Department of Health

Multiple Myeloma in Ohio

June 2024

Multiple myeloma is a cancer of the plasma cells, a type of white blood cell that produces antibodies. Abnormal plasma cells (myeloma cells) build up in the bone marrow, crowding out normal cells in the bone marrow that make red blood cells, platelets, and other white blood cells that help fight infection. Myeloma cells form tumors in many bones of the body and can weaken and cause damage to the bones. Myeloma cells also produce abnormal antibodies called M proteins, which can cause complications and damage to organs, such as the kidneys.

Key Findings

- An average of **967** new cases of multiple myeloma were diagnosed and an average of **511** deaths from multiple myeloma occurred each year in Ohio during 2017-2021.
- The multiple myeloma incidence rate in Ohio was 6.3 per 100,000 population, compared with the national rate of 7.2 per 100,000 during 2017-2021.
- Men have higher rates of multiple myeloma than women in Ohio and the United States.
- Black people are more than twice as likely to be diagnosed with multiple myeloma as White people.
- Multiple myeloma was most frequently diagnosed among men and women ages 65 to 74 in Ohio in 2017-2021. There were no cases reported in Ohio among persons younger than 20 years of age during that time period.
- Incidence rates of multiple myeloma increased, while mortality rates decreased in Ohio from 2000 to 2021.
- About 91% of multiple myelomas in Ohio were diagnosed at a distant stage (the latest stage) in Ohio in 2017-2021.
- Overall, about 58% of Ohioans diagnosed with multiple myeloma survive five years after diagnosis.

New Cases

Multiple myeloma made up 1.4% of newly diagnosed (incidence) cancer cases in Ohio reported to OCISS from 2017 through 2021. An average of **967** cases of multiple myeloma were diagnosed annually in Ohio during this time period (Table 1). The average annual age-adjusted incidence rate for multiple myeloma in Ohio was 6.3 per 100,000 population, which was lower than the national incidence rate of 7.2 per 100,000. The incidence rate among males diagnosed with multiple myeloma (7.7 per 100,000) was nearly 50% higher than the rate among females (5.2 per 100,000) in Ohio. The multiple myeloma incidence rate among Black Ohioans (12.8 per 100,000) was more than two times the rate among White Ohioans (5.5 per 100,000). Asians/Pacific Islanders had the lowest multiple myeloma rate (3.1 per 100,000) in Ohio in 2017-2021.

Deaths

An average of **511** deaths from multiple myeloma occurred each year in Ohio in 2017-2021 (Table 1). The average annual age-adjusted mortality rate for multiple myeloma in Ohio was 3.3 per 100,000 population, compared with the U.S. mortality rate of 3.1 per 100,000. The mortality rate was higher for males (4.3 per 100,000) than females (2.6 per 100,000) in Ohio during this time period. As shown in Table 1, in both Ohio and the United States, multiple myeloma mortality rates were greater for males, Black people, and those 65 years old and older.

Table 1. Average Annual Number and Age-Adjusted Rates of Multiple Myeloma Cases and Deaths per 100,000 Population by Sex, Race, and Age Group, Ohio and the United States, 2017-2021

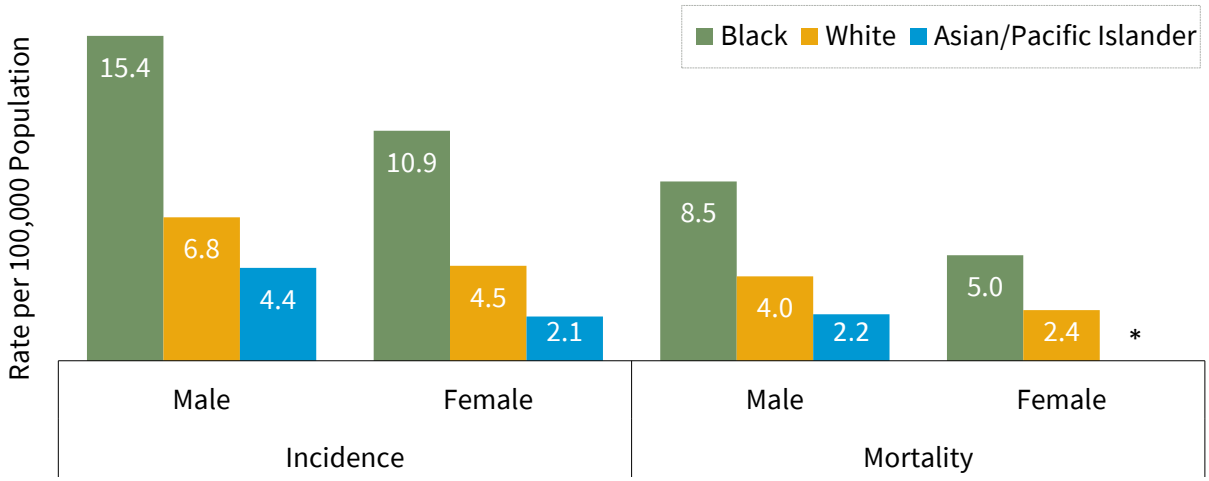
		Incidence			Mortality		
		Ohio		U.S.	Ohio		U.S.
		Cases	Rate	Rate	Deaths	Rate	Rate
Total		967	6.3	7.2	511	3.3	3.1
Sex	Male	531	7.7	8.7	285	4.3	3.9
	Female	435	5.2	5.9	225	2.6	2.4
Race	White	745	5.5	6.5	413	3.0	2.9
	Black	198	12.8	14.1	94	6.4	5.7
	A/PI	4	3.1	4.1	4	1.7	1.5
Age Group	<65	333	2.5	2.8	101	0.7	0.6
	65+	634	32.5	37.5	410	21.5	20.0

Sources: Incidence – Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024; Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: SEER Research Limited-Field Data, 22 Registries (2000-2021), based on the Nov. 2023 submission. Mortality – All Cause of Death (COD), Aggregated With State, Total U.S. (1990-2022) <Katrina/Rita Population Adjustment>, National Cancer Institute, April 2024. Underlying mortality data provided by NCHS (www.cdc.gov/nchs). Software: SEER*Stat version 8.4.3.

Incidence and Mortality by Race and Sex

Black males had the highest multiple myeloma incidence and mortality rates in Ohio, based on data from 2017 to 2021 (Figure 1). Black men were more than twice as likely as White men and three times as likely as Asian/Pacific Islander men to be diagnosed with multiple myeloma. Asian/Pacific Islander females had the lowest incidence rates for multiple myeloma in Ohio in 2017-2021. The reasons for the racial disparities in multiple myeloma are largely unknown.

Figure 1. Average Annual Age-Adjusted Incidence and Mortality Rates of Multiple Myeloma per 100,000 Population by Sex and Race, Ohio, 2017-2021

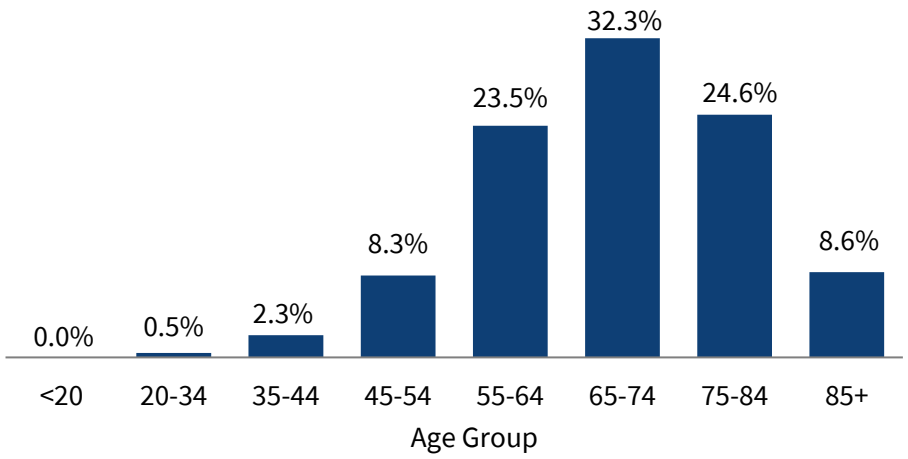


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.
* Rate not calculated when the total death count for 2017-2021 is less than 10.

Incidence by Age Group

In Ohio, multiple myeloma was most frequently diagnosed among people ages 65 to 74 (Figure 2). There were no cases of multiple myeloma among people less than 20 years of age in Ohio in 2017-2021.

Figure 2. Percent of New Cases of Multiple Myeloma by Age Group, Ohio, 2017-2021



Lifetime Risk

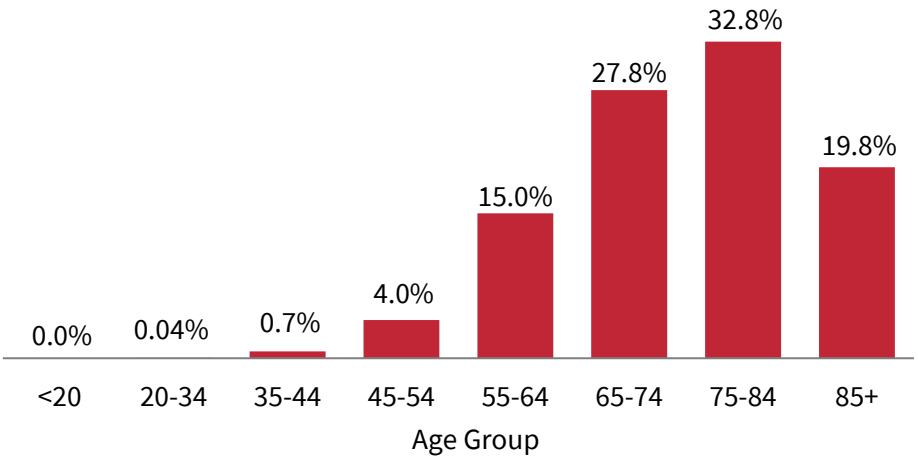
Men and women in the United States have about a 1 in 116 (0.86%) risk of developing multiple myeloma at some point in their lifetime, based on 2017–2019 data.

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

Mortality by Age Group

In Ohio, multiple myeloma deaths occurred most frequently among people ages 75-84 (Figure3). There were no deaths due to multiple myeloma among people less than 20 years of age in Ohio in 2017-2021.

Figure 3. Percent of Multiple Myeloma Deaths by Age Group, Ohio, 2017-2021



Lifetime Risk

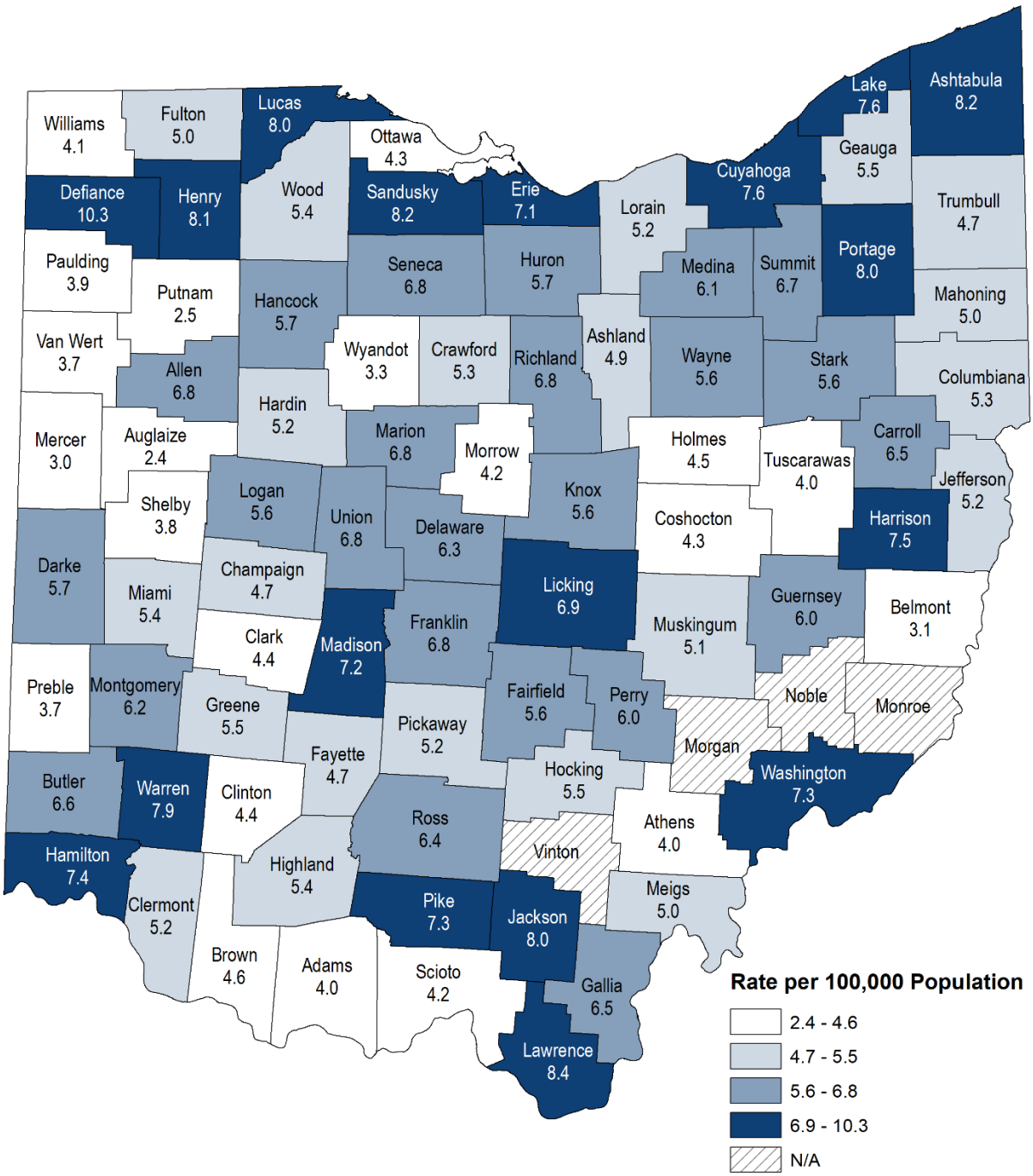
About 1 out of 244 (0.41%) men and women may die from multiple myeloma at some point in their lifetime, based on 2017–2019 data.

Source: Bureau of Vital Statistics, Ohio Department of Health, 2024.

Incidence by County

Figure 4 shows 2017-2021 average annual age-adjusted multiple myeloma incidence rates by county of residence. County-specific multiple myeloma incidence rates in Ohio ranged from 2.4 to 10.3 per 100,000 population, compared with Ohio's rate of 6.3 per 100,000.

Figure 4. Average Annual Age-Adjusted Incidence Rates of Multiple Myeloma per 100,000 Population by County of Residence, Ohio, 2017-2021

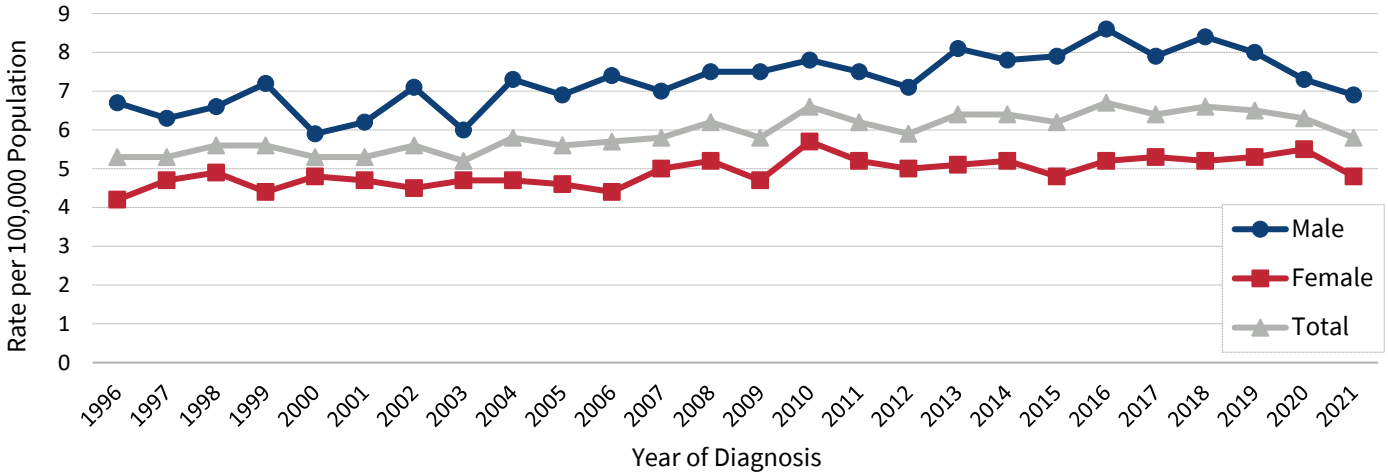


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.
Each category represents approximately 25 percent of the 88 Ohio counties.
N/A: Rate not calculated when the case count for 2017-2021 is less than five.

Trends in Incidence

Figure 5 shows incidence rates of multiple myeloma according to year of diagnosis (1996 through 2021) for males, females, and both sexes (total) in Ohio. For each year, the incidence rate was higher among Ohio males, compared with females. Overall, multiple myeloma incidence rates increased in Ohio from 1996 to 2016, then decreased.

Figure 5. Trends in Age-Adjusted Incidence Rates of Multiple Myeloma per 100,000 Population by Sex, Ohio, 1996-2021

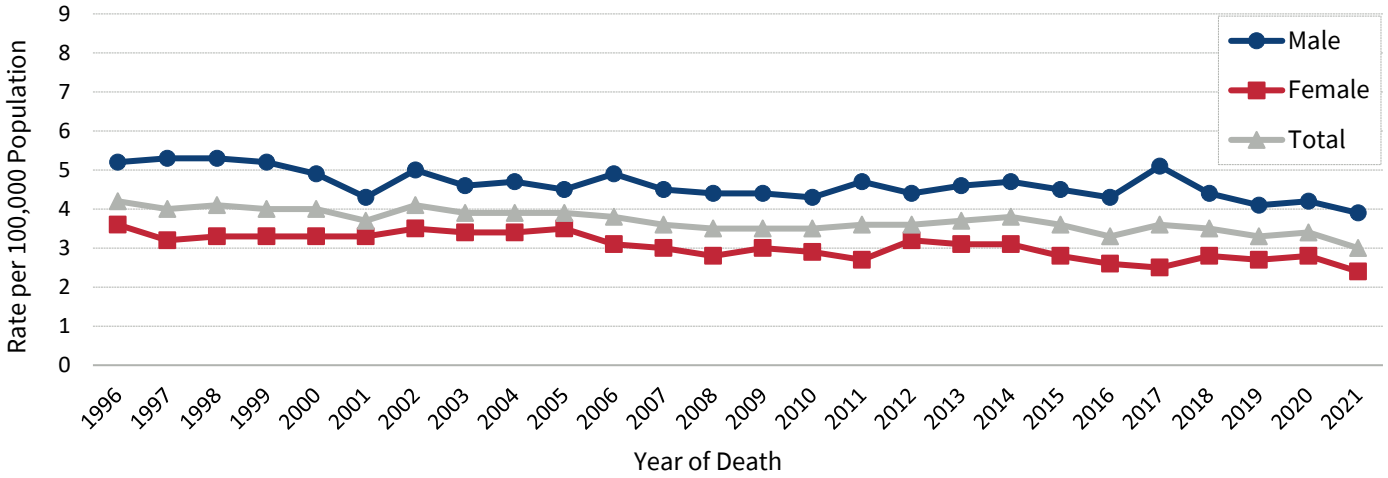


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

Trends in Mortality

Figure 6 shows multiple myeloma mortality rates in Ohio according to year of death (1996 through 2021) for males, females, and total. For each year, multiple myeloma mortality rates were higher among males, compared with females in Ohio. Overall, multiple myeloma mortality rates decreased from 4.2 per 100,000 in 1996 to 3.0 per 100,000 in 2021.

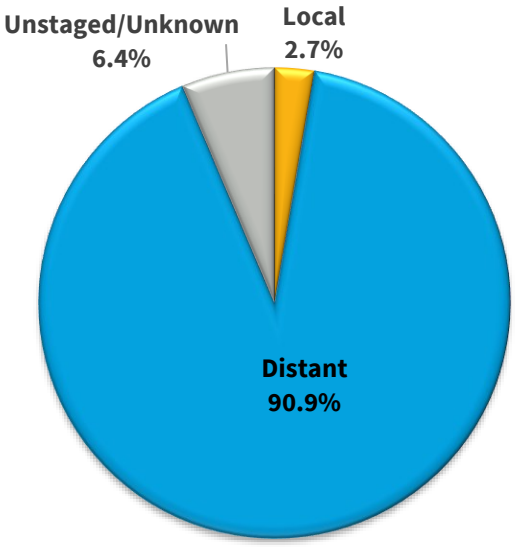
Figure 6. Trends in Age-adjusted Mortality Rates of Multiple Myeloma per 100,000 Population by Sex, Ohio, 1996-2021



Source: Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Mortality - All COD, Aggregated With State, Total U.S. (1990-2022) <Katrina/Rita Population Adjustment>, National Cancer Institute, April 2024. Underlying mortality data provided by NCHS (www.cdc.gov/nchs).

Stage at Diagnosis

Figure 7. Proportion of Multiple Myeloma Cases (%) by Stage at Diagnosis, Ohio, 2017-2021



Cancer stage at diagnosis, which refers to the extent or spread of a cancer in the body, is typically categorized as *in situ*, local, regional, or distant based on the extent of spread.*

In Ohio, about 2.7% of multiple myeloma cases were diagnosed at a local stage, nearly 91% were diagnosed at a distant stage, and 6.4% were unstaged or of unknown stage in 2017-2021 (Figure 7).

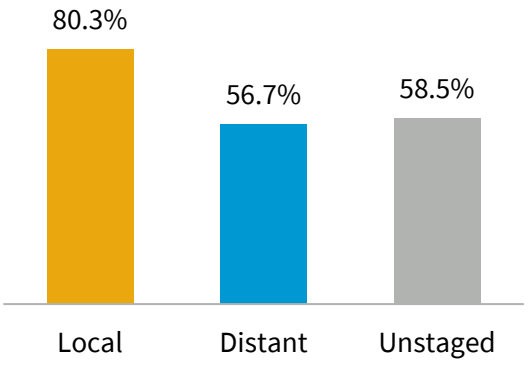
* However, multiple myeloma is typically staged as local or distant only.

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.

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 57.6% for those diagnosed with multiple myeloma from 2014 to 2020. Five-year relative survival was 80.3% when multiple myeloma was diagnosed at the local stage and 56.7% when multiple myeloma was diagnosed at the distant stage (Figure 8).

Figure 8. Five-Year Relative Survival (%) for Multiple Myeloma by Stage at Diagnosis, Ohio



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024.
Based on Ohio cases diagnosed from 2014-2020, followed through December 2021.

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 multiple myeloma.

Age: Multiple myeloma is an age-dependent cancer–Most people diagnosed with this cancer are at least 65 years old. Less than 1% of cases are diagnosed in people younger than 35.

Sex: Men are more likely to develop multiple myeloma than women.

Race: Black people are more than twice as likely to develop multiple myeloma than White people.

Having other plasma cell diseases: People with monoclonal gammopathy of undetermined significance (MGUS) or plasmacytoma are at higher risk of developing multiple myeloma than people who do not have these diseases.

Being exposed to radiation or certain chemicals: Multiple myeloma has been linked to ionizing radiation exposure. Organic solvent exposure in painters and exposure to unspecified pesticides among applicators, manufacturers, and agricultural workers have been associated with multiple myeloma.

Multiple Myeloma Signs and Symptoms

Sometimes multiple myeloma does not cause any signs or symptoms. The following signs and symptoms may be caused by multiple myeloma or other conditions.

- Bone pain, especially in the back or ribs.
- Bones that break easily.
- Fever for no known reason or frequent infections.
- Easy bruising or bleeding.
- Trouble breathing.
- Weakness of the arms or legs.
- Feeling very tired.

Hypercalcemia: Multiple myeloma can damage the bone and cause hypercalcemia (too much calcium in the blood). This can affect many organs in the body, including the kidneys, nerves, heart, muscles, and digestive tract, and cause serious health problems. Hypercalcemia may cause signs and symptoms, such as: loss of appetite, nausea or vomiting, feeling thirsty, frequent urination, constipation, feeling very tired, muscle weakness, restlessness, confusion, or trouble thinking.

Amyloidosis: In rare cases, multiple myeloma can cause peripheral nerves (nerves that are not in the brain or spinal cord) and organs to fail. This may be caused by a condition called amyloidosis. Antibody proteins build up and stick together in peripheral nerves and organs, such as the kidney and heart. This can cause the nerves and organs to become stiff and unable to work the way they should. Amyloidosis may cause the following signs and symptoms: feeling very tired, purple spots on the skin, enlarged tongue, diarrhea, swelling caused by fluid in body tissues, and tingling or numbness in legs and feet.

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 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., 2017-2021). 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.

Incidence: The number of cases diagnosed during a specified time period (e.g., 2017-2021). Multiple myeloma cases were defined by the International Classification of Diseases for Oncology, Third Edition (ICD-O-3), and categorized by histology codes 9731-9732 and 9734, 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/unknown 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., 2017-2021). Multiple myeloma deaths were defined by the International Statistical Classification of Diseases and Related Health Problems, Tenth Edition (ICD-10), codes C900 and C902.

Population for Calculating Rates: Age-adjusted rates were calculated using populations estimates produced by Woods & Poole Economics, Inc. (W&P) with support from the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) Program, https://seer.cancer.gov/popdata/download.html. Rates were calculated using SEER*Stat software version 8.4.3.

Rate: The number of cases or deaths per unit of population (e.g., per 100,000 persons) during a specified time period (e.g., 2017-2021). Rates may be unstable and are not presented when the case count is less than five or the death count is less than 10.

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. Relative survival 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/Unknown – Insufficient information is available to determine the stage or extent of the disease at diagnosis.

Table 2. Average Annual Number of Invasive Multiple Myeloma Cases and Age-Adjusted Incidence Rates per 100,000 Population by County of Residence and Sex, Ohio and the United States, 2017-2021

	Male		Female		Total	
	Cases	Rate	Cases	Rate	Cases	Rate
Ohio	**531**	**7.7**	**435**	**5.2**	**967**	**6.3**
U.S.		**8.7**		**5.9**		**7.2**
Adams	<1	*	1	5.9	2	4.0
Allen	6	9.1	4	5.1	9	6.8
Ashland	2	6.6	1	3.4	3	4.9
Ashtabula	7	10.3	4	6.4	11	8.2
Athens	2	5.2	<1	*	3	4.0
Auglaize	1	2.9	<1	*	2	2.4
Belmont	2	4.2	1	2.1	3	3.1
Brown	2	5.5	1	4.0	3	4.6
Butler	17	8.0	13	5.5	29	6.6
Carroll	<1	*	2	8.3	3	6.5
Champaign	2	8.6	<1	*	3	4.7
Clark	5	5.6	4	3.6	9	4.4
Clermont	8	6.3	6	4.1	14	5.2
Clinton	1	6.0	1	3.5	3	4.4
Columbiana	5	7.1	3	4.0	9	5.3
Coshocton	2	7.1	<1	*	2	4.3
Crawford	2	4.7	2	5.4	3	5.3
Cuyahoga	69	9.0	64	6.7	133	7.6
Darke	3	7.3	2	4.5	4	5.7
Defiance	3	12.8	2	7.1	5	10.3
Delaware	9	7.6	6	5.1	15	6.3
Erie	5	8.2	4	6.2	9	7.1
Fairfield	5	6.1	6	5.4	11	5.6
Fayette	<1	*	1	6.5	2	4.7
Franklin	46	8.1	42	5.9	88	6.8
Fulton	2	7.7	<1	*	3	5.0
Gallia	2	9.5	<1	*	3	6.5
Geauga	3	4.1	5	7.0	8	5.5
Greene	7	7.1	5	4.2	12	5.5
Guernsey	2	6.8	1	5.3	3	6.0
Hamilton	37	8.5	37	6.5	74	7.4
Hancock	4	9.8	1	1.9	5	5.7
Hardin	2	8.9	<1	*	2	5.2
Harrison	1	11.1	<1	*	2	7.5
Henry	1	9.1	1	6.8	3	8.1
Highland	1	4.8	2	6.4	3	5.4
Hocking	1	6.4	1	4.9	2	5.5
Holmes	1	5.9	1	3.8	2	4.5
Huron	2	6.6	2	4.9	4	5.7
Jackson	2	10.9	1	5.8	3	8.0
Jefferson	3	6.6	2	3.8	5	5.2
Knox	3	7.0	2	4.8	5	5.6
Lake	15	9.9	11	5.7	27	7.6
Lawrence	4	9.6	3	6.9	7	8.4
Licking	7	6.9	9	6.9	16	6.9
Logan	3	8.2	1	3.0	4	5.6
Lorain	14	7.1	8	3.4	22	5.2
Lucas	22	9.2	20	6.9	42	8.0
Madison	2	9.9	1	5.4	4	7.2
Mahoning	11	6.6	7	3.7	18	5.0
Marion	4	8.8	3	5.5	6	6.8
Medina	11	9.2	5	3.5	16	6.1
Meigs	<1	*	<1	*	2	5.0
Mercer	<1	*	<1	*	2	3.0
Miami	4	5.1	4	5.9	8	5.4
Monroe	<1	*	<1	*	<1	*
Montgomery	25	7.9	19	4.9	44	6.2
Morgan	<1	*	<1	*	<1	*
Morrow	2	6.0	<1	*	2	4.2
Muskingum	3	5.0	3	5.3	6	5.1
Noble	<1	*	<1	*	<1	*
Ottawa	1	4.1	1	4.8	3	4.3
Paulding	<1	*	<1	*	1	3.9
Perry	1	4.1	2	7.7	3	6.0
Pickaway	2	6.3	2	4.1	4	5.2
Pike	1	6.8	2	7.9	3	7.3
Portage	8	9.2	8	7.0	16	8.0
Preble	1	4.3	<1	*	2	3.7
Putnam	<1	*	<1	*	1	2.5
Richland	7	9.2	5	4.8	12	6.8
Ross	4	8.8	2	4.9	6	6.4
Sandusky	4	9.8	3	6.9	7	8.2
Scioto	3	6.1	2	2.9	4	4.2
Seneca	3	9.7	2	4.5	5	6.8
Shelby	1	4.5	1	2.9	2	3.8
Stark	17	7.2	12	4.4	30	5.6
Summit	28	8.8	20	5.0	48	6.7
Trumbull	8	5.3	8	4.4	15	4.7
Tuscarawas	3	4.4	3	3.9	6	4.0
Union	3	8.4	2	5.6	5	6.8
Van Wert	<1	*	<1	*	1	3.7
Vinton	<1	*	<1	*	<1	*
Warren	12	10.0	9	6.2	21	7.9
Washington	4	10.2	2	5.3	6	7.3
Wayne	5	6.7	4	4.4	9	5.6
Williams	<1	*	1	4.5	2	4.1
Wood	4	5.8	4	5.0	9	5.4
Wyandot	<1	*	<1	*	1	3.3

Sources: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2024; Surveillance, Epidemiology, and End Results (SEER) Program Database: SEER Research Limited-Field Data, 22 Registries (2000-2021), based on the Nov. 2023 submission, National Cancer Institute, April 2024.
* Rate not calculated when the total count for 2017-2021 is less than five (*i.e.*, the average annual count is less than one).
Note: Due to rounding, annual numbers for males and females may not add up to the totals indicated in the table.

Sources of Data and Additional Information

Ohio Cancer Incidence Surveillance System:
https://odh.ohio.gov/know-our-programs/ohio-cancer-incidence-surveillance-system/welcome-to

National Cancer Institute:
https://www.cancer.gov/types/myeloma

American Cancer Society:
https://www.cancer.org/cancer/types/multiple-myeloma.html

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