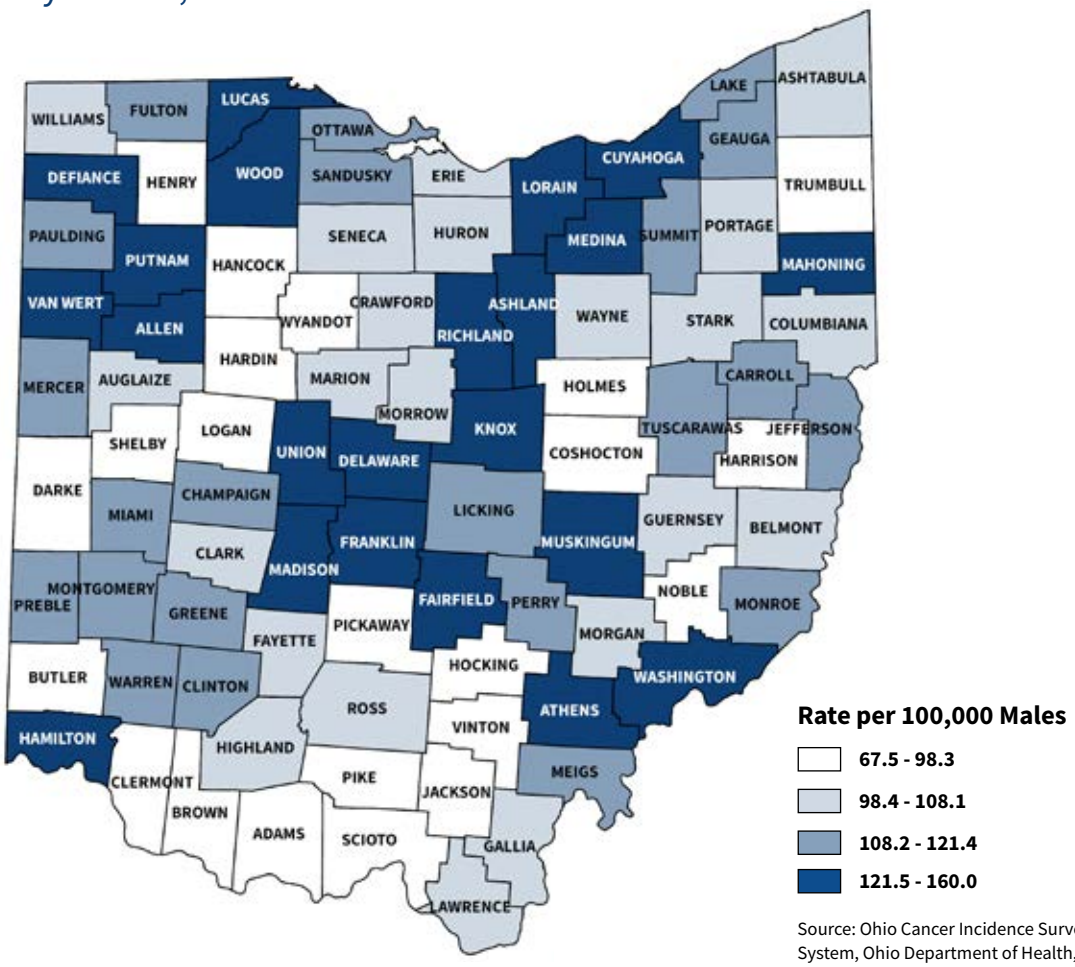
## New Cases

An average of 9,032 new cancer cases of prostate cancer were diagnosed among men in Ohio each year from 2017 to 2021, accounting for 25% of all new invasive cancer cases among men **(Figure 2)**.[10] The average annual age-adjusted prostate cancer incidence rate in Ohio was 118.1 per 100,000 males compared with the U.S. rate of 113.1 per 100,000 during this time period **(Table 2)**.[5,10]

In Ohio and the United States, prostate cancer occurs more often in Black men than in White men, but the reasons for the difference are not well understood **(Figure 4)**.[5,10] The average annual age-adjusted prostate cancer incidence rate in Ohio was 53% higher among Black men (168.5 per 100,000) than White men (110.1 per 100,000).[10] Average annual age-adjusted incidence rates of prostate cancer by Ohio county of residence are shown in **Figure 46**.

**Currently, a male living in the United States has a 1 in 8 lifetime risk of developing invasive prostate cancer.[6]**

### FIGURE 46. Cancer of the Prostate: Quartiles of Average Annual Age-Adjusted Incidence Rates by County in Ohio, 2017-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

## Deaths

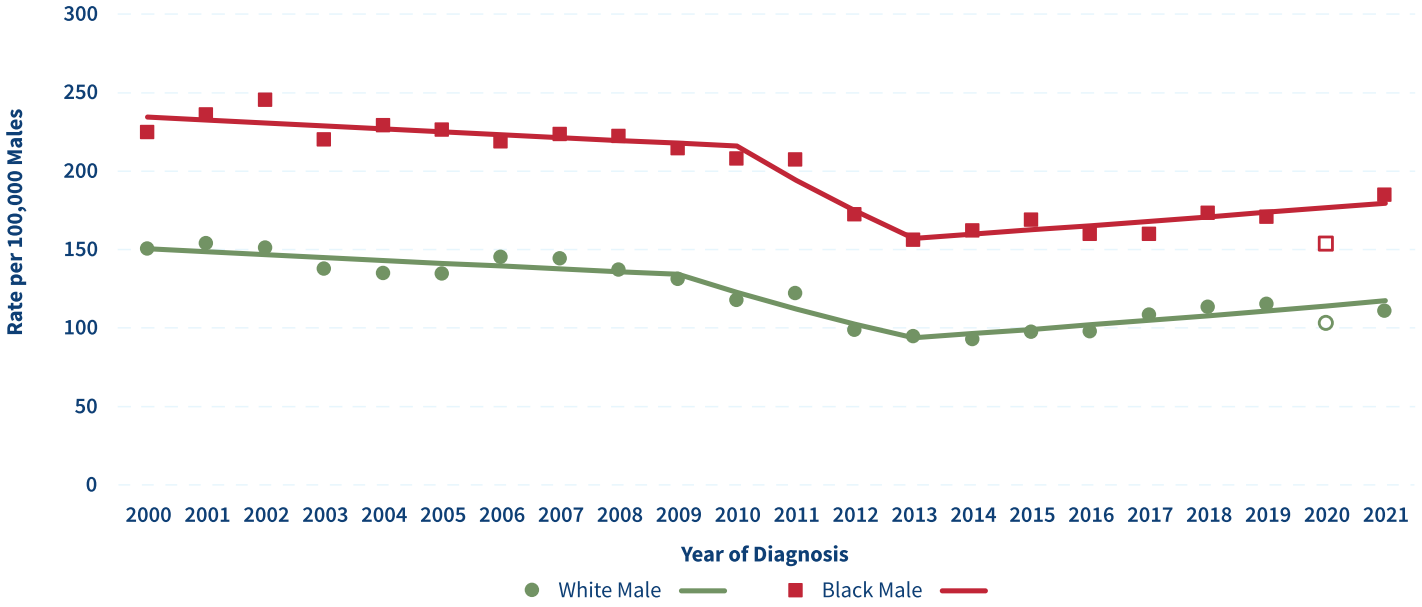
In Ohio, an average of 1,227 deaths occurred each year from prostate cancer from 2017 to 2021.[14] The average annual age-adjusted mortality rate for prostate cancer in Ohio was 19.7 per 100,000 males during this time period compared with 19.2 per 100,000 nationally **(Table 3)**.[14] In Ohio, the mortality rate of prostate cancer was nearly two times higher among Black men (35.2 per 100,000) than White men (18.5 per 100,000) from 2017 to 2021 **(Table 5)**.[14]

## Trends

Changes in age-adjusted prostate cancer incidence rates largely reflect screening with the prostate-specific antigen (PSA) blood test.[8] In Ohio, prostate cancer incidence rates for White men decreased 8.6% per year from 2009 to 2013 and then increased 2.8% per year from 2013 to 2021.[10] Prostate cancer incidence rates among Black men decreased by 10.1% per year from 2010 to 2013, then increased 1.7% per year from 2013 to 2021 **(Figure 47)**.[10]

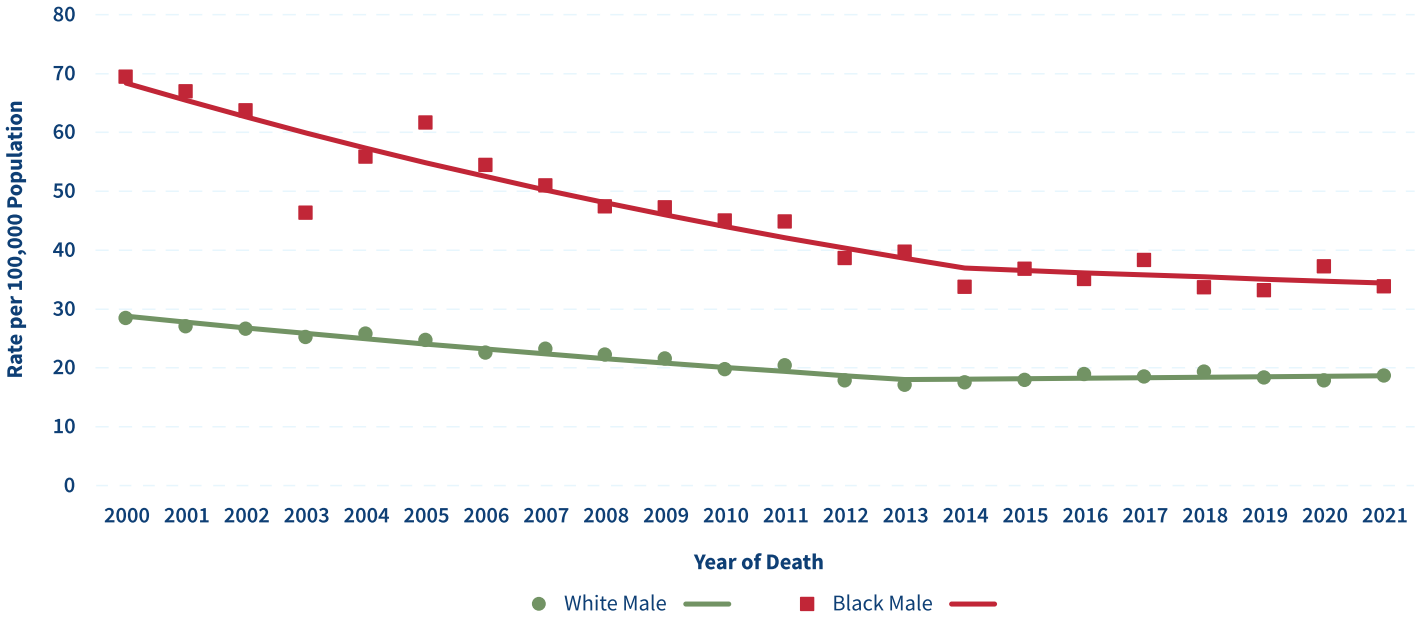
The age-adjusted mortality rate of prostate cancer decreased by 3.5% per year for White men from 2000 to 2013.[14] Among Black men, the prostate cancer mortality rate decreased 51% (3.2% per year) from 2000 to 2021 **(Figure 48).**[14]

### FIGURE 47. Trends in Age-Adjusted Incidence Rates for Cancer of the Prostate by Race in Ohio, 2000-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

### FIGURE 48. Trends in Age-Adjusted Mortality Rates for Cancer of the Prostate by Race in Ohio, 2000-2021




Source: Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

## Risk Factors and Populations with High Rates[72]

### Potentially Modifiable Risk Factors

**Vitamin E:** The Selenium and Vitamin E Cancer Prevention Trial (SELECT) found that vitamin E taken alone increased the risk of prostate cancer.

**Folic acid:** A 10-year study showed that the risk of prostate cancer was increased in men who took one milligram (mg) supplements of folic acid. However, the risk of prostate cancer was lower in men who had enough folate in their diets.

**Dairy and calcium:** A diet high in dairy foods and calcium may cause a small increase in the risk of prostate cancer.

### Non-modifiable Risk Factors

**Age:** Prostate cancer is rare in men younger than 50 years of age. The chance of developing prostate cancer increases as men get older.

**Race/ethnicity:** The risk of developing and dying of prostate cancer is highest among Black men and is lowest among native Japanese men.

**Family history:** A man whose father, brother, or son has had prostate cancer has a higher than average risk of prostate cancer.

### Signs and Symptoms[8,73]

Although men with early-stage prostate cancer do not usually experience symptoms, those with a more advanced stage of the disease may experience:

- **Weak or interrupted urine flow.**
- **Inability to urinate or start or stop urine flow.**
- **Need to urinate more frequently, especially at night.**
- **Blood in urine.**
- **Pain or burning with urination.**
- **Difficulty getting an erection (erectile dysfunction).**
- **Pain in hips, spine, ribs, or other areas from prostate cancer that has spread to bones.**
- **Weakness or numbness in legs or feet.**
- **Loss of bladder or bowel control.**

*Any of these signs/symptoms may be caused by cancer or by other, less serious health problems. If you have any of these signs/symptoms, see your healthcare provider.*

## Early Detection[73,74]

The ACS recommends that men have a chance to make an informed decision with their healthcare provider about whether to be screened for prostate cancer. The decision should be made after getting information about the possible benefits, risks, and uncertainties of prostate cancer screening. The discussion about screening should take place at:

- Age 50 for men who are at average risk of prostate cancer and are expected to live at least 10 more years.
- Age 45 for men at high risk of developing prostate cancer. This includes Black men and men who have a first-degree relative (father or brother) diagnosed with prostate cancer at an early age (younger than age 65).
- Age 40 for men at even higher risk (those with more than one first-degree relative who had prostate cancer at an early age).

The USPSTF recommends that for men 55 to 69 years old, the decision to receive PSA-based screening should be an individual one and should include discussion with their clinician about the potential benefits and harmful effects of screening. Clinicians should not screen men who do not express a preference for screening. The USPSTF recommends against PSA-based screening for prostate cancer in men 70 years old and older. An update to the USPSTF 2018 recommendations is in progress.

**Table A-7** on page 105 shows the ACS and USPSTF recommendations for the early detection of prostate cancer in average risk, asymptomatic men by age.

**Table 10** shows the prevalence of Ohio men 40 years old and older who reported having had a conversation with their healthcare provider about the advantages and/or disadvantages of PSA testing. In 2022, 41.9% of Ohio men 40 years old and older reported ever having a conversation with their doctor, nurse, or other health professional about the advantages and/or disadvantages of PSA testing.[35] The prevalence of having a discussion about prostate cancer screening was highest among men ages 65 and older (56.5%), Black men (53.7%), and those with a college degree (51.2%).[35]

**TABLE 10.** Prevalence of Men 40 and Older who Reported Ever Having Had a Prostate Cancer Screening Discussion by Demographics in Ohio, 2022[1,2,3]

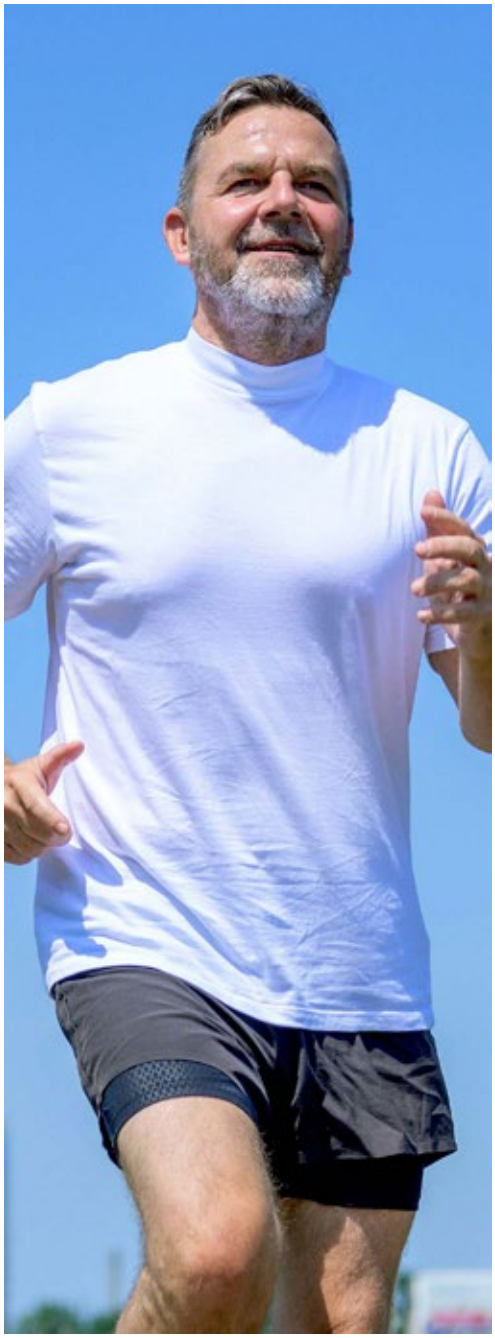
| | Had Prostate Cancer Screening Discussion |
|---|---|
| **AGE** | |
| 40-64 | 32.6% |
| 65+ | 56.5% |
| **RACE** | |
| White | 41.8% |
| Black | 53.7% |
| **EDUCATION** | |
| Less than High School | 34.5% |
| High School or GED* | 34.5% |
| Some College | 42.0% |
| College Graduation | 51.2% |
| **ANNUAL HOUSEHOLD INCOME** | |
| <$25,000 | 31.2% |
| $25,000-$49,999 | 44.5% |
| $50,000+ | 43.9% |
| **TOTAL (Men 40+)** | **41.9%** |

[1] Source: 2022 Ohio Behavioral Risk Factor Surveillance System, Ohio Department of Health, 2024.

[2] "Don't Know" and "Refused" were excluded from the denominator. This can cause an artificially high percentage.

[3] Among men ages 40 and older, the proportion who reported ever having a conversation with their doctor, nurse, or other health professional about the advantages and/or disadvantages of prostate-specific antigen (PSA) testing.

*General Educational Development.



## Stage at Diagnosis and Survival

In both Ohio and the United States, the five-year relative survival for patients whose prostate tumors were diagnosed at the local and regional stages was 100% based on cases diagnosed from 2014 through 2020.[10,11] For men in Ohio whose cancer had spread to distant parts of the body, the survival was only 35%.[10] From 2017 to 2021, approximately 69% of all prostate cancers in Ohio were diagnosed at a local stage, 14% at a regional stage, and 7% at a distant stage **(Figure 1, Table A-1, Table A-6)**.[10]

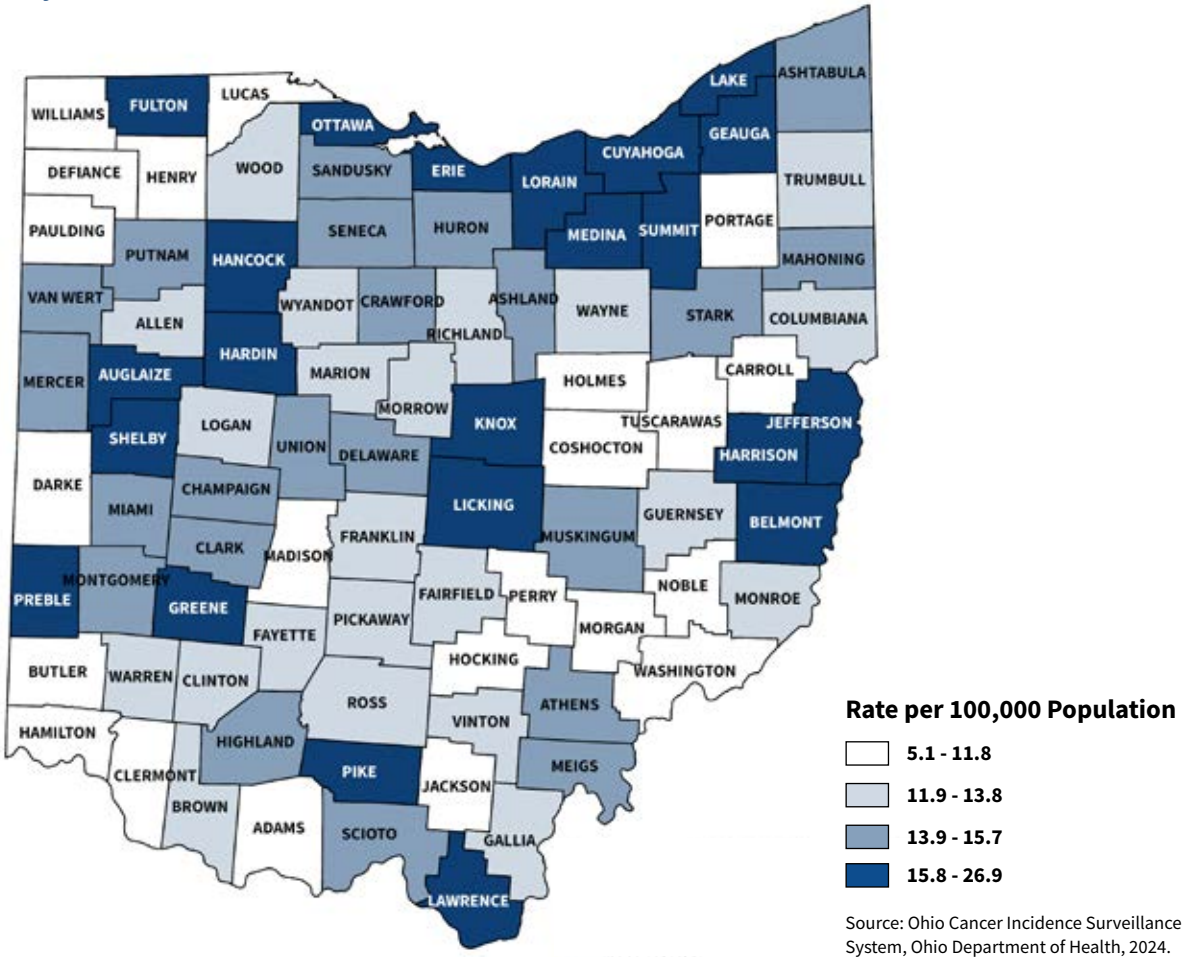
# THYROID CANCER

## New Cases

An average of 1,806 new cases (481 men and 1,326 women) of thyroid cancer were diagnosed annually from 2017 to 2021 in Ohio, corresponding to an average annual age-adjusted incidence rate of 14.3 per 100,000 population compared with the U.S. rate of 12.9 per 100,000 **(Table 2)**.[5,10] White women had the highest incidence rate of thyroid cancer (22.1 per 100,000), followed by Asian/Pacific Islander women (16.7 per 100,000).[10] Average annual age-adjusted incidence rates of thyroid cancer by Ohio county of residence are shown in **Figure 49**.

**Currently, a man living in the United States has a 1 in 167 lifetime risk of developing invasive thyroid cancer, and a woman has a 1 in 61 lifetime risk of developing invasive thyroid cancer.[6]**

### FIGURE 49. Cancer of the Thyroid: Quartiles of Average Annual Age-Adjusted Incidence Rates by County in Ohio, 2017-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

## Deaths

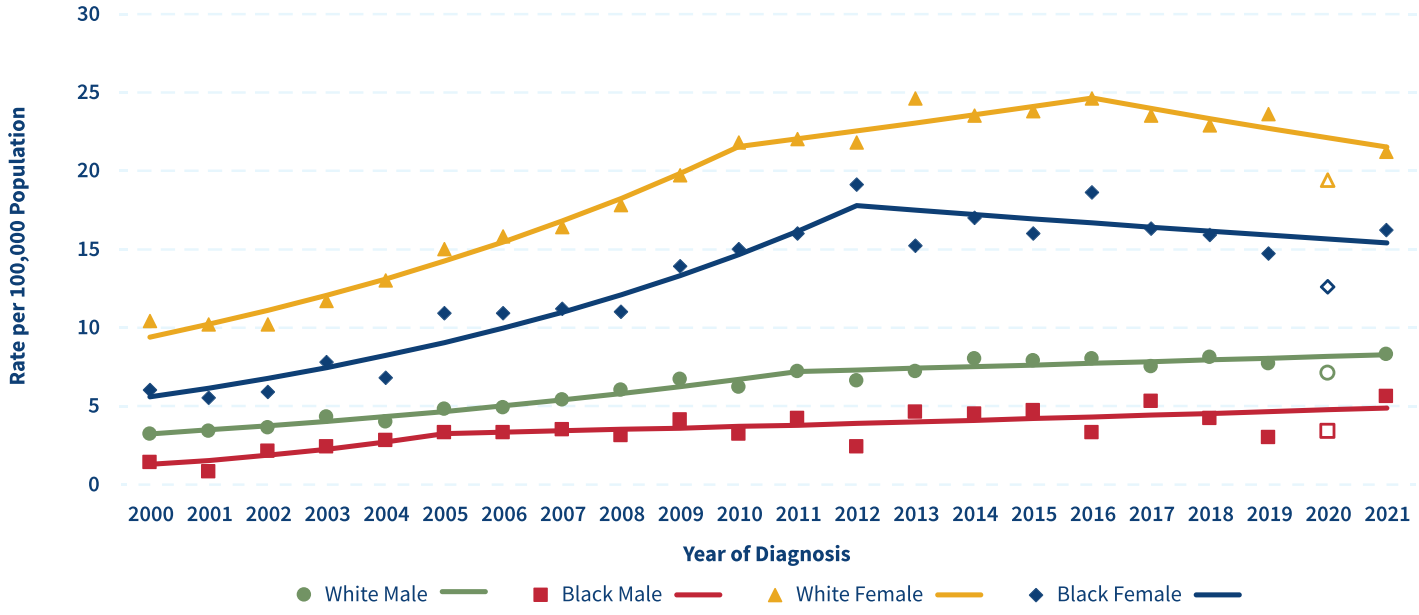
The average annual age-adjusted mortality rate for thyroid cancer in Ohio and the United States from 2017 to 2021 was 0.5 per 100,000 population.[14] This represents 74 average annual deaths in Ohio from thyroid cancer during this time period **(Table 3)**.[14] The mortality rate of thyroid cancer in Ohio was similar for all sex/race groups **(Table 5)**.[14]

## Trends

Age-adjusted thyroid cancer incidence rates in Ohio increased 20.6% per year from 2000 to 2005 for Black males.[10] Black female incidence rates increased 10.1% per year from 2000 to 2012.[10] From 2000 to 2011 in Ohio, thyroid cancer incidence rates increased 7.6% per year among White males.[10] For White females, thyroid cancer incidence rates increased 8.6% per year from 2000 to 2010, increased 2.3% per year from 2010 to 2016, and then decreased 2.7% per year from 2016 to 2021.[10] White females in Ohio had the highest thyroid cancer incidence rates each year, followed by Black females **(Figure 50)**.[10]

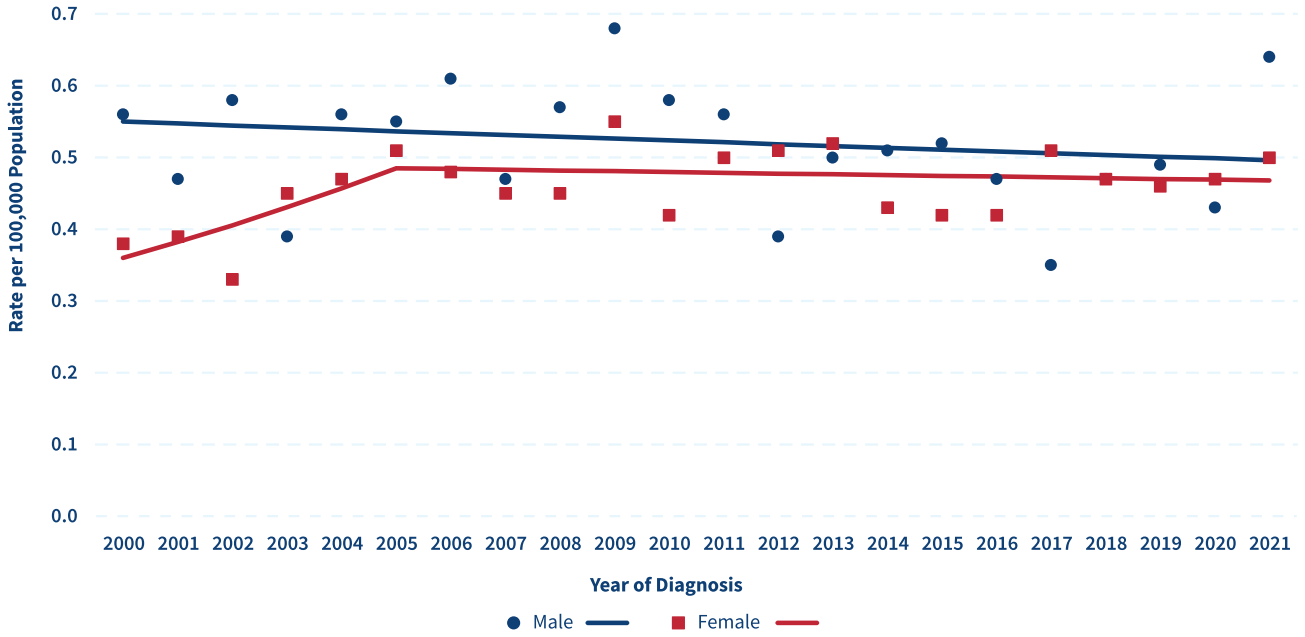
Age-adjusted thyroid cancer mortality rates in Ohio increased 6.1% per year for females from 2000-2004.[14] There was no apparent trend in thyroid cancer mortality rates from 2000 to 2021 among males **(Figure 51)**.[14] Note, mortality rates could not be calculated for Black males or Black females due to small numbers.

**FIGURE 50.** Trends in Age-Adjusted Incidence Rates for Cancer of the Thyroid by Sex and Race in Ohio, 2000-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

**FIGURE 51.** Trends in Age-Adjusted Mortality Rates for Cancer of the Thyroid by Sex in Ohio, 2000-2021




Source: Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

* Thyroid cancer deaths among Black males and Black females were typically less than five per year; therefore, no trends are presented by race.

## Risk Factors and Populations with High Rates[8,75,76]

### Potentially Modifiable Risk Factors

**Radiation:** Sources of radiation such as medical treatments and radiation fallout from power plant accidents or nuclear weapons increase risk of thyroid cancer. Head or neck radiation treatments in childhood are also a risk factor.

**Diet low in iodine:** Follicular thyroid cancers are more common in areas of the world where people's diets are low in iodine. In the United States, most people get enough iodine in their diet because it is added to table salt and other foods.

**Overweight and Obesity:** Excess body weight increases thyroid cancer risk.

### Non-modifiable Risk Factors

**Age:** Risk peaks earlier for women (who are most often in their 40s or 50s when diagnosed) than for men (who are usually in their 60s or 70s).

**Sex:** For unclear reasons, thyroid cancers occur about three times more often in women than in men.

**Hereditary conditions and family history:** Several inherited conditions and family history have been linked to different types of thyroid cancer, such as a history of goiter or thyroid nodules, a family history of thyroid cancer, an abnormal RET (rearranged during transfection) gene, which causes a hereditary form of thyroid cancer (familial medullary thyroid carcinoma), and certain rare genetic syndromes such as familial adenomatous polyposis (FAP), familial medullary thyroid cancer (FMTC), multiple endocrine neoplasia type 2A syndrome, or multiple endocrine neoplasia type 2B syndrome.

### Signs and Symptoms[8]

Many thyroid cancers are diagnosed incidentally in people without symptoms when abnormality is seen on an imaging test done for another reason. Signs and symptoms of thyroid cancer may include the following:

- **Lump in the neck.**
- **Tight or full feeling in the neck.**
- **Difficulty breathing or swallowing.**
- **Hoarseness.**
- **Swollen lymph nodes.**
- **Pain in neck or throat that does not go away.**

*Any of these symptoms may be caused by cancer or by other, less serious health problems. If you have any of these symptoms, see your healthcare provider.*

## Early Detection

There is no standard or routine screening test used for the early detection of thyroid cancer. Thyroid cancer that does not cause symptoms may be found during the following:

- A routine physician exam when the doctor checks the patient's neck for lumps (nodules) or swelling in the neck, voice box, and lymph nodes.
- Surgery that is done for another condition.
- An ultrasound that is done for another condition.

## Stage at Diagnosis and Survival

Based on cases diagnosed from 2014 to 2020, the five-year relative survival for patients with thyroid cancer was 99% in both Ohio and the United States.[10,11] When thyroid cancers were detected at local stage, the five-year relative survival in Ohio was 100% (72% of cases).[10] After the cancer has spread regionally to involve adjacent organs or lymph nodes (23% of cases), the five-year relative survival in Ohio was 98%, and for persons with distant metastases (2% of cases), the five-year relative survival was only 44% **(Table A-1, Table A-6)**.[10]

# UTERINE CANCER

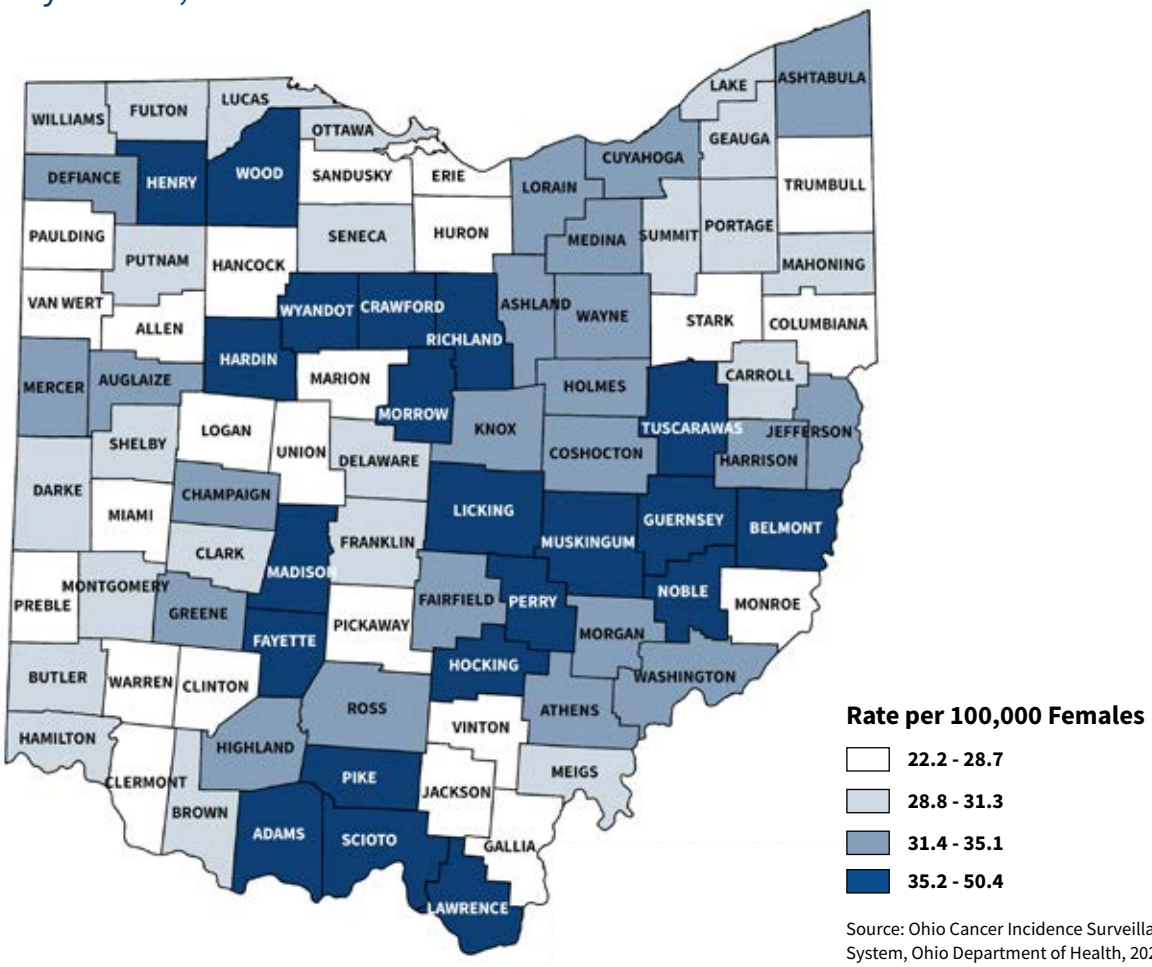
Uterine cancers include cancers of the uterine corpus and cancers classified as uterine not otherwise specified. The vast majority of uterine cancers are cancers of the uterine corpus. Uterine cancer is often referred to as endometrial cancer because more than 90% of cases occur in the endometrium (lining of the uterus).[8]

## New Cases

An average of 2,485 new cases of invasive uterine cancer were diagnosed annually in Ohio from 2017 to 2021 with a corresponding average annual age-adjusted incidence rate of 31.1 per 100,000 women compared with a rate of 27.8 per 100,000 women in the United States **(Table 2)**.[5,10] The incidence rate in Ohio was higher among White women (31.7 per 100,000) compared with Black women (27.3 per 100,000) and Asian/Pacific Islander women (20.4 per 100,000) **(Table 4)**.[10] Average annual age-adjusted incidence rates of uterine cancer by Ohio county of residence are shown in **Figure 52**.

**Currently, a woman living in the United States has a 1 in 34 lifetime risk of developing invasive uterine cancer.[6]**

**FIGURE 52.** Cancer of the Uterus: Quartiles of Average Annual Age-Adjusted Incidence Rates by County in Ohio, 2017-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

## Deaths

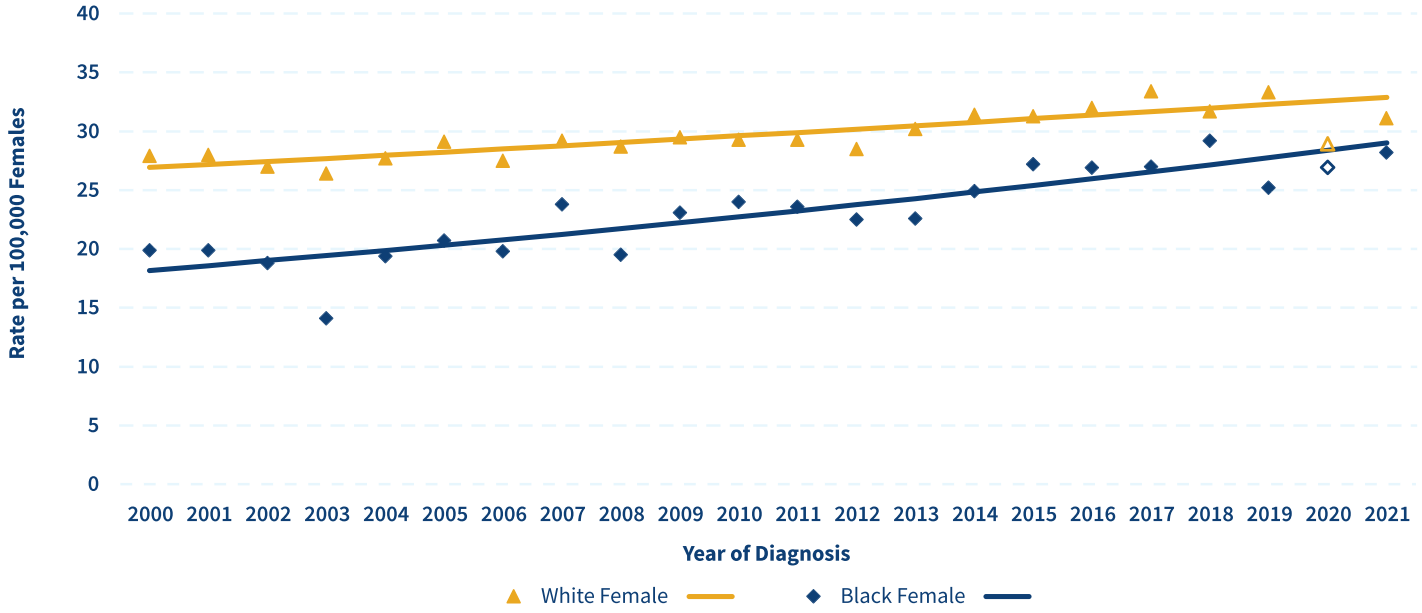
The average annual age-adjusted mortality rate for uterine cancer in Ohio from 2017 to 2021 was 5.4 per 100,000 women compared with the U.S. mortality rate of 5.2 per 100,000.[14] The Ohio mortality rate represents an annual average of 461 deaths in Ohio from uterine cancer over the time period **(Table 3)**.[14] The mortality rate was considerably higher among Black women in Ohio (8.4 per 100,000) compared with White women (5.1 per 100,000) **(Table 5)**.[14]

## Trends

In Ohio, age-adjusted uterine cancer incidence rates from 2000 to 2021 increased among both Black women (2.3% per year) and White women (1.0% per year) **(Figure 53)**.[10]

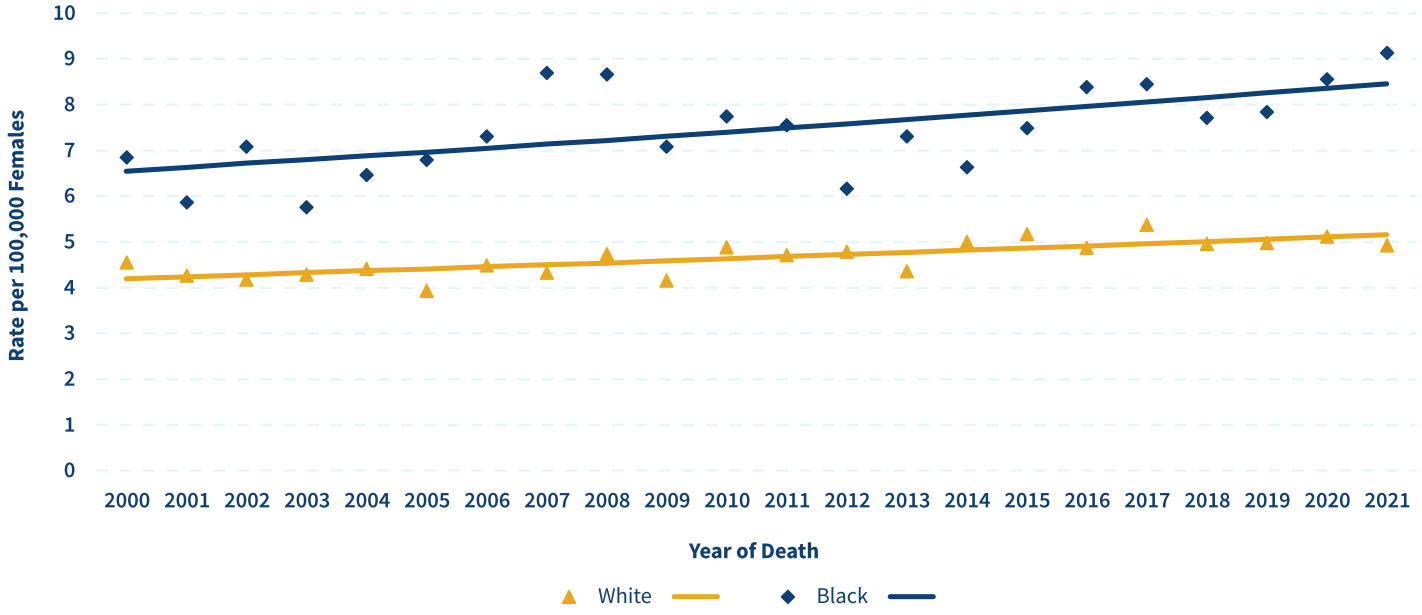
Age-adjusted uterine cancer mortality rates in Ohio increased slightly more for Black women from 2000 to 2021 than for White women (1.2% per year and 1.0% per year, respectively) **(Figure 54)**.[14]

**FIGURE 53.** Trends in Age-Adjusted Incidence Rates for Cancer of the Uterus by Race in Ohio, 2000-2021




Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

**FIGURE 54.** Trends in Age-Adjusted Mortality Rates for Cancer of Uterus by Race in Ohio, 2000-2021




Source: Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All Cause of Death, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

## Risk Factors and Populations with High Rates[78]

### Potentially Modifiable Risk Factors

**Obesity, weight gain, physical inactivity, metabolic syndrome, and diabetes:** Obesity and abdominal fatness likely increase the amount of circulating estrogen, which is a strong risk factor.

**Postmenopausal estrogen use:** Use of estrogen after menopause, but not estrogen plus progestin, increases risk.

**Not having children and low duration of lactation:** Not having children and no or low lactation increases risk as a result of prolonged endogenous estrogen exposure.

**Tamoxifen use:** Taking the drug Tamoxifen, used to prevent breast cancer, for two or more years increases risk slightly because it has estrogen-like effects on the uterus.

### Non-modifiable Risk Factors

**Age:** The average age at diagnosis of uterine cancer is 60 years.

**Race:** White women are at greater risk of being diagnosed with uterine cancer; however, Black women are at greater risk of dying from uterine cancer.

**Early menstruation:** Menarche at an early age increases risk of uterine cancer.

**Late menopause:** Women who go through menopause after age 55 years have increased risk.

**Endometrial hyperplasia:** Women diagnosed with endometrial hyperplasia, an increased growth of the endometrium, or with breast or ovarian cancer are at greater risk.

**Genetic predisposition/Inherited syndromes:** Women diagnosed with Lynch syndrome, Cowden syndrome, and polycystic ovary syndrome have a higher risk of uterine cancer.

**Family history:** Women with at least one first-degree relative with uterine cancer are at greater risk.

### Signs and Symptoms[79]

Signs and symptoms of uterine cancer include unusual vaginal bleeding or pain in the pelvis. Other signs and symptoms may include:

- **Vaginal bleeding or discharge not related to menstruation (periods).**
- **Vaginal bleeding after menopause.**
- **Difficult or painful urination.**
- **Pain during sexual intercourse.**
- **Pain in the pelvic area.**

*Any of these symptoms may be caused by cancer or by other, less serious health problems. If you have any of these symptoms, see your healthcare provider.*

## Early Detection[8]

There is no recommended screening test for uterine cancer for women at average risk. Most cases (69%) are diagnosed at an early stage when women report postmenopausal bleeding. The ACS recommends that women with known or suspected Lynch syndrome be offered annual screening with endometrial biopsy and/or transvaginal ultrasound beginning at age 35.

## Stage at Diagnosis and Survival

Based on cases diagnosed from 2014 to 2020, the five-year relative survival for uterine cancer is 84% in Ohio and 81% in the United States.[10,11] Five-year relative survival for uterine cancer in Ohio varies by stage at diagnosis (95% for women diagnosed local stage, 71% for regional stage, and 20% for distant stage).[10] From 2017 to 2021, the majority of women in Ohio were diagnosed at the local stage (72%), while 16% were diagnosed at the regional stage, and 9% were diagnosed at the distant stage **(Table A-1, Table A-6)**.[10]

# TOBACCO USE

Approximately 34 million American adults currently smoke cigarettes, with most of them smoking daily.[80] According to the U.S. Surgeon General, smoking leads to disease, disability, and death and harms nearly every organ of the body.[80] Cigarette smoking increases the risk of at least 16 cancers: lung and bronchus, larynx, esophagus, oral cavity and pharynx, bladder, liver and intrahepatic bile duct, cervix, stomach, kidney and renal pelvis, acute myeloid leukemia, pancreas, colon and rectum, trachea, ovary, ureter, and nasal cavity and paranasal sinus.[4] In addition to causing cancer, smoking causes heart disease, stroke, lung diseases such as chronic obstructive pulmonary disease (chronic bronchitis and emphysema), type 2 diabetes, and rheumatoid arthritis.[4]

Despite decades of declines in cigarette smoking prevalence, about 30% of all cancer deaths are still caused by smoking.[8] In Ohio, an estimated 7,500 cancer deaths each year are attributed to smoking, including 6,500 deaths from lung and bronchus cancer.[10]

## Cigarette Smoking Prevalence

The prevalence of current cigarette smoking among adults in the United States was 14.0% in 2022, down from 21.2% in 2011.[36] In Ohio, 17.1% of adults ages 18 and older were current cigarette smokers in 2022.[35] **Table 11** displays 2022 smoking prevalence in Ohio adults by sex, age group, race, education, and annual household income. Smoking prevalence in Ohio was highest among the 35-49 age group (22.9%), those with less than a high school education (35.4%), and those with an annual household income less than $25,000 (33.5%).[35]

**TABLE 11.** Prevalence of Current Cigarette Smoking Among Adults 18 and Older by Demographics in Ohio, 2022

| | Current Cigarette Smoker |
|---|---|
| **SEX** | |
| Male | 17.7% |
| Female | 16.5% |
| **AGE** | |
| 18-34 | 14.3% |
| 35-49 | 22.9% |
| 50-64 | 21.1% |
| 65+ | 11.4% |
| **RACE** | |
| White | 16.8% |
| Black | 18.2% |
| **EDUCATION** | |
| Less than High School | 35.4% |
| High School or GED* | 21.5% |
| Some College | 16.4% |
| College Graduation | 6.2% |
| **ANNUAL HOUSEHOLD INCOME** | |
| <$25,000 | 33.5% |
| $25,000-$49,999 | 21.5% |
| $50,000+ | 11.1% |
| **TOTAL** | **17.1%** |

Source: 2022 Ohio Behavioral Risk Factor Surveillance System, Ohio Department of Health, 2024.

"Don't Know" and "Refused" were excluded from the denominator. This can cause an artificially high percentage.

*General Educational Development.

Nationally, 8% of high school students in grades 9-12 were current smokers in 2021.[81] In Ohio in 2021, only 3% of high school students reported that they currently smoke cigarettes.[8] Male high school students in Ohio (4%) were more likely than female students (2%) to be current smokers.[82]

## Secondhand Smoke

Secondhand smoke is smoke from burning tobacco products, like cigarettes, cigars, hookahs, or pipes.[83] Secondhand smoke exposure occurs when people breath in smoke exhaled by people who smoke or from burning tobacco products.[84]

Secondhand smoke contains more than 7,000 chemicals, including at least 70 chemicals that can cause cancer.[83] In 2006, the U.S. Surgeon General's report on the health consequences of involuntary exposure to tobacco smoke concluded that the evidence is sufficient to infer a causal relationship between secondhand smoke exposure and lung cancer among lifetime nonsmokers.[84] Secondhand smoke can also cause coronary heart disease and stroke in adults who do not smoke.[83] In the United States, secondhand smoke causes approximately 7,330 lung cancer deaths and 34,000 deaths from heart disease each year.[8] Children exposed to secondhand smoke are at an increased risk for sudden infant death syndrome (SIDS), acute respiratory infections (e.g., pneumonia, bronchitis), middle ear disease, more frequent and severe asthma, and slowed lung growth.[84]

People are exposed to secondhand smoke primarily at home and in the workplace, but exposures also occur in public places.[84] Comprehensive smokefree laws and policies that prohibit smoking in all areas of indoor spaces are the only way to fully protect people who do not smoke from secondhand smoke exposure.[84] These laws and policies can also help people quit smoking and can help keep young people from starting to smoke.[84]

## E-cigarettes (Electronic Vaping Products)

E-cigarettes, also known as electronic vaping products or vapes, are battery-operated devices that heat a liquid that typically contains nicotine, and sometimes cannabis and other drugs, to create a vapor that is inhaled into the lungs.[85] There are many types of e-cigarettes, including disposable devices, refillable devices, and devices with pre-filled cartridges or pods, and they come in many shapes, sizes, and colors.[85] The following are some important facts about e-cigarettes:

- E-cigarettes should not be used by youth, young adults, or pregnant women.[85]
- Most e-cigarettes contain nicotine, which is highly addictive and harmful to youth, pregnant women, and fetuses.[85]
- The Food and Drug Administration (FDA) has not approved e-cigarettes as an aid to quit smoking, and more research is needed on whether e-cigarettes are effective for quitting smoking and to better understand the health effects of e-cigarettes.[86]
- Electronic vapor products are the most commonly used tobacco products among high school students; 19% of high school students in the United States used e-cigarettes in 2021 compared with 20% of high school students in Ohio.[81,82]

## Smokeless Tobacco

In 1986, the U.S. Surgeon General concluded that the use of smokeless tobacco is not a safe substitute for smoking cigarettes or cigars, as these products cause various cancers and noncancerous oral conditions and can lead to nicotine addiction.[87]

The following are some important facts about smokeless tobacco:

- In 2022, 4% of adults in the United States and Ohio were current users of smokeless tobacco products.[35,36]
- Nationally, an estimated 4% of high school students (5% male, 2% female) were current users of smokeless tobacco in 2021.[81]
- In 2021, less than 2% of middle school and high school students in Ohio were current users of smokeless tobacco products.[82]

## Tobacco Cessation

The following are some important facts about tobacco cessation:

- The Ohio Tobacco Quit Line (1-800-QUIT-NOW) provides personal quit coaching and telephone counseling free of charge to all Ohioans.
- In 2022, two out of three people (66%) in the United States who had ever smoked at least 100 cigarettes in their lifetime had quit smoking.[88]
- According to national data, the percentage of people who quit smoking is less among those with no high school diploma or GED, those at less than 100% of the poverty level, those with Medicaid/public/dual insurance, and those who are uninsured.[88]
- Smokers who quit, regardless of age, increase their longevity, with those who quit by age 30 living an average of 10 years longer than if they had continued to smoke.[8]
- Quitting smoking cuts cardiovascular risks. Just one to two years after quitting smoking, the risk for a heart attack drops dramatically.[89]
- Within five to 10 years after quitting smoking, the risk for cancers of the mouth, throat, and larynx is cut in half and the risk for stroke decreases.[89]
- After quitting smoking for 10 years, the risk for lung cancer drops by half.[89]
- Among adults 18 and older in Ohio, 2022 data showed that about 29% of current smokers in Ohio had stopped smoking at least one day in the preceding 12 months because they were trying to quit.[35]

# NUTRITION, PHYSICAL ACTIVITY, AND EXCESS BODY WEIGHT

Poor nutrition, physical inactivity, and excess body weight are among the leading modifiable risk factors for cancer. An estimated 12% of cancer cases and 11% of cancer deaths are attributable to the combined effects of low fruit and vegetable consumption, physical inactivity, and excess body weight.[4] ACS's 2020 diet and physical activity guidelines for cancer prevention emphasize the importance of achieving and maintaining a healthy body weight, being physically active, following a healthy eating pattern, and limited, if any, alcohol consumption. ACS's guidelines also include recommendations for community action because of the large influence that physical and social environments have on food and physical activity behaviors.[90]

## American Cancer Society Guideline for Diet and Physical Activity[90]

### Recommendations for Individual Choices

**Achieve and maintain a healthy weight throughout life.**

- Keep your weight within the healthy range, and avoid weight gain in adult life.

**Be physically active.**

- Adults should get 150-300 minutes of moderate intensity or 75-150 minutes of vigorous intensity activity each week (or a combination of these). Getting to or exceeding the upper limit of 300 minutes is ideal.
- Children and adolescents should get at least one hour of moderate or vigorous intensity activity each day.
- Limit sedentary behavior such as sitting, lying down, watching television, and other forms of screen-based entertainment.

**Follow a healthy eating pattern at all ages.**

- **A healthy eating pattern includes:**
  - Foods that are high in nutrients in amounts that help you get to and stay at a healthy body weight.
  - A variety of vegetables – dark green, red, and orange, fiber-rich legumes (beans and peas), and others.
  - Fruits, especially whole fruits in a variety of colors.
  - Whole grains.
- **A healthy eating pattern limits or does not include:**
  - Red and processed meats.
  - Sugar-sweetened beverages.
  - Highly processed foods and refined grain products.

**It is best to not drink alcohol.**

- People who do choose to drink alcohol should have no more than one drink per day for women or two drinks per day for men.

### Recommedations for Community Action

- **Increase access to affordable, healthy foods.**
- **Provide safe, enjoyable, and accessible opportunities for physical activity.**
- **Limit alcohol for individuals.**

## Nutrition

The 2020-2025 Dietary Guidelines for Americans has a fundamental premise that just about everyone, no matter their health status, can benefit from changes in food and beverage choices.[91] The guidelines encourage healthy eating patterns at each stage of life, from infancy through childhood, adolescence, and adulthood.[91] The benefits of healthy eating in adulthood include living longer, achieving and maintaining a healthy weight, and lowering the risk of some cancers, heart disease, and type 2 diabetes.[92] However, in 2021, 43% of Ohio adults reported consuming fruit or fruit juices less than one time per day, and 20% consumed vegetables or vegetable juice less than one time per day.[35]

Poor nutrition among children and adolescents contributes to overweight and obesity and increases the risk for chronic disease later in life.[91] Changing this trajectory is crucial because dietary patterns established during this life stage tend to continue into adult years.[91] Unfortunately, most young people are not following the recommendations set forth in the Dietary Guidelines for Americans. Data from the Ohio Youth Risk Behavior Survey (YRBS) in 2021 showed that 8% of Ohio high school students did not eat fruit or drink fruit juices during the seven days before the survey, and 9% did not eat vegetables during that same time frame.[82] In addition, 69% of Ohio high school students consumed one or more cans, bottles, or glasses of soda or pop during the seven days prior to the survey.[82]

## Physical Activity

The Physical Activity Guidelines for Americans (2nd edition) state the evidence is clear that physical activity fosters normal growth and development, and can make people feel better, function better, sleep better, and reduce the risk of many chronic diseases.[93] The health benefits of regular physical activity among adults include a reduced risk of cancers of the bladder, breast, colon, endometrium, esophagus, kidney, lung, and stomach; heart disease mortality; hypertension; and type 2 diabetes.[94] Despite the benefits of physical activity, in 2022, 24% of U.S. adults and 25% of Ohio adults reported that they did not participate in any physical activities or exercises outside of their regular job in the past 30 days.[35,36] The proportion of Ohio adults who participated in no exercise in the past 30 days was higher among females (28%) compared with males (22%), higher among Black adults than White adults (30% and 24%, respectively), and increased as age increased **(Figures 55-57)**.[35] Lower levels of education and household income were also associated with lower proportions of no exercise in the past 30 days **(Figures 58-59)**.[35]

Regular physical activity can help children and adolescents improve cardiorespiratory fitness, build strong bones and muscles, control weight, reduce symptoms of anxiety and depression, and reduce the risk of developing health conditions such as cancer, heart disease, type 2 diabetes, high blood pressure, osteoporosis, and obesity.[94] In Ohio in 2021, 51% of high school students were not physically active at least 60 minutes per day on five or more of the past seven days.[82]

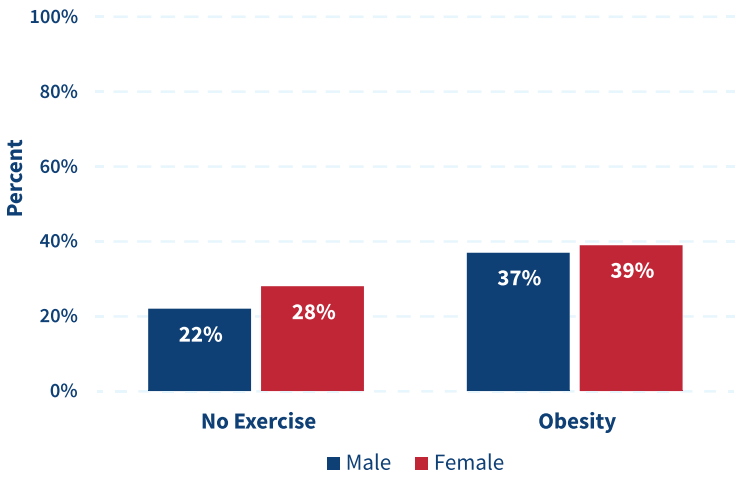
## Excess Body Weight

High caloric intake combined with inadequate physical activity leads to weight gain and subsequent development of overweight and obesity among adults and children. In adults, overweight is defined as having a body mass index (BMI) of 25.0-29.9 kg/m$^2$ and obesity is defined as having a BMI ≥30.0 kg/m$^2$. The NCI has identified the following cancer sites/types as being associated with overweight and obesity: endometrium, adenocarcinoma of the esophagus, stomach, liver and intrahepatic bile duct, kidney and renal pelvis, myeloma, meningioma, pancreas, colon and rectum, gallbladder, breast, ovary, and thyroid.[95]

The percentage of obese adults in the United States increased from 28% in 2011 to nearly 34% in 2022.[35] In Ohio, the percentage of adults classified as overweight was 33% and an additional 38% had obesity.[36] Thirty-seven percent of Ohio men and 39% of Ohio women had obesity in 2022 **(Figure 55)**.[35] A greater proportion of Black Ohioans (46%) had obesity compared with White Ohioans (38%) **(Figure 56)**.[35] Obesity levels were highest among the 35-49 age group (45%) and the 50-64 age group (43%) **(Figure 57)**.[35] Ohioans with the highest level of education (college graduate) reported the lowest percentage of obesity (33%) **(Figure 58)**.[35] Ohioans with household incomes less than $25,000 reported the highest percentage of obesity (43%) **(Figure 59)**.[35]

BMI levels among children and teens are expressed relative to other children of the same sex and age. Overweight in children and teens is defined as a BMI in the 85th to less than the 95th percentile, and obesity is defined as a BMI at or above the 95th percentile for children and teens of the same age and sex. Youth with obesity are more likely to have immediate health risks, including high blood pressure, high cholesterol, and impaired glucose tolerance.[91] They also are at increased risk of developing cardiovascular disease and type 2 diabetes beginning as soon as the teenage years.[91] Children with overweight and obesity are more likely to experience anxiety and depression, and have social concerns such as being bullied.[92] According to national data from 2017 to 2021, 14.7 million youths ages 2-19 years had obesity.[95] In 2021 in Ohio, 13% of high school students were classified as overweight and an additional 19% had obesity.[82]

**FIGURE 55.** Prevalence of No Exercise (Past 30 Days) and Obesity Among Adults 18 and Older by Sex in Ohio, 2022[1,2,3,4]



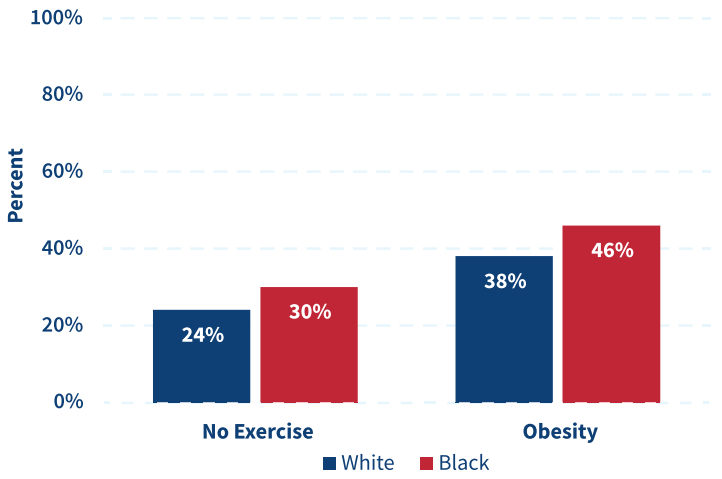

[1] Source: 2022 Ohio Behavioral Risk Factor Surveillance System, Ohio Department of Health, 2024.

[2] "Don't Know" and "Refused" were excluded from the denominator. This can cause an artificially high percentage.

[3] "Exercise" is defined as the percentage of adults who reported that they participated in any physical activities or exercises outside of their regular job during the past month.

[4] "Obesity" is defined as body mass index (BMI) ≥30.0 kg/m$^2$.

**FIGURE 56.** Prevalence of No Exercise (Past 30 Days) and Obesity Among Adults 18 and Older by Race in Ohio, 2022[1,2,3,4]



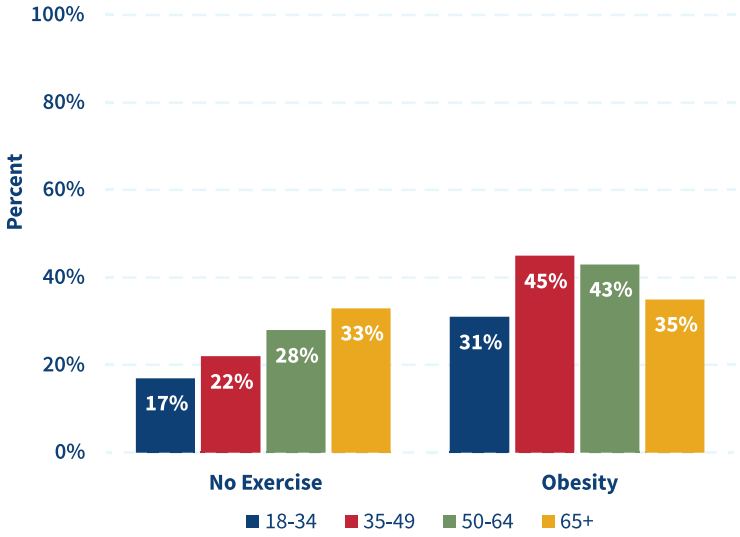

[1] Source: 2022 Ohio Behavioral Risk Factor Surveillance System, Ohio Department of Health, 2024.

[2] "Don't Know" and "Refused" were excluded from the denominator. This can cause an artificially high percentage.

[3] "Exercise" is defined as the percentage of adults who reported that they participated in any physical activities or exercises outside of their regular job during the past month.

[4] "Obesity" is defined as body mass index (BMI) ≥30.0 kg/m$^2$.

**FIGURE 57.** Prevalence of No Exercise (Past 30 Days) and Obesity Among Adults 18 and Older by Age Group in Ohio, 2022[1,2,3,4]



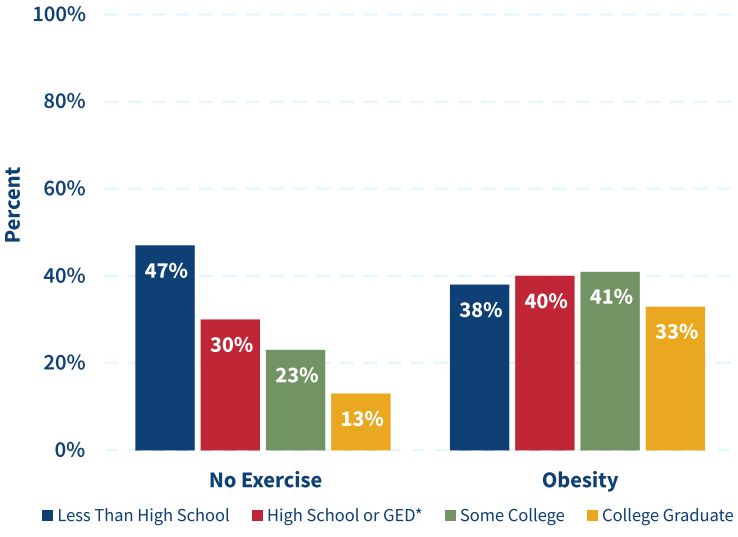

[1] Source: 2022 Ohio Behavioral Risk Factor Surveillance System, Ohio Department of Health, 2024.

[2] "Don't Know" and "Refused" were excluded from the denominator. This can cause an artificially high percentage.

[3] "Exercise" is defined as the percentage of adults who reported that they participated in any physical activities or exercises outside of their regular job during the past month.

[4] "Obesity" is defined as body mass index (BMI) ≥30.0 kg/m$^2$.

**FIGURE 58.** Prevalence of No Exercise (Past 30 Days) and Obesity Among Adults 18 and Older by Level of Education in Ohio, 2022[1,2,3,4]




[1] Source: 2022 Ohio Behavioral Risk Factor Surveillance System, Ohio Department of Health, 2024.

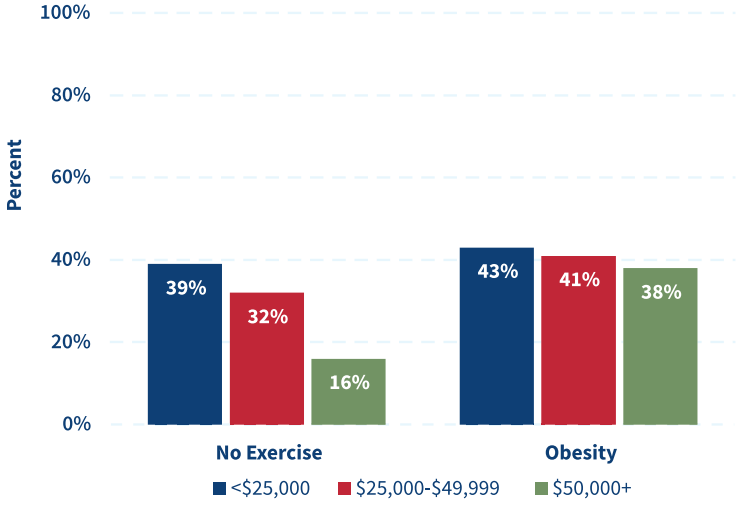
[2] "Don't Know" and "Refused" were excluded from the denominator. This can cause an artificially high percentage.

[3] "Exercise" is defined as the percentage of adults who reported that they participated in any physical activities or exercises outside of their regular job during the past month.

[4] "Obesity" is defined as body mass index (BMI) ≥30.0 kg/m$^2$.

* General educational development.

**FIGURE 59.** Prevalence of No Exercise (Past 30 Days) and Obesity Among Adults 18 and Older by Household Income in Ohio, 2022[1,2,3,4]




[1] Source: 2022 Ohio Behavioral Risk Factor Surveillance System, Ohio Department of Health, 2024.

[2] "Don't Know" and "Refused" were excluded from the denominator. This can cause an artificially high percentage.

[3] "Exercise" is defined as the percentage of adults who reported that they participated in any physical activities or exercises outside of their regular job during the past month.

[4] "Obesity" is defined as body mass index (BMI) ≥30.0 kg/m$^2$.

# ACRONYMS

| ACRONYM | FULL TERM |
|---|---|
| **ACS** | American Cancer Society |
| **ALL** | Acute lymphocytic leukemia |
| **AML** | Acute myeloid leukemia |
| **APC** | Adenomatous polyposis coli |
| **BMI** | Body mass index |
| **BRCA** | Breast cancer gene |
| **BRFSS** | Behavioral Risk Factor Surveillance System |
| **CDC** | Centers for Disease Control and Prevention |
| **CLL** | Chronic lymphocytic leukemia |
| **CML** | Chronic myeloid leukemia |
| **CNS** | Central nervous system |
| **CT** | Computed tomography |
| **DCIS** | Ductal carcinoma *in situ* |
| **DES** | Diethylstilbestrol |
| **EBV** | Epstein-Barr virus |
| **FAMM** | Familial atypical multiple mole melanoma |
| **FAP** | Familial adenomatous polyposis |
| **FDA** | Food and Drug Administration |
| **FIT** | Fecal immunochemical test |
| **FMTC** | Familial Medullary Thyroid Cancer |
| **FOBT** | Fecal occult blood test |
| **GED** | General educational development |
| **gFOBT** | Guaiac-based fecal occult blood test |
| **GVHD** | Graft-versus-host disease |
| **H. pylori** | Helicobacter pylori |
| **HBV** | Hepatitis B virus |
| **HCV** | Hepatitis C virus |
| **HHV8** | Human herpesvirus-8 |
| **HIV** | Human immunodeficiency virus |
| **HL** | Hodgkin lymphoma |
| **HNPCC** | Hereditary nonpolyposis colon cancer |
| **HPV** | Human papillomavirus |
| **HrHPV** | High-risk human papillomavirus |
| **HTLV-1** | Human T-cell leukemia virus type 1 |
| **IBD** | Intrahepatic bile duct |
| **iFOBT** | Immunochemical fecal occult blood test |
| **IV** | Intravenously |
| **LCIS** | Lobular carcinoma *in situ* |

| ACRONYM | FULL TERM |
|---|---|
| **LDCT** | Low-dose spiral computed tomography |
| **LEEP** | Loop electrosurgical excision procedure |
| **MEN1** | Multiple endocrine neoplasia type 1 |
| **MRI** | Magnetic resonance imaging |
| **MT-sDNA** | Multi-targeted stool DNA |
| **NAACCR** | North American Association of Central Cancer Registries |
| **NASH** | Nonalcoholic steatohepatitis |
| **NCI** | National Cancer Institute |
| **NHL** | Non-Hodgkin lymphoma |
| **NPCR** | National Program of Cancer Registries |
| **OCISS** | Ohio Cancer Incidence Surveillance System |
| **PSA** | Prostate-specific antigen |
| **SEER** | Surveillance, Epidemiology, and End Results |
| **SES** | Socioeconomic status |
| **SIDS** | Sudden infant death syndrome |
| **USPSTF** | U.S. Preventive Services Task Force |
| **UV** | Ultraviolet |
| **YRBS** | Youth Risk Behavior Survey |
| **YTS** | Youth Tobacco Survey |

# APPENDICES

**TABLE A-1.** Percentage of New Cancer Cases by Site/Type and Stage at Diagnosis in Ohio, 2017-2021

| PRIMARY CANCER SITE / TYPE | *in situ* | Local | Regional | Distant | Unstaged / Missing |
|---|---|---|---|---|---|
| **All Cancer Sites/Types** | **9%** | **42%** | **20%** | **21%** | **8%** |
| Bladder | 45% | 37% | 9% | 5% | 6% |
| Brain and Other CNS* | 0% | 70% | 10% | 2% | 19% |
| Breast | 17% | 55% | 22% | 5% | 1% |
| Cervix | 0% | 43% | 36% | 16% | 4% |
| Colon and Rectum | 3% | 30% | 39% | 20% | 7% |
| Esophagus | 1% | 20% | 36% | 33% | 11% |
| Hodgkin Lymphoma | 0% | 15% | 30% | 52% | 3% |
| Kidney and Renal Pelvis | 2% | 65% | 17% | 13% | 3% |
| Larynx | 6% | 44% | 40% | 7% | 4% |
| Leukemia | 0% | 1% | 0% | 92% | 7% |
| Liver and Intrahepatic Bile Duct | 0% | 43% | 19% | 21% | 17% |
| Lung and Bronchus | 0% | 28% | 24% | 42% | 7% |
| Melanoma of the Skin | 45% | 40% | 6% | 2% | 6% |
| Myeloma | 0% | 3% | 0% | 91% | 6% |
| Non-Hodgkin Lymphoma | 0% | 23% | 12% | 58% | 7% |
| Oral Cavity and Pharynx | 2% | 28% | 59% | 7% | 4% |
| Ovary | 1% | 26% | 26% | 41% | 6% |
| Pancreas | 1% | 16% | 27% | 45% | 11% |
| Prostate | 0% | 69% | 14% | 7% | 10% |
| Stomach | 1% | 34% | 25% | 29% | 11% |
| Testis | 0% | 63% | 21% | 12% | 4% |
| Thyroid | 1% | 72% | 23% | 2% | 2% |
| Uterus | 0% | 72% | 16% | 9% | 3% |

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

* Central Nervous System.

## **TABLE A-2.** Estimated Completeness of Reporting by Cancer Site/Type in Ohio, 2017-2021[1,2]

| PRIMARY CANCER SITE / TYPE | % Complete |
|---|---|
| **All Cancer Sites / Types** | **96%** |
| Bladder | 102% |
| Brain and Other CNS* | 103% |
| Breast (Female) | 95% |
| Cervix | 98% |
| Colon and Rectum | 98% |
| Esophagus | 107% |
| Hodgkin Lymphoma | 112% |
| Kidney and Renal Pelvis | 94% |
| Larynx | 116% |
| Leukemia | 83% |
| Liver and Intrahepatic Bile Duct | 86% |
| Lung and Bronchus | 107% |
| Melanoma of the Skin | 102% |
| Myeloma | 82% |
| Non-Hodgkin Lymphoma | 94% |
| Oral Cavity and Pharynx | 100% |
| Ovary | 100% |
| Pancreas | 95% |
| Prostate | 99% |
| Stomach | 99% |
| Testis | 97% |
| Thyroid | 106% |
| Uterus | 107% |

[1] Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

[2] Expected incidence rates generated to calculate completeness were estimated based on the Surveillance, Epidemiology, and End Results (SEER) Program cancer incidence to mortality rate ratio for 2017-2021, National Cancer Institute, 2024.

* Central Nervous System.

Note: Completeness may exceed 100% if the observed number of cases exceeds the number expected based on the SEER incidence to mortality rate ratio and Ohio mortality rates.

## TABLE A-3. Estimated Completeness of Reporting by County in Ohio, 2017-2021[1,2]

| County | Percent Complete |
|---|---|
| **Ohio** | **96%** |
| Adams | 73% |
| Allen | 91% |
| Ashland | 97% |
| Ashtabula | 88% |
| Athens | 99% |
| Auglaize | 93% |
| Belmont | 101% |
| Brown | 88% |
| Butler | 97% |
| Carroll | 90% |
| Champaign | 98% |
| Clark | 96% |
| Clermont | 96% |
| Clinton | 87% |
| Columbiana | 90% |
| Coshocton | 93% |
| Crawford | 84% |
| Cuyahoga | 97% |
| Darke | 82% |
| Defiance | 97% |
| Delaware | 119% |
| Erie | 96% |
| Fairfield | 99% |
| Fayette | 83% |
| Franklin | 99% |
| Fulton | 85% |
| Gallia | 89% |
| Geauga | 117% |
| Greene | 103% |
| Guernsey | 91% |
| Hamilton | 99% |
| Hancock | 90% |
| Hardin | 86% |
| Harrison | 94% |
| Henry | 90% |
| Highland | 86% |
| Hocking | 83% |
| Holmes | 76% |
| Huron | 93% |
| Jackson | 83% |
| Jefferson | 94% |
| Knox | 101% |
| Lake | 105% |
| Lawrence | 86% |
| Licking | 100% |
| Logan | 84% |
| Lorain | 102% |
| Lucas | 89% |
| Madison | 94% |
| Mahoning | 98% |
| Marion | 97% |
| Medina | 114% |
| Meigs | 91% |
| Mercer | 97% |
| Miami | 99% |
| Monroe | 101% |
| Montgomery | 97% |
| Morgan | 90% |
| Morrow | 80% |
| Muskingum | 97% |
| Noble | 99% |
| Ottawa | 93% |
| Paulding | 75% |
| Perry | 90% |
| Pickaway | 85% |
| Pike | 88% |
| Portage | 90% |
| Preble | 89% |
| Putnam | 112% |
| Richland | 94% |
| Ross | 96% |
| Sandusky | 92% |
| Scioto | 81% |
| Seneca | 94% |
| Shelby | 92% |
| Stark | 91% |
| Summit | 96% |
| Trumbull | 90% |
| Tuscarawas | 91% |
| Union | 107% |
| Van Wert | 83% |
| Vinton | 77% |
| Warren | 112% |
| Washington | 106% |
| Wayne | 96% |
| Williams | 79% |
| Wood | 95% |
| Wyandot | 89% |

[1] Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

[2] Expected incidence rates generated to calculate completeness were estimated based on the Surveillance, Epidemiology, and End Results (SEER) Program cancer incidence to mortality rate ratio for 2017-2021, National Cancer Institute, 2024.

* Central Nervous System.

Note: Completeness may exceed 100% if the observed number of cases exceeds the number expected based on the SEER incidence to mortality rate ratio and Ohio mortality rates.

## TABLE A-4. Average Annual Number of New Invasive Cancer Cases and Age-Adjusted Incidence Rates by County and Sex in Ohio, 2017-2021

| REGION | ALL SITES / TYPES | | | | | | COLON AND RECTUM | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Total | | Male | | Female | | Total | |
| | Cases | Rate | Cases | Rate | Cases | Rate | Cases | Rate | Cases | Rate | Cases | Rate |
| **Ohio** | **35,966** | **511.3** | **34,463** | **444.4** | **70,429** | **470.0** | **3,001** | **44.4** | **2,706** | **34.2** | **5,707** | **38.9** |
| Adams | 100 | 547.9 | 93 | 504.4 | 192 | 524.0 | 10 | 53.0 | 10 | 54.4 | 20 | 54.4 |
| Allen | 336 | 534.3 | 268 | 393.4 | 604 | 453.5 | 27 | 43.9 | 23 | 34.4 | 50 | 38.6 |
| Ashland | 177 | 510.7 | 165 | 460.2 | 342 | 478.4 | 17 | 49.5 | 18 | 47.9 | 35 | 48.9 |
| Ashtabula | 342 | 508.6 | 298 | 440.6 | 641 | 468.8 | 29 | 44.4 | 19 | 28.0 | 48 | 35.3 |
| Athens | 167 | 560.1 | 144 | 438.9 | 311 | 485.3 | 13 | 46.7 | 11 | 32.0 | 24 | 38.1 |
| Auglaize | 142 | 478.6 | 129 | 423.3 | 271 | 443.7 | 15 | 56.4 | 11 | 31.9 | 26 | 43.6 |
| Belmont | 246 | 528.3 | 227 | 472.0 | 472 | 489.4 | 20 | 47.6 | 24 | 45.3 | 44 | 46.3 |
| Brown | 148 | 514.4 | 141 | 487.1 | 289 | 496.0 | 16 | 57.9 | 12 | 42.6 | 29 | 49.8 |
| Butler | 1,027 | 487.8 | 1,048 | 448.7 | 2,074 | 461.9 | 90 | 45.2 | 82 | 35.3 | 173 | 39.8 |
| Carroll | 99 | 491.4 | 88 | 445.8 | 187 | 465.7 | 6 | 28.9 | 5 | 22.1 | 11 | 25.8 |
| Champaign | 140 | 548.5 | 116 | 434.6 | 256 | 484.7 | 13 | 52.7 | 9 | 32.4 | 22 | 41.9 |
| Clark | 473 | 538.0 | 454 | 468.5 | 927 | 496.5 | 37 | 45.3 | 36 | 36.1 | 73 | 40.3 |
| Clermont | 626 | 501.6 | 626 | 458.3 | 1,252 | 473.4 | 55 | 44.8 | 47 | 35.1 | 102 | 39.8 |
| Clinton | 144 | 559.6 | 126 | 446.6 | 270 | 493.6 | 12 | 48.4 | 10 | 38.3 | 23 | 42.0 |
| Columbiana | 382 | 532.8 | 317 | 434.2 | 699 | 472.3 | 32 | 45.4 | 29 | 39.3 | 61 | 42.4 |
| Coshocton | 125 | 513.3 | 116 | 460.4 | 241 | 482.1 | 13 | 53.5 | 9 | 34.7 | 22 | 43.1 |
| Crawford | 147 | 506.5 | 132 | 421.1 | 279 | 458.8 | 14 | 52.0 | 11 | 34.1 | 25 | 42.6 |
| Cuyahoga | 4,011 | 525.0 | 4,019 | 446.0 | 8,030 | 476.7 | 346 | 47.3 | 319 | 34.5 | 665 | 40.2 |
| Darke | 154 | 444.3 | 141 | 380.2 | 295 | 405.9 | 14 | 43.8 | 12 | 29.3 | 26 | 36.1 |
| Defiance | 130 | 523.1 | 118 | 448.1 | 248 | 478.0 | 13 | 54.7 | 13 | 45.4 | 26 | 50.0 |
| Delaware | 536 | 481.9 | 519 | 429.6 | 1,055 | 449.7 | 37 | 34.8 | 38 | 32.1 | 75 | 33.5 |
| Erie | 287 | 508.6 | 260 | 443.0 | 547 | 472.0 | 24 | 44.7 | 21 | 34.2 | 45 | 39.2 |
| Fairfield | 474 | 518.4 | 423 | 427.6 | 897 | 464.3 | 40 | 46.1 | 30 | 30.3 | 70 | 37.5 |
| Fayette | 92 | 535.9 | 95 | 499.6 | 186 | 505.7 | 9 | 57.4 | 10 | 54.6 | 19 | 54.0 |
| Franklin | 3,014 | 506.2 | 3,013 | 427.3 | 6,027 | 457.1 | 225 | 38.2 | 214 | 30.8 | 439 | 34.2 |
| Fulton | 128 | 476.1 | 115 | 417.6 | 243 | 438.6 | 10 | 39.3 | 9 | 31.0 | 18 | 34.3 |
| Gallia | 114 | 608.7 | 93 | 464.6 | 207 | 524.6 | 8 | 48.9 | 9 | 44.8 | 17 | 46.8 |
| Geauga | 327 | 482.2 | 323 | 467.3 | 650 | 469.2 | 21 | 33.8 | 23 | 32.3 | 45 | 33.1 |
| Greene | 484 | 484.8 | 482 | 446.4 | 967 | 458.3 | 40 | 42.6 | 29 | 27.2 | 69 | 34.2 |
| Guernsey | 142 | 533.1 | 128 | 500.4 | 270 | 510.3 | 12 | 48.9 | 14 | 49.8 | 25 | 49.2 |
| Hamilton | 2,311 | 517.2 | 2,323 | 443.8 | 4,635 | 472.5 | 191 | 44.2 | 178 | 33.2 | 369 | 38.2 |
| Hancock | 214 | 470.9 | 200 | 407.3 | 414 | 431.0 | 19 | 41.2 | 18 | 35 | 37 | 37.8 |
| Hardin | 91 | 525.2 | 89 | 475.2 | 180 | 491.9 | 9 | 57.7 | 6 | 34.7 | 15 | 44.9 |
| Harrison | 57 | 533.6 | 52 | 482.4 | 109 | 501.8 | 5 | 46.5 | 5 | 36.5 | 9 | 41.1 |
| Henry | 86 | 475.9 | 78 | 413.5 | 164 | 438.0 | 10 | 59.0 | 7 | 37.6 | 17 | 47.0 |
| Highland | 149 | 536.5 | 138 | 481.1 | 287 | 502.2 | 14 | 52.3 | 12 | 40.5 | 26 | 46.6 |
| Hocking | 99 | 500.5 | 87 | 451.0 | 186 | 472.1 | 8 | 43.8 | 7 | 35.4 | 15 | 39.7 |
| Holmes | 79 | 365.4 | 77 | 329.7 | 156 | 341.0 | 8 | 38.5 | 6 | 28.6 | 15 | 32.7 |
| Huron | 192 | 536.0 | 172 | 447.4 | 364 | 484.3 | 19 | 56.9 | 15 | 39.8 | 34 | 48.3 |
| Jackson | 108 | 539.6 | 107 | 501.0 | 215 | 516.1 | 8 | 43.4 | 11 | 47.6 | 19 | 45.8 |
| Jefferson | 266 | 570.9 | 236 | 481.2 | 502 | 517.1 | 23 | 52.7 | 21 | 42.6 | 44 | 47.2 |
| Knox | 212 | 545.8 | 190 | 456.9 | 402 | 494.3 | 15 | 39.9 | 18 | 41.9 | 33 | 41.0 |
| Lake | 788 | 506.1 | 825 | 478.5 | 1,614 | 485.2 | 57 | 39.6 | 54 | 30.5 | 112 | 34.9 |
| Lawrence | 230 | 612.1 | 220 | 533.9 | 450 | 565.4 | 22 | 62.2 | 19 | 44.2 | 40 | 52.5 |

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

## **TABLE A-4.** Average Annual Number of New Invasive Cancer Cases and Age-Adjusted Incidence Rates by County and Sex in Ohio, 2017-2021 (Continued)

| REGION | LUNG AND BRONCHUS | | | | | | BREAST | | PROSTATE | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Total | | Female | | Male | |
| | Cases | Rate | Cases | Rate | Cases | Rate | Cases | Rate | Cases | Rate |
| **Ohio** | **5,224** | **73.2** | **4,895** | **57.6** | **10,119** | **64.3** | **10,071** | **132.3** | **9,032** | **118.1** |
| Adams | 22 | 108.0 | 15 | 72.2 | 36 | 89.7 | 20 | 108.4 | 17 | 89.9 |
| Allen | 50 | 77.1 | 40 | 54.6 | 90 | 64.4 | 77 | 116.1 | 90 | 132.5 |
| Ashland | 25 | 68.1 | 21 | 51.8 | 46 | 59.4 | 42 | 118.1 | 45 | 122.1 |
| Ashtabula | 54 | 75.7 | 51 | 67.1 | 105 | 70.9 | 75 | 111.7 | 74 | 100.7 |
| Athens | 24 | 79.0 | 23 | 65.6 | 47 | 71.3 | 31 | 100.3 | 42 | 125.4 |
| Auglaize | 19 | 62.9 | 19 | 55.4 | 38 | 58.1 | 36 | 118.9 | 34 | 107.2 |
| Belmont | 41 | 86.8 | 33 | 60.0 | 74 | 72.1 | 62 | 130.1 | 54 | 105.0 |
| Brown | 29 | 96.9 | 24 | 71.7 | 52 | 83.1 | 35 | 116.5 | 28 | 89.9 |
| Butler | 155 | 73.6 | 152 | 61.2 | 307 | 66.5 | 325 | 140.5 | 226 | 98.2 |
| Carroll | 16 | 75.8 | 14 | 68.8 | 31 | 71.8 | 25 | 123.7 | 27 | 119.6 |
| Champaign | 19 | 73.6 | 18 | 61.0 | 37 | 66.4 | 31 | 119.1 | 31 | 114.1 |
| Clark | 81 | 88.2 | 75 | 70.4 | 157 | 78.3 | 133 | 139.2 | 104 | 108.1 |
| Clermont | 100 | 79.6 | 94 | 63.4 | 194 | 70.1 | 185 | 136.5 | 128 | 94.5 |
| Clinton | 26 | 102.1 | 22 | 73.2 | 49 | 84.8 | 33 | 122.0 | 31 | 114.4 |
| Columbiana | 61 | 81.0 | 46 | 54.3 | 107 | 66.1 | 87 | 119.7 | 81 | 100.9 |
| Coshocton | 21 | 80.9 | 20 | 72.3 | 41 | 75.3 | 30 | 117.5 | 24 | 89.1 |
| Crawford | 27 | 88.5 | 23 | 72.0 | 50 | 78.9 | 28 | 89.7 | 32 | 99.4 |
| Cuyahoga | 523 | 67.8 | 574 | 57.7 | 1,098 | 61.7 | 1,187 | 136.1 | 1,153 | 139.4 |
| Darke | 28 | 77.8 | 17 | 41.1 | 44 | 57.8 | 43 | 119.9 | 28 | 75.6 |
| Defiance | 22 | 85.2 | 18 | 63.1 | 39 | 72.4 | 30 | 113.3 | 35 | 127.3 |
| Delaware | 49 | 46.7 | 55 | 44.6 | 104 | 45.4 | 177 | 143.8 | 181 | 148.1 |
| Erie | 41 | 68.6 | 34 | 52.2 | 75 | 59.5 | 70 | 122.0 | 65 | 104.3 |
| Fairfield | 64 | 70.3 | 52 | 48.1 | 116 | 57.6 | 129 | 131.0 | 139 | 142.7 |
| Fayette | 16 | 86.3 | 15 | 71.7 | 31 | 78.2 | 28 | 144.3 | 19 | 104.1 |
| Franklin | 399 | 69.4 | 381 | 53.3 | 780 | 60.0 | 973 | 138.4 | 849 | 132.8 |
| Fulton | 14 | 50.7 | 17 | 53.6 | 31 | 52.2 | 30 | 112.6 | 35 | 118.3 |
| Gallia | 23 | 112.2 | 15 | 65.7 | 37 | 86.5 | 21 | 103.3 | 22 | 107.0 |
| Geauga | 35 | 50.8 | 36 | 45.9 | 71 | 47.6 | 102 | 151.9 | 86 | 112.4 |
| Greene | 60 | 59.5 | 63 | 53.3 | 123 | 55.6 | 156 | 145.6 | 121 | 110.8 |
| Guernsey | 27 | 96.6 | 25 | 84.6 | 52 | 89.5 | 28 | 111.7 | 31 | 105.6 |
| Hamilton | 321 | 73.0 | 342 | 60.9 | 663 | 65.9 | 706 | 138.8 | 616 | 126.0 |
| Hancock | 30 | 62.4 | 25 | 44.6 | 54 | 52.6 | 59 | 126.0 | 40 | 80.3 |
| Hardin | 19 | 106.4 | 14 | 66.3 | 32 | 83.9 | 25 | 136.4 | 16 | 87.7 |
| Harrison | 11 | 90.5 | 7 | 65.0 | 18 | 75.8 | 14 | 129.9 | 11 | 92.6 |
| Henry | 16 | 85.7 | 11 | 52.4 | 27 | 67.8 | 23 | 121.9 | 18 | 95.0 |
| Highland | 30 | 102.0 | 24 | 76.1 | 54 | 87.8 | 34 | 116.0 | 31 | 105.5 |
| Hocking | 21 | 105.8 | 17 | 77.7 | 38 | 90.3 | 22 | 110.0 | 22 | 98.3 |
| Holmes | 11 | 49.6 | 8 | 32.4 | 20 | 41.1 | 19 | 81.4 | 16 | 72.4 |
| Huron | 27 | 75.2 | 23 | 54.1 | 51 | 63.4 | 49 | 131.4 | 40 | 103.8 |
| Jackson | 21 | 102.6 | 19 | 79.5 | 40 | 89.3 | 25 | 120.2 | 17 | 84.2 |
| Jefferson | 43 | 87.4 | 36 | 64.2 | 79 | 74.5 | 61 | 120.6 | 61 | 118.8 |
| Knox | 26 | 67.1 | 25 | 52.3 | 51 | 58.2 | 51 | 123.4 | 58 | 135.6 |
| Lake | 103 | 64.9 | 121 | 62.7 | 223 | 63.2 | 239 | 141.4 | 193 | 113.3 |
| Lawrence | 45 | 115.1 | 39 | 83.8 | 84 | 97.1 | 55 | 133.2 | 43 | 105.5 |

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

## TABLE A-4. Average Annual Number of New Invasive Cancer Cases and Age-Adjusted Incidence Rates by County and Sex in Ohio, 2017-2021 (Continued)

| REGION | ALL SITES / TYPES | | | | | | COLON AND RECTUM | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Total | | Male | | Female | | Total | |
| | Cases | Rate | Cases | Rate | Cases | Rate | Cases | Rate | Cases | Rate | Cases | Rate |
| **Ohio** | **35,966** | **511.3** | **34,463** | **444.4** | **70,429** | **470.0** | **3,001** | **44.4** | **2,706** | **34.2** | **5,707** | **38.9** |
| Licking | 556 | 530.0 | 543 | 472.1 | 1,099 | 494.1 | 48 | 47.9 | 39 | 33.9 | 87 | 40.4 |
| Logan | 140 | 460.4 | 130 | 421.6 | 270 | 435.9 | 11 | 35.2 | 10 | 30.7 | 20 | 32.7 |
| Lorain | 1,031 | 518.5 | 996 | 469.3 | 2,027 | 486.7 | 78 | 40.3 | 76 | 34.7 | 153 | 37.3 |
| Lucas | 1,305 | 532.8 | 1,224 | 437.9 | 2,530 | 476.8 | 119 | 50.1 | 96 | 33.4 | 214 | 40.7 |
| Madison | 143 | 536.3 | 124 | 471.9 | 267 | 490.1 | 15 | 55.6 | 15 | 50.3 | 29 | 53.4 |
| Mahoning | 772 | 488.4 | 705 | 407.4 | 1,477 | 438 | 68 | 44.1 | 62 | 32.6 | 129 | 37.7 |
| Marion | 227 | 537.7 | 201 | 480.9 | 427 | 495.9 | 20 | 47.3 | 18 | 42.6 | 37 | 45.0 |
| Medina | 615 | 521.6 | 579 | 468.6 | 1,194 | 488.1 | 47 | 42.5 | 40 | 32.2 | 87 | 36.7 |
| Meigs | 91 | 569.8 | 71 | 444.6 | 162 | 500.8 | 8 | 44.3 | 6 | 33.9 | 14 | 39.6 |
| Mercer | 125 | 456.6 | 113 | 423.6 | 239 | 436.6 | 14 | 53.9 | 10 | 36.7 | 24 | 45.4 |
| Miami | 343 | 506.0 | 332 | 455.6 | 676 | 473.1 | 28 | 42.5 | 25 | 33.3 | 53 | 38.0 |
| Monroe | 57 | 517.6 | 48 | 497.6 | 105 | 503.8 | 5 | 46.9 | 4 | 38.2 | 9 | 42.4 |
| Montgomery | 1,687 | 529.1 | 1,706 | 464.4 | 3,393 | 488.3 | 134 | 43.6 | 129 | 34.6 | 264 | 38.6 |
| Morgan | 55 | 523.4 | 48 | 458.4 | 103 | 488.5 | 4 | 37.4 | 3 | 26.2 | 7 | 31.7 |
| Morrow | 108 | 464.7 | 99 | 419.3 | 207 | 437.4 | 8 | 34.6 | 8 | 30.4 | 15 | 32.8 |
| Muskingum | 294 | 553.8 | 277 | 485.5 | 572 | 509.4 | 23 | 45 | 23 | 39.1 | 46 | 41.8 |
| Noble | 50 | 339.1 | 35 | 436.1 | 84 | 370.0 | 5 | 33.5 | 4 | 43.1 | 9 | 41.6 |
| Ottawa | 181 | 520.8 | 157 | 485.2 | 338 | 497.0 | 17 | 52.1 | 11 | 34.0 | 29 | 42.7 |
| Paulding | 63 | 496.7 | 49 | 373.5 | 112 | 428.1 | 7 | 54.3 | 6 | 41.8 | 13 | 48.9 |
| Perry | 120 | 542.7 | 115 | 492.5 | 235 | 505.8 | 9 | 45.7 | 10 | 44.0 | 20 | 43.5 |
| Pickaway | 188 | 544.1 | 163 | 452.9 | 351 | 489.1 | 16 | 48.1 | 16 | 43.4 | 32 | 45.5 |
| Pike | 99 | 574.6 | 98 | 542.3 | 197 | 553.0 | 8 | 48.7 | 7 | 37.6 | 15 | 42.9 |
| Portage | 470 | 479.7 | 455 | 442.8 | 925 | 456.9 | 40 | 43.0 | 39 | 38.3 | 79 | 40.4 |
| Preble | 147 | 530.4 | 134 | 468.3 | 281 | 494.0 | 13 | 47.0 | 10 | 34.1 | 23 | 40.3 |
| Putnam | 106 | 482.3 | 94 | 420.3 | 200 | 444.4 | 10 | 46.9 | 6 | 26.9 | 16 | 36.4 |
| Richland | 426 | 526.9 | 394 | 459.1 | 819 | 483.3 | 32 | 42.0 | 34 | 37.8 | 66 | 39.7 |
| Ross | 285 | 589.8 | 239 | 479.7 | 524 | 520.7 | 25 | 54.2 | 17 | 33.0 | 43 | 43.3 |
| Sandusky | 197 | 506.7 | 181 | 448.1 | 379 | 468.9 | 20 | 56.5 | 16 | 39.3 | 37 | 46.9 |
| Scioto | 242 | 525.3 | 229 | 462.2 | 470 | 485.3 | 21 | 47.7 | 17 | 31.8 | 38 | 39.2 |
| Seneca | 185 | 525.5 | 174 | 475.1 | 360 | 493.9 | 17 | 49.8 | 15 | 38.7 | 32 | 44.5 |
| Shelby | 135 | 471.1 | 127 | 422.8 | 262 | 437.9 | 12 | 44.8 | 11 | 33.7 | 24 | 38.7 |
| Stark | 1,198 | 493.6 | 1,150 | 431 | 2,349 | 455.1 | 96 | 40.8 | 81 | 29.2 | 177 | 34.5 |
| Summit | 1,659 | 499.1 | 1,636 | 440.5 | 3,296 | 461.4 | 134 | 41.4 | 118 | 30.2 | 252 | 35.4 |
| Trumbull | 659 | 461.5 | 611 | 400.3 | 1,270 | 424.4 | 54 | 40.7 | 53 | 33.2 | 108 | 36.6 |
| Tuscarawas | 302 | 497.7 | 280 | 433.8 | 582 | 458.6 | 26 | 45.4 | 32 | 48.6 | 58 | 47.2 |
| Union | 162 | 531.0 | 138 | 402.1 | 300 | 458.4 | 14 | 50.7 | 9 | 27.1 | 24 | 37.6 |
| Van Wert | 88 | 476.3 | 79 | 394.1 | 167 | 428.7 | 8 | 49.0 | 8 | 39.2 | 16 | 44.5 |
| Vinton | 47 | 549.2 | 39 | 446.8 | 86 | 490.5 | 5 | 57.7 | 4 | 39.9 | 8 | 48.9 |
| Warren | 660 | 498.6 | 639 | 443.1 | 1,298 | 463.5 | 50 | 38.2 | 42 | 29.1 | 92 | 33.4 |
| Washington | 274 | 628.1 | 213 | 479.9 | 487 | 544.7 | 22 | 54.0 | 18 | 40.1 | 41 | 46.6 |
| Wayne | 342 | 470.9 | 309 | 411.3 | 651 | 434.4 | 27 | 38.6 | 28 | 36.5 | 55 | 37.1 |
| Williams | 113 | 468.3 | 101 | 382.1 | 214 | 416.4 | 15 | 59.6 | 12 | 41.9 | 26 | 49.8 |
| Wood | 358 | 507.0 | 347 | 445.2 | 706 | 466.9 | 33 | 49.0 | 28 | 36.2 | 61 | 42.3 |
| Wyandot | 65 | 442.7 | 66 | 423.1 | 131 | 426.6 | 5 | 32.1 | 5 | 31.5 | 10 | 32.5 |

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

## **TABLE A-4.** Average Annual Number of New Invasive Cancer Cases and Age-Adjusted Incidence Rates by County and Sex in Ohio, 2017-2021 (Continued)

| REGION | LUNG AND BRONCHUS | | | | | | BREAST | | PROSTATE | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Total | | Female | | Male | |
| | Cases | Rate | Cases | Rate | Cases | Rate | Cases | Rate | Cases | Rate |
| **Ohio** | **5,224** | **73.2** | **4,895** | **57.6** | **10,119** | **64.3** | **10,071** | **132.3** | **9,032** | **118.1** |
| Licking | 86 | 82.1 | 82 | 66.1 | 168 | 72.8 | 160 | 138.2 | 138 | 119.7 |
| Logan | 23 | 74.0 | 19 | 55.3 | 42 | 63.4 | 33 | 112.2 | 31 | 91.6 |
| Lorain | 140 | 68.9 | 134 | 55.9 | 273 | 61.6 | 295 | 142.2 | 270 | 124.4 |
| Lucas | 175 | 70.4 | 187 | 61.0 | 362 | 65.0 | 355 | 131.5 | 340 | 126.8 |
| Madison | 24 | 91.3 | 16 | 57.0 | 41 | 71.7 | 32 | 125.6 | 35 | 125.5 |
| Mahoning | 110 | 67.8 | 93 | 47.3 | 203 | 56.2 | 201 | 119.3 | 214 | 124.7 |
| Marion | 43 | 102.0 | 35 | 77.3 | 78 | 86.7 | 58 | 142.1 | 46 | 100.4 |
| Medina | 72 | 60.8 | 74 | 54.0 | 146 | 56.7 | 170 | 138.6 | 176 | 136.1 |
| Meigs | 18 | 110.8 | 12 | 71.5 | 30 | 89.6 | 17 | 107.8 | 19 | 109.4 |
| Mercer | 15 | 55.0 | 13 | 46.2 | 29 | 50.1 | 31 | 117.1 | 34 | 114.9 |
| Miami | 53 | 76.2 | 43 | 52.0 | 96 | 62.5 | 103 | 144.7 | 82 | 109.7 |
| Monroe | 10 | 87.7 | 5 | 45.0 | 15 | 65.6 | 12 | 114.6 | 13 | 109.7 |
| Montgomery | 249 | 77.7 | 256 | 62.6 | 505 | 68.8 | 523 | 144.8 | 402 | 116.9 |
| Morgan | 12 | 105.5 | 8 | 72.2 | 21 | 88.5 | 13 | 135.3 | 12 | 99.5 |
| Morrow | 20 | 82.3 | 15 | 59.7 | 35 | 70.0 | 29 | 121.0 | 27 | 104.7 |
| Muskingum | 50 | 93.3 | 41 | 64.6 | 91 | 76.5 | 78 | 138.2 | 70 | 123.7 |
| Noble | 8 | 43.3 | 5 | 62.7 | 13 | 50.4 | 9 | 109.6 | 13 | 67.5 |
| Ottawa | 24 | 64.4 | 21 | 54.7 | 45 | 59.2 | 47 | 144.1 | 46 | 120.6 |
| Paulding | 9 | 75.3 | 8 | 52.9 | 17 | 62.9 | 11 | 90.1 | 17 | 121.4 |
| Perry | 22 | 95.7 | 22 | 88.3 | 44 | 89.8 | 29 | 127.0 | 28 | 110.6 |
| Pickaway | 32 | 92.6 | 27 | 68.4 | 58 | 79.3 | 41 | 112.3 | 36 | 97.5 |
| Pike | 23 | 123.7 | 19 | 88.4 | 41 | 105.3 | 22 | 128.0 | 16 | 87.0 |
| Portage | 67 | 66.9 | 62 | 55.3 | 129 | 60.6 | 129 | 128.6 | 113 | 101.9 |
| Preble | 29 | 98.0 | 20 | 68.2 | 49 | 81.4 | 44 | 148.2 | 32 | 109.8 |
| Putnam | 12 | 54.3 | 11 | 46.6 | 23 | 49.0 | 34 | 155.1 | 30 | 126.2 |
| Richland | 65 | 77.8 | 55 | 57.2 | 120 | 66.0 | 100 | 122.3 | 106 | 122.6 |
| Ross | 55 | 108.5 | 44 | 78.6 | 99 | 91.7 | 58 | 116.8 | 54 | 106.0 |
| Sandusky | 27 | 66.7 | 28 | 63.9 | 55 | 64.4 | 48 | 119.7 | 51 | 117.7 |
| Scioto | 50 | 105.9 | 38 | 69.0 | 88 | 85.6 | 49 | 99.4 | 46 | 92.7 |
| Seneca | 27 | 73.8 | 24 | 58.6 | 52 | 65.8 | 49 | 135.2 | 41 | 105.7 |
| Shelby | 22 | 77.0 | 14 | 42.4 | 36 | 57.3 | 34 | 118.6 | 27 | 85.1 |
| Stark | 180 | 72.1 | 155 | 52.5 | 335 | 60.9 | 336 | 127.7 | 281 | 105.8 |
| Summit | 231 | 68.0 | 221 | 53.7 | 452 | 59.6 | 484 | 133.4 | 399 | 109.3 |
| Trumbull | 113 | 76.5 | 94 | 55.0 | 207 | 64.4 | 172 | 114.6 | 153 | 98.0 |
| Tuscarawas | 49 | 79.5 | 38 | 53.3 | 87 | 64.9 | 75 | 112.9 | 79 | 117.9 |
| Union | 19 | 63.7 | 16 | 45.8 | 34 | 53.5 | 43 | 123.9 | 42 | 122.0 |
| Van Wert | 11 | 58.8 | 12 | 54.0 | 24 | 55.5 | 21 | 106.5 | 25 | 125.8 |
| Vinton | 10 | 113.1 | 8 | 82.6 | 18 | 96.9 | 9 | 102.0 | 8 | 77.1 |
| Warren | 80 | 61.9 | 74 | 48.4 | 154 | 54.3 | 211 | 143.7 | 175 | 119.9 |
| Washington | 41 | 90.6 | 35 | 68.5 | 76 | 78.1 | 59 | 131.9 | 77 | 160.0 |
| Wayne | 53 | 71.0 | 40 | 48.1 | 93 | 58.4 | 90 | 120.0 | 82 | 104.0 |
| Williams | 20 | 83.7 | 13 | 43.8 | 33 | 61.6 | 30 | 113.4 | 26 | 103.7 |
| Wood | 40 | 56.6 | 43 | 49.5 | 83 | 52.1 | 99 | 130.1 | 95 | 125.5 |
| Wyandot | 12 | 78.7 | 10 | 59.2 | 22 | 65.5 | 17 | 105.8 | 12 | 73.0 |

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

## TABLE A-5. Average Annual Number of Cancer Deaths and Age-Adjusted Mortality Rates by County and Sex in Ohio, 2017-2021

| REGION | ALL SITES / TYPES | | | | | | COLON AND RECTUM | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Total | | Male | | Female | | Total | |
| | Deaths | Rate | Deaths | Rate | Deaths | Rate | Deaths | Rate | Deaths | Rate | Deaths | Rate |
| **Ohio** | **13,326** | **198.4** | **11,858** | **140.9** | **25,183** | **164.6** | **1,140** | **17.2** | **1,009** | **11.9** | **2,149** | **14.3** |
| Adams | 51 | 284.9 | 39 | 204.2 | 90 | 241.1 | 4 | 25.0 | 5 | 27.8 | 10 | 26.6 |
| Allen | 128 | 212.9 | 99 | 133.5 | 227 | 167.1 | 10 | 16.6 | 9 | 13.6 | 19 | 14.7 |
| Ashland | 69 | 202.2 | 57 | 137.4 | 126 | 165.5 | 9 | 28.2 | 7 | 15.8 | 16 | 21.2 |
| Ashtabula | 137 | 216.7 | 113 | 151.8 | 250 | 180.0 | 11 | 19.0 | 8 | 10.0 | 19 | 14.0 |
| Athens | 57 | 215.0 | 48 | 136.4 | 105 | 165.7 | 7 | 28.2 | 3 | 8.9 | 11 | 17.1 |
| Auglaize | 55 | 193.8 | 47 | 135.4 | 102 | 159.9 | 6 | 21.9 | 4 | 12.2 | 10 | 16.5 |
| Belmont | 93 | 207.2 | 74 | 132.2 | 167 | 163.7 | 8 | 17.6 | 8 | 11.5 | 16 | 14.3 |
| Brown | 62 | 218.9 | 52 | 164.3 | 114 | 189.4 | 6 | 23.0 | 4 | 13.4 | 10 | 17.7 |
| Butler | 374 | 190.9 | 341 | 138.9 | 715 | 160.3 | 33 | 17.1 | 27 | 11.1 | 60 | 13.7 |
| Carroll | 40 | 202.6 | 32 | 151.5 | 72 | 174.1 | 3 | 14.6 | 2 | 11.9 | 5 | 12.6 |
| Champaign | 48 | 197.8 | 41 | 145.0 | 89 | 166.2 | 6 | 26.8 | 4 | 13.2 | 10 | 19.3 |
| Clark | 181 | 209.2 | 158 | 147.9 | 339 | 174.0 | 14 | 17.6 | 14 | 13.4 | 28 | 15.4 |
| Clermont | 237 | 200.5 | 203 | 141.3 | 440 | 166.1 | 21 | 17.4 | 15 | 10.8 | 36 | 13.7 |
| Clinton | 57 | 227.8 | 50 | 164.7 | 107 | 191.3 | 7 | 27.2 | 4 | 11.9 | 10 | 18.5 |
| Columbiana | 156 | 222.3 | 118 | 143.9 | 274 | 177.0 | 14 | 19.8 | 11 | 12.5 | 24 | 16.1 |
| Coshocton | 50 | 213.4 | 40 | 143.6 | 90 | 174.0 | 3 | 12.1 | 4 | 15.1 | 7 | 13.6 |
| Crawford | 65 | 228.0 | 52 | 153.4 | 118 | 185.0 | 6 | 22.3 | 5 | 14.5 | 11 | 17.5 |
| Cuyahoga | 1,478 | 199.6 | 1,417 | 141.9 | 2,895 | 164.9 | 128 | 17.6 | 117 | 11.4 | 245 | 14.1 |
| Darke | 70 | 206.4 | 57 | 141.3 | 127 | 167.5 | 7 | 20.8 | 7 | 17.0 | 14 | 17.7 |
| Defiance | 48 | 198.8 | 42 | 144.0 | 90 | 165.7 | 5 | 21.1 | 5 | 16.8 | 9 | 18.8 |
| Delaware | 142 | 146.0 | 137 | 113.8 | 279 | 127.4 | 12 | 12.6 | 11 | 9.1 | 23 | 10.7 |
| Erie | 109 | 194.5 | 93 | 140.2 | 202 | 164.8 | 10 | 17.7 | 11 | 15.2 | 20 | 16.5 |
| Fairfield | 164 | 189.4 | 142 | 135.9 | 306 | 158.0 | 12 | 13.9 | 9 | 8.7 | 22 | 11.0 |
| Fayette | 42 | 265.2 | 33 | 162.3 | 76 | 205.6 | 5 | 35.8 | 5 | 24.2 | 10 | 28.4 |
| Franklin | 998 | 185.3 | 958 | 134.7 | 1,956 | 155.1 | 76 | 13.8 | 70 | 10.0 | 146 | 11.6 |
| Fulton | 56 | 219.1 | 44 | 140.1 | 100 | 173.4 | 6 | 22.0 | 5 | 13.9 | 10 | 17.6 |
| Gallia | 50 | 273.4 | 32 | 139.8 | 82 | 199.3 | 3 | 16.1 | 2 | 9.4 | 5 | 12.8 |
| Geauga | 106 | 163.5 | 92 | 116.0 | 198 | 134.8 | 7 | 12.1 | 8 | 9.8 | 15 | 10.7 |
| Greene | 169 | 176.3 | 154 | 132.7 | 323 | 150.3 | 11 | 11.5 | 10 | 8.8 | 21 | 10.0 |
| Guernsey | 59 | 229.2 | 45 | 157.7 | 104 | 189.0 | 4 | 14.8 | 5 | 15.9 | 9 | 15.7 |
| Hamilton | 805 | 191.2 | 782 | 139.0 | 1,588 | 160.3 | 70 | 16.7 | 66 | 11.6 | 136 | 13.9 |
| Hancock | 88 | 200.6 | 71 | 129.9 | 159 | 160.5 | 9 | 19.9 | 8 | 15.3 | 17 | 17.6 |
| Hardin | 39 | 227.1 | 32 | 164.9 | 71 | 192.2 | 5 | 33.2 | 2 | 11.9 | 8 | 21.8 |
| Harrison | 26 | 246.8 | 16 | 127.3 | 41 | 180.3 | 2 | 23.8 | <2 | * | 4 | 17.4 |
| Henry | 37 | 212.7 | 26 | 125.5 | 63 | 163.7 | 4 | 25.2 | 3 | 11.9 | 7 | 17.9 |
| Highland | 62 | 231.2 | 53 | 169.1 | 115 | 196.0 | 7 | 27.5 | 5 | 16.4 | 12 | 21.9 |
| Hocking | 42 | 226.5 | 34 | 161.9 | 76 | 191.4 | 4 | 23.5 | 3 | 14.2 | 7 | 18.8 |
| Holmes | 38 | 179.7 | 33 | 133.4 | 71 | 151.7 | 2 | 12.4 | 3 | 11.3 | 5 | 11.3 |
| Huron | 72 | 209.9 | 59 | 146.1 | 131 | 174.5 | 6 | 17.1 | 6 | 15.1 | 12 | 16.4 |
| Jackson | 47 | 250.8 | 40 | 179.9 | 87 | 209.2 | 4 | 23.3 | 5 | 20.2 | 9 | 22.0 |
| Jefferson | 106 | 231.7 | 84 | 149.2 | 190 | 185.1 | 11 | 25.0 | 7 | 12.6 | 19 | 18.5 |
| Knox | 75 | 198.2 | 64 | 143.6 | 139 | 165.5 | 7 | 19.8 | 5 | 12.4 | 12 | 15.3 |
| Lake | 282 | 186.9 | 264 | 136.0 | 545 | 156.4 | 26 | 17.4 | 21 | 11.8 | 47 | 14.2 |
| Lawrence | 101 | 273.6 | 80 | 184.5 | 180 | 222.6 | 8 | 21.4 | 7 | 16.0 | 15 | 18.6 |

Source: SEER*Stat Database: Mortality - All COD, Aggregated With County, Total U.S. (1990-2021), National Cancer Institute, released May 2024. Underlying mortality data provided by the National Center for Health Statistics.

* Rate not calculated when the 2017-2021 death count is less than 10 (i.e., the average annual number is less than two).

## TABLE A-5. Average Annual Number of Cancer Deaths and Age-Adjusted Mortality Rates by County and Sex in Ohio, 2017-2021 (Continued)

| REGION | LUNG AND BRONCHUS | | | | | | BREAST | | PROSTATE | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Total | | Female | | Male | |
| | Deaths | Rate | Deaths | Rate | Deaths | Rate | Deaths | Rate | Deaths | Rate |
| **Ohio** | **3,539** | **50.9** | **2,940** | **34.3** | **6,479** | **41.4** | **1,698** | **20.9** | **1,227** | **19.7** |
| Adams | 19 | 98.2 | 12 | 57.4 | 31 | 76.3 | 3 | 15.5 | 3 | 17.2 |
| Allen | 34 | 55.8 | 23 | 30.4 | 57 | 41.4 | 13 | 18.3 | 12 | 21.3 |
| Ashland | 15 | 42.5 | 12 | 27.8 | 27 | 34.7 | 7 | 16.8 | 6 | 17.6 |
| Ashtabula | 40 | 60.2 | 29 | 37.3 | 69 | 48.0 | 18 | 23.5 | 11 | 18.3 |
| Athens | 14 | 46.1 | 14 | 39.0 | 28 | 42.0 | 5 | 15.7 | 4 | 19.8 |
| Auglaize | 14 | 49.1 | 9 | 26.4 | 24 | 36.6 | 8 | 24.9 | 6 | 22.9 |
| Belmont | 30 | 66.5 | 20 | 35.9 | 50 | 49.0 | 10 | 18.7 | 8 | 19.6 |
| Brown | 21 | 70.8 | 15 | 44.9 | 36 | 57.0 | 6 | 18.0 | 4 | 16.9 |
| Butler | 99 | 49.0 | 93 | 37.2 | 192 | 42.0 | 50 | 21.3 | 33 | 19.1 |
| Carroll | 13 | 61.4 | 9 | 40.9 | 21 | 50.7 | 4 | 14.8 | 4 | 21.6 |
| Champaign | 11 | 42.2 | 14 | 46.8 | 24 | 44.2 | 5 | 18.3 | 4 | 17.4 |
| Clark | 52 | 57.8 | 41 | 37.9 | 93 | 46.5 | 22 | 22.3 | 14 | 16.6 |
| Clermont | 68 | 56.1 | 53 | 36.0 | 121 | 44.9 | 30 | 21.4 | 16 | 15.9 |
| Clinton | 18 | 72.3 | 14 | 47.2 | 33 | 57.7 | 7 | 25.9 | 4 | 21.1 |
| Columbiana | 42 | 56.1 | 29 | 35.1 | 71 | 44.4 | 17 | 21.2 | 14 | 20.2 |
| Coshocton | 13 | 50.9 | 10 | 37.4 | 23 | 42.7 | 6 | 20.0 | 5 | 22.1 |
| Crawford | 19 | 63.1 | 14 | 41.1 | 33 | 50.9 | 5 | 13.5 | 5 | 18.8 |
| Cuyahoga | 360 | 47.6 | 327 | 32.4 | 688 | 38.6 | 221 | 23.2 | 172 | 24.2 |
| Darke | 19 | 55.5 | 11 | 28.3 | 31 | 40.2 | 8 | 19.8 | 7 | 21.3 |
| Defiance | 13 | 53.8 | 10 | 35.2 | 23 | 42.1 | 4 | 12.8 | 3 | 13.5 |
| Delaware | 28 | 27.9 | 30 | 25.1 | 58 | 26.3 | 19 | 15.6 | 17 | 19.7 |
| Erie | 26 | 45.2 | 22 | 32.0 | 48 | 38.0 | 14 | 23.9 | 10 | 17.1 |
| Fairfield | 46 | 51.8 | 33 | 30.7 | 79 | 39.8 | 22 | 21.8 | 12 | 15.4 |
| Fayette | 11 | 62.4 | 9 | 43.1 | 20 | 51.7 | 4 | 21.3 | 4 | 27.1 |
| Franklin | 257 | 46.7 | 221 | 31.1 | 479 | 37.6 | 147 | 20.5 | 89 | 18.8 |
| Fulton | 12 | 43.5 | 11 | 35.3 | 23 | 38.9 | 5 | 17.0 | 4 | 16.0 |
| Gallia | 15 | 77.4 | 8 | 34.8 | 24 | 53.9 | 4 | 15.4 | 4 | 22.1 |
| Geauga | 26 | 38.7 | 20 | 24.5 | 46 | 30.5 | 15 | 19.3 | 11 | 16.8 |
| Greene | 41 | 40.4 | 40 | 34.2 | 81 | 36.7 | 21 | 18.4 | 16 | 18.3 |
| Guernsey | 19 | 69.8 | 15 | 51.6 | 35 | 59.0 | 3 | 12.3 | 5 | 19.3 |
| Hamilton | 199 | 45.9 | 199 | 35.0 | 398 | 39.6 | 113 | 20.9 | 85 | 21.5 |
| Hancock | 19 | 41.8 | 15 | 28.4 | 35 | 34.3 | 8 | 15.1 | 7 | 18.8 |
| Hardin | 12 | 70.2 | 10 | 47.0 | 22 | 57.1 | 5 | 28.6 | 2 | 17.5 |
| Harrison | 8 | 67.2 | 4 | 34.5 | 12 | 48.3 | <2 | * | <2 | * |
| Henry | 10 | 56.5 | 5 | 26.1 | 15 | 39.8 | 6 | 27.6 | 3 | 20.5 |
| Highland | 20 | 71.3 | 16 | 50.2 | 36 | 59.9 | 7 | 23.6 | 4 | 15.5 |
| Hocking | 15 | 77.2 | 11 | 47.4 | 25 | 61.0 | 5 | 27.4 | 3 | 15.2 |
| Holmes | 8 | 34.8 | 6 | 23.7 | 14 | 29.5 | 5 | 21.2 | 8 | 40.5 |
| Huron | 18 | 53.0 | 14 | 33.6 | 32 | 41.9 | 7 | 19.1 | 6 | 20.2 |
| Jackson | 15 | 79.0 | 10 | 44.0 | 25 | 58.8 | 5 | 23.5 | 3 | 21.9 |
| Jefferson | 30 | 61.8 | 22 | 37.6 | 52 | 48.6 | 9 | 16.9 | 7 | 17.3 |
| Knox | 20 | 49.8 | 15 | 33.4 | 35 | 40.4 | 9 | 20.9 | 8 | 21.5 |
| Lake | 70 | 45.5 | 69 | 35.3 | 139 | 39.5 | 35 | 18.8 | 30 | 21.2 |
| Lawrence | 32 | 81.1 | 22 | 49.1 | 54 | 63.4 | 10 | 23.3 | 10 | 29.8 |

Source: SEER*Stat Database: Mortality - All COD, Aggregated With County, Total U.S. (1990-2021), National Cancer Institute, released May 2024. Underlying mortality data provided by the National Center for Health Statistics.

* Rate not calculated when the 2017-2021 death count is less than 10 (i.e., the average annual number is less than two).

## TABLE A-5. Average Annual Number of Cancer Deaths and Age-Adjusted Mortality Rates by County and Sex in Ohio, 2017-2021 (Continued)

| REGION | ALL SITES / TYPES | | | | | | COLON AND RECTUM | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Total | | Male | | Female | | Total | |
| | Deaths | Rate | Deaths | Rate | Deaths | Rate | Deaths | Rate | Deaths | Rate | Deaths | Rate |
| **Ohio** | **13,326** | **198.4** | **11,858** | **140.9** | **25,183** | **164.6** | **1,140** | **17.2** | **1,009** | **11.9** | **2,149** | **14.3** |
| Licking | 188 | 191.2 | 182 | 149.7 | 370 | 166.1 | 15 | 15.6 | 14 | 11.7 | 28 | 13.3 |
| Logan | 56 | 193.9 | 56 | 160.9 | 112 | 174.8 | 6 | 19.3 | 5 | 13.7 | 11 | 16.7 |
| Lorain | 366 | 192.7 | 327 | 139.2 | 692 | 161.2 | 29 | 15.2 | 22 | 9.1 | 51 | 11.9 |
| Lucas | 506 | 219.8 | 454 | 152.8 | 960 | 179.7 | 47 | 20.5 | 38 | 12.6 | 85 | 15.9 |
| Madison | 48 | 204.6 | 45 | 162.9 | 93 | 176.2 | 6 | 25.1 | 4 | 13.3 | 9 | 18.3 |
| Mahoning | 291 | 187.3 | 253 | 123.8 | 543 | 150.5 | 27 | 18.2 | 29 | 13.7 | 56 | 15.8 |
| Marion | 85 | 215.3 | 65 | 144.1 | 150 | 172.1 | 8 | 20.4 | 6 | 13.4 | 14 | 16.4 |
| Medina | 193 | 173.6 | 166 | 124.2 | 359 | 144.8 | 14 | 13.5 | 12 | 8.7 | 26 | 10.7 |
| Meigs | 34 | 228.7 | 26 | 152.8 | 60 | 184.5 | 3 | 17.5 | <2 | * | 4 | 13.0 |
| Mercer | 47 | 177.1 | 39 | 130.7 | 86 | 150.9 | 5 | 20.5 | 4 | 14.3 | 10 | 17.1 |
| Miami | 124 | 190.5 | 116 | 141.9 | 240 | 160.5 | 10 | 15.0 | 10 | 12.6 | 20 | 13.6 |
| Monroe | 22 | 199.5 | 16 | 141.3 | 37 | 167.4 | <2 | * | <2 | * | 3 | 13.2 |
| Montgomery | 635 | 203.5 | 587 | 145.7 | 1,222 | 169.2 | 51 | 16.2 | 52 | 13.2 | 103 | 14.6 |
| Morgan | 23 | 218.6 | 17 | 149.9 | 40 | 182.8 | <2 | * | <2 | * | 3 | 12.4 |
| Morrow | 49 | 224.6 | 37 | 152.2 | 85 | 184.1 | 4 | 20.5 | 3 | 11.5 | 8 | 15.8 |
| Muskingum | 116 | 228.5 | 88 | 139.4 | 205 | 176.4 | 7 | 13.8 | 8 | 13.1 | 15 | 13.5 |
| Noble | 19 | 119.4 | 14 | 149.6 | 32 | 125.6 | 3 | 16.8 | <2 | * | 4 | 14.2 |
| Ottawa | 68 | 197.3 | 62 | 168.3 | 131 | 180.1 | 7 | 19.3 | 4 | 10.9 | 11 | 15.0 |
| Paulding | 29 | 246.5 | 21 | 150.0 | 49 | 192.7 | 3 | 25.0 | 3 | 20.8 | 6 | 23.0 |
| Perry | 45 | 223.0 | 39 | 168.5 | 84 | 189.4 | 2 | 10.4 | 3 | 13.5 | 5 | 11.9 |
| Pickaway | 79 | 248.9 | 57 | 149.6 | 136 | 192.9 | 8 | 23.9 | 5 | 12.4 | 12 | 17.4 |
| Pike | 44 | 254.6 | 35 | 175.7 | 79 | 212.0 | 5 | 26.1 | 2 | 12.1 | 7 | 18.5 |
| Portage | 183 | 194.9 | 166 | 152.1 | 349 | 171.0 | 14 | 16.1 | 16 | 14.3 | 31 | 15.2 |
| Preble | 59 | 216.2 | 49 | 163.1 | 108 | 186.9 | 5 | 19.1 | 4 | 13.8 | 9 | 16.2 |
| Putnam | 36 | 171.4 | 27 | 104.8 | 63 | 133.1 | 2 | 10.6 | <2 | * | 4 | 8.7 |
| Richland | 158 | 196.2 | 152 | 156.4 | 310 | 173.0 | 16 | 20.9 | 13 | 14.3 | 29 | 17.0 |
| Ross | 105 | 238.2 | 76 | 144.9 | 181 | 182.3 | 10 | 22.8 | 5 | 10.0 | 15 | 16.2 |
| Sandusky | 76 | 202.1 | 67 | 150.7 | 143 | 172.0 | 7 | 19.5 | 6 | 13.8 | 13 | 16.1 |
| Scioto | 112 | 253.0 | 90 | 163.7 | 202 | 201.3 | 11 | 26.6 | 6 | 10.4 | 17 | 17.7 |
| Seneca | 72 | 214.3 | 62 | 152.5 | 134 | 177.4 | 6 | 17.9 | 8 | 18.3 | 14 | 18.6 |
| Shelby | 58 | 210.6 | 42 | 125.7 | 100 | 161.0 | 7 | 23.5 | 6 | 15.3 | 12 | 19.1 |
| Stark | 488 | 205.0 | 427 | 142.9 | 916 | 168.4 | 33 | 14.2 | 35 | 11.6 | 68 | 12.8 |
| Summit | 624 | 195.0 | 568 | 139.2 | 1,192 | 161.8 | 48 | 14.9 | 48 | 11.4 | 95 | 13.0 |
| Trumbull | 267 | 191.2 | 229 | 134.8 | 496 | 158.5 | 19 | 13.7 | 22 | 13.1 | 41 | 13.4 |
| Tuscarawas | 120 | 201.0 | 108 | 148.6 | 228 | 170.4 | 12 | 21.7 | 12 | 15.6 | 24 | 18.2 |
| Union | 50 | 184.1 | 39 | 115.7 | 89 | 145.0 | 5 | 18.9 | 3 | 8.3 | 8 | 12.9 |
| Van Wert | 38 | 209.5 | 34 | 147.0 | 72 | 173.4 | 5 | 28.0 | 3 | 15.3 | 8 | 21.4 |
| Vinton | 20 | 258.2 | 16 | 180.2 | 36 | 215.3 | <2 | * | 3 | 28.9 | 4 | 25.6 |
| Warren | 197 | 162.2 | 182 | 123.4 | 379 | 139.5 | 17 | 14.4 | 12 | 8.3 | 29 | 11.0 |
| Washington | 89 | 212.6 | 72 | 145.2 | 161 | 173.9 | 8 | 21.8 | 6 | 11.8 | 15 | 16.5 |
| Wayne | 128 | 181.3 | 110 | 133.7 | 238 | 153.0 | 10 | 13.2 | 8 | 10.0 | 18 | 11.3 |
| Williams | 50 | 212.1 | 45 | 151.4 | 95 | 177.0 | 5 | 19.7 | 6 | 18.8 | 10 | 19.7 |
| Wood | 131 | 193.2 | 123 | 145.0 | 254 | 164.9 | 13 | 19.2 | 12 | 14.7 | 26 | 16.8 |
| Wyandot | 29 | 197.5 | 24 | 139.9 | 53 | 162.0 | <2 | * | 3 | 23.3 | 5 | 16.3 |

Source: SEER*Stat Database: Mortality - All COD, Aggregated With County, Total U.S. (1990-2021), National Cancer Institute, released May 2024. Underlying mortality data provided by the National Center for Health Statistics.

* Rate not calculated when the 2017-2021 death count is less than 10 (i.e., the average annual number is less than two).

## TABLE A-5. Average Annual Number of Cancer Deaths and Age-Adjusted Mortality Rates by County and Sex in Ohio, 2017-2021 (Continued)

| REGION | LUNG AND BRONCHUS | | | | | | BREAST | | PROSTATE | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Total | | Female | | Male | |
| | Deaths | Rate | Deaths | Rate | Deaths | Rate | Deaths | Rate | Deaths | Rate |
| **Ohio** | **3,539** | **50.9** | **2,940** | **34.3** | **6,479** | **41.4** | **1,698** | **20.9** | **1,227** | **19.7** |
| Licking | 60 | 58.8 | 51 | 40.7 | 111 | 48.2 | 27 | 22.8 | 15 | 17.0 |
| Logan | 16 | 54.6 | 16 | 44.8 | 32 | 48.6 | 6 | 19.1 | 4 | 16.4 |
| Lorain | 87 | 45.1 | 78 | 32.5 | 165 | 37.8 | 50 | 21.9 | 29 | 16.6 |
| Lucas | 123 | 52.1 | 119 | 38.8 | 242 | 44.3 | 63 | 22.1 | 47 | 22.1 |
| Madison | 16 | 63.2 | 11 | 38.6 | 26 | 48.6 | 7 | 26.0 | 4 | 20.4 |
| Mahoning | 80 | 50.3 | 59 | 28.6 | 139 | 38.0 | 34 | 16.9 | 27 | 18.2 |
| Marion | 23 | 59.7 | 19 | 39.7 | 42 | 47.2 | 8 | 18.8 | 6 | 15.6 |
| Medina | 50 | 42.7 | 40 | 28.8 | 89 | 34.8 | 21 | 15.5 | 18 | 17.4 |
| Meigs | 10 | 64.1 | 7 | 38.6 | 17 | 50.5 | 5 | 30.5 | 3 | 24.1 |
| Mercer | 10 | 39.0 | 8 | 27.2 | 19 | 32.6 | 5 | 16.3 | 4 | 14.7 |
| Miami | 33 | 47.9 | 31 | 35.9 | 63 | 41.1 | 16 | 19.9 | 12 | 19.5 |
| Monroe | 5 | 43.8 | 4 | 31.0 | 9 | 37.4 | <2 | * | <2 | * |
| Montgomery | 162 | 51.0 | 155 | 37.3 | 317 | 43.1 | 86 | 22.4 | 64 | 21.4 |
| Morgan | 7 | 61.2 | 5 | 40.9 | 11 | 49.7 | 2 | 21.0 | <2 | * |
| Morrow | 15 | 67.3 | 9 | 39.0 | 25 | 52.0 | 6 | 22.1 | 4 | 17.2 |
| Muskingum | 33 | 61.7 | 22 | 33.8 | 55 | 46.2 | 10 | 16.8 | 12 | 27.2 |
| Noble | 6 | 31.2 | 3 | 40.6 | 9 | 33.9 | <2 | * | <2 | * |
| Ottawa | 17 | 46.6 | 16 | 44.2 | 33 | 45.1 | 9 | 24.1 | 9 | 26.6 |
| Paulding | 9 | 70.4 | 4 | 27.3 | 13 | 48.2 | 3 | 21.0 | <2 | * |
| Perry | 16 | 76.1 | 13 | 50.9 | 28 | 61.2 | 3 | 15.3 | 3 | 17.1 |
| Pickaway | 22 | 68.4 | 18 | 44.6 | 40 | 55.3 | 8 | 22.4 | 4 | 16.0 |
| Pike | 16 | 85.9 | 10 | 47.6 | 26 | 66.0 | 6 | 32.5 | 3 | 17.6 |
| Portage | 50 | 51.3 | 39 | 34.4 | 89 | 42.1 | 23 | 21.6 | 13 | 15.0 |
| Preble | 19 | 67.7 | 14 | 46.4 | 34 | 55.8 | 6 | 20.0 | 6 | 23.1 |
| Putnam | 8 | 40.5 | 5 | 19.8 | 13 | 28.3 | 5 | 19.3 | 3 | 13.9 |
| Richland | 46 | 54.1 | 36 | 36.2 | 81 | 44.1 | 18 | 20.5 | 17 | 22.4 |
| Ross | 35 | 75.1 | 21 | 38.9 | 56 | 54.3 | 9 | 18.4 | 6 | 17.6 |
| Sandusky | 21 | 54.9 | 17 | 37.4 | 38 | 45.0 | 10 | 21.6 | 6 | 16.3 |
| Scioto | 37 | 81.1 | 27 | 48.1 | 64 | 62.6 | 15 | 27.7 | 8 | 18.3 |
| Seneca | 19 | 54.1 | 14 | 32.9 | 33 | 42.4 | 8 | 20.3 | 6 | 17.3 |
| Shelby | 16 | 55.5 | 9 | 26.5 | 25 | 39.2 | 6 | 18.8 | 6 | 21.4 |
| Stark | 135 | 54.6 | 98 | 32.2 | 233 | 41.9 | 64 | 22.7 | 46 | 20.4 |
| Summit | 155 | 46.7 | 138 | 33.2 | 293 | 39.0 | 82 | 20.8 | 60 | 20.0 |
| Trumbull | 82 | 58.1 | 63 | 36.2 | 145 | 45.7 | 34 | 20.7 | 18 | 13.9 |
| Tuscarawas | 35 | 55.8 | 24 | 33.1 | 59 | 43.0 | 17 | 22.8 | 8 | 14.6 |
| Union | 11 | 38.2 | 7 | 21.9 | 18 | 28.9 | 7 | 20.0 | 4 | 18.8 |
| Van Wert | 9 | 51.5 | 9 | 39.6 | 19 | 44.3 | 3 | 13.2 | 3 | 17.6 |
| Vinton | 8 | 86.0 | 4 | 45.0 | 11 | 65.1 | <2 | * | <2 | * |
| Warren | 53 | 41.5 | 46 | 30.3 | 99 | 35.2 | 32 | 21.7 | 16 | 15.2 |
| Washington | 25 | 55.5 | 19 | 38.5 | 44 | 46.1 | 13 | 26.3 | 7 | 17.7 |
| Wayne | 35 | 47.3 | 24 | 28.9 | 59 | 37.3 | 19 | 24.3 | 14 | 21.8 |
| Williams | 13 | 52.6 | 9 | 30.9 | 22 | 40.3 | 5 | 18.2 | 5 | 23.4 |
| Wood | 32 | 45.5 | 25 | 29.7 | 57 | 36.5 | 15 | 18.3 | 12 | 20.6 |
| Wyandot | 9 | 59.1 | 5 | 31.2 | 14 | 42.0 | 3 | 15.3 | 2 | 15.9 |

Source: SEER*Stat Database: Mortality - All COD, Aggregated With County, Total U.S. (1990-2021), National Cancer Institute, released May 2024. Underlying mortality data provided by the National Center for Health Statistics.

* Rate not calculated when the 2017-2021 death count is less than 10 (i.e., the average annual number is less than two).

## TABLE A-6. Ohio Five-Year Relative Survival by Cancer Site/Type and Stage at Diagnosis in Ohio, 2014-2020

| PRIMARY CANCER SITE / TYPE | *in situ* | Local | Regional | Distant | All Stages |
|---|---|---|---|---|---|
| **All Cancer Sites / Types** | **100%** | **92%** | **66%** | **30%** | **68%** |
| Bladder | 97% | 71% | 40% | 6% | 61% |
| Brain and Other CNS* | N/A | 36% | 22% | 33% | 33% |
| Breast | 100% | 100% | 87% | 31% | 92% |
| Cervix | N/A | 92% | 63% | 17% | 69% |
| Colon and Rectum | 94% | 91% | 74% | 16% | 66% |
| Esophagus | 69% | 49% | 24% | 4% | 20% |
| Hodgkin Lymphoma | N/A | 95% | 95% | 83% | 89% |
| Kidney and Renal Pelvis | 90% | 94% | 75% | 16% | 79% |
| Larynx | 95% | 79% | 51% | 34% | 62% |
| Leukemia | N/A | 82% | N/A | 64% | 64% |
| Liver and Intrahepatic Bile Duct | 100% | 35% | 14% | 5% | 21% |
| Lung and Bronchus | 64% | 60% | 34% | 8% | 26% |
| Melanoma of the Skin | 100% | 100% | 76% | 31% | 95% |
| Myeloma | N/A | 80% | N/A | 57% | 58% |
| Non-Hodgkin Lymphoma | N/A | 89% | 82% | 69% | 75% |
| Oral Cavity and Pharynx | 97% | 88% | 69% | 36% | 70% |
| Ovary | 98% | 92% | 62% | 29% | 51% |
| Pancreas | 97% | 37% | 14% | 3% | 11% |
| Prostate | 95% | 100% | 100% | 35% | 99% |
| Stomach | 71% | 75% | 34% | 8% | 37% |
| Testis | 81% | 99% | 96% | 73% | 96% |
| Thyroid | 100% | 100% | 98% | 44% | 99% |
| Uterus | 100% | 95% | 71% | 20% | 84% |

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024. Five-year relative survival was calculated based on cases diagnosed from 2014 to 2020 and followed through Dec. 31, 2021.

* Central Nervous System.

N/A = Statistic could not be calculated.

## **TABLE A-7.** American Cancer Society (ACS) and U.S. Preventive Services Task Force (USPSTF) Recommendations for the Early Detection of Cancer in Average Risk, Asymptomatic People

| AMERICAN CANCER SOCIETY | | | | U.S. PREVENTIVE SERVICES TASK FORCE | |
|---|---|---|---|---|---|
| **SEX** | **CANCER** | **AGE** | **TEST OR PROCEDURE** | **AGE** | **TEST OR PROCEDURE** |
| Female | Breast | 40 - 44[1] | Women at average risk for breast cancer have a choice to start annual mammograms if they wish to do so. | 40 - 74[2] | Mammogram every 2 years. |
| | | 45 - 54[1] | Mammogram every year. | 75+[2] | Evidence is insufficient to assess benefits and harms of screening. |
| | | 55+[1] | Mammograms every 2 years or continue yearly screening. | Women with Dense Breasts[1] | Evidence is insufficient to assess benefits and harms of supplemental (ultrasonography or MRI) screening. |
| | Cervix | 25-65[3] | A primary human papillomavirus (HPV) test every 5 years. | 21 - 29 | Cervical cytology (Pap test) alone every 3 years. |
| | | 25 - 65 | If a primary HPV test is not available, a co-test (an HPV test with a Pap test) every 5 years or a Pap test every 3 years. | 30 - 65 | Pap test alone every 3 years, high-risk human papillomavirus (hrHPV) testing every 5 years, or hrHPV testing in combination with a Pap test (co-testing) every 5 years. |
| Male | Prostate | 50+ [4] | Men should talk to a healthcare provider about the pros and cons of testing so they can decide if testing is the right choice for them. | 55 - 69[5] | The decision to receive PSA-based screening should be an individual one. |
| Female and Male | Colon and Rectum | 45 - 75[6] | **Visual Exams**<br>• Colonoscopy every 10 years.<br>• Computed tomography (CT) colonography (virtual colonoscopy) every 5 years.<br>• Flexible sigmoidoscopy every 5 years.<br>**Stool-Based Tests**<br>• Fecal immunochemical test (FIT) every year.<br>• Guaiac-based fecal occult blood test (gFOBT) every year.<br>• Multi-targeted stool DNA test with FIT (MT-sDNA or sDNA-FIT or FIT-DNA) every 3 years. | 50 - 75[7] | Several different tests may be used to detect early stage colon and rectum cancer. Screening frequency depends on the test performed. |
| Female and Male | Lung and Bronchus | 50 - 80 | Annual lung cancer screening with low-dose computed tomography (LDCT) for people who smoke or used to smoke and have at least a 20 pack-year history of smoking.[8] | 50 - 80 | Annual screening with LDCT in patients who have a 20 pack-year smoking history and currently smoke or have quit within the past 15 years. |

Source: Ohio Department of Health and The Ohio State University, 2024.

[1] Women who are at high risk for breast cancer based on certain factors should be screened with magnetic resonance imaging (MRI) and a mammogram every year. Women at high risk include those with a personal history of breast cancer, a family history of breast cancer, a genetic mutation known to increase risk of breast cancer (such as BRCA), and those who had radiation therapy to the chest before age 30.

[2] Based on USPSTF Final Recommendation Statement, April 30, 2024.

[3] ACS recommends that cervical cancer screening should begin at age 25. People under age 25 should not be tested because cervical cancer is rare in this age group. People older than age 65 who have had regular cervical cancer testing in the past 10 years with normal results should not be tested for cervical cancer. Once testing is stopped, it should not be started again.

[4] ACS recommends that African American men and men who have a father or brother who had prostate cancer before age 65 have this talk with a healthcare provider starting at age 45.

[5] Before deciding whether to be screened, the USPSTF recommends that men should have an opportunity to discuss the potential benefits and harms of screening and to incorporate their values and preferences in the decision. The USPSTF recommends against PSA-based screening for prostate cancer in men 70 years old and older. An update to the 2018 recommendations is in progress.

[6] People who are in good health and with a life expectancy of more than 10 years should continue regular colorectal cancer screening through age 75. For people ages 76 through 85, the decision to be screened should be based on a person's preferences, life expectancy, overall health, and prior screening history. People older than age 85 should no longer get colorectal cancer screening.

[7] USPSTF also recommends screening for colorectal cancer in adults ages 45 to 49 years. The USPSTF recommends that clinicians selectively offer screening for colorectal cancer in adults ages 76 to 85 years, as evidence indicates that the net benefit of screening all persons in this age group is small.

[8] Before deciding to be screened, people should have a discussion with a healthcare professional about the purpose of screening and how it is done, as well as the benefits, limits, and possible harms of screening. People who still smoke should be counseled about quitting and offered interventions and resources to help them.

* This summary of recommendations is based on information available as of April 2024 at:

ACS website: https://www.cancer.org/cancer/screening/american-cancer-society-guidelines-for-the-early-detection-of-cancer.html.

USPSTF website: https://www.uspreventiveservicestaskforce.org/uspstf/recommendation-topics.

# GLOSSARY

**Age-Adjusted Rate:** A summary rate that is a weighted average of age-specific rates, where the weights represent the age distribution of a standard population (direct adjustment). The incidence and mortality rates presented in this report were standardized to the age distribution of the 2000 U.S. Standard Population. Under the direct method, the population was first divided into 19 age groups, i.e., <1, 1-4, 5-9, 10-14, 15-19...85+, and the age-specific rate was calculated for each age group. Each age-specific rate was then multiplied by the standard population proportion for the respective age group.

**Benign:** Noncancerous. A condition categorized by abnormal cell division that has not invaded or metastasized and, in most cases, has not recurred.

**Body Mass Index (BMI):** A number calculated from a person's weight and height that is an indicator of body fatness and is used to screen for weight categories that may lead to health problems. BMI is calculated the same way for children and adults, however, the criteria used to interpret the meaning of BMI are different. For children and teens, the CDC BMI-for-age growth charts account for changes in body fat with age and differences between girls and boys and allow translation of BMI into a percentile for a child's sex and age. For adults, BMI categories are not dependent on sex or age.

**Cancer:** Uncontrolled abnormal cell growth, which may lead to invasion of surrounding tissues and spread to other parts of the body.

**Carcinoma:** A malignant tumor that begins in the lining layer of organs. Carcinomas account for 80-90% of all cancers.

**Ethnicity:** The heritage, nationality group, lineage, or country of birth of a person or his parents or ancestors before their arrival in the United States. People who identify their origin as Spanish, Hispanic, or Latino may be of any race.

**Incidence rate:** The number of new cases of a disease that occur in a defined population per 100,000 during a specified period of time. Incidence counts and rates in this report were based on newly diagnosed invasive cancer cases and *in situ* (non-invasive) bladder cancer cases.

**Invasive cancer:** Cancer that has spread beyond the layer of tissue in which it developed and is growing into surrounding, healthy tissues. Invasive cancers consist of those diagnosed at the local, regional, distant, and unstaged/unknown stages. Only invasive cancers were included in the calculation of incidence rates in this document.

**Lifetime risk:** The probability that an individual, over the course of a lifetime, will develop or die from a disease or condition.

**Malignant:** Cancerous. A condition characterized by abnormal cell division with the ability to invade, metastasize, and recur.

**Metastasis:** The spread of cancer cells to other parts of the body through the lymph system or blood.

**Mortality rate:** The number of deaths that occur in a defined population per 100,000 during a specified period of time.

**Prevalence:** The number or proportion of people with a condition or attribute at a specific point in time.

**Rate:** The frequency of an event in a defined population during a given period of time, often expressed per 100,000 population.

**Relative survival:** The percentage of people who are alive at a designated time period (usually five years) after a cancer diagnosis divided by the percentage expected to be alive in the absence of cancer based on normal life expectancy. It does not distinguish between patients who have no evidence of cancer and those who have relapsed or are still in treatment.

**Risk factor:** Anything that increases a person's probability of getting a disease such as cancer. Cancer risk factors include age, sex, race, ethnicity, genetics, health behaviors, lifestyle factors, socioeconomic status, and environmental factors.

**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.

**Tumor:** An abnormal lump or mass of tissue. Tumors can be benign (noncancerous) or malignant (cancerous).

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# DATA SOURCES

## Cancer Incidence

Ohio cancer incidence data are from the Ohio Cancer Incidence Surveillance System (OCISS) at the Ohio Department of Health (ODH). OCISS, the central cancer registry for Ohio, collects cancer incidence data for all Ohio residents diagnosed with cancer. U.S. cancer incidence data were obtained from the National Program of Cancer Registries and Surveillance, Epidemiology and End Results Program SEER*Stat Database: NPCR and SEER Incidence – U.S. Cancer Statistics Public Use Research Database, 2023 Submission (2001-2021). United States Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. Released June 2024. Accessed at **https://www.cdc.gov/united-states-cancer-statistics/public-use/?CDC_AAref_Val=https://www.cdc.gov/cancer/uscs/public-use/.**

## Cancer Mortality

Ohio and U.S. mortality data were obtained from the Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality – All Cause of Death, Aggregated With State, Total U.S. (1990-2022) <Katrina/Rita Population Adjustment> National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics (www.cdc.gov/nchs).

## Relative Survival

Ohio five-year relative survival data were calculated using SEER*Stat software version 8.3.5 for Ohio cases diagnosed from 2014 to 2020 with a follow-up cut-off of Dec. 31, 2021. U.S. five-year relative survival data are from the SEER 22 areas for 2013 to 2019 based on follow-up of patients into 2020.

## Behavioral Risk Factor Surveillance System (BRFSS)

ODH, in conjunction with CDC, annually conducts the Ohio BRFSS through landline and cell phone interviews of randomly selected adults 18 and older to collect data regarding diseases/conditions, risk factors, and health practices among Ohioans. To ensure that prevalence estimates are representative of Ohio's population, data from 2011-present were weighted by age, sex, race/ethnicity, geography, marital status, education, home ownership, and telephone source using an iterative proportional fitting (raking) method. Respondents who answered "don't know/not sure" or refused the question were excluded from the analyses for that question. U.S. BRFSS data are from the BRFSS Prevalence and Trends database from the CDC's National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health.

## Ohio Youth Risk Behavior Survey (YRBS)/Youth Tobacco Survey (YTS)

The Ohio YRBS/YTS, which was conducted by ODH under the direction of CDC, is a population-based survey of students in grades six through 12. The Ohio YRBS/YTS provides information on risk behaviors among young people to more effectively target and improve health programs.

## Probability of Developing Cancer

Probabilities of developing cancer were calculated using DevCan (Probability of Developing Cancer Software) developed by NCI (Version 6.7.6; Surveillance Research Program, Statistical Methodology and Applications, National Cancer Institute, 2018. **https://surveillance.cancer.gov/devcan/**) These probabilities reflect the average experience of people in the United States (born free of cancer and living to 85) and do not account for individual behaviors and risk factors. For example, the estimate of 1 man in 20 developing invasive lung and bronchus cancer in his lifetime underestimates the risk for smokers and overestimates the risk for nonsmokers. These probabilities are based on invasive cancers only and do not include *in situ* or non-reportable cancers.