

Breast Cancer in Ohio, 2010-2014



Incidence and Mortality

In the United States, breast cancer is about 100 times more common in women, as compared to men. This report focuses on female breast cancer in Ohio and also includes a special section concerning male breast cancer on pages 16-18. Note that the breast cancer incidence data contained in this report pertains to invasive cancers, with the exception of data about stage at diagnosis which also includes *in situ* cancers.

Breast cancer is the most common cancer among women in Ohio, accounting for 28.6 percent of new female invasive cancer cases (incidence) reported to the Ohio Cancer Incidence Surveillance System (OCISS) from 2010 through 2014. The average annual number of new cases of female breast cancer in Ohio during this time period was 8,932, and the average annual age-adjusted incidence rate was 123.8 cases per 100,000 females (Table 1). This incidence rate is similar to the U.S. rate of 124.9 per 100,000 females. In Ohio and the United States, female breast cancer incidence rates were more than five times higher among those 65 and older.

Breast cancer is the second-leading cause of cancer death among women in Ohio after lung and bronchus cancer, accounting for 15 percent of total cancer deaths among women. The average annual age-adjusted mortality rate of 23.0 deaths per 100,000 females in Ohio was 8 percent higher than the U.S. mortality rate (21.2 per 100,000 females) in 2010-2014 (Table 1). In Ohio and the United States, female breast cancer mortality rates were nearly 10 times higher among those 65 years and older.

Key Findings & Populations at High Risk

- In 2010-2014, female breast cancer incidence rates in Ohio were similar to those in the United States, while mortality rates in Ohio were 8 percent higher compared to the United States.
- From 1996 to 2014, female breast cancer incidence rates in Ohio were relatively stable, while mortality rates decreased slightly for both white and black women.
- In 2010-2014, the majority of counties with the highest female breast cancer incidence rates were, or adjacent to, counties with large cities.
- In Ohio, approximately two-thirds of female breast cancers were diagnosed at *in situ* or local stage.
- The U.S. five-year relative survival probability for female breast cancer was lower among blacks (80.6 percent) than for whites (90.8 percent).
- Mammography screening did not differ by age group or race/ethnicity, but increased with annual household income and education.
- In 2010-2014, male breast cancer incidence and mortality rates in Ohio were the same as those in the United States. Male breast cancer incidence rates were higher among blacks, compared to whites, and among men 65 and older, compared to men less than 65.

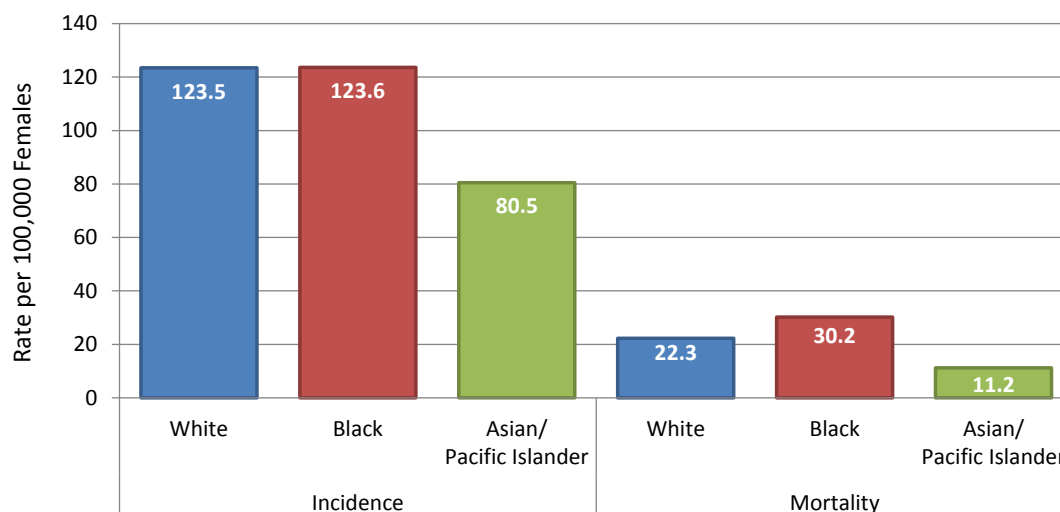
Table 1. Female Breast Cancer: Average Annual Number and Age-adjusted Rates of Cases and Deaths per 100,000 Females by Race and Age Group in Ohio and the United States, 2010-2014

		Incidence			Mortality		
		Ohio Cases	Ohio Rate	U.S. Rate	Ohio Deaths	Ohio Rate	U.S. Rate
Total		8,932	123.8	124.9	1,768	23.0	21.2
Race	White	7,810	123.5	127.7	1,523	22.3	20.6
	Black	959	123.6	125.1	233	30.2	29.2
	Asian/Pacific Islander	85	80.5	98.5	10	11.2	11.3
Age Group	<65	4,801	79.5	81.4	690	11.0	10.3
	65+	4,131	429.7	425.5	1,078	106.4	96.2

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2017; Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2017; Bureau of Vital Statistics, Ohio Department of Health, 2017; National Center for Health Statistics, 2017.

Female Breast Cancer Incidence and Mortality by Race and Age

Figure 1. Female Breast Cancer: Average Annual Age-adjusted Incidence and Mortality Rates per 100,000 Females by Race in Ohio, 2010-2014

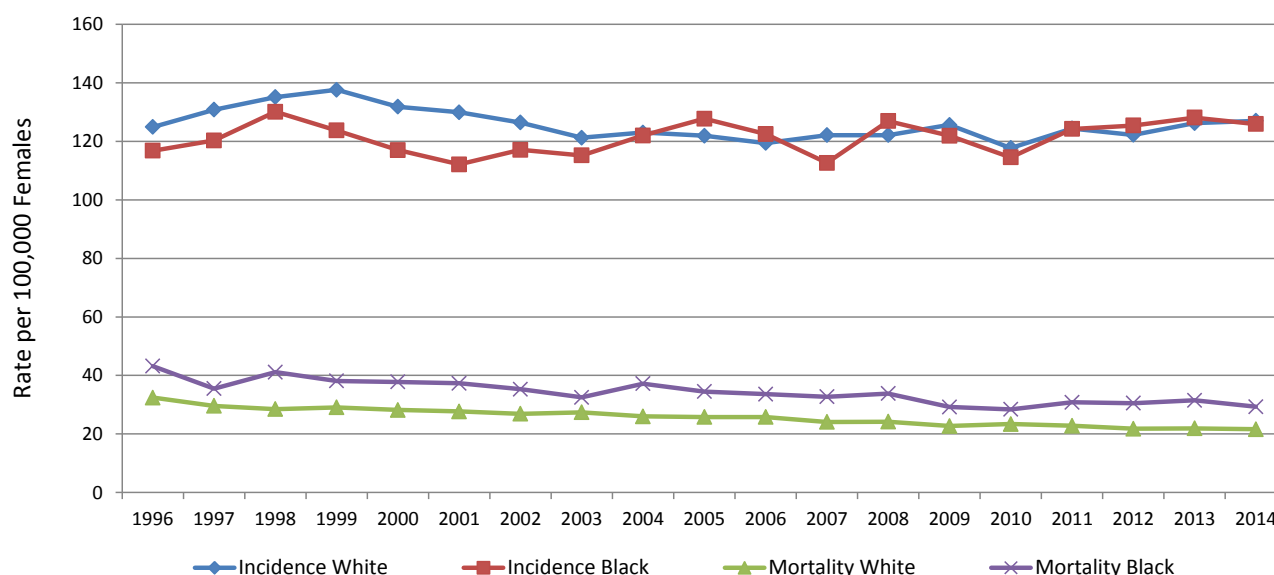


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2017; Bureau of Vital Statistics, Ohio Department of Health, 2017.

As shown in Table 1 and Figure 1, whites and blacks had similar female breast cancer incidence rates, both of which were considerably higher than the rates among Asians/Pacific Islanders. The female breast cancer mortality rate was highest among blacks (30.2 per 100,000) and lowest among Asians/Pacific Islanders (11.2 per 100,000).

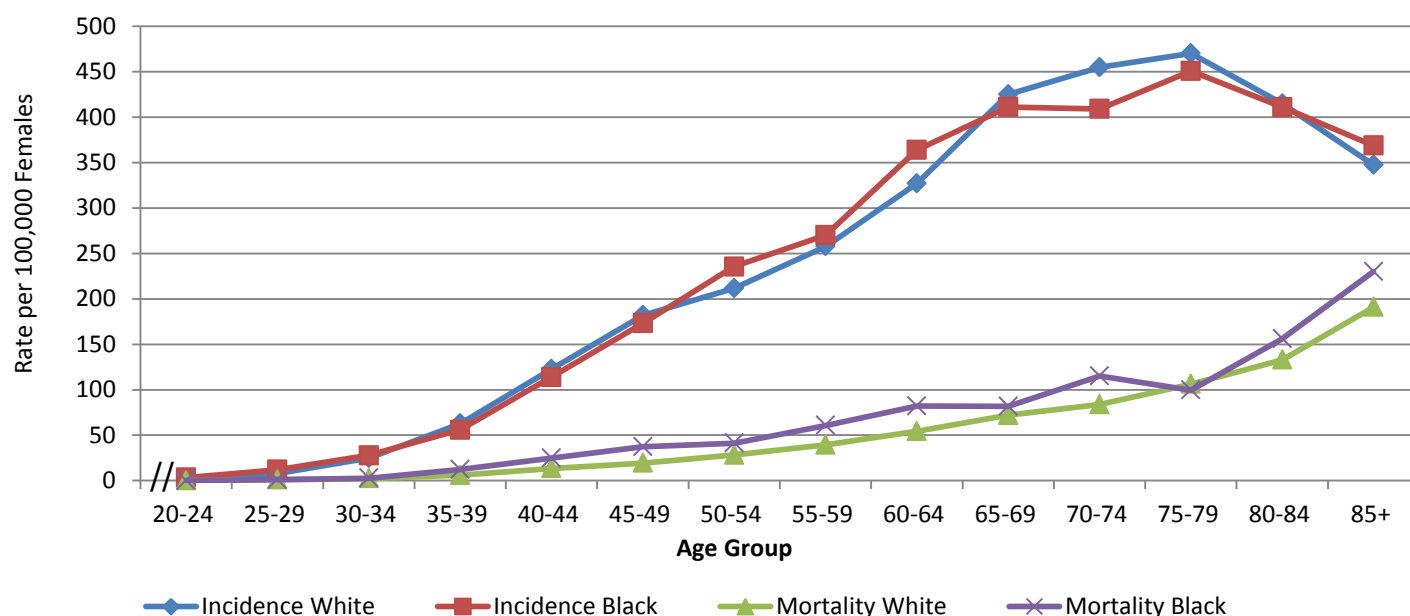
As shown in Figure 2, from 1996 to 2003 in Ohio, female breast cancer incidence rates among whites were slightly greater than rates among blacks; from 2004 to 2014 the rates converged. Female breast cancer mortality rates among whites and blacks decreased from 1996 to 2014. For each year, the mortality rate among blacks was greater than the rate for whites.

Figure 2. Female Breast Cancer: Trends in Annual Age-adjusted Incidence and Mortality Rates per 100,000 Females by Race in Ohio, 1996-2014



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2017; Bureau of Vital Statistics, Ohio Department of Health, 2017.

Figure 3. Female Breast Cancer: Average Annual Age-specific Incidence and Mortality Rates per 100,000 Females by Race in Ohio, 2010-2014

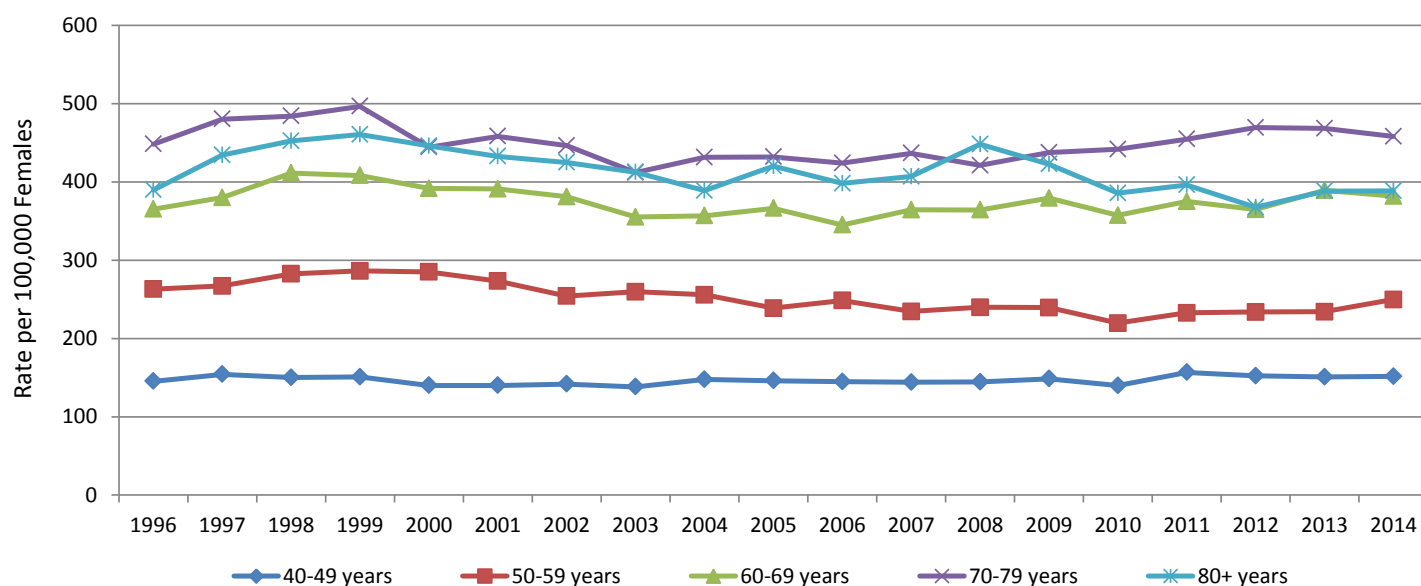


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2017; Bureau of Vital Statistics, Ohio Department of Health, 2017.

Figure 3 presents 2010-2014 age-specific female breast cancer incidence and mortality rates by race. Incidence rates increased for whites and blacks through ages 75-79 (with the exception of a slight decrease among blacks ages 70-74), then declined. Female breast cancer mortality rates increased through ages 85 and older, with the exception of a slight decrease among blacks ages 75-79. Mortality rates were slightly higher for blacks in most age groups.

Figure 4 shows trends in age-specific incidence rates from 1996 through 2014. Incidence rates declined 12 percent among women ages 50-59 from 2000 to 2014, but there were no apparent trends among women in other age groups from 1996 to 2014.

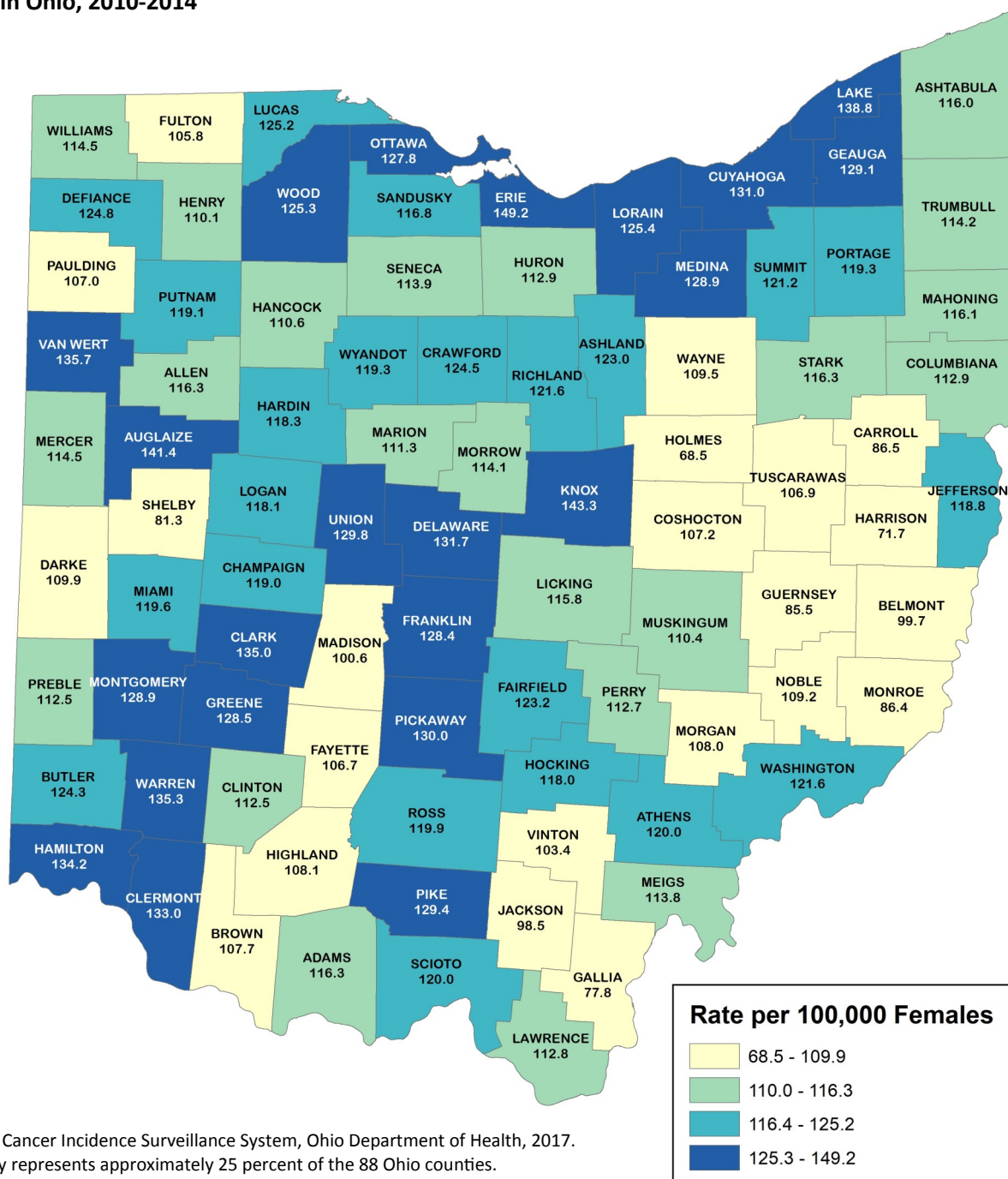
Figure 4. Female Breast Cancer: Trends in Annual Age-adjusted Incidence Rates per 100,000 Females by Age Group in Ohio, 1996-2014



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2017.

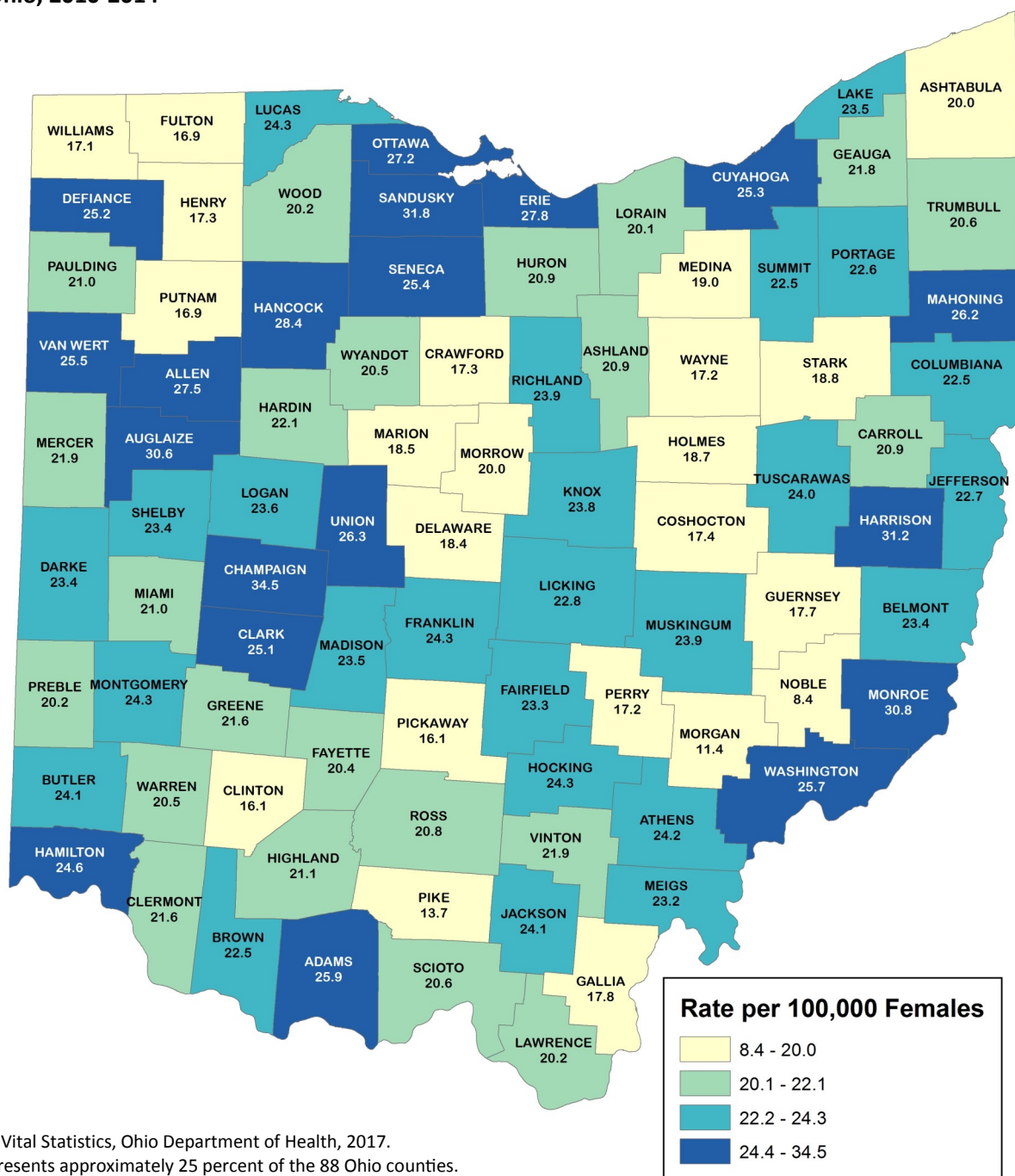
Female Breast Cancer Incidence by County of Residence

Figure 5. Female Breast Cancer: Average Annual Age-adjusted Incidence Rates per 100,000 Females by County of Residence in Ohio, 2010-2014



Female Breast Cancer Mortality by County of Residence

Figure 6. Female Breast Cancer: Average Annual Age-adjusted Mortality Rates per 100,000 Females by County of Residence in Ohio, 2010-2014



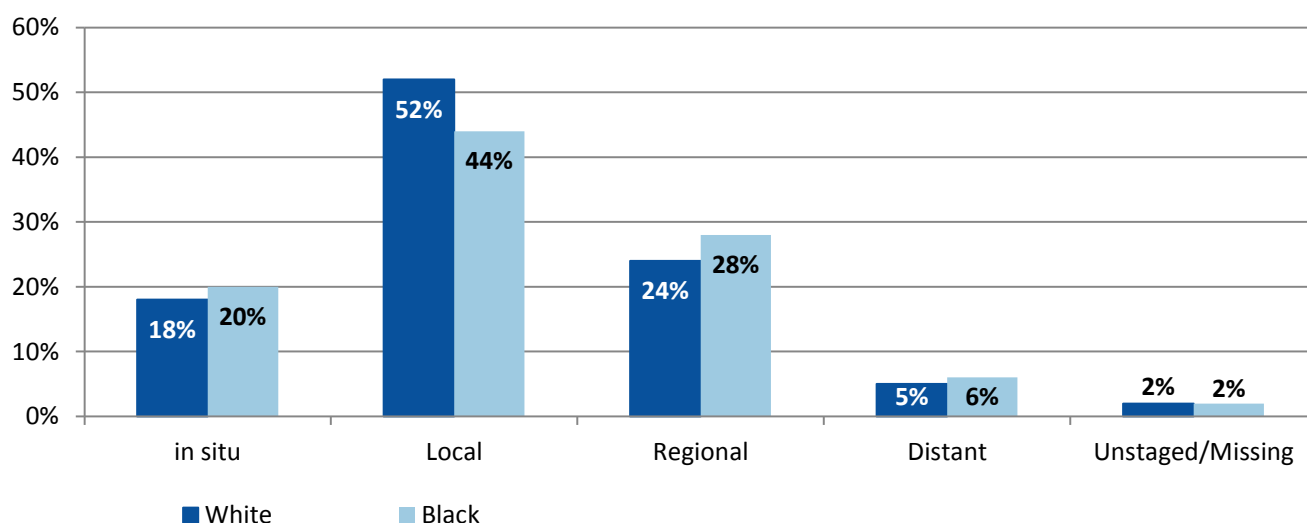
Source: Bureau of Vital Statistics, Ohio Department of Health, 2017.
Each category represents approximately 25 percent of the 88 Ohio counties.

Figure 6 presents 2010-2014 average annual age-adjusted female breast cancer mortality rates by county of residence. County-specific mortality rates in Ohio ranged from 8.4 to 34.5 per 100,000 females. There was no clear geographic pattern of mortality rates by county. Mortality rates used to generate this map can be found in Table 11 on page 21 of this document.

Female Breast Cancer by Stage at Diagnosis

Figure 7 shows the proportion of female breast cancers by stage at diagnosis and race in Ohio in 2010-2014. Approximately two-thirds of female breast cancers were diagnosed at *in situ* or local stage among both whites and blacks. There was a higher proportion of whites diagnosed at local stage and a higher proportion of blacks diagnosed at regional stage.

Figure 7. Female Breast Cancer: Proportion (%) of Cases by Stage at Diagnosis and Race in Ohio, 2010-2014

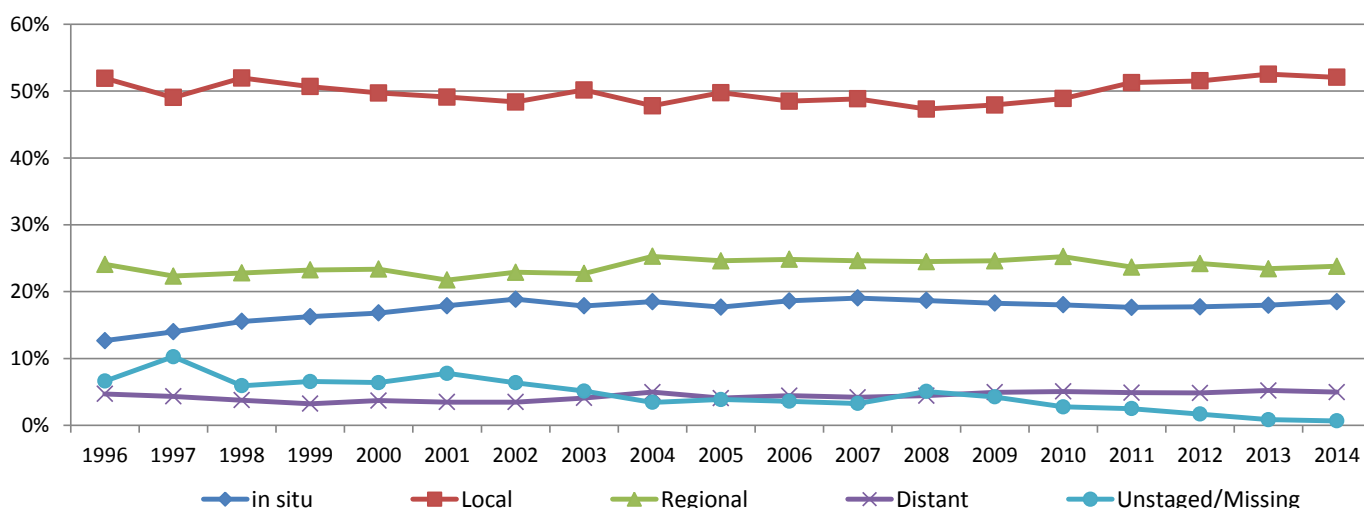


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2017.

Note: Percentages may not add to 100 because of rounding.

Figure 8 shows proportions of female breast cancer cases diagnosed at each stage from 1996 to 2014. There was an increase in the proportion of female breast cancers diagnosed at *in situ* stage from 1996 to 2002 (after which the proportion remained stable through 2014). From 2008 to 2013, there was a slight increase in the proportion diagnosed at the local stage, while there was a decrease in the proportion unstaged/missing stage. Proportions diagnosed at regional and distant stages remained relatively stable from 1996 to 2014.

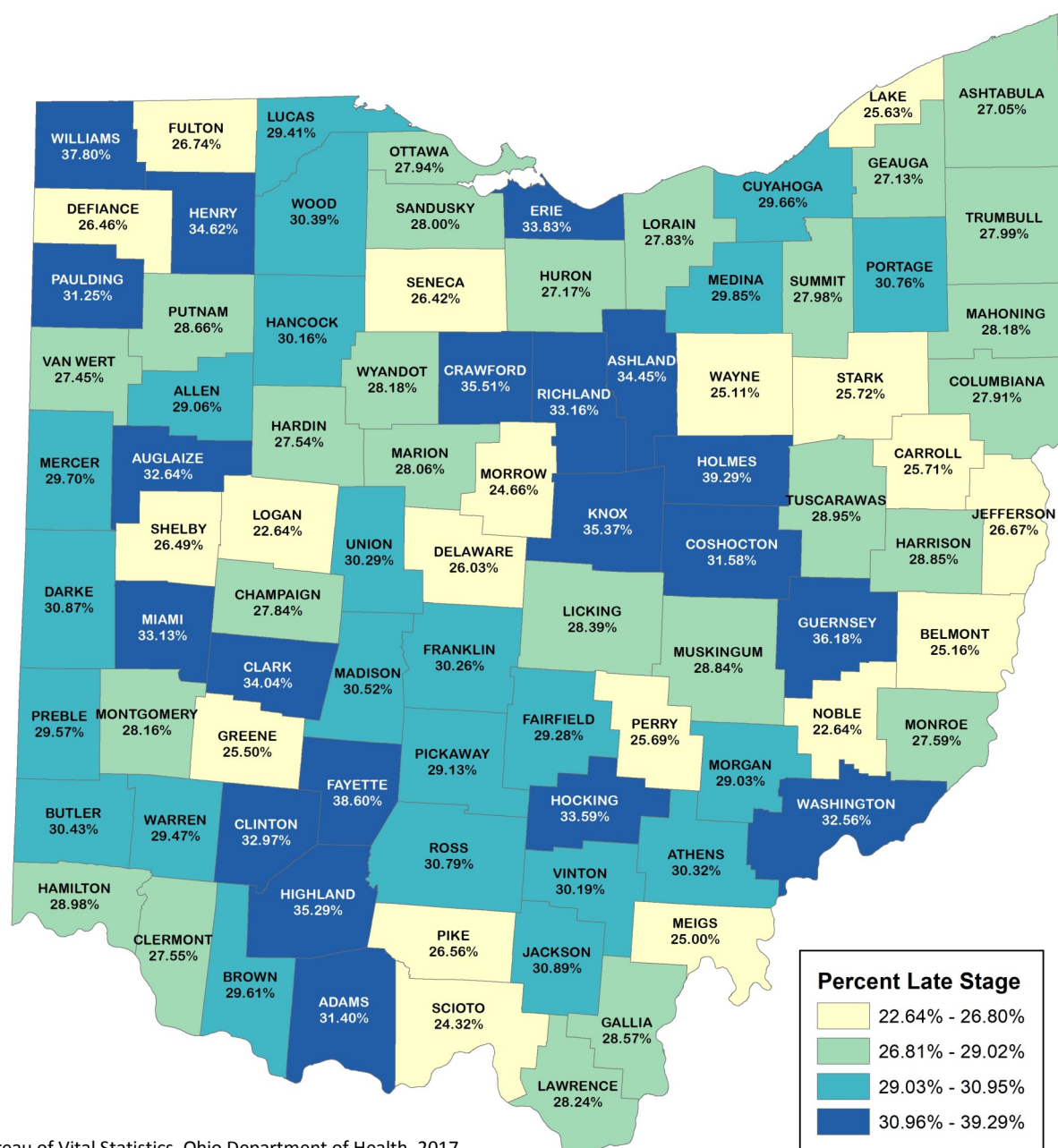
Figure 8. Female Breast Cancer: Trends in Proportion (%) of Cases by Stage at Diagnosis in Ohio, 1996-2014



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2017.

Female Breast Cancer by Stage at Diagnosis and County of Residence

Figure 9. Female Breast Cancer: Proportion (%) of Cases Diagnosed Late (Regional & Distant) Stage by County of Residence in Ohio, 2010-2014



Source: Bureau of Vital Statistics, Ohio Department of Health, 2017
Each category represents approximately 25 percent of the 88 Ohio counties.

Figure 9 shows percent late (regional and distant) stage for female breast cancer by county of residence. County-specific percents ranged from 22.64 to 39.29. Counties with the highest percent late stage were located in more rural areas of Ohio; none were counties containing large cities. Data used to generate this map can be found in Table 12 on page 22 of this document.

Female Breast Cancer by Histologic Type

Most (82.1 percent) female breast cancers in Ohio in 2010-2014 were invasive. Table 2 shows the proportion of invasive female breast cancer cases according to histologic type. Almost all invasive female breast cancers were adenocarcinomas. In both Ohio and the United States, infiltrating duct carcinoma was the most common type, followed by lobular carcinoma, not otherwise specified (NOS), and infiltrating duct mixed and infiltrating lobular mixed. The vast majority (84.8 percent) of the non-invasive female breast cancers were of the histologic type ductal carcinoma *in situ* (DCIS) (data not shown).

Table 2. Female Breast Cancer: Average Annual Number and Proportion (%) of Cases by Histologic Type in Ohio and the United States, 2010-2014

	Ohio Cases	Ohio Percent	U.S. Percent
Adenocarcinoma	8,596	96.2%	97.5%
Adenocarcinoma, NOS (8140)	84	0.9%	0.7%
Infiltrating duct carcinoma (8500)	6,668	74.6%	73.5%
Lobular carcinoma, NOS (8520)	827	9.3%	9.3%
Inflammatory adenocarcinoma (8530)	27	0.3%	0.3%
Infiltrating duct mixed and infiltrating lobular mixed (8522-8524)	588	6.6%	9.1%
Mucinous adenocarcinoma (8480, 8482)	180	2.0%	1.9%
Tubular adenocarcinoma (8211)	43	0.5%	0.5%
Papillary adenocarcinoma (8050, 8260, 8503, 8504)	53	0.6%	0.6%
Paget disease (8540-8543)	21	0.2%	0.4%
Other adenocarcinomas	107	1.2%	1.1%
Other specified carcinomas	82	0.9%	0.8%
Other Histologies	255	2.9%	1.8%

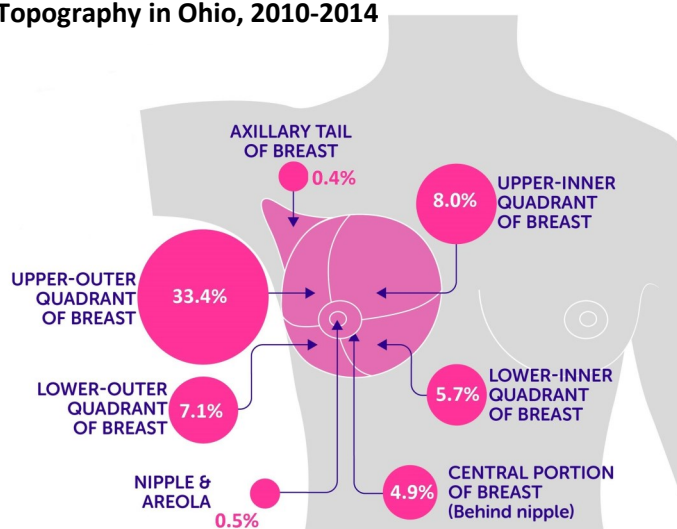
Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2017.

Female Breast Cancer by Topography

Figure 10 shows proportions of female breast cancer cases in Ohio in 2010-2014 according to topography (area) of the breast. Female breast cancer was most commonly diagnosed in the upper-outer quadrant of the breast (33.4 percent). Overlapping lesion of the breast (18.6 percent) was the second most common area, followed by areas that were not otherwise specified (18.2 percent) (data not shown).

Female breast cancer topography is related to survival probability, with slightly lower five-year relative survival probability (87.0 to 88.0 percent) for breast cancers located in the nipple and areola, central portion of breast and axillary tail of breast, and slightly higher survival probabilities (92.7 to 94.8 percent) for each of the quadrants.

Figure 10. Female Breast Cancer: Proportion (%) of Cases by Topography in Ohio, 2010-2014



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2017.

Female Breast Cancer Hormone Receptor Status and HER2 Status

Hormone Receptor Status

Some breast cancer cells need estrogen and/or progesterone to grow. These cancer cells have special proteins outside the cells, called hormone receptors. When hormones attach to hormone receptors, the cancer cells with these receptors grow. Hormone receptor status is determined by testing tumor tissue. 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. About 70 percent of breast cancers are hormone receptor-positive.

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.

Hormone receptor status is also related to the chance of breast cancer recurrence. Hormone receptor-positive tumors have a slightly lower chance of breast cancer recurrence than hormone receptor-negative tumors in the first five years after diagnosis. However, after five years, this difference begins to decrease and eventually goes away.

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. HER2 status also helps guide treatment. HER2+ breast cancers can benefit from anti-HER2 drugs, such as trastuzumab (Herceptin), which directly target the HER2 receptor.

Table 3 shows the percentage of female breast cancer cases in Ohio according to ER, PR and HER2 status. The majority of female breast cancer cases were ER+ (78.8 percent), PR+ (69.5 percent) and HER2- (75.9 percent). The percentages in Ohio are similar to those in the United States.

Table 3. Female Breast Cancer: Proportion (%) of Cases by ER, PR and HER2 Status in Ohio, 2010-2014

	ER	PR	HER2
Positive/Elevated	78.8%	69.5%	14.3%
Negative/normal within normal limits	17.3%	26.4%	75.9%
Other*	3.1%	3.1%	6.9%

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2017.

* Not applicable; borderline; equivocal; indeterminate; information not collected for this case; test not ordered and/or not done; no information in record.

Female Breast Cancer Hormone Receptor Status and HER2 Status

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, although triple negative breast cancers are found in women of all age groups and races/ethnicities. 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.

Table 4 shows the percentage of female breast cancer cases according to combinations of ER, PR and HER2 status by race (white, black). The most common combination for female breast cancer cases in Ohio from 2010-2014 was ER+/PR+/HER2- (57.6 percent), which was more common among whites, followed by triple negative (10.8 percent), which was nearly twice as common among blacks.

Table 4. Female Breast Cancer: Proportion (%) of Cases by the Combination of ER/PR/HER2 Status in Ohio, 2010-2014

	Total	White	Black
ER-/PR-/HER2-	10.8%	9.9%	18.7%
ER-/PR-/HER2+	4.2%	4.0%	5.5%
ER-/PR+/HER2-	1.0%	<1%	2.2%
ER-/PR+/HER2+	<1%	<1%	<1%
ER+/PR-/HER2-	7.5%	7.4%	8.2%
ER+/PR-/HER2+	2.5%	2.4%	2.7%
ER+/PR+/HER2-	57.6%	58.9%	47.0%
ER+/PR+/HER2+	7.3%	7.3%	6.9%
Other*	8.5%	8.6%	7.8%

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2017.

*One or more tests either not performed; unknown if performed; unknown or borderline results/information.

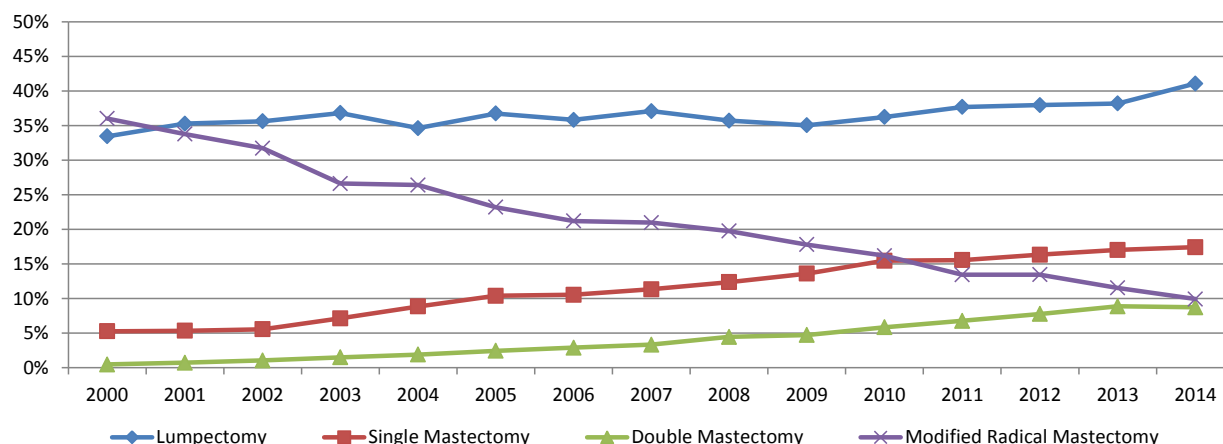
Did You Know?

Tumor markers are substances produced by cancer or other cells of the body in response to cancer. By itself, a high tumor marker level is not enough to be sure cancer is present. Tumor markers may be used in conjunction with other tests (scans, biopsies, etc.) to help diagnose a patient, to determine prognosis and treatment, to evaluate a patient's response to cancer treatment or to monitor for recurrence. There are some limits to the use of tumor markers, including non-cancerous conditions that cause tumor markers to be elevated, and the fact that not everyone with breast cancer will have an increase in a specific tumor marker. Specific tumor markers for breast cancer include: cancer antigen (CA) 15-3, CA 27.29 and carcinoembryonic antigen (CEA); each has been used to help monitor metastatic breast cancer. Future research will likely identify additional useful breast cancer tumor markers.

Female Breast Cancer Treatment

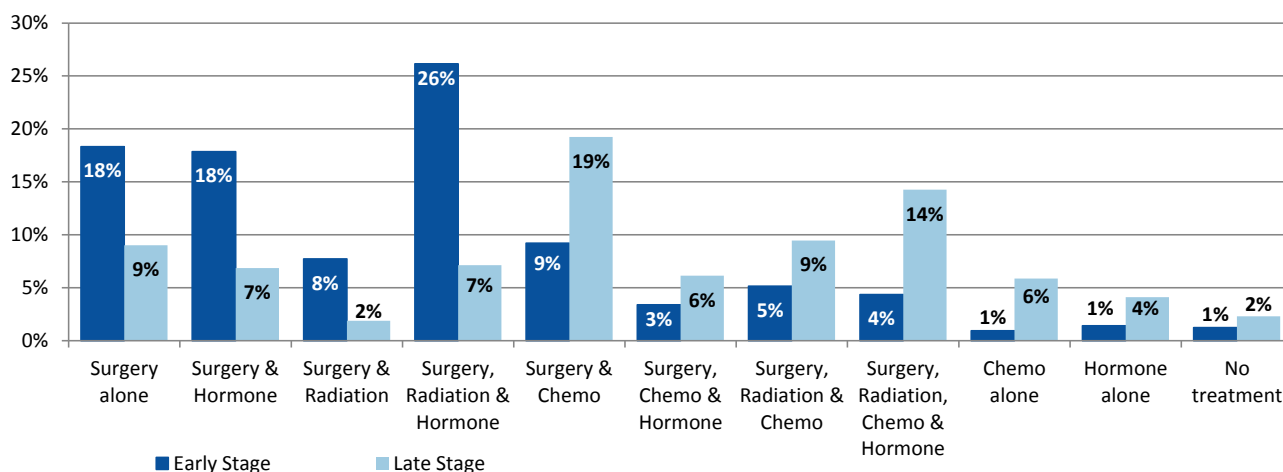
Figure 11 presents surgery trends for invasive female breast cancer cases in Ohio from 2000 to 2014. Modified radical mastectomies decreased dramatically from 2000 to 2014, and were largely replaced by lumpectomies (also known as breast-conserving surgery) which increased during this same time period. Both single mastectomies and double mastectomies (contralateral prophylactic mastectomies) also increased during this 15-year period.

Figure 11. Female Breast Cancer: Trends in Selected Types of Surgery as Proportion (%) of Total Surgeries in Ohio, 2000-2014



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2017.

Figure 12. Female Breast Cancer: Proportion (%) of Selected Treatment Combinations by Stage at Diagnosis in Ohio, 2010-2014



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2017.

Data are based on initiated first course of treatment only. Treatment planned but not yet started at the time of reporting to OCISS or not administered for a variety of reasons (e.g., patient refusal, co-morbidity, death, etc.) is not included.

Note: the percentages do not add up to 100 percent, as not all possible treatment combinations are shown.

Figure 12 shows first course of treatment for invasive female breast cancer in Ohio in 2010-2014. Women diagnosed with early stage breast cancer often received surgery alone or in combination with radiation and/or hormone therapies. In contrast, women diagnosed with late stage breast cancer had treatment combinations that more frequently included surgery and chemotherapy. Additionally, first course of therapy may differ by race. For example, among women who received lumpectomy in 2010-2014, there were fewer black women who received lumpectomy with radiation (57.1 percent) compared to white women (65.3 percent) (data not shown).

Female Breast Cancer Survival Probability

Table 5. Female Breast Cancer: Five-year Survival Probability (%) by Stage at Diagnosis, Race and Age Group in the United States, 2007-2013

	Total	White			Black		
		All Ages	<50 Years	50+ Years	All Ages	<50 Years	50+ Years
All Stages	89.7%	90.8%	90.8%	90.8%	80.6%	80.4%	80.7%
<i>in situ</i>	100.0%	100.0%	100.0%	100.0%	100.0%	99.7%	100.0%
Local	98.9%	99.4%	97.4%	99.9%	94.8%	93.5%	95.3%
Regional	85.2%	86.4%	88.1%	85.8%	76.1%	76.7%	75.8%
Distant	26.9%	27.9%	39.8%	25.0%	19.7%	25.8%	17.5%

Source: Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2017.

Table 5 shows the U.S. (SEER) five-year female breast cancer relative survival probability in 2007-2013 by stage at diagnosis, race and age group. For all stages combined, the relative survival probability among blacks (80.6 percent) was lower than the probability among whites (90.8 percent). With the exception of *in situ* cancers, relative survival probability was lower among blacks for each stage. For all stages combined, relative survival probability was similar for those less than 50 and those 50 and older for both blacks and whites. For both whites and blacks diagnosed with distant stage breast cancer, relative survival probabilities were considerably lower among those 50 and older, compared to those less than 50.

Female Breast Cancer Late Effects

The National Cancer Institute defines a late effect as “a health problem that occurs months or years after a disease is diagnosed or after treatment has ended. They may include physical, mental, and social problems and second cancers.” Late effects can be caused by the cancer itself or by the treatment. Some common late effects of breast cancer include:

- Early menopause (menopausal symptoms, infertility)
- Emotional distress and depression
- Fatigue
- Insomnia
- Fear of recurrence
- Sexual/Intimacy issues
- Lymphedema – an abnormal collection of fluid that causes swelling (edema), especially in the arms
- Pain
- Changes in the look and feel of the breast
- Weight gain
- Fatigue
- Cognitive function (“chemo-brain” – problems with thinking and memory)

Did You Know?

Lesbian and bisexual women are at higher risk for breast cancer because they have a higher prevalence of risk factors than other women. Lesbian and bisexual women are less likely to become pregnant, less likely to breastfeed, more likely to be overweight, less likely to engage in regular physical activity and more likely to consume greater amounts of alcohol than heterosexual women. While some research has shown lesbian and bisexual women to have lower mammography screening rates compared to heterosexual women, other studies have shown little difference or even higher screening rates. Access to culturally competent healthcare providers may be a barrier to lesbian and bisexual women receiving recommended breast cancer screenings.

Female Breast Cancer Risk Factors and Populations at High Risk

According to the American Cancer Society (ACS), the following factors have been found to increase or decrease the likelihood that a woman will develop breast cancer.

Non-Modifiable Risk Factors:

- **Age:** Most invasive breast cancers are diagnosed in women who are 55 and older.
- **Race and ethnicity:** While white and black women are equally likely to get breast cancer, black women are more likely to die from it. Asian, Hispanic and Native American women have a lower risk of getting breast cancer, as well as a lower risk of dying from it.
- **Inherited gene mutations:** About 5 to 10 percent of breast cancers are hereditary and most commonly caused by mutations in the BRCA1 and BRCA2 genes.
- **Family history of breast cancer:** While most women who get breast cancer **do not** have a family history, women with close relatives with breast cancer have a higher risk. Women with a mother, sister or daughter with breast cancer have almost twice the risk of developing the disease.
- **Personal history of breast cancer:** 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).
- **Dense breast tissue:** Women with dense breasts (more glandular/fibrous tissue than fatty tissue) have an increased risk of getting breast cancer compared to women with average breast density. In addition, dense breasts make detecting breast cancer more difficult.
- **Certain benign breast conditions:** Women with the following conditions are at increased risk for developing breast cancer:
 - Lobular carcinoma *in situ*,
 - Proliferative lesions with atypia (including atypical ductal hyperplasia (ADH) and atypical lobular hyperplasia), and
 - Proliferative lesions without atypia (including ductal hyperplasia, fibroadenoma, sclerosing adenosis, several papillomas and radial scar).
- **More menstrual cycles:** Women who have more menstrual cycles (started menstruation before age 12 or went through menopause after age 55) are at greater risk.
- **Exposure to DES (diethylstilbestrol):** Women who took DES during pregnancy have a slightly higher risk of breast cancer.

Modifiable Risk/Protective Factors:

- **Alcohol consumption:** Women who have two or more drinks a day have about 1.5 times the risk of developing breast cancer.
 - **Overweight and obesity:** Being overweight or obese, especially after menopause, increases risk for breast cancer.
 - **Pregnancy:** There is a slightly higher risk of developing breast cancer for women who have not had children, or who have had their first child after the age of 30.
 - **Use of oral contraceptives:** Women using oral contraceptives are at slightly higher risk.
 - **Hormone therapy:** Combined hormone therapy after menopause increases risk.
 - **Chest radiation:** Having radiation therapy to the chest prior to the age of 40 increases breast cancer risk.
 - **Physical activity:** Being physically active reduces breast cancer risk. To reduce risk, the ACS recommends adults engage in 150 minutes of moderate intensity activity or 75 minutes of vigorous intensity activity each week.
 - **Breastfeeding:** Women who breastfeed their children, especially for those who continue for 1.5 to 2 years, are slightly less likely to get breast cancer.
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Female Breast Cancer Signs and Symptoms

The following are female breast cancer signs and symptoms:

- A new lump (or thickening) in the breast or underarm
- Any change in the size, shape, texture or color of the breast
- Irritation, dimpling or puckering of the breast skin
- Scaly, flaky, red or swollen skin on the breast, nipple or areola
- Discharge from the nipple (other than breast milk), especially blood
- Nipple retraction or pulling to one side
- 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.

Female Breast Cancer Screening

Table 6 presents the female breast cancer screening recommendations from the ACS and U.S. Preventive Services Task Force (USPSTF) for persons at average risk.

Table 6. American Cancer Society (ACS) and U.S. Preventive Services Task Force (USPSTF) Recommendations for the Early Detection of Female Breast Cancer in Average Risk, Asymptomatic People

American Cancer Society		U.S. Preventive Services Task Force	
Age	Test or Procedure	Age	Test or Procedure
40-44 ¹	Women at average risk for breast cancer have a choice to start annual mammograms if they wish to do so.	40-49 ²	Women who place a higher value on the potential benefits than the potential harms may choose to begin screening mammography every 2 years.
45-54 ¹	Mammogram every year	50-74	Mammogram every 2 years
55+ ¹	Mammogram every 2 years or continue yearly screening	75+	Evidence is insufficient to assess the benefits and harms of screening.

Source: ACS website <https://www.cancer.org/health-care-professionals/american-cancer-society-prevention-early-detection-guidelines/breast-cancer-screening-guidelines.html> and USPSTF website <https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/breast-cancer-screening1> as of November 2016.

¹Based on ACS guidelines published October 20, 2015. 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 30.

²The decision to start regular, biennial screening mammograms before 50 should be an individual one and should take into account the patient's values regarding the benefits and harms. Women with a parent, sibling or child with breast cancer are at higher risk for breast cancer and thus may benefit more from biennial screenings than average-risk women.

The prevalence of mammography screening in the past two years among Ohio women ages 50-74 is presented by demographics in Table 7. In 2016, the overall prevalence of mammography screening among women in this age group was 77.1 percent. Mammography screening did not differ by age group or race/ethnicity, but was significantly higher among women with an annual household income of \$75,000 or more compared to those earning less than \$50,000, and higher among college graduates compared to those with a high school or less education.

Table 7. Prevalence (%) of Women Age 50-74 Who Reported Having Had a Mammogram in the Last Two Years by Race/Ethnicity, Age Group, Annual Household Income and Education, Ohio, 2016^{1,2}

	Prevalence	95% Confidence Interval
State Overall	77.1	75.0 - 79.2
Age Group		
50 - 54 yrs	76.4	71.4 - 81.5
55- 60 yrs	75.7	72.5 - 78.9
65+ yrs	79.6	76.5 - 82.7
Race/Ethnicity		
White, non-Hispanic	77.1	74.9 - 79.3
Black, non-Hispanic	77.9	70.4 - 85.4
Annual Household Income		
<\$15,000	69.4	61.9 - 77.0
\$15,000-\$24,999	67.3	61.1 - 73.4
\$25,000-\$34,999	72.8	66.0 - 79.6
\$35,000-\$49,999	78.3	72.8 - 79.6
\$50,000-\$74,999	80.6	75.5 - 85.8
\$75,000+	84.3	80.4 - 88.3
Education		
Less than high school	67.0	58.1 - 75.8
High school	75.9	72.4 - 79.4
Some college	77.6	73.9 - 81.4
College Graduate	83.6	80.4 - 86.8

Source: 2016 Ohio Behavioral Risk Factor Surveillance System, Ohio Department of Health, 2017.

Did You Know?

The Ohio Department of Health Breast and Cervical Cancer Project (BCCP) can help all women navigate cancer screenings. BCCP's Patient Navigation Program helps guide women through the healthcare system, find providers and community resources, and answer questions about scheduling appointments, using insurance and more. The Ohio BCCP program also offers no-cost breast and cervical cancer screenings and diagnostic testing to qualified participants. For more information about BCCP or to see if you qualify for no-cost screenings, call 1-844-430-BCCP (2227) or visit

<http://www.odh.ohio.gov/health/cancer/bccp/bccpmap.aspx>.

Male Breast Cancer

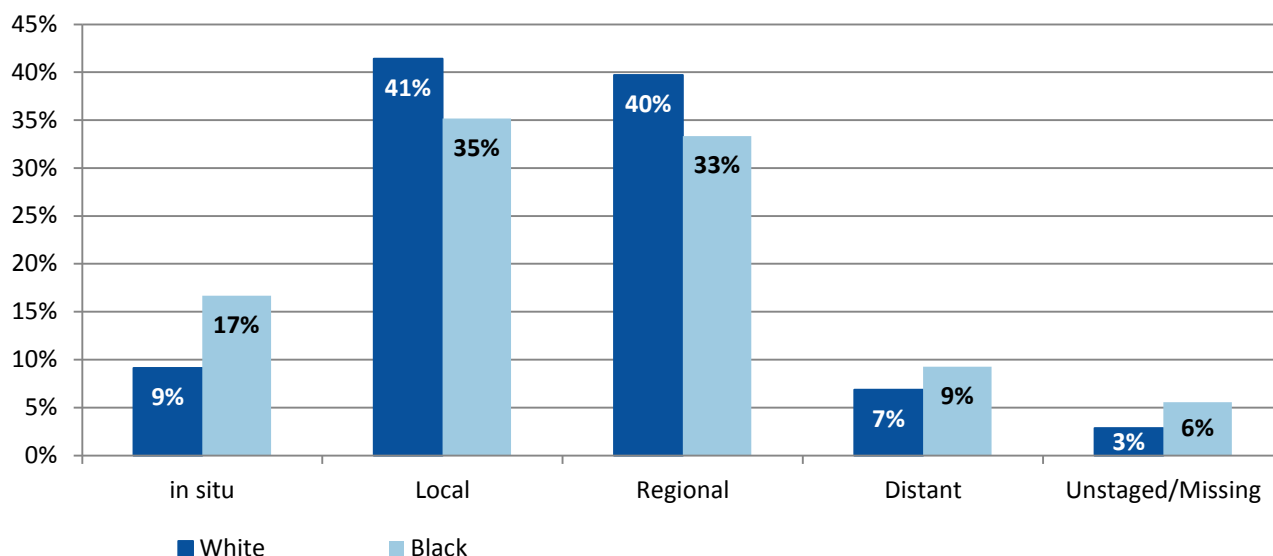
As shown in Table 8, the average annual number of new cases of male breast cancer in Ohio during 2010-2014 was 74, and the age-adjusted incidence rate was 1.2 cases per 100,000 males, which is identical to the U.S. rate. In Ohio and the United States, the incidence rates among blacks and men 65 and older were higher than those for whites and men less than 65, respectively. The average annual age-adjusted mortality rate of 0.3 deaths per 100,000 males from 2010 to 2014 in Ohio was also identical to the U.S. mortality rate. Similar to incidence, in both Ohio and the United States, male breast cancer mortality rates were higher for blacks and men 65 and older.

Table 8. Male Breast Cancer: Average Annual Number and Age-adjusted Rates of Cancer Cases and Cancer Deaths per 100,000 Males by Race and Age Group in Ohio and the United States, 2010-2014

		Incidence			Mortality		
		Ohio Cases	Ohio Rate	U.S. Rate	Ohio Deaths	Ohio Rate	U.S. Rate
Total		74	1.2	1.2	19	0.3	0.3
Race	White	64	1.2	1.2	16	0.3	0.3
	Black	9	1.6	1.9	2	0.5	0.5
Age Group	<65	27	0.4	0.6	5	0.1	0.1
	65+	47	6.6	6.4	14	2.0	1.7

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2017; Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2017; Bureau of Vital Statistics, Ohio Department of Health, 2017; National Center for Health Statistics, 2017.

Figure 13. Male Breast Cancer: Proportion of Cases (%) by Stage at Diagnosis and Race in Ohio, 2010-2014



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2017.

Figure 13 shows the proportion of male breast cancers by stage at diagnosis and race in Ohio in 2010-2014. Approximately half of male breast cancers were diagnosed at *in situ* or local stages among both whites and blacks. There was a higher proportion of blacks diagnosed at *in situ* stage, a slightly higher proportion of blacks diagnosed at distant and unstaged/missing stage, and a higher proportion of whites diagnosed at local and regional stages.

Male Breast Cancer by Histologic Type and Topography

Table 9. Male Breast Cancer: Average Annual Number and Proportion (%) of Cases by Topography in Ohio, 2010-2014

Subtypes	Cases	Percent
Nipple (C500)	4	5.9%
Central portion of breast (C501)	27	36.8%
Upper-inner quadrant of breast (C502)	3	3.5%
Lower-inner quadrant of breast (C503)	1	1.6%
Upper-outer quadrant of breast (C504)	5	7.3%
Lower-outer quadrant of breast (C505)	2	2.7%
Axillary tail of breast (C506)	<1	0.8%
Overlapping lesion of breast (C508)	10	13.5%
Breast, NOS (C509)	21	27.8%

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2017.

Most (89.8 percent) male breast cancers in Ohio in 2010-2014 were invasive. Of the invasive male breast cancers, Infiltrating duct carcinoma was the most common histologic type (83.0 percent), followed by papillary adenocarcinoma (3.8 percent) and adenocarcinoma, NOS (2.2 percent) (data not shown).

Table 9 shows proportions of male breast cancer cases according to topography (area) of the breast. Male breast cancer cases were most commonly diagnosed in the central portion of the breast (36.8 percent), followed by breast, NOS (27.8 percent).

An illustration of the areas of the breast can be found in Figure 10 on page 8.

Male Breast Cancer Survival Probability

Table 10. Male Breast Cancer: Five-year Survival Probability (%) by Stage at Diagnosis and Race in the United States, 2007-2013

	Total	White	Black
All Stages	85.4%	87.9%	70.2%
<i>in situ</i>	99.9%	99.9%	77.2%
Local	95.1%	96.1%	85.7%
Regional	83.9%	81.3%	72.7%
Distant	24.1%	21.1%	33.3%

Source: Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2017.

Table 10 shows the U.S. (SEER) five-year male breast cancer relative survival probability in 2007-2013 by stage at diagnosis and race. For all stages combined, the relative survival probability among blacks (70.2 percent) was lower than the probability among whites (87.9 percent). With the exception of distant stage cancers, relative survival probability was lower among blacks for each stage. However, it should be noted that relative survival probabilities, especially for blacks, were based on relatively small numbers.

Male Breast Cancer Risk Factors and Populations at High Risk

Males share many of the same risk factors for breast cancer as females. In addition, factors that increase estrogen levels increase risk for developing the disease.

Non-Modifiable Risk Factors:

- **Age:** Breast cancer risk increases with age.
- **Family history of breast cancer:** Males with a close relative, male or female, with breast cancer are at increased risk.
- **Inherited gene mutations:** Mutations in the BRCA2 gene, and to a lesser extent the BRCA1 gene, increase the risk for breast cancer among men.
- **Liver disease:** Men with severe liver disease have higher estrogen levels and therefore are at greater risk for breast cancer.
- **Klinefelter syndrome:** The risk of developing breast cancer for men who have cells with two or more X chromosomes is approximately 1 percent.
- **Testicular conditions:** Having an undescended testicle, or having one or both testicles removed, increases breast cancer risk.
- **Gynecomastia:** Men with excess breast tissue are more likely to develop breast cancer.

Modifiable Risk Factors:

- **Alcohol consumption:** Men who consume large amounts of alcohol, possibly due to the effect this has on the liver, are at greater risk.
- **Obesity:** Obese men are at higher risk for breast cancer as they have higher estrogen levels.
- **Chest radiation:** Having radiation therapy to the chest increases breast cancer risk.

Did You Know?

There has been little research about risk factors for male breast cancer and about the efficacy of treatments. More research is needed to understand the potential roles of factors like physical activity and hormone-related factors, such as the use of hormone-related treatment for prostate 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. Under the direct method, the population was first divided into 19 five-year 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., 2010-2014). 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.

Census Data: The 1996-2014 rates were calculated using bridged-race interdecadal population estimates for July 1, 1996-July 1, 1999 (U.S. Census Bureau and National Center for Health Statistics, 2004); revised bridged-race intercensal population estimates for July 1, 2000-July 1, 2009 (U.S. Census Bureau and National Center for Health Statistics, 2012); and vintage 2015 bridged-race postcensal population estimates for July 1, 2010-July 1, 2015 (U.S. Census Bureau and National Center for Health Statistics, 2016).

Incidence: The number of cases diagnosed during a specified time period (e.g., 2010-2014). Breast cancer cases were defined as follows: International Classification of Diseases for Oncology, Third Edition (ICD-O-3), C500-C509, excluding types 9590-9989.

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.

Mastectomy: Surgical removal of all breast tissue to treat or prevent breast cancer. Types of mastectomies include:

Single mastectomy: Mastectomy without removal of the uninvolved contralateral breast

Double mastectomy: Mastectomy with removal of the uninvolved contralateral breast

Modified radical mastectomy: Mastectomy plus removal of most or all of the lymph nodes under the arm

Mortality: The number of deaths during a specified time period (e.g., 2010-2014). Breast cancer deaths were defined as follows: International Statistical Classification of Diseases and Related Health Problems, Tenth Edition (ICD-10), codes C500-C509.

Rate: The number of cases or deaths per unit of population (e.g., per 100,000 persons) during a specified time period (e.g., 2010-2014). Rates may be unstable and are not presented when the case count is less than five.

Stage at Diagnosis: The degree to which a tumor has spread from its site of origin at the time of diagnosis. Cancer stage is often related to survival and is used to select appropriate treatment. Patients with early stage disease often have better long-term survival, and detecting cancers at an early stage may lead to a reduction in mortality. The stages presented in this report, in the order of increasing spread, are *in situ*, local, regional, and distant. *In situ* and local tumors are referred to as early stage tumors, and regional and distant tumors are termed late stage. Cancers diagnosed at the local, regional, distant and unstaged/missing stages are categorized as invasive.

***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.

Survival Probability: The probability that an individual will survive a given number of years after diagnosis. Five-year relative survival probabilities are from the SEER 18 areas for diagnosis years 2007-2013. Probabilities are based on follow-up of patients into 2014.

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 breast cancer, 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
- **National Institutes of Health:**
<https://clinicaltrials.gov/>
- **Center Watch:**
<http://www.centerwatch.com/>
- **The Ohio State University Comprehensive Cancer Center—Arthur G. James Cancer Hospital and Richard J. Solove Research Institute:**
http://cancer.osu.edu/patientsandvisitors/cancerinfo/clinical_trials/Pages/index.aspx
- **The Cleveland Clinic:**
http://my.clevelandclinic.org/cancer/clinical_trials/default.aspx
- **Case Western Reserve University Comprehensive Cancer Center:**
<http://cancer.case.edu/patientinfo/clinical-trials/>
- **University of Cincinnati:**
<http://cancer.uc.edu/patientcare/ClinicalTrials/Overview.aspx>
- **Toledo Community Hospital Oncology Program:**
<https://www.clinicaltrials.gov/study/2017-01-01/TOLEDO-001/>
- **Dayton Clinical Oncology Program:**
<http://www.med.wright.edu/dcop/Clinical%20Trials.htm>
- **Columbus Community Clinical Oncology Program:**
<http://columbusccop.org/>

Sources of Data and Additional Information

Ohio Cancer Incidence Surveillance System:

http://www.odh.ohio.gov/health/cancer/ocisshs/ci_surv1.aspx

National Cancer Institute:

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

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

American Cancer Society:

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

Table 11. Female Breast Cancer: Average Annual Number and Age-adjusted Rates of Cases and Deaths per 100,000 Females, by County of Residence, Ohio, 2010-2014

	Incidence		Mortality			Incidence		Mortality	
	Cases	Rate	Deaths	Rate		Cases	Rate	Deaths	Rate
Ohio	8,932	123.8	1,768	23.0	Lawrence	46	112.8	9	20.2
U.S.		124.9		21.2	Licking	120	115.8	24	22.8
Adams	20	116.3	5	25.9	Logan	35	118.1	7	23.6
Allen	75	116.3	20	27.5	Lorain	243	125.4	41	20.1
Ashland	42	123.0	7	20.9	Lucas	333	125.2	68	24.3
Ashtabula	76	116.0	14	20.0	Madison	24	100.6	6	23.5
Athens	36	120.0	8	24.2	Mahoning	201	116.1	50	26.2
Auglaize	41	141.4	9	30.6	Marion	44	111.3	8	18.5
Belmont	50	99.7	12	23.4	Medina	140	128.9	21	19.0
Brown	30	107.7	6	22.5	Meigs	18	113.8	3	23.2
Butler	260	124.3	52	24.1	Mercer	29	114.5	6	21.9
Carroll	17	86.5	4	20.9	Miami	79	119.6	15	21.0
Champaign	30	119.0	9	34.5	Monroe	9	86.4	4	30.8
Clark	123	135.0	25	25.1	Montgomery	455	128.9	93	24.3
Clermont	158	133.0	26	21.6	Morgan	11	108.0	1	11.4
Clinton	29	112.5	4	16.1	Morrow	25	114.1	4	20.0
Columbiana	80	112.9	18	22.5	Muskingum	62	110.4	15	23.9
Coshocton	27	107.2	4	17.4	Noble	9	109.2	1	8.4
Crawford	38	124.5	6	17.3	Ottawa	42	127.8	9	27.2
Cuyahoga	1,118	131.0	239	25.3	Paulding	13	107.0	3	21.0
Darke	38	109.9	9	23.4	Perry	24	112.7	4	17.2
Defiance	30	124.8	6	25.2	Pickaway	43	130.0	6	16.1
Delaware	129	131.7	18	18.4	Pike	23	129.4	3	13.7
Erie	80	149.2	16	27.8	Portage	113	119.3	22	22.6
Fairfield	107	123.2	21	23.3	Preble	31	112.5	6	20.2
Fayette	20	106.7	4	20.4	Putnam	25	119.1	4	16.9
Franklin	792	128.4	150	24.3	Richland	102	121.6	20	23.9
Fulton	29	105.8	5	16.9	Ross	57	119.9	10	20.8
Gallia	16	77.8	4	17.8	Sandusky	47	116.8	14	31.8
Geauga	81	129.1	15	21.8	Scioto	61	120.0	11	20.6
Greene	129	128.5	22	21.6	Seneca	39	113.9	10	25.4
Guernsey	24	85.5	5	17.7	Shelby	24	81.3	7	23.4
Hamilton	655	134.2	128	24.6	Stark	296	116.3	53	18.8
Hancock	52	110.6	14	28.4	Summit	426	121.2	86	22.5
Hardin	21	118.3	4	22.1	Trumbull	170	114.2	34	20.6
Harrison	9	71.7	4	31.2	Tuscarawas	68	106.9	16	24.0
Henry	21	110.1	4	17.3	Union	36	129.8	7	26.3
Highland	29	108.1	6	21.1	Van Wert	26	135.7	6	25.5
Hocking	22	118.0	5	24.3	Vinton	9	103.4	2	21.9
Holmes	15	68.5	4	18.7	Warren	166	135.3	25	20.5
Huron	39	112.9	8	20.9	Washington	52	121.6	12	25.7
Jackson	21	98.5	5	24.1	Wayne	78	109.5	13	17.2
Jefferson	59	118.8	12	22.7	Williams	28	114.5	5	17.1
Knox	55	143.3	10	23.8	Wood	90	125.3	16	20.2
Lake	219	138.8	41	23.5	Wyandot	17	119.3	3	20.5

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2017; Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2017; Bureau of Vital Statistics, Ohio Department of Health, 2017; National Center for Health Statistics, 2017.

Note: Low county numbers and rates may reflect underreporting for that county.

Table 12. Female Breast Cancer: Percentage of Cases by County of Residence and Stage at Diagnosis in Ohio, 2010-2014

	Early Stage %	Late Stage %	Unstaged/ Missing %	Average Annual Cases		Early Stage %	Late Stage %	Unstaged/ Missing %	Average Annual Cases
Ohio	69%	29%	2%	10,815	Lawrence	71%	28%	0%	52
U.S.	71%	28%	2%		Licking	71%	28%	1%	142
Adams	65%	31%	3%	24	Logan	75%	23%	2%	42
Allen	67%	29%	4%	94	Lorain	70%	28%	2%	295
Ashland	64%	34%	2%	48	Lucas	70%	29%	1%	403
Ashtabula	72%	27%	1%	90	Madison	69%	31%	0%	31
Athens	65%	30%	5%	44	Mahoning	66%	28%	6%	242
Auglaize	66%	33%	2%	48	Marion	71%	28%	1%	51
Belmont	74%	25%	1%	64	Medina	69%	30%	1%	172
Brown	69%	30%	2%	36	Meigs	72%	25%	3%	20
Butler	68%	30%	1%	319	Mercer	62%	30%	8%	33
Carroll	73%	26%	1%	21	Miami	65%	33%	2%	96
Champaign	69%	28%	3%	35	Monroe	69%	28%	3%	12
Clark	65%	34%	1%	142	Montgomery	71%	28%	1%	554
Clermont	72%	28%	1%	188	Morgan	68%	29%	3%	12
Clinton	66%	33%	1%	37	Morrow	73%	25%	2%	29
Columbiana	67%	28%	5%	95	Muskingum	70%	29%	2%	76
Coshocton	66%	32%	2%	30	Noble	75%	23%	2%	11
Crawford	61%	36%	3%	43	Ottawa	70%	28%	2%	49
Cuyahoga	69%	30%	2%	1361	Paulding	65%	31%	4%	16
Darke	67%	31%	3%	46	Perry	73%	26%	1%	29
Defiance	72%	26%	2%	38	Pickaway	70%	29%	1%	51
Delaware	73%	26%	1%	164	Pike	71%	27%	2%	26
Erie	64%	34%	2%	95	Portage	69%	31%	0%	132
Fairfield	70%	29%	1%	130	Preble	68%	30%	3%	37
Fayette	61%	39%	0%	23	Putnam	71%	29%	1%	33
Franklin	68%	30%	2%	976	Richland	66%	33%	1%	118
Fulton	72%	27%	1%	34	Ross	69%	31%	0%	66
Gallia	68%	29%	3%	18	Sandusky	69%	28%	3%	55
Geauga	71%	27%	1%	101	Scioto	75%	24%	1%	73
Greene	73%	26%	2%	159	Seneca	71%	26%	3%	42
Guernsey	63%	36%	1%	30	Shelby	71%	26%	3%	30
Hamilton	70%	29%	1%	796	Stark	73%	26%	1%	366
Hancock	69%	30%	1%	61	Summit	70%	28%	2%	509
Hardin	69%	28%	4%	28	Trumbull	70%	28%	2%	214
Harrison	63%	29%	8%	10	Tuscarawas	70%	29%	1%	82
Henry	63%	35%	2%	26	Union	65%	30%	5%	42
Highland	59%	35%	6%	34	Van Wert	63%	27%	10%	31
Hocking	64%	34%	2%	26	Vinton	68%	30%	2%	11
Holmes	58%	39%	2%	17	Warren	70%	29%	0%	204
Huron	71%	27%	2%	51	Washington	66%	33%	1%	60
Jackson	68%	31%	1%	25	Wayne	73%	25%	2%	90
Jefferson	71%	27%	3%	72	Williams	60%	38%	2%	33
Knox	61%	35%	4%	62	Wood	69%	30%	1%	107
Lake	73%	26%	1%	276	Wyandot	67%	28%	5%	22

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2014; Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2017.

The total case counts by stage at diagnosis include *in situ* cancers and thus differ from tables with counts and rates of invasive cancer cases only. Early stage includes tumors diagnosed at *in situ* and local stages, and late stage includes tumors diagnosed at regional and distant stages.

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 Healthy Ohio website: <http://www.healthy.ohio.gov>

Acknowledgements

The following individuals contributed to this report:

Holly L. Sobotka, M.S.; John Kollman, M.S.; Emily Bunt, M.A.
 Ohio Department of Health

James L. Fisher, Ph.D.; Julie A. Stephens, M.S.; Ryan D. Baltic, M.P.H.; Electra D. Paskett, Ph.D.
 The Ohio State University

Sincere appreciation to the OCISS, cancer registrars, medical records technicians and other health professionals who improve the collection and quality of cancer data in Ohio.

Suggested Citation

Breast Cancer in Ohio, 2010-2014. Ohio Cancer Incidence Surveillance System, Ohio Department of Health and The Ohio State University, Columbus, Ohio, October 2017.

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The OCISS is supported in part by the State of Ohio and the Centers for Disease Control and Prevention (CDC), National Program of Cancer Registries, cooperative agreement number NU58DP006284. The contents are the sole responsibility of the authors and do not necessarily represent the official views of the CDC.