



Ovarian Cancer in Ohio, 2002-2006

This Report on Ovarian Cancer Contains:

- Incidence and Mortality Rates in Ohio and the US
- Incidence Rates by Age Group and Race
- Mortality Rates by Race
- Maps of Incidence Rates by County
- Trends in Incidence, Mortality and Stage at Diagnosis
- Stage at Diagnosis by Age Group
- Survival Probability by Stage at Diagnosis
- Histology Distribution in Ohio and the US
- Risk Factors
- Ovarian Anatomy
- Signs and Symptoms
- Clinical Trials
- Sources of Data and Additional Information

Ovarian Cancer Incidence and Mortality

Cancers of the ovary made up 1.4 percent of the incident (newly diagnosed) cancers reported to the Ohio Cancer Incidence Surveillance System (OCISS) from 2002 to 2006 (Table 1). The average annual age-adjusted ovarian cancer incidence rate during this time period was 12.3 cases per 100,000 females, or an average of 826 cases per year (N). The 2002-2006 average annual age-adjusted U.S. (SEER²) incidence rate of 13.1 cases per 100,000 females was 7 percent greater than the rate for Ohio. However, completeness of reporting for ovarian cancer in Ohio is estimated to be 95 percent for 2002-2006. Therefore, the ovarian cancer incidence rates presented in this report may slightly underestimate the true ovarian cancer burden in Ohio. The Ohio mortality rate of 8.7 deaths per 100,000 females in 2002-2006 was similar to the U.S. (NCHS³) age-adjusted ovarian cancer mortality rate of 8.8 deaths per 100,000 females.

Table 1: Leading Sites/Types of Cancer and Ovarian Cancer: Average Annual Number (N), Percent (%) and Age-adjusted Rates of Invasive Cancer Cases and Cancer Deaths in Ohio, with Comparison to the US (SEER and NCHS), 2002-2006^{1,2,3}

Incidence	N	%	Ohio U.S.		Mortality	N	%	Ohio U.S.	
			Rate	Rate				Rate	Rate
All Sites/Types	57,110		466.4	462.9	All Sites/Types	24,870		201.4	189.8
Lung and Bronchus	9,212	16.1%	75.0	63.1	Lung and Bronchus	7,406	29.8%	60.2	53.4
Breast (Female)*	8,030	14.1%	120.4	123.8	Colon and Rectum	2,479	10.0%	20.0	18.2
Prostate*	7,774	13.6%	144.7	159.3	Breast (Female)*	1,892	7.6%	27.0	24.5
Colon and Rectum	6,422	11.2%	52.1	49.1	Pancreas	1,331	5.4%	10.7	10.7
Bladder	2,660	4.7%	21.6	21.0	Prostate*	1,243	5.0%	26.9	25.6
Non-Hodgkin's Lymphoma	2,338	4.1%	19.2	19.5	Non-Hodgkin's Lymphoma	921	3.7%	7.5	7.1
•					•				
•					•				
Ovary*	826	1.4%	12.3	13.1	Ovary*	611	2.5%	8.7	8.8

[1] Ohio Cancer Incidence Surveillance System, Chronic Disease and Behavioral Epidemiology Section and the Vital Statistics Program, Ohio Department of Health, 2009.

[2] SEER: Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2009.

[3] NCHS: National Center for Health Statistics, 2009.

*The rates of breast, prostate and ovarian cancer are gender specific (i.e., the population denominator is females or males only).

Technical Notes:

- Ovarian cancer cases were defined as follows: International Classification of Diseases for Oncology, Third Edition (ICD-O-3), code C569, excluding histology types 9590-9989. Ovarian cancer deaths were defined as follows: International Statistical Classification of Diseases and Related Health Problems, Tenth Edition (ICD-10), codes C560-C569.
- The 2002-2006 rates were calculated using vintage 2007 postcensal estimates for July 1, 2002-2006 (U.S. Census Bureau, 2008). Rates are direct age-adjusted to the U.S. 2000 standard population.
- N = Average number of cases per year rounded to the nearest integer.

Ovarian Cancer Cases and Incidence Rates by Age and Race

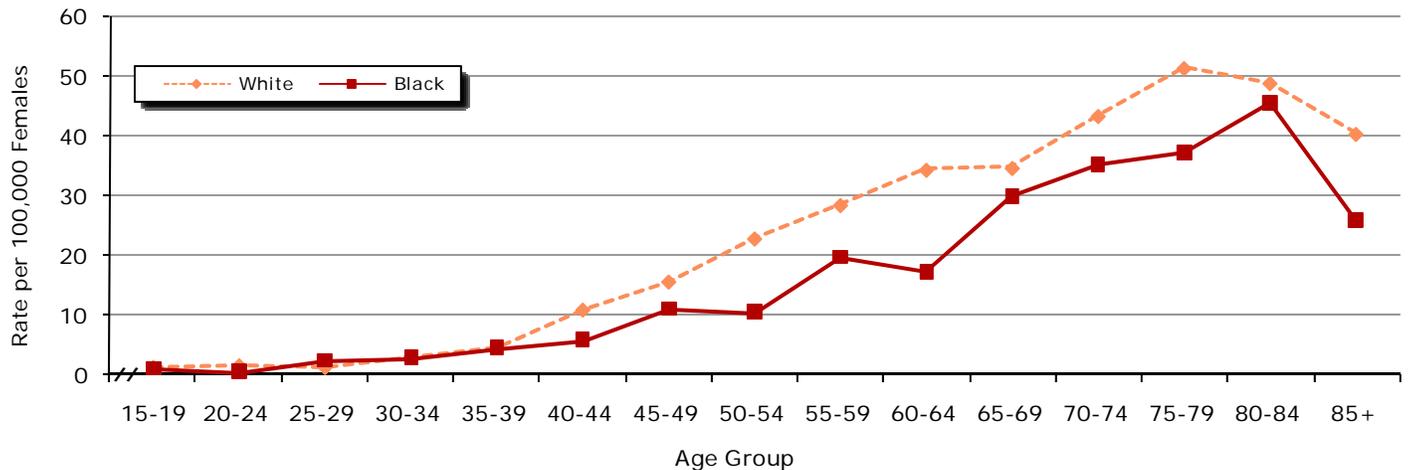
Table 2: Ovarian Cancer: Average Annual Number of Cases (N), Incidence Rates per 100,000 Females and Cumulative Percentages (Cum%), by Age Group and Race in Ohio, 2002-2006

Age Group	White			Black			Total		
	N	Rate	Cum%	N	Rate	Cum%	N	Rate	Cum%
<5	0	*	0.0%	<1	*	0.3%	<1	*	0.0%
5-9	<1	*	0.1%	0	*	0.3%	<1	*	0.1%
10-14	2	0.7	0.4%	<1	*	1.0%	3	0.8	0.4%
15-19	4	1.3	1.0%	<1	*	2.1%	5	1.3	1.0%
20-24	5	1.6	1.7%	<1	*	2.4%	6	1.4	1.7%
25-29	4	1.3	2.2%	1	2.3	4.5%	5	1.5	2.4%
30-34	10	3.1	3.5%	1	2.8	6.9%	12	3.2	3.8%
35-39	16	4.6	5.6%	2	4.4	10.7%	19	4.7	6.1%
40-44	42	10.9	11.2%	3	5.8	16.3%	47	10.4	11.8%
45-49	62	15.6	19.5%	6	11.0	26.3%	70	15.4	20.3%
50-54	81	22.8	30.4%	5	10.4	34.3%	89	21.9	31.1%
55-59	86	28.4	41.9%	7	19.6	45.7%	94	27.4	42.5%
60-64	81	34.3	52.7%	4	17.2	53.3%	87	33.0	53.1%
65-69	68	34.6	61.9%	7	29.8	64.7%	77	34.8	62.4%
70-74	78	43.3	72.2%	7	35.1	76.5%	87	43.2	72.9%
75-79	88	51.3	84.0%	6	37.1	86.9%	95	50.6	84.4%
80-84	67	48.8	92.9%	5	45.5	95.5%	72	48.5	93.1%
85+	53	40.3	100.0%	3	25.8	100.0%	57	39.7	100.0%

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2009.

* Rates may be unstable and are not presented when the case count for 2002-2006 is less than five (i.e., N<1).

Figure 1: Ovarian Cancer: Age-specific Incidence Rates (Ages 15+) per 100,000 Females, by Race in Ohio, 2002-2006

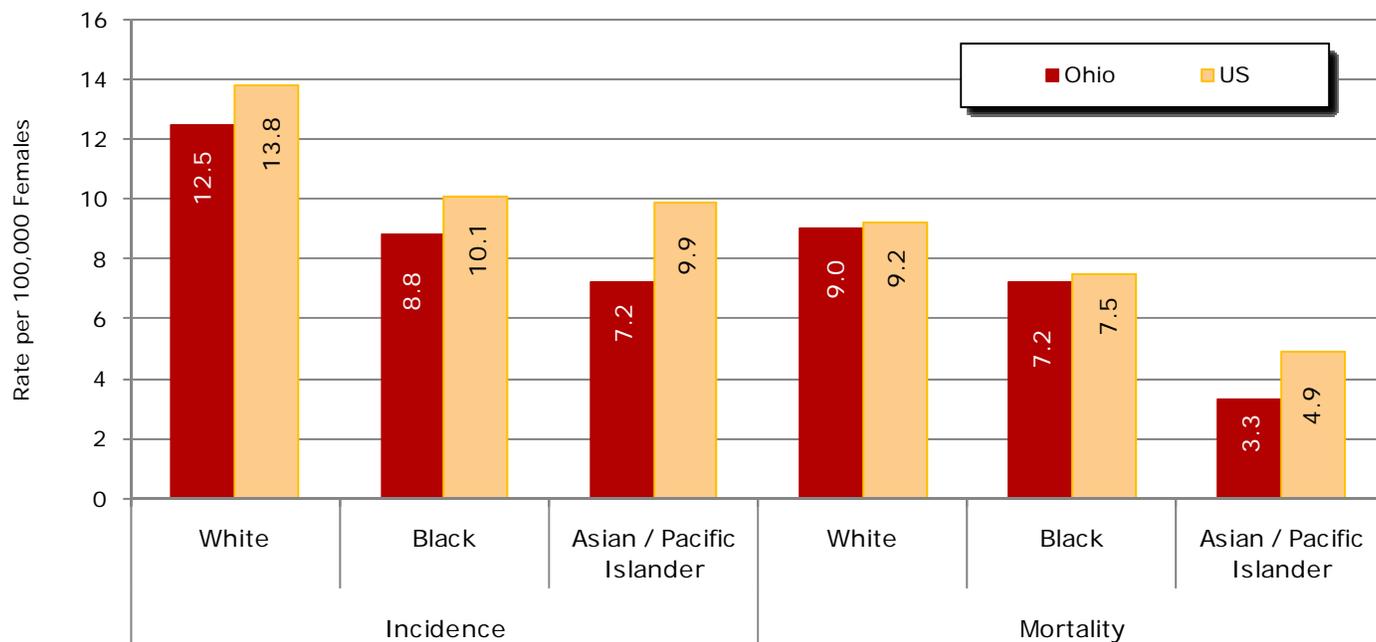


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2009.

Table 2 and Figure 1 show 2002-2006 age-specific incidence rates for ovarian cancer by race. The majority of ovarian cancers were diagnosed among women 40 and older. Figure 1 shows whites had higher incidence rates, compared to blacks, for all age groups 30 years and older. Among whites, ovarian cancer incidence rates increased with advancing age group from 25-29 to 75-79, then declined among women 80 and older. Ovarian cancer incidence rates among blacks were slightly variable but generally increased from 25-29 to 80-84, followed by a decline among women 85 and older.

Ovarian Cancer Incidence and Mortality Rates by Race in Ohio Compared to the United States

Figure 2: Ovarian Cancer: Average Annual Age-adjusted Incidence and Mortality Rates per 100,000 Females, by Race in Ohio with Comparison to the US (SEER and NCHS), 2002-2006^{1,2,3}



[1] Ohio Cancer Incidence Surveillance System, Chronic Disease and Behavioral Epidemiology Section and the Vital Statistics Program, Ohio Department of Health, 2009.

[2] SEER: Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2009.

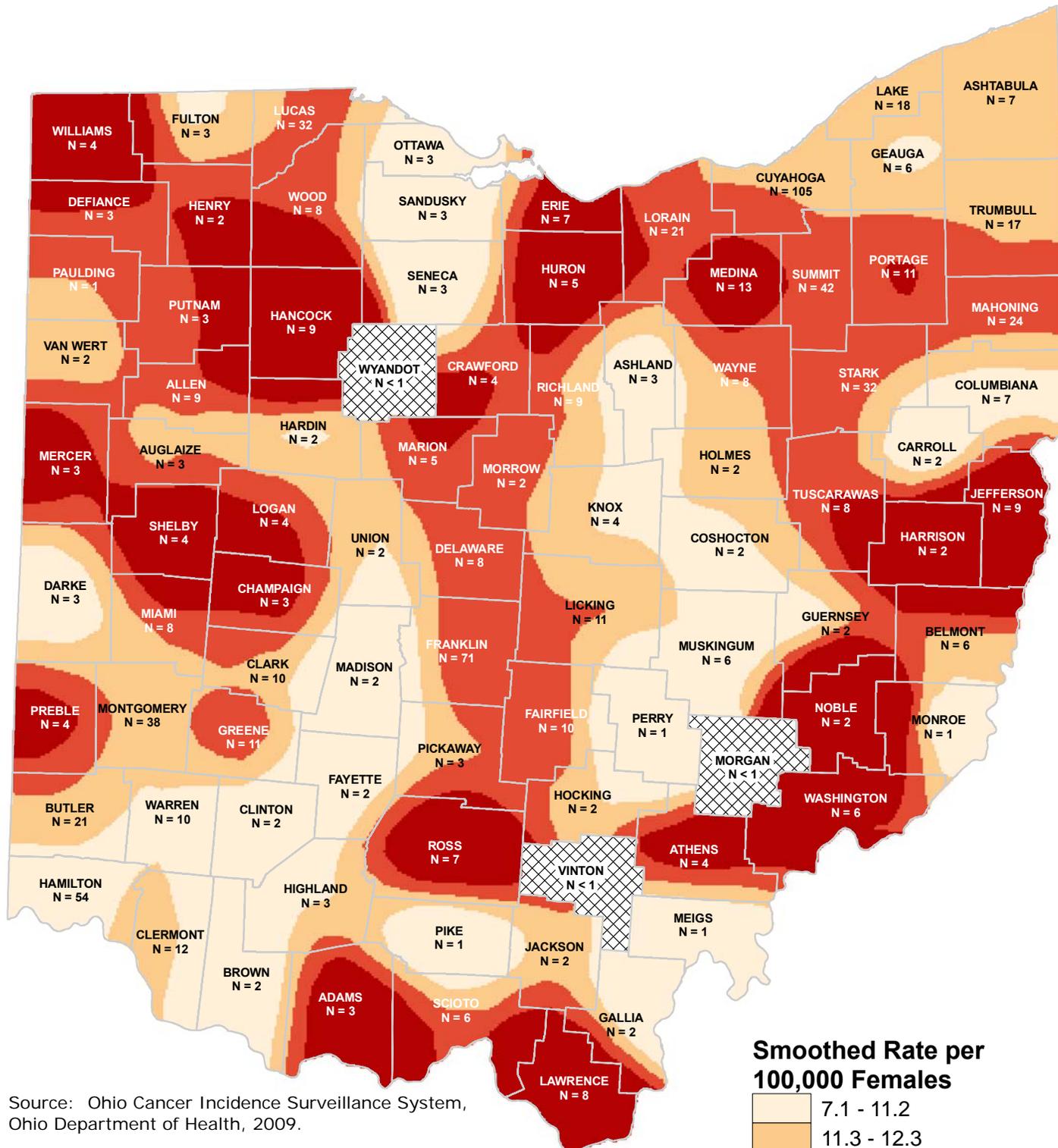
[3] NCHS: National Center for Health Statistics, 2009.

Figure 2 shows the 2002-2006 ovarian cancer age-adjusted incidence rates for whites were considerably higher than those of blacks and Asian/Pacific Islanders in both Ohio and the United States. Race differences in ovarian cancer incidence rates are not fully understood and are currently being studied. The ovarian cancer incidence rates for each of the three race groups were greater in the United States, compared to Ohio; however, the lower ovarian cancer incidence rates in Ohio may be due to less than 100 percent complete case reporting. Ovarian cancer age-adjusted mortality rates for whites were also higher than those of blacks and especially Asian/Pacific Islanders in both Ohio and the United States. The ovarian cancer mortality rates for whites and blacks in Ohio were similar to the rates in the United States; whereas, the rate for Asian/Pacific Islanders was much greater (48 percent) in the United States, compared to Ohio.

Ovarian Cancer Cases and Incidence Rates by County of Residence

Figure 3 presents 2002-2006 average annual age-adjusted ovarian cancer incidence rates by county of residence. As shown in Figure 3, county-specific ovarian cancer incidence rates in Ohio ranged from 6.2 to 24.4 per 100,000 females. To illustrate the concept that disease patterns do not abruptly change at county boundaries, Figure 4 displays the pattern of incidence after the county rates are smoothed—a process in which rates are adjusted to consider the rates of neighboring geographical areas. Ovarian cancer incidence rates exhibit some geographical variability across the state, with a tendency for lower rates in the southwestern and mid-eastern portions of the state.

Figure 4: Ovarian Cancer: Smoothed Pattern of Incidence, Based on Average Annual, Age-adjusted Incidence Rates per 100,000 Females, by County of Residence in Ohio, 2002-2006



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2009.

• N = Average number of cases *per year* rounded to the nearest integer.

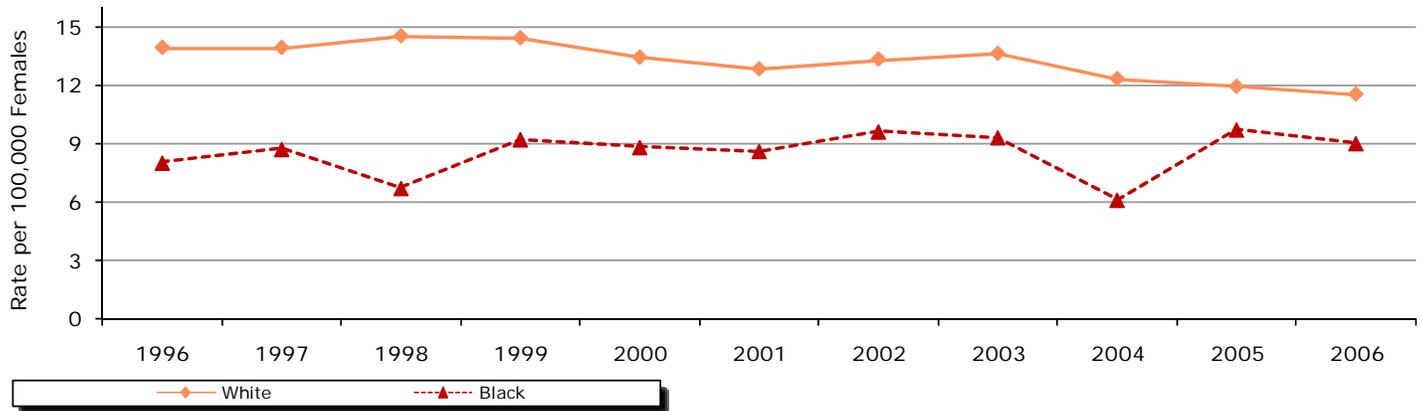
$$N = \frac{\text{Total cases in 2002-2006}}{5 \text{ years}}$$

• Each category represents approximately 25% of the 88 Ohio counties.

* Rates may be unstable and are not presented when the case count for 2002-2006 is less than five (i.e., N < 5).

Ovarian Cancer Incidence and Mortality Trends

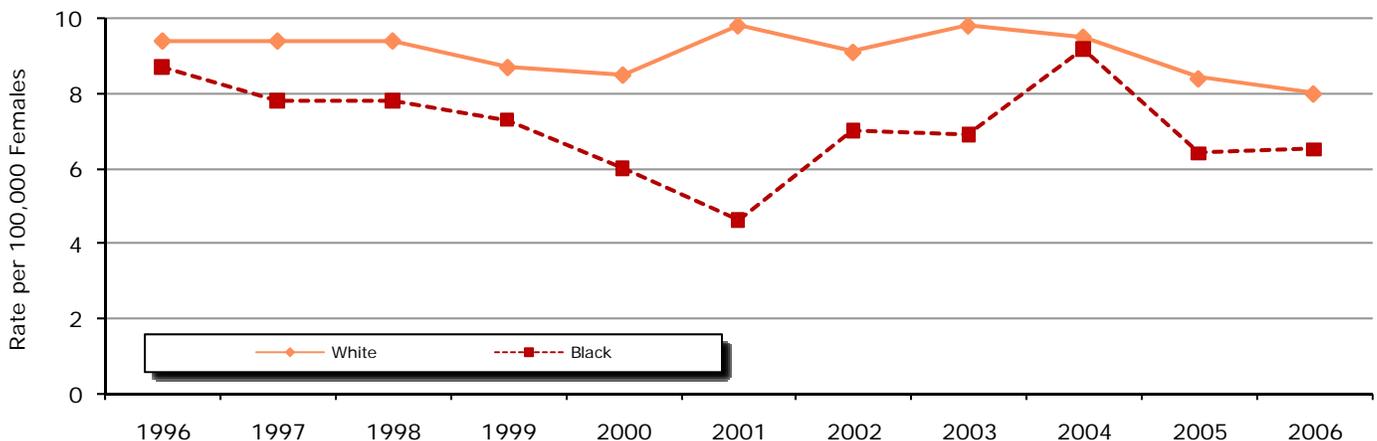
Figure 5: Ovarian Cancer: Trends in Average Annual Age-adjusted Incidence Rates per 100,000 Females, by Race in Ohio, 1996-2006



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2009.

Figure 5 shows incidence rates of ovarian cancer in Ohio according to year of diagnosis (1996 to 2006) by race. Incidence rates among whites were greater than those of blacks for each year. From 1996 to 2006, ovarian cancer incidence rates decreased 19 percent among white women, but were relatively stable among black women.

Figure 6: Ovarian Cancer: Trends in Average Annual Age-adjusted Mortality Rates per 100,000 Females, by Race in Ohio, 1996-2006

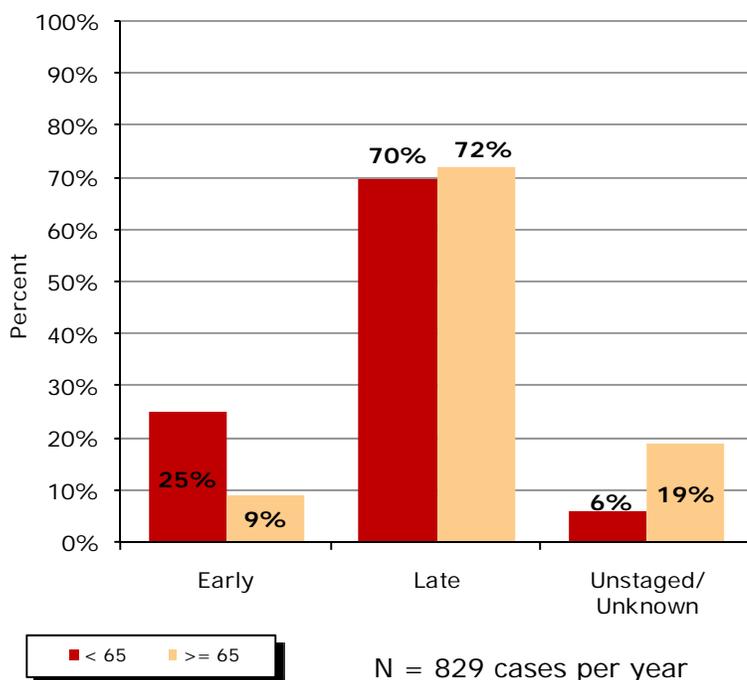


Source: Chronic Disease and Behavioral Epidemiology Section and the Vital Statistics Program, Ohio Department of Health, 2009.

Figure 6 shows trends in mortality rates of ovarian cancer according to year of death (1996 to 2006) by race. For each year of comparison, the rate for whites was greater than the rate for blacks. Comparing 1996 to 2006, the ovarian cancer mortality rate decreased 18 and 35 percent among whites and blacks, respectively, although the rates were variable for each race group during the time period.

Ovarian Cancer Cases and Survival by Stage at Diagnosis

Figure 7: Ovarian Cancer: Proportion of Cases (%) by Stage at Diagnosis and Age Group in Ohio, 2002-2006



The stage at diagnosis of ovarian cancer is an important determinant of survival. In the localized stage, the tumor is confined to the ovary. In the regional stage, the tumor has metastasized (spread) to surrounding tissues. In the distant stage, the malignancy has metastasized through the blood or lymphatic system to other organs. The 2002-2006 Ohio data presented in Figure 7 reveal the percentage of ovarian cancers diagnosed early (*in situ* or local) stage was 25 percent among women less than 65 and 9 percent among women 65 and older. Seventy percent of women under 65 were diagnosed late (regional or distant) stage, while 72 percent of those 65 and older were diagnosed late stage. Women 65 and older were more than three times as likely to be reported unstaged or with an unknown stage (19 percent), compared to women under 65 (6 percent).

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2009.

Table 3 shows the U.S. (SEER) five-year survival probability for women diagnosed with ovarian cancer in 1999-2005 was 45.9 percent for all stages combined. Five-year survival probabilities were 93.8 percent for those diagnosed localized stage, 72.8 percent for those diagnosed regional stage and 28.2 percent for distant-stage tumors. The survival probability for women diagnosed with unstaged tumors or unknown stage at diagnosis (27.3 percent) was similar to those diagnosed distant stage (28.2 percent). For each stage at diagnosis, women under 65 had greater five-year survival probabilities, although the difference was slight for those diagnosed with localized stage tumors. Five-year survival probabilities for all stages combined were higher for whites (45.8 percent), compared to blacks (37.4 percent) (not shown in Table 3).

Table 3: Ovarian Cancer: Five-year Survival Probability (%) by Stage at Diagnosis and Age at Diagnosis in the US (SEER), 1999-2005

Stage	Five-year Survival Probability (%)		
	Overall	< 65 Years	65+ Years
All Stages	45.9%	56.5%	29.8%
Localized	93.8%	93.9%	93.5%
Regional	72.8%	79.7%	56.7%
Distant	28.2%	34.9%	20.0%
Unstaged/Unknown Stage	27.3%	48.9%	13.0%

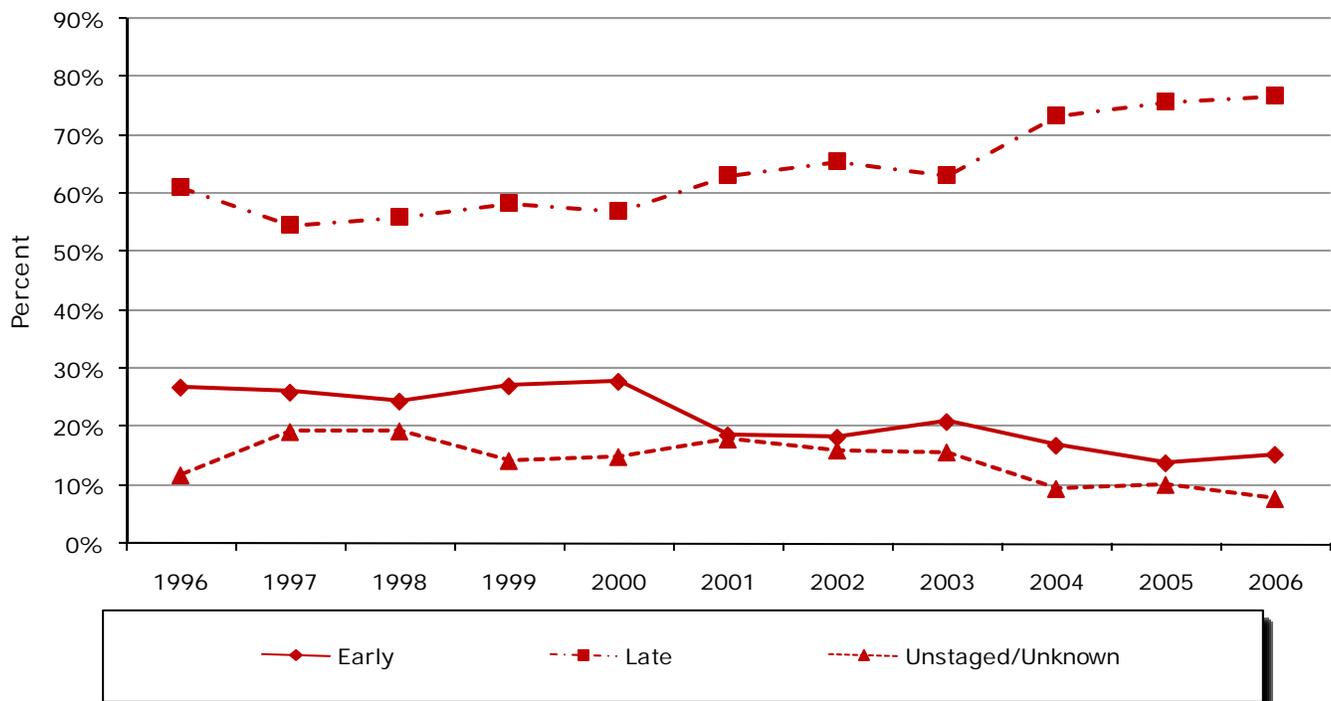
Source: SEER Cancer Statistics Review 1975-2005, National Cancer Institute, 2009.

Did You Know?

There is no ovarian cancer screening test that has been found to reduce mortality from this disease. Cancer antigen-125 (CA-125), a tumor protein that can be found in blood, is being studied as potentially useful in identifying women with early stage ovarian cancer, when the woman has a greater probability of surviving.

Ovarian Cancer Stage at Diagnosis Trends

Figure 8: Ovarian Cancer: Trends in the Proportion of Cases (%) by Stage at Diagnosis in Ohio, 1996-2006



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2009.

Figure 8 shows the distribution of stage at diagnosis of ovarian cancer by year of diagnosis. From 1996 to 2006, the proportion of women diagnosed early stage decreased considerably. There was also a general trend of a decreasing proportion of women diagnosed unstaged or with an unknown stage at diagnosis. There was a clear increase in the proportion of women diagnosed late stage. The increase in the proportion diagnosed late stage may be the result of the decreasing proportion with unstaged/unknown stage tumors during this time period.

Ovarian Cancer By Histology

Table 4: Ovarian Cancer: Percent Distribution by Histology in Ohio with Comparison to the US (SEER), 2002-2006^{1,2,3}

Histology	Ohio		US
	N	Percent	Percent
Total	826		
Carcinoma			
Epidermoid Carcinoma (8051-8131)	5	0.7%	0.8%
Adenocarcinomas			
Adenocarcinoma, NOS (8140)	113	13.7%	13.4%
Papillary adenocarcinoma, NOS (8050, 8260)	25	3.0%	2.8%
Clear cell adenocarcinoma (8310, 9110)	36	4.4%	5.0%
Endometrioid carcinoma (8380-8383, 8570)	89	10.8%	10.7%
Cystadenocarcinoma, NOS (8440, 8450)	7	0.8%	0.7%
Serous cystadenocarcinoma (8441)	103	12.5%	10.7%
Papillary serous cystadenocarcinoma (8460-8462)	224	27.2%	30.7%
Mucinous cystadenocarcinoma (8470-8473)	19	2.3%	2.4%
Mucinous adenocarcinoma (8480, 8482)	31	3.7%	3.6%
Mucin-producing adenocarcinoma (8481)	1	0.1%	0.4%
Other (8141-8147, 8160-8162, 8180-8221, 8250-8259, 8261-8507, 8514, 8520-8551, 8560, 8571-8574, 8576, 8940-8941)	8	0.9%	4.5%
Other specific carcinomas			
Stromal cell tumor (8620-8631, 8650)	13	1.6%	1.3%
Other (8011-8015, 8030-8046, 8150-8155, 8170-8175, 8230-8231, 8247-8249, 8508, 8510-8513, 8561-8562, 8575, 8580-8619, 8632-8649, 8651-8671)	6	0.8%	0.8%
Unspecified, "Carcinoma, NOS" (8010, 8020-8022)	58	7.0%	4.5%
Sarcoma and other soft tissue tumors (8680-8713, 8800-8921, 8990-8991, 9040-9044, 9120-9136, 9141-9340, 9540-9582)	2	0.2%	0.3%
Other Specific Types			
Mullerian mixed tumor (8950-8951, 8980)	17	2.1%	2.8%
Teratoma, malignant (9080-9085, 9102)	6	0.8%	1.4%
Other (8240-8246, 8720-8790, 8930-8936, 8952-8979, 8981-8983, 9000-9030, 9060-9150, 9350-9364, 9380-9513, 9530-9539)	15	1.9%	2.4%
Unspecified (8000-8005)	47	5.6%	0.7%

[1] Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2009.

[2] SEER: Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2009.

[3] Histology types and numbers are taken from the International Classification of Diseases for Oncology, Third Edition (ICD-O-3).

Table 4 shows the distribution of ovarian cancer in Ohio and the United States by histologic grouping. In Ohio, about 89 percent of ovarian cancers were carcinomas. The most common type of ovarian carcinoma in both Ohio and the United States was papillary serous cystadenocarcinoma, followed by adenocarcinoma, NOS and serous cystadenocarcinoma.

Risk Factors for Ovarian Cancer

The following is a list of confirmed ovarian cancer risk factors:

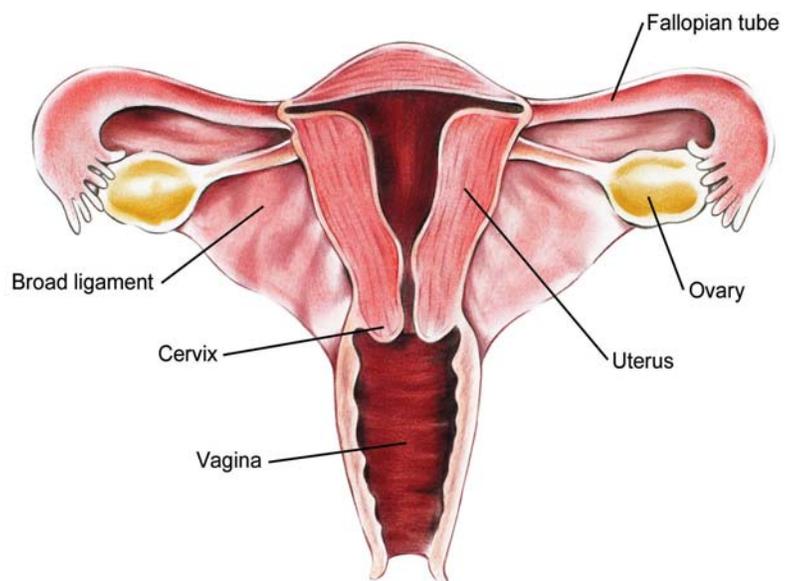
- **Age** — Ovarian cancer risk increases with age. Approximately half of all ovarian cancers are diagnosed in women over the age of 65.
- **Family History** — Having a mother, sister or daughter diagnosed with ovarian cancer increases risk, especially if the relative was diagnosed at a young age. Also, women with a family history of cancer of the breast, uterus, colon or rectum may have an increased risk of ovarian cancer.
- **Personal History of Cancer** — Women who have a personal history of cancer of the breast, uterus, colon or rectum have a higher risk of ovarian cancer.
- **Menopausal Hormone Therapy** — Some studies have suggested that women who take estrogen by itself (estrogen without progesterone) for 10 or more years may have an increased risk of ovarian cancer.
- **Never Pregnant** — Older women who have never been pregnant have an increased risk of ovarian cancer.

Did You Know?

Most ovarian tumors are benign (non-cancerous) and can be treated successfully by removing the ovary or part of the ovary.

Figure 9: Ovarian Anatomy: Location of the Ovaries in the Female Reproductive Tract

The ovaries are a part of the female reproductive system and produce eggs as well as the hormones estrogen and progesterone. Ovaries in women are homologous to testes in men, in that they are both gonads (produce eggs and sperm) and endocrine glands (produce hormones). The ovaries are oval shaped and measure approximately the size of an almond. As shown in Figure 9, the ovary (for a given side) is located in the lateral wall of the pelvis in a region called the ovarian fossa. Eggs travel from the ovaries through the fallopian tubes to the uterus. Typically, each ovary takes turns releasing eggs every month.



Ovarian Cancer Signs and Symptoms

Ovarian cancer often does not have signs or symptoms until later in its development. Symptoms may include abdominal pressure, bloating or swelling, abdominal or pelvic pain, difficulty eating or feeling full quickly, frequent urination or feeling a need to urinate.

Others symptoms of ovarian cancer can include back pain, constipation, fatigue, menstrual changes, pain during sex and persistent upset stomach.

These symptoms, however, may be caused by other conditions and aren't necessarily signs of ovarian cancer. If these symptoms are persistent and are not normal for you, you should see a gynecologist.

Clinical Trials Information

Clinical trials test many types of treatments including new drugs, surgical procedures, radiation therapy and combinations of these. The goal of conducting clinical trials is to find better ways to treat cancer. To obtain information concerning clinical trials for ovarian cancer, please talk with your health care provider or visit one of the following Web sites:

- **National Cancer Institute:**
<http://www.cancer.gov/clinicaltrials>
 - **American Cancer Society:**
http://www.cancer.org/docroot/ETO/ETO_6.asp?sitearea=ETO
 - **The Ohio State University Comprehensive Cancer Center—Arthur G. James Cancer Hospital and Richard J. Solove Research Institute:**
<http://www.jamesline.com/trials>
 - **The Cleveland Clinic:**
http://my.clevelandclinic.org/cancer/clinical_trials/default.aspx
 - **Case Western Reserve University Comprehensive Cancer Center:**
<http://cancer.case.edu/sharedresources/clinicaltrials>
 - **University of Cincinnati:**
<http://uccancercenter.uc.edu/research/clinicaltrials>
 - **Toledo Community Hospital Oncology Program:**
<http://www.tchop.com>
 - **Dayton Clinical Oncology Program:**
<http://www.med.wright.edu/dcop>
 - **Columbus Community Clinical Oncology Program:**
<http://www.columbusccop.org>
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Sources of Data and Additional Information

- **Ohio Cancer Incidence Surveillance System:**
http://www.odh.ohio.gov/odhPrograms/dis/ociss/ci_surv1.aspx
 - **National Cancer Institute:**
<http://www.cancer.gov/cancertopics/types/Ovarian>
 - **American Cancer Society:**
http://www.cancer.org/docroot/CRI/CRI_2_3x.asp?dt=33
-

**Ohio Cancer Incidence Surveillance System (OCISS)
Ohio Department of Health**

and

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Arthur G. James Cancer Hospital and
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