Department of Health

Ovarian Cancer in Ohio

August 2024

Key Findings

- An average of 748 cases of ovarian cancer were diagnosed each year in Ohio during 2017-2021.
- The ovarian cancer incidence rate in Ohio was 9.9 per 100,000 females, compared with the U.S. rate of 10.1 per 100,000 females during 2017-2021.
- In both Ohio and the United States, White women had the highest mortality rates of ovarian cancer, while Asian/Pacific Islander women had the lowest rates.
- Ovarian cancer was most frequently diagnosed among Ohio women 55 to 64 years old.
- From 1996 to 2021, incidence rates of ovarian cancer in Ohio decreased 23%, while mortality rates decreased 34% over that period.
- There was no clear geographic pattern of incidence rates of ovarian cancer by county in Ohio.
- The greatest percentage of ovarian cancers in Ohio (41.2%) were diagnosed at a distant stage, where the five-year relative survival is low (29%).
- In Ohio, about 88% of ovarian cancers were epithelial tumors, where malignant (cancer) cells form in the tissue covering the ovary.
- Older age is the main risk factor for most cancers. About half of all ovarian cancers are diagnosed in women 65 years old and older.

New Cases

Cancers of the ovary (also known as ovarian cancer) made up 1.1% of newly diagnosed cancer cases (incidence) in Ohio reported to the Ohio Cancer Incidence Surveillance System (OCISS) from 2017 through 2021.[1] An average of **748 cases** of ovarian cancer were diagnosed annually in Ohio during this time period (Table 1). The average annual age-adjusted ovarian cancer incidence rate in Ohio was 9.9 cases per 100,000 females, compared with the U.S. incidence rate of 10.1 per 100,000. In Ohio during 2017-2021, the ovarian cancer incidence rate was highest among White women (10.3 per 100,000) and lowest among Black women (6.7 per 100,000).

[1]Due to the complexity of the cancer data collection and quality control process, there is typically a 24-month delay between the time a new cancer is diagnosed and the time the data is ready for analysis. Therefore, the most recent incidence data presented in this report is for cancer cases diagnosed through Dec. 31, 2021.

Deaths

An average of **505 deaths** from ovarian cancer occurred each year in Ohio in 2017-2021 (Table 1). Ohio's average annual age-adjusted ovarian cancer mortality rate was 6.0 per 100,000 females, compared with the U.S. mortality rate of 6.2 per 100,000. The mortality rate was higher for White women (6.2 deaths per 100,000) than Black women (4.6 per 100,000) and Asian/Pacific Islander women (2.3 per 100,000) in Ohio during 2017-2021.

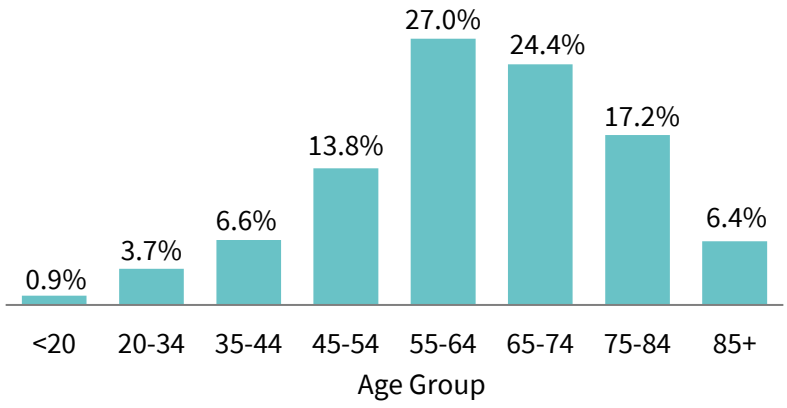
Table 1. Average Annual Number of Cases and Deaths and Age-Adjusted Incidence and Mortality Rates of Ovarian Cancer per 100,000 Females by Race, Ohio and U.S., 2017-2021

	Incidence			Mortality		
	Ohio		U.S.	Ohio		U.S.
	Cases	Rate	Rate	Deaths	Rate	Rate
Total	**748**	**9.9**	**10.1**	**505**	**6.0**	**6.2**
White	670	10.3	10.2	460	6.2	6.4
Black	59	6.7	8.3	42	4.6	5.5
A/PI	11	7.7	9.0	3	2.3	4.3

Sources: Incidence - Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024; U.S. Cancer Statistics, Centers for Disease Control and Prevention and National Cancer Institute, June 2024. Mortality - All Cause of Death (COD), Aggregated With State, Total U.S. (1990-2022) SEER*Stat Database, National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.
A/PI = Asian/Pacific Islander.

Incidence by Age Group

Figure 1. Percent of New Cases of Ovarian Cancer by Age Group, Ohio, 2017-2021

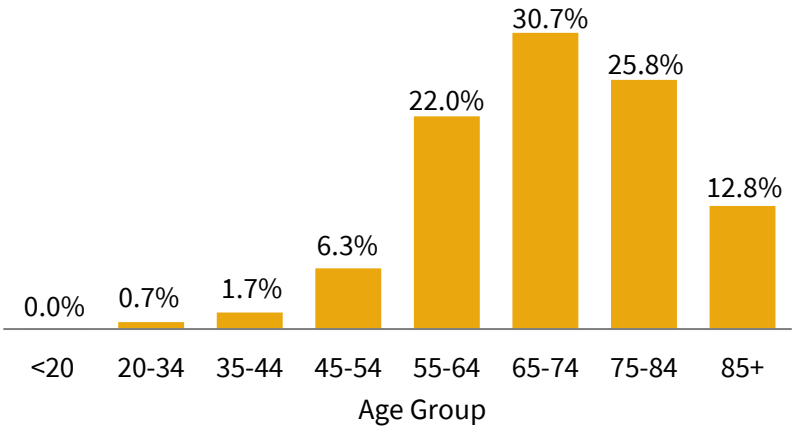


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

Ovarian cancer was most frequently diagnosed among women in the 55-64 age group in Ohio during 2017-2021. There were very few cases of ovarian cancer for females younger than 35 years old in Ohio (Figure 1).

Mortality by Age Group

Figure 2. Percent of Deaths from Ovarian Cancer by Age Group, Ohio, 2017-2021



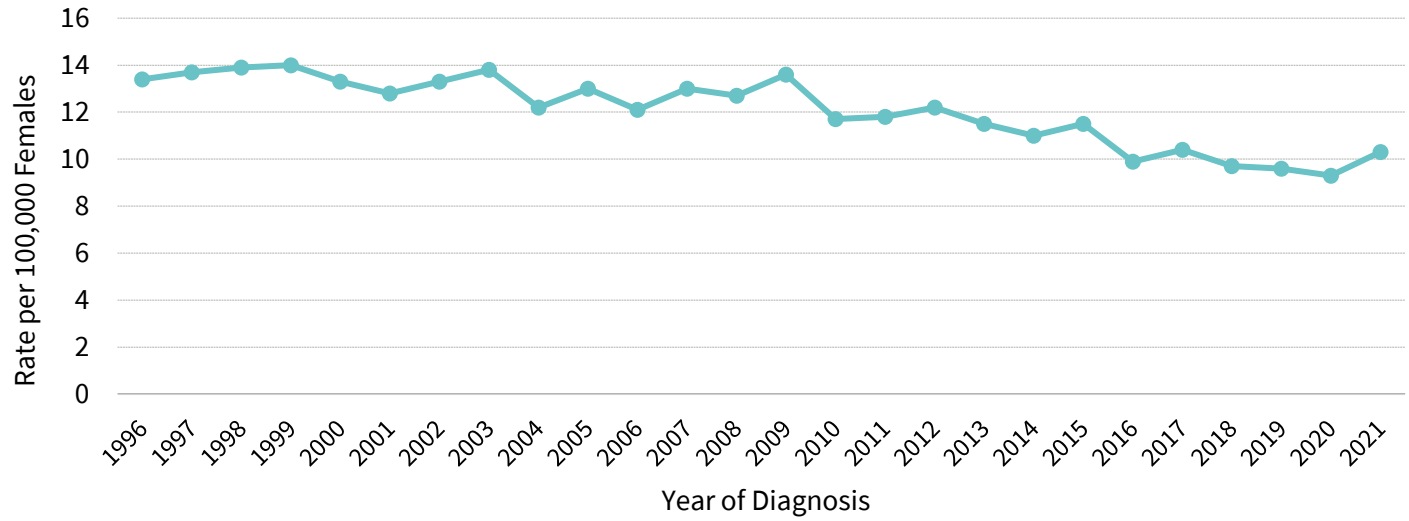
Source: Bureau of Vital Statistics, Ohio Department of Health, 2024; SEER*Stat Database: Mortality - All Cause of Death (COD), Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

In Ohio, ovarian cancer deaths occurred most frequently among women 65 to 74 years old. There were very few deaths due to ovarian cancer among females younger than 45 years old in Ohio during 2017-2021 (Figure 2).

Trends in Incidence and Mortality

From 1996 to 2021, ovarian cancer incidence rates in Ohio decreased 23%, from 13.4 per 100,000 females in 1996 to 10.3 per 100,000 in 2021 (Figure 3).

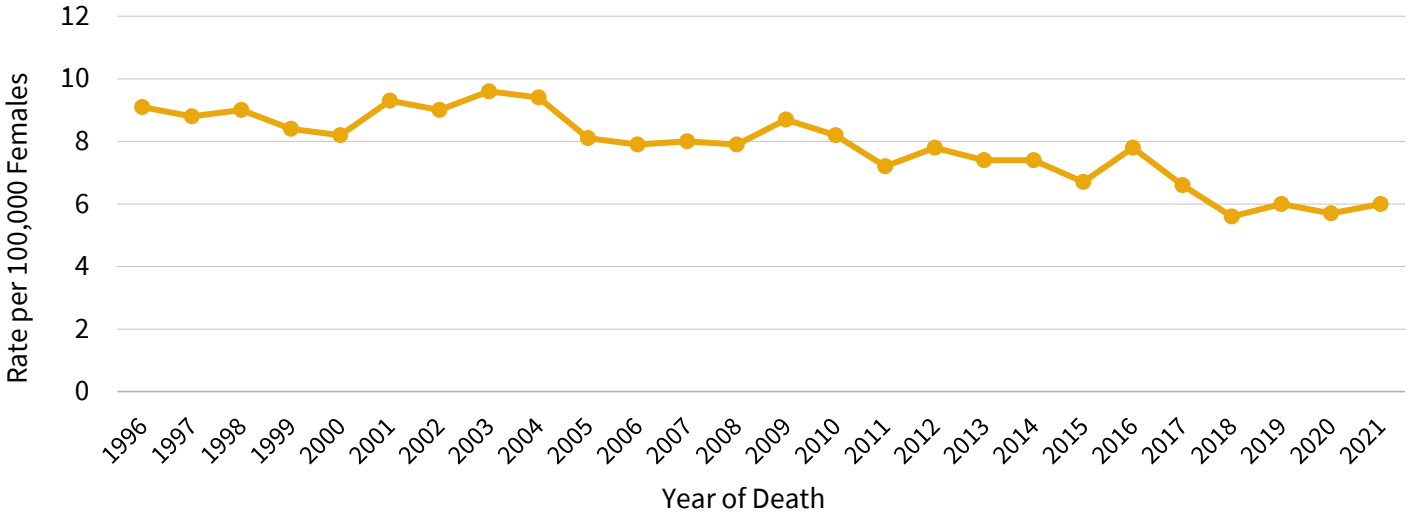
Figure 3. Trends in Age-Adjusted Incidence Rates of Ovarian Cancer per 100,000 Females, Ohio, 1996-2021



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

Comparing 1996 to 2021, the ovarian cancer mortality rate decreased 34%, from 9.1 per 100,000 females in 1996 to 6.0 per 100,000 in 2021 (Figure 4).

Figure 4. Trends in Age-Adjusted Mortality Rates of Ovarian Cancer per 100,000 Females, Ohio, 1996-2021

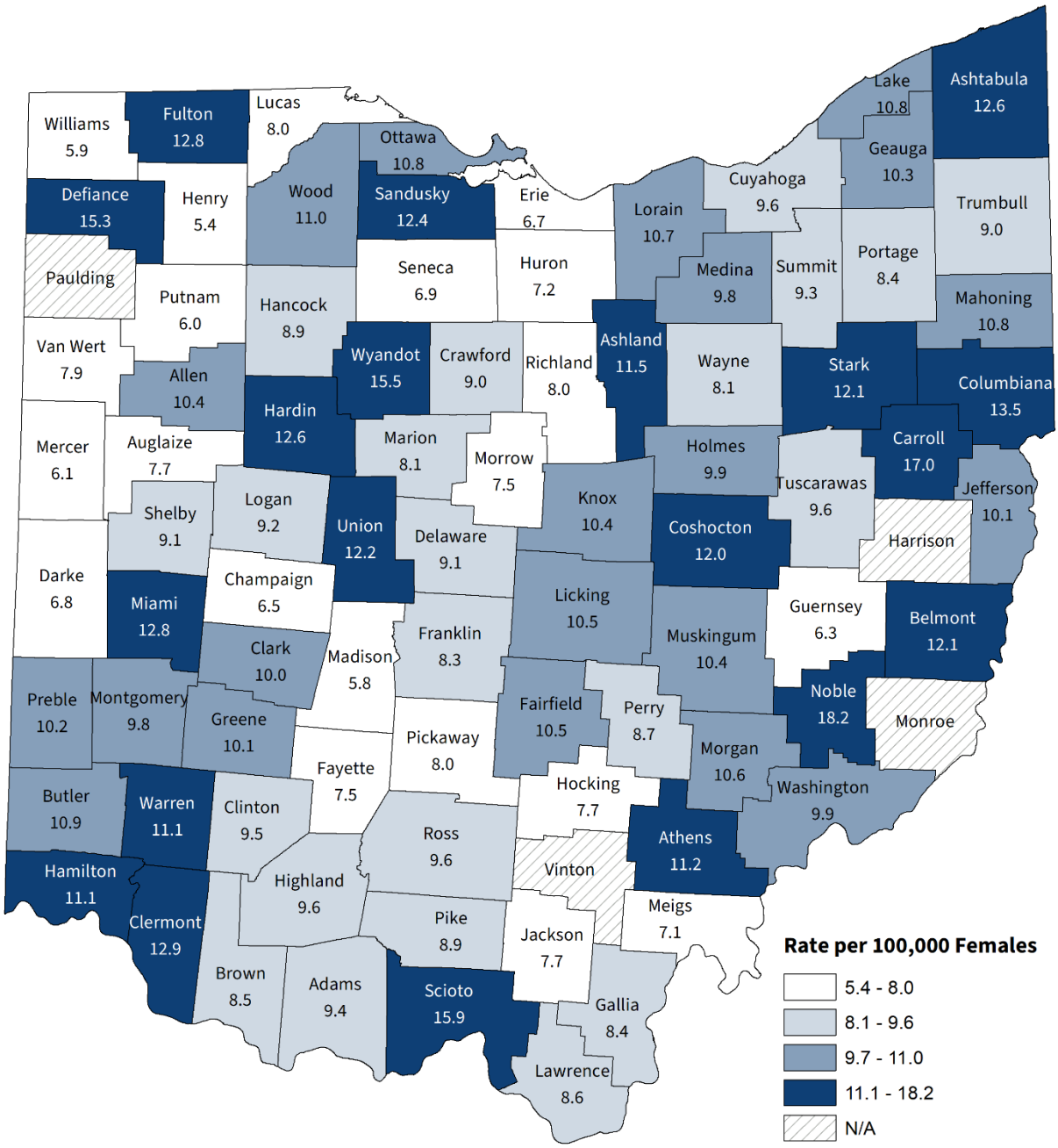


Source: SEER*Stat Database: Mortality - All COD, Aggregated With State, Total U.S. (1990-2022), National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.

Incidence by County

County-specific ovarian cancer incidence rates in Ohio ranged from 5.4 to 18.2 per 100,000 female residents, compared with Ohio's rate of 9.9 per 100,000 females. There was no clear geographic pattern of incidence rates by county. The following five counties, in decreasing order, had the highest incidence rates for this time period: Noble, Carroll, Scioto, Wyandot, and Defiance.

Figure 5. Average Annual Age-Adjusted Incidence Rates of Ovarian Cancer per 100,000 Females by County of Residence, Ohio, 2017-2021

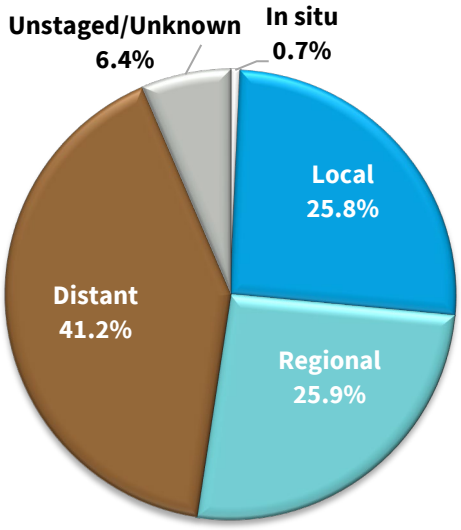


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.
Each category represents approximately 25% of the 84 Ohio counties for which rates were calculated.
N/A: Rate not calculated when the case count for 2017-2021 is less than five.

Stage at Diagnosis

Cancer stage at diagnosis, which refers to the extent or spread of a cancer in the body, is used to select appropriate treatment and is an important determinant of survival. 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.

Figure 6. Proportion of Ovarian Cancer Cases (%) by Stage at Diagnosis, Ohio, 2017-2021



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

In Ohio during 2017-2021, the greatest percentage of ovarian cancers (41.2%) were diagnosed at a distant stage when the cancer has spread (metastasized) to distant organs, tissues, and/or lymph nodes.

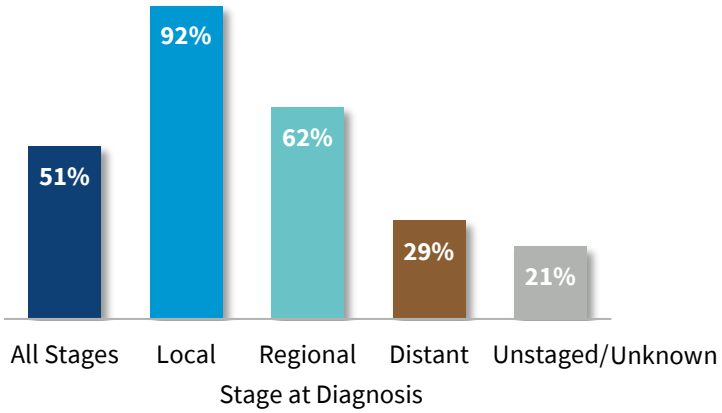
At the regional stage, cancer has spread to surrounding organs and tissues or regional lymph nodes; this was the second most common stage at diagnosis (25.9%) for ovarian cancer in Ohio during 2017-2021.

Local stage, where cancer is confined to the ovary, made up 25.8% of diagnoses in Ohio. (Figure 6).

Survival

In general, cancer survival is estimated as the proportion of people alive at some point after cancer diagnosis, usually five years. Five-year relative survival, the estimate used here, compares the survival of people diagnosed with cancer with the survival of people in the general population who are the same age, race, and sex, and who have not been diagnosed with cancer.

Figure 7: Five-Year Relative Survival (%) for Ovarian Cancer by Stage at Diagnosis, Ohio



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.
Based on Ohio cases diagnosed in 2014-2020, followed through 2021.

For all stages combined, the five-year relative survival for ovarian cancer in Ohio was 51%.

In Ohio, the five-year relative survival was 92% among those diagnosed at a local stage, 62% at the regional stage, and 29% when the cancer was diagnosed at the latest (distant) stage. (Figure 7).

Types of Ovarian Cancer

Ovarian cancers come in a variety of different tumor types and subtypes. Ovarian epithelial cancer is a disease in which malignant (cancer) cells form in the tissue covering the ovary.

Table 2: Ovarian Cancer: Average Annual Number and Proportion of Cases (%) by Histology, Ohio, 2017-2021

Histological Type	Cases	Percent
Epithelial Ovarian Cancer	**659**	**88.3%**
Serous	351	47.0%
Endometrioid	74	9.9%
Mucinous	43	5.7%
Clear cell	38	5.1%
Other epithelial	154	20.6%
Non-epithelial Ovarian Cancer	**51**	**6.8%**
Germ cell	20	2.7%
Sex cord-stromal	30	4.1%
Other non-epithelial	0	0.1%
Unspecified	**36**	**4.8%**

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

As shown in Table 2, approximately 88% of ovarian cancers in Ohio were epithelial tumors in 2017-2021. The most common type of epithelial ovarian cancer is serous (47.0%), followed by endometrioid (9.9%), mucinous (5.7%), and clear cell tumors (5.1%). Serous tumors are mostly high-grade serous carcinomas, which are characterized by involvement of both ovaries, aggressive behavior, late-stage diagnosis, and low survival.

The two main types of non-epithelial ovarian cancer include sex cord-stromal tumors (4.1%), which form in the supportive tissue of the ovaries, and germ cell tumors (2.7%), which form in the germ (egg) cells of the ovaries.

Risk Factors

Anything that increases your risk of getting a disease is called a risk factor. However, having a risk factor does not necessarily mean that you will get cancer; not having risk factors does not mean that you will not get cancer.

Risk factors for ovarian cancer include the following:

- Family history of ovarian cancer in a first-degree relative (mother, daughter, or sister).
- Inherited changes in the *BRCA1* or *BRCA2* genes.
- Other hereditary conditions, such as hereditary nonpolyposis colorectal cancer (HNPCC; also called Lynch syndrome).
- Endometriosis.
- Postmenopausal hormone therapy.
- Obesity.
- Tall height.
- Age. Older age is the main risk factor for most cancers. The chance of getting cancer increases as you get older. About half of all ovarian cancers are diagnosed in women 65 years old and older.

Signs and Symptoms

Ovarian cancer may not cause early signs or symptoms. When signs or symptoms do appear, the cancer is often advanced. Signs and symptoms may include the following:

- Pain, swelling, or a feeling of pressure in the abdomen or pelvis.
- Sudden or frequent urge to urinate.
- Trouble eating or feeling full.
- A lump in the pelvic area.
- Gastrointestinal problems, such as gas, bloating, or constipation.

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.

Ovarian Cancer Screening

Currently, there is no recommended screening test for the early detection of ovarian cancer in average-risk women. Tests that examine the ovaries, pelvic area, blood, and ovarian tissue are used to detect and diagnose ovarian tumors. The following tests and procedures may be used in the diagnosis and staging of ovarian cancer:

- Physical exam and history.
- Pelvic exam.
- CA 125 (cancer antigen 125) test. *
- Ultrasonography (pelvic or transvaginal).
- Computed tomography (CT) scan.
- Positron emission tomography (PET) scan.
- Magnetic resonance imaging (MRI).
- Chest x-ray.
- Biopsy.

*An increased CA 125 level in the blood can be a sign of ovarian cancer or another condition such as endometriosis. CA-125 levels and histology are used to diagnose epithelial ovarian cancer.

Technical Notes

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. Using the direct method of age-adjustment, 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.

Average Annual Number: The number of cases or deaths diagnosed per year, on average, for the time period of interest (e.g., 2017-2021). Average annual numbers are calculated by summing the number of cases or deaths for a given time period, dividing by the number of years that comprise the time period, and rounding to the nearest whole number.

Incidence: The number of cases diagnosed during a specified time period (e.g., 2017-2021). Ovarian cancer cases were defined as follows: International Classification of Diseases for Oncology, Third Edition (ICD-O-3), code C569.

Invasive Cancer: A malignant tumor that has infiltrated the organ in which the tumor originated. 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.

Mortality: The number of deaths during a specified time period (e.g., 2017-2021). Ovarian cancer deaths were defined as follows: International Statistical Classification of Diseases and Related Health Problems, Ninth Edition (ICD-9), code 183 for 1996-1998 and International Statistical Classification of Diseases and Related Health Problems, Tenth Edition (ICD-10), codes C560-C569 for 1999-2021.

Rate: The number of cases or deaths per unit of population (e.g., per 100,000 population) during a specified time period (e.g., 2017-2021). Rates may be unstable and are not presented when the case count during 2017-2021 is less than five or the death count is less than 10.

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.

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

Table 3. Ovarian Cancer: Average Annual Number and Age-Adjusted Rates of Cases and Deaths per 100,000 Females by County of Residence, Ohio and the United States, 2017-2021

	Incidence		Mortality			Incidence		Mortality	
	Cases	Rate	Deaths	Rate		Cases	Rate	Deaths	Rate
Ohio	**748**	**9.9**	**505**	**6.0**	Lawrence	3	8.6	<2	*
U.S.		**10.1**		**6.2**	Licking	11	10.5	8	5.8
Adams	2	9.4	<2	*	Logan	3	9.2	2	5.5
Allen	7	10.4	5	6.3	Lorain	21	10.7	13	5.8
Ashland	4	11.5	2	5.5	Lucas	21	8.0	19	6.7
Ashtabula	8	12.6	5	6.8	Madison	1	5.8	2	9.1
Athens	4	11.2	2	6.2	Mahoning	18	10.8	11	5.9
Auglaize	2	7.7	3	8.8	Marion	3	8.1	3	6.0
Belmont	5	12.1	2	4.5	Medina	12	9.8	7	5.2
Brown	2	8.5	<2	*	Meigs	1	7.1	2	11.3
Butler	25	10.9	15	6.1	Mercer	2	6.1	<2	*
Carroll	3	17.0	<2	*	Miami	8	12.8	4	4.4
Champaign	2	6.5	<2	*	Monroe	<1	*	<2	*
Clark	10	10.0	6	5.0	Montgomery	35	9.8	23	6.0
Clermont	17	12.9	11	7.5	Morgan	1	10.6	<2	*
Clinton	3	9.5	3	10.0	Morrow	2	7.5	<2	*
Columbiana	9	13.5	5	6.3	Muskingum	6	10.4	4	6.5
Coshocton	3	12.0	3	9.0	Noble	1	18.2	<2	*
Crawford	3	9.0	2	5.7	Ottawa	3	10.8	3	7.8
Cuyahoga	83	9.6	60	6.0	Paulding	<1	*	<2	*
Darke	2	6.8	2	5.4	Perry	2	8.7	<2	*
Defiance	4	15.3	2	8.2	Pickaway	3	8.0	<2	*
Delaware	11	9.1	6	4.5	Pike	2	8.9	<2	*
Erie	4	6.7	3	3.9	Portage	9	8.4	9	7.9
Fairfield	10	10.5	7	7.0	Preble	3	10.2	2	6.5
Fayette	2	7.5	<2	*	Putnam	1	6.0	<2	*
Franklin	59	8.3	37	5.1	Richland	7	8.0	7	7.2
Fulton	4	12.8	2	7.4	Ross	4	9.6	3	5.1
Gallia	2	8.4	<2	*	Sandusky	5	12.4	3	6.0
Geauga	7	10.3	5	5.6	Scioto	7	15.9	3	5.7
Greene	11	10.1	8	6.9	Seneca	2	6.9	3	5.9
Guernsey	1	6.3	<2	*	Shelby	3	9.1	2	6.9
Hamilton	58	11.1	32	5.6	Stark	32	12.1	22	7.4
Hancock	5	8.9	3	6.2	Summit	34	9.3	24	5.9
Hardin	2	12.6	2	10.4	Trumbull	14	9.0	10	6.2
Harrison	<1	*	<2	*	Tuscarawas	6	9.6	5	7.1
Henry	1	5.4	<2	*	Union	4	12.2	<2	*
Highland	3	9.6	<2	*	Van Wert	2	7.9	<2	*
Hocking	2	7.7	<2	*	Vinton	<1	*	<2	*
Holmes	3	9.9	2	8.9	Warren	16	11.1	9	5.9
Huron	3	7.2	3	6.3	Washington	5	9.9	4	6.9
Jackson	1	7.7	<2	*	Wayne	6	8.1	6	6.9
Jefferson	5	10.1	3	4.3	Williams	2	5.9	3	9.8
Knox	4	10.4	2	5.1	Wood	8	11.0	6	7.3
Lake	19	10.8	12	6.2	Wyandot	2	15.5	<2	*

Sources: Incidence – Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024; Mortality – All COD, Aggregated With State, Total U.S. (1990-2022) SEER*Stat Database, National Cancer Institute, April 2024. Underlying mortality data provided by the National Center for Health Statistics.
* Rate not calculated when the 2017-2021 case count is less than 5 (average <1) or death count is less than 10 (average <2).

Sources of Data and Additional Information

National Cancer Institute:
https://www.cancer.gov/types/ovarian

American Cancer Society:
https://www.cancer.org/cancer/types/ovarian-cancer.html

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