

Stomach Cancer in Ohio, 2012-2016



Incidence and Mortality

Stomach cancer, also called gastric cancer, occurs when cancer cells form in the lining of the stomach. Stomach cancer made up 1.4 percent of newly diagnosed (incidence) cancer cases in Ohio reported to the Ohio Cancer Incidence Surveillance System (OCISS) from 2012 through 2016. An average of 900 cases of stomach cancer were diagnosed annually in Ohio during this time period (Table 1). The average annual age-adjusted incidence rate for stomach cancer in Ohio was 6.4 per 100,000, which was lower than the national incidence rate of 7.4 per 100,000. The incidence rate among males diagnosed with stomach cancer (9.0 per 100,000) was more than two times higher than the rate among females (4.2 per 100,000) in Ohio. Blacks showed higher rates of stomach cancer (10.4 per 100,000) than whites (5.8 per 100,000) and Asians/Pacific Islanders (7.0 per 100,000) in Ohio in 2012-2016.

An average of 376 deaths from stomach cancer occurred each year in Ohio in 2012-2016 (Table 1). The average annual age-adjusted mortality rate for stomach cancer in Ohio was 2.7 per 100,000, compared to the U.S. mortality rate of 3.1 per 100,000. The mortality rate was nearly two times higher for males (3.6 per 100,000) than females (1.9 per 100,000) in Ohio during this time period. As shown in Table 1, in both Ohio and the United States, stomach cancer mortality rates were greater for males, blacks and those ages 65 and older.

Key Findings and Populations at High Risk

- An average of 900 new cases of stomach cancer were diagnosed and an average of 376 deaths from stomach cancer occurred each year in Ohio during 2012-2016.
- The stomach cancer incidence rate in Ohio was 6.4 per 100,000, which was 14 percent lower than the national rate of 7.4 per 100,000 in 2012-2016.
- Stomach cancer occurs about twice as often in males than in females in Ohio and the United States.
- Blacks have higher incidence and mortality rates of stomach cancer than whites in Ohio and the United States.
- Stomach cancer was most frequently diagnosed among men ages 60 to 74 and among women ages 70 to 74 and 85 and older.
- Rates of stomach cancer decreased among both men and women in Ohio from 1996 to 2016.
- In Ohio, there was no clear geographic pattern of stomach cancer incidence by county in 2012-2016.
- Thirty percent of stomach cancers in Ohio were diagnosed at a distant stage (the latest stage) in Ohio in 2012-2016.
- Overall, only about one-third of Ohioans diagnosed with stomach cancer survive five years after diagnosis.

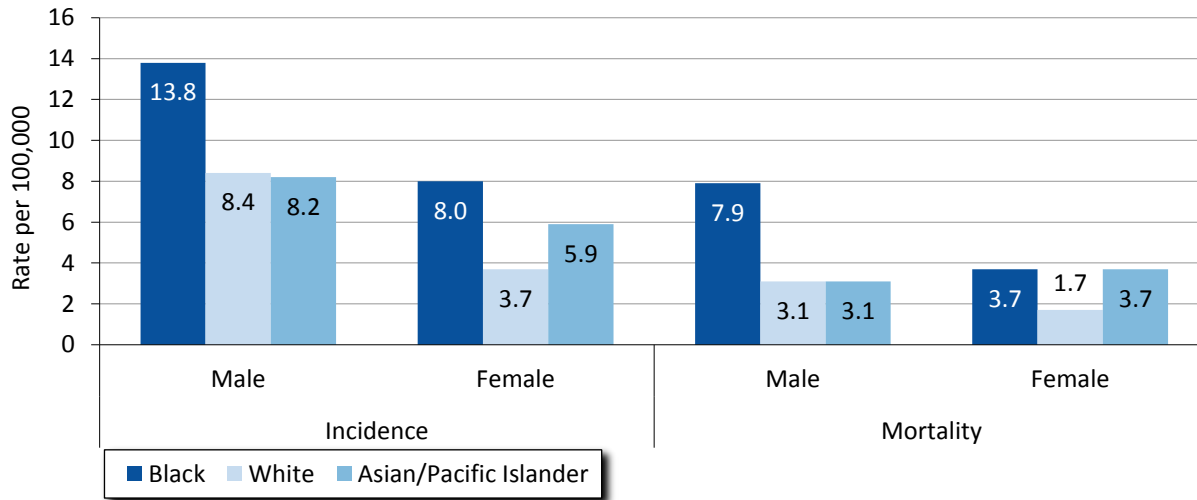
Table 1. Average Annual Number and Age-adjusted Rates of Stomach Cancer Cases and Deaths per 100,000 Persons by Sex, Race and Age Group, Ohio and the United States, 2012-2016

		Incidence			Mortality		
		Ohio Cases	Ohio Rate	U.S. Rate	Ohio Deaths	Ohio Rate	U.S. Rate
Total		900	6.4	7.4	376	2.7	3.1
Sex	Male	571	9.0	10.0	220	3.6	4.2
	Female	329	4.2	5.3	156	1.9	2.3
Race	White	731	5.8	6.6	295	2.3	2.7
	Black	141	10.4	10.3	72	5.4	5.5
	Asian/Pacific Islander	13	7.0	10.9	6	3.6	5.3
Age Group	<65	342	2.7	3.1	113	0.9	1.2
	65+	558	31.8	36.7	263	14.9	16.6

Sources: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019; Bureau of Vital Statistics, Ohio Department of Health, 2019; Surveillance, Epidemiology and End Results (SEER) Program, National Cancer Institute, 2019.

Incidence and Mortality by Sex and Race

Figure 1. Average Annual Age-adjusted Incidence and Mortality Rates of Stomach Cancer per 100,000 Persons by Sex and Race, Ohio, 2012-2016

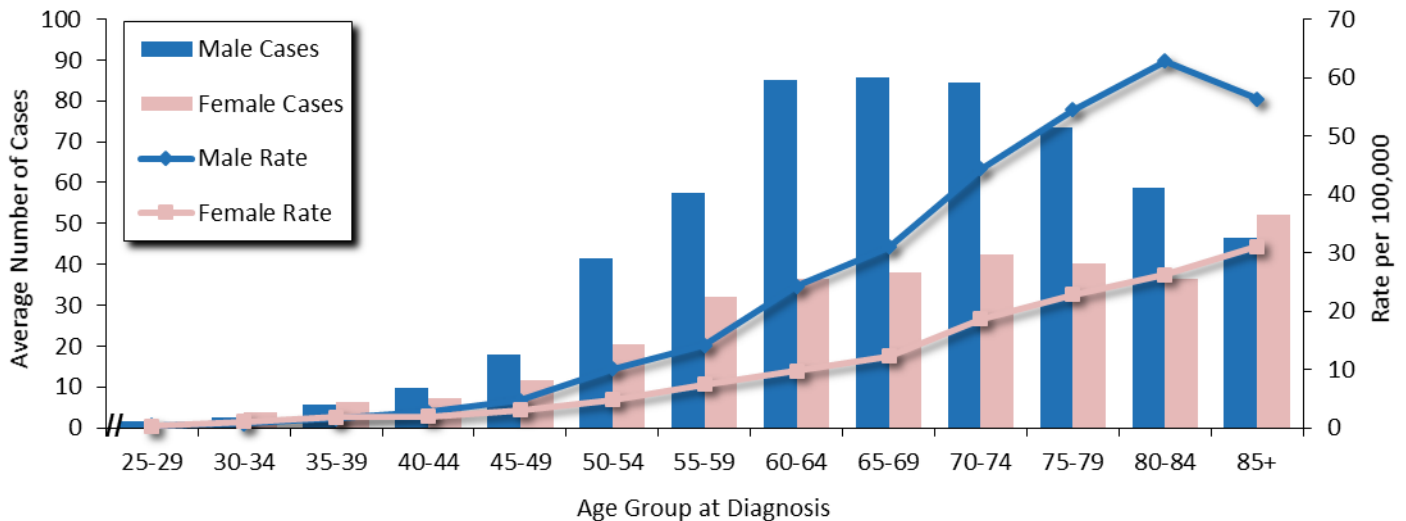


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019; Bureau of Vital Statistics, Ohio Department of Health, 2019.

Black males had the highest stomach cancer incidence and mortality rates in Ohio, based on data from 2012 to 2016 (Figure 1). Black men were more than twice as likely as white or Asian/Pacific Islander men to die from stomach cancer. White females had the lowest incidence and mortality rates for stomach cancer in Ohio in 2012-2016.

Incidence by Age Group and Sex

Figure 2. Average Annual Number and Age-specific Incidence Rates of Stomach Cancer per 100,000 Persons by Age Group and Sex, Ohio, 2012-2016



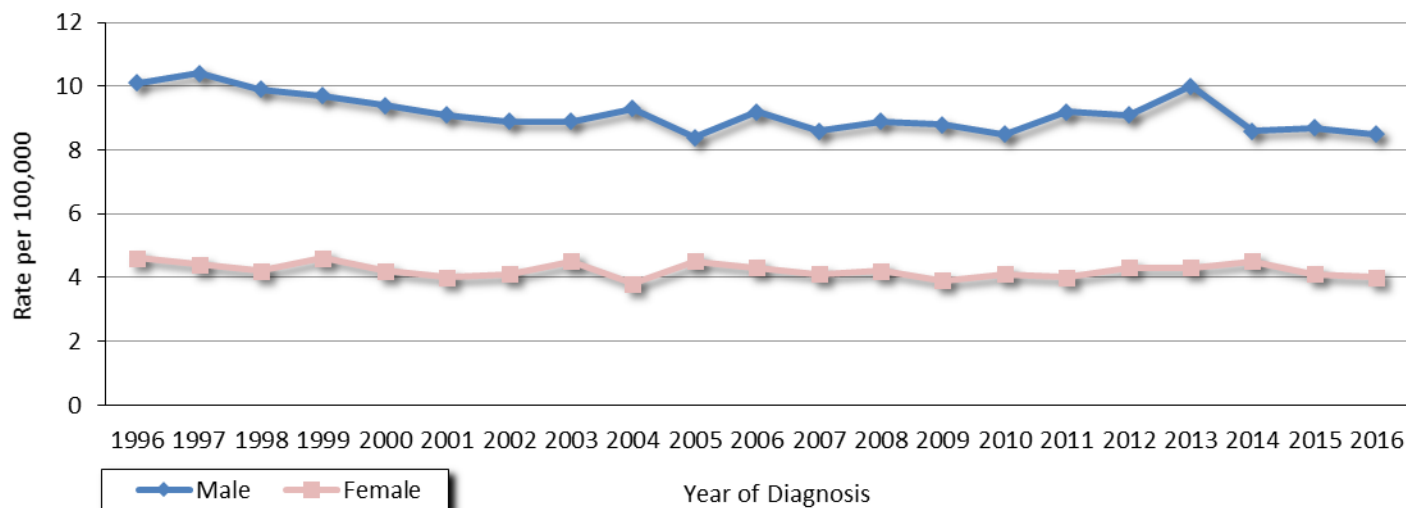
Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

In Ohio, stomach cancer was most frequently diagnosed among men ages 60 to 74 and among women ages 70-74 and ages 85 and older (Figure 2). Incidence rates for men and women increased with advancing age, with men having about twice the rate of stomach cancer than women, beginning around age 50. There were very few stomach cancers diagnosed among those younger than 40 in Ohio in 2012-2016.

Trends in Incidence and Mortality

Figure 3 shows incidence rates of stomach cancer according to year of diagnosis (1996 through 2016) for males and females in Ohio. For each year, the incidence rate was higher among Ohio males compared to females. From 1996 to 2016, stomach cancer incidence rates decreased 16 percent among Ohio males but was relatively stable among Ohio females.

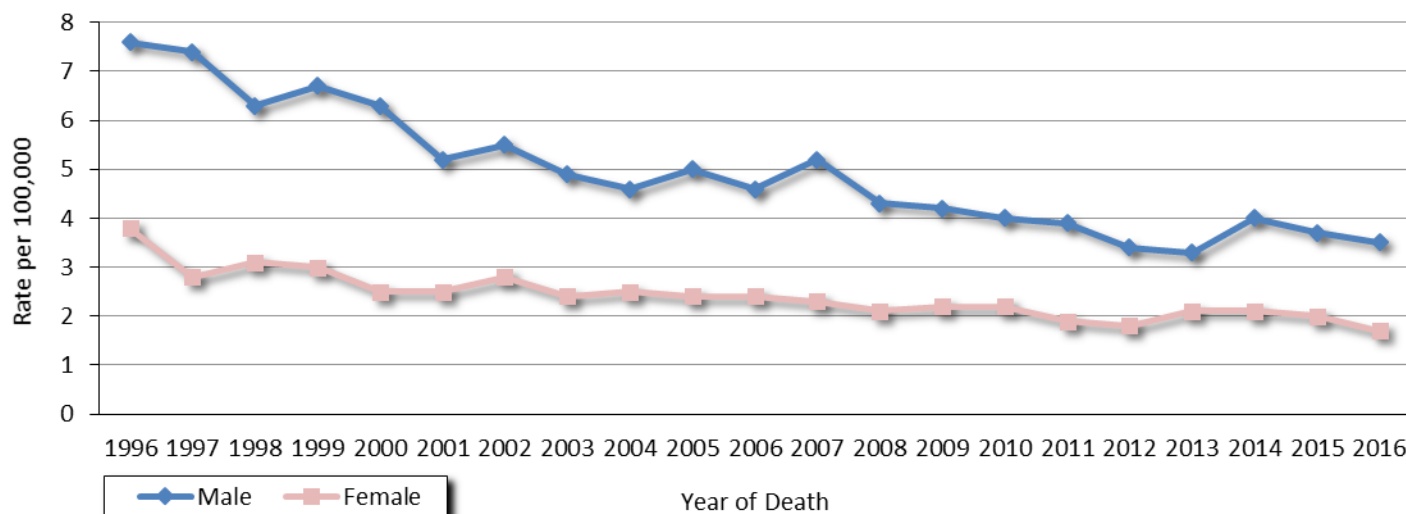
Figure 3. Trends in Age-adjusted Incidence Rates of Stomach Cancer per 100,000 Persons by Sex, Ohio, 1996-2016



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

Figure 4 shows stomach cancer mortality rates in Ohio according to year of death (1996 through 2016) for males and females. For each year, stomach cancer mortality rates were higher among males compared to females in Ohio. From 1996 to 2016, stomach cancer mortality rates decreased by more than 50 percent among both men and women. The reasons for this decline are not completely known but may be linked to greater consumption of fresh fruits and vegetables, decreased use of salted and smoked foods and more frequent use of antibiotics to treat infections, such as antibiotics that kill the bacteria *Helicobacter pylori*, which is believed to be a major cause of stomach cancer.

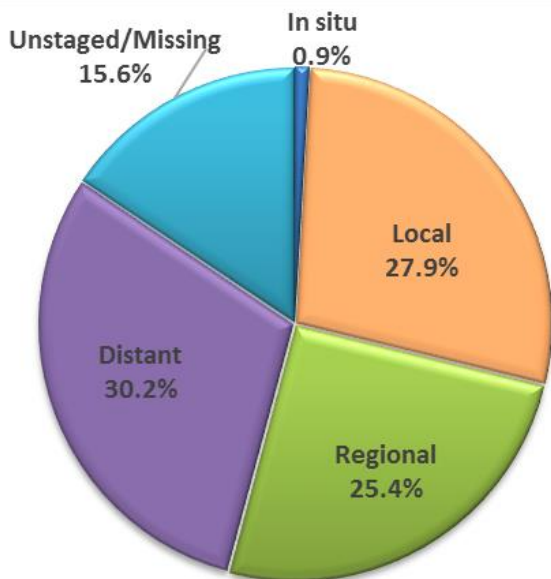
Figure 4. Trends in Age-adjusted Mortality Rates of Stomach Cancer per 100,000 Persons by Sex, Ohio, 1996-2016



Source: Bureau of Vital Statistics, Ohio Department of Health, 2019.

Stage at Diagnosis

Figure 6. Proportion of Stomach Cancer Cases (%) by Stage at Diagnosis, Ohio, 2012-2016



Cancer stage at diagnosis, which refers to the extent or spread of a cancer in the body, is used to select appropriate treatment and is an important determinant of survival. If cancer cells are present only in the layer of cells (tissue) where they developed and have not spread, the stage is *in situ*. If cancer cells have penetrated beyond the original layer of tissue, the cancer has become invasive and is categorized as local, regional or distant based on the extent of spread.

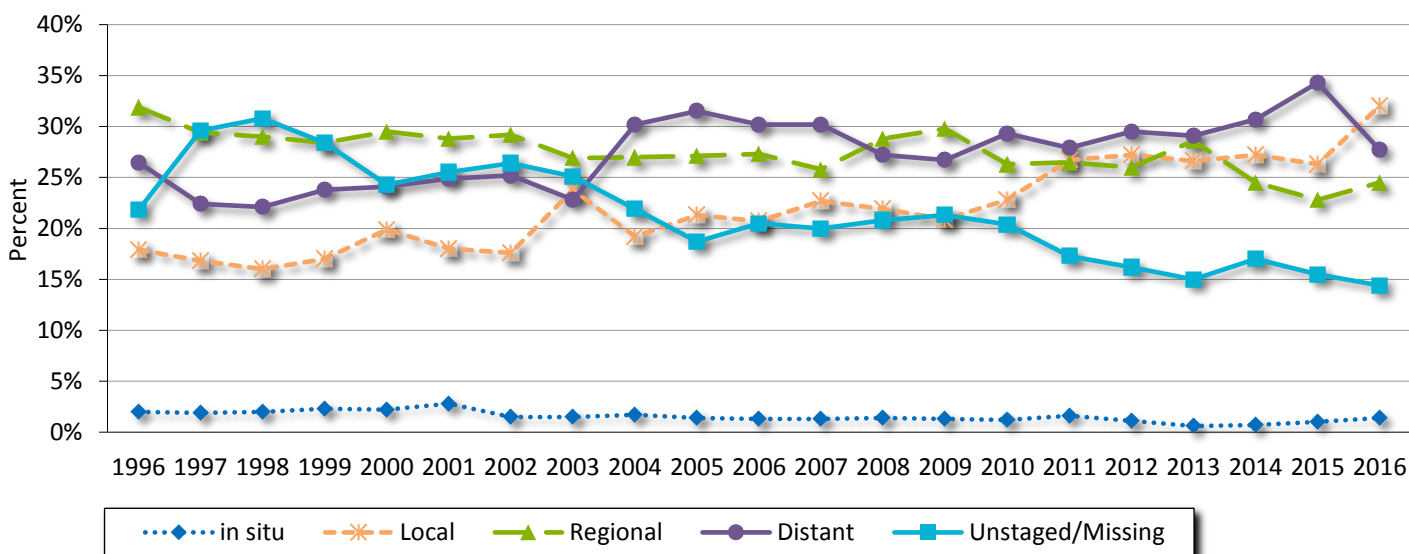
In Ohio, 0.9 percent of stomach cancer cases were diagnosed *in situ*, 27.9 percent were local stage, 25.4 percent were regional stage, 30.2 percent were distant stage and 15.6 percent were unstaged or of unknown stage in 2012-2016 (Figure 6).

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

Trends in Stage at Diagnosis

Figure 7 shows the distribution of stage at diagnosis of stomach cancer cases according to year of diagnosis from 1996 to 2016. The proportions of cases diagnosed at the local and distant stages in Ohio increased during 1996 to 2016, while cases diagnosed at a regional stage or an unstaged/missing stage decreased 28.5 and 28.9 percent, respectively, during this 21-year period. The proportion of *in situ* cases was relatively stable from 1996 to 2016.

Figure 7. Trends in the Proportion of Stomach Cancer Cases (%) by Stage at Diagnosis, Ohio, 1996-2016

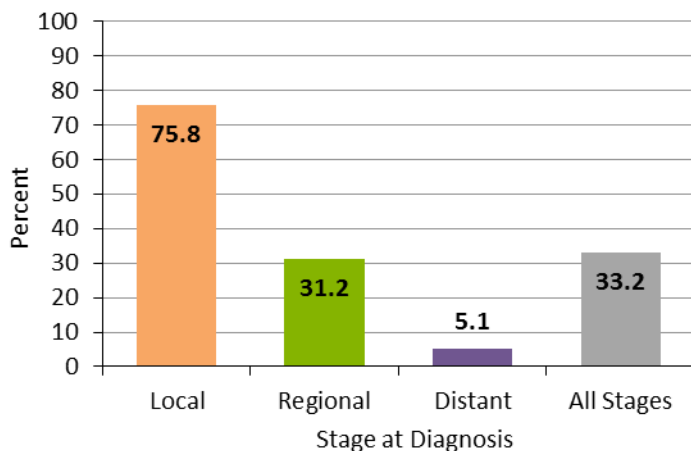


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

Survival

Relative survival is the percentage of people who are alive at a designated time period (usually five years) after a diagnosis divided by the percentage expected to be alive in the absence of a diagnosis based on normal life expectancy. The overall five-year relative survival in Ohio was 33.2 percent for those diagnosed with stomach cancer from 2009 to 2015. Five-year relative survival was 75.8 percent when stomach cancer was diagnosed at the local stage, 31.2 percent when diagnosed at the regional stage and only 5.1 percent for tumors diagnosed at the distant stage (Figure 8).

Figure 8: Five-Year Relative Survival (%) for Stomach Cancer by Stage at Diagnosis, Ohio, 2009-2015



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

Stomach Cancer by Location

The stomach can be divided into five main parts, as listed below:

1. **Cardia:** The part of the stomach that is closest to the esophagus. Food and liquids pass through the cardia to enter the stomach from the esophagus.
2. **Fundus:** The upper part of the stomach.
3. **Body (Corpus):** The main part of the stomach.
4. **Antrum:** The lower portion of the stomach.
5. **Pylorus:** The part of the stomach that connects to the duodenum (first part of the small intestine). The pylorus is a valve that opens and closes during digestion and allows stomach contents to pass from the stomach to the small intestine.

Other parts of the stomach include the lesser curvature of the stomach, greater curvature of the stomach, overlapping lesion of the stomach, and stomach, NOS (Not Otherwise Specified).

In Ohio in 2012-2016, the highest percentage of stomach cancers (39.8 percent) were found in the cardia. Other areas of the stomach where stomach cancer was found, in decreasing order, included: stomach, NOS (20.0 percent), antrum (11.9 percent), body (8.9 percent), lesser curvature of the stomach (4.8 percent), fundus (4.6 percent), overlapping lesion of the stomach (4.3 percent), greater curvature of the stomach (3.9 percent) and the pylorus (1.7 percent).

Types of Stomach Cancer

As shown in Table 2, the types of cancer that can originate in the stomach include:

Adenocarcinoma

Most cancers of the stomach are adenocarcinomas. These cancers develop from the cells that form the innermost lining of the stomach (the mucosa). In Ohio in 2012-2016, 74.3 percent of stomach cancers were adenocarcinomas.

Gastrointestinal stromal tumor (GIST)

A type of tumor that usually begins in cells in the wall of the gastrointestinal tract. Gastrointestinal stromal tumors, also called GISTs, can be benign or malignant. Although GISTs can be found anywhere in the digestive tract, most are found in the stomach. In Ohio, 11.9 percent of stomach tumors were of this type in 2012-2016.

Carcinoid tumor

A slow-growing type of tumor usually found in the gastrointestinal system. Carcinoid tumors may secrete substances such as serotonin or prostaglandins, causing carcinoid syndrome, a combination of symptoms that may include flushing of the face, flat angiomas (small collections of dilated blood vessels) of the skin, diarrhea, bronchial spasms, rapid pulse and sudden drops in blood pressure. Carcinoid tumors in Ohio made up 6.4 percent of stomach cancer cases in 2012-2016.

Other cancers

Other types of cancer, such as squamous cell carcinoma, small cell carcinoma and leiomyosarcoma, can also originate in the stomach, but these cancers are very rare. Other specified types of stomach cancer made up about 4.4 percent of cases in Ohio, while unspecified types made up 3.0 percent in 2012-2016.

Table 2. Average Annual Number and Percent Distribution of Stomach Cancer Cases by Histology, Ohio, 2012-2106

Type of Stomach Cancer (Histology)	Cases	Percent
Adenocarcinoma	668	74.3%
Gastrointestinal stromal tumor	107	11.9%
Carcinoid tumor	58	6.4%
Other specified types	40	4.4%
Unspecified types	27	3.0%

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019.

Did You Know?

Infection with *Helicobacter pylori* (*H. pylori*) is the primary identified cause of stomach (gastric) cancer. Studies in China in areas with high rates of stomach cancer found that short-term treatment with antibiotics to eradicate *H. pylori* reduced the incidence of gastric cancer. During the 15-year period after treatment, gastric cancer incidence was reduced by almost 40 percent.

Risk Factors and Populations at High Risk

Anything that increases the chance of getting a disease is called a risk factor. Having a risk factor does not mean that you will get cancer; not having risk factors doesn't mean that you will not get cancer. The following is a list of risk factors for stomach cancer:

Age: Risk increases with age, with most cases occurring after age 60.

Sex: Males are about twice as likely to develop stomach cancer compared to females.

Race and Ethnicity: Blacks, Asians/Pacific Islanders and Hispanics are more likely to develop stomach cancer compared to other races and non-Hispanics.

***Helicobacter pylori* Infection:** *H. pylori* is a bacterium that commonly infects the inner lining (the mucosa) of the stomach. Infection with *H. pylori* can cause stomach inflammation and peptic ulcers. It also increases the risk of stomach cancer, but only a small number of infected people develop stomach cancer.

Long-term Inflammation of the Stomach: People who have conditions associated with long-term stomach inflammation (such as the blood disease pernicious anemia) are at increased risk of stomach cancer. Also, people who have had part of their stomach removed may have long-term stomach inflammation and increased risk of stomach cancer many years after their surgery.

Tobacco Smoking: Smokers are more likely than nonsmokers to develop stomach cancer. Heavy smokers are most at risk.

Family History: Persons who have close relatives (parents, brothers, sisters or children) with a history of stomach cancer are somewhat more likely to develop the disease themselves. If many close relatives have a history of stomach cancer, the risk is even greater.

Poor Diet, Lack of Physical Activity and Obesity: Studies suggest that people who eat a diet high in foods that are smoked, salted or pickled have an increased risk for stomach cancer. On the other hand, people who eat a diet high in fresh fruits and vegetables may have a lower risk of this disease. A lack of physical activity may increase the risk of stomach cancer. Also, people who are obese may have an increased risk of cancer developing in the upper part of the stomach.

Stomach Cancer Signs and Symptoms

Early stomach cancer often does not cause symptoms. As the cancer grows, the most common symptoms are:

- Discomfort or pain in the stomach area
- Difficulty swallowing
- Nausea and vomiting
- Weight loss
- Feeling full or bloated after a small meal
- Vomiting blood or having blood in the stool

It is possible that one or more of these signs and symptoms may be the result of other health problems. If you have any of these symptoms, you should consult with your healthcare provider.

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., 2012-2016). 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 1996-2016 rates were calculated using population estimates from the U.S. Census Bureau and National Center for Health Statistics. Population data were compiled from bridged-race intercensal population estimates for July 1, 1990-July 1, 1999; revised bridged-race intercensal population estimates for July 1, 2000-July 1, 2004 (released 10/26/2012); revised bridged-race intercensal population estimates for July 1, 2005-July 1, 2009 (released 6/26/2014) and vintage 2017 bridged-race postcensal population estimates for July 1, 2010-July 1, 2017 (released 6/27/2018).

Incidence: The number of cases diagnosed during a specified time period (e.g., 2012-2016). Stomach cancer cases were defined by International Classification of Diseases for Oncology, Third Edition (ICD-O-3), and categorized by site codes C160-C169, excluding types 9050-9055, 9140 and 9590-9992, in accordance with the Surveillance, Epidemiology and End Results (SEER) Program of the National Cancer Institute.

Invasive Cancer: A malignant tumor that has infiltrated the organ in which the tumor originated. Invasive cancers consist of those diagnosed at the local, regional, distant and unstaged/missing stages. Only invasive cancers were included in the calculation of incidence rates in this document.

Mortality: The number of deaths during a specified time period (e.g., 2012-2016). Stomach cancer deaths were defined as follows: International Statistical Classification of Diseases and Related Health Problems, Ninth Edition (ICD-9), code 151 for 1996-1998 and International Statistical Classification of Diseases and Related Health Problems, Tenth Edition (ICD-10), codes C160-C169 for 1999-2016.

Rate: The number of cases or deaths per unit of population (e.g., per 100,000 persons) during a specified time period (e.g., 2012-2016). Rates may be unstable and are not presented when the count is less than five.

Relative Survival: The percentage of people who are alive at a designated time period (usually five years) after a cancer diagnosis divided by the percentage expected to be alive in the absence of cancer based on normal life expectancy. It does not distinguish between patients who have no evidence of cancer and those who have relapsed or are still in treatment.

Stage at Diagnosis: The degree to which a tumor has spread from its site of origin at the time of diagnosis. A system of summary staging is often used to group cases into the following stages:

in situ—Noninvasive cancer that has not penetrated surrounding tissue.

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

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

Distant—A malignant tumor that has spread to parts of the body (distant organs, tissues and/or lymph nodes) remote from the primary tumor.

Unstaged/Missing—Insufficient information is available to determine the stage or extent of the disease at diagnosis.

Table 2. Average Annual Number of Invasive Stomach Cancer Cases and Age-adjusted Incidence Rates per 100,000 Persons by County of Residence and Sex, Ohio and the United States, 2012-2016

	Male		Female		Total			Male		Female		Total	
	Cases	Rate	Cases	Rate	Cases	Rate		Cases	Rate	Cases	Rate	Cases	Rate
Ohio	571	9.0	329	4.2	900	6.4	Lawrence	3	8.9	1	3.0	5	5.7
U.S.	10.0		5.3		7.4		Licking	8	9.3	4	4.1	13	6.4
Adams	2	9.9	1	5.3	3	7.5	Logan	2	8.6	1	3.8	3	6.1
Allen	6	9.8	3	3.8	8	6.7	Lorain	19	10.7	8	3.7	27	6.9
Ashland	2	4.9	2	4.3	3	4.7	Lucas	23	10.5	12	4.5	35	7.1
Ashtabula	8	12.2	2	2.9	10	7.4	Madison	2	7.3	<1	*	3	4.9
Athens	2	8.5	<1	*	3	4.2	Mahoning	19	12.4	11	5.6	30	8.6
Auglaize	2	6.9	<1	*	3	4.4	Marion	4	10.7	2	4.5	6	7.3
Belmont	2	4.2	1	2.4	3	3.2	Medina	10	9.8	4	3.6	14	6.5
Brown	2	9.3	<1	*	3	5.7	Meigs	1	7.7	<1	*	2	4.7
Butler	17	9.1	10	4.5	27	6.6	Mercer	2	7.2	1	4.1	3	5.7
Carroll	2	9.7	<1	*	2	6.2	Miami	6	9.6	3	5.0	9	7.0
Champaign	3	13.6	1	4.4	4	8.3	Monroe	<1	*	<1	*	<1	*
Clark	6	7.8	3	3.2	9	5.1	Montgomery	29	9.4	17	4.6	46	6.7
Clermont	9	8.4	5	3.7	14	5.9	Morgan	<1	*	<1	*	<1	*
Clinton	2	8.0	1	4.3	3	6.0	Morrow	2	6.2	<1	*	2	4.7
Columbiana	5	8.3	4	4.8	9	6.2	Muskingum	3	5.3	3	4.8	5	5.0
Coshocton	2	9.8	1	4.5	3	7.0	Noble	1	4.9	<1	*	1	3.0
Crawford	2	6.5	1	3.4	3	4.8	Ottawa	3	10.6	2	5.0	5	7.5
Cuyahoga	80	11.4	47	5.0	127	7.7	Paulding	<1	*	<1	*	1	3.8
Darke	3	10.6	2	4.3	5	7.2	Perry	1	6.2	2	6.6	3	6.3
Defiance	1	5.4	2	7.5	3	6.7	Pickaway	4	13.6	2	6.3	6	9.5
Delaware	8	9.4	2	2.0	10	5.4	Pike	<1	*	<1	*	1	2.8
Erie	4	7.8	2	3.6	7	5.6	Portage	8	9.6	3	3.1	11	6.1
Fairfield	5	6.3	3	3.7	9	4.9	Preble	3	10.7	1	5.8	4	8.1
Fayette	1	5.9	<1	*	1	3.8	Putnam	<1	*	<1	*	1	3.1
Franklin	46	9.1	33	5.2	79	6.9	Richland	4	5.7	3	3.4	7	4.5
Fulton	2	7.2	1	4.0	3	5.6	Ross	5	9.9	2	3.4	6	6.4
Gallia	2	9.6	<1	*	3	6.3	Sandusky	3	7.4	1	2.7	4	4.9
Geauga	5	6.9	1	2.0	6	4.3	Scioto	3	7.6	2	2.7	5	4.9
Greene	8	8.8	5	4.9	13	6.7	Seneca	2	5.9	1	3.5	3	4.5
Guernsey	2	8.3	1	3.7	3	5.7	Shelby	1	4.6	<1	*	2	3.4
Hamilton	35	8.8	25	4.9	60	6.6	Stark	20	8.9	11	3.9	31	6.1
Hancock	3	6.5	<1	*	4	3.7	Summit	25	8.1	18	4.8	43	6.2
Hardin	1	6.9	<1	*	2	5.3	Trumbull	14	10.4	9	5.2	23	7.5
Harrison	1	13.0	<1	*	2	8.4	Tuscarawas	4	6.5	3	3.8	7	5.0
Henry	1	5.7	<1	*	1	3.6	Union	3	9.8	<1	*	3	5.4
Highland	2	6.4	1	3.8	3	5.1	Van Wert	1	7.4	<1	*	2	4.4
Hocking	2	9.0	<1	*	2	6.1	Vinton	1	17.5	<1	*	2	11.7
Holmes	<1	*	<1	*	1	2.7	Warren	9	7.5	3	2.9	12	5.0
Huron	4	11.5	<1	*	4	6.2	Washington	3	8.6	3	5.9	6	7.1
Jackson	1	4.8	<1	*	2	3.8	Wayne	4	6.6	3	4.3	8	5.3
Jefferson	3	6.9	2	4.6	6	5.7	Williams	1	4.7	1	3.5	2	4.1
Knox	2	5.7	1	3.1	3	4.1	Wood	4	6.2	3	3.6	7	4.8
Lake	12	8.3	7	4.0	19	6.0	Wyandot	1	7.8	<1	*	1	4.7

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2019; Surveillance, Epidemiology and End Results (SEER) Program, National Cancer Institute, 2019.

* Rate not calculated when the count for 2012-2016 is less than five.

Sources of Data and Additional Information

Ohio Cancer Incidence Surveillance System:

<https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/ohio-cancer-incidence-surveillance-system/welcome-to>

National Cancer Institute:

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

American Cancer Society:

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

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