

# Breast Cancer in Ohio 2022

October 2022

## Key Findings and Populations at High Risk

- An average of 9,871 invasive and 2,079 *in situ* female breast cancer cases occurred each year in Ohio during 2015-2019.
- In Ohio, breast cancer occurred most often among women ages 65-74 years.
- Female breast cancer incidence rates in Ohio were higher in counties with or adjacent to large cities.
- Breast cancer incidence rates were relatively stable for both white women and Black women in Ohio from 1996 to 2019, while mortality rates decreased 37% for both white and Black women during this time period.
- In Ohio, approximately 72% of female breast cancers were diagnosed at an early stage in 2015-2019.
- The five-year relative survival for breast cancer was nearly 100% when diagnosed at an early stage, but only 31% when the cancer was diagnosed at the latest (distant) stage.
- Infiltrating ductal carcinoma, which begins in the lining of the milk ducts, is the most common type of invasive breast cancer, while ductal carcinoma in situ (DCIS) is the most common non-invasive type.
- In 2020, 78.3% of Ohio women ages 50-74 years reported having a mammogram in the past two years.

## Incidence and Mortality

### New Cases

Breast cancer is the most common cancer among women in Ohio, accounting for 29% of all new female invasive cancer cases (incidence) reported to the Ohio Cancer Incidence Surveillance System (OCISS) during 2015-2019. An average of 9,871 new cases of invasive female breast cancer were diagnosed each year in Ohio during this five-year period, at an average annual age-adjusted incidence rate of 130.6 per 100,000 females, compared with the U.S. rate of 128.3 per 100,000. In Ohio, the breast cancer incidence rate was higher among white women (131.3 per 100,000) than Black women (125.5 per 100,000) and Asian American and Pacific Islander women (85.2 per 100,000), and higher among those age 65 and older. In addition, an average of 2,079 *in situ* breast cancer cases were diagnosed among women in Ohio in 2015-2019. This report focuses on female breast cancer; however, men can also get breast cancer. An average of 78 men were diagnosed with breast cancer each year in Ohio in 2015-2019, with a corresponding rate of 1.1 per 100,000 males.

### Deaths

Breast cancer ranks as the second leading cause of cancer death among women in Ohio after lung and bronchus cancer. Breast cancer accounted for 14% of all cancer-related deaths in Ohio during 2015-2019. An average of 1,743 deaths from breast cancer occurred each year in Ohio during this period (Table 1). Ohio's female breast cancer mortality rate of 21.6 per 100,000 was 9% higher than the U.S. rate of 19.9 per 100,000. In Ohio, the female breast cancer mortality rate was highest among Black women (27.8 per 100,000) and lowest among Asian American and Pacific Islander women (10.8 per 100,000). More deaths occurred among women age 65 and older, who had a mortality rate almost 10 times higher than women younger than 65.

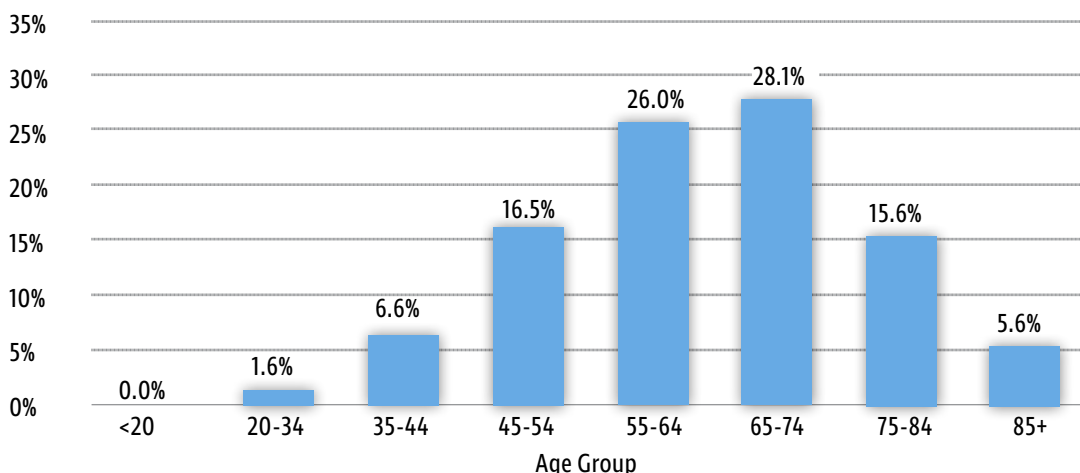
**Table 1. Average Annual Number and Age-adjusted Rates of Female Breast Cancer Cases and Deaths per 100,000, Ohio and the United States, 2015-2019**

		Incidence			Mortality		
		Ohio Cases	Ohio Rate	U.S. Rate	Ohio Deaths	Ohio Rate	U.S. Rate
<b>Total</b>		<b>9,871</b>	<b>130.6</b>	<b>128.3</b>	<b>1,743</b>	<b>21.6</b>	<b>19.9</b>
Race	White	8,626	131.3	130.2	1,485	21.0	19.4
	Black	1,054	125.5	125.9	236	27.8	27.1
	Asian/Pacific Islander	117	85.2	106.9	14	10.8	11.6
Age Group	<65	5,004	84.0	84.8	632	10.2	9.6
	65+	4,868	453.0	428.9	1,111	100.5	91.1

Source: Ohio Cancer Incidence Surveillance System and Bureau of Vital Statistics, Ohio Department of Health, 2022; Surveillance, Epidemiology, and End Results Program, National Cancer Institute, 2022.

## Female Breast Cancer Incidence by Age Group

**Figure 1. Percentage of Female Breast Cancer Cases by Age Group, Ohio, 2015-2019**

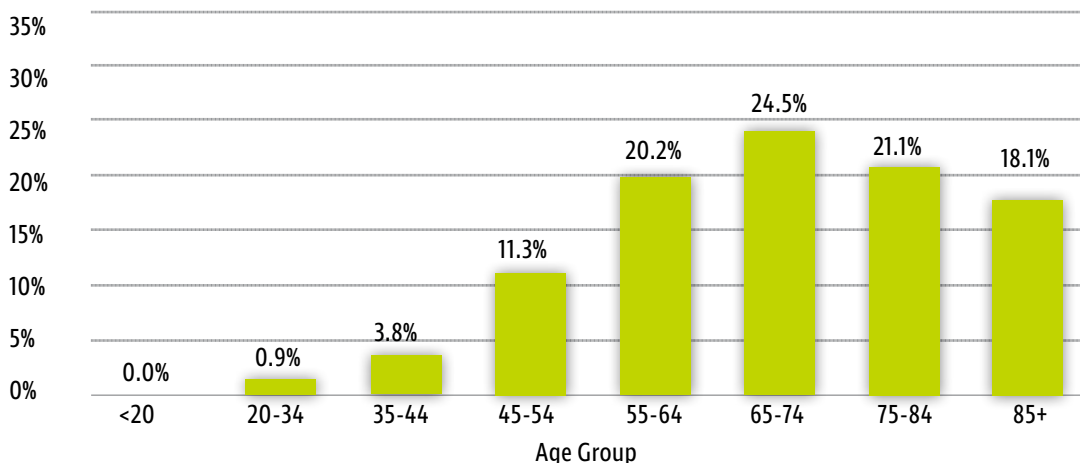


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2022.

As shown in Figure 1, breast cancer in Ohio was most frequently diagnosed among women ages 65-74 years (28.1%).

## Female Breast Cancer Mortality by Age Group

**Figure 2. Percentage of Female Breast Cancer Deaths by Age Group, Ohio, 2015-2019**

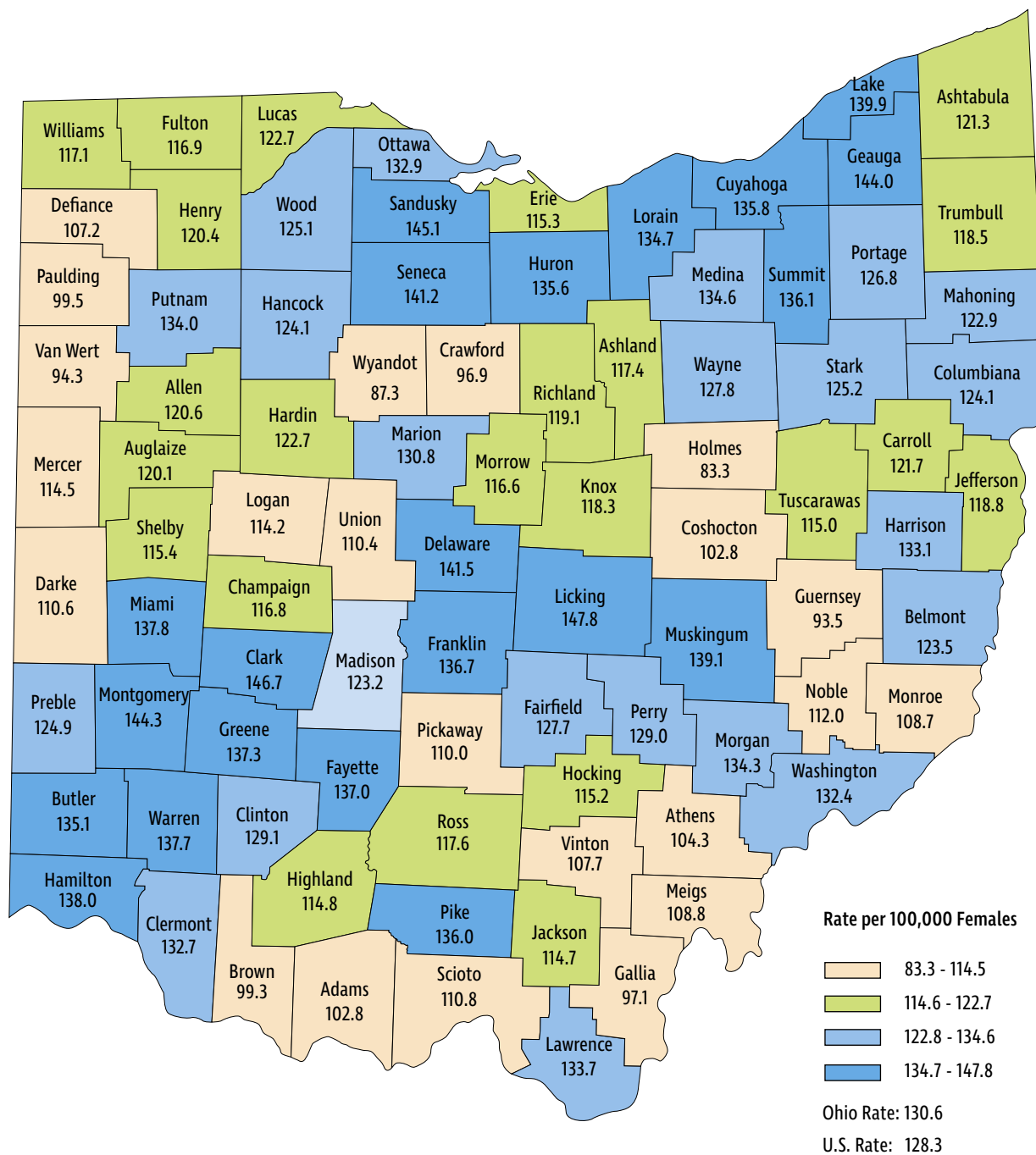


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2022.

As shown in Figure 2, deaths due to breast cancer in Ohio occurred most often among women ages 65-74 years (24.5%).

# Female Breast Cancer Incidence by County

**Figure 3. Average Annual Age-adjusted Incidence Rates of Female Breast Cancer per 100,000 by County of Residence, Ohio, 2015-2019**

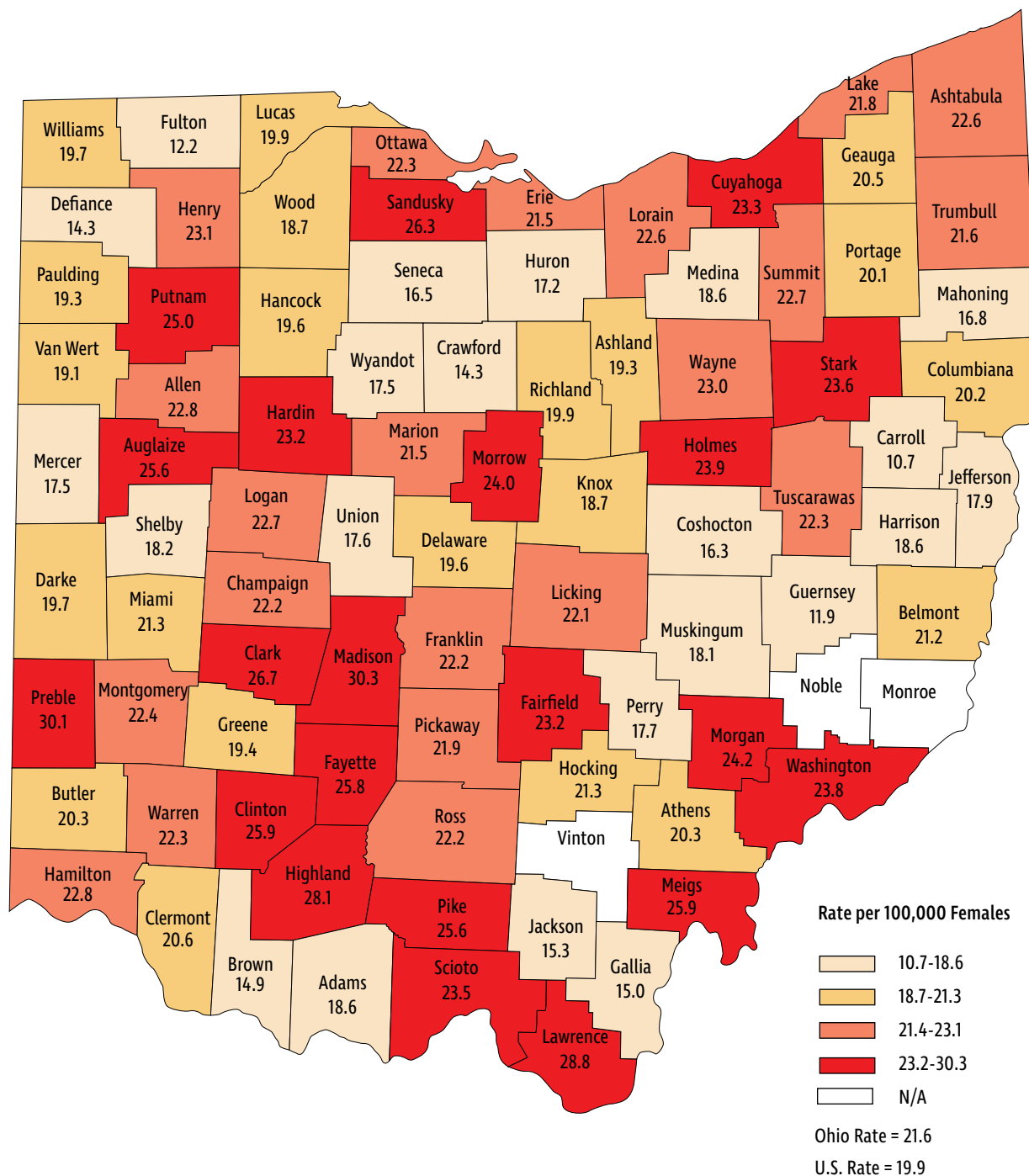


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2022. Each category represents approximately 25% of the 88 Ohio counties.

Incidence rates for female breast cancer in 2015-2019 tended to be higher in counties with or adjacent to large cities, including Cleveland (northeastern Ohio counties), Columbus (central Ohio counties), and Cincinnati and Dayton (southwestern Ohio counties).

# Female Breast Cancer Mortality by County

**Figure 4. Average Annual Age-adjusted Mortality Rates of Female Breast Cancer per 100,000 by County of Residence, Ohio, 2015-2019**

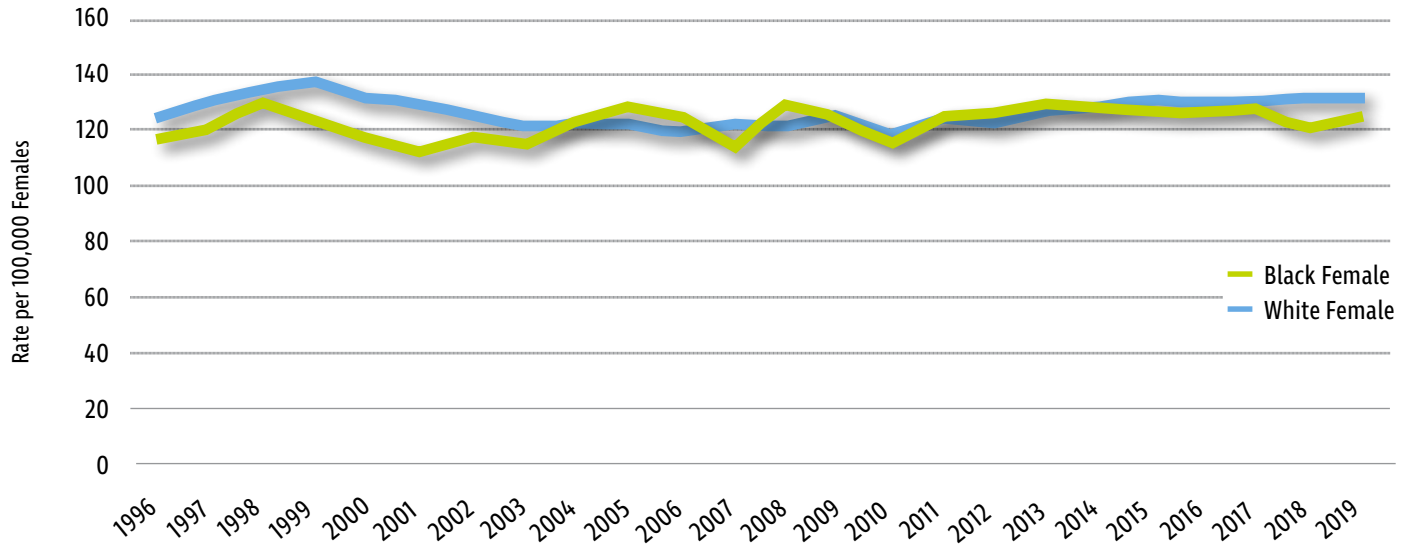


Source: Bureau of Vital Statistics, Ohio Department of Health, 2022. N/A: Rate not calculated when the death count for 2015-2019 is less than 10.

In Ohio in 2015-2019, the county with the highest age-adjusted female breast cancer mortality rate (Madison County, 30.3 per 100,000) had a rate 2.8 times higher than the county with the lowest rate (Carroll County, 10.7 per 100,000).

# Trends

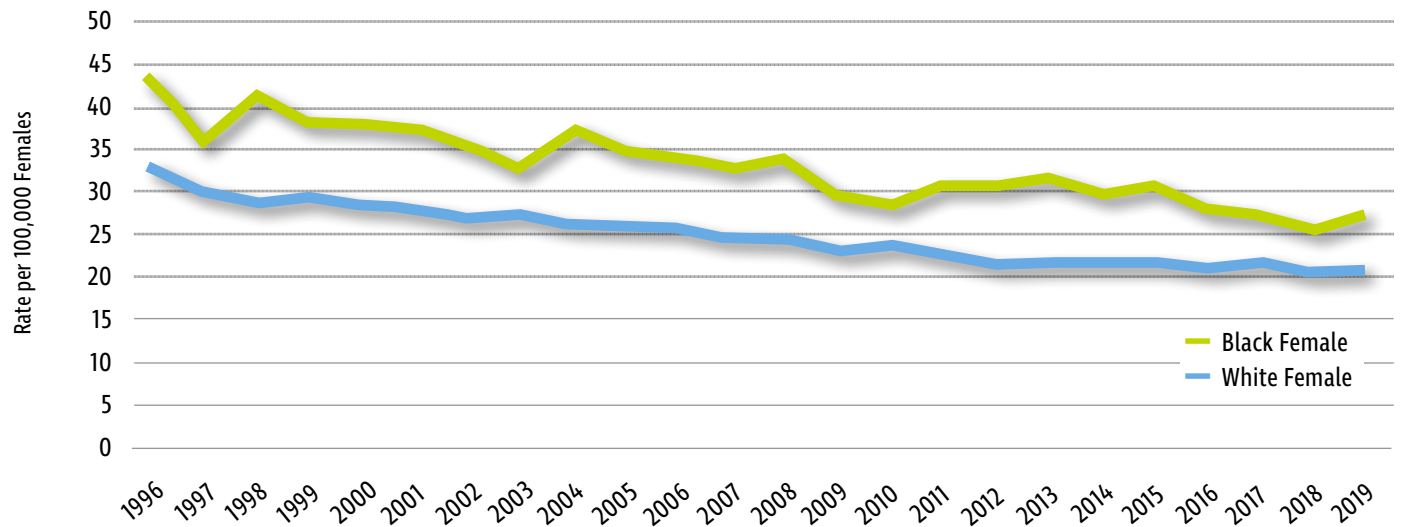
**Figure 5. Trends in Age-adjusted Incidence Rates of Female Breast Cancer per 100,000, Ohio, 1996-2019**



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2022.

Breast cancer incidence rates were relatively stable for both white women and Black women in Ohio from 1996 to 2019.

**Figure 6. Trends in Age-adjusted Mortality Rates of Female Breast Cancer per 100,000, Ohio, 1996-2019**



Source: Bureau of Vital Statistics, Ohio Department of Health, 2022.

Breast cancer mortality rates decreased 37% from 1996 to 2019 for both Black women and white women in Ohio. For each year, Black women had the highest breast cancer mortality rate.

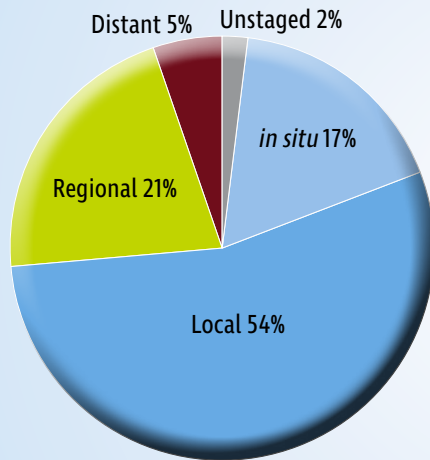


## Stage at Diagnosis

Cancer stage at diagnosis refers to the extent or spread of a cancer in the body and is an important determinant of survival. If cancer cells are present only in the layer of cells (tissue) 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.

*In situ* and local stage cancers are known as “early stage” cancers, and regional and distant stage cancers are known as “late stage” cancers. For example, in Ohio, approximately 72% of female breast cancers were diagnosed at an early stage from 2015-2019.

**Figure 7. Proportion of Female Breast Cancer Cases (%) by Stage at Diagnosis, Ohio, 2015-2019**

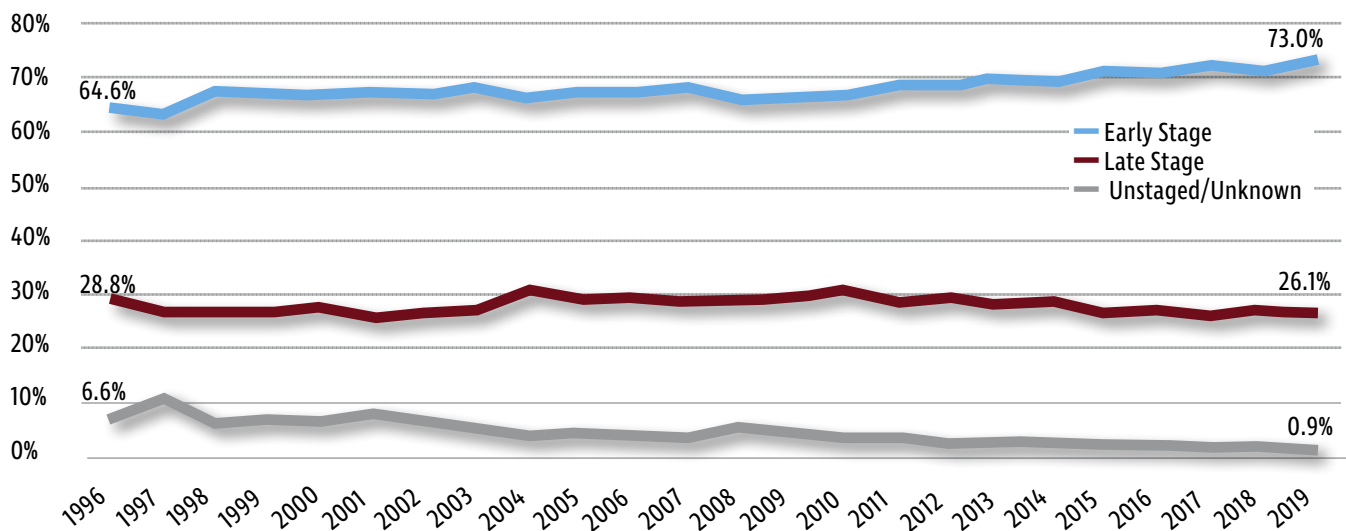


### In Ohio from 2015-2019:

- 17% of breast cancer cases were *in situ*.
- 54% were diagnosed at a local stage.
- 21% were regional stage.
- 5% were distant stage.
- 2% were unstaged or had missing stage information (Figure 7).

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2022.

**Figure 8. Trends in Proportion of Female Breast Cancer Cases (%) by Stage at Diagnosis, Ohio, 1996-2019**



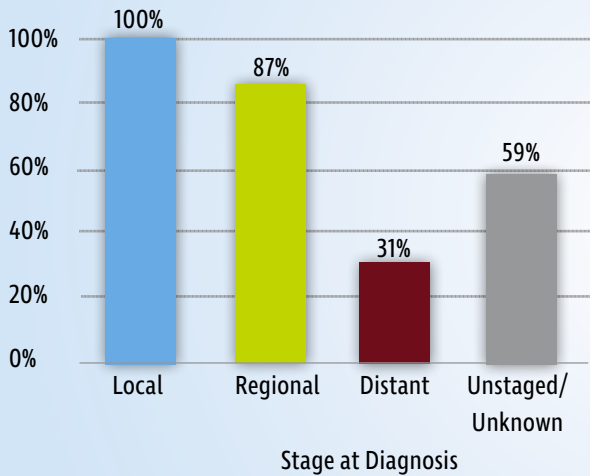
Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2022.

The proportions of female breast cancer cases diagnosed at an early stage increased 13% from 1996 to 2019, while late-stage diagnoses decreased slightly. The proportion of female breast cancer cases that were unstaged/unknown stage decreased from 6.6% in 1996 to 0.9% in 2019.

# Survival

In general, cancer survival is the estimated 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 9: Five-Year Relative Survival (%) for Female Breast Cancer by Stage at Diagnosis, Ohio, 2012-2018**

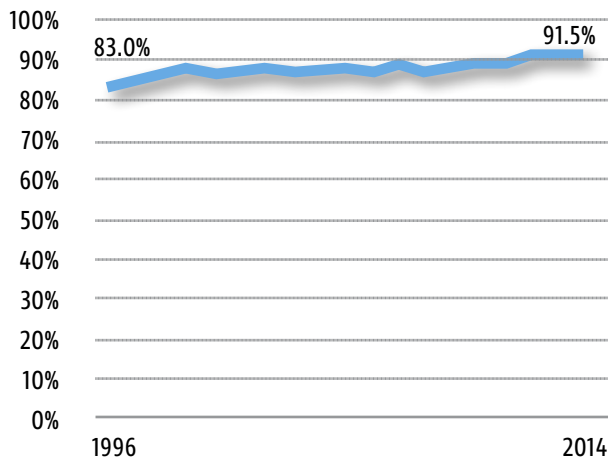


In Ohio, the five-year relative survival for breast cancer cases diagnosed from 2012 to 2018 was:

- 92% for all stages combined (not shown).
- Nearly 100% among those diagnosed at a local stage.
- 87% at the regional stage.
- Only 31% when the cancer was diagnosed at the latest (distant) stage.
- 59% for unstaged or unknown stage cases (Figure 9).

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2022.

**Figure 10. Five-Year Relative Survival Trends for Female Breast Cancer, Ohio, 1996-2014**



- Trends in five-year relative survival among women diagnosed with breast cancer in Ohio increased from 83.0% in 1996 to 91.5% in 2014 (Figure 10).

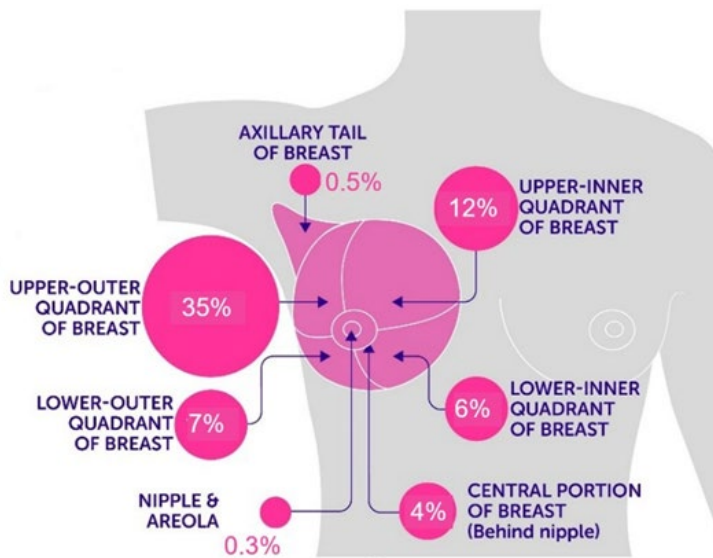
Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2022.

## Did You Know?

**The Breast and Cervical Cancer Project** offers no-cost breast and cervical cancer screenings and diagnostic testing to qualified participants. Call 1-844-430-BCCP for more information.

## Female Breast Cancer by Anatomical Site

**Figure 11. Proportion (%) of Female Breast Cancer Cases by Anatomical Site, Ohio, 2015-2019**



### Based on Ohio cancer data from 2015 to 2019:

- The highest percentage of cases occurred in the upper-outer quadrant of the breast (35%).
- Overlapping lesion of the breast (a single tumor which overlaps quadrants/sites) was the second most common area (22%), followed by areas that were not otherwise specified (13%) (data not shown).
- Other sites included cancers of the upper-inner quadrant (12%), lower-outer quadrant (7%), lower-inner quadrant (6%), central portion of the breast (4%), axillary tail (0.5%), and nipple (0.3%).

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2022.

Image: [https://commons.wikimedia.org/wiki/File:Breast\\_cancer\\_incidence\\_by\\_anatomical\\_site\\_\(females\).svg](https://commons.wikimedia.org/wiki/File:Breast_cancer_incidence_by_anatomical_site_(females).svg). (Adapted to show Ohio data.)

## Female Breast Cancer by Histologic Type

### Invasive Breast Cancer

Most (82.6%) female breast cancers in Ohio in 2015-2019 were invasive. Invasive cancer cells can spread, or metastasize, to other parts of the body. The most common types of invasive breast cancer are:

- **Invasive ductal carcinoma**, also called infiltrating ductal carcinoma, begins in the lining of the milk ducts. This was the most common type of invasive female breast cancer, accounting for an average of 7,472 cases, or 75.7% of all invasive breast cancer cases in Ohio from 2015 to 2019.
- **Invasive lobular carcinoma** begins in the lobules (milk glands) of the breast. Lobular carcinoma, not otherwise specified (NOS), represented an average of 1,010 cases, or 10.2% of all invasive breast cancer cases in Ohio from 2015 to 2019.

Mixed types of invasive ductal and lobular carcinoma made up 5.9% of invasive breast cancer cases in Ohio. There are several other less common types of breast cancer such as mucinous adenocarcinoma (1.8% of cases), papillary adenocarcinoma (0.5% of cases), Paget's disease (0.2% of cases), and inflammatory breast cancer (0.2% of cases).

### Non-invasive Breast Cancer

There was an average of 2,079 of non-invasive female breast cancer cases diagnosed each year in Ohio from 2015-2019. Ductal carcinoma *in situ* (DCIS) is the most common type of non-invasive female breast cancer. DCIS is a breast disease that may lead to invasive breast cancer. The cancer cells are only in the lining of the ducts and have not spread to other tissues in the breast.



# Female Breast Cancer Hormone Receptor Status and HER2 Status

## Hormone Receptor Status

Hormone receptor status indicates whether breast cancer cells have receptors for estrogen or progesterone, which can promote the growth of cancer. A cancer is called estrogen-receptor-positive (or ER+) if it has many estrogen receptors, or estrogen-receptor negative (ER-) if it has few or no estrogen receptors. A cancer is progesterone-receptor-positive (PR+) if it has many progesterone receptors, or progesterone-receptor negative (PR-) if it has few or no progesterone receptors. Hormone receptor status is a main factor in planning breast cancer treatment. Hormone receptor-positive breast cancers can be treated with hormone therapies, including tamoxifen and the aromatase inhibitors. Hormone receptor-negative breast cancers are not treated with hormone therapies because they have few or no hormone receptors.

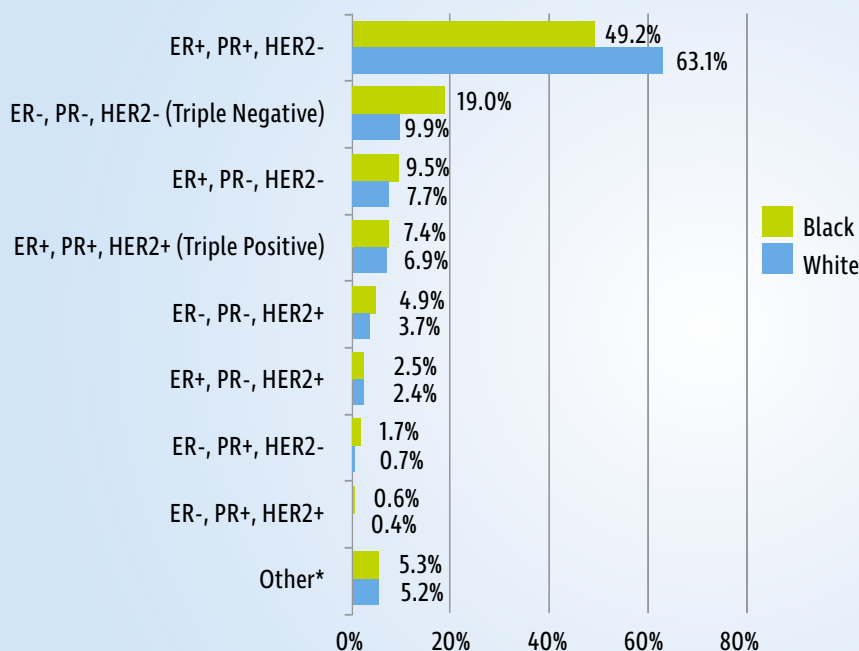
## HER2 Status

HER2 (human epidermal growth factor receptor 2) is a protein that appears on the surface of some breast cancer cells. HER2-positive (HER2+) breast cancers have a lot of HER2 protein, while HER2-negative (HER2-) breast cancers have little or no HER2 protein. HER2 status is determined by testing tumor tissue and helps guide treatment. HER2+ breast cancers can benefit from anti-HER2 drugs, such as trastuzumab (Herceptin), which directly target the HER2 receptor.

## Combinations of Hormone Receptor Status and HER2 Status

Combinations of ER, PR, and HER2 status are important for deciding which treatments are most useful to women diagnosed with breast cancer. Triple-negative breast tumors (ER-, PR-, HER2-) have little to no HER2 and few to no estrogen or progesterone receptors. Younger women and Black or Hispanic/Latina women have a higher risk of being diagnosed with triple-negative breast cancer. Triple-negative breast cancers grow and spread more quickly than most other types of breast cancer. Because the cancer cells have few to no hormone receptors and little to no HER2, hormone therapy and anti-HER2 drugs are not helpful in treating these cancers. Triple-positive breast tumors (ER+, PR+, HER2+) are treated with hormone drugs as well as drugs that target HER2.

**Figure 12. Proportion (%) of Invasive Female Breast Cancer Cases by Combinations of ER, PR, and HER2 Status, Ohio, 2015-2019**



The most common type of female breast cancer, based on hormone receptor/HER2 status, was ER+, PR+, HER2-, which was more common among white women (63.1%) than Black women (49.2%) in 2015-2019.

This was followed by triple-negative breast cancer (ER-, PR-, HER2-), which was nearly twice as common among Black women (19.0%) than white women (9.9%).

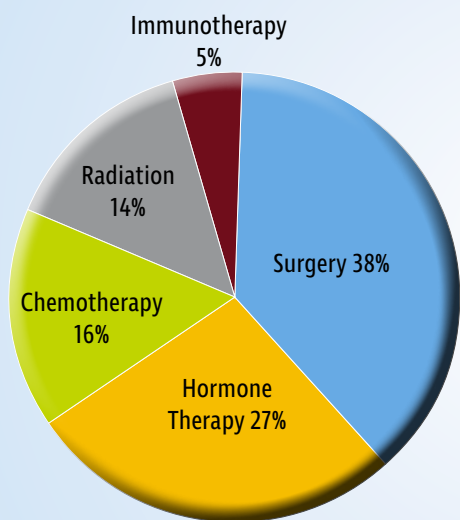
Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2022.

\*One or more tests either not performed or unknown if performed, cannot be determined, not documented, or missing.

# Female Breast Cancer Treatment

First course of treatment includes all methods of treatment recorded in the treatment plan and administered to the patient before disease progression or recurrence. Treatment for breast cancer may involve one or more of the following: breast-conserving surgery (surgical removal of the tumor and surrounding tissue), mastectomy (surgical removal of the breast), removal of the lymph nodes under the arm, radiation therapy, chemotherapy, hormone therapy, immunotherapy, or other therapy. Numerous studies have shown that, for early-stage disease, long-term survival after breast-conserving surgery plus radiation therapy is similar to mastectomy.

**Figure 13. Proportions of First Course of Treatment for Invasive Female Breast Cancer, Ohio, 2015-2019**

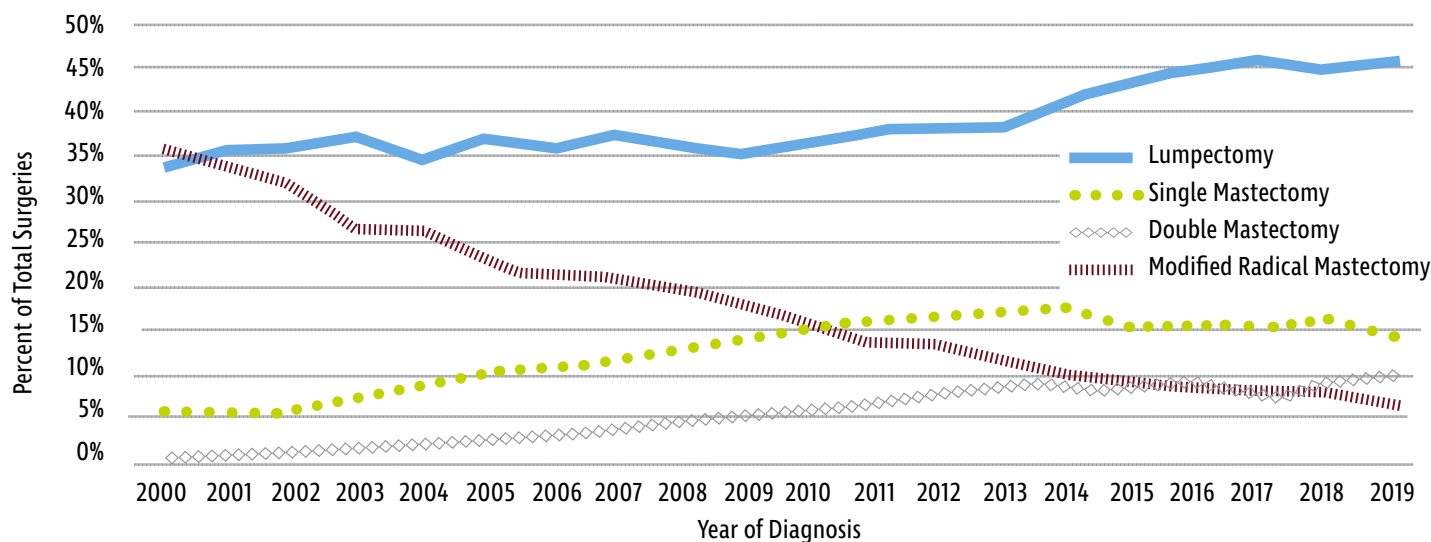


Surgery was the major part (38%) of first course of treatment for invasive breast cancer in Ohio during 2015 to 2019, followed by hormone therapy (27%), chemotherapy (16%), radiation (14%), immunotherapy (5%), and other therapy (0.2%, data not shown).

Data are based on initiated first course of treatment only. Treatments planned but not yet started at the time of reporting to OCIS are not included. Although cancer cases must be reported to OCIS within six months of diagnosis or treatment, first course of treatment may not be complete at the time of reporting.

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2022.

**Figure 14. Trends in Selected Types of Surgery During First Course of Treatment for Invasive Female Breast Cancer as a Proportion (%) of Total Surgeries, Ohio, 2000-2019**



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2022.

Modified radical mastectomies decreased dramatically in Ohio from 2000 to 2019 and were largely replaced by lumpectomies (also known as breast-conserving surgery), which increased during this time. Both single mastectomies and double mastectomies (contralateral prophylactic mastectomies) increased from 2000 to 2014 but remained relatively stable during 2015 to 2019.

# Risk Factors

Anything that increases the chance of getting a disease is called a risk factor. Having one or more risk factors does not mean that a person will develop the disease. Below are some of the risk factors for female breast cancer.

## Potentially Modifiable Risk Factors

**Having children after 30 or not having children:** Women who have had no children or who had their first child after age 30 have a slightly higher breast cancer risk.

**Oral contraceptive use:** Women who currently or recently used oral contraceptives have a slightly increased risk compared with women who stopped using them more than 10 years ago or never used them.

**Use of menopausal hormone therapy:** Women who use combined estrogen and progesterone menopausal hormone therapy for two or more years are at increased risk. This increased risk goes away within five years of nonuse.

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

**Overweight and obesity:** Women who are overweight or obese after menopause have an increased risk of breast cancer.

**Not being physically active:** Women who are not physically active have a higher risk, compared with women who are.

**Alcohol:** The more alcohol a woman drinks, the greater her risk of breast cancer.

**Previous breast/chest radiation:** Women who had radiation therapy to the chest area before age 40 as treatment for another cancer or other medical conditions have increased risk.

## Non-Modifiable Risk Factors

**Age:** Risk of developing breast cancer increases with age. Most breast cancers are diagnosed in women age 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:** About 5-10% of cases are hereditary and result from gene mutations, most commonly mutations of the BRCA1 and BRCA2 genes. Ashkenazi Jewish are at increased risk due to increased prevalence of BRCA1 and BRCA2 mutations.

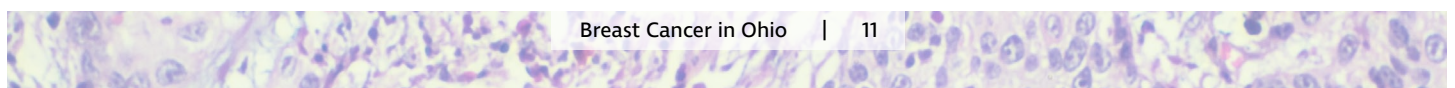
**High breast tissue density:** Women with high breast tissue density (the amount of glandular tissue relative to fatty tissue measured on a mammogram) have higher risk of breast cancer.

**Family history:** Risk is higher if a first-degree relative has had breast cancer, especially if the family member was diagnosed before age 50.

**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 DCIS, lobular carcinoma *in situ* (LCIS), or proliferative lesions with or without cell abnormalities (e.g., hyperplasia) are at increased risk.

**Long menstrual history:** Women who started menstruating before age 12 or who went through menopause after age 55 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 of Breast Cancer

- Lump or swelling in the breast or underarm area.
- Persistent changes in the breast such as skin irritation, dimpling, thickening, swelling, distortion, or tenderness.
- Nipple ulceration or retraction (turning inward).
- Redness or scaliness of the nipple or breast skin.
- Nipple discharge (other than breast milk).
- 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

Regular mammograms can help find breast cancer early. The U.S. Preventive Services Task Force (USPSTF) recommends mammography screening every two years for women ages 50-74 who are at average risk. Women with a parent, sibling, or child with breast cancer are at higher risk for breast cancer and may benefit from beginning screening in their 40s.

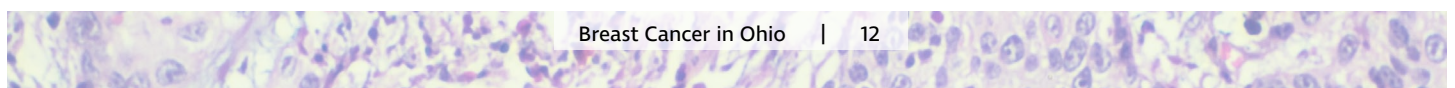
**Table 2. Prevalence of Women Ages 50-74 Years Who Reported Having Had a Mammogram in the Past Two Years by Demographics, Ohio, 2020**

Demographics	Prevalence (%)	95% CI
Total	78.3	76.3 - 80.3
<b>Age</b>		
50 - 54	70.2	65.1 - 75.3
55 - 64	79.1	76.0 - 82.1
65 - 74	81.5	78.8 - 84.3
<b>Race/Ethnicity</b>		
White, Non-Hispanic	78.4	76.3 - 80.4
Black, Non-Hispanic	85.0	79.4 - 90.6
Hispanic	N/A	N/A - N/A
Other, Non-Hispanic	N/A	N/A - N/A
Multi-Racial	N/A	N/A - N/A
<b>Annual Household Income</b>		
<\$15,000	68.9	61.6 - 76.1
\$15,000 - \$24,999	73.7	68.2 - 79.1
\$25,000 - \$34,999	67.5	59.3 - 75.8
\$35,000 - \$49,999	75.5	69.6 - 81.5
\$50,000 - \$74,999	79.3	74.1 - 84.4
\$75,000+	86.0	82.9 - 89.2
<b>Education</b>		
Less than High School	70.2	61.5 - 79.0
High School Diploma	75.0	71.4 - 78.5
Some College	78.9	75.4 - 82.5
College Graduate	84.0	81.1 - 87.0

Among Ohio women ages 50-74 years, the prevalence of mammography in the past two years was:

- 78.3% overall.
- Significantly higher among women ages 55-64 and 65-74 years, compared with women ages 50-54 years.
- Not significantly different between white, non-Hispanic women and Black, non-Hispanic women.
- Significantly higher among Ohio women in the highest income category (\$75,000+), compared with those earning less than \$50,000 per year.
- Significantly higher among college graduates, compared with those with a high school diploma or less education.

Source: 2020 Ohio Behavioral Risk Factor Surveillance System, Ohio Department of Health, 2022.  
 N/A = Not Applicable; estimate does not meet the reliability criteria for reporting set by the CDC.  
 95% CI = 95% Confidence Interval.



# Genetic Counseling

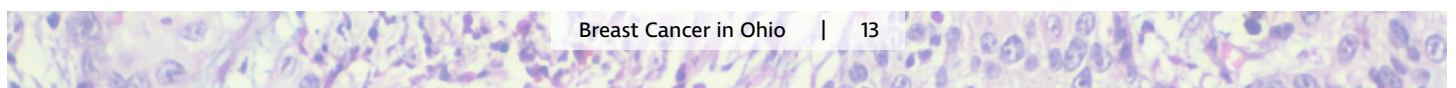
Women who have inherited changes (mutations) to certain genes, such as BRCA1 and BRCA2 (BRCA is an abbreviation for BReast CAncer gene) are at higher risk of breast cancer. Not every woman who has a BRCA1 or BRCA2 gene mutation will get breast cancer. According to the Centers for Disease Control and Prevention (CDC), about 50 out of 100 women with a BRCA1 or BRCA2 gene mutation will get breast cancer by the time they turn 70 years old, compared with only 7 out of 100 women in the general U.S. population. For more information, see [Video: BRCA Genes and Breast Cancer](#).

Genetic counseling related to breast cancer is appropriate for anyone with a personal history or a first- or second-degree relative with the following:

- Breast cancer at or younger than age 50.
- Triple negative breast cancer at any age.
- Breast cancer, bilateral or multiple tumors.
- Breast cancer that is recurrent or metastatic and HER2/neu negative.
- Breast cancer at any age and Ashkenazi Jewish ancestry.
- Male breast cancer.

Additional information can be found in *Criteria For Referral for Cancer Genetics Evaluation*: <https://odh.ohio.gov/know-our-programs/genetic-services/materials-publications/criteria-for-referral-cancer-genetics-eval>.

The Ohio Department of Health (ODH) Genetics Services Program funds a network of genetic centers that provide comprehensive care and services to people affected with or at risk for genetic disorders. Genetic services include genetic counseling, education, diagnosis, and treatment for genetic conditions and congenital abnormalities. There are currently 24 counties in Ohio where Ohio Cancer Genetics Risk Assessment sites are located. Site names, addresses, and contact information can be found at <https://odh.ohio.gov/know-our-programs/genetic-services/Ohio-Cancer-Genetics-Risk-Assessment-Sites>.





# 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. 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.

**Average Annual Number:** The number of cases or deaths diagnosed per year, on average, for the time period of interest (e.g., 2015 to 2019). 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.

**Confidence Interval (CI):** An estimated range of values for a measure constructed so the range has a specified probability of including the true value of the measure in the population.

**Incidence:** The number of cases diagnosed during a specified time period (e.g., 2015 to 2019). Breast cancer cases were defined by the International Classification of Diseases for Oncology, Third Edition (ICD-O-3), and categorized by C500-C509, excluding 9050-9055, 9140, 9590-9992, in accordance with the SEER Program of the National Cancer Institute.

**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/missing stages. Only invasive cancers were included in the calculation of incidence rates in this document.

**Histology:** The study of tissues and cells under a microscope.

**Mortality:** The number of deaths during a specified time period (e.g., 2015 to 2019). Breast cancer deaths were defined by the International Statistical Classification of Diseases and Related Health Problems, Tenth Edition (ICD-10), C500-C509.

**Population Data Used to Calculate Rates:** The 1996 to 2019 rates were calculated using population estimates from the U.S. Census Bureau and National Center for Health Statistics. Population data were compiled from bridged-race intercensal population estimates for July 1, 1990 to July 1, 1999 (released July 26, 2004); revised bridged-race intercensal population estimates for July 1, 2000 to July 1, 2004 (released Oct. 26, 2012); revised bridged-race intercensal population estimates for July 1, 2005 to July 1, 2009 (released June 26, 2014), and vintage 2020 bridged-race postcensal population estimates for July 1, 2010 to July 1, 2020 (released September 22, 2021).

**Prevalence:** The proportion of people with a certain disease or characteristic at a given time.

**Rate:** The number of cases or deaths per unit of population (e.g., per 100,000 persons) during a specified time period (e.g., 2015 to 2019). Rates may be unstable and are not presented when the count is less than five.

**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.

**Stage at Diagnosis:** The degree to which a tumor has spread from its site of origin at the time of diagnosis. A system of summary staging is often used to group cases 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 Stage** — Insufficient information is available to determine the stage or extent of the disease at diagnosis.

**Table 3. Average Annual Number and Age-adjusted Rates of Invasive Female Breast Cancer Cases and Deaths per 100,000 Females by County of Residence, Ohio and the United States, 2015-2019**

	Incidence		Mortality			Incidence		Mortality			Incidence		Mortality	
	Cases	Rate	Deaths	Rate		Cases	Rate	Deaths	Rate		Cases	Rate	Deaths	Rate
Ohio	9,871	130.6	1,743	21.6	Greene	148	137.3	22	19.4	Morrow	27	116.6	6	24.0
U.S.		128.3		19.9	Guernsey	24	93.5	3	11.9	Muskingum	79	139.1	11	18.1
Adams	19	102.8	4	18.6	Hamilton	692	138.0	121	22.8	Noble	9	112.0	1	N/A
Allen	80	120.6	15	22.8	Hancock	60	124.1	11	19.6	Ottawa	45	132.9	8	22.3
Ashland	44	117.4	8	19.3	Hardin	23	122.7	4	23.2	Paulding	12	99.5	3	19.3
Ashtabula	81	121.3	17	22.6	Harrison	15	133.1	2	18.6	Perry	29	129.0	4	17.7
Athens	34	104.3	7	20.3	Henry	21	120.4	5	23.1	Pickaway	39	110.0	7	21.9
Auglaize	35	120.1	8	25.6	Highland	32	114.8	8	28.1	Pike	24	136.0	5	25.6
Belmont	60	123.5	11	21.2	Hocking	23	115.2	4	21.3	Portage	129	126.8	21	20.1
Brown	29	99.3	5	14.9	Holmes	19	83.3	6	23.9	Preble	37	124.9	9	30.1
Butler	305	135.1	47	20.3	Huron	50	135.6	7	17.2	Putnam	30	134.0	6	25.0
Carroll	25	121.7	3	10.7	Jackson	25	114.7	4	15.3	Richland	95	119.1	18	19.9
Champaign	31	116.8	6	22.2	Jefferson	59	118.8	9	17.9	Ross	59	117.6	11	22.2
Clark	138	146.7	26	26.7	Knox	47	118.3	9	18.7	Sandusky	60	145.1	12	26.3
Clermont	176	132.7	27	20.6	Lake	232	139.9	39	21.8	Scioto	57	110.8	13	23.5
Clinton	35	129.1	8	25.9	Lawrence	56	133.7	12	28.8	Seneca	50	141.2	7	16.5
Columbiana	91	124.1	16	20.2	Licking	167	147.8	26	22.1	Shelby	35	115.4	6	18.2
Coshocton	27	102.8	5	16.3	Logan	33	114.2	7	22.7	Stark	330	125.2	66	23.6
Crawford	30	96.9	5	14.3	Lorain	273	134.7	50	22.6	Summit	497	136.1	89	22.7
Cuyahoga	1,171	135.8	222	23.3	Lucas	338	122.7	58	19.9	Trumbull	179	118.5	35	21.6
Darke	40	110.6	8	19.7	Madison	33	123.2	8	30.3	Tuscarawas	74	115.0	17	22.3
Defiance	28	107.2	4	14.3	Mahoning	209	122.9	35	16.8	Union	35	110.4	5	17.6
Delaware	165	141.5	22	19.6	Marion	54	130.8	9	21.5	Van Wert	18	94.3	5	19.1
Erie	66	115.3	13	21.5	Medina	160	134.6	24	18.6	Vinton	10	107.7	2	N/A
Fairfield	123	127.7	23	23.2	Meigs	17	108.8	4	25.9	Warren	192	137.7	31	22.3
Fayette	26	137.0	5	25.8	Mercer	31	114.5	5	17.5	Washington	59	132.4	11	23.8
Franklin	941	136.7	156	22.2	Miami	98	137.8	16	21.3	Wayne	94	127.8	18	23.0
Fulton	32	116.9	3	12.2	Monroe	11	108.7	1	N/A	Williams	32	117.1	6	19.7
Gallia	21	97.1	3	15.0	Montgomery	517	144.3	87	22.4	Wood	94	125.1	15	18.7
Geauga	97	144.0	16	20.5	Morgan	13	134.3	3	24.2	Wyandot	14	87.3	3	17.5

Source: Ohio Cancer Incidence Surveillance System and Bureau of Vital Statistics, Ohio Department of Health, 2022; Surveillance, Epidemiology, and End Results Program, National Cancer Institute, 2022.

## Sources of Data and Additional Information

### Ohio Department of Health:

[Ohio Cancer Incidence Surveillance System \(OCISS\)](#)

[Comprehensive Cancer Control Program](#)

[Breast & Cervical Cancer Project | Ohio Department of Health](#)

### Ohio Public Health Data Warehouse:

<https://publicapps.odh.ohio.gov/EDW/DataCatalog>

### National Cancer Institute:

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

### American Cancer Society:

<https://www.cancer.org/cancer/breast-cancer.html>

### U.S. Cancer Statistics:

[www.cdc.gov/cancer/dataviz](http://www.cdc.gov/cancer/dataviz)

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