



Cancer in Minnesota, 1988-2017

REPORT TO THE MINNESOTA LEGISLATURE: FISCAL YEAR 2021

February 2021

Cancer in Minnesota, 1988-2017

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Contents

Executive Summary	6
Introduction.....	7
All Cancers Combined.....	8
Changes in all cancers combined between 1988 and 2017 for males and females.....	9
Trends in all cancers combined in Minnesota, 1988-2017.....	10
Common sites for cancer in Minnesota for males and females.....	10
Incidence of all cancers combined by race and ethnicity.....	13
Mortality of all cancers combined by race and ethnicity.....	14
Risk factors and screening.....	16
References.....	18
Resource Section	18
Data sources	18
Methods for data analyses.....	19
Collecting and processing cancer incidence and mortality data.....	20
Other sources of cancer statistics	21
Glossary of Terms	21
Health Impacts of Cancer	21
Know your chances.....	21
Healthy People 2020	21
Programs	21
Comprehensive Cancer Control Program.....	21
Minnesota Cancer Alliance.....	22
Sage Screening Programs	22
Healthy Minnesota Partnership	22
Center for Health Equity.....	22
Statewide Health Improvement Partnership	23
Appendices	23
A. Trend Data.....	23
B. MCRS Publications and Reports	24



Protecting, Maintaining and Improving the Health of All Minnesotans

February 17, 2021

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To the Honorable Chairs:

The Minnesota Department of Health (MDH) is pleased to release the sixteenth biennial report of the Minnesota Cancer Reporting System (MCRS) on the occurrence of cancer in Minnesota in accordance with Minnesota Statute 144.672, Subdivision 2.

This biennial report focuses on the patterns and trends of new cancer diagnoses (incidence) and cancer deaths (mortality) for all cancer sites combined in Minnesota from 1988 to 2017. The report shows that, on average, every day in 2017 approximately 84 Minnesotans were diagnosed with a new cancer and 28 died from their cancer. Since 1988, overall cancer incidence rates for Minnesota have generally decreased for males but have gradually increased for females. We see similar trends nationally. Decreasing rates of common cancers for males

(lung, prostate, and colorectal cancers) and increasing rates of lung cancer among females are thought to account for a portion of these trends. Trends in cancer mortality in Minnesota also parallel national trends, with overall cancer mortality rates decreasing for both males and females. Despite these declines, cancer remains a leading cause of death in Minnesota.

Our report identifies opportunities for cancer prevention and control. In particular, Minnesota’s Black and American Indian populations continue to have the highest rates of both new cancers diagnosed and cancer deaths in the state. The Sage Screening Program and the Eliminating Health Disparities Initiative at MDH are dedicated to reducing the burden of cancer in populations that have experienced long-standing racism, inequities, and trauma. During the COVID-19 pandemic, these root causes of health disparities have also led to disproportionately high COVID-19 morbidity and mortality rates among communities of color in Minnesota and underscore the importance of addressing social determinants to ensure that all communities can thrive.

We are concerned about potential indirect effects of the COVID-19 pandemic on Minnesotans with cancer. Between March and June 2020, there was a precipitous drop in the rates of cancer screening, diagnosis, and treatment early in the pandemic. The delayed detection and treatment of cancer could increase the number of individuals diagnosed with cancer at a later stage and lead to an increase in cancer-related morbidity and mortality. It will be some time before we are able to assess whether the rates for cancer screening, diagnosis and treatment have rebounded to pre-pandemic levels, and quantify size and scope of these secondary impacts of the pandemic on Minnesota’s cancer burden.

Our work to control cancer and reduce its impact in Minnesota requires the engagement and collaboration of communities, health systems, public health, nonprofit corporations like the American Cancer Society, as well as government. MCRS will be a critical resource in efforts to monitor changes in baseline cancer rates in Minnesota, identify disparities in the burden of cancer, accurately target resources, educate citizens and professionals about cancer, and support research into the causes and prevention of cancer. We encourage all organizations and individuals to join with us to reduce the cancer burden for all Minnesotans.

Sincerely,



Jan K. Malcolm
Commissioner
P.O. Box 64975
St. Paul, MN 55164-097

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Executive Summary

Minnesota Cancer Reporting System staff developed this report to describe the occurrence of cancer in Minnesota from 1988 through 2017, in accordance with Minnesota Statute 144.672 Subdivision 2. The report describes the cancer burden in Minnesota for all cancer sites combined. We include cancer incidence and mortality rates overall and by sex, and race and ethnicity. Below is a summary of key findings:

In 2017, 30,668 Minnesotans were diagnosed with a new cancer and 10,000 Minnesotans died with cancer as the underlying cause of death. This means that, on average, about 84 Minnesota residents were diagnosed with a new cancer and 28 died from cancer every day in 2017.

Over the past 30 years, the total number of newly diagnosed cancers and cancer deaths have generally increased even as cancer incidence and mortality rates for all cancers have decreased. The state's changing demographics in population growth and population aging explain much of this pattern.

Cancer incidence and mortality for all sites combined have been consistently greater among males than females, but trends in cancer rates over the 30-year period differ between the two groups.

- Between 2007 and 2013, age-adjusted incidence rates for males decreased 2.6 percent per year. Between 2013 and 2017, the rates show a non-significant increase of 0.6 percent per year. Age-adjusted incidence rates for females, by contrast, have gradually increased 0.5 percent per year since 1988.
- Age-adjusted mortality rates for males and females have decreased over the past 30 years, but more recent average declines have been greater for males than females. Since 1997, mortality rates for males decreased 1.6 percent per year, while mortality rates for females were stable from 1988 to 2000 and decreased 1.2 percent per year thereafter.

Four major cancer sites were among the most common new cancers diagnosed and causes of cancer deaths overall: prostate (males), breast (females), lung and bronchus, and colorectal. Each of these cancers is strongly linked to modifiable lifestyle risk factors (e.g., smoking, diet, physical activity).

- Among males, cancers of the prostate, lung and bronchus, and colon and rectum represented nearly 46 percent of all cancers diagnosed in males and 41 percent of all cancer deaths in 2017.
- Among females, cancers of the breast, lung, and colon and rectum represented 51 percent of all cancers diagnosed, and 45 percent of all cancer causes of death in 2017.

Between 2013 and 2017, American Indian males and females had both the highest incidence and mortality rates for all cancers combined in the state. These results suggest the need for continued targeted, appropriate cancer prevention and control efforts.

The Healthy People (HP) 2020 cancer mortality goals of 161.4 deaths per 100,000 have not been met for:

- American Indian males (305.1 deaths/100,000) and females (244.4 deaths/100,000)
- Black males (219.7 deaths/100,000)
- White non-Hispanic males (181.9 deaths/100,000)

Introduction

Cancer is an umbrella term for more than 100 different diseases, each with different causes, treatments, and short- and long-term outcomes. Nevertheless, a hallmark of any cancer is uncontrolled cell growth and spread to distant sites in the body. A diagnosis of cancer can have serious, life-changing repercussions for cancer patients and their families. Fortunately, our understanding of cancer has improved over the past 100 years because of scientific advances in biology, genetics, medicine, public health, statistics, and related disciplines. From this research, cancer treatment and survival has improved. We are also better able to document and quantify the substantial health impacts of cancer in our state, communities, and families. Importantly, Minnesota public health professionals, clinicians, legislators, and associations like the Minnesota Cancer Alliance and the American Cancer Society (ACS) use scientific results and descriptive data on cancer occurrence to prioritize, plan, and fund cancer prevention and control activities in our state.

One indispensable source of data on cancer is the Minnesota Department of Health's Minnesota Cancer Reporting System (MCRS), formerly called the Minnesota Cancer Surveillance System. The 1987 Minnesota Legislature established this statewide cancer registry program to assure that accurate, complete, and timely data on cancer would be available to inform planning and decision-making at the local, state and national levels, as well as to foster research into the causes of different cancers. Enabling legislation also required a biennial report (Minnesota Statute 144.672, Subdivision 2) to describe cancer incidence and discuss the public health significance of cancer in Minnesota. MCRS collects cancer and demographic data on Minnesotans with incident cancers from hospitals, clinics, and pathology laboratories in accordance with Minnesota statutes and rules including those for data protection and privacy. The registry program has been in operation since 1988 and has been a member of the CDC's National Program of Central Cancer Registries since 1995.

The need for data-informed programs and policy takes on added importance as the number of cancer diagnoses continues to increase over time because of population growth and the aging of the baby boom generation. Cancer prevention, intervention, and control programs carried out now promise to reduce the anticipated increase of cancer incidence in the years to come. MCRS data is critically important to help guide planning and resource allocation in response to the current and future cancer burden, as well as to reduce the persistent health disparities in Minnesota.

This report describes the total cancer burden from all cancers combined in Minnesota. It fulfills requirements for a biennial report as mentioned above, and MCRS objectives for CDC-RFA-DP17-1701 funding of the National Program of Cancer Registries (NPCR). In the report, we present descriptive statistics by sex, race and ethnicity, and describe trends in the cancer incidence and mortality rates over time. In the body of the report, we embedded numerous links to detailed technical information located primarily, but not exclusively in the [Resource Section](#). This section contains brief descriptions and links to registry methods, data standards, MCRS legal authority and data privacy, statistical methods, and a glossary of terms used. It also contains other links to MCRS and US cancer statistics. The appendices provide additional information:

- [Appendix A](#) shows incidence and mortality trend data for the 30-year period.
- [Appendix B](#) provides an overview of MCRS data use in research and public health practice.
- [Supplement 1 Maps and Data \(PDF\) \(https://www.health.state.mn.us/data/mcrs/docs/2021biensup1.pdf\)](https://www.health.state.mn.us/data/mcrs/docs/2021biensup1.pdf) provides maps showing cancer incidence and mortality statistics for Minnesota counties and for [State](#)

[Community Health Services Advisory Committee \(SCHSAC\)](https://www.health.state.mn.us/communities/practice/schsac/index.html)

[\(https://www.health.state.mn.us/communities/practice/schsac/index.html\)](https://www.health.state.mn.us/communities/practice/schsac/index.html) geographic regions.

- [Supplement 2 Publications and Data Use \(PDF\)](https://www.health.state.mn.us/data/mcrs/docs/2021biensup2.pdf)

[\(https://www.health.state.mn.us/data/mcrs/docs/2021biensup2.pdf\)](https://www.health.state.mn.us/data/mcrs/docs/2021biensup2.pdf) provides a list of selected reports and publications that used MCRS data in public health practice and research. Both supplements are available online.

All Cancers Combined

Different cancers have different causes, treatments, and long- and short-term outcomes, but all cancers start with the uncontrolled growth of cells at a specific location or site within the body. The site where the cancer first started usually identifies the cancer type. For example, abnormal cells that started growing in the breast are called breast cancers. Unfortunately, cancer cells are able to spread to distant sites, away from where the cancer first started and this can have serious impacts on a person's health, and their family and community.

Cancer is common

Cancers are much more common than most people realize, especially when considered in terms of lifetimes rather than as a yearly rate. Using current Minnesota cancer rates and average life expectancies, we estimate that about four or five people out of ten will be diagnosed with some type of cancer at some point in their lifetimes. Most of this "lifetime" risk of cancer occurs as we get older because cancer rates rise sharply with age. As we and our families, friends, and neighbors advance into middle age and beyond, we will begin to witness an increasing number of family members, other relatives, neighbors, and friends develop and, unfortunately, die from some type of cancer.

Burden of cancer incidence and mortality in Minnesota

Examining the trends in the incidence and mortality of all cancer sites combined is useful in describing the overall cancer burden in a population. This will give us a partial answer to the question, "How large of a public health problem is cancer in Minnesota?" It is important to keep in mind that the overall trend for all cancer sites combined represents the net change in trends for all individual cancer types, some of which are increasing while others are decreasing or remaining stable over the same year or group of years. In addition, because different cancers have different causes, in looking at the trends for cancers combined we will not be able to gain an understanding of the factors that are linked to an increase or decrease in the chance of developing any individual cancer.

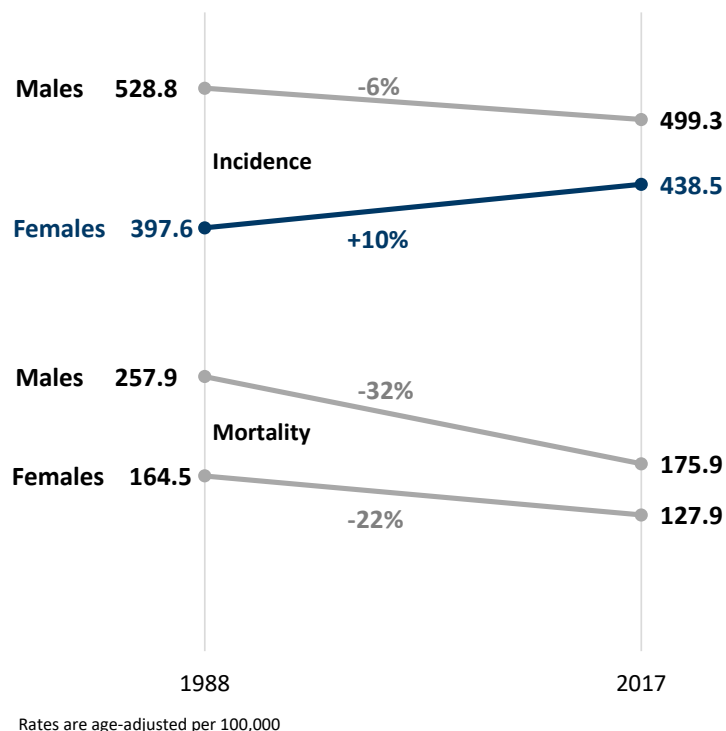
Examining the patterns of all cancers by population demographics (for example, age, sex, race and ethnicity) broadens our understanding of cancer as a public health problem. The number and rates of different cancers are different in males and females. Differences in the number of cancers and rates also exist by racial and ethnic groups, as well as by age groups. Understanding these differences can help inform effective and culturally appropriate cancer prevention and control programs. The tables and figures below display the patterns in cancer incidence and mortality for all sites combined overall and by sex, race and ethnicity in Minnesota between 1988 and 2017, unless otherwise noted.

Changes in all cancers combined between 1988 and 2017 for males and females

The chart below and tables of trend data ([Appendix A](#)) show that while the total number of new cancers and cancer deaths increased in Minnesota, the overall incidence and mortality rates for all cancers combined decreased between 1988 and 2017.

- Between 1988 and 2017, the number of new cancers diagnosed in males increased from 9,147 to 15,751 (72 percent) in males and in females from 8,850 to 14,917 (68 percent). The increase in the number of new cancers diagnosed in males and females during this time reflects both population growth and population aging, as well as the net effect of changes in risk or protective factors that increase or decrease the chance of a new cancer diagnosis.
- Compared with 1988, the age-adjusted incidence rate for all cancer sites decreased nearly 6 percent for males but increased 10 percent for females in 2017. Decreasing rates of the most common cancers in males – lung, prostate and colorectal cancers – have contributed to the decline in the incidence rate for all cancers combined for males. Increases in the rate of lung cancer among females explains, in part, why the rate for all cancers combined has increased for females since 1988.
- Over the 30-year period, the number of deaths from cancer for males increased from 4,205 to 5,263 (25 percent) and for females from 3,895 to 4,737 (22 percent). Minnesota’s changing population demographics largely explain the increased number of cancer deaths among males and females.
- From 1988 to 2017, the mortality rate for all cancers decreased 32 percent for males and 22 percent for females. The decline in cancer mortality over this time reflects the impact of early cancer detection and screening, improvements in cancer therapies and supportive care, and other factors (1).

Incidence rates are increasing in females, 1988-2017

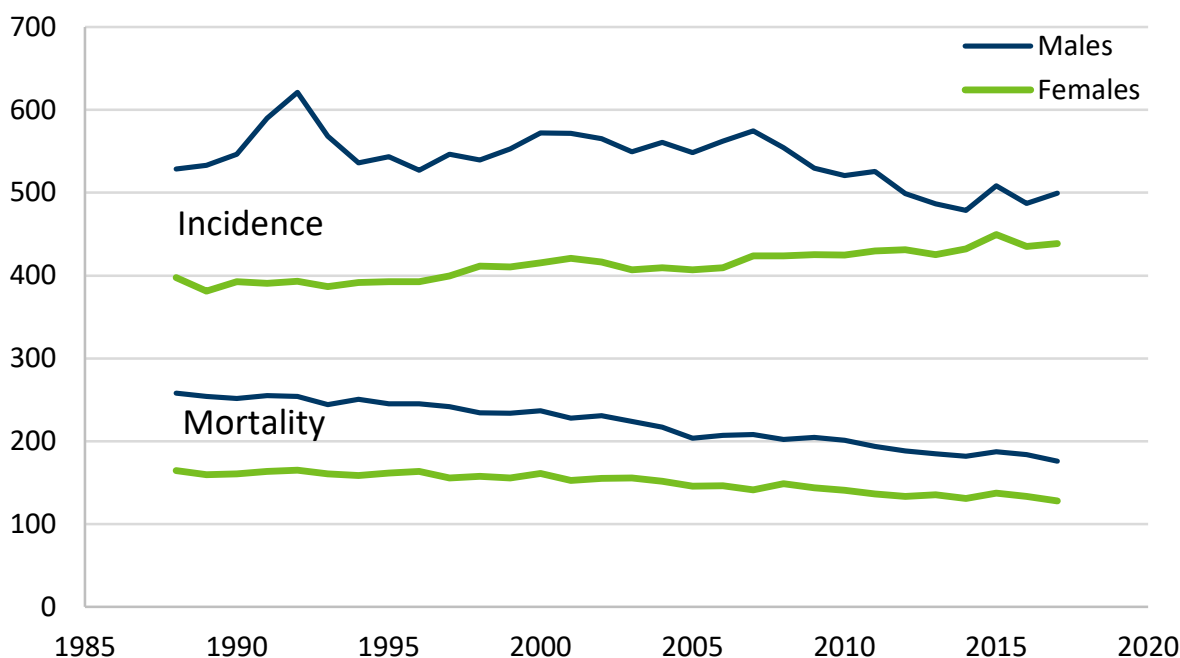


Trends in all cancers combined in Minnesota, 1988-2017

The graph below displays the trends in age-adjusted cancer incidence and mortality for Minnesota males and females between 1988 and 2017 ([Appendix A](#)).

- Since 1988, cancer incidence rates for Minnesota males fluctuated up and down. Between 2007 and 2013, rates for males decreased 2.6 percent per year and from 2013 to 2017 show a non-significant increase of 0.6 percent per year. The age-adjusted incidence rates for females gradually increased at a rate of 0.5 percent per year during this time.
- Over the 30-year period, cancer mortality rates for males and females have decreased. For males, rates decreased 0.7 percent per year between 1988 and 1997. Since 1997, mortality rates for males decreased 1.6 percent per year. Mortality rate for females remained stable between 1988 and 2000 and then decreased 1.2 percent per year thereafter.

Incidence and mortality rates for all cancers combined, 1988-2017



Rates are age-adjusted per 100,000

Common sites for cancer in Minnesota for males and females

The tables below show the 10 most common sites for new cancers and cancer causes of death in Minnesota males and females.

- Among males, cancers of the prostate, lung and bronchus, and colon and rectum represented 46 percent all newly diagnosed cancers in males and 42 percent of all cancer deaths in 2017. Cancer of the prostate was the most common cancer diagnosed in Minnesota males and the second leading cause of cancer death. Lung cancer was the second most common cancer diagnosed and was the leading cause of cancer death

among males. Colorectal cancers were both the third most common cancer diagnosed and the third leading cause of cancer deaths among Minnesota males in 2017.

- Among females, cancers of the breast, lung, and colon and rectum represented 51 percent of all newly diagnosed cancers and 45 percent of all cancer causes of death in 2017. Breast cancer was the most common cancer diagnosed and the second most common cancer cause of death among females overall. Lung cancer was the second most common cancer and the top cancer cause of death among females. Finally, colorectal cancers were the third most common cancer diagnosed and the fourth most common cancer cause of death. Pancreatic cancers were the third leading cancer cause of death among Minnesota women in 2017.
- The incidence of some cancer sites was low but the mortality rate was high, testifying to poor survival from these cancers. Examples include brain and other nervous system cancers, and liver and intrahepatic bile duct cancers in both males and females. These cancers did not rank among the 10 most common incident cancers but they were one of the 10 most common cancer causes of deaths.
- Finally, other cancer sites are among the 10 most common cancers diagnosed in Minnesota, but they were not among the 10 most common cancer causes of death. Examples include thyroid cancer in women, and cancers of the oral cavity and pharynx in men.

Top 10 Incident cancers in males, 2017

Cancer	Rate/100,000	Number of cases	Percent of total
Prostate	119.4	4,093	26.0%
Lung and Bronchus	58.0	1,822	11.6%
Colon and Rectum	42.5	1,287	8.2%
Melanoma of the Skin	40.6	1,243	7.9%
Urinary Bladder	37.4	1,130	7.2%
Non-Hodgkin Lymphoma	25.5	777	4.9%
Kidney and Renal Pelvis	23.3	733	4.7%
Leukemia	20.9	627	4.0%
Oral Cavity and Pharynx	17.9	586	3.7%
Pancreas	14.6	448	2.8%
All Cancers Combined		15,751	

Top 10 incident cancers in females, 2017

Cancer	Rate/100,000	Number of cases	Percent of total
Breast	138.4	4,643	31.1%
Lung and Bronchus	50.5	1,823	12.2%
Colon and Rectum	32.2	1,111	7.5%
Corpus and Uterus, NOS	30.4	1092	7.3%
Melanoma of Skin	31.3	971	6.5%
Non-Hodgkin Lymphoma	17.3	613	4.1%
Thyroid	17.3	490	3.3%
Pancreas	11.8	427	2.9%
Leukemia	11.9	411	2.8%
Kidney and Renal Pelvis	10.3	356	2.4%
All Cancers Combined		14,917	

Top 10 cancer causes of death in males, 2017

Cancer	Rate/100,000	Number of deaths	Percent of total
Lung and Bronchus	38.6	1,189	22.6%
Prostate	20.4	576	10.9%
Colon and Rectum	14.6	430	8.2%
Pancreas	13.2	406	7.7%
Leukemia	9.3	267	5.1%
Liver and Intrahepatic Bile Duct	8.5	264	5.0%
Esophagus	7.7	247	4.7%
Non-Hodgkin Lymphoma	8.0	233	4.4%
Urinary Bladder	6.9	191	3.6%
Brain and Other Nervous System	6.0	180	3.4%
All Malignant Cancer Deaths		5,263	

Top 10 cancer causes of death in females, 2017

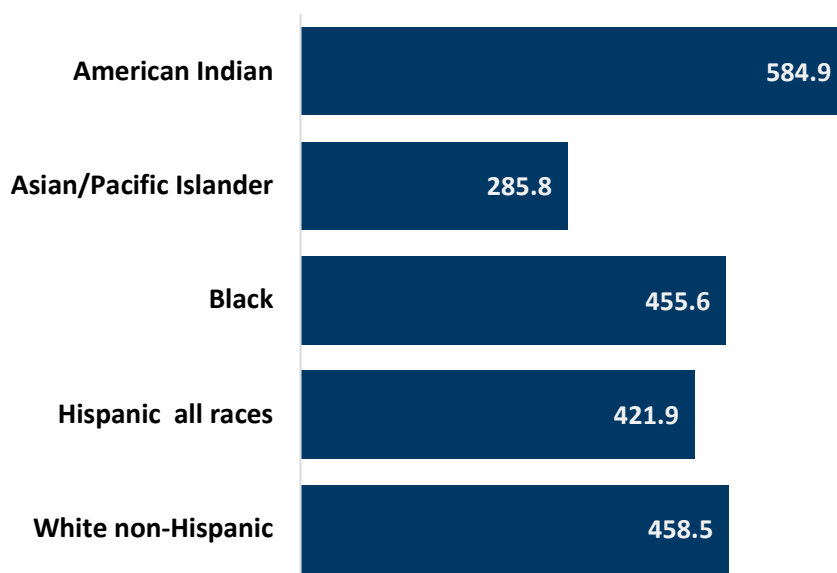
Cancer	Rate/100,000	Number of deaths	Percent of total
Lung and Bronchus	30.5	1,124	23.7%
Breast	17.0	627	13.2%
Pancreas	10.3	377	8.0%
Colon and Rectum	9.5	365	7.7%
Ovary	5.6	210	4.4%
Leukemia	5.3	198	4.2%
Non-Hodgkin Lymphoma	5.1	196	4.1%
Corpus and Uterus	5.0	184	3.9%
Liver and Intrahepatic Bile Duct	3.7	134	2.8%
Brain and Other Nervous System	3.5	123	2.6%
All Malignant Cancer Deaths		4,737	

Incidence of all cancers combined by race and ethnicity

The chart and table below show the incidence of all cancers combined was highest for American Indians compared with Minnesotans of all other race and ethnicities.

- Overall and by sex, American Indians had the highest rate of new cancers diagnosed and Asian and Pacific Islanders had the lowest incidence rate during 2013-2017. The overall incidence rate for American Indians was double the rate for Asian and Pacific Islanders.
- The incidence rate for American Indian males was 2.1 times the rate for Asian and Pacific Islander males, and between 1.2 and 1.4 times the rates for males of the other racial and ethnic groups. The incidence rate for American Indian females was double the rate for Asian and Pacific Islander females, and between 1.3 and 1.4 times the rates for females of the other racial and ethnic groups.

Incidence rates for all cancers combined by race/ethnicity, 2013-2017



Race/ethnicity	Total Rate	Count	Male Rate	Count	Female Rate	Count
American Indian	584.9	1,576	624.8	756	558.4	820
Asian/Pacific Islander	285.8	2,480	290.9	1,061	286.9	1,419
Black	455.6	4,676	531.3	2,522	396.2	2,154
Hispanic all races	421.9	2,558	432.7	1,178	421.9	1,380
White non-Hispanic	458.5	133,444	490.0	67,746	438.5	65,698
All Races Combined	458.2	146,030	492.1	74,070	436.1	71,960

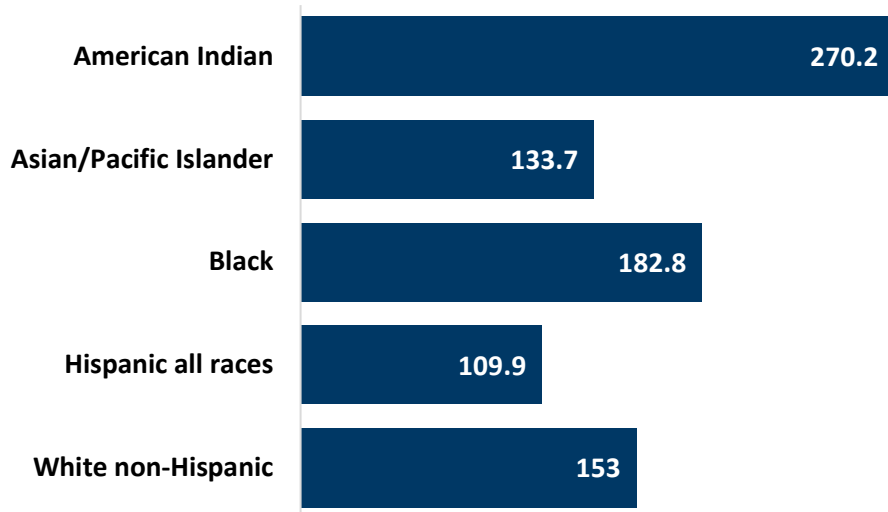
Mortality of all cancers combined by race and ethnicity

The chart and table below show that cancer mortality was highest for American Indians overall and by sex compared with Minnesotans of other races and ethnic groups.

- Overall and by sex, American Indians had the highest overall cancer mortality rate. Hispanics of all races, and Asian and Pacific Islanders had the lowest overall cancer mortality rates.
- Black Minnesotans had the second highest cancer mortality rate in the state between 2013 and 2017. For both sexes, the cancer mortality rate for Black Minnesotans was greater than the rates for Whites, Hispanics of all races, and Asian and Pacific Islanders.
- The mortality rate for American Indian males was 2.5 times the mortality rate for Hispanic males of all races, and between 1.4 and 1.9 times greater than the mortality rates for males of all other racial and ethnic groups. The mortality rate for American Indian females was 2.4 times the mortality rate for Hispanic females, and between 1.6 and 2.1 times greater than the mortality rates for females of all other racial and ethnic groups.

- Overall, the HP2020 goal for all cancer mortality is 161.4 deaths per 100,000. This goal has not been achieved for American Indian and Black Minnesotans overall, and for American Indian males and females, and Black or non-Hispanic White males.

Mortality rates for all cancers combined by race/ethnicity, 2013-2017

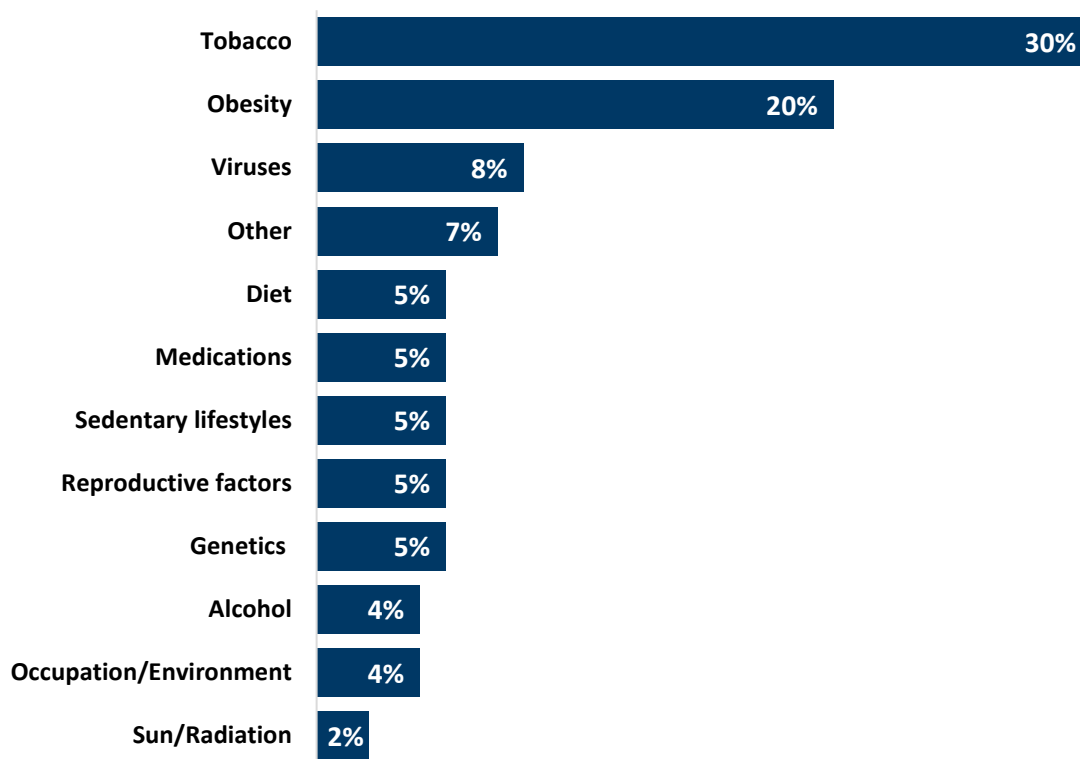


Race	Total Rate	Count	Male Rate	Count	Female Rate	Count
American Indian	270.2	614	305.1	311	243.4	303
Asian/Pacific Islander	133.7	965	160.2	494	114.6	471
Black	182.8	1,473	219.7	800	155.2	673
Hispanic all races	109.9	520	121.8	272	99.9	248
White non-Hispanic	153.0	46,236	181.9	24,195	132.3	22,041
All Races Combined	153.8	49,691	182.7	26,015	132.9	23,676

Risk factors and screening

It is not possible to pinpoint exactly what caused an individual's cancer, but research has shown that age, genetics, obesity, certain exposures, and behaviors increase or decrease the chances of developing cancer. To learn more about how sex, age, and race might affect the chances of developing and dying from cancer and other conditions, go to National Cancer Institute's interactive online tool: [Know Your Chances \(knowyourchances.cancer.gov/\)](https://knowyourchances.cancer.gov/). While we have no control over our age, race, family history, and genetics, much of our cancer risk is strongly influenced by lifestyle factors that we can control (2, 3, 4, 5). Such modifiable lifestyle risk factors include cigarette smoking, obesity, alcohol consumption, ionizing and solar radiation, certain infectious agents (for example, hepatitis and human papilloma viruses), occupation, and physical inactivity (See chart below). Those factors account about 60 percent of cancer deaths in the U.S. Other lifestyle factors that increase risk include reproductive patterns, sexual behavior, and medications.

Estimate of U.S. cancer mortality attributable to various known risk factors



Screening for certain cancers in people who do not already show signs or symptoms of cancer can reduce the risk of dying from those cancers. The goal of screening is to identify and treat specific cancers early in the course of disease when treatment is usually more effective compared to when they have spread to distant sites in the body. If the screening procedure removes an *in situ* cancer or pre-cancerous tissue from the cervix, breast, colon, or rectum, the procedure can prevent the cancer from occurring altogether. The U.S. Preventive Services

Task Force (USPSTF) and the American Cancer Society (ACS) are two organizations in the US that develop screening guidelines recommending at what age screening should occur, and type and frequency of screening tests or procedures for specific cancers. To learn more about which cancers have a screening test and the types of test procedures used, please see the [ACS guidelines for the early detection of cancer \(www.cancer.org/healthy/find-cancer-early/cancer-screening-guidelines/american-cancer-society-guidelines-for-the-early-detection-of-cancer.html\)](http://www.cancer.org/healthy/find-cancer-early/cancer-screening-guidelines/american-cancer-society-guidelines-for-the-early-detection-of-cancer.html) (6) or [CDC-Screening Tests \(www.cdc.gov/cancer/dcpc/prevention/screening.htm\)](http://www.cdc.gov/cancer/dcpc/prevention/screening.htm) (7). If you have questions about whether you should be screened and when, please contact your health care provider.

The Minnesota Department of Health's [Sage Cancer Screening \(www.health.state.mn.us/diseases/cancer/sage/index.html\)](http://www.health.state.mn.us/diseases/cancer/sage/index.html) provides free screening for breast and cervical cancers at participating locations across Minnesota. To determine if you are eligible for the programs' free cancer screening based on your age, insurance and income, please go to [Sage Cancer Screenings Covered Services and Eligibility \(www.health.state.mn.us/diseases/cancer/sage/services/index.html\)](http://www.health.state.mn.us/diseases/cancer/sage/services/index.html).

References

1. Siegel R.L., Miller K.D., Jemal A. Cancer Statistics, 2018. CA: A Cancer Journal for Clinicians, 2018 Jan;68(1):7-30.
2. Colditz G.A., Wei E.K. Relative Contributions of Biologic and Social and Physical Environmental Determinants of Cancer Mortality. Annual Review of Public Health, 2012;33:137-156.
3. Doll R, Peto R. The Causes of Cancer: Quantitative Estimates of Avoidable Risks of Cancer in the United States Today. Journal of the National Cancer Institute; 1981, 66:6;1193-1308.
4. Harvard Report on Cancer Prevention. Cancer Causes and Control, 1996, 7:S55-S58.
5. Schottenfeld D, Beebe-Dimmer JL, Buffler PA, Omenn GS. Current Perspective on the Global and United States Cancer Burden Attributable to Lifestyle and Environmental Risk Factors. Annual Review of Public Health 2013, 34:97-117.
6. American Cancer Society (ACS). May 30, 2018. Retrieved June 4, 2018, from [American Cancer Society Guidelines for the Early Detection of Cancer \(www.cancer.org/healthy/find-cancer-early/cancer-screening-guidelines/american-cancer-society-guidelines-for-the-early-detection-of-cancer.html\)](http://www.cancer.org/healthy/find-cancer-early/cancer-screening-guidelines/american-cancer-society-guidelines-for-the-early-detection-of-cancer.html).
7. Centers for Disease Control (CDC). May 2, 2018. Retrieved June 4, 2018 from [Centers for Disease Control - Screening Tests \(www.cdc.gov/cancer/dcpc/prevention/screening.htm\)](http://www.cdc.gov/cancer/dcpc/prevention/screening.htm).

Resource Section

Data sources

Cancer incidence data

Cancer incidence data for this report were drawn from the MCRS database on January 2020. The database contains information on nearly all microscopically confirmed malignant and in situ cancers diagnosed in Minnesota residents between 1988 and 2017. After a rule change, both clinical and microscopically confirmed cancers were reported to the state's cancer registry, starting in 2012. Cancers excluded from reporting include the most common forms of skin cancer (basal and squamous cell carcinomas) and in situ carcinomas of the cervix. These exclusions are consistent with guidelines for cancer registration practice in the U.S. (See Registry Methods and Standards below.) For detailed information about cancer reporting in Minnesota, cancer statistics and reports, legislative authority, and archived reports and publications, please visit [Minnesota Cancer Reporting System \(www.health.state.mn.us/data/mcrs/index.html\)](http://www.health.state.mn.us/data/mcrs/index.html).

Cancer mortality data

Gathering data on Minnesotans with cancer from death certificates is necessary to completely describe the cancer burden, as well as to evaluate the progress made in treating and controlling cancer in Minnesota. Mortality data are obtained from electronic death certificates on Minnesota residents. Only the underlying cause of death is used in calculating cancer mortality rates. To learn more about the Office of Vital Records and Cancer in Minnesota, 1988-2017

death certificates, in particular, please visit [Minnesota Center for Health Statistics, Office of Vital Records \(www.health.state.mn.us/people/vitalrecords/about.html\)](http://www.health.state.mn.us/people/vitalrecords/about.html)

Population data

The NCI's website contains population data used in generating statistics for this report. The U.S. Census Bureau develops annual population estimates. Census population estimation methods and the population estimates used in the calculations. See the [National Cancer Institute \(NCI\) – U.S. Population Data – 1969-2017 \(seer.cancer.gov/popdata/\)](http://seer.cancer.gov/popdata/) page for more information.

Methods for data analyses

Analytic software

Incidence and mortality counts and age adjusted rates for this report were generated using NCI's SEER*Stat software. Trend statistics and average annual percent change estimates were generated using NCI's Joinpoint software. Percent change in the number of cancers and incidence or mortality rates were calculated to describe the change in cancer occurrence between 1988 and 2017. The year 1988 was the reference year in calculating percent change. Rate ratios were calculated to identify and describe excess burden of cancer incidence or mortality by race and ethnicity. To calculate these ratios, the rate for the subpopulation with the highest rate was divided by the rates for the other racial and ethnic subpopulations to obtain a range of rate ratio estimates.

Defining cancer statistics

For more information about statistics used to assess the impact of cancer in the general population, go to [NCI Defining Cancer Statistics page \(seer.cancer.gov/statistics/types.html\)](http://seer.cancer.gov/statistics/types.html).

Age-adjusted rate

To learn what an age-adjusted rate is and how it is calculated, please see the NCI [Tutorial to Calculate Age-Adjusted Rates \(seer.cancer.gov/seerstat/tutorials/aarates/definition.html\)](http://seer.cancer.gov/seerstat/tutorials/aarates/definition.html).

Unstable rate

An unstable rate is defined as one with a relative standard error ($100 \times SE/Rate$) > 30%. If a rate was unstable only counts were included in a table. Unstable rates in the tables are denoted with "N/A".

Standard population

To learn more about the 2000 U.S. standard population used in calculating age-adjusted rates, go to [NCI-2000 US Standard Population \(https://seer.cancer.gov/stdpopulations/single_age.html\)](https://seer.cancer.gov/stdpopulations/single_age.html).

Minnesota geographic divisions

The State Community Health Services Advisory Committee (SCHSAC) advises the health commissioner and provides guidance on the development, maintenance, financing, and evaluation of community health services in Minnesota. SCHSAC recommendations influence public health policy, guidelines, and practice throughout Minnesota. SCHSAC regions represent Minnesota's community health boards, whose representatives are members of SCHSAC. For more information about SCHSAC regions, go to [State Community Health Services Advisory Committee \(SCHSAC\) \(www.health.state.mn.us/communities/practice/schsac/index.html\)](http://www.health.state.mn.us/communities/practice/schsac/index.html).

Collecting and processing cancer incidence and mortality data

MCRS authority and data protection

For information on the history, statutory authority, and objectives of the Minnesota Department of Health's statewide cancer registry please visit [Legislative Authority for MCRS \(www.health.state.mn.us/communities/practice/schsac/index.html\)](http://www.health.state.mn.us/communities/practice/schsac/index.html).

For information on the Minnesota Government Data Practices Act please visit [Minnesota Government Data Privacy Act \(www.health.state.mn.us/communities/practice/resources/chsadmin/data-mgdpa.html\)](http://www.health.state.mn.us/communities/practice/resources/chsadmin/data-mgdpa.html).

Registry methods and standards

The North American Association of Central Cancer Registries (NAACCR) provides the data dictionary and standards governing data collection, coding, and processing used in member central cancer registries to develop high quality cancer data needed to address the cancer burden in North America, including Minnesota. For more information about NAACCR please visit the section "Central Registry Standards" on the [North American Association of Central Cancer Registries \(NAACCR\) \(www.naacr.org/\)](http://www.naacr.org/) page.

Definitions for cancer incidence data

A diagnosis of cancer includes identifying and describing where in the body (site) the cancer is present, and the cell type (histology) of the tumor. A part of cancer registration includes assigning codes to cancer site and histology for each cancer reported to the MCRS. The World Health Organization maintains the rules for coding cancer site and histology, which are documented in the International Classification of Diseases for Oncology (ICD-O). The current version of the ICD-O rules is ICD-O/WHO 2008. To learn more about the ICD-O, go to [International Classification of Diseases for Oncology \(ICD-O\) \(http://codes.iarc.fr/home\)](http://codes.iarc.fr/home).

To analyze cancer data, ICD-O-3 site and histology codes are grouped together using the National Cancer Institute's SEER Program conventions and standards. To learn more about SEER's Site Recodes, see the [SEER Site Recode page \(seer.cancer.gov/siterecode/\)](http://seer.cancer.gov/siterecode/) and to read more about the [Site Recode ICD-O-3/WHO 2008 Definition \(seer.cancer.gov/siterecode/icdo3_dwhohome/index.html\)](http://seer.cancer.gov/siterecode/icdo3_dwhohome/index.html).

Definitions for cancer mortality data

Causes of death are coded using the World Health Organization's International Classification of Diseases (ICD). The current version of the ICD is ICD-10, 2016, which can be viewed at [ICD-10 Version 2016 \(icd.who.int/browse10/2016/en\)](http://icd.who.int/browse10/2016/en).

The NCI's SEER program groups ICD causes of death codes together to analyze cancer mortality data. The site groupings account for changes in coding over time to facilitate reporting of long term trends. To learn more about SEER's Cause of Death Recode, please see the [SEER Cause of Death Recode \(seer.cancer.gov/coderecode/\)](http://seer.cancer.gov/coderecode/) page.

GIS analysis for county level data

The classifications in the county level maps were calculated using Jenks natural breaks classification method. If a county level rate was unstable, hash marks identified that county in the map. Unstable rates displayed on

county level maps should be interpreted with caution. Unstable rates in the tables in [Appendix A](#) are denoted with “N/A”.

Other sources of cancer statistics

For MCRS cancer reports go to [MCRS Cancer Statistics and Reports](https://www.health.state.mn.us/data/mcrs/data/index.html) (<https://www.health.state.mn.us/data/mcrs/data/index.html>).

For MCRS data and queries to [Minnesota Public Health Data Access portal](https://data.web.health.state.mn.us/web/mndata/) (data.web.health.state.mn.us/web/mndata/).

For cancer statistics in the US, including Minnesota go to:

- National Cancer Institute -Cancer Statistics (<https://seer.cancer.gov/statistics/>)
- National Program of Cancer Registries (<https://www.cdc.gov/cancer/npcr/index.htm>)
- Centers for Disease and Prevention online database-WONDER (<https://wonder.cdc.gov/>)
- United States Cancer Statistics: Data Visualizations (<https://gis.cdc.gov/cancer/uscs/dataviz.html>)

Glossary of Terms

To look up unfamiliar terms please visit [NCI Glossary of Statistical Terms](https://seer.cancer.gov/cgi-bin/glossary/glossary.pl) (seer.cancer.gov/cgi-bin/glossary/glossary.pl) page.

Health Impacts of Cancer

Know your chances

[NIH-Know Your Chances](https://knowyourchances.cancer.gov/) (knowyourchances.cancer.gov/) is an interactive tool to learn about how age, sex, and race can influence a person’s chance of developing cancer, various other chronic diseases, and injury.

Healthy People 2020

To learn more about the CDC’s Healthy People 2020 objectives, go to [CDC Healthy People 2020](https://www.cdc.gov/nchs/healthy_people/hp2020.htm) (www.cdc.gov/nchs/healthy_people/hp2020.htm).

Programs

Comprehensive Cancer Control Program

The [Comprehensive Cancer Control Program](https://www.health.state.mn.us/diseases/cancer/compcancer/index.html) (www.health.state.mn.us/diseases/cancer/compcancer/index.html) at the Minnesota Department of Health is a

CDC funded initiative to strengthen efforts across Minnesota to decrease the impacts of cancer. To achieve this objective, program staff collaborated with the Minnesota Cancer Alliance (below) to develop the [Cancer Plan Minnesota 2025: A Framework for Action. \(mncanceralliance.org/cancer-plan/](#).

Minnesota Cancer Alliance

The Minnesota Cancer Alliance is a coalition of more than 100 organizations from diverse backgrounds and disciplines dedicated toward reducing the burden of cancer in Minnesota. Members are actively working to achieve the objectives of the *Cancer Plan Minnesota 2025*. For more information, go to [Minnesota Cancer Alliance \(mncanceralliance.org/\)](#).

Sage Screening Programs

The Minnesota Department of Health's Sage Screening Programs provide free screening for breast, cervical, and colorectal cancers at participating locations across Minnesota. The program has a wide network of partners working together to reduce the burden of cancer by providing access to and promoting breast, cervical, and colorectal cancer screening services for Minnesota's uninsured and underinsured populations. For more information, go to [MDH Sage Screening Programs \(www.health.state.mn.us/diseases/cancer/sage/screening/index.html\)](#)

Healthy Minnesota Partnership

The Healthy Minnesota Partnership is a collaboration between community partners and the Minnesota Department of Health to improve the health and quality of life for individuals, families and communities in the state. The Healthy Minnesota 2020 Framework identifies and acts on strategic opportunities to improve health and well-being for all people in Minnesota. The most recent progress report was produced as a collaboration between the Minnesota Department of Health and the Healthy Minnesota Partnership. To access the report, go to [Healthy Minnesota 2020 Update \(www.health.state.mn.us/communities/practice/healthymnpartnership/docs/annualreport2017.pdf\)](#).

Center for Health Equity

The Center for Health Equity (CHE) was created in 2013 to advance health equity as a practice or approach within the Minnesota Department of Health and across the state. Under CHE's leadership, Minnesota's approach addresses health disparities as part of a broad spectrum of public investments in housing, transportation, education, economic opportunity and criminal justice. CHE also carries out specific initiatives and projects, including state funding available to Tribal Nations to support Eliminating Health Disparities Initiative (EHDI) activities (Minnesota Statute 145.928, subdivision 10). EHDI funding is for various activities in health areas including decreasing morbidity and mortality rates from breast and cervical cancer, diabetes, HIV/AIDS and other health conditions. For more information, go to [MDH Center for Health Equity \(www.health.state.mn.us/communities/equity/about/index.html\)](#).

Statewide Health Improvement Partnership

SHIP works to create healthier communities across Minnesota by expanding opportunities for active living, healthy eating and tobacco-free living. At its core, SHIP is a locally driven effort, with community partnerships formed to create better health together across Minnesota. Communities choose strategies that are based on the latest science and focused on making long-term, sustainable changes in schools and childcare facilities, communities, workplaces and health care settings. SHIP has been instrumental in helping Minnesota keep obesity rates relatively stable and reducing commercial tobacco use and secondhand smoke exposure. These factors contribute to chronic diseases, rising health care costs, disability and death. For more information about SHIP, go to [Statewide Health Improvement Partnership \(www.health.state.mn.us/communities/ship/\)](http://www.health.state.mn.us/communities/ship/).

Appendices

A. Trend Data

All cancers sites combined

Year	Males Incidence Rate	Males Incidence Count	Females Incidence Rate	Females Incidence Count	Males Mortality Rate	Males Mortality Count	Females Mortality Rate	Females Mortality Count
1988	528.8	9,147	397.6	8,851	257.9	4,205	164.5	3,895
1989	532.9	9,329	381.1	8,576	254.1	4,219	159.7	3,789
1990	546.7	9,712	392.6	8,920	251.5	4,256	160.7	3,857
1991	590.2	10,692	390.5	8,974	255.0	4,362	163.7	4,014
1992	620.9	11,389	393.0	9,182	253.9	4,422	165.1	4,116
1993	568.0	10,653	386.6	9,145	244.1	4,317	160.8	4,087
1994	536.1	10,226	391.7	9,401	250.8	4,487	158.6	4,055
1995	543.4	10,489	392.3	9,553	245.3	4,463	161.7	4,209
1996	527.2	10,349	392.7	9,691	245.0	4,541	163.8	4,309
1997	546.1	10,837	399.6	10,008	241.8	4,556	155.9	4,178
1998	539.5	10,894	411.5	10,454	234.5	4,480	157.7	4,313
1999	552.6	11,375	410.3	10,551	233.7	4,572	155.7	4,296
2000	571.8	12,002	415.3	10,820	236.9	4,695	161.3	4,503
2001	571.6	12,209	420.6	11,097	228.0	4,610	152.7	4,297
2002	564.9	12,332	416.3	11,169	230.8	4,745	155.0	4,455
2003	549.1	12,233	407.0	11,061	223.8	4,701	155.5	4,482
2004	560.5	12,739	409.3	11,314	216.9	4,643	151.7	4,447

Year	Males Incidence Rate	Males Incidence Count	Females Incidence Rate	Females Incidence Count	Males Mortality Rate	Males Mortality Count	Females Mortality Rate	Females Mortality Count
2005	548.0	12,763	406.7	11,402	203.9	4,464	146.0	4,359
2006	561.5	13,378	409.4	11,639	206.9	4,660	146.1	4,404
2007	574.0	14,061	423.2	12,279	208.2	4,813	141.1	4,355
2008	553.9	14,012	423.2	12,443	202.0	4,783	148.8	4,656
2009	529.2	13,769	424.8	12,678	204.6	4,979	143.6	4,591
2010	521.0	13,786	424.9	12,898	201.1	5,017	140.7	4,582
2011	524.1	14,296	429.1	13,235	193.4	4,957	136.0	4,511
2012	495.8	13,857	429.2	13,563	187.9	4,937	132.9	4,497
2013	483.0	13,902	423.7	13,558	184.4	4,992	134.8	4,611
2014	474.8	14,031	429.3	13,979	181.2	5,027	130.6	4,597
2015	501.9	15,104	446.8	14,743	186.7	5,352	136.9	4,890
2016	487.1	15,003	435	14,589	183.9	5,382	133.6	4,842
2017	499.3	15,751	438.5	14,917	175.9	5,263	127.9	4,737

B. MCERS Publications and Reports

Over the past 30-years, Minnesota has promoted high quality research to provide better information for cancer control and to address public concerns and questions about cancer. The list below highlights how MCERS cancer data has been used in research and public health since the registry began in 1988 to address the burden of cancer in Minnesota.

- **Research**

Approved academic researchers have used MCERS data to conduct studies into the causes of different types of adult and childhood cancers, as well as the safety of various cancer treatments, racial and ethnic disparities in cancer occurrence, health related quality of life, and cancer survivorship. [Supplement 2 publications and data use \(https://www.health.state.mn.us/data/mcers/docs/2021biensup2.pdf\)](https://www.health.state.mn.us/data/mcers/docs/2021biensup2.pdf) includes a bibliography of publications from these studies since 2008.

- **Resource allocation and health service planning**

Health care organizations, facilities, clinicians, and local public health have used MCERS data to inform resource allocation and health services planning. MCERS data provide an important population-based perspective, because these analyses help answer questions about the completeness of local or regional cancer care coverage and services across Minnesota communities.

- **Inform cancer prevention and control programs**

Public health professionals, legislators, coalitions, and non-profit organizations have used MCERS data to inform policy, programs and other activities to address Minnesota's cancer burden including health inequities related to cancer. MCERS data used in this work usually take the form of tables of cancer statistics

from specialized “data requests” or queries from the [MN Public Health Data Access Portal \(https://data.web.health.state.mn.us/web/mndata/\)](https://data.web.health.state.mn.us/web/mndata/). Members of the Minnesota Cancer Alliance rely on these statistics in their efforts to achieve specific objectives in the [Cancer Plan Minnesota 2025 \(https://mncanceralliance.org/cancer-plan/\)](https://mncanceralliance.org/cancer-plan/). The American Cancer Society uses presentations developed by MCRS epidemiologists in workshops to educate stakeholders, primary care providers, and others about cancer prevention and control. For example, MCRS data was recently presented in provider educational workshops to increase HPV-vaccination rates in Minnesota as well as to increase awareness of screening for breast, cervical and colorectal cancers.

- **Concerns about cancer**

MDH epidemiologists and other professionals have used MCRS data to address the public’s concerns about cancer. Cancers are much more common than most people realize, and the rates of cancer increase sharply with age. As the baby boom generation ages, Minnesotans will see increasing numbers of family members, other relatives, neighbors, and friends develop and, unfortunately, die from some type of cancer. MCRS data are used to help people understand the trends in cancer occurrence and the risk factors for different cancers. MCRS data also have been used to investigate perceived excesses of cancer in communities. Since 1988, thousands of concerns have been addressed successfully. Published MCRS reports of selected investigations are located on the [MCRS Cancer Statistics and Reports](#) webpage.