

# Ohio Annual Cancer Report, 2016

Summary of Cancer Incidence and Mortality for 2013 and  
Cancer Trends for 2004-2013

Ohio Department of Health  
Office of the Medical Director  
Bureau of Health Promotion

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## Preface

*Ohio Annual Cancer Report, 2016* presents a summary of cancer incidence (new cases) and mortality (deaths) for the state of Ohio, highlighting cancer data by sex, race, stage at diagnosis and county for 2013, as well as trends in Ohio cancer rates from 2004-2013. The collection and analysis of population-based cancer data help determine the burden of cancer in Ohio's communities, raise awareness about factors that may increase cancer risk and the benefits of early detection, and improve the survival of persons diagnosed with cancer. The data and information in this report can be used by public health professionals, policy makers, researchers and others to develop, implement and evaluate cancer prevention and control activities, support cancer-related research and inform Ohioans of the cancer burden in the state.

### **Ohio Cancer Incidence Surveillance System**

Data on cancer incidence and stage at diagnosis presented in this report were provided by the Ohio Cancer Incidence Surveillance System (OCISS) at the Ohio Department of Health (ODH). OCISS, the central cancer registry for Ohio, collects and analyzes cancer incidence data for all Ohio residents. All Ohio medical providers who diagnose or treat patients with cancer are required, by law, to report each case of cancer to OCISS within six months of diagnosis or first contact. Due to the complexity of the cancer data collection and quality control process, there is a delay between the time a new cancer is diagnosed and the time the data are ready for analysis. The typical delay is about 24 months after the end of the calendar year of diagnosis. Incidence data presented in this report are for cancer cases diagnosed through December 2013 and reported to OCISS as of December 2015. The data are evaluated to determine the percent of cancer cases that are reported to OCISS by 24 months after the year of diagnosis. For cases diagnosed in 2013, OCISS data were estimated to be 98 percent complete as of December 2015. However, completeness may be higher or lower for specific cancer types, geographic areas or demographic subgroups. Also, it is not unusual for the number of cancer cases and incidence rates to vary from year to year, especially for smaller geographic areas and demographic subgroups.

### **Ohio Vital Statistics**

Cancer mortality data were provided by the Bureau of Vital Statistics and analyzed by the Chronic Disease Epidemiology and Evaluation Section at ODH. The Bureau of Vital Statistics receives certificates of death from local vital statistics offices and from other states when an Ohio resident dies outside of Ohio. Cancer death data in this report were categorized by the primary underlying cause of death.

### **Ohio Public Health Data Warehouse**

In addition to this report, OCISS data are available in the Ohio Public Health Data Warehouse on the ODH website, <http://publicapps.odh.ohio.gov/EDW/DataCatalog>. The Warehouse is a self-service online tool where anyone can obtain the most recent public health data available about Ohio. The Warehouse currently has reports of OCISS data analyses from the official end of year file for 1996-2013, which contains more than one million records. Small numbers are not displayed in the Warehouse to protect confidentiality.

## Overview

Cancer is a group of diseases characterized by the uncontrolled growth and spread of abnormal cells. Although some forms of cancer are rare, cancer is much more common than most people realize. About one-half of all males and more than one-third of all females in the United States will develop cancer in their lifetime. Cancer is not one disease but many—there are more than one hundred different kinds of cancer, many of which have different causes and risk factors. Cancer may strike at any age; however, most cancer cases occur in adults who are middle aged or older. Nearly 88 percent of all new cancers in Ohio in 2013 were diagnosed in people age 50 and older.

According to the American Cancer Society, more than 1.6 million new cancer cases and more than 595,000 cancer deaths are projected to occur in the United States in 2016. In Ohio, approximately 68,800 cancer cases were reported to OCISS in 2013. Of these, 62,802 were considered new invasive cancer cases, which include malignant cancer cases plus *in situ* bladder cancer cases.

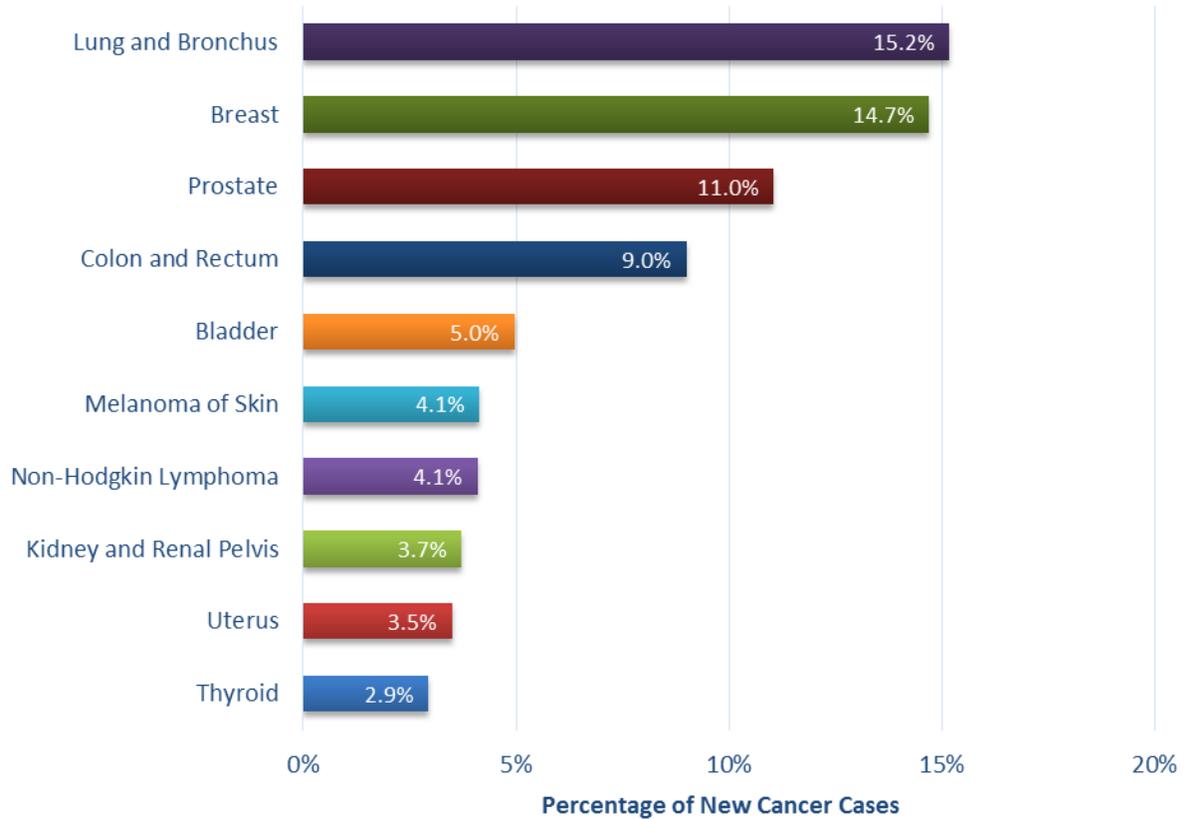
Based on the number of new cancer cases diagnosed, lung and bronchus cancer was the leading cause of cancer incidence in Ohio in 2013, followed by breast cancer, prostate cancer, and colon and rectum cancer. In the United States, breast cancer was the leading cause of cancer incidence in 2009-2013, followed by prostate, lung and bronchus, and colon and rectum cancers. The age-adjusted cancer incidence rate for all cancer sites/types combined decreased 6 percent in Ohio from 2004 (479.4 per 100,000) to 2013 (452.4 per 100,000).

Cancer is the second most common cause of death in Ohio and the United States, accounting for nearly one of every four deaths. Cancer claimed the lives of 24,906 Ohioans in 2013, at a rate (176.8 per 100,000) that was 8 percent higher than the U.S. rate (163.0 per 100,000). Lung and bronchus cancer was the leading cause of cancer death in Ohio in 2013, followed by colon and rectum cancer, breast cancer and pancreatic cancer. These cancer types were also the leading causes of cancer death in the United States in 2009-2013, in the same order. The age-adjusted cancer mortality rate in Ohio decreased 12 percent from 2004 (201.9 per 100,000) to 2013 (176.8 per 100,000). In 2013, males in Ohio were more likely to die of cancer than females, and blacks were more likely to develop and die from cancer than any other racial or ethnic group.

Diagnosis of cancer at a later (regional or distant) stage of disease can lower the chance of survival. About 73 percent of Ohio lung and bronchus cancer cases were diagnosed at late stage in Ohio in 2013, where the five-year survival probability is 28 percent for patients with regional-stage disease and only 4 percent for patients with distant-stage disease. In Ohio in 2013, about 28 percent of breast cancers among females were diagnosed at late stage. More than half of all colon and rectum cancers in Ohio in 2013 were diagnosed at late stage (54 percent), where survival is 71 percent for patients with regional-stage disease and 14 percent for patients with distant-stage disease.

## Ohio Cancer Incidence

**Figure 1. Percentage of New Invasive Cancer Cases for the Leading Cancers in Ohio, 2013**



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2016.

- Lung and bronchus cancer was the leading cause of cancer incidence in Ohio in 2013, representing 15.2 percent of all new invasive cancer cases, followed by breast cancer (14.7 percent), prostate cancer (11.0 percent), and colon and rectum cancer (9.0 percent).
- These four sites/types accounted for half of all new invasive cancer cases in Ohio in 2013.

**Table 1. Number of New Invasive Cancer Cases and Age-adjusted Incidence Rates by Cancer Site/Type and Sex in Ohio, 2013** <sup>1,2</sup>

Primary Cancer Site/Type	Male		Female		Total	
	Cases	Rate	Cases	Rate	Cases	Rate
<b>All Cancer Sites/Types</b>	<b>31,364</b>	<b>492.7</b>	<b>31,438</b>	<b>426.6</b>	<b>62,802</b>	<b>452.4</b>
Bladder	2,393	39.4	722	9.1	3,115	22.1
Brain and Other CNS	539	8.6	421	6.3	960	7.4
Breast	65	1.0	9,166	125.8	9,231	67.6
Cervix	*	*	452	7.4	*	*
Colon and Rectum	2,950	47.3	2,702	35.0	5,652	40.6
Esophagus	580	8.9	140	1.7	720	5.0
Hodgkin Lymphoma	176	3.0	129	2.2	305	2.6
Kidney and Renal Pelvis	1,477	23.0	862	11.8	2,339	16.9
Larynx	486	7.2	148	1.9	634	4.3
Leukemia	906	15.1	678	9.3	1,584	11.9
Liver and Intrahepatic Bile Duct	674	9.9	291	3.8	965	6.6
Lung and Bronchus	5,025	79.9	4,504	58.2	9,529	67.4
Melanoma of Skin	1,494	24.3	1,102	16.2	2,596	19.5
Multiple Myeloma	465	7.4	362	4.6	827	5.9
Non-Hodgkin Lymphoma	1,413	22.8	1,158	15.2	2,571	18.6
Oral Cavity and Pharynx	1,172	17.4	490	6.6	1,662	11.7
Ovary	*	*	821	11.3	*	*
Pancreas	870	13.7	876	11.1	1,746	12.3
Prostate	6,931	101.7	*	*	*	*
Stomach	611	9.9	331	4.3	942	6.8
Testis	279	5.2	*	*	*	*
Thyroid	424	6.9	1,423	23.2	1,847	15.2
Uterus	*	*	2,195	28.8	*	*

<sup>1</sup> Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2016.

<sup>2</sup> Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

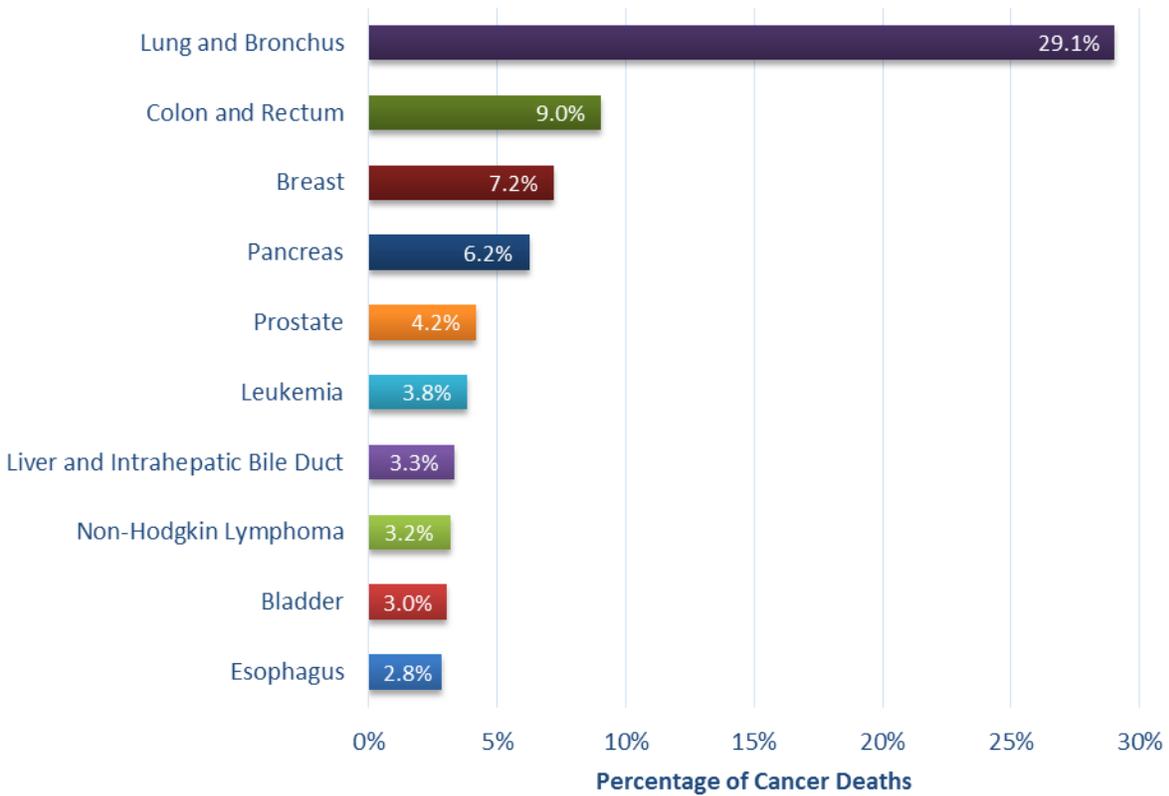
\* Not Applicable; Sex-specific cancer

CNS = Central Nervous System

- In Ohio, 62,802 new invasive cancer cases were diagnosed in 2013 and reported to OCISS by December 2015. Ohio's age-adjusted cancer incidence rate was 452.4 per 100,000 in 2013.
- In 2013, males had a 15 percent higher cancer incidence rate (492.7 per 100,000) compared to females (426.6 per 100,000).

## Ohio Cancer Mortality

Figure 2. Percentage of Cancer Deaths for the Leading Cancers in Ohio, 2013



Source: Chronic Disease Epidemiology and Evaluation Section and the Bureau of Vital Statistics, Ohio Department of Health, 2016.

- Cancer is the second most common cause of death in Ohio and the United States, accounting for nearly one of every four deaths.
- Lung and bronchus cancer was the leading cause of cancer death in Ohio in 2013, representing 29.1 percent of all cancer deaths, followed by colon and rectum cancer (9.0 percent), breast cancer (7.2 percent) and pancreatic cancer (6.2 percent).
- These four sites/types accounted for more than half (51.5 percent) of all cancer deaths in Ohio in 2013.

**Table 2. Number of Cancer Deaths and Age-adjusted Mortality Rates by Cancer Site/Type and Sex in Ohio, 2013**<sup>1,2,3</sup>

Primary Cancer Site/Type	Male		Female		Total	
	Deaths	Rate	Deaths	Rate	Deaths	Rate
<b>All Cancer Sites/Types</b>	<b>12,877</b>	<b>211.1</b>	<b>12,029</b>	<b>152.6</b>	<b>24,906</b>	<b>176.8</b>
Bladder	556	9.5	200	2.4	756	5.3
Brain and Other CNS	354	5.6	264	3.6	618	4.5
Breast	16	0.3	1,775	22.7	1,791	12.7
Cervix	*	*	170	2.5	*	*
Colon and Rectum	1,178	19.7	1,073	13.3	2,251	16.0
Esophagus	578	9.1	128	1.6	706	5.0
Hodgkin Lymphoma	25	0.4	12	0.2	37	0.3
Kidney and Renal Pelvis	397	6.3	209	2.7	606	4.3
Larynx	123	1.9	46	0.6	169	1.1
Leukemia	532	9.1	424	5.3	956	6.9
Liver and Intrahepatic Bile Duct	557	8.5	270	3.4	827	5.7
Lung and Bronchus	3,911	62.9	3,325	42.5	7,236	51.2
Melanoma of Skin	267	4.4	126	1.6	393	2.8
Multiple Myeloma	271	4.6	243	3.0	514	3.7
Non-Hodgkin Lymphoma	419	7.1	368	4.6	787	5.7
Oral Cavity and Pharynx	234	3.6	103	1.3	337	2.3
Ovary	*	*	582	7.3	*	*
Pancreas	736	11.9	816	10.1	1,552	11.0
Prostate	1,043	18.5	*	*	*	*
Stomach	201	3.3	161	2.1	362	2.6
Testis	16	0.3	*	*	*	*
Thyroid	31	0.5	40	0.5	71	0.5
Uterus	*	*	372	4.6	*	*

<sup>1</sup> Source: Chronic Disease Epidemiology and Evaluation Section and the Bureau of Vital Statistics, Ohio Department of Health, 2016.

<sup>2</sup> Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

<sup>3</sup> Excludes 63 cancer records with missing or unknown sex, age or county data.

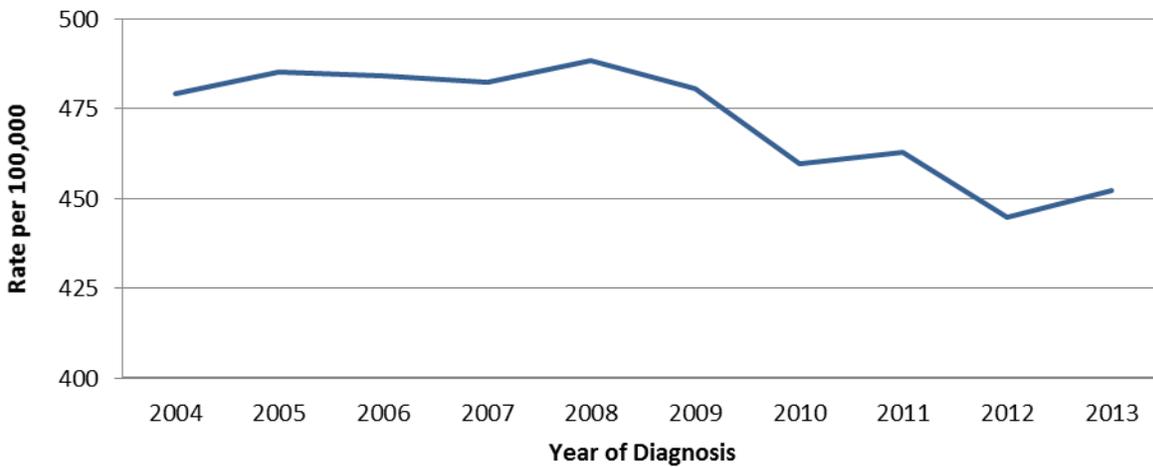
\* Not Applicable; Sex-specific cancer

CNS = Central Nervous System

- Cancer claimed the lives of 24,906 Ohioans in 2013. Ohio's age-adjusted cancer mortality rate (176.8 per 100,000) was 8 percent higher than the U.S. rate (163.0 per 100,000) in 2013.
- Males in Ohio were 38 percent more likely to die of cancer than females in 2013 (211.1 and 152.6 per 100,000, respectively).
- Approximately 69 percent of all cancer deaths in Ohio occurred among people 65 years and older in 2013.

## Trends in Ohio Cancer Rates

**Figure 3. Trends in Age-adjusted Cancer Incidence Rates in Ohio, 2004-2013**<sup>1,2</sup>

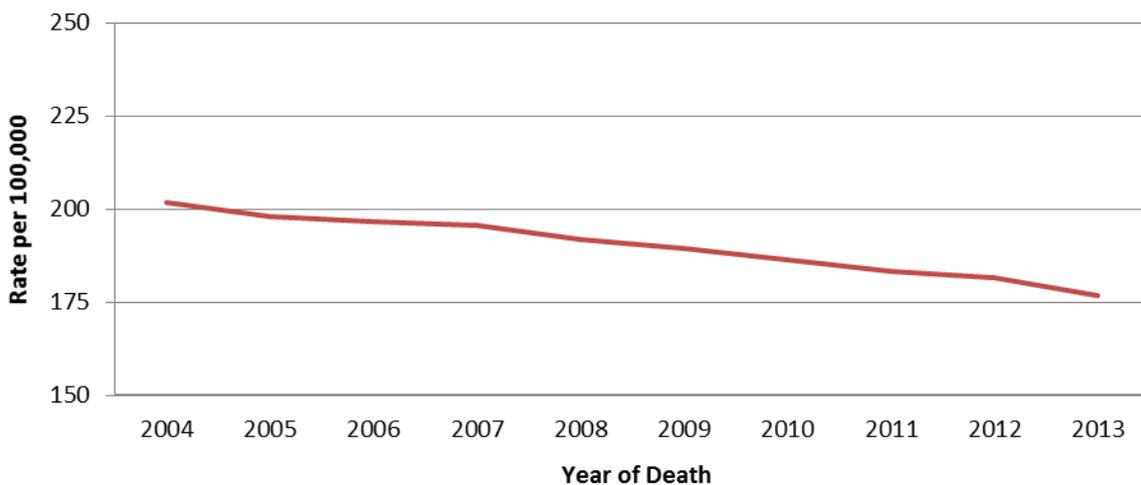


<sup>1</sup> Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2016.

<sup>2</sup> Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

- The age-adjusted cancer incidence rate decreased 6 percent from 2004 (479.4 per 100,000) to 2013 (452.4 per 100,000).

**Figure 4. Trends in Age-adjusted Cancer Mortality Rates in Ohio, 2004-2013**<sup>1,2</sup>

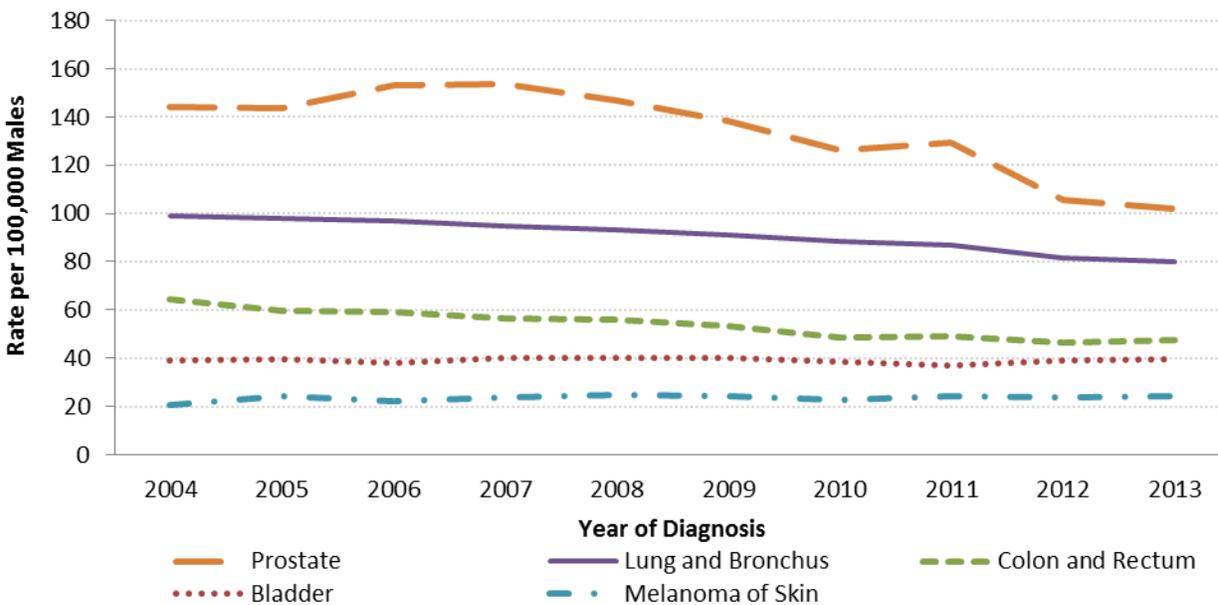


<sup>1</sup> Source: Chronic Disease Epidemiology and Evaluation Section and the Bureau of Vital Statistics, Ohio Department of Health, 2016.

<sup>2</sup> Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

- The age-adjusted cancer mortality rate decreased 12 percent from 2004 (201.9 per 100,000) to 2013 (176.8 per 100,000).

**Figure 5. Trends in Age-adjusted Incidence Rates for the Leading Cancers among Males in Ohio, 2004-2013**<sup>1,2</sup>

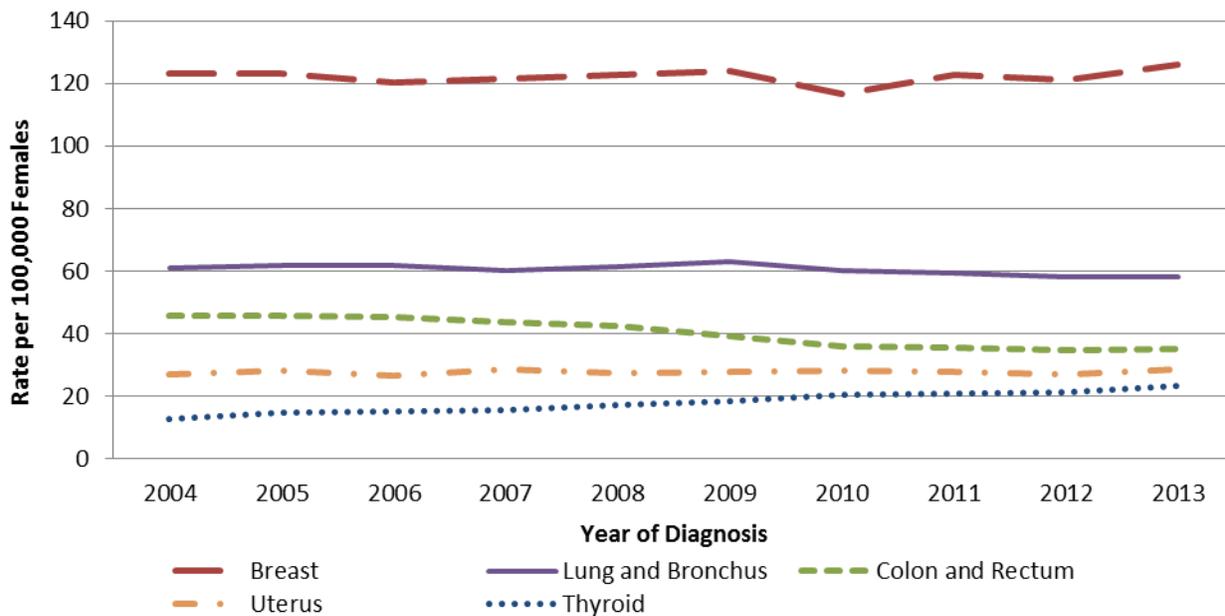


<sup>1</sup> Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2016.

<sup>2</sup> Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

- Prostate cancer is the most frequently diagnosed cancer among males. Incidence rates for prostate cancer have fallen significantly both in the United States and Ohio since the 1990s. In Ohio, prostate cancer incidence rates have decreased 29 percent, from 144.0 per 100,000 in 2004 to 101.7 per 100,000 in 2013. Part of the recent decline in prostate cancer diagnoses since 2011 may be due to changes in screening guidelines.
- The lung and bronchus cancer incidence rate for Ohio males declined 19 percent from 2004 (98.8 per 100,000) to 2013 (79.9 per 100,000).
- Colon and rectum cancer incidence rates in Ohio declined 26 percent from 2004 (64.2 per 100,000) to 2013 (47.3 per 100,000) among males.
- Age-adjusted cancer incidence rates for bladder cancer remained stable from 2004 to 2013 among Ohio males.
- Among Ohio males, the age-adjusted cancer incidence rate for melanoma of the skin increased 18 percent from 2004 (20.6 per 100,000) to 2013 (24.3 per 100,000).

**Figure 6. Trends in Age-adjusted Incidence Rates for the Leading Cancers among Females in Ohio, 2004-2013**<sup>1,2</sup>

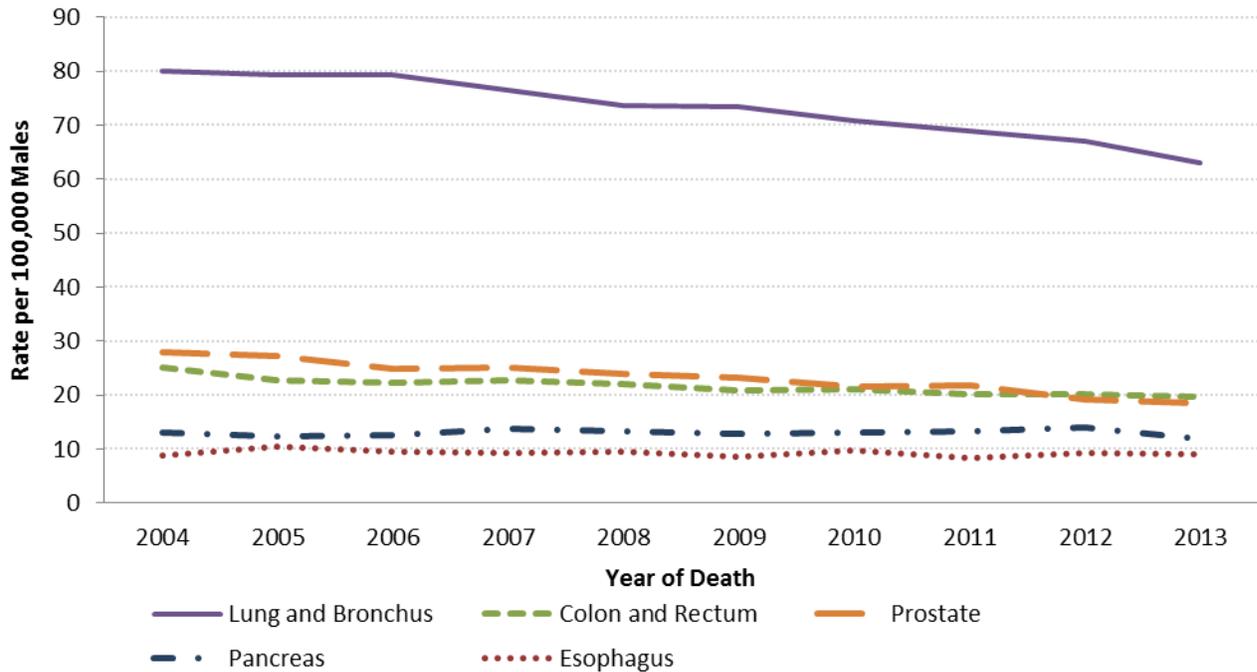


<sup>1</sup> Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2016.

<sup>2</sup> Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

- Breast cancer is the most frequently diagnosed cancer among females. Breast cancer incidence rates in Ohio were relatively stable from 2004 (123.3 per 100,000) to 2013 (125.8 per 100,000).
- The lung and bronchus cancer incidence rate among Ohio females declined 5 percent from 2004 (61.0 per 100,000) to 2013 (58.2 per 100,000).
- Colon and rectum cancer incidence rates in Ohio declined 23 percent from 2004 (45.7 per 100,000) to 2013 (35.0 per 100,000) among females.
- Uterine cancer incidence rates increased about 7 percent from 2004 (27.0 per 100,000) to 2013 (28.8 per 100,000) in Ohio.
- Thyroid cancer incidence rates increased 84 percent in Ohio from 2004 (12.6 per 100,000) to 2013 (23.2 per 100,000) among females. Much of this increase can be explained by improved detection methods.

**Figure 7. Trends in Age-adjusted Mortality Rates for the Leading Cancers among Males in Ohio, 2004-2013**<sup>1,2</sup>

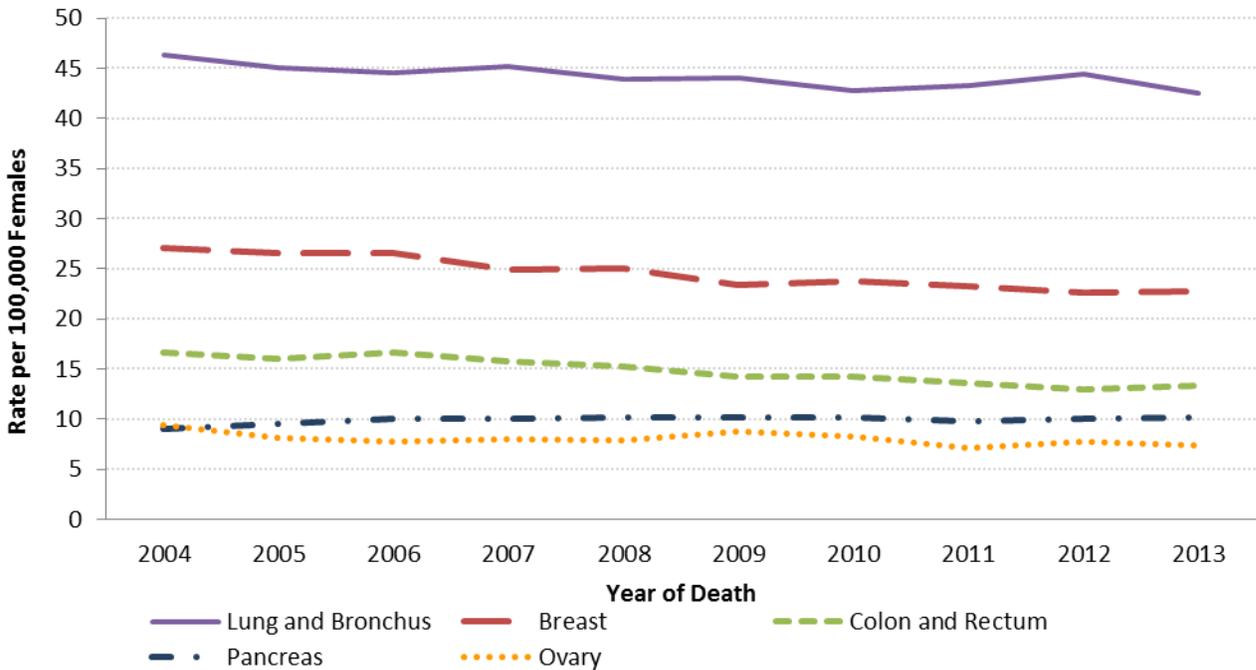


<sup>1</sup> Source: Chronic Disease Epidemiology and Evaluation Section and the Bureau of Vital Statistics, Ohio Department of Health, 2016.

<sup>2</sup> Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

- Lung and bronchus cancer mortality rates among Ohio males declined 21 percent from 2004 (80.0 per 100,000) to 2013 (62.9 per 100,000).
- Prostate cancer mortality rates showed an overall decline of 34 percent among males in Ohio from 2004 (28.0 per 100,000) to 2013 (18.5 per 100,000).
- Colon and rectum cancer mortality rates declined 21 percent in Ohio from 2004 (25.0 per 100,000) to 2013 (19.7 per 100,000) among males.
- Mortality rates for pancreatic cancer among Ohio males declined 9 percent from 2004 (13.1 per 100,000) to 2013 (11.9 per 100,000).
- Mortality rates for esophageal cancer among Ohio males were relatively stable from 2004 to 2013.

**Figure 8. Trends in Age-adjusted Mortality Rates for the Leading Cancers among Females in Ohio, 2004-2013<sup>1,2</sup>**



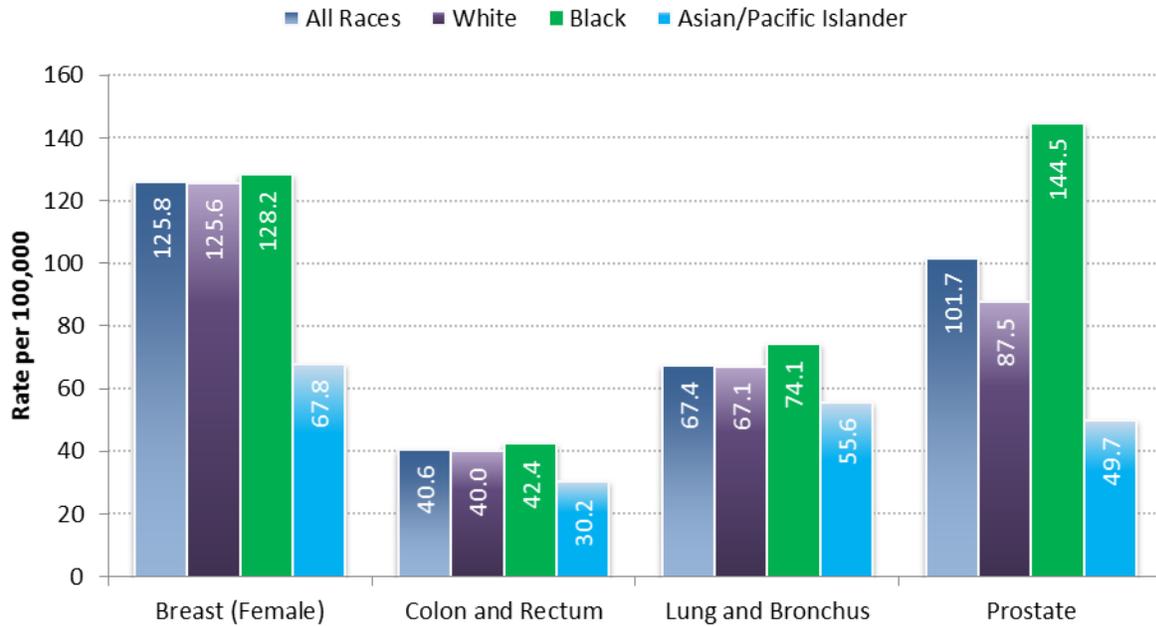
<sup>1</sup>Source: Chronic Disease Epidemiology and Evaluation Section and the Bureau of Vital Statistics, Ohio Department of Health, 2016.

<sup>2</sup>Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

- Lung and bronchus cancer mortality rates in Ohio were lower among females compared to males in 2004-2013. However, lung and bronchus cancer mortality rates among Ohio females declined only 8 percent from 2004 (46.3 per 100,000) to 2013 (42.5 per 100,000) compared to a 21 percent decline among Ohio males.
- Mortality rates due to female breast cancer in Ohio decreased 16 percent, from 27.1 per 100,000 in 2004 to 22.7 per 100,000 in 2013.
- Colon and rectum cancer mortality rates declined 20 percent in Ohio from 2004 (16.6 per 100,000) to 2013 (13.3 per 100,000) among females.
- Pancreatic cancer mortality rates among Ohio females increased 12 percent from 2004 (9.0 per 100,000) to 2013 (10.1 per 100,000).
- Ovarian cancer mortality rates in Ohio decreased 22 percent, from 9.4 per 100,000 in 2004 to 7.3 per 100,000 in 2013.

## Cancer by Race

**Figure 9. Age-adjusted Incidence Rates for the Leading Cancers by Race in Ohio, 2013**<sup>1,2</sup>



<sup>1</sup> Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2016.

<sup>2</sup> Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

- Incidence rates among blacks were higher than those of whites for female breast cancer, colon and rectum cancer, lung and bronchus cancer and prostate cancer in 2013.
- The prostate cancer incidence rate in 2013 was 65 percent higher among blacks (144.5 per 100,000) compared to whites (87.5 per 100,000) in Ohio.
- Asian/Pacific Islanders in Ohio had lower incidence rates compared to whites and blacks for the leading cancer sites/types in 2013.

**Table 3. Number of New Invasive Cancer Cases and Age-adjusted Incidence Rates by Cancer Site/Type and Race in Ohio, 2013<sup>1,2</sup>**

Primary Cancer Site/Type	White		Black		Asian/Pacific Islander	
	Cases	Rate	Cases	Rate	Cases	Rate
<b>All Sites/Types</b>	<b>54,649</b>	<b>446.4</b>	<b>6,234</b>	<b>441.8</b>	<b>439</b>	<b>270.2</b>
Bladder	2,837	22.6	140	10.3	13	15.7
Brain and Other CNS	871	7.7	71	4.7	6	6.0
Breast	8,062	67.0	1,013	72.8	74	48.2
Cervix	387	7.5	51	6.7	3	*
Colon and Rectum	4,944	40.0	590	42.4	37	30.2
Esophagus	650	5.1	58	3.9	6	5.9
Hodgkin Lymphoma	253	2.6	43	3.0	2	*
Kidney and Renal Pelvis	2,051	16.8	258	18.4	5	5.7
Larynx	552	4.3	67	4.4	6	7.6
Leukemia	1,405	12.1	112	7.7	18	13.6
Liver and Intrahepatic Bile Duct	765	6.0	168	10.9	10	9.3
Lung and Bronchus	8,430	67.1	1,009	74.1	66	55.6
Melanoma of Skin	2,421	20.7	11	0.8	4	*
Multiple Myeloma	659	5.2	148	10.9	5	7.9
Non-Hodgkin Lymphoma	2,329	19.0	191	13.5	11	10.3
Oral Cavity and Pharynx	1,515	12.1	116	7.8	14	11.3
Ovary	728	11.3	71	9.3	13	13.2
Pancreas	1,515	12.0	204	15.2	12	11.6
Prostate	5,332	87.5	941	144.5	42	49.7
Stomach	772	6.2	149	10.8	8	7.8
Testis	259	5.8	7	1.0	1	*
Thyroid	1,643	15.8	145	10.2	31	21.0
Uterus	1,981	29.8	182	22.4	15	13.2

<sup>1</sup> Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2016.

<sup>2</sup> Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population. Rates are sex specific for cancers of the cervix, ovary, prostate, testis and uterus.

\* Rates may be unstable and are not presented when the count is less than five.

CNS = Central Nervous System

- Blacks had higher incidence rates compared to whites for the following primary cancers: breast, colon and rectum, Hodgkin lymphoma, kidney and renal pelvis, larynx, liver and intrahepatic bile duct, lung and bronchus, multiple myeloma, pancreas, prostate and stomach.
- Incidence rates were about two times higher among blacks compared to whites for multiple myeloma, stomach cancer and cancer of the liver and intrahepatic bile duct, whereas rates among whites compared to blacks were two times higher for bladder cancer, 26 times higher for melanoma of the skin and six times higher for testicular cancer.
- Asian/Pacific Islanders in Ohio had lower incidence rates compared to whites and blacks for most cancer sites/types in 2013, except for cancers of the esophagus, larynx, ovary and thyroid and leukemia; however, these rates are based on small numbers and should be interpreted with caution.

**Table 4. Number of Cancer Deaths and Age-adjusted Mortality Rates by Cancer Site/Type and Race in Ohio, 2013<sup>1,2</sup>**

Primary Cancer Site/Type	White		Black		Asian/Pacific Islander	
	Deaths	Rate	Deaths	Rate	Deaths	Rate
<b>All Sites/Types</b>	<b>21,880</b>	<b>174.1</b>	<b>2,677</b>	<b>201.2</b>	<b>132</b>	<b>86.9</b>
Bladder	703	5.5	41	3.1	5	4.5
Brain and Other CNS	578	4.8	32	2.2	5	3.1
Breast	1,519	12.1	247	18.4	7	5.0
Cervix	144	1.3	23	1.7	1	*
Colon and Rectum	1,965	15.7	255	19.2	14	8.9
Esophagus	648	5.1	51	3.7	4	*
Hodgkin Lymphoma	36	0.3	1	*	0	*
Kidney and Renal Pelvis	548	4.3	54	4.1	0	*
Larynx	136	1.0	28	2.0	2	*
Leukemia	877	7.1	72	5.6	4	*
Liver and Intrahepatic Bile Duct	682	5.3	122	8.1	8	4.4
Lung and Bronchus	6,389	50.6	749	56.1	37	25.7
Melanoma of Skin	382	3.1	5	0.4	1	*
Multiple Myeloma	430	3.4	77	6.1	2	*
Non-Hodgkin Lymphoma	735	5.9	42	3.2	4	*
Oral Cavity and Pharynx	304	2.4	28	2.0	3	*
Ovary	529	4.2	48	3.6	2	*
Pancreas	1,318	10.4	205	15.9	14	8.6
Prostate	857	6.7	177	14.5	4	*
Stomach	292	2.4	64	4.9	0	*
Testis	16	0.1	0	*	0	*
Thyroid	63	0.5	8	0.6	0	*
Uterus	306	2.4	58	4.2	3	*

<sup>1</sup> Source: Chronic Disease Epidemiology and Evaluation Section and the Bureau of Vital Statistics, Ohio Department of Health, 2016.

<sup>2</sup> Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population. Rates are sex specific for cancers of the cervix, ovary, prostate, testis and uterus.

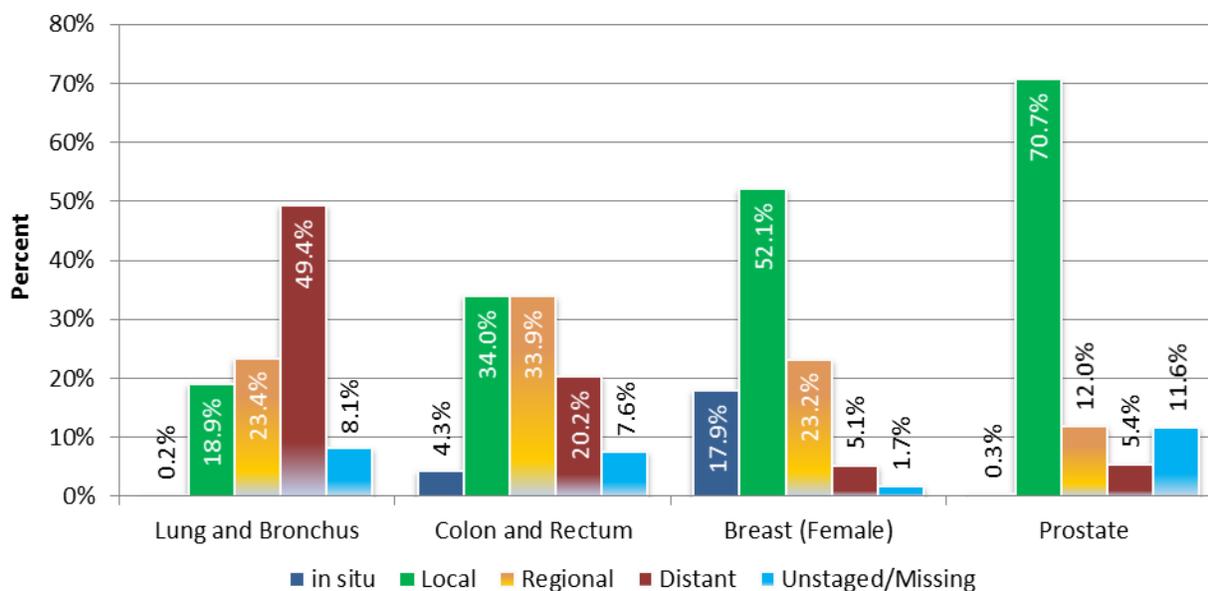
\* Rates may be unstable and are not presented when the count is less than five.

CNS = Central Nervous System

- In 2013, the cancer mortality rate for blacks (201.2 per 100,000) was 16 percent higher than the rate for whites (174.1 per 100,000).
- Mortality rates were approximately two times higher among blacks compared to whites for laryngeal cancer, multiple myeloma, prostate cancer and stomach cancer in 2013.
- Asian/Pacific Islanders had the lowest mortality rate for all cancer sites/types combined (86.9 per 100,000) compared to both whites and blacks in 2013.

## Cancer by Stage at Diagnosis

Figure 10. Stage at Diagnosis for Selected Cancers in Ohio, 2013



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2016.

- About 50 percent of Ohio lung and bronchus cancer cases were diagnosed at a distant stage in Ohio in 2013, where the five-year relative survival probability is only 4 percent.
- In Ohio in 2013, 34 percent of colon and rectum cancers were diagnosed at a local stage, and 34 percent were diagnosed at a regional stage. When colon and rectum cancers are diagnosed at a local stage, the five-year relative survival probability is 90 percent. If the cancer has spread regionally to involve nearby organs or lymph nodes at the time of diagnosis, the five-year relative survival probability drops to 71 percent.
- In Ohio in 2013, 70 percent of breast cancers among females were diagnosed early (*in situ* or local stage); while 28 percent were diagnosed late (regional or distant stage). The five-year relative survival probability for localized breast cancer was 99 percent in 2006-2012.
- Most (83 percent) prostate cancers in Ohio in 2013 were diagnosed at a local or regional stage, for which the five-year relative survival probability is 100 percent.

Staging describes the extent or spread of the disease at the time of diagnosis.

***in situ*** – Noninvasive cancer that has not penetrated surrounding tissue.

**Local** – A malignant tumor confined entirely to the organ of origin.

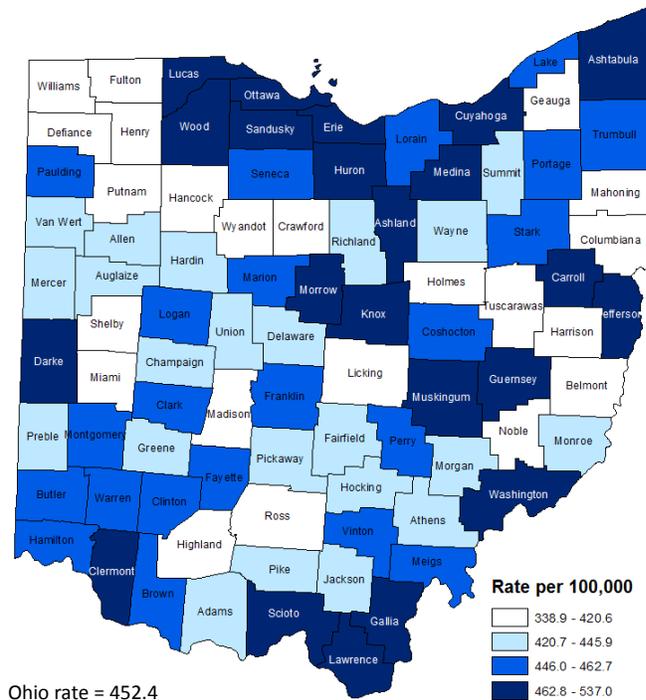
**Regional** – A malignant tumor that has extended beyond the organ of origin directly into surrounding organs or tissues or into regional lymph nodes.

**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.

## Cancer by County

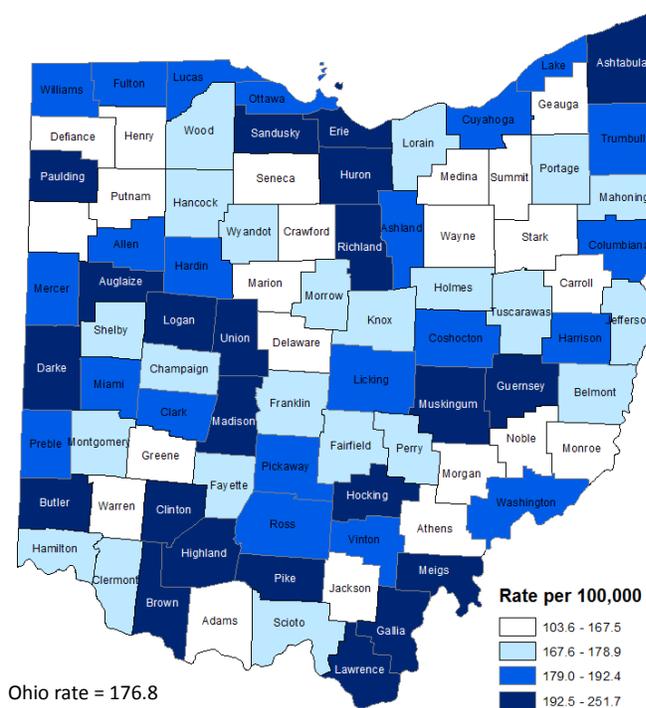
Figure 11. Age-adjusted Cancer Incidence Rates by County in Ohio, 2013



- Cancer incidence rates in Ohio varied by county in 2013. The county with the highest age-adjusted cancer incidence rate (Lawrence County, 537.0 per 100,000) had a rate 1.6 times higher than the county with the lowest rate (Shelby County, 338.9 per 100,000) (Figure 11 and Table 5).
- A grouping of counties with higher age-adjusted rates was located in the Great Lakes region; otherwise, an overall geographic pattern for cancer incidence for all cancer sites/types combined is not apparent in 2013.

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2016.

Figure 12. Age-adjusted Cancer Mortality Rates by County in Ohio, 2013



- Cancer mortality rates in Ohio varied by county in 2013. The county with the highest age-adjusted cancer mortality rate (Guernsey County, 251.7 per 100,000) had a rate 2.4 times higher than the county with the lowest rate (Noble County, 103.6 per 100,000) (Figure 12 and Table 6).
- An overall geographic pattern for cancer mortality for all cancer sites/types combined is not apparent in 2013.

Source: Chronic Disease Epidemiology and Evaluation Section and the Bureau of Vital Statistics, Ohio Department of Health, 2016.

**Table 5. Number of New Invasive Cancer Cases and Age-adjusted Incidence Rates by County in Ohio, 2013**

County	All Sites/Types		Breast (Female)		Lung and Bronchus		Colon and Rectum		Prostate	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
<b>Ohio</b>	<b>62,802</b>	<b>452.4</b>	<b>9,166</b>	<b>125.8</b>	<b>9,529</b>	<b>67.4</b>	<b>5,652</b>	<b>40.6</b>	<b>6,931</b>	<b>101.7</b>
Adams	152	440.1	21	114.9	28	75.8	17	54.2	9	50.0
Allen	541	435.0	64	94.9	93	71.0	49	40.1	58	95.3
Ashland	349	534.6	48	141.9	37	55.1	47	66.2	32	91.8
Ashtabula	612	476.7	78	123.4	108	80.2	64	49.9	56	84.3
Athens	247	430.2	33	110.1	42	70.8	21	36.2	31	110.2
Auglaize	249	423.3	37	125.0	42	68.9	18	29.9	18	60.5
Belmont	382	397.2	59	121.4	58	58.6	36	38.6	48	100.3
Brown	257	457.6	25	83.7	55	96.5	26	47.4	30	100.7
Butler	1,809	455.4	264	125.0	303	75.9	164	41.1	213	112.5
Carroll	187	463.7	19	92.3	33	81.6	21	51.1	21	98.9
Champaign	212	433.5	31	113.4	38	79.2	22	46.5	23	97.9
Clark	813	456.2	125	137.1	137	72.9	84	46.0	59	64.3
Clermont	1,071	474.6	159	134.1	172	76.4	98	43.5	106	91.6
Clinton	224	457.3	29	114.0	44	89.1	19	37.4	22	105.7
Columbiana	590	408.0	73	95.1	93	62.1	56	35.6	66	86.9
Coshocton	211	450.2	17	67.2	25	50.5	25	51.3	10	39.6
Crawford	249	416.1	41	132.7	37	58.3	22	36.5	27	88.8
Cuyahoga	7,609	477.8	1,105	129.1	1,044	64.3	660	41.0	871	116.3
Darke	357	521.5	42	116.3	48	69.4	48	68.7	44	125.6
Defiance	193	398.0	28	116.3	26	52.8	12	23.1	29	123.4
Delaware	801	429.6	138	136.3	97	57.0	49	28.5	115	123.2
Erie	529	499.1	87	168.2	80	71.9	62	56.2	55	99.1
Fairfield	747	441.2	117	133.3	114	67.1	59	35.7	82	91.3
Fayette	171	462.6	25	135.4	29	76.8	7	18.8	20	113.6
Franklin	5,193	450.0	815	130.4	765	68.8	463	40.3	604	112.8
Fulton	219	412.9	35	123.9	19	34.1	21	39.1	28	104.0
Gallia	183	467.7	16	78.5	28	67.4	14	35.0	24	123.4
Geauga	514	409.4	86	135.9	56	39.7	41	33.6	69	103.8
Greene	828	428.5	137	133.4	116	59.4	56	30.6	91	93.0
Guernsey	244	468.5	25	94.0	43	79.8	35	69.5	16	59.4
Hamilton	4,206	459.7	683	138.2	648	70.9	354	38.5	509	118.6
Hancock	375	413.2	42	85.4	47	50.8	36	39.0	42	92.0
Hardin	153	429.0	21	110.6	24	66.0	17	46.8	13	72.6
Harrison	87	379.3	12	91.4	16	65.4	9	43.1	12	94.4
Henry	149	415.9	24	133.4	20	52.4	17	45.4	14	76.6
Highland	221	409.4	32	114.6	31	54.8	24	43.0	20	76.8
Hocking	151	423.0	28	146.4	30	80.0	12	34.0	11	56.7
Holmes	147	352.5	11	47.8	13	32.5	22	56.4	16	76.4
Huron	340	490.5	50	148.1	51	73.1	27	36.1	34	92.1
Jackson	164	426.5	19	91.1	29	72.9	15	37.6	16	86.9
Jefferson	437	465.2	60	132.0	73	72.8	50	56.7	42	83.1
Knox	362	475.9	53	137.0	58	75.1	33	41.8	52	135.5
Lake	1,405	462.0	220	134.7	183	58.5	119	38.8	133	87.1
Lawrence	421	537.0	54	135.3	80	94.7	34	42.3	30	75.7

<sup>1</sup> Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2016.

<sup>2</sup> Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

\* Rates may be unstable and are not presented when the count is less than five.

**Table 5 Continued. Number of New Invasive Cancer Cases and Age-adjusted Incidence Rates by County in Ohio, 2013**

County	All Sites/Types		Breast (Female)		Lung and Bronchus		Colon and Rectum		Prostate	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
<b>Ohio</b>	<b>62,802</b>	<b>452.4</b>	<b>9,166</b>	<b>125.8</b>	<b>9,529</b>	<b>67.4</b>	<b>5,652</b>	<b>40.6</b>	<b>6,931</b>	<b>101.7</b>
Licking	848	420.6	101	93.8	125	60.5	76	37.7	92	88.4
Logan	261	461.4	49	167.2	39	63.9	27	49.3	18	60.0
Lorain	1,706	451.6	252	125.1	261	68.3	155	41.2	194	102.2
Lucas	2,451	485.3	364	137.4	367	71.9	227	44.9	296	119.9
Madison	204	412.6	26	104.6	30	63.1	13	25.2	21	84.0
Mahoning	1,360	414.9	197	113.0	219	65.4	156	47.9	135	85.9
Marion	370	458.0	51	129.4	52	62.2	56	68.4	22	52.9
Medina	986	466.1	131	118.0	128	60.5	79	38.1	132	119.1
Meigs	142	453.4	16	94.9	26	85.8	11	34.5	10	70.7
Mercer	228	437.4	24	91.4	41	74.6	20	39.3	27	105.2
Miami	549	414.3	90	130.6	93	67.3	50	37.1	65	97.2
Monroe	89	430.6	10	116.5	12	53.3	5	21.6	12	110.3
Montgomery	3,044	457.8	469	131.5	492	72.6	265	38.7	340	107.9
Morgan	92	439.4	10	115.3	15	67.1	8	36.3	7	62.7
Morrow	224	513.1	36	155.0	40	89.5	24	54.5	28	127.2
Muskingum	525	500.3	81	147.1	90	82.6	57	52.0	27	49.1
Noble	72	341.6	12	138.8	11	47.0	8	37.3	6	38.1
Ottawa	300	466.9	42	127.3	40	59.9	30	44.3	39	109.8
Paulding	105	456.8	11	100.8	21	86.4	10	44.0	9	70.4
Perry	192	457.4	28	131.8	25	54.6	24	55.9	7	26.9
Pickaway	291	445.9	49	144.7	47	72.4	27	41.3	23	69.2
Pike	155	434.4	23	130.6	35	93.8	11	29.8	11	60.4
Portage	840	453.6	118	121.3	128	68.7	59	33.3	109	114.9
Preble	240	442.6	38	132.1	41	73.3	23	46.2	29	108.6
Putnam	158	386.7	29	135.8	17	40.9	11	24.9	25	116.7
Richland	702	439.3	98	115.2	110	65.5	66	42.9	70	90.2
Ross	389	415.4	57	122.8	89	92.0	43	48.5	23	52.3
Sandusky	362	473.4	46	115.8	60	78.0	43	53.3	26	68.3
Scioto	479	495.2	66	127.9	77	75.9	48	45.9	48	100.4
Seneca	313	453.5	46	137.8	47	68.2	38	53.3	29	81.3
Shelby	198	338.9	17	54.6	36	56.1	12	20.2	23	81.5
Stark	2,232	453.1	320	128.0	349	67.5	160	32.6	281	118.7
Summit	2,968	440.4	418	118.6	425	61.9	231	33.6	323	96.2
Trumbull	1,317	458.0	163	108.5	230	77.4	138	49.3	146	103.5
Tuscarawas	515	416.4	74	113.7	60	46.2	36	30.1	69	112.4
Union	232	432.7	33	118.5	31	59.1	17	34.5	29	108.4
Van Wert	167	436.6	28	130.7	23	58.3	20	50.0	21	119.3
Vinton	75	462.7	12	133.8	18	109.9	4	*	4	*
Warren	1,057	448.7	146	113.0	155	67.8	89	37.5	143	125.4
Washington	410	474.4	56	131.9	84	93.4	37	43.5	32	75.5
Wayne	620	439.4	100	138.8	84	57.8	54	37.8	58	79.7
Williams	190	384.0	26	105.0	33	63.9	17	34.5	17	72.1
Wood	660	469.9	102	144.7	87	59.8	70	50.5	73	102.3
Wyandot	123	411.3	13	94.4	23	72.4	12	37.0	11	76.2

<sup>1</sup> Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2016.

<sup>2</sup> Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

\* Rates may be unstable and are not presented when the count is less than five.

**Table 6. Number of Cancer Deaths and Age-adjusted Mortality Rates by County in Ohio, 2013**

County	All Sites/Types		Breast (Female)		Lung and Bronchus		Colon and Rectum		Prostate	
	Deaths	Rate	Deaths	Rate	Deaths	Rate	Deaths	Rate	Deaths	Rate
<b>Ohio</b>	<b>24,906</b>	<b>176.8</b>	<b>1,775</b>	<b>22.7</b>	<b>7,236</b>	<b>51.2</b>	<b>2,251</b>	<b>16.0</b>	<b>1,043</b>	<b>18.5</b>
Adams	61	166.9	4	*	23	61.0	9	27.9	1	*
Allen	250	190.6	24	32.9	69	51.2	19	13.6	9	16.2
Ashland	132	192.4	9	23.9	38	57.5	17	23.3	3	*
Ashtabula	255	198.4	23	33.3	86	65.2	19	13.2	3	*
Athens	95	162.4	10	30.0	33	55.6	10	18.3	4	*
Auglaize	119	196.5	9	26.6	37	61.5	9	14.5	3	*
Belmont	178	178.5	12	24.5	49	49.8	17	17.6	7	18.5
Brown	108	198.7	8	30.6	39	69.1	11	21.8	3	*
Butler	746	192.6	50	22.9	236	60.3	65	17.1	30	19.8
Carroll	58	140.2	5	21.5	11	26.5	5	11.5	3	*
Champaign	85	171.7	6	21.3	23	47.2	7	14.7	3	*
Clark	341	183.6	19	17.6	101	52.5	42	24.0	10	12.8
Clermont	375	168.8	30	24.1	124	55.4	30	13.9	8	9.0
Clinton	107	212.2	5	18.0	36	69.7	7	15.2	4	*
Columbiana	282	189.2	20	25.7	85	57.2	27	17.3	8	13.1
Coshocton	89	182.6	4	*	24	45.3	10	22.3	2	*
Crawford	103	161.5	3	*	39	61.5	10	15.7	2	*
Cuyahoga	2,987	179.9	256	27.4	747	45.1	269	16.0	147	22.2
Darke	152	212.4	8	19.2	42	60.7	20	30.2	6	19.2
Defiance	70	144.5	8	34.4	20	42.6	5	9.8	5	28.3
Delaware	230	138.3	14	14.1	67	39.4	17	10.2	8	12.8
Erie	214	195.2	15	26.1	64	58.9	23	22.0	11	21.4
Fairfield	280	167.7	25	27.7	89	52.4	29	18.2	11	15.1
Fayette	62	169.9	1	*	29	79.1	2	*	1	*
Franklin	1,908	173.3	155	24.9	555	51.1	163	14.6	88	21.7
Fulton	101	189.7	5	17.3	26	46.6	14	28.6	7	28.9
Gallia	98	246.1	7	37.1	35	83.1	6	13.8	3	*
Geauga	157	124.5	12	15.1	37	27.6	7	7.8	14	28.2
Greene	285	144.3	22	19.1	80	40.5	21	10.4	9	10.0
Guernsey	133	251.7	7	21.0	42	77.9	9	17.0	3	*
Hamilton	1,642	177.0	125	23.1	477	52.4	149	16.0	79	21.9
Hancock	161	171.4	12	26.2	45	47.7	10	10.6	7	17.6
Hardin	67	185.7	3	*	18	48.0	4	*	4	*
Harrison	44	186.4	4	*	13	51.0	1	*	2	*
Henry	59	151.5	2	*	19	48.7	7	18.3	4	*
Highland	105	192.7	5	17.2	33	61.7	13	25.6	2	*
Hocking	76	202.6	2	*	29	77.0	10	27.1	5	35.0
Holmes	70	173.6	3	*	10	25.3	10	24.9	4	*
Huron	143	203.5	4	*	43	60.3	11	15.9	14	44.6
Jackson	67	164.5	6	26.3	25	60.4	2	*	3	*
Jefferson	177	176.7	10	18.2	60	58.6	19	22.3	8	18.2
Knox	132	168.0	10	22.1	36	46.2	17	21.0	11	36.3
Lake	570	181.7	45	27.2	166	53.7	53	16.9	23	18.6
Lawrence	170	211.5	9	19.2	55	66.4	16	20.1	3	*

<sup>1</sup> Source: Chronic Disease Epidemiology and Evaluation Section and the Bureau of Vital Statistics, Ohio Department of Health, 2016.

<sup>2</sup> Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

\* Rates may be unstable and are not presented when the count is less than five.

**Table 6 Continued. Number of Cancer Deaths and Age-adjusted Mortality Rates by County in Ohio, 2013**

County	All Sites/Types		Breast (Female)		Lung and Bronchus		Colon and Rectum		Prostate	
	Deaths	Rate	Deaths	Rate	Deaths	Rate	Deaths	Rate	Deaths	Rate
<b>Ohio</b>	<b>24,906</b>	<b>176.8</b>	<b>1,775</b>	<b>22.7</b>	<b>7,236</b>	<b>51.2</b>	<b>2,251</b>	<b>16.0</b>	<b>1,043</b>	<b>18.5</b>
Licking	370	185.2	27	24.3	108	52.1	23	11.9	12	16.1
Logan	120	204.8	5	18.1	40	66.1	6	10.8	2	*
Lorain	663	172.2	40	18.3	194	50.2	59	14.9	32	21.1
Lucas	985	192.4	74	24.9	256	49.8	106	20.6	46	24.3
Madison	111	231.3	6	21.5	26	52.8	17	34.5	2	*
Mahoning	611	176.2	47	25.9	188	54.7	58	16.1	25	17.5
Marion	135	165.5	11	24.7	39	44.3	7	9.1	6	17.2
Medina	318	152.2	15	13.9	78	36.4	32	15.3	20	23.8
Meigs	66	206.5	4	*	17	52.2	5	14.7	1	*
Mercer	98	179.0	10	31.5	29	50.8	9	16.8	3	*
Miami	251	185.9	18	24.4	76	55.5	20	14.3	9	15.7
Monroe	30	136.8	3	*	8	33.4	1	*	0	*
Montgomery	1,201	174.9	88	23.6	360	52.5	109	15.3	51	18.5
Morgan	33	154.2	2	*	6	27.0	7	30.0	0	*
Morrow	76	178.9	4	*	28	65.0	9	22.2	4	*
Muskingum	213	193.6	13	19.0	68	63.6	15	13.8	7	15.0
Noble	26	103.6	1	*	10	39.2	1	*	1	*
Ottawa	117	180.3	9	27.5	30	44.2	14	22.0	3	*
Paulding	51	211.4	5	35.2	19	74.4	4	*	1	*
Perry	73	178.0	2	*	23	52.9	7	17.7	2	*
Pickaway	122	190.4	5	13.1	45	70.1	8	11.6	1	*
Pike	71	199.4	0	*	19	54.1	5	12.7	2	*
Portage	319	178.2	25	25.0	97	51.5	27	16.1	9	10.8
Preble	104	191.3	7	22.0	33	58.5	10	18.0	4	*
Putnam	53	127.5	5	21.2	16	40.6	6	14.9	4	*
Richland	333	199.0	20	23.8	105	63.0	25	14.4	14	19.6
Ross	166	184.6	12	23.7	47	54.1	11	12.7	10	29.2
Sandusky	151	193.8	15	35.9	47	61.6	23	28.5	5	15.4
Scioto	178	177.5	7	12.4	67	66.4	18	17.5	7	18.5
Seneca	109	154.5	4	*	37	52.1	11	14.9	4	*
Shelby	103	177.4	6	19.8	28	47.6	9	15.8	8	37.9
Stark	859	167.5	49	16.3	249	48.3	77	15.4	36	16.3
Summit	1,142	165.4	70	17.8	320	47.0	91	13.2	36	12.4
Trumbull	535	179.7	28	17.2	168	56.8	52	17.8	26	20.9
Tuscarawas	229	175.3	21	33.1	63	47.0	28	20.7	9	16.9
Union	98	204.9	8	26.6	26	53.7	10	22.7	3	*
Van Wert	70	166.8	6	27.1	23	58.5	6	14.2	3	*
Vinton	28	182.1	3	*	9	64.1	0	*	0	*
Warren	352	153.9	24	19.5	100	43.9	27	11.9	14	17.3
Washington	169	188.0	12	23.5	52	56.2	12	14.8	5	14.7
Wayne	234	166.9	19	26.1	64	44.7	20	14.6	7	12.2
Williams	95	189.4	6	23.3	18	36.4	10	20.3	8	38.6
Wood	238	170.7	17	22.2	66	45.9	33	24.5	13	21.1
Wyandot	56	173.4	6	39.4	19	61.2	2	*	3	*

<sup>1</sup> Source: Chronic Disease Epidemiology and Evaluation Section and the Bureau of Vital Statistics, Ohio Department of Health, 2016.

<sup>2</sup> Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

\* Rates may be unstable and are not presented when the count is less than five.

## Data Sources and Methods

### Ohio Incidence Data

Ohio cancer incidence data presented in this report were from OCISS, ODH. Cancer statistics were calculated using SAS® statistical application software by the Chronic Disease Epidemiology and Evaluation Section, ODH. Incidence rates in this publication are per 100,000 and age-adjusted to 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 U.S. standard population proportion for the respective age group. Cancer cases were coded to the International Classification of Diseases for Oncology, Third Edition (ICD-O-3). OCISS data are presented for 23 primary site/type groupings following the conventions of the National Cancer Institute Surveillance, Epidemiology and End Results (SEER) Program. Invasive cancer cases include malignant cancer cases plus *in situ* bladder cancer cases.

### Ohio Mortality Data

Death data were obtained from the Bureau of Vital Statistics, ODH. Data represent the underlying cause of death and are coded using the International Classification of Diseases, version 10 (ICD-10). Death rates in this report are presented per 100,000 and age-adjusted to the 2000 U.S. standard population using 19 age groups, i.e., <1, 1-4, 5-9, 10-14, 15-19...85+. Mortality rates were calculated using SAS® statistical application software by the Chronic Disease Epidemiology and Evaluation Section, ODH.

### U.S. Incidence and Mortality Data

Cancer statistics for the United States were taken from the National Cancer Institute SEER Program *SEER Cancer Statistics Review, 1975-2013* and the SEER\*Stat Database, SEER 18 Registries Research Data, released April 2016, based on the November 2015 submission. National mortality rates were taken from CDC, National Center for Health Statistics, National Vital Statistics System.

### Survival Data

Survival information was taken from the SEER Program *SEER Cancer Statistics Review, 1975-2013*, April 2016.

### Other Sources of Information

Cancer Programs at ODH: <http://www.healthy.ohio.gov/cancer/cancprgms.aspx>

American Cancer Society (ACS): <http://www.cancer.org>

National Cancer Institute (NCI): <http://www.cancer.gov>

National Vital Statistics System (NVSS): <http://www.cdc.gov/nchs/deaths.htm>