DEPARTMENT OF HEALTH

Cancer in Minnesota

1988-2014

Report to the Minnesota Legislature
Fiscal year 2017

DEPARTMENT OF HEALTH
MINNESOTA CANCER REPORTING SYSTEM

Cancer in Minnesota 1988 – 2014

Report to the Minnesota Legislature: Fiscal Year 2016-2017

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DEPARTMENT OF HEALTH

Protecting, Maintaining and Improving the Health of All Minnesotans

October 9, 2018

The Honorable Michelle Benson, Chair
Health and Human Services Finance & Policy
Committee, Minnesota Senate
3109 Minnesota Senate Building
95 University Ave W.
Saint Paul, MN 55155-1606

The Honorable Matt Dean, Chair
Health and Human Services Finance Committee
Minnesota House of Representatives
401 State Office Building
100 Rev. Dr. Martin Luther King Jr. Blvd.
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The Honorable Jim Abeler, Chair
Human Services Reform Finance & Policy
Committee, Minnesota Senate
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The Honorable Joe Schomacker, Chair
Health and Human Services Reform Committee
Minnesota House of Representatives
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Saint Paul, MN 55155-1606

To the Honorable Chairs:

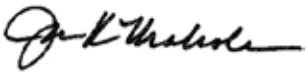
The Minnesota Department of Health (MDH) is pleased to release the fourteenth biennial report of the Minnesota Cancer Reporting System (MCRS) on the occurrence of cancer in Minnesota, in accordance with Minnesota Statute 144.672, Subdivison 2. A new feature of our report is embedded hypertext links to allow interested readers the option of accessing technical details and information. The advantage of this format change is that it allows us to directly present content and findings to readers.

This report describes the total cancer burden from all cancers combined in Minnesota from 1988 through 2014. It also focuses on selected common cancers with ongoing screening or intervention programs, including colorectal, female breast, lung and bronchus, cervix, and melanomas of the skin. One key finding of this report is that the total number of new cancers and cancer deaths is increasing even as cancer incidence (males) and mortality rates are decreasing. Increased numbers of new cancer diagnoses and cancer deaths are the result of both the growth and aging of our population, and the net effect of changes in factors that increase or decrease the chance of a new cancer diagnosis.

The report documents promising trends. In the last ten years, cancer mortality rates have decreased for all cancers combined and for cancers of the lung and bronchus, colon and rectum, cervix, and female breast. Similarly, cancer incidence rates have decreased for all cancers combined (males), colorectal cancer, and cancer of the cervix. These declines reflect the successes of early cancer detection and screening programs, improvements in cancer therapies and supportive care, and the success of the Sage and Sage Scopes Programs, the Minnesota Cancer Alliance (MCA), and the Statewide Health Improvement Partnership (SHIP), among others.

However, cancer is still the leading cause of death in Minnesota, and incidence and mortality rates are increasing for some preventable cancers, including lung cancer (females) and melanomas of the skin. Because cancer is more common in individuals age 50 years and older, the total cancer burden in Minnesota will increase as the baby boom generation ages. Further, people of color and American Indians continue to experience greater burden of cancer in our state. These findings underscore the need for sustained cancer prevention efforts. MCRS will remain critically important to state and local cancer control efforts. MDH encourages all organizations and individuals to join with us and the MCA to reduce the cancer burden for all Minnesotans.

Sincerely,



Jan K. Malcolm
Commissioner
P.O. Box 64975
St. Paul, MN 55164-0975

Executive summary

Minnesota Cancer Reporting System staff developed this report to describe the occurrence of cancer in Minnesota from 1988 through 2014, in accordance with Minnesota Statute 144.672 Subdivison 2. The report presents statistics for all cancers combined and several common cancers that have ongoing active screening or intervention programs: colorectal, breast (female), lung, cervix, and melanomas of the skin. Each section of the report includes cancer incidence and mortality rates and trends by age group, sex, race and ethnicity, and stage at diagnosis for incident cancers. A summary of key findings is listed below.

In 2014, 28,161 Minnesotans were diagnosed with a new cancer and 9,624 Minnesotans died with cancer as the underlying cause of death. This means that, on average, about 78 Minnesota residents were diagnosed with a new cancer and 26 died from cancer every day in 2014.

- In Minnesota, 87 percent of all cancers combined are diagnosed in people who are 50 or more years of age. As our state's baby boom population ages, we will witness an increasing number of family members, other relatives, neighbors, and friends develop and, unfortunately, die from some type of cancer.
- Four major cancer types were among the most common cancers diagnosed and causes of cancer deaths in 2014: prostate (males), breast (females), lung and bronchus, and colorectal. Each of these cancers are strongly linked to modifiable lifestyle risk factors (e.g., smoking, diet, physical activity). Minnesota needs sustained cancer prevention and control efforts to reduce the overall health impacts of all cancers substantially.

The total number of new cancers and cancer deaths is increasing even as cancer incidence (males only) and mortality rates for all cancers are decreasing.

- The increased number of new cancer diagnoses and cancer deaths is the result of both the growth and aging of our population, as well as changes in factors that increase or decrease the chance of a new cancer diagnosis.

Since 2000, cancer has been the leading cause of death in Minnesota. In 2014, 27 percent (or 2,054 people) more individuals in Minnesota died of cancer than heart disease.

- Between 1988 and 2014, the total number of cancer deaths increased by around 19 percent for both males and females. However, the rate of cancer deaths substantially decreased since 1988, by 29 percent for males and 21 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.

Differences in incidence and mortality rates by race and ethnicity document the need for continued targeted, culturally appropriate health promotion and cancer control efforts.

- American Indian males and females had the highest incidence and mortality rates for colorectal and lung cancers. American Indian females had the highest incidence rate for cancer of the cervix, closely followed by Asian and Pacific Islander females.
- Asian and Pacific Islander females had the highest cervical cancer mortality rate, followed by black females.
- White females had the highest breast cancer incidence rate. Black females had the highest breast cancer mortality rate, followed closely by white females.
- White males and females had the highest incidence and mortality rates for melanomas of the skin.

Based on 2010-2014 Minnesota mortality data, Healthy People (HP) 2020 cancer mortality goals have not been met for:

- All cancer sites mortality (goal 161.4 deaths per 100,000):
    - American Indian males (317.2 deaths/100,000) and females (228.4 deaths/100,000);
    - black males (215.9 deaths/100,000); and
    - white non-Hispanic males (192.8 deaths/100,000).
- Colorectal cancer mortality (goal: 14.5 deaths/100, 7 000):

  - American Indian males (32.3 deaths/100,000) and females (28.9 deaths/100,000);
  - white non-Hispanic males (15.7 deaths/100,000)
- Lung & bronchus cancer mortality (goal: 45.5 deaths/100,000):
  - American Indian males (123.6 deaths/100,000) and females (83.3/100,000);
  - black males (50.8 deaths/100,000); and white males (48.5 deaths/100,000)
- Melanoma of the skin mortality (goal: 2.5 deaths/100,000):
  - white males (4.1 deaths/100,000)
- Cervical cancer mortality (goal: 2.2 deaths/100,000):
  - Asian and Pacific Islander females (4.9 deaths/100,000) and
  - black females (2.6 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 or 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 who have a newly diagnosed cancer 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. Based on preliminary (unpublished) MCRS analyses, by 2037, changes in both population growth and aging could result in a 50% increase in the number of new cancers diagnosed in Minnesotans. 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 will be critically important to help guide planning and resource allocation in response to the increased cancer burden, as well as to reduce the persistent health disparities in Minnesota.

This year's biennial report provides a snapshot of the total cancer burden from all cancers combined in Minnesota and gives special focus to selected common cancers that have ongoing active screening or intervention programs: colorectal, breast (female), lung, cervix, and melanomas of the skin. The content of this report should be especially useful to state and local public health professionals, legislators, and policy and program planners in developing, funding, and carrying out and evaluating cancer prevention and control activities in Minnesota. This report fulfills requirements for a biennial report (M.S. 144.672, as mentioned above) and MCRS objectives for CDC-RFA-DP17-1701 funding of the National Program of Cancer Registries (NPCR).

Each section of the report contains descriptive statistics by cancer stage, age group, sex, race and ethnicity, and describes trends in the incidence and mortality rates over time. We have also presented CDC's Healthy People 2020 (HP2020) objectives for each cancer, as appropriate, to support cancer prevention and control programs across Minnesota. We embedded in the body of the report 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. The appendices provide additional statistics, including population data (Appendix A) and statewide incidence and mortality trend data for the 27-year period (Appendix B). Appendix C of the report provides cancer incidence and mortality statistics for Minnesota counties, and Appendix D provides cancer incidence and mortality statistics for State Community Health Services Advisory Committee (SCHSAC) geographic regions. We included a brief evaluation form for readers to provide us with feedback about this report and input on what they would like to see in future MCRS reports (Appendix E).

Finally, Appendix F contains a summary of MCRS data use in research and public health practice carried out by individuals who work outside of MDH.

Quick start guide

This report describes the occurrence of invasive cancers in Minnesota for the following sites: all cancer sites combined, colon and rectum combined (colorectal cancers), female breast, lung and bronchus, melanoma of the skin, and cervix. Except for all cancer sites combined, each of these cancers has established public health cancer prevention and intervention programs ongoing in Minnesota.

For an overview of work cancer registries perform in support of cancer prevention and control programs, go to

North American Association of Central Cancer Registries

For MCRS statistics on other cancer sites, go to

MDH Cancer Quick Facts

Minnesota Public Health Data Access portal

For statistics on cancers in the US, go to

National Cancer Institute's Surveillance, Epidemiology, and End Results Program

National Program of Cancer Registries-State Cancer facts

Centers for Disease Control and Prevention online database

Counts versus rates provide important but different information about the cancer burden in Minnesota.

- Counts of people with cancer are needed in planning and evaluating programs and services for people newly diagnosed with a cancer. For example, a count of particular cancer will estimate the number of Minnesotans with that cancer who need services for treatment and follow-up. The larger the population, the larger the number of cancers diagnosed in that population. In Minnesota, people who are of white race make up about 84% of the total population. As such, counts of cancers for whites are often greater than the counts of cancers for Minnesotans who are of non-white racial and ethnic groups.
- Rates of cancer are useful in establishing priorities, developing and evaluating cancer control and intervention programs, and identifying the need for health services and epidemiologic research studies. For example, differences in the chance of a cancer diagnosis between one or more groups in a population can occur because of disparities in access to health care and screening services. Disparities can also occur because of differences in exposure to such factors as cigarette smoking, the routine use of sunscreen, and hepatitis B vaccination that can increase or decrease the risk of developing cancer. Epidemiologists and other researchers analyze cancer registry data to understand the reasons for differences in cancer occurrence between populations. The results of such analyses can inform next steps in cancer prevention and control measures to protect the public's health. Although people of color and American Indians represent 16% of the total population in Minnesota, cancer rates are often higher among people of color and American Indians compared with Minnesota residents who are of white race. There are a number of ongoing initiatives and programs throughout the state to eliminate racial and ethnic cancer-related disparities.

Cancer Incidence is the number of invasive cancers newly diagnosed in a defined population at risk of developing cancer during a specified year or group of years. An invasive cancer is one that has spread beyond the site where the cancer cells first developed. Incidence statistics for all cancer sites combined also includes *in situ* bladder cancers. An *in situ* cancer has not gained access to blood vessels. For this reason, *in situ* cancers typically do not spread to distant sites in the body. The incidence statistics presented in this report are based on MCRS data extracted from a dynamic database in

July 2017. Because the MCRS database constantly changes, statistics in this report will differ slightly from statistics based on MCRS data extracted on a different date. (See the Resource Section for details on statistical methods and cancers included in this report).

Cancer incidence rate =

$$\left(\frac{Number\ of\ new\ cancers\ diagnosed\ in\ a\ defined\ population\ in\ specified\ years}{Number\ of\ people\ in\ the\ defined\ population\ in\ specified\ years}\right) \text{ x } 100{,}000$$

For example, the unadjusted incidence rate for colorectal cancers among Minnesota males in 2014 was 44.1 per 100,000. This statistic means that in 2014 there were nearly 45 new colorectal cancers diagnosed for every 100,000 males living in Minnesota on July 1, 2014. The defined population is males living in Minnesota on July 1, 2014. The size of the population was estimated using data from the U.S. Census Bureau.

Population refers to the people living in a geographic region with a defined boundary such as a county or state during a specified year or group of years. Demographic characteristics including age and sex can refine the definition for a population. The size of a population is estimated using census data developed by the U.S. Census Bureau in collaboration with the National Center for Health Statistics. Population data are available in the National Cancer Institute's SEER*Stat analytic software.

For more information on population data visit SEER Population Estimates

Cancer mortality is the number of deaths from cancer as the underlying cause of death in Minnesota residents in a specified year or group of years. The mortality statistics in this report were developed using data from the Minnesota Department of Health's Center for Health Statistics.

Cancer mortality rate =

$$\left(\frac{Number\ of\ cancer\ deaths\ diagnosed\ in\ a\ defined\ population\ in\ specified\ years}{Number\ of\ people\ in\ the\ defined\ population\ in\ specified\ years}\right) \text{ x } 100{,}000$$

For example, the unadjusted mortality rate for female breast cancer in 2014 was 21.5 per 100,000. This statistic means that in 2014 there were nearly 22 Minnesota females who died of breast cancer for every 100,000 female who were residents of Minnesota on July 1, 2014. The defined population is females living in Minnesota on July 1, 2014. The size of the population was estimated using data from the U.S. Census Bureau.

Age-specific rates are cancer incidence or mortality rates calculated using the methods described above for separate age-groups. Age groups in this report are: 0-14, 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80-84, 85+.

Age-specific rates show how the burden of a given cancer differs by age in a defined population of Minnesotans. Because cancer is typically a disease of older people, age-specific cancer incidence and mortality rates tend to increase with older age.

Age-adjusted rate is a weighted average of age-specific rates for a given population and year or group of years. The weights are the proportion of people in the corresponding age groups of a standard population. Age-adjusted rates are used for comparing rates for different populations (for example, Minnesota versus the US in 2013) or for comparing rates across different years (for example, Minnesota in 1988 versus Minnesota in 2014).

For an explanation of the method to calculate age-adjusted rates please visit

Tutorial to Calculate Age-Adjusted Rates

In this report, the standard population is the 2000 US Census.

The risk of cancer is dramatically higher in older (age 50 or more years) than younger people (less than age 50 years). This fact complicates comparing cancer rates over time as well as between different populations. Without accounting for differences in age, populations with a greater proportion of older people will have higher cancer rates than populations with a smaller proportion of older people. If we want compare rates to find out which population or time period has a higher cancer rate, we need to adjust for differences in age distributions. In this report, we use the direct method of age-standardization. This approach levels out the differences in age, so we can make fair comparisons of cancer rates.

Rates by race and ethnicity measures the burden of cancer in racial and ethnic groups in a population. Racial and ethnic groups for this report include American Indian, Asian/Pacific Islander, black, Hispanic (all races), and white (non-Hispanic). This classification of race and ethnicity is based on standards from the Office of Budget and Management (OMB) and the National Cancer Institute (NCI).

In this report, we will refer to the white (non-Hispanic) population as white.

Examining rates for different racial and ethnic groups in Minnesota can show if there is a disproportionate burden of cancer incidence or mortality in Minnesota's populations of color and American Indians.

Cancer stage describes how far the cancer has spread in the body when the cancer was first diagnosed. The stage of a cancer at diagnosis is often related to the chances of surviving from that cancer over the long-term. There are several different ways to measure stage. This analysis uses NCI's summary staging system that classifies cancer stage for solid tumors as *in situ*, localized, regional, and distant.

- *In situ*: the earliest stage of cancer development when the tumor has not spread into the organ where they first started growing.
- Localized: the tumor is confined to the tissue or organ where the cancer first began and has not spread to nearby lymph nodes.
- Regional: the tumor has spread outside of the organ where they started to nearby lymph nodes, surrounding tissues, or organs close to where the cancer first began.
- Distant: most advanced stage of tumor development when the tumor has spread to lymph nodes, tissues and organs away from where the cancer first developed.
- Unknown: a tumor is unstaged when there is not enough information recorded in the medical record to determine the spread of the tumor at the time of diagnosis.

For screen-able cancers, incidence rates by cancer stage can show where increased public health intervention is needed to promote screening and early diagnosis of a cancer.

For detailed information on registry methods, legislative authority, data protection, glossary, statistical methods, and other topics, please visit the links listed in the Resource Section.

All cancer 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

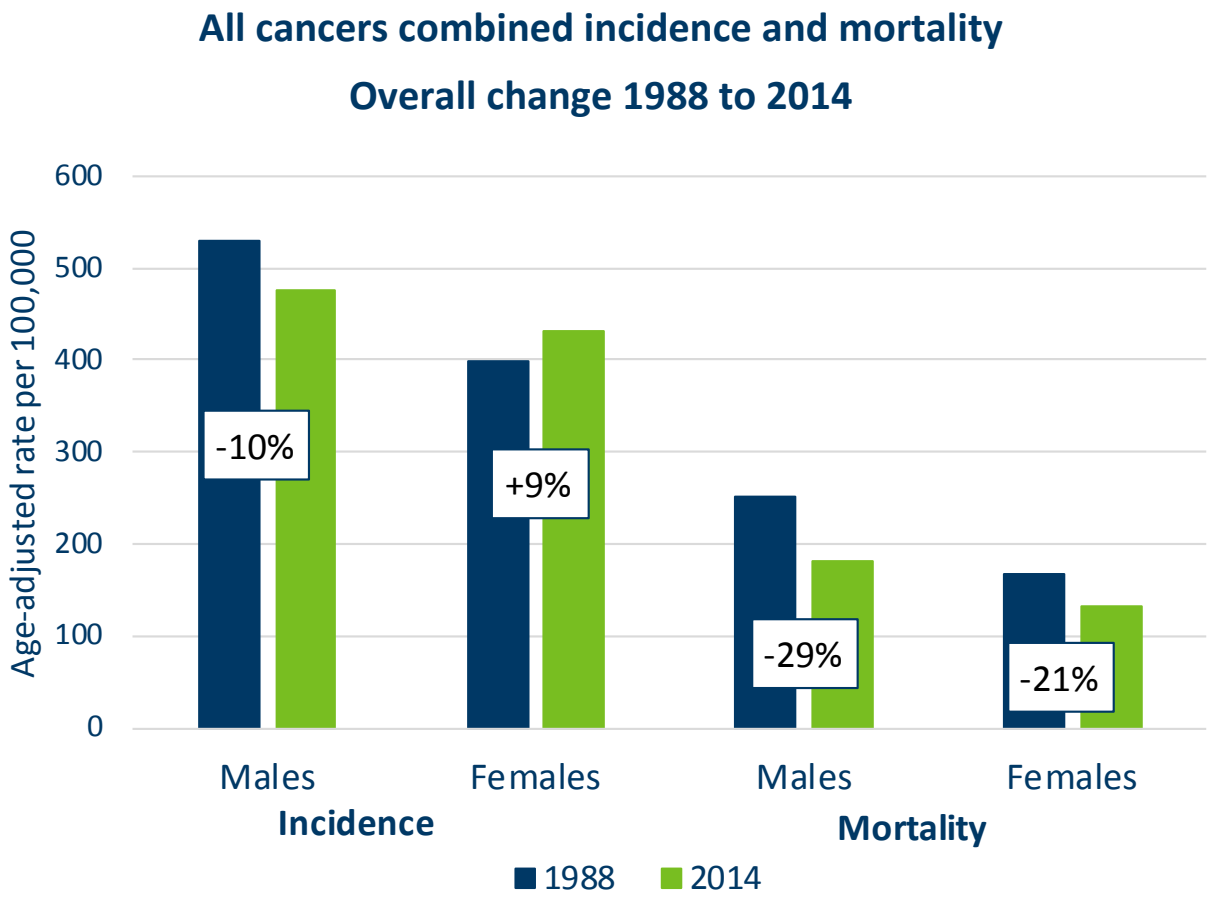
Examining the trends in the incidence and mortality of all cancers combined is useful in describing the overall cancer burden in a population. This will give us a partial answer to the question, "How large of a public health problem is cancer in Minnesota?" It is important to keep in mind that the overall trend for all cancer sites combined represents the net change in trends for all individual cancer types, some of which are increasing, decreasing or remaining stable over the same year or group of years. In addition, because different cancers have different causes, in looking at trends for cancer in all sites 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 combined by population demographics (for example, sex, race and ethnicity, and age) 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 be helpful in developing 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 and age group in Minnesota between 1988 and 2014, unless otherwise noted.

Changes in all cancers combined between 1988 and 2014

The chart below and tables of trend data (Appendix B) show that while the total number of new cancers and cancer deaths increased in Minnesota, the overall incidence and mortality rates for cancer decreased between 1988 and 2014.

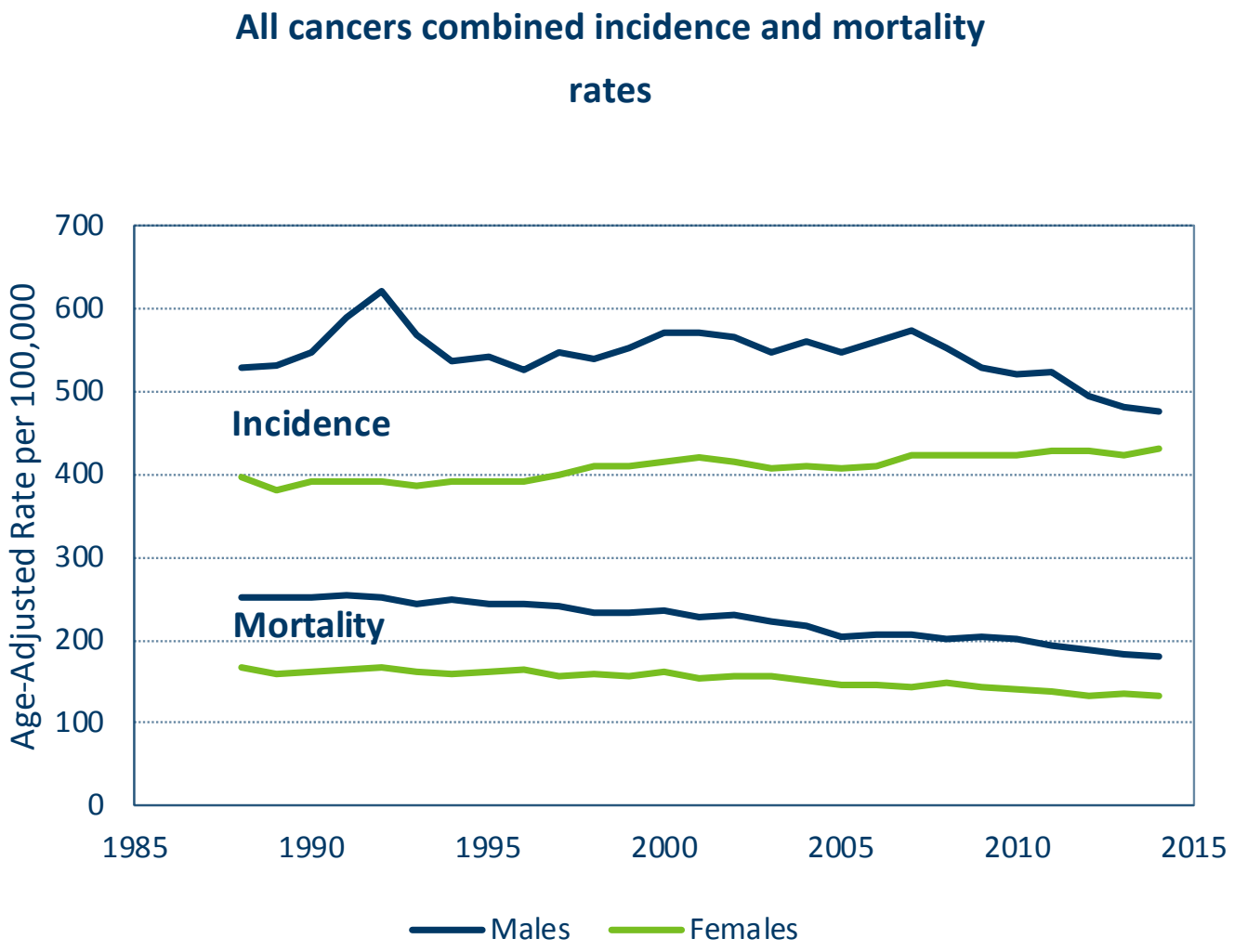
- The number of new cancers diagnosed in males and females increased more than 50% between 1988 and 2014, from 9,148 to 14,077 in males and from 8,851 to 14,084 in females. The increase in the number of new cancers diagnosed in males and females during this time reflects both population growth and population aging, as well as the net effect of changes in the factors that increase or decrease the chance of a new cancer diagnosis in Minnesota, as mentioned above.
- From 1988 to 2014, the number of cancer deaths increased in both males and females by nearly 20%, from 4,205 to 5,026 in males and from 3,895 to 4,598 in females.
- Compared with 1988, age-adjusted incidence rates for all cancers decreased by 10% for males but increased by 9% for females in 2014. Mortality rates for males and females decreased more than 20% between 1988 and 2014. 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).



1988-2014 trends in all cancers combined in Minnesota

The chart below shows the trends in cancer age-adjusted incidence and mortality among Minnesota males and female during 1988-2014 (Appendix B).

- Since 1988, age-adjusted cancer incidence rates for Minnesota males fluctuated up and down. By 2014, the trend in the rate for males showed a net decrease. In the last ten years cancer incidence rates for males decreased by 2.0 percent per year. The age-adjusted incidence rates for females gradually increased during this time. In the last 10 years cancer incidence rates for females increased by 0.5 percent per year.
- Over the 27-year period, cancer mortality rates for males and females have steadily decreased. In the last ten years cancer mortality rates decreased for males by 1.5 percent per year and by 1.3 percent per year for females.



Common types of cancers in Minnesota

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

- The types of new cancers that males and females are most commonly diagnosed with are not exactly the same as the most common causes of cancer death. Nonetheless, lung and colorectal cancers account for 20 percent of new cancer diagnoses and about 33 percent of deaths in both males and females. Additionally, cancer of the prostate is a common new diagnosis and cause of death for Minnesota males, while cancer of the breast is a common new diagnosis and cause of death for Minnesota females.
- The incidence of some cancers is low but the mortality is high, testifying to poor survival from these cancers. Pancreatic cancer is the 10th most common incident cancer diagnosed in males and females but it is the 4th most common cancer cause of death in both sexes. Similar examples include brain and other nervous system cancers in females, and liver and intrahepatic bile duct cancers in both males and females. These cancers do not rank among the 10 most common incident cancers but they are one of the 10 most common causes of cancer deaths.
- Finally, some cancers are among the 10 most common cancers diagnosed in Minnesota but they are 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, 2014

Cancer	Rate/100,000	Number of cases	Percent of total
Prostate	99.4	3,180	22.6%
Lung and Bronchus	57.6	1,662	11.8%
Colon and Rectum	41.4	1,195	8.5%
Urinary Bladder	37.7	1,066	7.6%
Melanoma of the Skin	36.0	1,040	7.4%
Non-Hodgkin Lymphoma	26.6	765	5.4%
Kidney and Renal Pelvis	24.8	735	5.2%
Leukemia	21.5	613	4.4%
Oral Cavity and Pharynx	17.3	534	3.8%
Pancreas	14.5	419	3.0%
All Cancers Combined		14,077	

Top 10 incident cancers in females, 2014

Cancer	Rate/100,000	Number of cases	Percent of total
Breast	131.0	4,221	30.0%
Lung and Bronchus	48.7	1,643	11.7%
Colon and Rectum	35.1	1,175	8.3%
Corpus and Uterus	32.2	1,092	7.8%
Melanoma of the Skin	25.5	781	5.5%
Thyroid	20.8	580	4.1%
Non-Hodgkin Lymphoma	17.1	574	4.1%
Leukemia	12.4	408	2.9%
Kidney and Renal Pelvis	11.3	366	2.6%
Pancreas	11.3	385	2.7%
All Cancers Combined		14,084	

Top 10 cancer causes of death in males, 2014

Cancer	Rate/100,000	Number of deaths	Percent of total
Lung and Bronchus	45.5	1,287	25.6%
Prostate	18.9	494	9.8%
Colon and Rectum	13.9	385	7.7%
Pancreas	12.6	360	7.2%
Leukemia	8.9	242	4.8%
Esophagus	8.2	238	4.7%
Non-Hodgkin Lymphoma	7.9	207	4.1%
Urinary Bladder	7.6	199	4.0%
Liver and Intrahepatic Bile Duct	6.6	201	4.0%
Kidney and Renal Pelvis	5.9	172	3.4%
All Malignant Cancer Deaths		5,026	

Top 10 cancer causes of death in females, 2014

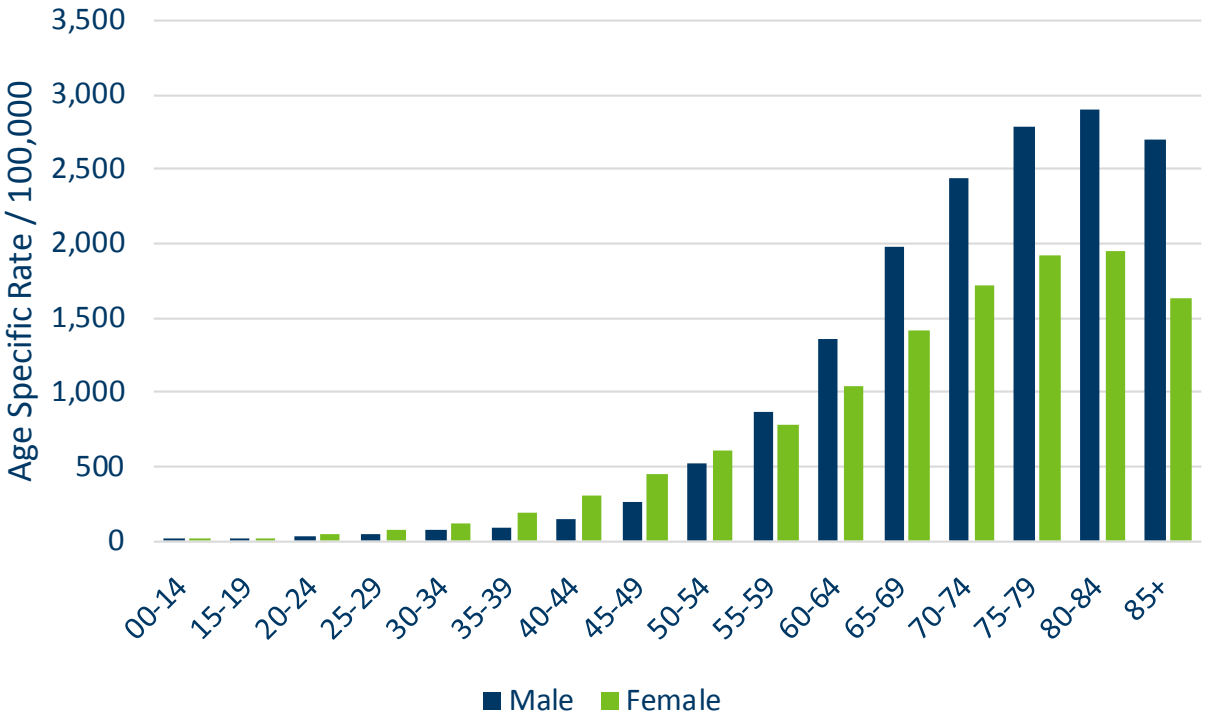
Cancer	Rate/100,000	Number of deaths	Percent of total
Lung and Bronchus	34.3	1,185	25.8%
Breast	16.9	589	12.8%
Colon and Rectum	11.1	395	8.6%
Pancreas	8.8	310	6.7%
Ovary	6.4	222	4.8%
Leukemia	5.2	187	4.1%
Corpus and Uterus, NOS	4.2	145	3.2%
Non-Hodgkin Lymphoma	4.1	144	3.1%
Brain and Other Nervous System	3.7	117	2.5%
Liver and Intrahepatic Bile Duct	3.4	124	2.7%
All Malignant Cancer Deaths		4,598	

Incidence of all cancers combined by age at diagnosis

The chart and table below show how age-specific incidence rates for all cancer sites combined varies with both age and sex.

- Cancer incidence rates for all sites combined increase substantially with age. Approximately 87% of cancers in Minnesota are diagnosed in people who are 50 or more years of age.
- The graph also shows that cancer incidence rates are somewhat greater in females than males before age 55. After age 55, cancer incidence rates are much greater in males than females. It is important to remember that this graph shows how total cancer incidence at all sites varies by age and sex. The pattern in age-specific rates for individual cancer types can be different from the pattern for males and females seen in this graph.

All cancers combined incidence rate by age – 2010-2014



Age	Male Rate	Male Count	Female Rate	Female Count
00-14	17.8	487	15.6	408
15-19	24.5	227	20.5	182
20-24	35.6	325	44.1	388
25-29	52.4	488	79.6	726
30-34	74.4	690	127.3	1,149
35-39	99.4	821	194.4	1,563
40-44	153.5	1,335	306.4	2,622
45-49	271.7	2,568	452.5	4,257
50-54	526.4	5,351	613.6	6,261

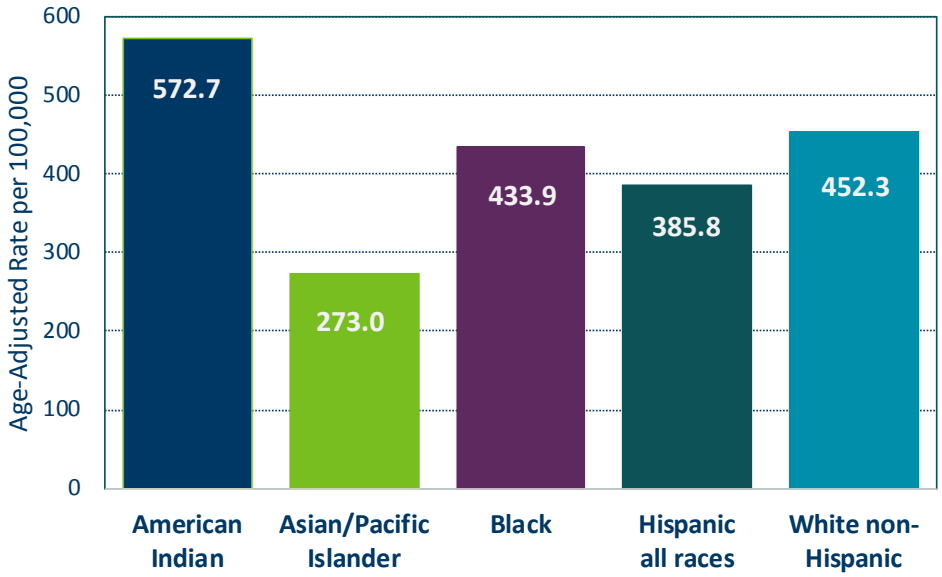
Age	Male Rate	Male Count	Female Rate	Female Count
55-59	871.8	8,016	789.8	7,310
60-64	1,354.9	10,277	1,044.1	8,134
65-69	1,977.6	10,800	1,418.1	8,272
70-74	2,442.9	9,538	1,713.3	7,559
75-79	2,788.0	7,896	1,917.3	6,652
80-84	2,897.4	6,034	1,945.8	5,686
85+	2,696.8	5,015	1,632.9	6,116

Incidence of all cancers combined by race and ethnicity

The chart and table below show the disproportionate burden of cancer incidence in American Indian males and females compared to Minnesotans of other races and ethnic groups.

- 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 2010-2014. The overall incidence rate for American Indians was double the rate for Asian and Pacific Islanders.
- The incidence rate for American Indian males was more than double the rate for Asian and Pacific Islander males, and between 1.3 and 1.6 times the rates for males of the other racial and ethnic groups. The incidence rate for American Indian females was nearly double the rate for Asian and Pacific Islander females, and between 1.2 and 1.4 times the rates for females of the other racial and ethnic groups.
- Among males only, black Minnesotans had the second highest overall cancer incidence rate in the state. Among females only, whites had the second highest overall cancer incidence rate in Minnesota.

All cancers combined incidence by race/ethnicity – 2010-2014



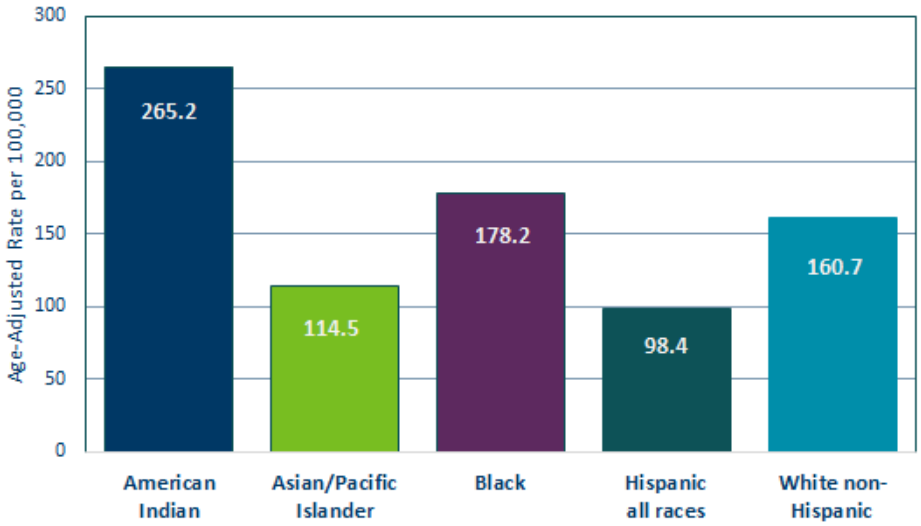
Race/ethnicity	Total Rate	Count	Male Rate	Count	Female Rate	Count
American Indian	572.7	1,415	640.5	708	524.8	707
Asian/Pacific Islander	273.0	2,006	282.9	866	269.6	1,140
Black	433.9	3,806	503.6	2,047	378.1	1,759
Hispanic all races	385.8	1,927	393.2	872	387.8	1,055
White non-Hispanic	452.3	125,243	492.4	63,840	424.9	61,403
All Races Combined	456.5	137,153	498.8	69,868	427.5	67,285

Mortality of all cancers combined by race and ethnicity

The chart and table below show the disproportionate burden of cancer mortality in American Indian males and females compared to 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 2009 and 2013. 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 3.2 times the mortality rate for Hispanic males, and between 1.5 and 2.2 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 1.5 and 2.4 times greater than the mortality rates for females of all other racial and ethnic groups.
- Overall, the HP2020 goal for all cancer mortality has not been met for American Indian and black Minnesotans. By sex, the HP2020 goal for mortality for all sites has not been met for American Indian males and females, and for black or white males.

All cancers combined mortality by race/ethnicity – 2009-2013



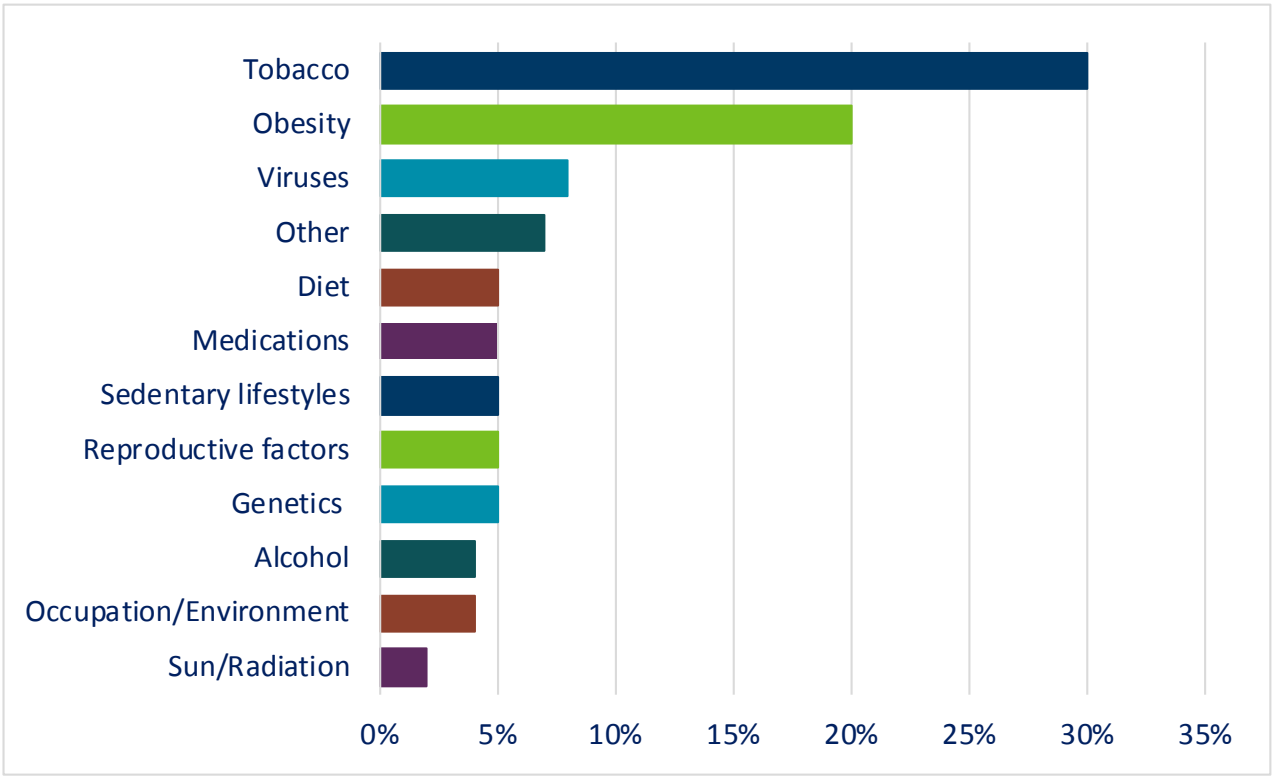
Race/ethnicity	Total Rate	Count	Male Rate	Count	Female Rate	Count
American Indian	265.2	535	317.2	279	228.2	256
Asian/Pacific Islander	114.5	650	142.0	341	95.4	309
Black	178.2	1,179	215.9	648	149.6	531
Hispanic all races	98.4	377	99.8	191	96.1	186
White non-Hispanic	160.7	44,869	192.8	23,384	138.1	21,485
All Races Combined	160.9	47,676	193.1	24,883	138.3	22,793

Healthy People 2020 cancer mortality goal: 161.4 deaths/100,000

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 the National Cancer Institute's interactive online tool: Know Your Chances. 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% 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 (3)



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 (6) or CDC (7) webpages on cancer screening. If you have questions about whether you should be screened and when, please contact your health care provider.

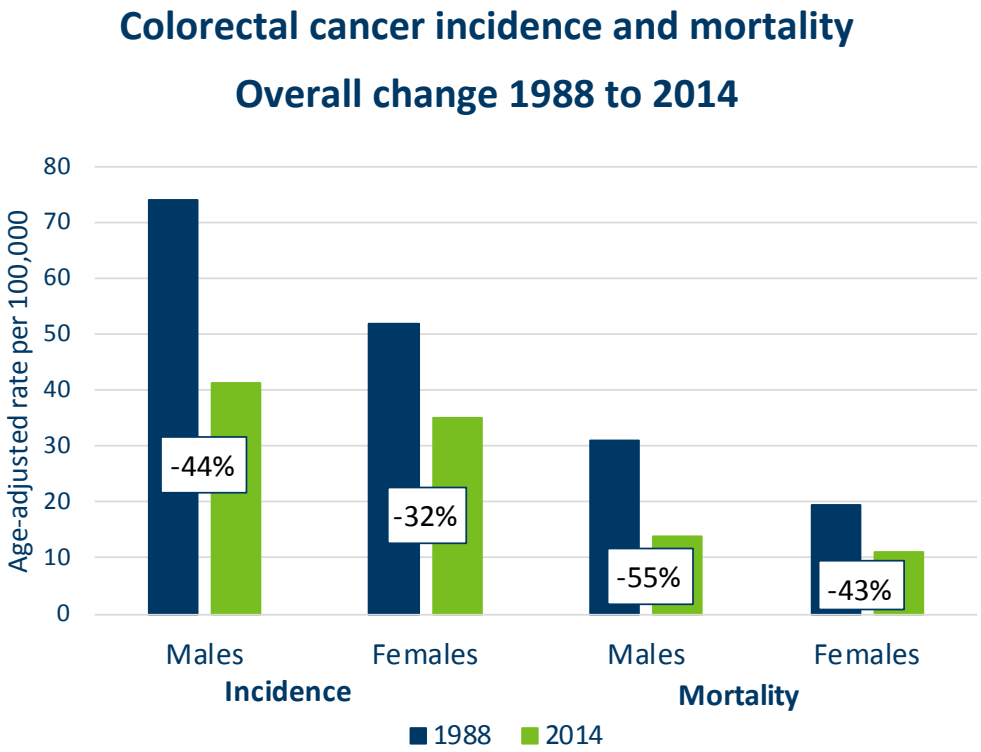
Colorectal cancer

Colon and rectum (colorectal) cancer is the third most common malignant cancer worldwide and the second leading cause of cancer deaths in the United States (8). In Minnesota, colorectal cancer is the third most common cancer diagnosed and the third most common cause of cancer deaths in both males and females. Colorectal cancer usually develops slowly over the course of several years. It begins as a growth called a polyp inside the colon or rectum (9). Research has shown that screening procedures that surgically remove precancerous polyps can prevent colorectal cancer. Early detection and treatment of colorectal cancers can also reduce mortality from colorectal cancer (10).

Changes in colorectal cancer occurrence between 1988 and 2014

The chart below displays the dramatic declines in colorectal cancer incidence and mortality between 1988 and 2014.

- The number of new colorectal cancers diagnosed in Minnesota males and females decreased between 1988 and 2014 by just under 5%, from 1,253 to 1,195 in males and from 1,234 to 1,175 in females (Appendix B). Rates of new colorectal cancer diagnoses in 2014 were 44% lower in males and 32% lower in females than the corresponding rates in 1988.
- During this time the number of colorectal cancer deaths dropped by 24% in males and 18% in females, from 507 to 385 deaths in males and from 482 to 395 in females (Appendix B). The decrease in the mortality rates of colorectal cancer for males and females between 1988 and 2014 was substantial. The rates were 55% lower in males and 43% lower in females than the corresponding mortality rates in 1988.

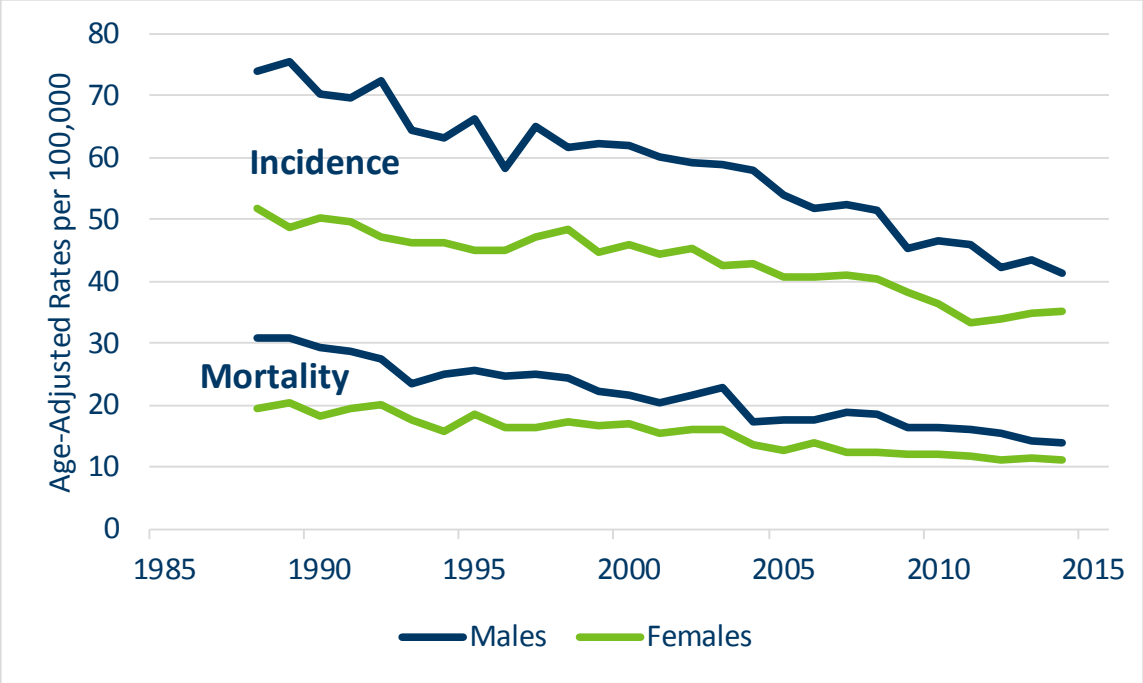


1988-2014 trends in colorectal cancer incidence and mortality rates

Rates of new diagnoses and deaths from colorectal cancer death were consistently higher among males than females, but rates have decreased substantially for both sexes over the past 27 years.

- Age-adjusted colorectal cancer incidence and mortality rates per 100,000 were greater for Minnesota males than females. In 2014, the colorectal cancer incidence rate among males was 18% greater than the rate for females while the mortality rate among males was 25% greater than the rate for females.
- Between 1988 and 2014, the incidence rate of colorectal cancer in Minnesota has fluctuated, but there was a net decrease in the rates for both males and females. In the last ten years colorectal cancer incidence rates decreased by 3.0 percent per year for males and by 2.4 percent per year for females.
- Since 1988, colorectal cancer mortality rates for males and females in Minnesota have declined. In the last ten years colorectal cancer mortality rates decreased by 3.1 percent per year for males and by 2.0 percent per year for females.

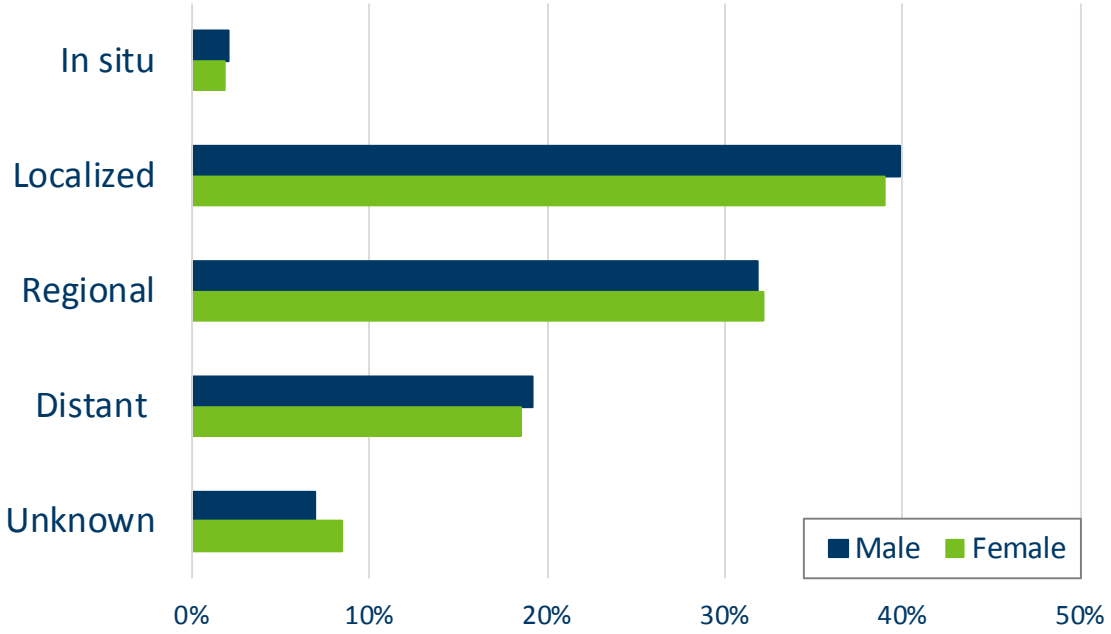
Colorectal cancer incidence and mortality rates



Colorectal cancer incidence by stage at diagnosis

- During the most recent 5 years, half of newly diagnosed colorectal cancers were regional or distant stage at time of diagnosis in both males and females.

Colorectal cancer stage at diagnosis – 2010-2014

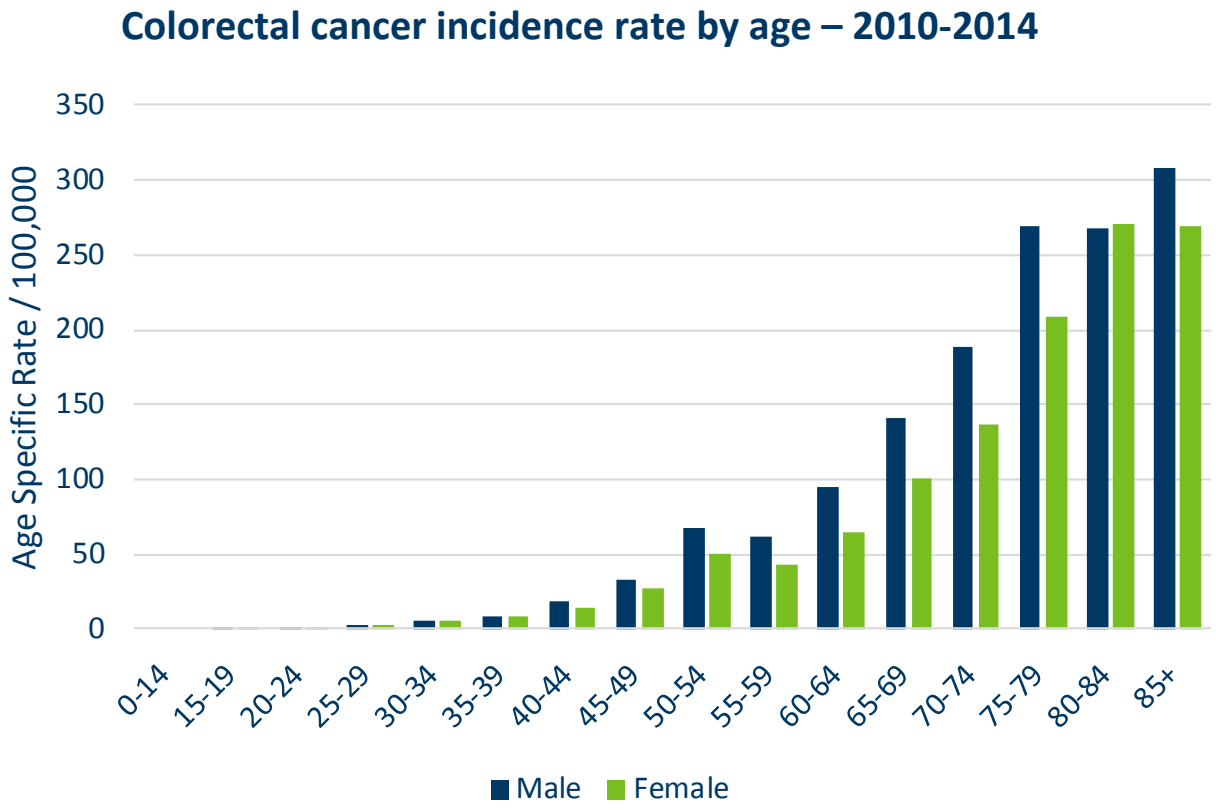


Stage	Males Count	Males %	Females Count	Females %
In situ	127	2.1%	108	1.9%
Localized	2,447	39.9%	2,249	39.0%
Regional	1,957	31.9%	1,854	32.1%
Distant	1,179	19.2%	1,070	18.5%
Unknown	430	7.0%	489	8.5%

Colorectal cancer incidence by age at diagnosis

The chart below shows how colorectal cancer incidence increases as people age.

- Among males and females, the age-specific rates of new diagnoses of colorectal cancer increase sharply beginning at about 50 years of age.
- Beginning at age 40, the incidence rates for males at almost every age group are greater than the rates for females.
- Ninety percent of colorectal cancers in Minnesota are diagnosed among people 50 years of age or older.



Age	Male Rate	Male Count	Female Rate	Female Count
0-14	0	0	0	1
15-19	0.5	5	0.8	7
20-24	1.4	13	1.0	9
25-29	2.1	20	3.0	27
30-34	5.7	53	5.2	47
35-39	8.7	72	9.0	72
40-44	18.4	160	14.7	126
45-49	33.2	314	26.6	250
50-54	67.6	687	49.6	506

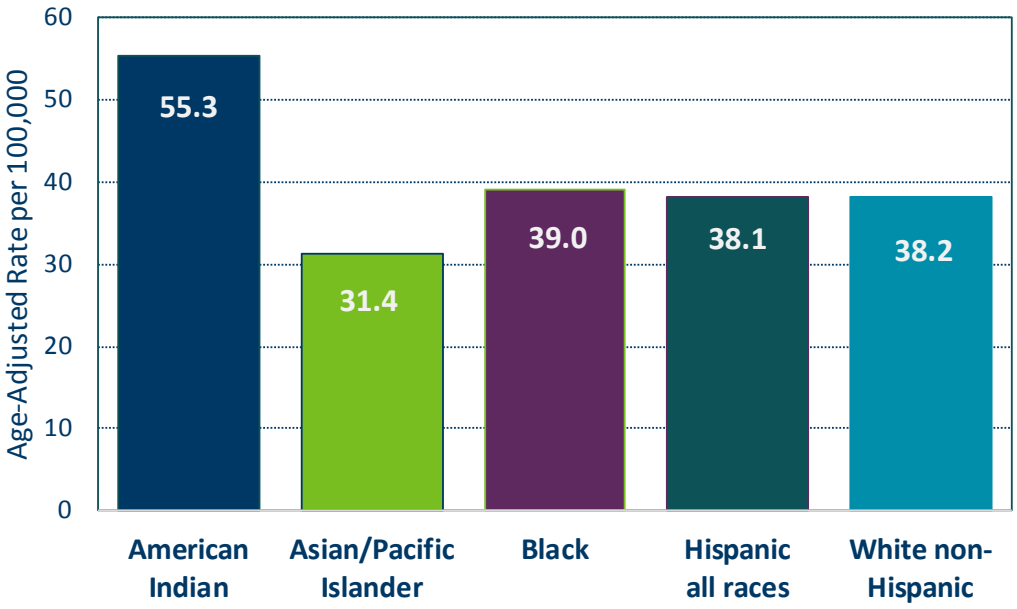
Age	Male Rate	Male Count	Female Rate	Female Count
55-59	61.4	565	42.6	394
60-64	95.6	725	65.1	507
65-69	140.6	768	100.8	588
70-74	188.3	735	137.1	605
75-79	269.1	762	208.4	723
80-84	268.4	559	270.3	790
85+	308.7	574	269.1	1,008

Colorectal cancer incidence by race and ethnicity

The chart and table below show the high burden of colorectal cancer incidence in the American Indian population of Minnesota.

- Overall and by sex, American Indians had the highest colorectal cancer incidence rate and Asian and Pacific Islander Minnesotans had the lowest incidence rate.
- Among males, colorectal cancer incidence rates were very similar for those who were black and Hispanic of all races. The 2010-2014 incidence rate for American Indians was nearly 2 times the rate for Asian and Pacific Islander and 1.5 times the rate for whites.
- Among females, the rates were similar for Hispanics of all races and black Minnesotans, and both groups had higher rates than whites. The incidence rate for American Indians was 1.6 times the rate for Asian and Pacific Islanders and 1.4 times the rate for whites.

Colorectal cancer incidence by race/ethnicity – 2010-2014



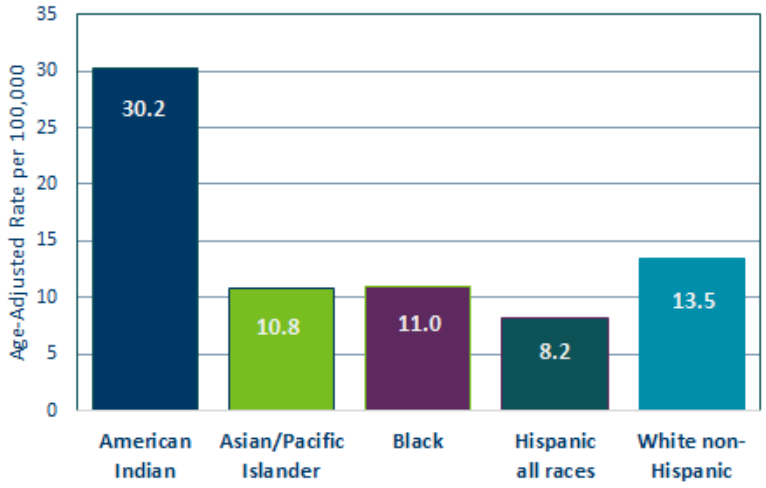
Race/ethnicity	Total Rate	Count	Male Rate	Count	Female Rate	Count
American Indian	55.3	133	64.3	79	46.5	54
Asian/Pacific Islander	31.4	216	33.0	103	29.9	113
Black	39.0	325	40.1	165	38.0	160
Hispanic all races	38.1	175	39.4	88	36.6	87
White non-Hispanic	38.2	10,637	43.1	5,472	33.9	5,165
All Races Combined	39.0	11,672	43.8	6,012	34.7	5,660

Colorectal cancer mortality by race and ethnicity

The chart and table below show the high burden of colorectal cancer mortality in the American Indian population of Minnesota.

- Overall and by sex, American Indians had the highest mortality rate for colorectal cancer, followed by whites. Hispanics of all races had the lowest rate. Minnesotans who were black and Asian and Pacific Islander had similar mortality rates.
- Among males only, the age-adjusted mortality rate for American Indians ranged between 2.1 and 4.6 times the mortality rates for males of other racial and ethnic groups.
- Among females only, the mortality rate for American Indians ranged between 2.5 and 3.3 times the mortality rates for females of the other racial and ethnic groups in Minnesota.
- Overall, the HP2020 goal for colorectal cancer mortality has not been met for American Indians. By sex, the HP2020 goal has not been met for American Indian and white males, as well as for American Indian females.

Colorectal cancer mortality by race/ethnicity – 2009-2013



Race/ethnicity	Total Rate	Count	Male Rate	Count	Female Rate	Count
American Indian	30.2	51	32.3	25	28.9	26
Asian/Pacific Islander	10.8	60	11.4	30	9.8	30
Black	11.0	83	13.2	49	8.8	34
Hispanic all races	8.2	29	7.0	15	8.7	14
White non-Hispanic	13.5	3,809	15.7	1,907	11.6	1,902
All Races Combined	13.5	4,041	15.7	2,031	11.7	2,010

Healthy People 2020 colorectal cancer mortality goal: 14.5 deaths/100,000

Risk factors and screening

Risk factors for colorectal cancer include non-modifiable factors such as age, inflammatory bowel disease, a personal or family history of colorectal cancer or colorectal polyps, a genetic syndrome such as familial adenomatous polyposis (FAP) or hereditary non-polyposis colorectal cancer (Lynch syndrome). Lifestyle factors that may contribute to an increased risk of colorectal cancer include being overweight, a diet low in fruit and vegetables, a low-fiber and high-fat diet, a lack of regular physical activity, alcohol consumption, and tobacco use (11).

Because screening can prevent colorectal cancer by removing precancerous polyps, not being screened is a risk factor for the disease (1). The ACS (12) and the USPSTF (13) have different recommendations for colorectal cancer screening that depend on age and family history. On May 30, 2018 the ACS updated screening guidelines for colorectal cancer by recommending that adults at average risk be screened starting at age 45 instead of 50, as previously recommended (12). If you have questions about whether you should be screened and when, please contact your health care provider. If you do not have a health care provider, you may be eligible for free colorectal cancer screening thought the MDH's Sage Scopes Program (14).

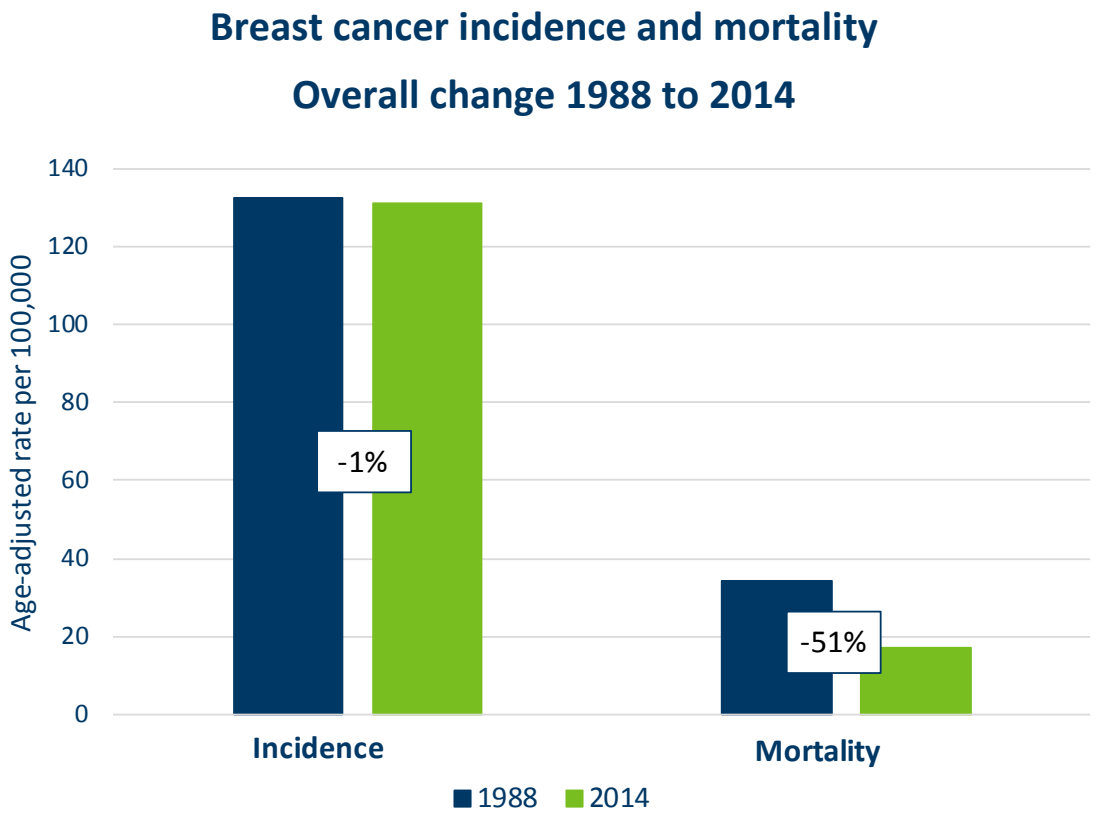
Breast cancer – Female only

In 2014, breast cancer was the most commonly diagnosed cancer in Minnesota and the second leading cause of cancer death in females. Breast cancer is predominantly a disease of females, but it can occur in men too. This report describes the burden of breast cancer in females. Breast cancer develops when cells in the breast grow out of control and form a tumor (15). Breast cancers can start in different parts of the breast including the ducts that carry milk to the nipple (ductal cancers) and glands that make breast milk (lobular cancers). The encouraging news is that the risk of dying from breast cancer has decreased and the chance of long-term survival has increased.

Changes in breast cancer occurrence between 1988 and 2014

The chart below and the table (Appendix B) show a large decline in breast cancer mortality between 1988 and 2014.

- The number of newly diagnosed breast cancers increased almost 50%, from 2,854 in 1988 to 4,221 in 2014. However, the age-adjusted rate of new breast cancer diagnoses decreased by only 1%, from 132.3 per 100,000 in 1988 to 131.0 per 100,000 in 2014.
- The number of females who died with breast cancer as the underlying cause of death on the death certificate decreased by nearly 25% between 1988 and 2014, with 765 deaths from breast cancer in 1988 compared with 589 deaths in 2014. Between 1988 and 2014, the age-adjusted mortality rate decreased by 51%, from 34.2 per 100,000 to 16.9 per 100,000.

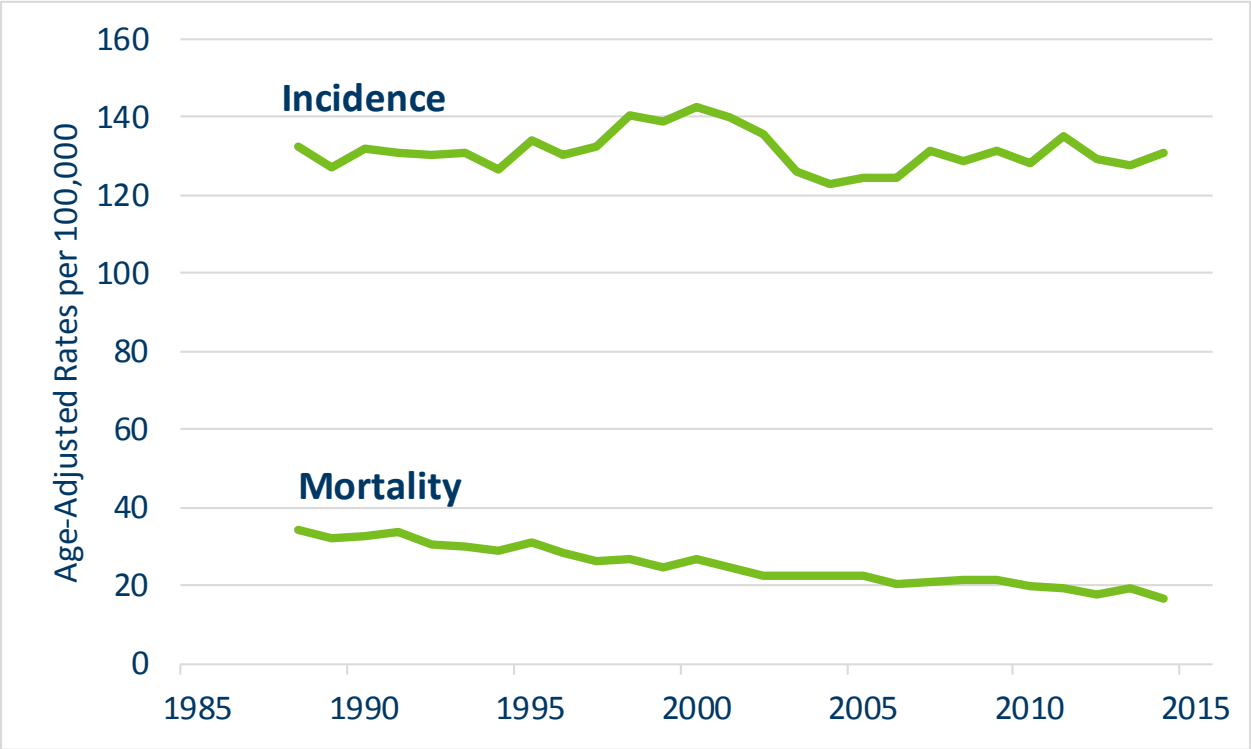


1988-2014 trends in female breast cancer incidence and mortality rates

The chart below shows that the incidence rate for breast cancer has fluctuated but the mortality rate for breast cancer has consistently decreased over the past 3 decades.

- Between 1988 and 2014, the incidence rate for female breast cancer in Minnesota has remained relatively stable. In the last ten years female breast cancer incidence rates also remained stable.
- Since 1988, the mortality rate for breast cancer among females in Minnesota has steadily declined. In the last ten years the breast cancer mortality rate decreased by 2.3 percent per year.

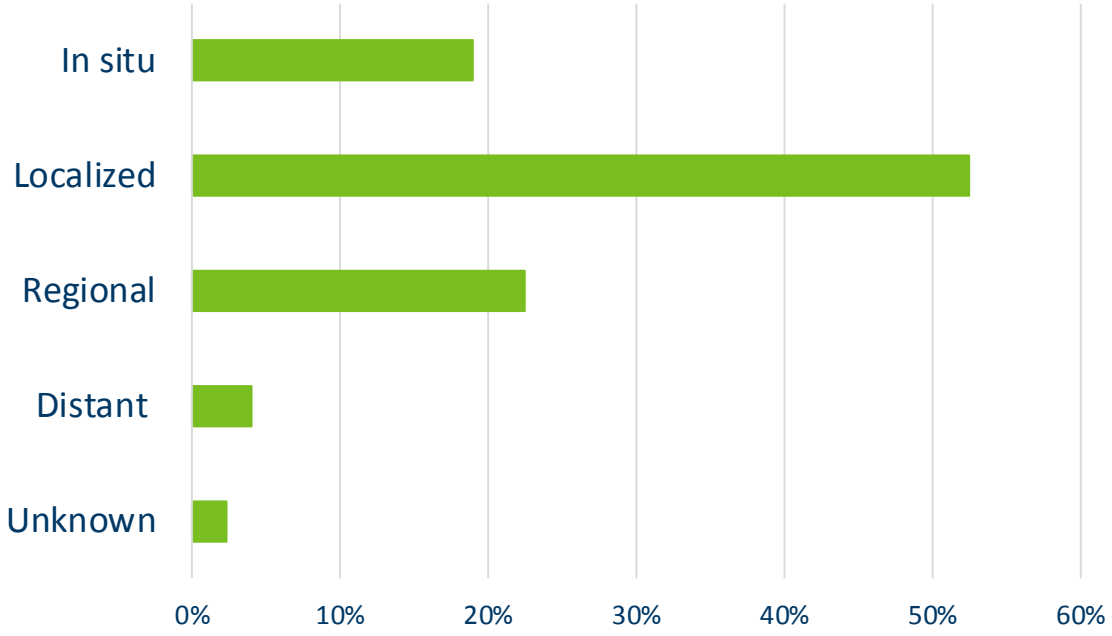
Breast cancer incidence and mortality rates



Breast cancer incidence by stage at diagnosis

- Between 2010 and 2014, slightly more than 70% of breast cancers were diagnosed at an early stage (18.9% in situ, 52.4% localized)

Breast cancer incidence by stage at diagnosis – 2010-2014

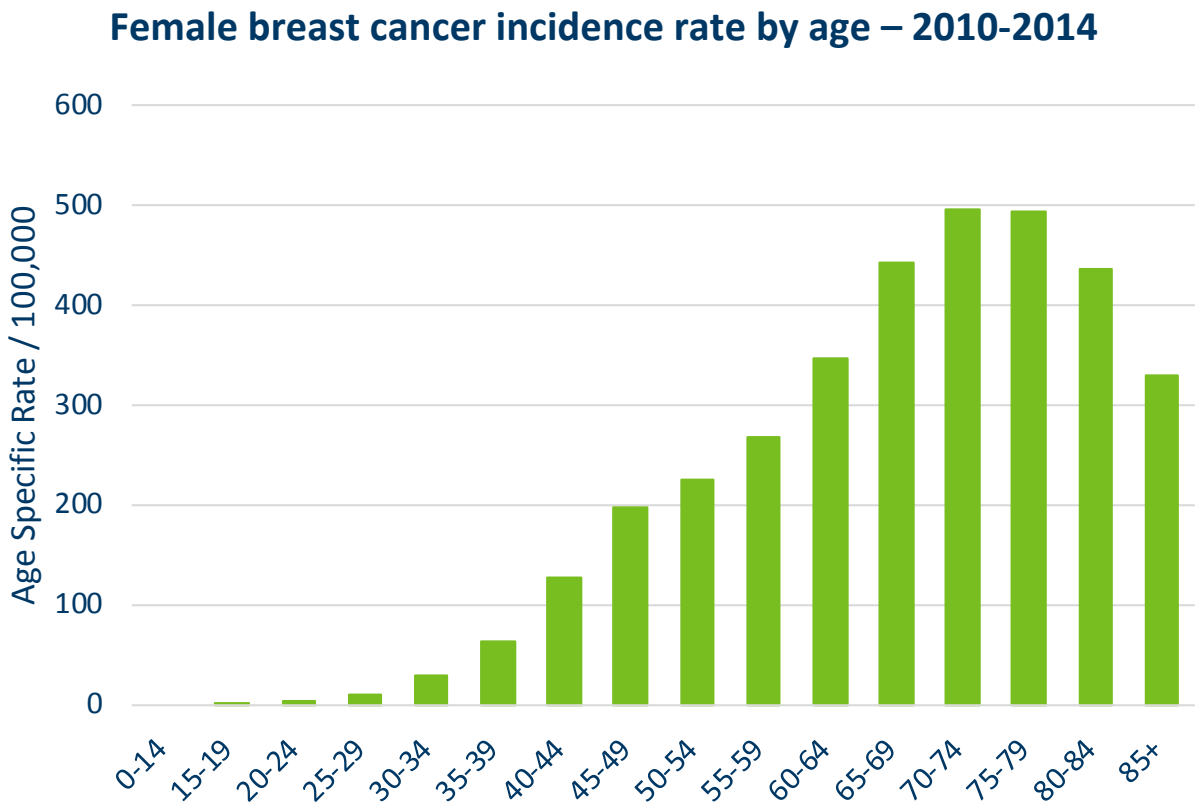


Stage	Count	%
In situ	4,734	18.9%
Localized	13,120	52.4%
Regional	5,608	22.4%
Distant	985	3.9%
Unknown	571	2.3%

Breast cancer incidence by age at diagnosis

The chart below shows how breast cancer incidence varies with age.

- Rates of new diagnoses of breast cancer increase steadily throughout adulthood until 70-74 years of age.
- The overwhelming majority (81%) of breast cancers are diagnosed in females aged 50 years or more, but 19% of new diagnoses in Minnesota are in females between 20 and 49 years of age. Very few breast cancers are diagnosed in children and teens less than 20 years of age.



Age	Rate	Count
0-14	0	1
15-19	0.2	2
20-24	2.4	21
25-29	10.2	93
30-34	28.0	253
35-39	62.2	500
40-44	127.0	1,087
45-49	197.5	1,858
50-54	224.7	2,293

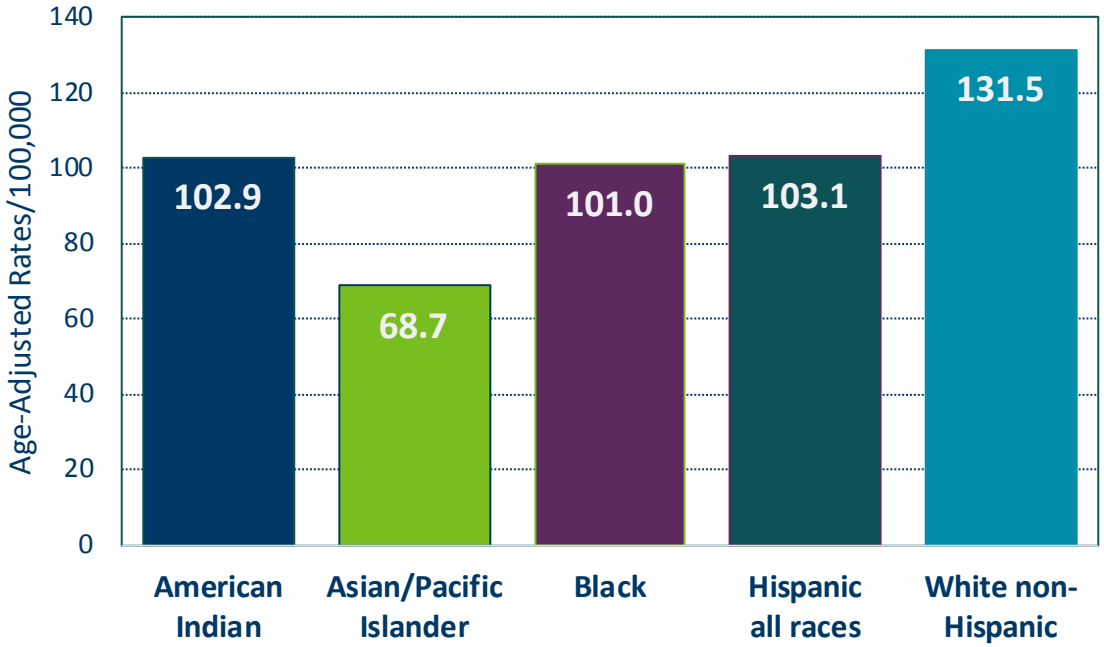
Age	Rate	Count
55-59	266.9	2,470
60-64	347.7	2,709
65-69	443.0	2,584
70-74	495.7	2,187
75-79	493.7	1,713
80-84	436.0	1,274
85+	330.3	1,237

Breast cancer incidence by race and ethnicity

The chart below shows that breast cancer was more common among white females in Minnesota compared with females of other racial and ethnic groups.

- The age-adjusted incidence rate for breast cancer was highest for females who were white and lowest for females who were Asian and Pacific Islander. The age-adjusted incidence rate of breast cancer for white females was between 1.3 and 1.9 times greater than the rates for females of all other racial and ethnic groups in Minnesota.

Breast cancer incidence by race/ethnicity – 2010-2014



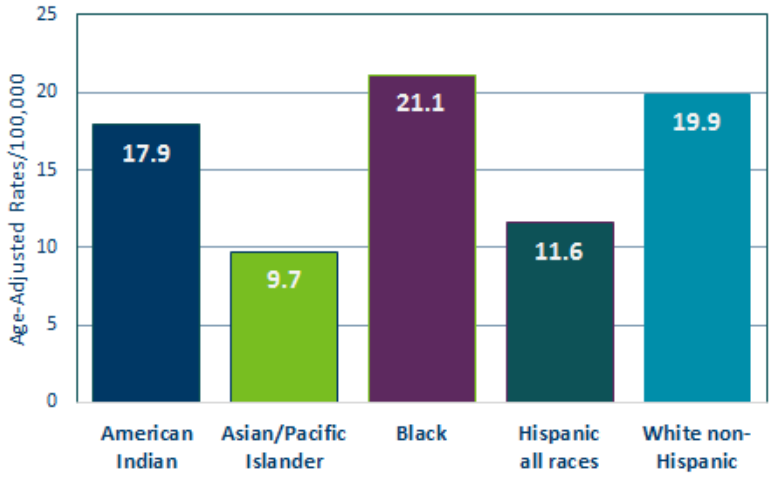
Race/ethnicity	Rate	Count
American Indian	102.9	149
Asian/Pacific Islander	68.7	298
Black	101.0	515
Hispanic all races	103.1	295
White non-Hispanic	131.5	18,768
All Races Combined	130.2	20,282

Breast cancer mortality by race and ethnicity

The chart below shows that breast cancer mortality rate was highest for black females in Minnesota.

- The age-adjusted breast cancer mortality rate was highest among Minnesota females who were black, followed by females who were white, and lowest for females who were Asian and Pacific Islanders.
- The rate for black females was 1.1 times higher than the rate for whites and 1.2 times higher for American Indian females. However the rate for black females was about double the mortality rate for Asian and Pacific Islanders and the rate for Hispanic females.
- HP2020 goal for breast cancer has not been achieved for black females in Minnesota.

Breast cancer mortality by race/ethnicity – 2009-2013



Race/ethnicity	Rate	Count
American Indian	17.9	24
Asian/Pacific Islander	9.7	32
Black	21.1	81
Hispanic all races	11.6	24
White non-Hispanic	19.9	3,072
All Races Combined	19.6	3,239

Healthy People 2020 breast cancer mortality goal: 20.7 deaths/100,000

Risk factors and screening

The reasons why breast cancer occurs in a particular woman are not well understood, however, some factors increase a woman's chance of getting the disease. Some of these factors can be controlled and others cannot be changed. Females with risk factors do not always develop the disease and females diagnosed with breast cancer often have no known risk factors. The risk of developing breast cancer increases with age, the strongest risk factor. Other factors (17) associated with developing breast cancer include: genetic alterations, breast density, a family history of breast cancer, a personal history of breast cancer, certain cellular changes found on biopsy, radiation therapy, alcohol, reproductive and menstrual history, long-term use of menopausal hormone replacement therapy, exposure to DES, being overweight, physical inactivity throughout life, and race (16).

The CDC (18) website describes breast cancer screening tests and recommendations that depend on age and family history. If you have questions about whether you should be screened and when, please contact your health care provider. If you do not have a health care provider, you may be eligible for free breast cancer screening thought the MDH's Sage Program (14). Treatment for non-insured, Sage patients may be covered by the Medical Assistance for Breast or Cervical Cancer (MA-BC).

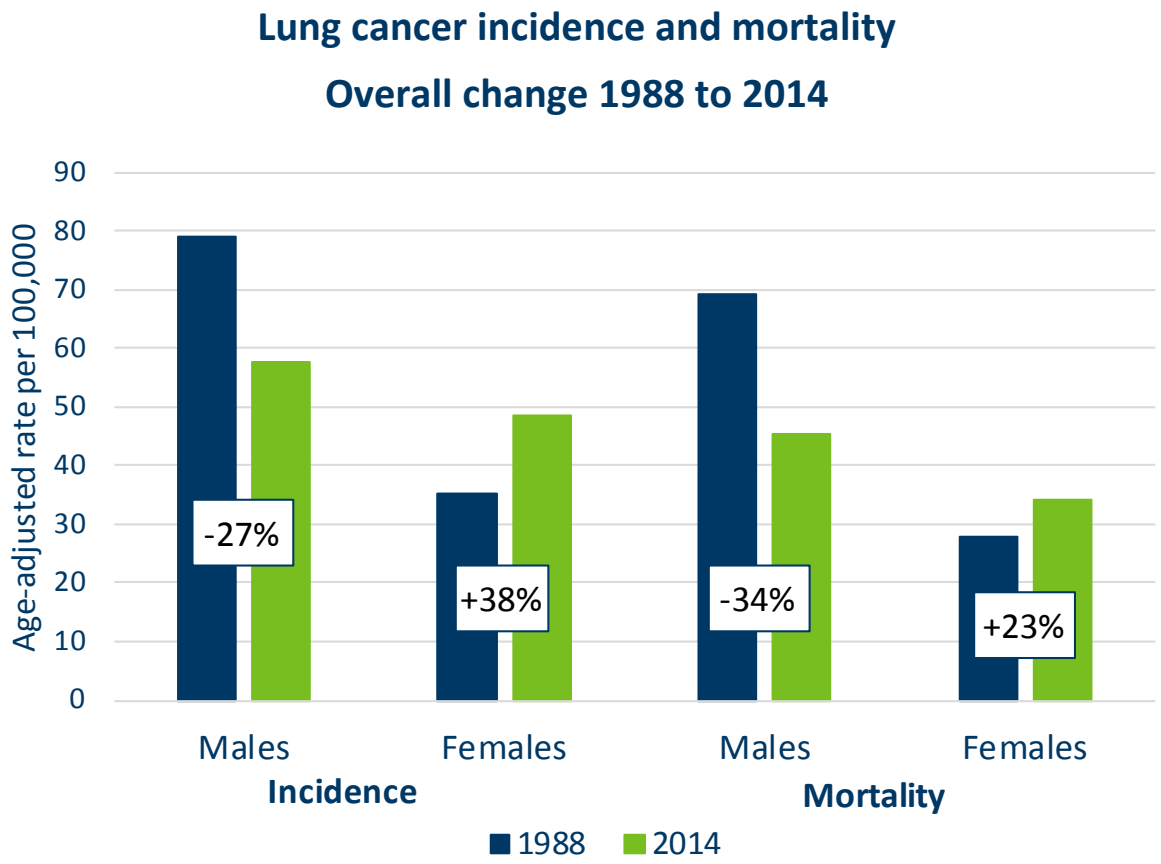
Lung and bronchus cancer

Lung and bronchus cancer (lung cancer) includes two man types: non-small cell lung cancer and small cell lung cancer (19). Smoking causes most lung cancers, but nonsmokers can also develop the disease. Lung cancer is the second most commonly diagnosed cancer among males and females in Minnesota and is the leading cause of cancer death for each sex. It accounts for 12% of cancers and 25% of Minnesota cancer deaths.

Changes in lung cancer occurrence between 1988 and 2014

The chart below and the trend data (Appendix B) show that between 1988 and 2014, the burden of lung cancer has decreased for males but increased for females in Minnesota.

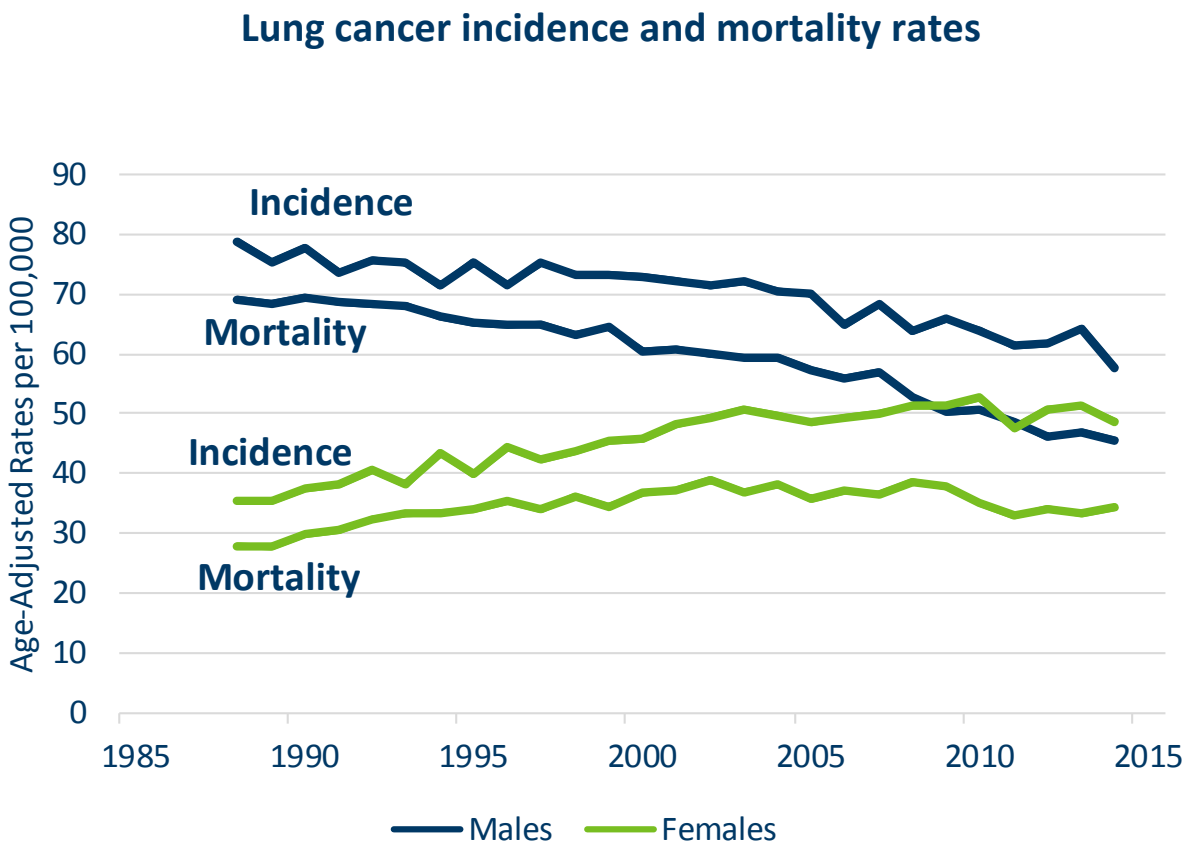
- Between 1988 and 2014, the number of new cases of lung cancer increased by nearly 20% in males, from 1,395 to 1,662. The age-adjusted incidence rate for lung cancer among males decreased by 27%, from 78.9 per 100,000 to 57.6 per 100,000.
- The number of new lung cancer cases diagnosed in females more than doubled from 775 in 1988 to 1,643 in 2014, representing an increase of 112%. The age-adjusted incidence rate for lung cancer among Minnesota females also increased by 38% over this period, from 35.3 per 100,000 to 48.7 per 100,000.
- Between 1988 and 2014, the number of lung cancer deaths increased by 8% for males whereas the age-adjusted mortality rate decreased by 34%. By contrast, both the number of lung cancer deaths and the age-adjusted mortality rate for females increased.



1988-2014 trends in lung and bronchus incidence and mortality rates

The chart and tables (Appendix B) show that lung and bronchus cancer trends are markedly different for males and females in Minnesota.

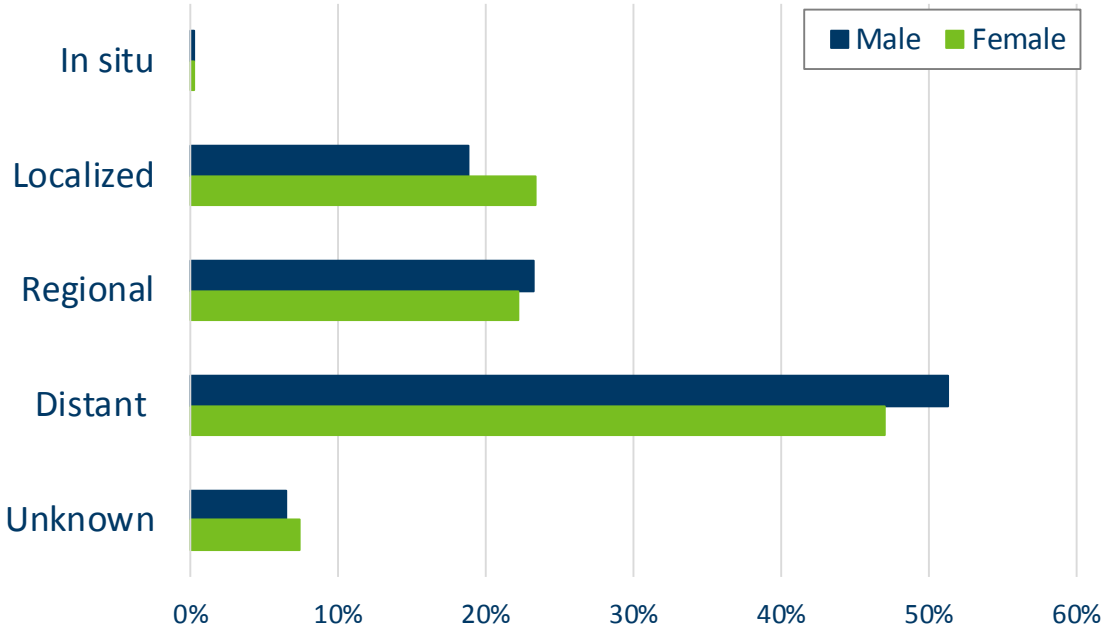
- Among males, lung cancer incidence and mortality rates have consistently decreased since 1988. Over the last ten years incidence rates decreased by 1.5 percent per year, while mortality rates for males decreased by 2.7 percent per year.
- Among females, lung cancer incidence increased rapidly between 1988 and 2003 and, on average, remained unchanged between 2003 and 2014. Mortality rates for Minnesota females decreased, on average, by 1.2 percent per year between 2003 and 2014.



Lung cancer incidence by stage at diagnosis

- From 2010-2014, about half of all lung and bronchus cancer in Minnesota males and females were distant at the time of diagnosis. Less than 25% of cases were at an early stage – in situ or localized.

Lung and bronchus cancer stage at diagnosis – 2010-2014

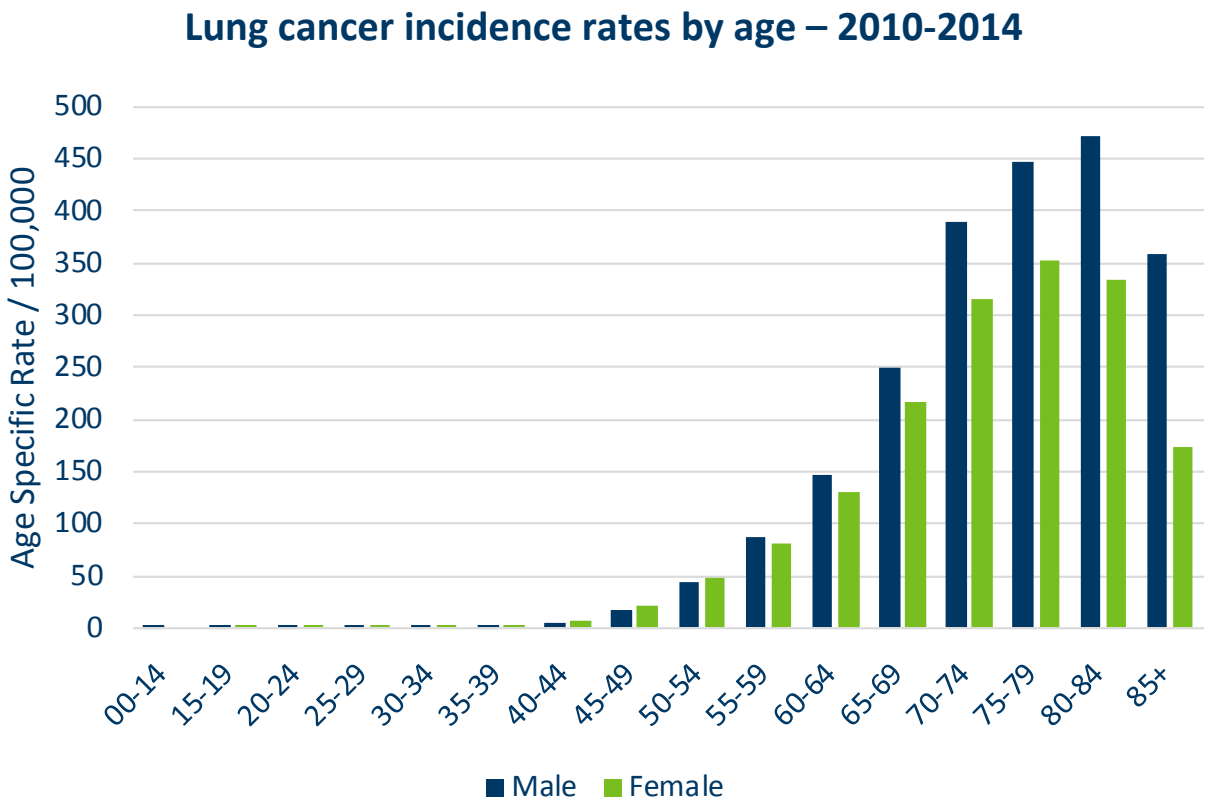


Stage	Males Count	Males %	Females Count	Females %
In situ	19	0.2%	16	0.2%
Localized	1,588	18.8%	1,891	23.4%
Regional	1,960	23.2%	1,789	22.1%
Distant	4,327	51.3%	3,794	46.9%
Unknown	544	6.4%	594	7.3%

Lung cancer incidence by age at diagnosis

The chart below shows how lung cancer incidence varies with age.

- The incidence of lung cancer increases with age and peaks between 80 and 84 years of age in males and between 75-79 years of age in females.
- From 2010-2014, about 97% of diagnoses in Minnesotans were in people age 50 and older, with half of all cases diagnosed after age 70 years.



Age	Male Rate	Male Count	Female Rate	Female Count
00-14	0.1	2	0	0
15-19	0.2	2	0.1	1
20-24	0.1	1	0.5	4
25-29	0.6	6	0.2	2
30-34	0.6	6	0.9	8
35-39	2.4	20	3.2	26
40-44	5.6	49	7.4	63
45-49	17.9	169	22.2	209
50-54	43.6	443	48.0	490
55-59	86.9	799	80.2	742
60-64	146.9	1,114	129.8	1,011

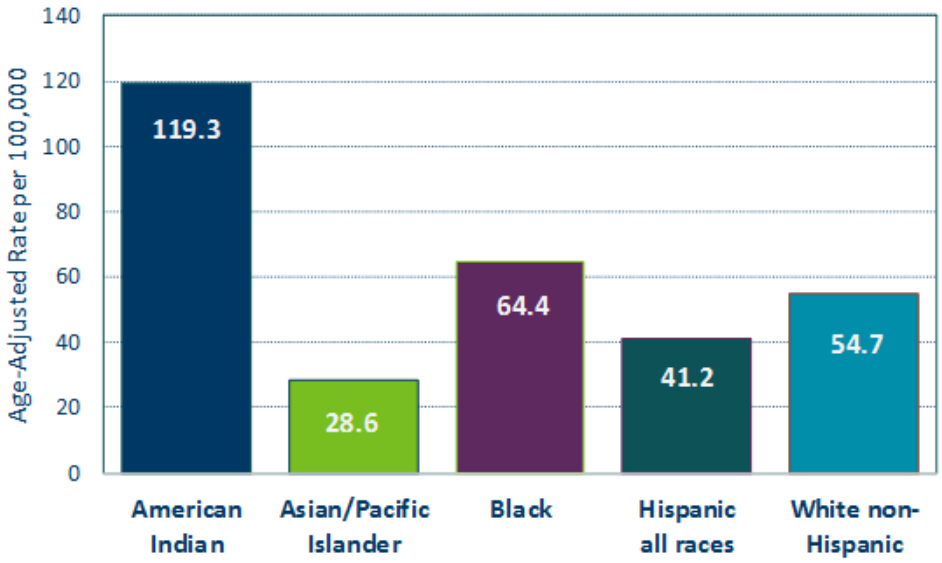
Age	Male Rate	Male Count	Female Rate	Female Count
65-69	250.3	1,367	217.0	1,266
70-74	389.8	1,522	316.4	1,396
75-79	447.7	1,268	352.5	1,223
80-84	472.5	984	334.0	976
85+	358.1	666	173.5	650

Lung cancer incidence by race and ethnicity

The chart below shows the high burden of lung cancer incidence among American Indian males and females in Minnesota.

- Overall and by sex, the age-adjusted lung cancer incidence rate was highest among American Indians, followed by blacks, whites, Hispanics of all races, and lowest for Asian and Pacific Islanders.
- The lung cancer incidence rate for American Indian males in Minnesota was between 1.7 and 3.8 times greater than the rates for males of all other racial and ethnic groups. The rate for American Indian females was between 2.0 and 4.6 times greater than the rates for females of all other racial and ethnic groups.

Lung and bronchus cancer incidence by race/ethnicity – 2010-2014



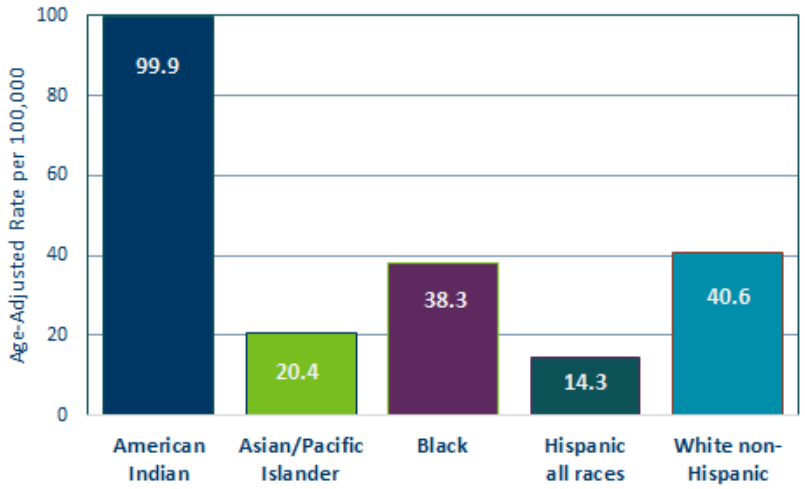
Race/ethnicity	Total Rate	Count	Male Rate	Count	Female Rate	Count
American Indian	119.3	250	135.9	123	107.2	127
Asian/Pacific Islander	28.6	179	36.0	96	23.1	83
Black	64.4	461	79.8	258	52.6	203
Hispanic all races	41.2	142	52.6	83	32.2	59
White non-Hispanic	54.7	15,379	61.1	7,825	50.1	7,554
All Races Combined	55.0	16,485	61.7	8,418	50.2	8,067

Lung cancer mortality by race and ethnicity

The chart below shows the excess burden of lung cancer mortality among American Indian males and females in Minnesota.

- Overall, mortality rates for lung and bronchus cancer in Minnesota was highest for American Indians and lowest for Hispanics of all races.
- Among males, the lung and bronchus cancer mortality rate for American Indians was between 2.5 and 8.2 times greater than the rates for males of all other racial and ethnic groups. Among females, the 2009-2013 morality rate for American Indians was between 2.4 and 6.4 times greater than the rates for females of all other racial and ethnic groups.
- The HP2020 goal for lung cancer mortality has not been achieved for American Indian males and females, and males who are of black or white race and ethnicity.

Lung and bronchus cancer mortality by race/ethnicity – 2009-2013



Race/ethnicity	Total Rate	Count	Male Rate	Count	Female Rate	Count
American Indian	99.9	179	123.6	93	83.3	86
Asian/Pacific Islander	20.4	105	28.9	62	14.8	43
Black	38.3	249	50.8	148	28.7	101
Hispanic all races	14.3	48	15.1	29	13.0	19
White non-Hispanic	40.6	11,218	48.5	5,956	35.0	5,262
All Races Combined	40.4	11,805	48.4	6,295	34.5	5,510

Healthy People 2020 lung cancer mortality goal: 45.5 deaths/100,000

Risk factors and screening

Smoking is the leading cause of lung and bronchus cancer worldwide. Other risk factors for lung and bronchus cancer include exposure to radon, an invisible, odorless gas, and exposure to secondhand smoke. Occupational exposure to asbestos, arsenic, chromium, and metal dust, and exposure to air pollution and arsenic in drinking water also increase the risk of developing lung and bronchus cancer. In cigarette smokers, the risk is even higher for many of these exposures. The risk of developing lung and bronchus cancer is increased in smokers who take beta-carotene supplements (20,21,22).

Smoking cessation is the best way to prevent lung and bronchus cancer. Radon reduction is another important way to prevent lung cancer. In Minnesota, 40 percent of homes have radon level high enough to pose a health risk (23). The Minnesota Department of Health (MDH) recommends that every home in Minnesota be tested for elevated radon levels (24). If radon testing finds the home's level is elevated, the home owner should seek remediation by a qualified contractor (25).

The CDC (26) supports screening certain current and former cigarette smokers for lung and bronchus cancer as recommended by the U.S. Preventive Services Task Force (USPSTF) (27). The ACS (28) also has screening guidelines for lung and bronchus cancer. If you have questions about you should be screened and when, please contact your health care provider.

Melanoma of the skin

Melanoma is a cancer that begins in cells called melanocytes that make the pigment, melanin (29). Melanoma of the skin is the fifth most common cancer diagnosed in both Minnesota males and females. The disease also rarely occurs in pigmented cells in any other site in the body. This report describes the incidence and mortality of melanoma of the skin. US central cancer registries do not track the most common forms of skin cancer, basal and squamous cell carcinomas (23). Special studies are periodically conducted to estimate the frequency of these non-melanoma skin cancers (31). Non-melanomas are rarely fatal when appropriately treated. Compared with basal and squamous cell skin cancers, melanomas are more likely to invade nearby tissues and spread to other parts of the body.

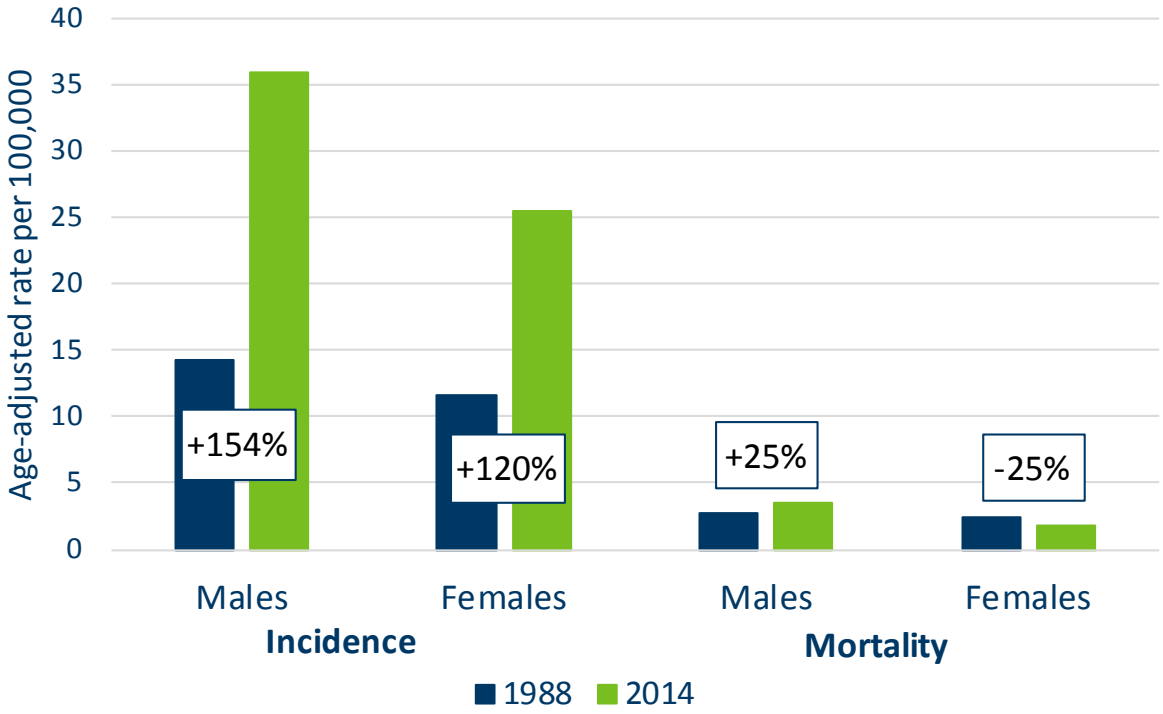
Changes in melanoma of the skin occurrence between 1988 and 2014

The chart below and trend data (Appendix B) show that the incidence of melanoma has increased dramatically between 1988 and 2014.

- Between 1988 and 2014, the number of new cases of melanoma of the skin increased by 300 percent in males in Minnesota, from 258 newly diagnosed cancers in 1988 to 1,040 in 2014. Age-adjusted incidence for males has increased by 154 percent during this period, from 14.2 per 100,000 in 1988 to 36 per 100,000 in 2014.
- The number of new cancers diagnosed in females has climbed by nearly 210 percent between 1988 and 2014. During this time, the age-adjusted incidence rate increased for females by 120 percent, from 11.6 per 100,000 to 25.5 per 100,000.
- Among males, the number of deaths from melanoma increased by nearly 100 percent, with 49 deaths in 1988 compared to 96 deaths in 2014. The age-adjusted mortality rate between 1988 and 2014 increased as well, from 2.8 per 100,000 to 3.5 per 100,000 and representing an increase of 25 percent.
- Although the number of deaths from melanoma increased among females between 1988 and 2014 (52 in 1988 versus 62 in 2014), the mortality rate for Minnesota females decreased by 25 percent.

Melanoma of the skin incidence and mortality

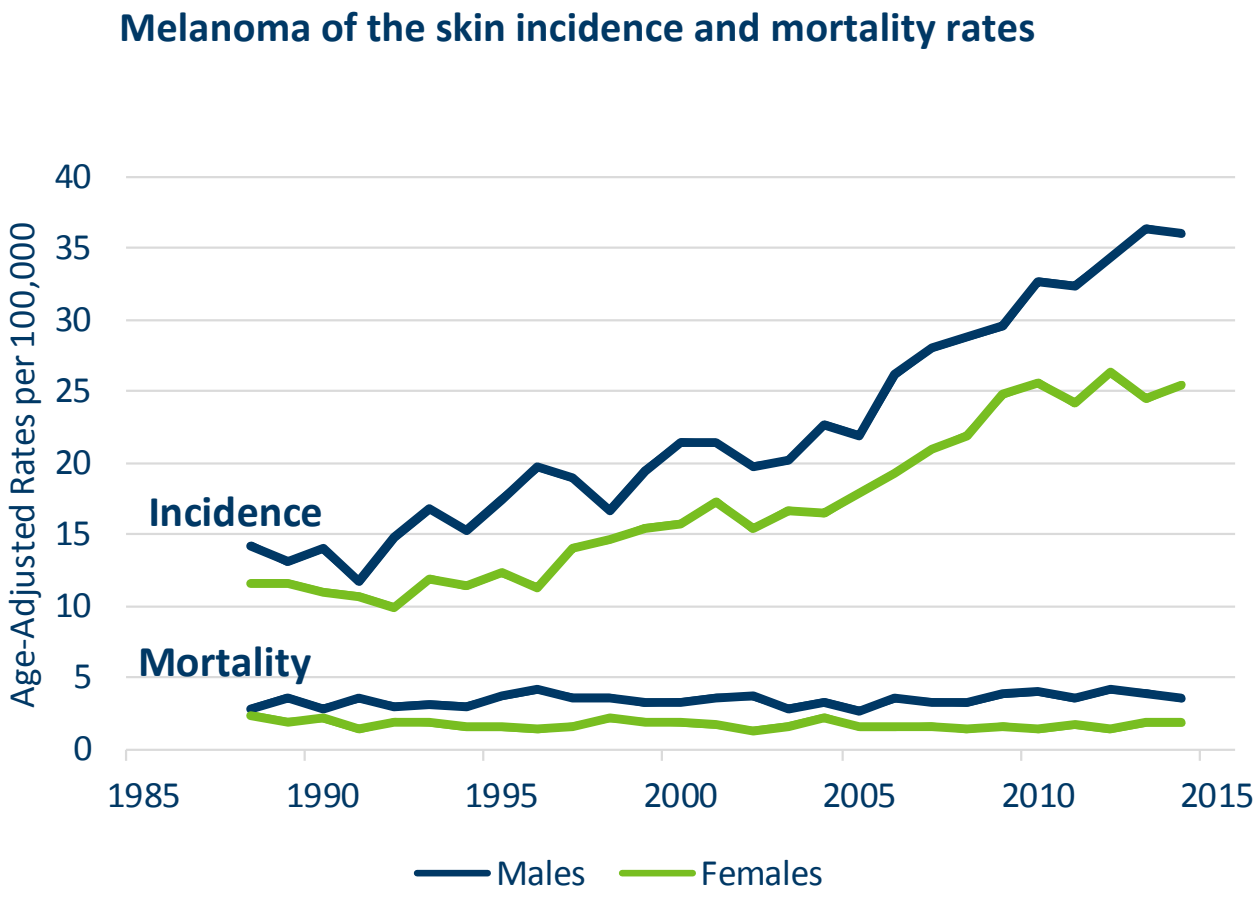
Overall change 1988 to 2014



1988-2014 trends in melanoma of the skin incidence and mortality rates

The chart below shows that incidence rates for melanoma of the skin have increased markedly in both males and females over the past three decades in Minnesota.

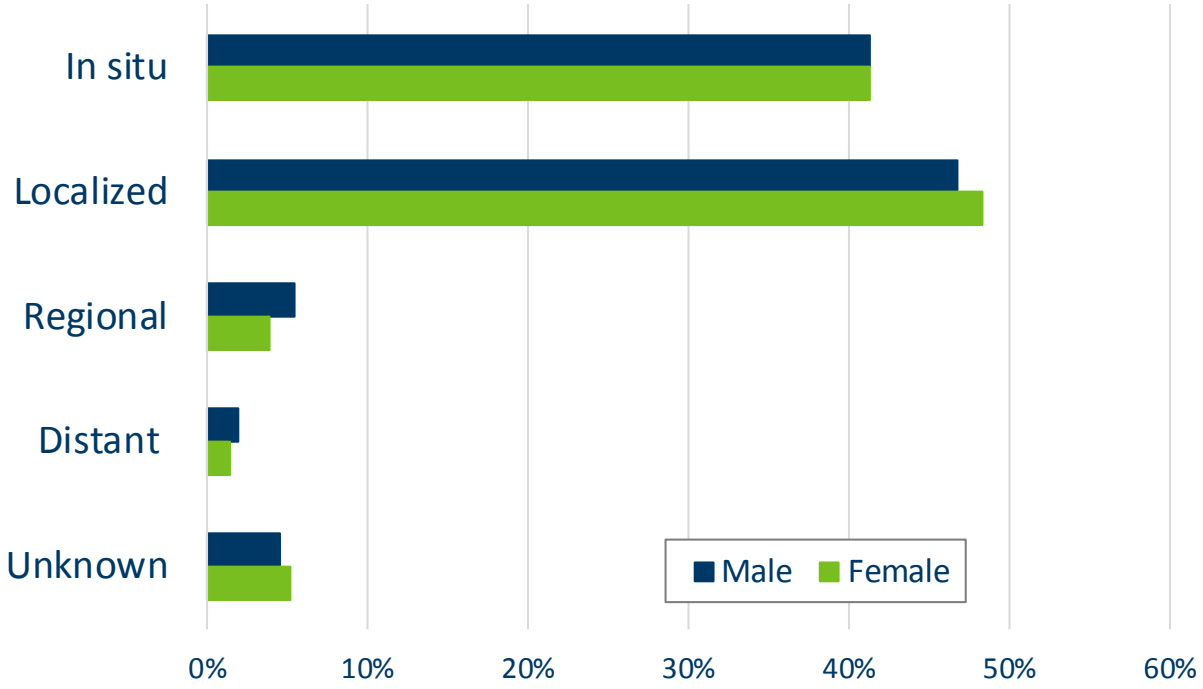
- In the last ten years, melanoma incidence rates increased by 5.1 percent per year for males and by 3.9 percent per year for females.
- Increases in mortality rates over the last ten years are evident, especially for males, but not as pronounced as the increases in incidence. In the last ten years, the melanoma skin cancer mortality rate increased by 2.9 percent per year for males and by 1.9 percent per year for females.



Melanoma of the skin incidence by stage at diagnosis

- During 2010-2014, nearly 90 percent of newly diagnosed melanomas were diagnosed at an early stage (in situ or localized) for both males and females.
- The proportion of late (regional or distant) stage melanomas was slightly greater for males than females.

Melanoma of the skin stage at diagnosis – 2010-2014



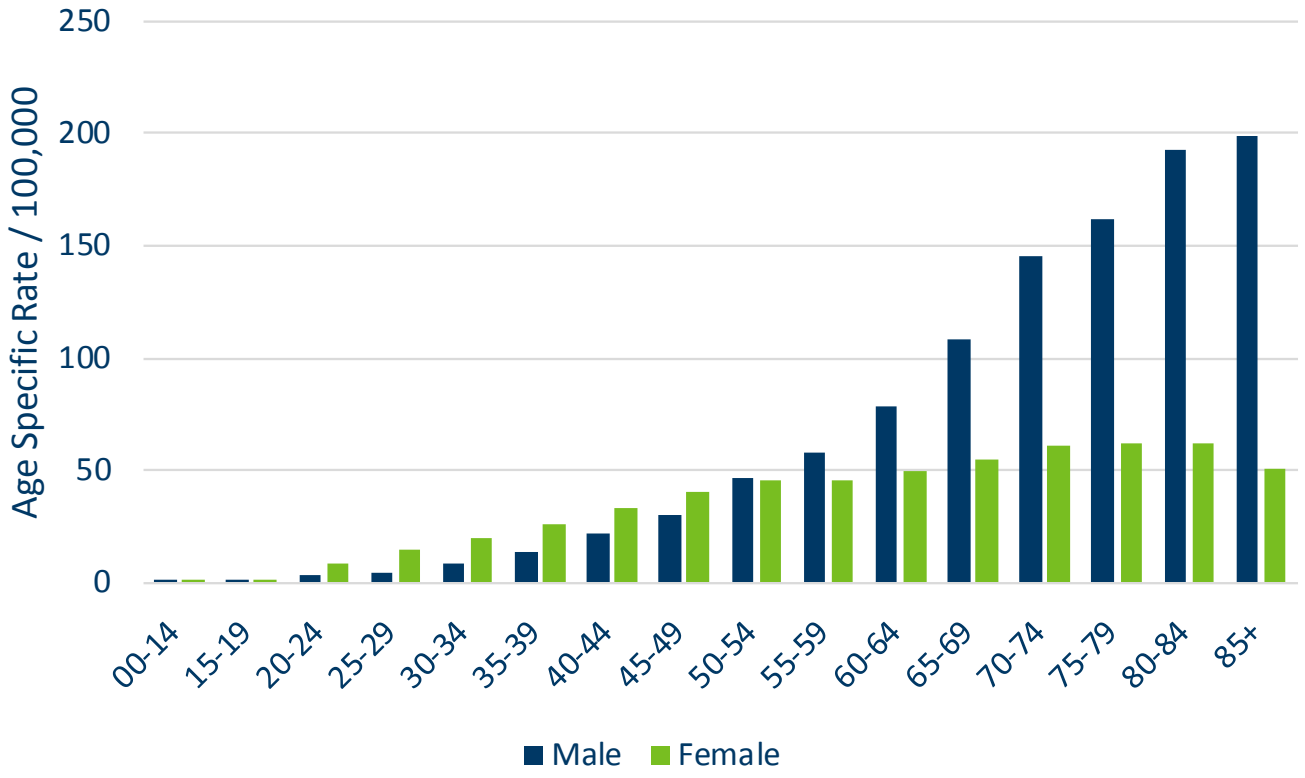
Stage	Males Count	Males %	Females Count	Females %
In Situ	3,352	41.3%	2,629	41.3%
Localized	3,795	46.8%	3,073	48.3%
Regional	439	5.4%	246	3.9%
Distant	154	1.9%	88	1.4%
Unknown	371	4.6%	330	5.2%

Melanoma of the skin incidence by age at diagnosis

The chart below shows that the incidence of melanoma of the skin by age group is different for males and females, with incidence rates dramatically higher in males aged 55 years and older.

- Prior to age 50, the incidence of melanoma was somewhat greater in females than males. Among females, 35 percent of melanomas were diagnosed prior to age 50, whereas among males 16 percent of melanomas were diagnosed prior to age 50.
- After age 50, the incidence of melanoma was substantially greater in males than females. Among males, 84 percent of melanomas were diagnosed at age 50 and older, whereas among females 65 percent of melanomas were diagnosed at age 50 or older.
- Among males, the rates of new melanoma diagnoses increased with every age group and peak at age 85+. By contrast, the rates for females increased gradually with every age group but stabilized around age 65 and then declined at age 85+.

Melanoma of the skin incidence rates by age – 2010-2014



Age	Male Rate	Male Count	Female Rate	Female Count
00-14	0.3	8	0.1	3
15-19	1.2	11	1.7	15
20-24	3.3	30	8.3	73
25-29	4.4	41	15.3	140

Age	Male Rate	Male Count	Female Rate	Female Count
30-34	9.0	83	20.4	184
35-39	14.0	116	26.6	214
40-44	22.2	193	33.3	285
45-49	30.4	287	40.2	378
50-54	47.0	478	45.3	462
55-59	57.6	530	45.5	421
60-64	78.3	594	49.8	388
65-69	108.0	590	54.5	318
70-74	145.7	569	61.0	269
75-79	161.4	457	62.5	217
80-84	193.0	402	62.3	182
85+	199.0	370	50.7	190

Melanoma of the skin incidence by race and ethnicity

The chart and data table below shows the high burden of incident melanomas on white males and females in Minnesota.

- Overall, the incidence of melanoma of the skin was highest among whites, followed by Hispanics and American Indians.
- The 2010-2014 incidence rates for males among whites and Hispanics of all races were greater than females of the corresponding race and ethnicity. The rates for other racial and ethnic groups were unstable.

Melanoma of the skin incidence by race/ethnicity – 2010-2014

(N/A denotes unstable rate)

Race/ethnicity	Total Rate	Count	Male Rate	Count	Female Rate	Count
American Indian	7.1	20	N/A	9	N/A	11
Asian/Pacific Islander	N/A	10	N/A	7	N/A	3
Black	N/A	7	N/A	2	N/A	5
Hispanic all races	8.0	42	9.3	20	7.1	22
White non-Hispanic	29.5	7,780	34.9	4,416	25.7	3,364
All Races Combined	29.0	8,498	34.4	4,759	25.3	3,739

Melanoma of the skin mortality by race and ethnicity

The chart and data table below shows that the burden of melanoma mortality by sex differs slightly between males and females.

- Among whites, the 2009-2013 mortality rate for males was greater than for females. The mortality rates for other races and ethnic groups were unstable.
- The HP2020 goal for melanoma mortality has not been achieved for white males.

- **Melanoma of the skin mortality by race/ethnicity – 2009-2013**

(N/A denotes unstable rate)

Race/ethnicity	Total Rate	Count	Male Rate	Count	Female Rate	Count
American Indian	N/A	3	N/A	3	N/A	0
Asian/Pacific Islander	N/A	1	N/A	0	N/A	1
Black	N/A	2	N/A	2	N/A	0
Hispanic all races	N/A	4	N/A	1	N/A	3
White non-Hispanic	2.7	747	4.1	497	1.7	250
All Races Combined	2.6	758	3.8	503	1.6	255

Healthy People 2020 melanoma cancer mortality goal: 2.4 deaths/100,000

Risk factors and screening

Excessive exposure to sunlight, particularly intense intermittent exposure during childhood and adolescence through young adulthood, is the primary risk factor for melanoma. Exposure to ultraviolet radiation through indoor tanning is another important risk factor for melanoma of the skin. Having fair skin color and blue or green eyes, several large or many small moles, or genetic conditions of dysplastic nevi are physical traits that are associated with an increased risk of developing melanoma. Individuals with a personal or family history of melanoma or those who are immunosuppressed also have increased risk of melanoma (32).

The USPSTF does not recommend screening for skin cancer for people who do not have a history of skin cancer and do not have any suspicious moles or other spots (33). However, in March 2018, the USPSTF Skin Cancer Prevention: Behavioral Counseling updated guidelines to recommend counseling young adults, adolescents, children and parents of young children about minimizing exposure to ultraviolet radiation for persons aged six months to 24 years with fair skin types to reduce their risk of skin cancer (34). The ACS does not have guidelines for the early detection of skin cancer, but offers information on how to detect skin cancer early (35).

The 2015 Minnesota Legislature passed a law prohibiting minors from using indoor tanning beds (36). The results of a University of Minnesota, School of Public Health research study (which used MCRS data) was a key consideration for legislators (37).

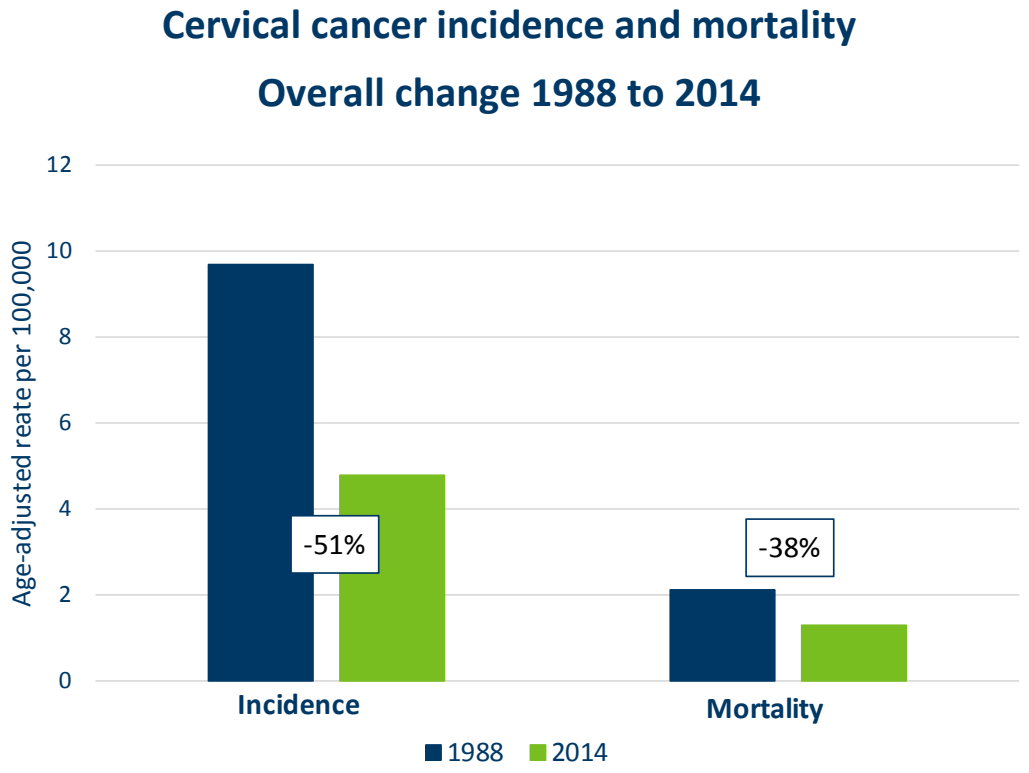
Cervical cancer

Cervical cancer usually begins as a pre-cancer and takes years to develop (38). The primary cause of nearly all cases of cervical cancer is human papillomavirus, a sexually transmitted infection (39). HPV-16 and HPV-18 are the two HPV types most often associated with invasive cervical cancer and HPV related cancers (39). Research has shown that HPV infections can be prevented with vaccination at an early age before sexual initiation (40). Once the most common cause of cancer deaths in US females in the 1930s (41), cervical cancer incidence and mortality rates have decreased with the introduction of Pap Test screening in the 1940s (42). Recently, the CDC has identified controlling cervical cancer though screening and HPV vaccination as one of the ten top public health achievements in the U.S. between 2001 and 2010 (43). In June 2018, the ACS launched *Mission: HPV Cancer Free*, a public health campaign to eliminate vaccine-preventable HPV cancers in the next 40 years, starting with cervical cancer. Along with continued screening, the goal of the campaign is to have 80 percent of 13-year-old boys and girls in the U.S. fully vaccinated with HPV vaccine by 2026 (44).

Change in cervical cancer occurrence between 1988 and 2014

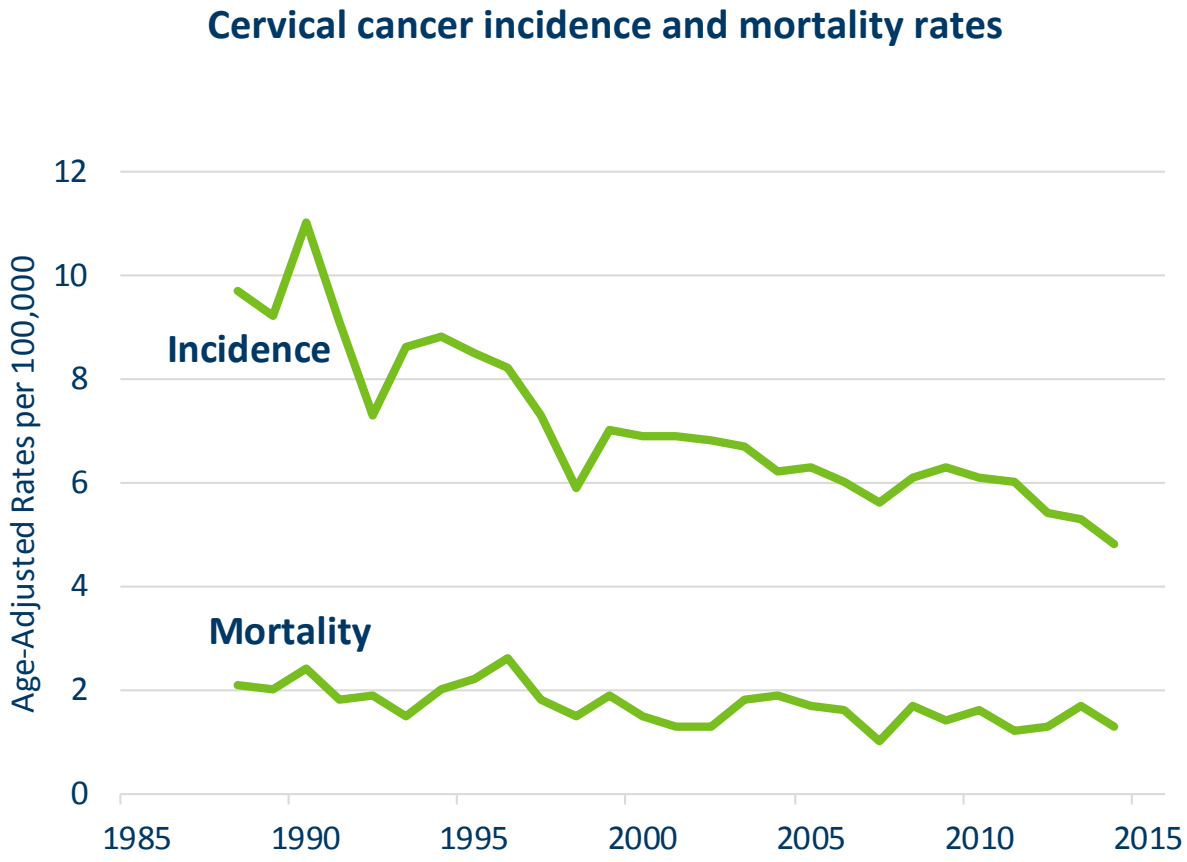
The chart below and the trend data (Appendix B) show that between 1988 and 2014 the burden of cervical cancer in Minnesota has decreased.

- Between 1988 and 2014, the number of newly diagnosed cervical cancers decreased by 32 percent and the number of cervical cancer deaths decreased by 11 percent.
- The rate of new diagnoses of cervical cancer has decreased by 51 percent since 1988, from 9.7 per 100,000 to 4.8 per 100,000. The rate of deaths due to cervical cancer also decreased since 1988. In 2014, the cervical cancer mortality rate was 38 percent lower than in 1988.



1988-2014 trends in cervical cancer incidence and mortality rates

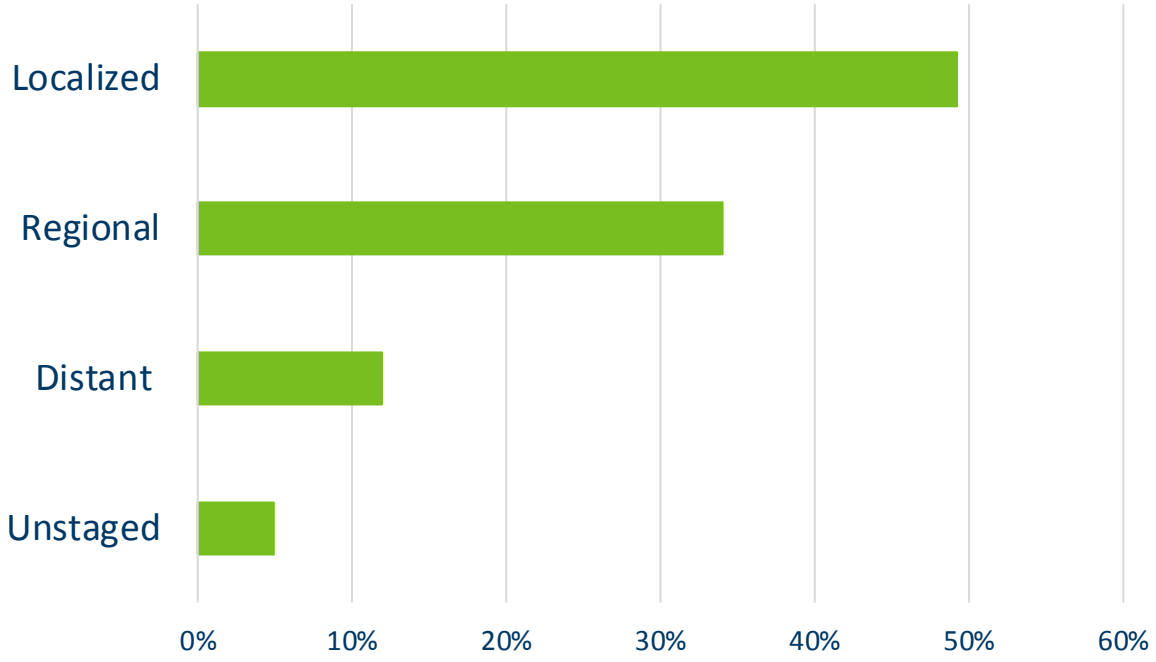
- In 2014, 140 new cases of cervical cancer were diagnosed in Minnesota females and the age-adjusted incidence rate was 4.8 cases per 100,000. Between 2005 and 2014 the incidence rate of cervical cancer decreased annually by 2.2 percent.
- In 2014, 41 female Minnesotans died with cervical cancer as the underlying cause of death on the death certificate and the age-adjusted mortality rate was 1.3 deaths per 100,000. Between 2005 and 2014, the rate of deaths due to cervical cancer remained stable.



Cervical cancer incidence by stage at diagnosis

- From 2010-2014, nearly half of all invasive cervical cancers were localized at the time of diagnosis in females of Minnesota. The chart below does not include counts of in situ cancers, which are not reported to the state registry.

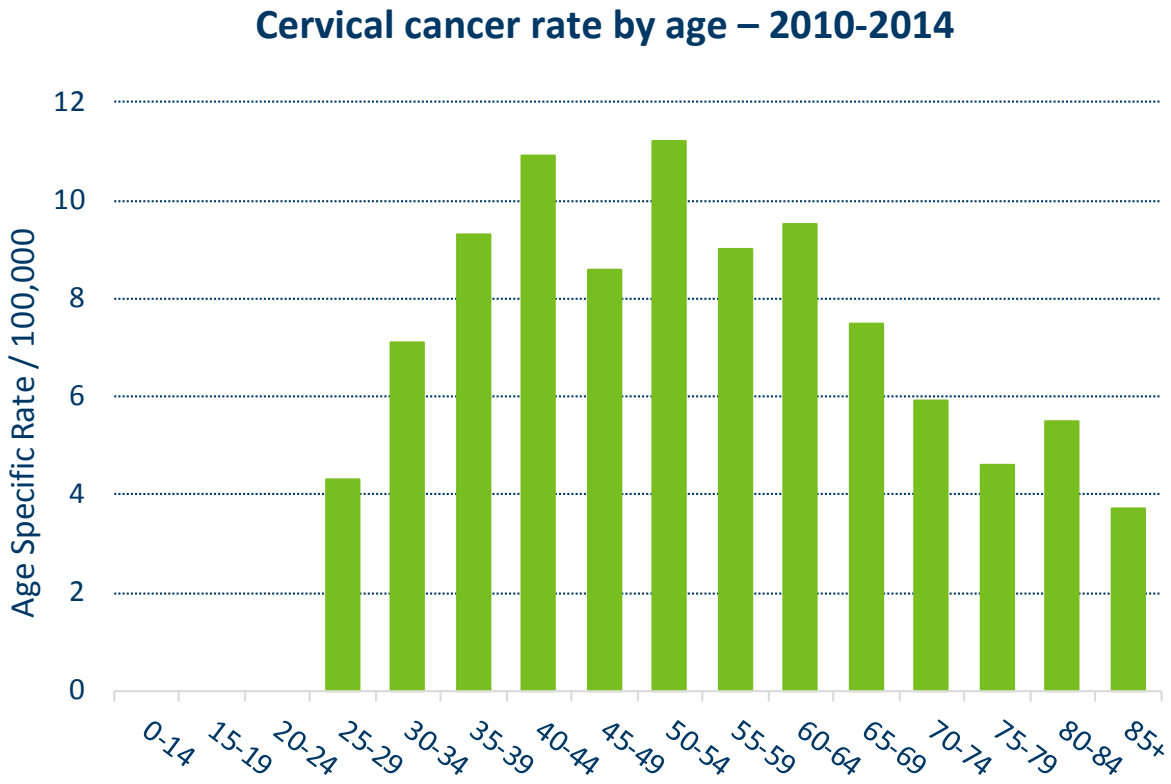
Cervical cancer stage at diagnosis – 2010-2014



Stage	Count	%
Localized	381	49.2%
Regional	263	34.0%
Distant	92	11.9%
Unknown	38	4.9%

Cervical cancer incidence by age at diagnosis

- The incidence rate for invasive cervical cancer increases with age beginning at age 20 and peaks at age 50-54 years. Cervical cancer tends to be diagnosed at young ages, with half of all invasive cervical cancers diagnosed in females under age 51 years.



Age	Rate	Count
0-14	0.0	0
15-19	0.0	0
20-24	0.0	0
25-29	4.3	39
30-34	7.1	64
35-39	9.3	75
40-44	10.9	93
45-49	8.6	81
50-54	11.2	114
55-59	9.0	83
60-64	9.5	74
65-69	7.5	44

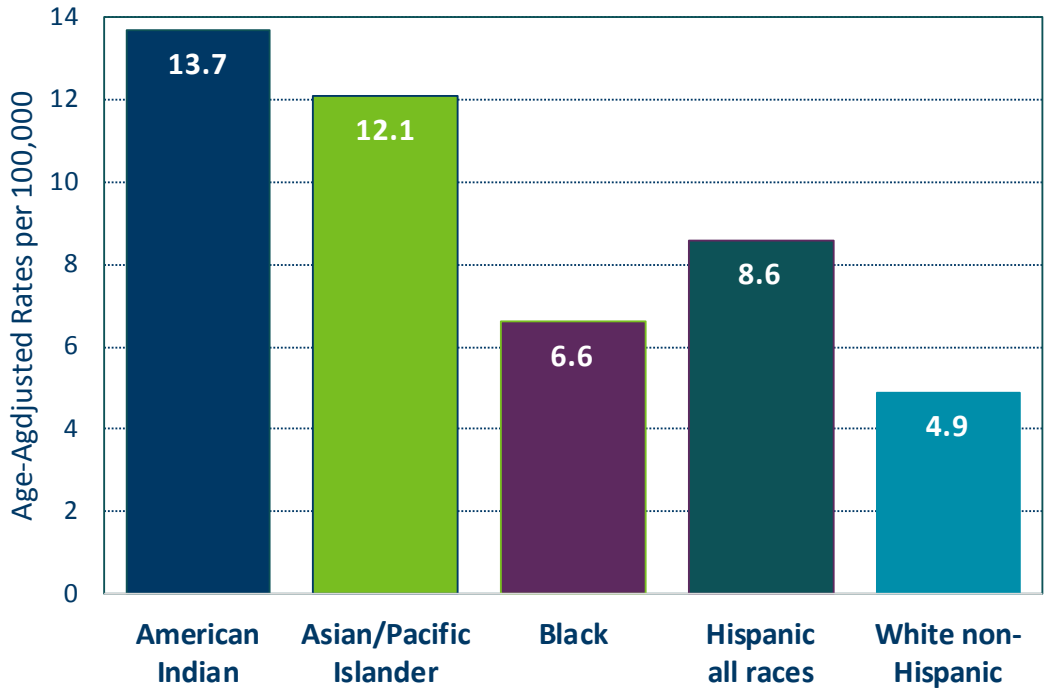
Age	Rate	Count
70-74	5.9	26
75-79	4.6	16
80-84	5.5	16
85+	3.7	14

Cervical cancer incidence by race and ethnicity

The chart below shows that the burden of cervical cancer is greater for women of color and American Indians than whites in Minnesota.

- American Indian females had the highest incidence rate, closely followed by females who were Asian and Pacific Islander. Females who were white had the lowest invasive cervical cancer incidence rate.
- The incidence rate for American Indian females was 2.8 times the rate for white females and 2.1 times the rates for black females. It is also of note that the incidence rate for Asian and Pacific Islander females ranged between 1.8 to 2.5 times greater than the rates for females who were black, Hispanic of all races, and white.

Cervical cancer incidence by race/ethnicity – 2010-2014



Race/ethnicity	Rate	Count
American Indian	13.7	23
Asian/Pacific Islander	12.1	52
Black	6.6	39
Hispanic all races	8.6	35
White non-Hispanic	4.9	602
All Races Combined	5.5	774

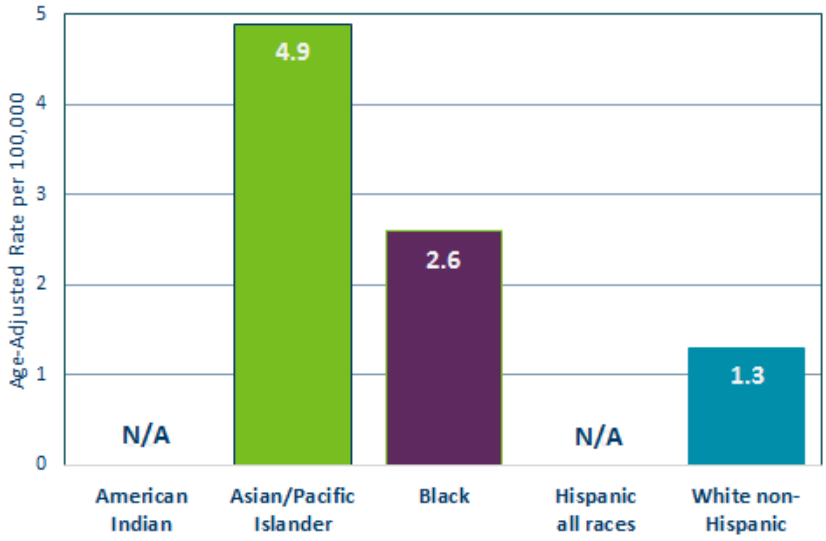
Cervical cancer mortality by race and ethnicity

The chart below shows that mortality from cancer of the cervix is highest for females who are of Asian and Pacific Islander race and ethnicity in Minnesota.

- The 2009-2013 mortality rate of cervical cancer was highest among Minnesota females who were Asian and Pacific Islanders and lowest for white females. The mortality rates for females who were American Indian or Hispanic of all races were unstable.
- The mortality rate for American Indians females was 3.8 times greater than the rate for whites and 1.8 times the rate for blacks. The mortality rate for black females in Minnesota was also 2 times the rate for whites.
- The HP2020 cervical cancer mortality goal has not been achieved for females who are Asian and Pacific Islander, or black.

Cervical cancer mortality by race/ethnicity – 2009-2013

(N/A denotes unstable rate)



Race/ethnicity	Rate	Count
American Indian	N/A	4
Asian/Pacific Islander	4.9	17
Black	2.6	13
Hispanic all races	N/A	11
White non-Hispanic	1.3	170
All Races Combined	1.4	216

Healthy People 2020 cervical cancer mortality goal: 2.2 deaths/100,000

Risk factors and screening

The human papillomavirus (HPV), a sexually transmitted infection, is the cause of nearly all cases of cervical cancer (45). Two types of HPV, HPV-16 and HPV-18, are most often associated with invasive disease (46). There is an association between an increased risk for cervical cancer, the beginning of sexual activity at a younger age, and with a greater number of lifetime sexual partners (46). Immunosuppression is another risk factor for cervical cancer because it may lead to long-term persistence of viral infection (46). Once HPV infection occurs, additional risk factors associated with a higher risk of developing cervical cancer include: 1) high parity, 2) long-term use of oral contraceptives, and 3) and exposure to cigarette smoking, actively or passively. In utero exposure to Diethylstilbestrol (DES) is also associated with an increased risk of developing cervical dysplasia (45).

The joint guideline for cervical cancer screening from the ACS, the American Society for Colposcopy and Cervical Pathology, and the American Society for Clinical Pathology recommends different surveillance strategies and options based on a woman's age, screening history and other risk factors, and the choice of screening tests (41, 47). The USPSTF issued their own guidelines which are also based on a woman's age, screening history, and other factors (48). If you have questions about if you should be screened and when, please contact your health care provider. If you do not have a health care provider, you may be eligible for free cervical cancer screening through the MDH's Sage Program (14).

References

All Cancers Combined

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 Attributatble 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.
7. Centers for Disease Control (CDC). May 2, 2018. Retrieved June 4, 2018 from Centers for Disease Control - Screening Tests.

Colorectal Cancer

8. World Cancer Research Fund International. (January 16, 2015). Worldwide data. Retrieved June 27, 2018, from World Cancer Research Fund International.
9. American Cancer Society (ACS). (February 1, 2018). What is Colorectal Cancer. Retrieved June 27, 2018 from, American Cancer Society -What is Colorectal Cancer.
10. American Cancer Society (ACS). (February 21, 2018). Can Colorectal Polyps and Cancer Be Found Early? Retrieved June 27, 2018 from, American Cancer Society - Can Colorectal Polyps and Cancer Be Detected Early?.
11. Centers for Disease Control and Prevention (CDC). (June 20, 2018). What are the Risk Factors for Colorectal Cancer? Retrieved June 28, 2018 from Centers for Disease Control and Prevention - What are the Risk Factors for Colorectal Cancer?.
12. American Cancer Society (ACS). (May 30, 2018). American Cancer Society Updates Colorectal Cancer Screening Guideline. Retrieved June 28, 2018 from, American Cancer Society Updates Colorectal Cancer Screening Guideline.
13. U.S. Preventive Services Task Force (USPSTF). (June, 2016). Colorectal Cancer: Screening. Retrieved June 28, 2018, from U.S. Preventive Services Task Force -Colorectal Cancer: Screening.
14. Minnesota Department of Health (MDH). (January 1, 2018). Sage Cancer Screenings Covered Services & Eligibility. Retrieved June 5, 2018, from Minnesota Department of Health (MDH) - Sage Cancer Screenings Covered Services & Eligibility.

Breast

15. American Cancer Society (ACS). (September 21, 2017). What is Breast Cancer? Retrieved April 19, 2018, from American Cancer Society - What is Breast Cancer? .

16. Centers for Disease Control and Prevention (CDC). (July 25, 2017). What are the Risk Factors for Breast Cancer? Retrieved April 20, 2018 from Centers for Disease Control and Prevention - What are the Risk Factors for Breast Cancer? .
17. American Cancer Society (ACS). Breast Cancer Risk and Prevention. Retrieved April 19, 2018, from American Cancer Society - Breast Cancer Risk and Prevention.
18. Centers for Disease Control and Prevention (CDC). (July 25,2017). What is Breast Cancer Screening? Retrieved April 20, 2018, from Centers for Disease Control and Prevention - What is Breast Cancer Screening? .

Lung

19. National Cancer Institute (NCI). Lung Cancer – Patient Version. Retrieved April 24, 2018, from National Cancer Institute - Lung Cancer – Patient Version.
20. National Cancer Institute (NCI). (2017). Lung Cancer Prevention (PDQ) – Patient Version. Retrieved April 26, 2018, from National Cancer Institute - Lung Cancer Prevention (PDQ) – Patient Version.
21. National Cancer Institute (NCI). (2018). Lung Cancer Prevention (PDQ) – Health Professional Version. Retrieved April 26, 2018, from National Cancer Institute (NCI) - Lung Cancer Prevention (PDQ) – Health Professional Version.
22. American Cancer Society (ACS). (2016). Lung Cancer Risk Factors. Retrieved April 26, 2018, from American Cancer Society - Lung Cancer Risk Factors
23. Minnesota Department of Health (MDH). Radon in Minnesota Homes. Retrieved April 27, 2018, from Minnesota Department of Health - Radon in Minnesota Homes.
24. Minnesota Department of Health (MDH). Radon Testing. Retrieved April 27, 2018, from Minnesota Department of Health - Radon Testing.
25. Minnesota Department of Health (MDH). Radon Contractors/Mitigation Service Providers. Retrieved April 27, 2018 from Minnesota Department of Health - Radon Contractors/Mitigation Service Providers.
26. Centers for Disease Control and Prevention (CDC). (2018). Who Should Be Screened for Lung Cancer: Retrieved April 27, 2018 from Centers for Disease Control and Prevention -Who Should Be Screened for Lung Cancer?.
27. American Cancer Society (ACS). 2018. Can Lung Cancer Be Found Early? Retrieved April 27, 2018, from American Cancer Society (ACS) - Can Lung Cancer Be Found Early? .
28. U.S. Preventive Services Task Force (USPSTF). (2015). Lung Cancer: Screening. Retrieved April 27, 2018, from U.S. Preventive Services Task Force - Lung Cancer: Screening.

Melanoma

29. American Cancer Society (ACS). (2016). What is Melanoma Skin Cancer? Retrieved April 3, 2018, from American Cancer Society - What is Melanoma Skin Cancer? .
30. American Cancer Society (ACS). (2016). What are Basal and Squamous Cell Skin Cancers? Retrieved April 3, 2018, from American Cancer Society (ACS) - What are Basal and Squamous Cell Skin Cancers? .
31. Rogers HW, Weinstock MA, Feldman SR, Coldiron BM. Incidence estimate of nonmelanoma skin cancer (keratinocyte carcinomas) in the U.S. population. JAMA Dermatol. 2015 Oct. 151(10):1081-6.

32. American Cancer Society (ACS). (2016). Risk Factors for Melanoma Skin Cancer. Retrieved April 5, 2018, from American Cancer Society - Risk Factors for Melanoma Skin Cancer.
33. U.S. Preventive Services Task Force (USPSTF). (2016). Final Recommendation Statement: Skin Cancer: Screening. Retrieved April 5, 2018, from U.S. Preventive Services Task Force - Final Recommendation Statement: Skin Cancer: Screening. .
34. American Cancer Society (ACS). (2018). Skin Exams. Retrieved April 5, 2018, from American Cancer Society - Skin Exams.
35. Minnesota Statute 325H.085 Use By Minors Prohibited. (2017).
36. Lazovich DA, Vogel RI, Berwick M, Weinstock MA, Anderson KE, Warshaw EM. Indoor Tanning and Risk of Melanoma: A Case-Control Study in a Highly Exposed Population. Cancer Epidemiology, Biomarkers & Prevention. 19(6):1557-1568.

Cervix

37. American Cancer Society (ACS). What is Cervical Cancer? (December 5, 2016). Retrieved May 21, 2018 from American Cancer Society - What is Cervical Cancer? .
38. National Cancer Institute (NCI). (2015). HPV and Cancer. Retrieved May 21, 2018, from National Cancer Institute - HPV and Cancer.
39. National Cancer Institute (NCI). (2018.) Human Papillomavirus (HPV) Vaccines. Retrieved May 21, 2018, from National Cancer Institute - Human Papillomavirus (HPV) Vaccines.
40. Janicek MF, Averette HE. Cervical Cancer: Prevention, Diagnosis, and Therapeutics. CA: A Journal for Clinicians (2001);51:92-114.
41. Saslow D, Solomon D, Lawson H, Killackey M, Kulasingam S, Cain J, Farcia F, Moriarty A, Waxman A, Wilbur D, Wentzensen N, Downs L, Spitzer M, Moscicki A, Franco E, Stoler M, Schiffman M, Castel P, Myers E, ACS-ASCCP-ASCP Cervical Cancer Guideline Committee. American Cancer Society, American society for Colposcopy and Cervical Pathology, and American Society for Clinical Pathology screening guidelines for the prevention and early detection of cervical cancer. (2012). CA: A Cancer Journal for Clinicians, 2012 May/June;62(3):147-172.
42. Centers for Disease Control and Prevention (CDC). (2011). Ten Great Public Health Achievements -- - United States, 2001—2010. Morbidity and Mortality Weekly Report 2011:60(19);619-623.
43. American Cancer Society (ACS). American Cancer Society Launches Campaign to Eliminate Cervical Cancer. Mission: HPV Cancer Free aims to increase vaccination rates among boys and girls to 80%. Retrieved May 1, 2018 from American Cancer Society Launches Campaign to Eliminate Cervical Cancer.
44. American Cancer Society (ACS). (November 1, 2017). What Are the Risk Factors for Cervical Cancer? Retrieved May 1, 2018, from American Cancer Society - What Are the Risk Factors for Cervical Cancer?
45. National Cancer Institute (NCI). (February 1, 2018). Cervical Cancer Prevention (PDQ®) – Health Professional Version. Retrieved May 2, 2018 from National Cancer Institute - Cervical Cancer Prevention (PDQR) – Health Professional Version.
46. American Cancer Society (ACS) (2012). Cervical Cancer Screening Guidelines. Retrieved May 3, 2018 from American Cancer Society - Cervical Cancer Screening Guidelines.
47. U.S. Preventive Services Task Force (USPSTF). (2016). Final Recommendation Statement: Cervical Cancer: Screening. Retrieved May 2, 2018, from U.S. Preventive Services Task Force - Final Recommendation Statement: Cervical Cancer: Screening.

Resource Section

Data Sources

Cancer incidence data

Cancer incidence data for this report were drawn from the MCRS database on July 2017. The database contains information on nearly all microscopically confirmed malignant and in site cancers diagnosed in Minnesota residents between 1988 and 2014. 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

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 death certificates, in particular, please visit

Minnesota Center for Health Statistics, Office of Vital Records

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 are linked to URL below:

SEER Population Estimates

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 2014. 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

Age-adjusted rate

To learn what an age-adjusted rate is and how it is calculated, go to

Tutorial to Calculate Age-Adjusted Rates

Unstable rate

An unstable rate is defined as one with a relative standard error (100 x 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

2000 US Standard Population

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)

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 of the MDH Statewide Cancer Registry

For information on the Minnesota Government Data Practices Act please visit

Minnesota Government Data Privacy Act

Registry methods and standards

The North American Association of Central Cancer Registries (NAACCR) provides the data dictionary and standards governing data collection, coding, 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"

North American Association of Central Cancer Registries (NAACCR)

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)

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, go to

SEER Site Recode

Site Recode ICD-O/WHO 2008 Definition

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

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, go to the following URLs:

SEER Cause of Death Recode

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 B are denoted with "N/A". Maps for melanoma mortality and cervical cancer incidence and mortality are not presented because of a large number of counties with unstable rates.

Glossary of terms

To look up unfamiliar terms please visit

NCI Glossary of Terms

Health Impacts of Cancer

Know your chances

Use this 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.

NCI Know Your Chances

Healthy People 2020

To learn more about the CDC's Healthy People 2020 objectives, go to

CDC Healthy People 2020

Other sources of cancer statistics

For MCRS cancer reports go to

MCRS Cancer Statistics and Reports

MCRS Cancer Statistics and Reports Archive

For MCRS statistics on other cancer sites, go to

MDH Quick Facts

Minnesota Public Health Data Access portal

For statistics on cancers in the US, go to

National Cancer Institute-Surveillance, Epidemiology, and End Results Program

National Program of Cancer Registries-State Cancer facts

Centers for Disease and Prevention online database-WONDER

Programs – What we do?

Comprehensive Cancer Control Program

The MDH Comprehensive Cancer Control Program 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: A Framework for Action*.

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

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

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

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

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 child care facilities, communities, workplaces and health care settings. SHIP has been instrumental in helping Minnesota keep obesity rates relatively flat, 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

Appendices

A. Minnesota Demographics – 2010 U.S. Decennial census

Minnesota demographics						
Total population	5,310,903					
Sex	**Population**	**Percent**				
Male	2,635,419	49.60%				
Female	2,675,484	50.40%				
Race/Ethnicity	**Total**	**Percent**	**Male**	**Percent**	**Female**	**Percent**
American Indian	78,067	1.50%	38,962	1.50%	39,105	1.50%
Asian/Pacific Islander	234,424	4.40%	114,143	4.30%	120,281	4.50%
Black	313,920	5.90%	159,711	6.10%	154,209	5.80%
Hispanic (all races)	251,817	4.74%	132,569	5.03%	119,248	4.46%
White (non-Hispanic)	4,464,287	84.10%	2,206,563	83.70%	2,257,724	84.40%
Age group	**Total**	**Percent**	**Male**	**Percent**	**Female**	**Percent**
0-14 years	1,063,198	20.00%	543,108	20.60%	520,090	19.40%
15-19 years	368,300	6.90%	188,698	7.20%	179,602	6.70%
20-24 years	354,380	6.70%	180,154	6.80%	174,226	6.50%
25-29 years	372,192	7.00%	187,251	7.10%	184,941	6.90%
30-34 years	345,421	6.50%	175,715	6.70%	169,706	6.30%
35-39 years	326,313	6.10%	164,881	6.30%	161,432	6.00%
40-44 years	352,251	6.60%	176,972	6.70%	175,279	6.60%
45-49 years	403,667	7.60%	202,226	7.70%	201,441	7.50%
50-54 years	403,102	7.60%	201,300	7.60%	201,802	7.50%
55-59 years	352,136	6.60%	175,597	6.70%	176,539	6.60%
60-64 years	283,640	5.30%	139,751	5.30%	143,889	5.40%
65-69 years	203,790	3.80%	98,170	3.70%	105,620	3.90%
70-74 years	152,913	2.90%	71,404	2.70%	81,509	3.00%
75-79 years	122,071	2.30%	54,483	2.10%	67,588	2.50%
80-84 years	100,101	1.90%	41,043	1.60%	59,058	2.20%
85+ years	107,428	2.00%	34,666	1.30%	72,762	2.70%
SCHSAC Regions	**Total**	**Percent**	**Male**	**Percent**	**Female**	**Percent**
Metro	2,855,245	53.80%	1,404,330	53.30%	1,450,915	54.20%
Non-Metro	2,455,658	46.20%	1,231,089	46.70%	1,224,569	45.80%
•Central	730,220	13.70%	369,729	14.00%	360,491	13.50%
•Northeast	326,149	6.10%	164,188	6.20%	161,961	6.10%
• Northwest	169,233	3.20%	84,979	3.20%	84,254	3.10%
•South Central	291,198	5.50%	145,169	5.50%	146,029	5.50%
•Southeast	494,941	9.30%	245,411	9.30%	249,530	9.30%
•Southwest	222,151	4.20%	110,954	4.20%	111,197	4.20%
•West Central	221,766	4.20%	110,659	4.20%	111,107	4.20%

B. Trend data – 1988-2014

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	9,148	397.6	8,851	252.3	4,205	166.8	3,895
1989	533.0	9,331	381.1	8,576	252.5	4,220	160.4	3,789
1990	546.8	9,715	392.7	8,922	250.3	4,256	161.8	3,857
1991	590.4	10,695	390.6	8,976	253.1	4,362	164.8	4,014
1992	621.0	11,391	393.0	9,180	252.3	4,422	166.0	4,116
1993	567.8	10,651	386.6	9,145	242.7	4,317	161.7	4,088
1994	535.9	10,223	391.6	9,400	249.3	4,487	159.5	4,055
1995	543.4	10,490	392.4	9,554	243.9	4,463	162.8	4,209
1996	527.0	10,346	392.6	9,689	243.4	4,541	164.8	4,309
1997	546.3	10,840	399.6	10,010	240.5	4,556	156.7	4,178
1998	539.5	10,895	411.5	10,454	233.2	4,480	158.7	4,314
1999	552.6	11,374	410.2	10,550	232.5	4,575	156.9	4,301
2000	571.8	12,002	415.1	10,817	235.7	4,696	162.4	4,503
2001	571.6	12,208	420.6	11,096	226.8	4,610	153.8	4,296
2002	565.0	12,334	416.3	11,170	229.5	4,745	156.1	4,455
2003	548.9	12,230	406.9	11,061	222.7	4,700	156.5	4,482
2004	560.4	12,737	409.4	11,314	216.0	4,644	152.5	4,445
2005	547.9	12,763	406.6	11,400	203.1	4,464	147.0	4,359
2006	561.7	13,383	409.3	11,635	206.2	4,661	147.1	4,404
2007	573.8	14,058	423.0	12,275	207.2	4,813	142.0	4,355
2008	553.6	14,004	422.9	12,434	201.1	4,783	149.6	4,656
2009	528.8	13,759	424.7	12,676	203.8	4,979	144.4	4,591
2010	520.9	13,781	424.7	12,892	200.4	5,017	141.5	4,582
2011	523.8	14,289	429.3	13,240	192.6	4,958	137.0	4,512
2012	495.3	13,847	428.4	13,542	187.1	4,937	133.8	4,497
2013	481.7	13,874	422.6	13,527	183.3	4,992	135.3	4,611
2014	476.3	14,077	432.4	14,084	180.2	5,026	131.5	4,598

Colorectal cancer

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	74.1	1,253	51.9	1,234	31.0	507	19.5	482
1989	75.4	1,291	48.8	1,179	30.9	515	20.5	518
1990	70.4	1,218	50.3	1,226	29.4	497	18.3	462
1991	69.7	1,229	49.6	1,219	28.6	482	19.3	496
1992	72.5	1,292	47.3	1,178	27.4	464	20.0	522
1993	64.3	1,175	46.3	1,174	23.6	416	17.5	473
1994	63.2	1,180	46.2	1,190	24.9	446	15.7	432
1995	66.2	1,245	45.0	1,179	25.7	470	18.6	517
1996	58.4	1,118	45.0	1,179	24.6	454	16.3	461
1997	65.0	1,250	47.2	1,259	25.0	466	16.3	461
1998	61.7	1,217	48.5	1,304	24.3	462	17.4	498
1999	62.4	1,255	44.7	1,222	22.1	426	16.6	475
2000	61.9	1,275	46.1	1,276	21.7	429	17.1	497
2001	60.0	1,263	44.4	1,237	20.4	410	15.4	458
2002	59.1	1,268	45.2	1,272	21.6	451	16.0	481
2003	58.8	1,291	42.6	1,214	22.7	473	16.1	487
2004	58.1	1,307	42.8	1,234	17.2	371	13.7	425
2005	54.1	1,248	40.6	1,195	17.6	383	12.8	408
2006	51.8	1,212	40.6	1,193	17.5	393	13.8	429
2007	52.5	1,277	40.9	1,248	18.9	444	12.5	411
2008	51.4	1,275	40.4	1,231	18.5	445	12.3	401
2009	45.3	1,158	38.1	1,179	16.4	404	12.2	408
2010	46.7	1,214	36.3	1,150	16.5	418	12.0	406
2011	46.0	1,229	33.4	1,073	16.0	418	11.6	398
2012	42.2	1,148	33.8	1,096	15.4	407	11.1	391
2013	43.4	1,226	34.9	1,166	14.2	384	11.5	407
2014	41.4	1,195	35.1	1,175	13.9	385	11.1	395

Female breast cancer

Year	Incidence Rate	Incidence Count	Mortality Rate	Mortality Count
1988	132.3	2,854	34.3	765
1989	127.1	2,768	32.0	716
1990	132.2	2,903	32.8	746
1991	130.7	2,921	33.8	786
1992	130.5	2,946	30.4	726
1993	131.1	3,016	30.0	732
1994	126.9	2,973	28.9	708
1995	133.9	3,170	31.0	773
1996	130.6	3,155	28.5	725
1997	132.3	3,240	26.1	678
1998	140.7	3,512	26.9	720
1999	138.7	3,494	24.9	670
2000	142.6	3,657	26.8	729
2001	139.8	3,645	24.9	685
2002	135.6	3,607	22.6	640
2003	125.9	3,401	22.8	639
2004	122.9	3,380	22.5	655
2005	124.5	3,483	22.4	656
2006	124.6	3,540	20.5	609
2007	131.7	3,804	20.7	636
2008	128.8	3,788	21.5	673
2009	131.3	3,932	21.3	684
2010	128.4	3,862	20.0	648
2011	135.0	4,137	19.6	637
2012	129.1	4,045	18.0	605
2013	127.7	4,017	19.5	665
2014	131.0	4,221	16.9	589

Lung and bronchus cancer

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	78.9	1,395	35.3	775	69.2	1,193	27.9	618
1989	75.3	1,343	35.3	779	68.4	1,182	27.6	627
1990	77.8	1,418	37.4	829	69.5	1,223	29.7	684
1991	73.7	1,346	38.1	862	68.6	1,222	30.5	708
1992	75.7	1,397	40.5	921	68.3	1,233	32.3	772
1993	75.2	1,418	38.1	882	68.0	1,244	33.2	797
1994	71.3	1,359	43.4	1,023	66.2	1,226	33.4	812
1995	75.3	1,454	39.8	953	65.2	1,228	34.0	839
1996	71.5	1,402	44.3	1,071	64.7	1,238	35.3	884
1997	75.1	1,477	42.3	1,033	65.0	1,259	33.9	859
1998	73.3	1,474	43.7	1,093	63.2	1,242	36.1	929
1999	73.2	1,496	45.4	1,151	64.5	1,293	34.5	906
2000	73.0	1,514	45.7	1,169	60.4	1,224	36.7	971
2001	72.2	1,525	48.1	1,247	60.8	1,263	37.2	996
2002	71.3	1,528	49.3	1,298	60.0	1,261	38.9	1,066
2003	72.0	1,572	50.7	1,355	59.4	1,267	36.9	1,017
2004	70.5	1,559	49.7	1,358	59.4	1,296	38.0	1,060
2005	70.0	1,596	48.4	1,327	57.3	1,272	35.7	1,009
2006	64.7	1,510	49.4	1,392	56.0	1,277	37.1	1,076
2007	68.2	1,612	50.1	1,443	56.9	1,327	36.6	1,088
2008	63.7	1,575	51.3	1,498	52.8	1,272	38.6	1,153
2009	65.9	1,654	51.3	1,528	50.3	1,243	37.8	1,155
2010	64.0	1,631	52.6	1,611	50.5	1,272	34.9	1,098
2011	61.4	1,631	47.7	1,499	48.6	1,268	32.8	1,047
2012	61.7	1,690	50.7	1,623	46.0	1,224	34.1	1,108
2013	64.3	1,804	51.2	1,691	46.9	1,288	33.2	1,102
2014	57.6	1,662	48.7	1,643	45.5	1,287	34.3	1,185

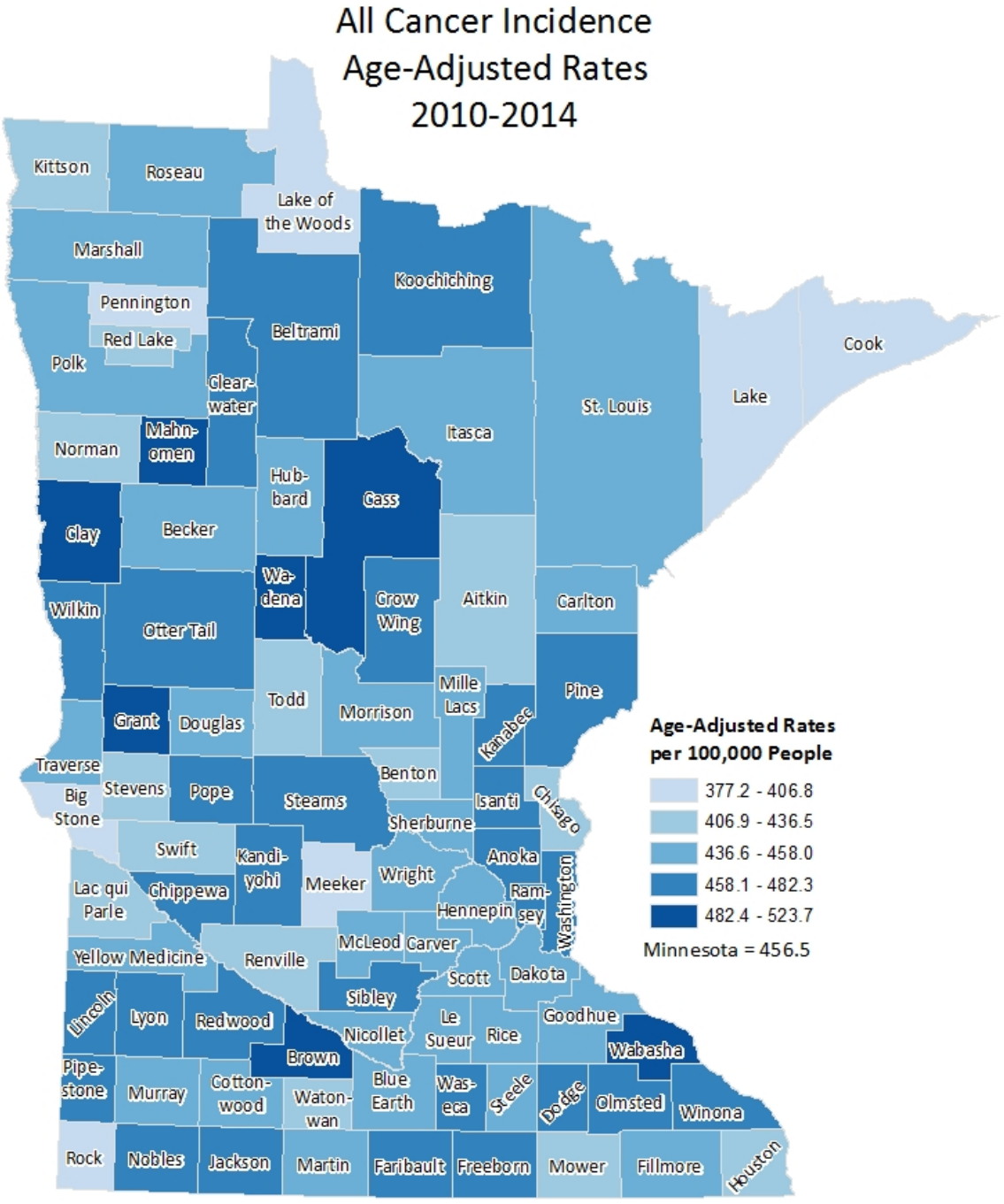
Melanoma of the skin cancer

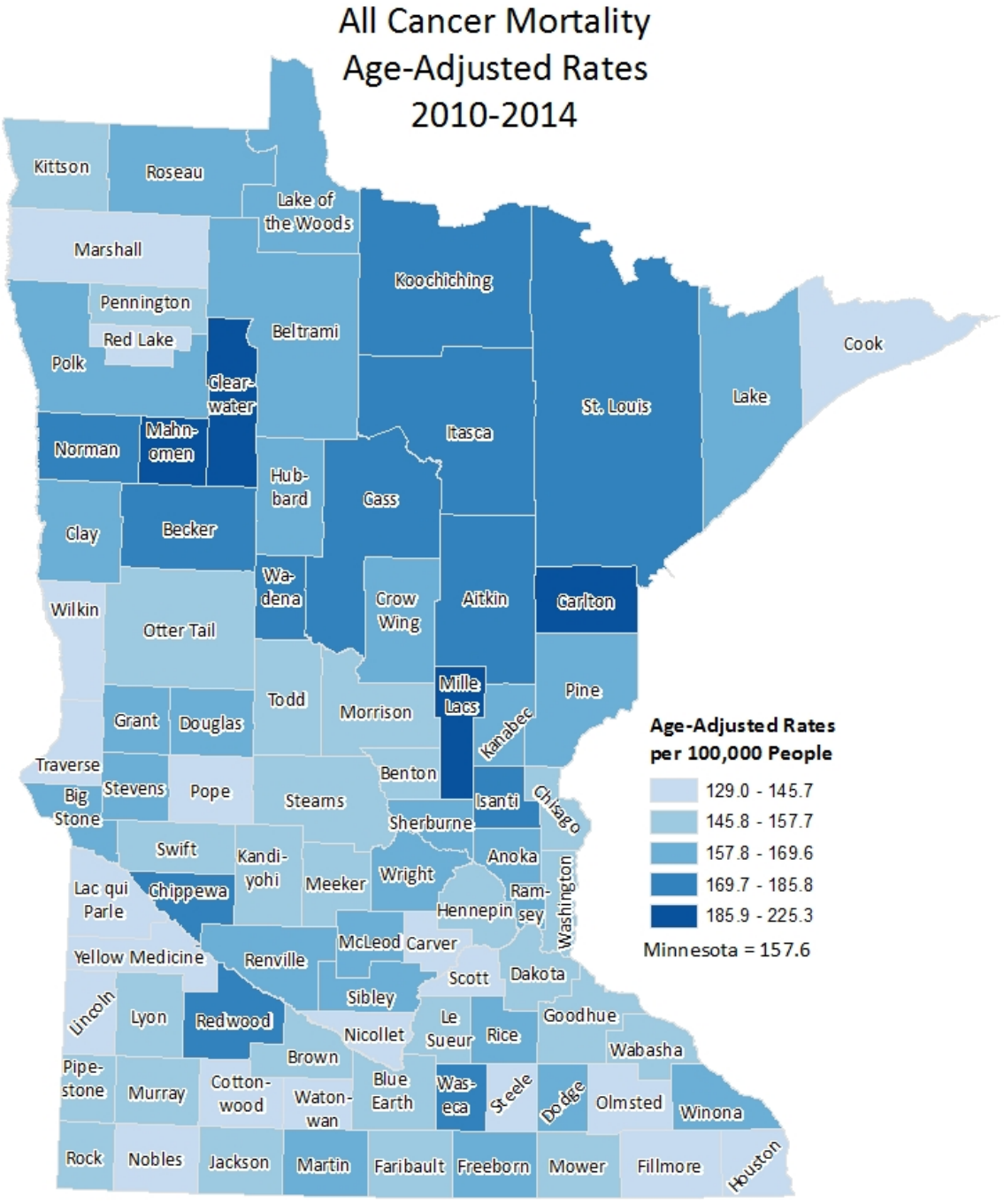
Year	Males Incidence Rate	Males Incidence Count	Females Incidence Rate	Females Incidence Count	Males Mortality Rate	Males Mortality Count	Females Mortality Rate	Females Mortality Count
1988	14.2	258	11.6	253	2.8	49	2.4	52
1989	13.1	245	11.6	251	3.6	61	1.9	42
1990	14.0	260	11.0	252	2.8	51	2.1	45
1991	11.7	225	10.7	237	3.5	62	1.4	32
1992	14.8	292	9.9	231	3.0	54	1.9	43
1993	16.8	330	11.9	275	3.1	59	1.8	44
1994	15.3	302	11.4	268	3.0	58	1.5	36
1995	17.5	352	12.3	297	3.7	72	1.5	38
1996	19.7	413	11.3	276	4.1	80	1.4	36
1997	18.9	395	14.1	346	3.6	69	1.6	43
1998	16.7	356	14.6	362	3.6	72	2.1	56
1999	19.5	427	15.5	389	3.2	67	1.9	52
2000	21.5	474	15.8	403	3.3	71	1.8	48
2001	21.4	479	17.3	447	3.6	75	1.7	45
2002	19.8	450	15.4	398	3.7	79	1.3	34
2003	20.2	465	16.7	440	2.8	62	1.6	45
2004	22.7	533	16.5	440	3.3	72	2.2	60
2005	21.9	527	17.9	479	2.7	62	1.5	44
2006	26.2	634	19.3	520	3.5	83	1.5	44
2007	28.0	700	20.9	577	3.3	79	1.6	49
2008	28.8	721	21.9	609	3.2	82	1.4	42
2009	29.6	778	24.8	695	3.8	94	1.6	50
2010	32.7	871	25.6	722	4.0	104	1.4	45
2011	32.4	869	24.2	706	3.5	90	1.7	56
2012	34.3	953	26.3	788	4.1	109	1.4	46
2013	36.4	1,026	24.5	742	3.9	106	1.8	58
2014	36.0	1,040	25.5	781	3.5	96	1.8	62

Cervical cancer

Year	Females Incidence Rate	Females Incidence Count	Females Mortality Rate	Females Mortality Count
1988	9.7	207	2.1	46
1989	9.2	202	2.0	43
1990	11.0	245	2.4	51
1991	9.1	201	1.8	41
1992	7.3	166	1.9	44
1993	8.6	196	1.5	36
1994	8.8	203	2.0	46
1995	8.5	201	2.2	51
1996	8.2	200	2.6	61
1997	7.3	175	1.8	45
1998	5.9	143	1.5	37
1999	7.0	176	1.9	49
2000	6.9	173	1.5	42
2001	6.9	175	1.3	35
2002	6.8	171	1.3	34
2003	6.7	172	1.8	48
2004	6.2	163	1.9	52
2005	6.3	168	1.7	48
2006	6.0	157	1.6	45
2007	5.6	151	1.0	28
2008	6.1	160	1.7	49
2009	6.3	168	1.4	40
2010	6.1	166	1.6	47
2011	6.0	168	1.2	39
2012	5.4	152	1.3	39
2013	5.3	148	1.7	51
2014	4.8	140	1.3	41

C. County maps and data

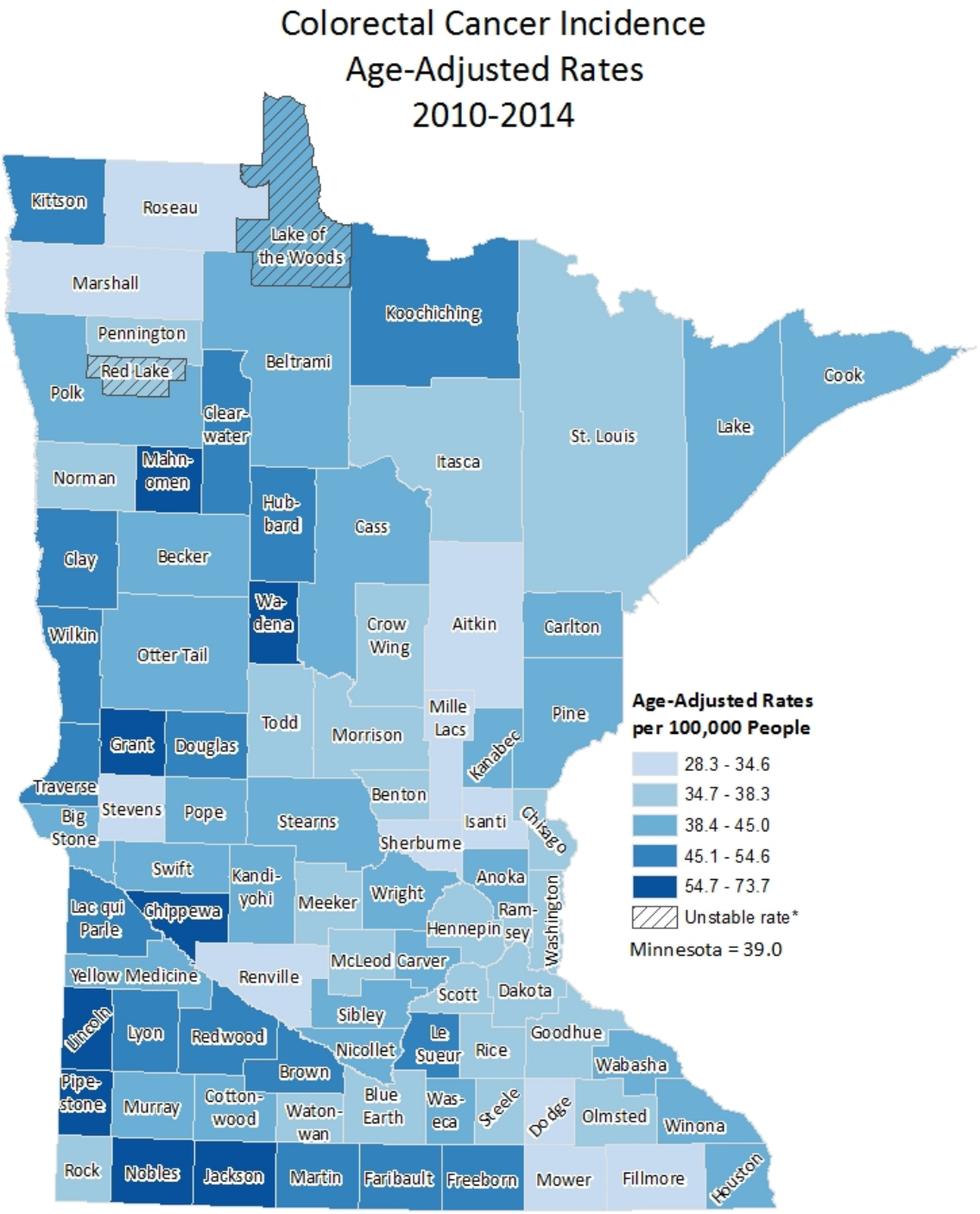

All Cancer Incidence
Age-Adjusted Rates
2010-2014
Kittson
Roseau
Lake of the Woods
Marshall
Koochiching
Pennington
Beltrami
Red Lake
Polk
Clear-water
St. Louis
Lake
Cook
Itasca
Norman
Mahn-omen
Hub-bard
Cass
Clay
Becker
Wa-dena
Crow Wing
Aitkin
Carlton
Wilkin
Otter Tail
Todd
Morrison
Mille Lacs
Pine
Grant
Douglas
Kanabec
Traverse
Stevens
Pope
Stearns
Benton
Big Stone
Isanti
Chisago
Sherburne
Swift
Kandi-yohi
Anoka
Lac qui Parle
Chippewa
Meeker
Wright
Ram-sey
Washington
Hennepin
McLeod
Carver
Yellow Medicine
Renville
Scott
Dakota
Sibley
Lincoln
Lyon
Redwood
Nicollet
Le Sueur
Rice
Goodhue
Wabasha
Brown
Pipe-stone
Murray
Cotton-wood
Waton-wan
Blue Earth
Was-eca
Steele
Dodge
Olmsted
Winona
Rock
Nobles
Jackson
Martin
Faribault
Freeborn
Mower
Fillmore
Houston
Age-Adjusted Rates
per 100,000 People
377.2 - 406.8
406.9 - 436.5
436.6 - 458.0
458.1 - 482.3
482.4 - 523.7
Minnesota = 456.5


All Cancer Mortality
Age-Adjusted Rates
2010-2014
Kittson
Roseau
Lake of the Woods
Marshall
Koochiching
Pennington
Red Lake
Beltrami
Cook
Polk
Clear-water
St. Louis
Lake
Itasca
Norman
Mahn-omen
Hub-bard
Cass
Clay
Becker
Wa-dena
Crow Wing
Aitkin
Carlton
Wilkin
Otter Tail
Mille Lacs
Pine
Todd
Morrison
Kanabec
Grant
Douglas
Traverse
Benton
Big Stone
Stevens
Pope
Steams
Isanti
Chisago
Sherburne
Swift
Kandi-yohi
Anoka
Lac qui Parle
Chippewa
Meeker
Wright
Ram-sey
Washington
Hennepin
McLeod
Carver
Yellow Medicine
Renville
Scott
Dakota
Sibley
Lincoln
Lyon
Redwood
Nicollet
Le Sueur
Rice
Goodhue
Wabasha
Brown
Pipe-stone
Murray
Cotton-wood
Waton-wan
Blue Earth
Was-eca
Steele
Dodge
Olmsted
Winona
Rock
Nobles
Jackson
Martin
Faribault
Freeborn
Mower
Fillmore
Houston
Age-Adjusted Rates
per 100,000 People
129.0 - 145.7
145.8 - 157.7
157.8 - 169.6
169.7 - 185.8
185.9 - 225.3
Minnesota = 157.6

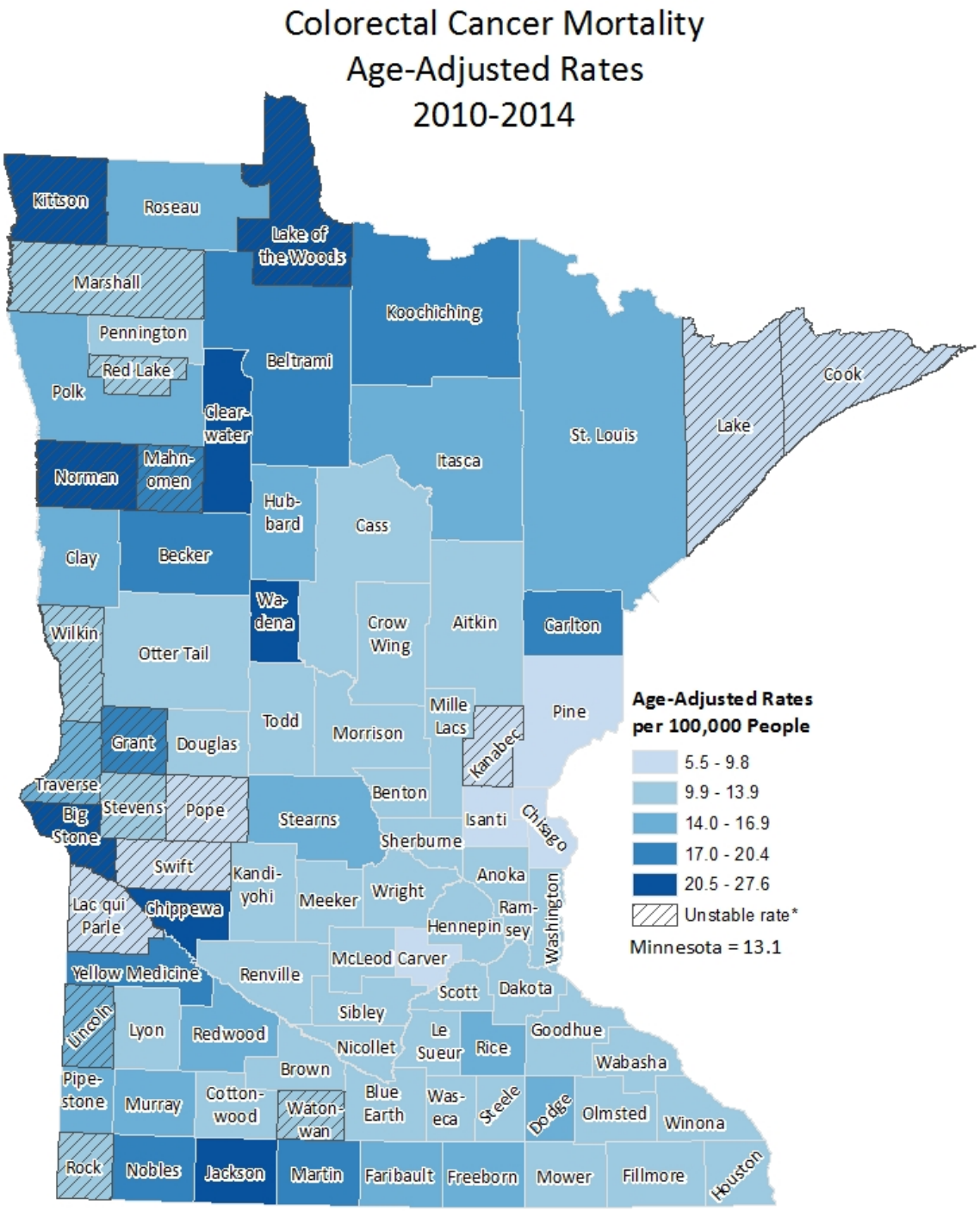
County - All cancer sites	FIPS	Incidence Rate	Incidence Count	Mortality Rate	Mortality Count
Minnesota	27000	456.5	137153	157.6	47730
MN: Aitkin County (27001)	27001	436.5	654	174.5	272
MN: Anoka County (27003)	27003	480.6	8129	165.8	2558
MN: Becker County (27005)	27005	446.4	994	176.3	408
MN: Beltrami County (27007)	27007	471.4	1151	166.7	413
MN: Benton County (27009)	27009	418.9	858	150.6	317
MN: Big Stone County (27011)	27011	406.8	180	160.7	87
MN: Blue Earth County (27013)	27013	439.9	1370	149.2	497
MN: Brown County (27015)	27015	485.7	867	153.7	319
MN: Carlton County (27017)	27017	447.8	990	191.6	429
MN: Carver County (27019)	27019	452.8	1931	143.4	552
MN: Cass County (27021)	27021	497.8	1130	172.9	398
MN: Chippewa County (27023)	27023	477.3	411	185.8	180
MN: Chisago County (27025)	27025	413.5	1224	153.6	437
MN: Clay County (27027)	27027	492.7	1470	159.2	495
MN: Clearwater County (27029)	27029	465.4	283	189.9	120
MN: Cook County (27031)	27031	392.2	166	129.0	53
MN: Cottonwood County (27033)	27033	450.1	390	143.1	141
MN: Crow Wing County (27035)	27035	469.1	2097	169.6	784
MN: Dakota County (27037)	27037	453.1	9285	152.3	2925
MN: Dodge County (27039)	27039	477.0	506	161.9	172
MN: Douglas County (27041)	27041	455.6	1211	161.1	467
MN: Faribault County (27043)	27043	467.5	502	156.5	192
MN: Fillmore County (27045)	27045	450.4	658	141.9	232
MN: Freeborn County (27047)	27047	460.2	1016	161.8	410
MN: Goodhue County (27049)	27049	445.9	1369	156.3	526
MN: Grant County (27051)	27051	523.7	240	162.8	82
MN: Hennepin County (27053)	27053	450.3	27610	153.1	9262
MN: Houston County (27055)	27055	435.7	565	142.1	202
MN: Hubbard County (27057)	27057	446.0	716	161.1	270
MN: Isanti County (27059)	27059	459.8	986	174.6	370
MN: Itasca County (27061)	27061	448.4	1472	177.5	621

County - All cancer sites	FIPS	Incidence Rate	Incidence Count	Mortality Rate	Mortality Count
MN: Jackson County (27063)	27063	475.7	353	151.1	126
MN: Kanabec County (27065)	27065	470.5	514	160.5	174
MN: Kandiyohi County (27067)	27067	469.6	1258	151.2	436
MN: Kittson County (27069)	27069	418.4	140	155.9	63
MN: Koochiching County (27071)	27071	470.3	463	173.7	189
MN: Lac qui Parle County (27073)	27073	435.2	242	131.6	91
MN: Lake County (27075)	27075	398	363	158.8	153
MN: Lake of the Woods County (27077)	27077	403.1	125	165.5	53
MN: Le Sueur County (27079)	27079	442.7	741	157.7	268
MN: Lincoln County (27081)	27081	474.3	214	144	84
MN: Lyon County (27083)	27083	482.3	679	157.6	239
MN: McLeod County (27085)	27085	450.1	999	162.9	384
MN: Mahnomen County (27087)	27087	521.1	177	225.3	79
MN: Marshall County (27089)	27089	447.2	296	142	104
MN: Martin County (27091)	27091	448.6	689	164.3	290
MN: Meeker County (27093)	27093	401.1	611	154.8	250
MN: Mille Lacs County (27095)	27095	456.4	745	190.7	324
MN: Morrison County (27097)	27097	454.6	957	153.4	339
MN: Mower County (27099)	27099	428.4	1066	146.6	420
MN: Murray County (27101)	27101	441.1	311	147.8	116
MN: Nicollet County (27103)	27103	454.3	801	131.2	229
MN: Nobles County (27105)	27105	463.7	590	145.7	209
MN: Norman County (27107)	27107	417.5	209	175.9	97
MN: Olmsted County (27109)	27109	469.3	3780	136.4	1108
MN: Otter Tail County (27111)	27111	463.2	1999	153.6	735
MN: Pennington County (27113)	27113	377.2	316	156.1	140
MN: Pine County (27115)	27115	462.3	896	165.6	330
MN: Pipestone County (27117)	27117	469.1	305	152.4	118
MN: Polk County (27119)	27119	450.1	900	167.9	356
MN: Pope County (27121)	27121	461	388	144.6	135
MN: Ramsey County (27123)	27123	465.2	12663	163.7	4512
MN: Red Lake County (27125)	27125	435.3	115	138.5	41

County - All cancer sites	FIPS	Incidence Rate	Incidence Count	Mortality Rate	Mortality Count
MN: Redwood County (27127)	27127	465.2	513	180.3	231
MN: Renville County (27129)	27129	422.3	467	167.9	202
MN: Rice County (27131)	27131	449.9	1562	162.7	563
MN: Rock County (27133)	27133	400.6	266	154.9	120
MN: Roseau County (27135)	27135	458	427	168.9	161
MN: St. Louis County (27137)	27137	454.4	5870	177.7	2399
MN: Scott County (27139)	27139	449.3	2562	144.3	730
MN: Sherburne County (27141)	27141	448.6	1789	160.4	581
MN: Sibley County (27143)	27143	461.7	443	168.8	176
MN: Stearns County (27145)	27145	460.6	3632	154.6	1235
MN: Steele County (27147)	27147	447.2	960	142.4	330
MN: Stevens County (27149)	27149	424.3	245	158.9	107
MN: Swift County (27151)	27151	419.1	309	152	127
MN: Todd County (27153)	27153	426.7	705	152.9	255
MN: Traverse County (27155)	27155	447.8	133	135.5	51
MN: Wabasha County (27157)	27157	484.9	694	155	233
MN: Wadena County (27159)	27159	488.6	479	180.3	200
MN: Waseca County (27161)	27161	470.6	538	172.2	207
MN: Washington County (27163)	27163	478.7	6102	149.2	1768
MN: Watonwan County (27165)	27165	416.3	325	145.3	130
MN: Wilkin County (27167)	27167	469.2	209	132.9	63
MN: Winona County (27169)	27169	466.4	1330	162.6	482
MN: Wright County (27171)	27171	452.8	2697	158.3	872
MN: Yellow Medicine County (27173)	27173	443.2	328	145	122



*Unstable rate based on relative standard error (100 x SE/Rate) > 30% . Rate should be interpreted with caution.



*Unstable rate based on relative standard error (100 x SE/Rate) > 30% . Rate should be interpreted with caution.

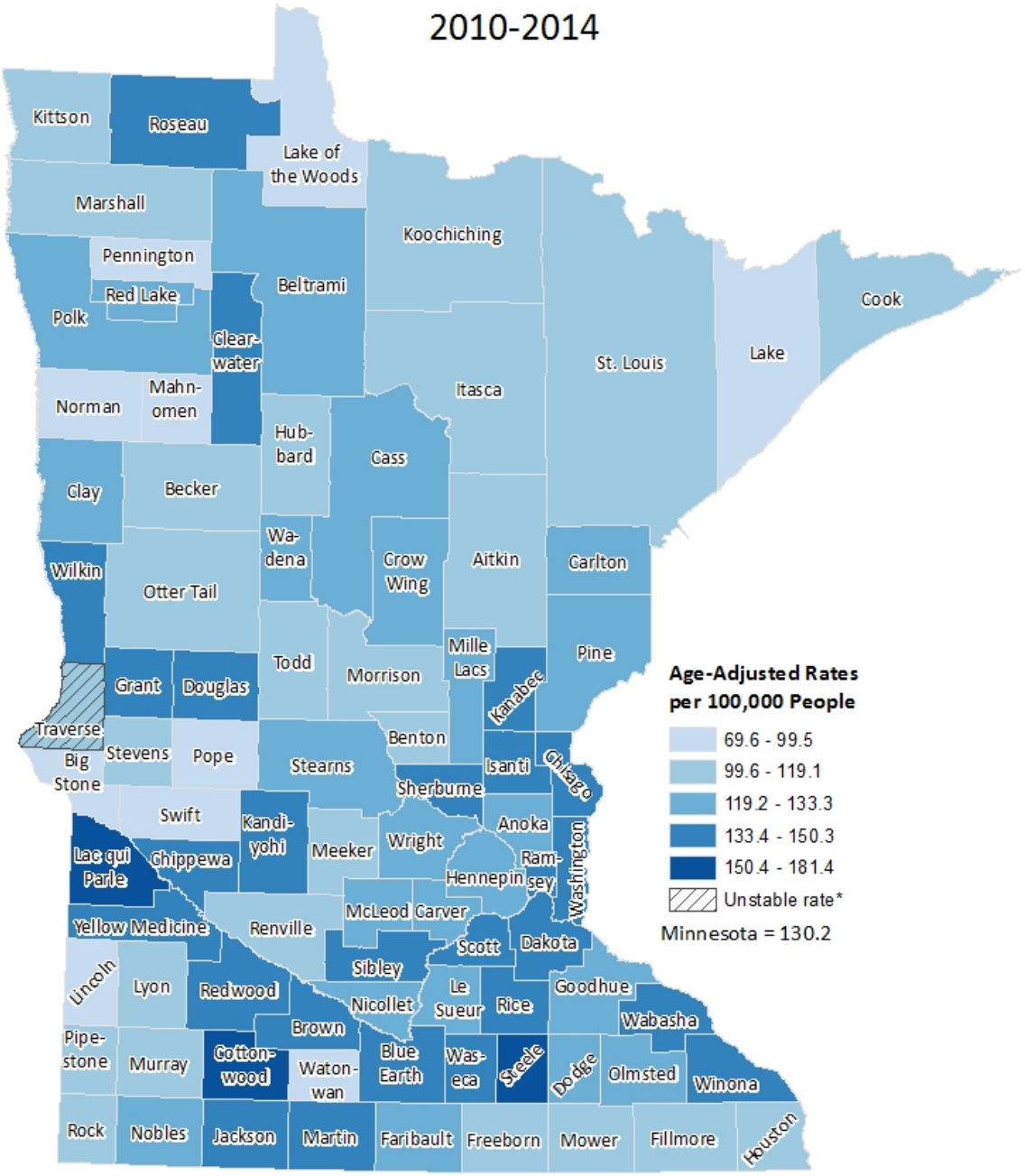
County - Colorectal cancer	FIPS	Incidence Rate	Incidence Count	Mortality Rate	Mortality Count
Minnesota	27000	39.0	11,672	13.1	4009
MN: Aitkin County (27001)	27001	34.4	52	12.6	20
MN: Anoka County (27003)	27003	41.0	658	12.4	190
MN: Becker County (27005)	27005	42.5	91	20.4	46
MN: Beltrami County (27007)	27007	42.2	103	18.3	45
MN: Benton County (27009)	27009	36.8	74	11.5	24
MN: Big Stone County (27011)	27011	43.5	20	N/A*	12
MN: Blue Earth County (27013)	27013	37.2	120	12.1	41
MN: Brown County (27015)	27015	47.0	92	12.6	29
MN: Carlton County (27017)	27017	42.9	93	20.3	46
MN: Carver County (27019)	27019	40.0	166	9.5	38
MN: Cass County (27021)	27021	42.7	95	10.7	22
MN: Chippewa County (27023)	27023	64.2	57	24.0	24
MN: Chisago County (27025)	27025	35.0	101	6.6	18
MN: Clay County (27027)	27027	45.6	139	15.4	47
MN: Clearwater County (27029)	27029	45.4	29	23.0	15
MN: Cook County (27031)	27031	44.4	16	N/A*	4
MN: Cottonwood County (27033)	27033	43.9	41	12.8	13
MN: Crow Wing County (27035)	27035	37.9	168	10.5	47
MN: Dakota County (27037)	27037	35.0	700	12.9	255
MN: Dodge County (27039)	27039	34.6	37	14.7	16
MN: Douglas County (27041)	27041	46.7	127	12.1	36
MN: Faribault County (27043)	27043	52.8	58	15.3	18
MN: Fillmore County (27045)	27045	34.3	51	11.3	18
MN: Freeborn County (27047)	27047	46.7	107	16.9	48
MN: Goodhue County (27049)	27049	36.8	116	12.7	44
MN: Grant County (27051)	27051	60.3	30	N/A*	10
MN: Hennepin County (27053)	27053	37.3	2,277	12.1	748
MN: Houston County (27055)	27055	39.7	50	13.9	19
MN: Hubbard County (27057)	27057	50.5	81	14.8	23
MN: Isanti County (27059)	27059	33.1	68	9.1	18
MN: Itasca County (27061)	27061	37.6	125	16.6	60

County - Colorectal cancer	FIPS	Incidence Rate	Incidence Count	Mortality Rate	Mortality Count
MN: Jackson County (27063)	27063	72.8	55	24.8	23
MN: Kanabec County (27065)	27065	39.6	43	N/A*	10
MN: Kandiyohi County (27067)	27067	44.2	115	13.7	42
MN: Kittson County (27069)	27069	45.6	16	N/A*	10
MN: Koochiching County (27071)	27071	54.6	56	18.1	20
MN: Lac qui Parle County (27073)	27073	48.5	31	N/A*	8
MN: Lake County (27075)	27075	40.1	33	N/A*	6
MN: Lake of the Woods County (27077)	27077	39.6*	10	N/A*	7
MN: Le Sueur County (27079)	27079	46.7	77	13.5	23
MN: Lincoln County (27081)	27081	73.7	36	N/A*	7
MN: Lyon County (27083)	27083	51.5	73	13.2	19
MN: McLeod County (27085)	27085	36.6	84	13.6	33
MN: Mahnomen County (27087)	27087	61.8	20	N/A*	6
MN: Marshall County (27089)	27089	30.7	22	N/A*	10
MN: Martin County (27091)	27091	46.8	82	20.0	35
MN: Meeker County (27093)	27093	35.4	57	12.7	22
MN: Mille Lacs County (27095)	27095	33.4	55	13.3	25
MN: Morrison County (27097)	27097	37.0	76	11.6	25
MN: Mower County (27099)	27099	34.2	90	12.8	35
MN: Murray County (27101)	27101	41.1	32	14.1	12
MN: Nicollet County (27103)	27103	39.9	70	12.6	22
MN: Nobles County (27105)	27105	60.5	79	20.4	29
MN: Norman County (27107)	27107	36.3	22	N/A*	12
MN: Olmsted County (27109)	27109	35.5	286	10.5	86
MN: Otter Tail County (27111)	27111	41.4	181	12.0	60
MN: Pennington County (27113)	27113	36.2	29	13.2	13
MN: Pine County (27115)	27115	43.4	86	9.8	20
MN: Pipestone County (27117)	27117	67.8	46	14.9	14
MN: Polk County (27119)	27119	45.0	93	14.9	32
MN: Pope County (27121)	27121	40.5	34	N/A*	7
MN: Ramsey County (27123)	27123	36.7	1,005	12.7	355
MN: Red Lake County (27125)	27125	38.2*	11	N/A*	3

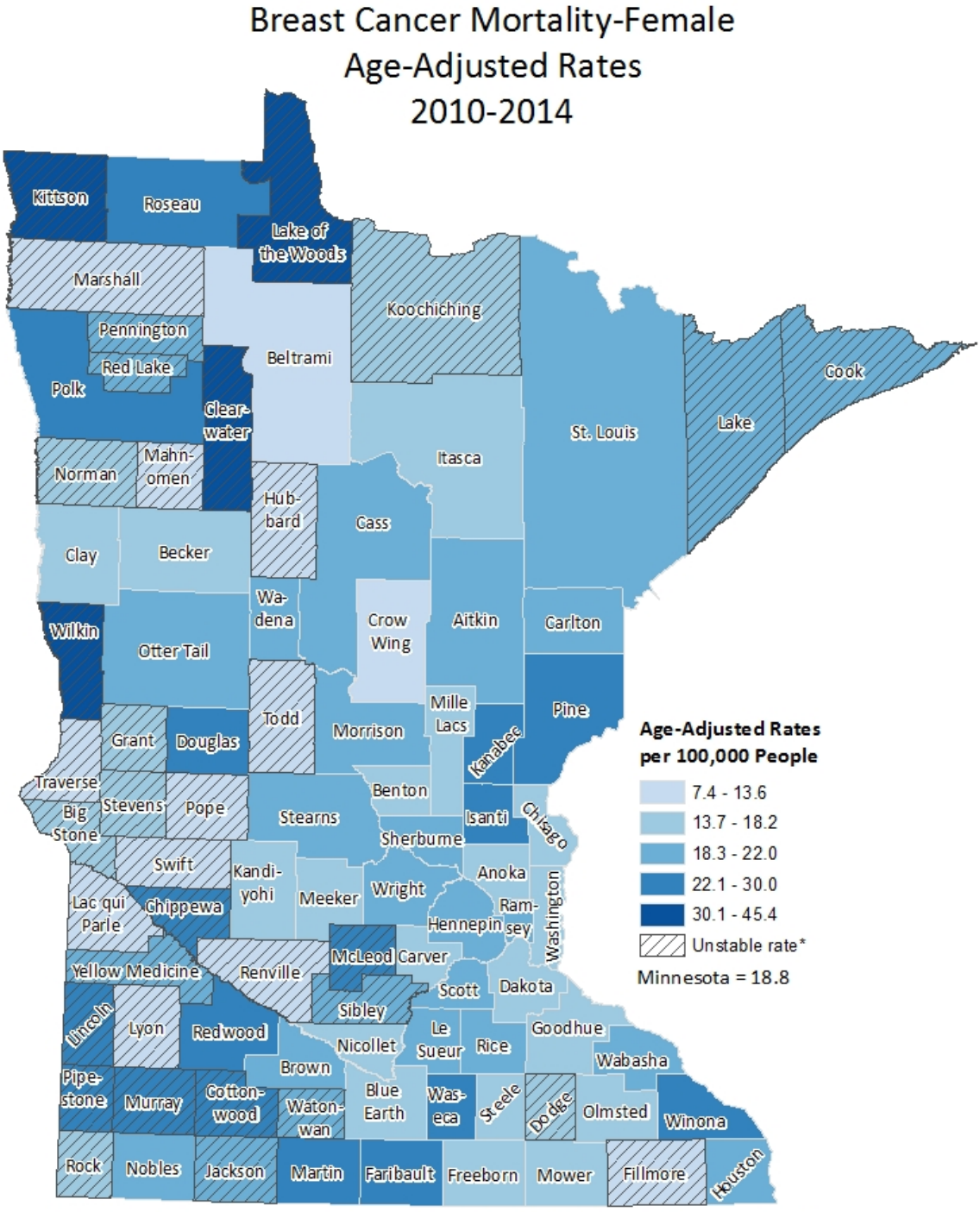
County - Colorectal cancer	FIPS	Incidence Rate	Incidence Count	Mortality Rate	Mortality Count
MN: Redwood County (27127)	27127	45.9	57	16.8	22
MN: Renville County (27129)	27129	28.3	32	13.6	16
MN: Rice County (27131)	27131	36.1	125	14.8	49
MN: Rock County (27133)	27133	38.3	26	N/A*	9
MN: Roseau County (27135)	27135	32.8	30	15.9	15
MN: St. Louis County (27137)	27137	37.1	493	15.4	208
MN: Scott County (27139)	27139	35.4	202	13.2	70
MN: Sherburne County (27141)	27141	34.4	129	11.4	39
MN: Sibley County (27143)	27143	43.9	42	11.2	12
MN: Stearns County (27145)	27145	41.7	326	14.2	115
MN: Steele County (27147)	27147	36.4	80	13.2	31
MN: Stevens County (27149)	27149	31.9	20	N/A*	9
MN: Swift County (27151)	27151	40.9	30	N/A*	7
MN: Todd County (27153)	27153	37.0	65	13.0	21
MN: Traverse County (27155)	27155	50.6	17	N/A*	6
MN: Wabasha County (27157)	27157	40.1	60	12.9	20
MN: Wadena County (27159)	27159	61.3	63	24.9	28
MN: Waseca County (27161)	27161	40.6	49	12.4	16
MN: Washington County (27163)	27163	35.3	434	12.4	147
MN: Watonwan County (27165)	27165	36.2	29	N/A*	10
MN: Wilkin County (27167)	27167	51.7	25	N/A*	7
MN: Winona County (27169)	27169	41.0	116	13.8	42
MN: Wright County (27171)	27171	40.8	229	13.3	70
MN: Yellow Medicine County (27173)	27173	40.4	33	19.1	15

*N/A Unstable rate based on relative standard error (100 x SE/Rate) > 30% . Rate should be interpreted with caution.

Breast Cancer Incidence-Female
Age-Adjusted Rates
2010-2014



*Unstable rate based on relative standard error (100 x SE/Rate) > 30% . Rate should be interpreted with caution.



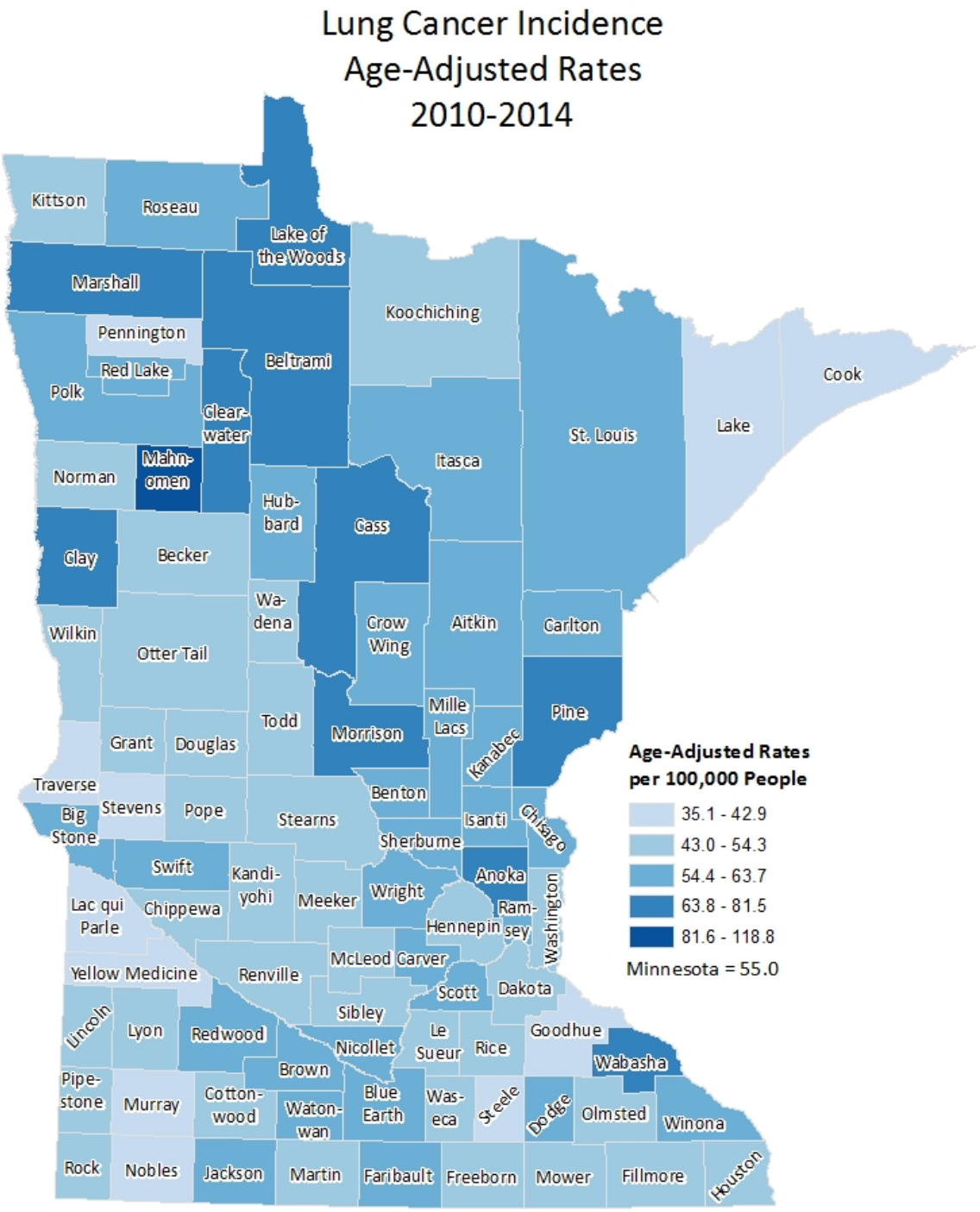
*Unstable rate based on relative standard error (100 x SE/Rate) > 30% . Rate should be interpreted with caution.

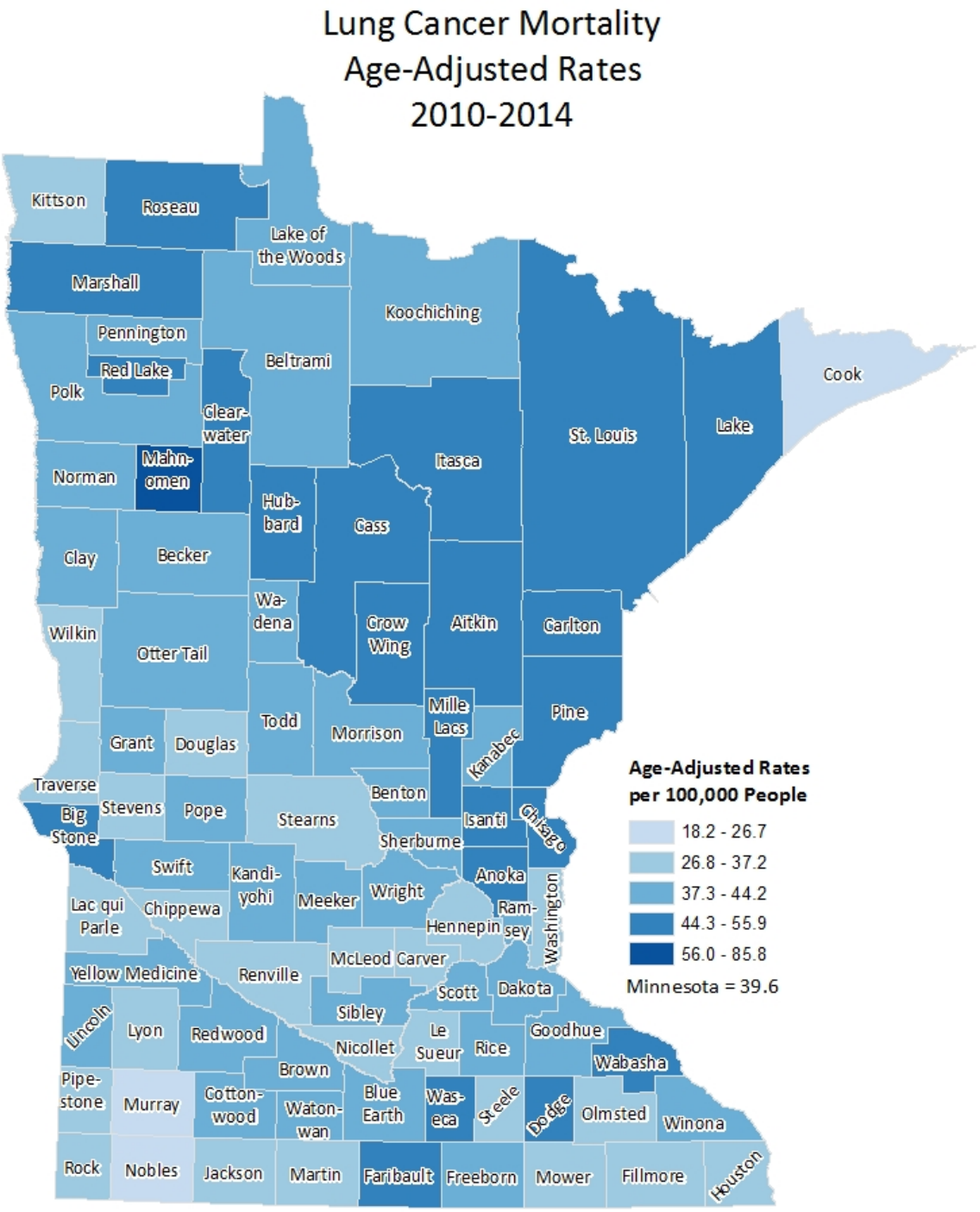
County - Breast cancer-female	FIPS	Incidence Rate	Incidence Count	Mortality Rate	Mortality Count
Minnesota	27000	130.2	20282	18.8	3144
MN: Aitkin County (27001)	27001	107.5	79	21.3	16
MN: Anoka County (27003)	27003	125.6	1161	15.8	143
MN: Becker County (27005)	27005	104.4	119	14.1	18
MN: Beltrami County (27007)	27007	125.0	153	13.5	18
MN: Benton County (27009)	27009	117.4	121	15.5	18
MN: Big Stone County (27011)	27011	99.5	22	N/A*	6
MN: Blue Earth County (27013)	27013	140.2	215	17.0	31
MN: Brown County (27015)	27015	140.9	130	20.5	20
MN: Carlton County (27017)	27017	130.8	144	18.4	21
MN: Carver County (27019)	27019	125.0	297	17.2	37
MN: Cass County (27021)	27021	125.1	138	20.4	24
MN: Chippewa County (27023)	27023	135.3	58	N/A*	12
MN: Chisago County (27025)	27025	134.6	204	17.4	26
MN: Clay County (27027)	27027	120.6	179	14.5	25
MN: Clearwater County (27029)	27029	142.7	39	N/A*	12
MN: Cook County (27031)	27031	107.3	23	N/A*	4
MN: Cottonwood County (27033)	27033	174.7	72	N/A*	12
MN: Crow Wing County (27035)	27035	127.8	286	13.0	32
MN: Dakota County (27037)	27037	137.8	1561	17.8	199
MN: Dodge County (27039)	27039	125.3	69	N/A*	10
MN: Douglas County (27041)	27041	137.8	177	23.7	37
MN: Faribault County (27043)	27043	119.9	64	24.5	14
MN: Fillmore County (27045)	27045	118.0	83	N/A*	11
MN: Freeborn County (27047)	27047	118.0	132	16.4	22
MN: Goodhue County (27049)	27049	130.2	200	17.0	34
MN: Grant County (27051)	27051	150.0	34	N/A*	3
MN: Hennepin County (27053)	27053	133.3	4358	20.0	694
MN: Houston County (27055)	27055	115.7	75	19.7	15
MN: Hubbard County (27057)	27057	118.7	91	N/A*	10
MN: Isanti County (27059)	27059	142.1	154	26.5	31
MN: Itasca County (27061)	27061	109.9	179	16.6	32

County - Breast cancer-female	FIPS	Incidence Rate	Incidence Count	Mortality Rate	Mortality Count
MN: Jackson County (27063)	27063	138.8	51	N/A*	7
MN: Kanabec County (27065)	27065	144.6	78	24.7	15
MN: Kandiyohi County (27067)	27067	142.1	196	17.1	29
MN: Kittson County (27069)	27069	112.7	16	N/A*	8
MN: Koochiching County (27071)	27071	104.9	51	N/A*	9
MN: Lac qui Parle County (27073)	27073	159.4	32	N/A*	5
MN: Lake County (27075)	27075	90.7	37	N/A*	9
MN: Lake of the Woods County (27077)	27077	73.8	13	N/A*	5
MN: Le Sueur County (27079)	27079	125.9	102	18.7	19
MN: Lincoln County (27081)	27081	96.8	24	N/A*	7
MN: Lyon County (27083)	27083	117.9	90	N/A*	12
MN: McLeod County (27085)	27085	129.9	148	N/A*	32
MN: Mahnomen County (27087)	27087	69.6	12	N/A*	2
MN: Marshall County (27089)	27089	108.8	35	N/A*	3
MN: Martin County (27091)	27091	150.3	101	24.2	22
MN: Meeker County (27093)	27093	114.1	88	18.2	16
MN: Mille Lacs County (27095)	27095	123.6	104	17.9	17
MN: Morrison County (27097)	27097	115.6	118	19.4	22
MN: Mower County (27099)	27099	111.8	143	16.2	26
MN: Murray County (27101)	27101	109.8	38	N/A*	8
MN: Nicollet County (27103)	27103	130.2	121	16.9	16
MN: Nobles County (27105)	27105	128.3	80	22.0	16
MN: Norman County (27107)	27107	99.4	26	N/A*	5
MN: Olmsted County (27109)	27109	132.1	563	17.1	77
MN: Otter Tail County (27111)	27111	109.1	224	19.4	42
MN: Pennington County (27113)	27113	72.3	33	N/A*	8
MN: Pine County (27115)	27115	127.8	116	30.0	29
MN: Pipestone County (27117)	27117	101.7	37	N/A*	11
MN: Polk County (27119)	27119	132.6	132	24.0	26
MN: Pope County (27121)	27121	97.4	42	N/A*	7
MN: Ramsey County (27123)	27123	136.4	1983	18.9	292
MN: Red Lake County (27125)	27125	131.7	16	N/A*	3

County - Breast cancer-female	FIPS	Incidence Rate	Incidence Count	Mortality Rate	Mortality Count
MN: Redwood County (27127)	27127	138.0	72	22.8	14
MN: Renville County (27129)	27129	113.3	58	N/A*	10
MN: Rice County (27131)	27131	134.4	237	19.8	36
MN: Rock County (27133)	27133	119.1	40	N/A*	8
MN: Roseau County (27135)	27135	137.5	60	26.0	12
MN: St. Louis County (27137)	27137	114.1	746	20.3	149
MN: Scott County (27139)	27139	134.5	432	20.6	59
MN: Sherburne County (27141)	27141	134.0	289	19.3	43
MN: Sibley County (27143)	27143	143.8	69	N/A*	11
MN: Stearns County (27145)	27145	123.9	488	18.4	76
MN: Steele County (27147)	27147	181.4	199	16.7	22
MN: Stevens County (27149)	27149	108.5	30	N/A*	6
MN: Swift County (27151)	27151	99.3	39	N/A*	6
MN: Todd County (27153)	27153	106.4	89	N/A*	9
MN: Traverse County (27155)	27155	N/A*	15	N/A*	2
MN: Wabasha County (27157)	27157	145.0	103	18.8	14
MN: Wadena County (27159)	27159	127.0	62	20.9	12
MN: Waseca County (27161)	27161	142.9	88	25.0	16
MN: Washington County (27163)	27163	140.6	979	18.2	125
MN: Watonwan County (27165)	27165	89.7	37	N/A*	9
MN: Wilkin County (27167)	27167	136.5	29	N/A*	10
MN: Winona County (27169)	27169	144.1	205	24.1	37
MN: Wright County (27171)	27171	121.0	389	18.5	57
MN: Yellow Medicine County (27173)	27173	145.5	50	N/A*	8

*N/A Unstable rate based on relative standard error (100 x SE/Rate) > 30% . Rate should be interpreted with caution.


Lung Cancer Incidence
Age-Adjusted Rates
2010-2014
Kittson
Roseau
Lake of the Woods
Marshall
Koochiching
Pennington
Beltrami
Red Lake
Polk
Glear-water
St. Louis
Lake
Cook
Mahn-omen
Itasca
Norman
Hub-bard
Cass
Clay
Becker
Wa-dena
Crow Wing
Aitkin
Carlton
Wilkin
Otter Tail
Mille Lacs
Pine
Todd
Morrison
Kanabec
Grant
Douglas
Traverse
Benton
Big Stone
Stevens
Pope
Stearns
Isanti
Chisago
Sherburne
Swift
Kandi-yohi
Anoka
Wright
Meeker
Lac qui Parle
Chippewa
Ram-sey
Hennepin
Washington
McLeod
Carver
Yellow Medicine
Renville
Scott
Dakota
Sibley
Lincoln
Lyon
Redwood
Nicollet
Le Sueur
Rice
Goodhue
Wabasha
Brown
Pipe-stone
Murray
Cotton-wood
Waton-wan
Blue Earth
Was-eca
Steele
Dodge
Olmsted
Winona
Rock
Nobles
Jackson
Martin
Faribault
Freeborn
Mower
Fillmore
Houston
Age-Adjusted Rates
per 100,000 People
35.1 - 42.9
43.0 - 54.3
54.4 - 63.7
63.8 - 81.5
81.6 - 118.8
Minnesota = 55.0

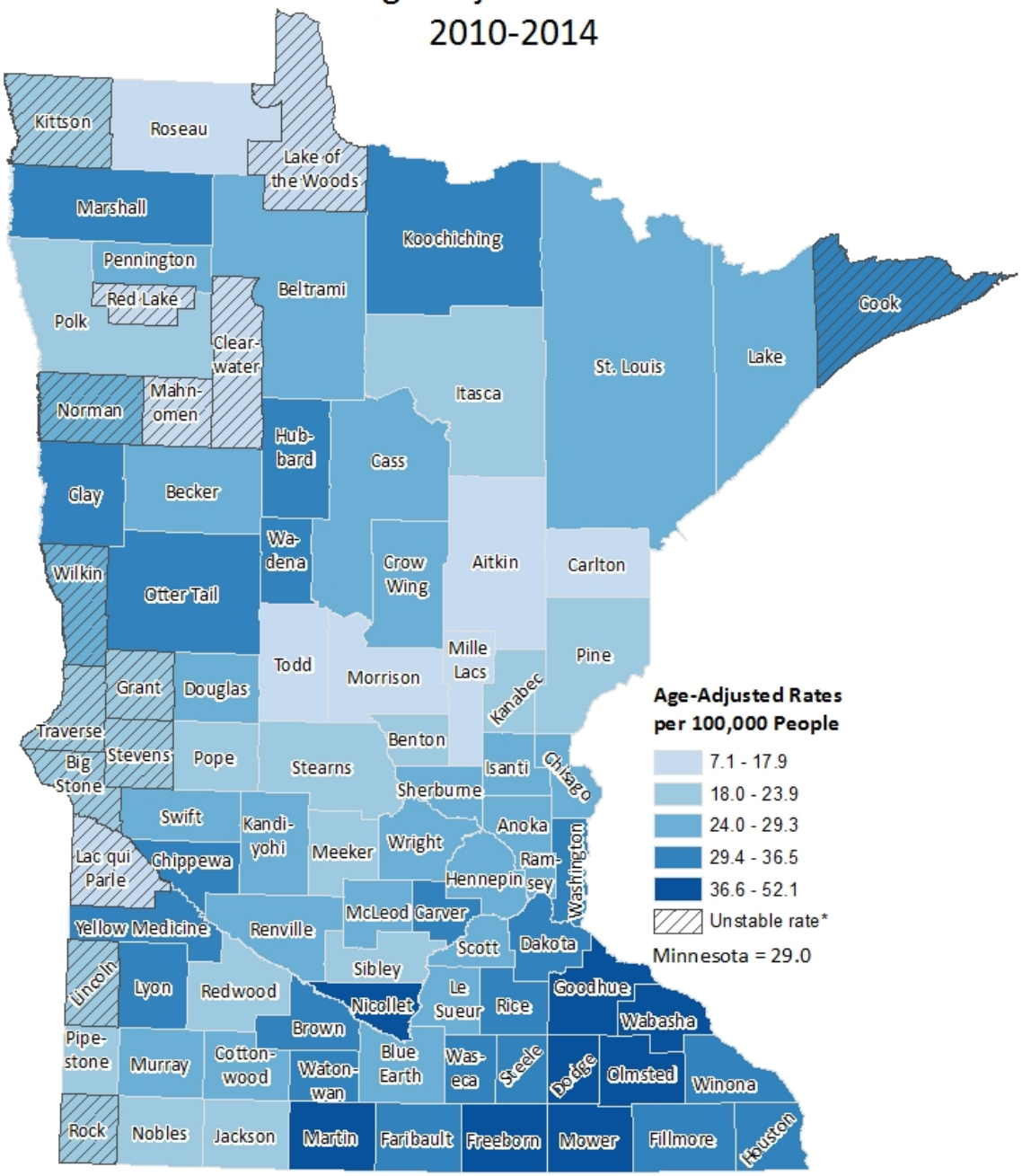

Lung Cancer Mortality
Age-Adjusted Rates
2010-2014
Kittson
Roseau
Lake of the Woods
Marshall
Koochiching
Pennington
Beltrami
Cook
Red Lake
Polk
Glear-water
St. Louis
Lake
Itasca
Norman
Mahn-omen
Hub-bard
Cass
Clay
Becker
Wa-dena
Grow Wing
Aitkin
Carlton
Wilkin
Otter Tail
Todd
Morrison
Mille Lacs
Pine
Kanabec
Grant
Douglas
Traverse
Benton
Stevens
Pope
Stearns
Isanti
Chisago
Big Stone
Sherburne
Swift
Kandi-yohi
Anoka
Lac qui Parle
Chippewa
Meeker
Wright
Ram-sey
Hennepin
Washington
McLeod
Carver
Yellow Medicine
Renville
Scott
Dakota
Sibley
Lincoln
Lyon
Redwood
Nicollet
Le Sueur
Rice
Goodhue
Wabasha
Brown
Pipe-stone
Murray
Cotton-wood
Waton-wan
Blue Earth
Was-eca
Steele
Dodge
Olmsted
Winona
Rock
Nobles
Jackson
Martin
Faribault
Freeborn
Mower
Fillmore
Houston
Age-Adjusted Rates
per 100,000 People
18.2 - 26.7
26.8 - 37.2
37.3 - 44.2
44.3 - 55.9
56.0 - 85.8
Minnesota = 39.6

County - Lung cancer	FIPS	Incidence Rate	Incidence Count	Mortality Rate	Mortality Count
Minnesota	27000	55.0	16485	39.6	11879
MN: Aitkin County (27001)	27001	61.8	99	46.7	75
MN: Anoka County (27003)	27003	69.1	1113	49.9	776
MN: Becker County (27005)	27005	52.1	120	43.6	100
MN: Beltrami County (27007)	27007	65.4	161	42.2	104
MN: Benton County (27009)	27009	56.1	112	41.9	85
MN: Big Stone County (27011)	27011	63.7	30	46.2	23
MN: Blue Earth County (27013)	27013	57.2	179	39.5	127
MN: Brown County (27015)	27015	57.3	107	39.7	75
MN: Carlton County (27017)	27017	56.5	126	46.4	105
MN: Carver County (27019)	27019	58.7	225	37.0	137
MN: Cass County (27021)	27021	68.5	166	52.7	125
MN: Chippewa County (27023)	27023	49.4	46	34.0	33
MN: Chisago County (27025)	27025	56.4	164	46.8	132
MN: Clay County (27027)	27027	67.6	199	42.5	128
MN: Clearwater County (27029)	27029	72.6	48	48.3	31
MN: Cook County (27031)	27031	35.1	16	18.2	7
MN: Cottonwood County (27033)	27033	52.8	48	37.7	35
MN: Crow Wing County (27035)	27035	59.0	277	48.9	230
MN: Dakota County (27037)	27037	52.6	1021	39.8	756
MN: Dodge County (27039)	27039	62.2	65	45.5	48
MN: Douglas County (27041)	27041	48.6	132	37.0	105
MN: Faribault County (27043)	27043	62.9	69	47.2	56
MN: Fillmore County (27045)	27045	45.8	72	29.7	49
MN: Freeborn County (27047)	27047	52.5	127	40.8	99
MN: Goodhue County (27049)	27049	42.6	137	37.7	121
MN: Grant County (27051)	27051	50.9	25	43.1	23
MN: Hennepin County (27053)	27053	53.2	3141	35.1	2079
MN: Houston County (27055)	27055	49.4	66	33.5	46
MN: Hubbard County (27057)	27057	63.4	112	48.9	85
MN: Isanti County (27059)	27059	62.1	134	44.7	96
MN: Itasca County (27061)	27061	61.6	213	47.6	166

County - Lung cancer	FIPS	Incidence Rate	Incidence Count	Mortality Rate	Mortality Count
MN: Jackson County (27063)	27063	61.7	47	32.4	27
MN: Kanabec County (27065)	27065	55.7	62	39.4	43
MN: Kandiyohi County (27067)	27067	50.9	140	42.1	117
MN: Kittson County (27069)	27069	53.0	21	31.3	12
MN: Koochiching County (27071)	27071	50.6	56	41.3	46
MN: Lac qui Parle County (27073)	27073	42.9	26	33.9	22
MN: Lake County (27075)	27075	42.5	40	45.4	42
MN: Lake of the Woods County (27077)	27077	81.5	28	39.6	14
MN: Le Sueur County (27079)	27079	49.1	85	34.1	57
MN: Lincoln County (27081)	27081	49.3	25	42.9	24
MN: Lyon County (27083)	27083	51.8	73	35.2	50
MN: McLeod County (27085)	27085	49.7	114	37.2	86
MN: Mahnomen County (27087)	27087	118.8	42	85.8	30
MN: Marshall County (27089)	27089	65.2	45	55.9	40
MN: Martin County (27091)	27091	46.4	75	31.4	55
MN: Meeker County (27093)	27093	47.6	75	39.1	62
MN: Mille Lacs County (27095)	27095	58.2	98	51.7	87
MN: Morrison County (27097)	27097	67.3	148	38.5	85
MN: Mower County (27099)	27099	50.1	133	34.4	99
MN: Murray County (27101)	27101	37.3	27	26.7	20
MN: Nicollet County (27103)	27103	57.3	100	35.1	58
MN: Nobles County (27105)	27105	38.1	51	24.9	37
MN: Norman County (27107)	27107	54.1	29	43.3	26
MN: Olmsted County (27109)	27109	49.0	394	28.9	233
MN: Otter Tail County (27111)	27111	53.4	250	40.5	192
MN: Pennington County (27113)	27113	42.9	35	38.5	33
MN: Pine County (27115)	27115	72.9	149	47.2	96
MN: Pipestone County (27117)	27117	48.7	36	33.4	25
MN: Polk County (27119)	27119	55.3	113	43.1	90
MN: Pope County (27121)	27121	49.1	44	39.9	38
MN: Ramsey County (27123)	27123	55.1	1471	41.9	1124
MN: Red Lake County (27125)	27125	60.0	17	55.7	17

County - Lung cancer	FIPS	Incidence Rate	Incidence Count	Mortality Rate	Mortality Count
MN: Redwood County (27127)	27127	54.9	65	42.6	52
MN: Renville County (27129)	27129	47.5	55	33.0	39
MN: Rice County (27131)	27131	52.0	184	39.4	136
MN: Rock County (27133)	27133	48.6	34	35.7	29
MN: Roseau County (27135)	27135	62.8	58	45.6	43
MN: St. Louis County (27137)	27137	59.4	788	45.1	612
MN: Scott County (27139)	27139	58.1	294	40.4	197
MN: Sherburne County (27141)	27141	62.6	227	43.6	158
MN: Sibley County (27143)	27143	46.7	46	41.0	41
MN: Stearns County (27145)	27145	51.5	410	35.9	289
MN: Steele County (27147)	27147	40.5	88	30.6	71
MN: Stevens County (27149)	27149	36.6	23	31.9	19
MN: Swift County (27151)	27151	59.2	46	44.2	34
MN: Todd County (27153)	27153	54.3	92	38.1	64
MN: Traverse County (27155)	27155	38.4	13	32.5	11
MN: Wabasha County (27157)	27157	72.4	108	47.2	70
MN: Wadena County (27159)	27159	52.5	56	43.4	49
MN: Waseca County (27161)	27161	48.8	57	45.5	53
MN: Washington County (27163)	27163	51.5	625	37.0	438
MN: Watonwan County (27165)	27165	59.1	47	40.3	34
MN: Wilkin County (27167)	27167	48.7	21	30.8	15
MN: Winona County (27169)	27169	59.3	172	40.3	119
MN: Wright County (27171)	27171	60.5	343	41.9	230
MN: Yellow Medicine County (27173)	27173	42.3	33	40.3	32

Melanoma of the Skin Incidence
Age-Adjusted Rates
2010-2014



*Unstable rate based on relative standard error (100 x SE/Rate) > 30% . Rate should be interpreted with caution.

County - Melanoma	FIPS	Incidence Rate	Incidence Count	Mortality Rate	Mortality Count
Minnesota	27000	29.0	8498	2.6	772
MN: Aitkin County (27001)	27001	15.4	17	N/A*	5
MN: Anoka County (27003)	27003	26.9	467	2.5	40
MN: Becker County (27005)	27005	28.6	60	N/A*	7
MN: Beltrami County (27007)	27007	27.8	63	N/A*	3
MN: Benton County (27009)	27009	21.7	45	N/A*	9
MN: Big Stone County (27011)	27011	N/A*	5	N/A*	1
MN: Blue Earth County (27013)	27013	26.6	85	N/A*	4
MN: Brown County (27015)	27015	32.7	48	N/A*	3
MN: Carlton County (27017)	27017	17.2	36	N/A*	6
MN: Carver County (27019)	27019	35.7	158	3.0	13
MN: Cass County (27021)	27021	29.3	59	N/A*	6
MN: Chippewa County (27023)	27023	31.0	22	N/A*	1
MN: Chisago County (27025)	27025	26.6	75	N/A*	7
MN: Clay County (27027)	27027	32.7	94	N/A*	4
MN: Clearwater County (27029)	27029	N/A*	5	N/A*	0
MN: Cook County (27031)	27031	N/A*	11	N/A*	1
MN: Cottonwood County (27033)	27033	25.5	16	N/A*	2
MN: Crow Wing County (27035)	27035	27.0	112	2.9	14
MN: Dakota County (27037)	27037	31.1	642	2.3	45
MN: Dodge County (27039)	27039	42.7	42	N/A*	3
MN: Douglas County (27041)	27041	24.9	60	5.5	14
MN: Faribault County (27043)	27043	30.5	30	N/A*	3
MN: Fillmore County (27045)	27045	35.5	46	N/A*	3
MN: Freeborn County (27047)	27047	42.3	78	N/A*	7
MN: Goodhue County (27049)	27049	44.2	132	5.0	15
MN: Grant County (27051)	27051	N/A*	10	N/A*	1
MN: Hennepin County (27053)	27053	27.7	1715	2.4	145
MN: Houston County (27055)	27055	34.5	38	N/A*	10
MN: Hubbard County (27057)	27057	30.6	43	N/A*	5
MN: Isanti County (27059)	27059	26.6	55	N/A*	5
MN: Itasca County (27061)	27061	23.0	64	N/A*	8

County - Melanoma	FIPS	Incidence Rate	Incidence Count	Mortality Rate	Mortality Count
MN: Jackson County (27063)	27063	23.5	14	N/A*	3
MN: Kanabec County (27065)	27065	22.9	23	N/A*	4
MN: Kandiyohi County (27067)	27067	29.1	73	N/A*	5
MN: Kittson County (27069)	27069	N/A*	7	N/A*	2
MN: Koochiching County (27071)	27071	29.8	29	N/A*	2
MN: Lac qui Parle County (27073)	27073	N/A*	8	N/A*	2
MN: Lake County (27075)	27075	28.6	24	N/A*	6
MN: Lake of the Woods County (27077)	27077	N/A*	5	N/A*	1
MN: Le Sueur County (27079)	27079	27.3	44	N/A*	2
MN: Lincoln County (27081)	27081	N/A*	7	N/A*	0
MN: Lyon County (27083)	27083	32.9	46	N/A*	4
MN: McLeod County (27085)	27085	26.8	55	N/A*	10
MN: Mahnomen County (27087)	27087	N/A*	5	N/A*	0
MN: Marshall County (27089)	27089	35.4	18	N/A*	0
MN: Martin County (27091)	27091	43.5	61	N/A*	2
MN: Meeker County (27093)	27093	19.4	28	N/A*	1
MN: Mille Lacs County (27095)	27095	17.2	27	N/A*	4
MN: Morrison County (27097)	27097	15.8	34	N/A*	3
MN: Mower County (27099)	27099	43.0	97	N/A*	8
MN: Murray County (27101)	27101	29.1	19	N/A*	4
MN: Nicollet County (27103)	27103	46.8	81	N/A*	1
MN: Nobles County (27105)	27105	23.5	28	N/A*	4
MN: Norman County (27107)	27107	N/A*	11	N/A*	1
MN: Olmsted County (27109)	27109	52.1	409	3.0	25
MN: Otter Tail County (27111)	27111	30.7	108	N/A*	11
MN: Pennington County (27113)	27113	26.0	20	N/A*	4
MN: Pine County (27115)	27115	19.4	36	N/A*	1
MN: Pipestone County (27117)	27117	20.9	13	N/A*	4
MN: Polk County (27119)	27119	21.0	37	N/A*	8
MN: Pope County (27121)	27121	21.6	15	N/A*	2
MN: Ramsey County (27123)	27123	27.6	748	2.7	76
MN: Red Lake County (27125)	27125	N/A*	3	N/A*	0

County - Melanoma	FIPS	Incidence Rate	Incidence Count	Mortality Rate	Mortality Count
MN: Redwood County (27127)	27127	20.3	18	N/A*	5
MN: Renville County (27129)	27129	24.7	26	N/A*	0
MN: Rice County (27131)	27131	30.1	101	N/A*	9
MN: Rock County (27133)	27133	N/A*	10	N/A*	3
MN: Roseau County (27135)	27135	14.5	13	N/A*	3
MN: St. Louis County (27137)	27137	24.5	288	3.5	44
MN: Scott County (27139)	27139	27.5	162	N/A*	8
MN: Sherburne County (27141)	27141	25.7	106	N/A*	6
MN: Sibley County (27143)	27143	23.9	23	N/A*	3
MN: Stearns County (27145)	27145	22.5	171	2.0	16
MN: Steele County (27147)	27147	34.3	71	N/A*	4
MN: Stevens County (27149)	27149	N/A*	11	N/A*	1
MN: Swift County (27151)	27151	26.8	17	N/A*	2
MN: Todd County (27153)	27153	17.9	27	N/A*	5
MN: Traverse County (27155)	27155	N/A*	4	N/A*	1
MN: Wabasha County (27157)	27157	42.5	55	N/A*	4
MN: Wadena County (27159)	27159	34.0	30	N/A*	2
MN: Waseca County (27161)	27161	34.0	37	N/A*	2
MN: Washington County (27163)	27163	36.5	475	2.8	34
MN: Watonwan County (27165)	27165	30.3	21	N/A*	5
MN: Wilkin County (27167)	27167	N/A*	10	N/A*	2
MN: Winona County (27169)	27169	31.0	86	N/A*	5
MN: Wright County (27171)	27171	25.4	154	2.7	17
MN: Yellow Medicine County (27173)	27173	31.9	23	N/A*	1

*N/A Unstable rate based on relative standard error (100 x SE/Rate) > 30%. Rate should be interpreted with caution

County - Cervical cancer	FIPS	Incidence Rate	Incidence Count	Mortality Rate	Mortality Count
Minnesota	27000	5.5	774	1.4	217
MN: Aitkin County (27001)	27001	N/A*	3	N/A*	2
MN: Anoka County (27003)	27003	4.5	42	1.4	13

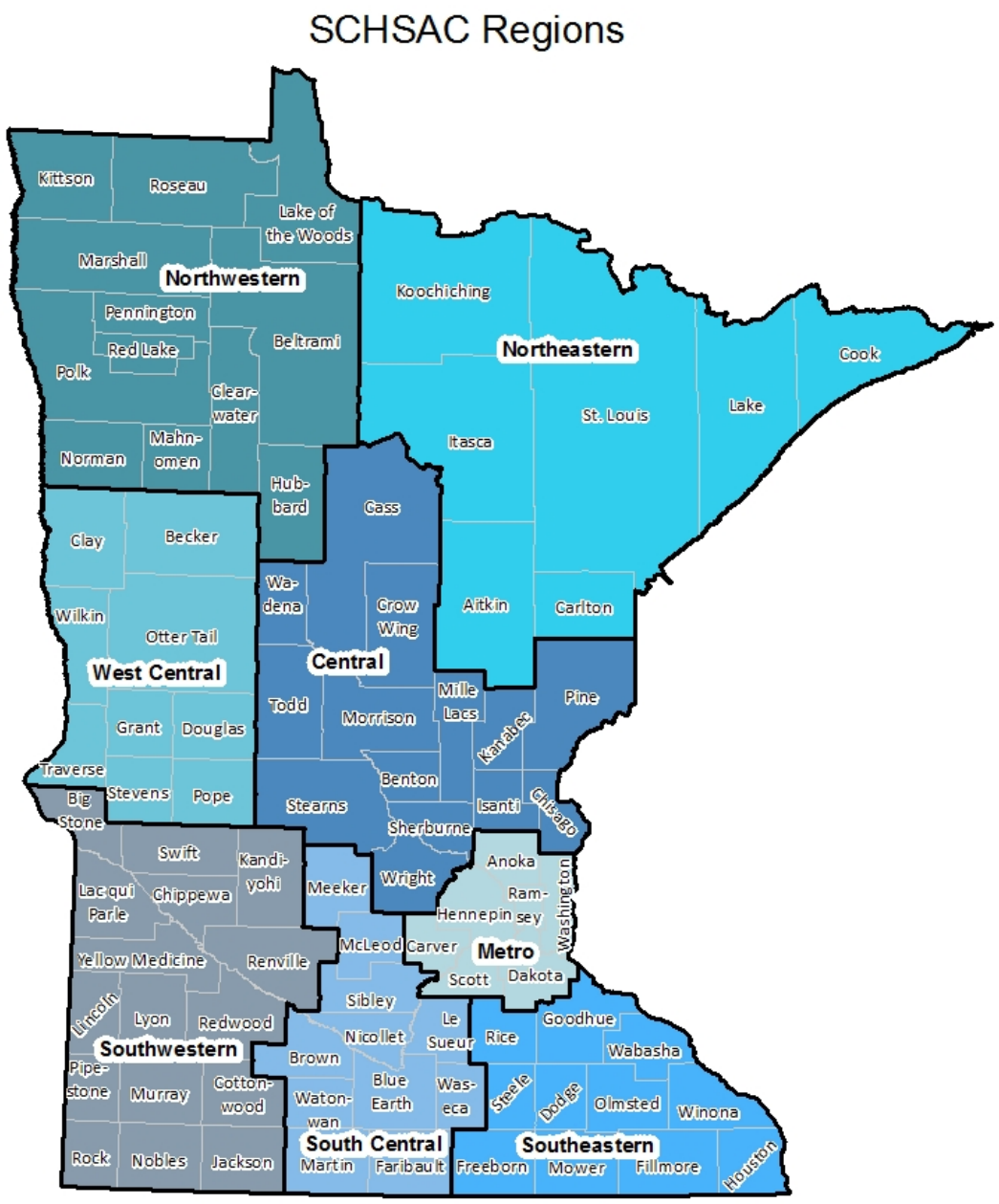
County - Cervical cancer	FIPS	Incidence Rate	Incidence Count	Mortality Rate	Mortality Count
MN: Becker County (27005)	27005	N/A*	6	N/A*	2
MN: Beltrami County (27007)	27007	N/A*	10	N/A*	2
MN: Benton County (27009)	27009	N/A*	3	N/A*	1
MN: Big Stone County (27011)	27011	N/A*	1	N/A*	0
MN: Blue Earth County (27013)	27013	N/A*	10	N/A*	2
MN: Brown County (27015)	27015	N/A*	1	N/A*	3
MN: Carlton County (27017)	27017	N/A*	5	N/A*	0
MN: Carver County (27019)	27019	N/A*	11	N/A*	2
MN: Cass County (27021)	27021	N/A*	1	N/A*	1
MN: Chippewa County (27023)	27023	N/A*	3	N/A*	0
MN: Chisago County (27025)	27025	N/A*	5	N/A*	0
MN: Clay County (27027)	27027	N/A*	6	N/A*	1
MN: Clearwater County (27029)	27029	N/A*	1	N/A*	0
MN: Cook County (27031)	27031	N/A*	0	N/A*	0
MN: Cottonwood County (27033)	27033	N/A*	1	N/A*	0
MN: Crow Wing County (27035)	27035	8.0	14	N/A*	2
MN: Dakota County (27037)	27037	4.9	54	1.5	17
MN: Dodge County (27039)	27039	N/A*	4	N/A*	3
MN: Douglas County (27041)	27041	N/A*	8	N/A*	2
MN: Faribault County (27043)	27043	N/A*	4	N/A*	1
MN: Fillmore County (27045)	27045	N/A*	1	N/A*	0
MN: Freeborn County (27047)	27047	N/A*	2	N/A*	0
MN: Goodhue County (27049)	27049	N/A*	7	N/A*	2
MN: Grant County (27051)	27051	N/A*	1	N/A*	0
MN: Hennepin County (27053)	27053	6.6	207	1.7	55
MN: Houston County (27055)	27055	N/A*	2	N/A*	0
MN: Hubbard County (27057)	27057	N/A*	3	N/A*	2
MN: Isanti County (27059)	27059	N/A*	3	N/A*	3
MN: Itasca County (27061)	27061	N/A*	9	N/A*	2
MN: Jackson County (27063)	27063	N/A*	1	N/A*	0
MN: Kanabec County (27065)	27065	N/A*	3	N/A*	1
MN: Kandiyohi County (27067)	27067	N/A*	7	N/A*	1

County - Cervical cancer	FIPS	Incidence Rate	Incidence Count	Mortality Rate	Mortality Count
MN: Kittson County (27069)	27069	N/A*	0	N/A*	0
MN: Koochiching County (27071)	27071	N/A*	1	N/A*	1
MN: Lac qui Parle County (27073)	27073	N/A*	0	N/A*	0
MN: Lake County (27075)	27075	N/A*	2	N/A*	0
MN: Lake of the Woods County (27077)	27077	N/A*	0	N/A*	0
MN: Le Sueur County (27079)	27079	N/A*	4	N/A*	3
MN: Lincoln County (27081)	27081	N/A*	2	N/A*	0
MN: Lyon County (27083)	27083	N/A*	2	N/A*	0
MN: McLeod County (27085)	27085	N/A*	5	N/A*	2
MN: Mahnomen County (27087)	27087	N/A*	0	N/A*	0
MN: Marshall County (27089)	27089	N/A*	1	N/A*	0
MN: Martin County (27091)	27091	N/A*	1	N/A*	0
MN: Meeker County (27093)	27093	N/A*	5	N/A*	0
MN: Mille Lacs County (27095)	27095	N/A*	5	N/A*	1
MN: Morrison County (27097)	27097	N/A*	5	N/A*	1
MN: Mower County (27099)	27099	N/A*	12	N/A*	3
MN: Murray County (27101)	27101	N/A*	0	N/A*	0
MN: Nicollet County (27103)	27103	N/A*	4	N/A*	2
MN: Nobles County (27105)	27105	N/A*	1	N/A*	0
MN: Norman County (27107)	27107	N/A*	2	N/A*	0
MN: Olmsted County (27109)	27109	4.9	19	N/A*	6
MN: Otter Tail County (27111)	27111	N/A*	7	N/A*	3
MN: Pennington County (27113)	27113	N/A*	3	N/A*	0
MN: Pine County (27115)	27115	N/A*	3	N/A*	2
MN: Pipestone County (27117)	27117	N/A*	0	N/A*	0
MN: Polk County (27119)	27119	N/A*	3	N/A*	3
MN: Pope County (27121)	27121	N/A*	5	N/A*	0
MN: Ramsey County (27123)	27123	5.2	75	N/A*	23
MN: Red Lake County (27125)	27125	N/A*	0	N/A*	0
MN: Redwood County (27127)	27127	N/A*	5	N/A*	0
MN: Renville County (27129)	27129	N/A*	5	N/A*	3
MN: Rice County (27131)	27131	N/A*	5	N/A*	3

County - Cervical cancer	FIPS	Incidence Rate	Incidence Count	Mortality Rate	Mortality Count
MN: Rock County (27133)	27133	N/A*	0	N/A*	0
MN: Roseau County (27135)	27135	N/A*	4	N/A*	2
MN: St. Louis County (27137)	27137	4.5	27	1.7	13
MN: Scott County (27139)	27139	5.6	20	N/A*	2
MN: Sherburne County (27141)	27141	N/A*	8	N/A*	4
MN: Sibley County (27143)	27143	N/A*	0	N/A*	0
MN: Stearns County (27145)	27145	5.5	19	N/A*	2
MN: Steele County (27147)	27147	N/A*	6	N/A*	1
MN: Stevens County (27149)	27149	N/A*	0	N/A*	0
MN: Swift County (27151)	27151	N/A*	0	N/A*	0
MN: Todd County (27153)	27153	N/A*	5	N/A*	1
MN: Traverse County (27155)	27155	N/A*	0	N/A*	0
MN: Wabasha County (27157)	27157	N/A*	2	N/A*	0
MN: Wadena County (27159)	27159	N/A*	0	N/A*	0
MN: Waseca County (27161)	27161	N/A*	6	N/A*	1
MN: Washington County (27163)	27163	3.9	26	N/A*	9
MN: Watonwan County (27165)	27165	N/A*	1	N/A*	0
MN: Wilkin County (27167)	27167	N/A*	2	N/A*	0
MN: Winona County (27169)	27169	N/A*	9	N/A*	2
MN: Wright County (27171)	27171	3.9	13	N/A*	3
MN: Yellow Medicine County (27173)	27173	N/A*	2	N/A*	1

*N/A Unstable rate based on relative standard error (100 x SE/Rate) > 30%. Rate should be interpreted with caution.

D. State Community Health Service (SCHSAC) regional data



Incidence data 2010-2014

(Rates/100,000 and counts)

Cancer site	Central	Metro	Northeast	Northwest	South Central	Southeast	Southwest	West Central
All sites Rate	454.3	459.2	448.1	446.2	447.5	456.4	453.8	464.1
All sites Count	18,709	68,294	9,978	4,855	7,886	13,508	6,816	6,891
Colorectal Rate	38.9	37.1	38.5	42.0	41.7	37.3	49.0	44.0
Colorectal Count	1,578	5,442	868	466	760	1,118	763	664
Breast Rate	127.1	134.2	113.3	117.5	132.1	132.9	128.8	117.2
Breast Count	2,636	10,771	1,259	626	1,163	2,009	959	849
Lung Rate	58.8	55.4	57.8	63.0	52.7	50.8	49.5	53.7
Lung Count	2,438	7,894	1,338	709	954	1,546	782	827
Melanoma Rate	24.0	29.1	23.5	23.5	30.7	41.4	25.5	28.1
Melanoma Count	954	4,367	469	230	513	1,156	345	374
Cervical Rate	4.8	5.6	5.4	6.7	6.3	5.5	4.9	5.6
Cervical Count	87	435	47	27	41	69	30	35

Mortality data 2010-2014

(Rates/100,000 and counts)

Cancer site	Central	Metro	Northeast	Northwest	South Central	Southeast	Southwest	West Central
All sites Rate	161.2	155.4	176.4	165.9	154.7	149.9	154.9	157.5
All sites Count	6,616	22,307	4116	1897	2942	4678	2629	2543
Colorectal Rate	11.9	12.3	15.5	16.7	13.4	12.9	15.8	14.0
Colorectal Count	482	1,803	364	191	261	408	272	228
Breast Rate	18.7	18.8	19.4	19.3	20.5	17.9	18.8	18.1
Breast Count	411	1,549	240	112	206	304	171	150
Lung Rate	42.9	39.0	44.8	46.1	38.4	35.4	36.5	39.8
Lung Count	1,769	5,507	1,053	525	704	1,091	599	631
Melanoma Rate	2.4	2.5	3.3	2.6	2.0	3.0	2.7	2.8
Melanoma Count	99	361	72	27	36	93	41	43
Cervical Rate	1.2	1.5	1.5	1.7	1.9	1.3	0.7	1.1
Cervical Count	22	121	18	9	14	20	5	8

E. Feedback form

Minnesota Department of Health
Minnesota Cancer Reporting System
PO Box 64882
St. Paul, MN 55164-0882
651-201-5900
Minnesota Cancer Reporting System Email Address (mcrs@state.mn.us)
Minnesota Department of Health Website (www.health.state.mn.us)

Please take a few minutes to provide us with your thoughts and comments about the report, Cancer in Minnesota 1988-2014. Please send your responses to MCRS by US mail or email. Our office mailing address and email address is located above.

We will summarize feedback we receive and use it in planning future reports or other publications. We will not individually identify respondents in our summary and planning.

1. Was the information in the report clearly written and understandable? If you have any suggestions for improvements, please include them in your answer.

2. Please tell us how you will to use the information in this publication?

3. What would be useful in future publications?

F. MCRS publications and data use

Reports published by MCSS or in collaboration with other organizations

American Cancer Society, Midwest Division. Minnesota Cancer Facts & Figures 2015. Mendota Heights, MN: American Cancer Society, Midwest Division, October 2015.

Cancer in Minnesota, 1988-2009: Report to the Minnesota Legislature 2013. Minnesota Cancer Surveillance System, St. Paul, MN, December 2012.

Cancer in Minnesota, 1988-2008: Report to the Minnesota Legislature 2012. Minnesota Cancer Surveillance System, St. Paul, MN, March 2012.

Minnesota Affiliate of Susan G. Komen for the Cure. Community Profile Report, June 2011.

American Cancer Society, Midwest Division. Minnesota Cancer Facts & Figures 2011. Mendota Heights, MN: American Cancer society, Midwest division, March 2011.

Perkins C, Bushhouse S. Cancer in Minnesota, 2009: Preliminary report. Minnesota Cancer Surveillance System, St. Paul, MN, February 2011.

Perkins C, Bushhouse S. Cancer in Minnesota, 2008: 24-month report. Minnesota Cancer Surveillance System, St. Paul, MN, February 2011.

Publications incorporating or based on data from MCSS

Ovenuga M, Yang JK, Prizment AE, Bushhouse S, Demerath EW, Spector LG. Cancer patterns in Hmong in Minnesota, 2000 to 2012. Cancer. 2018 Jul 5.

Gilsenan A, Harding A, Kellier-Steele N, Harris D, Midkiff K, Andrews E. The Forteo Patient Registry linkage to multiple state cancer registries: study design and results from the first 8 years. Osteoporosis Int. 2018 Jul 5.

Allemani C, Matsuda T, Di Carlo V, Harewood R, Matz M, Niksic M, Bonaventure A, Valkov M, Johnson CJ, Esteve J, Ogunbiyi OJ, Azevedo E Silva G, Chen WQ, Eser S, Engholm G, Stiller CA, Monnereau A, Woods RR, Visser O, Lim GH, Aitken J, Weir HK, Coleman MP, CONCORD Working Group. Global surveillance of trends in ncancer survival 2000-14 (CONCORD-3): analysis of individual records for 37 513 025 patients diagnosed with one of 18 cancers from 322 population-based registries in 71 countries. Lancet. 2018 Mar 17;391(10125):1023-1075.

Marcotte EL[1,2], Druley TE[3], Johnson KJ[4], Richardson M[1], von Behren J[5], Mueller BA[6], Carozza S[7], McLaughlin C[8], Chow EJ[6], Reynolds P[5], Spector LG[1,2]. Parental Age and Risk of Infant Leukaemia: A Pooled Analysis. Paediatr Perinat Epidemiol. 2017 Nov;31(6):563-572. Doi: 10.1111/ppe.12412. Epub 2017 Sep 22.

Kehm RD, Spector LG, Poynter JN, Vock DM, Osypuk TL. Socioeconomic Status and Childhood Cancer Incidence: A Population-Based Multilevel Analysis. Am J Epidemiol. 2018 May 1;187(5):982-991.

Steliarova-Foucher E, Colombet M, Ries LAG, Morena F, Dolya A, Bray F, Hesseling P, Shin HY, Stiller CA, IICC-3 contributors. International incidence of childhood cancer, 2001-10: a population-based registry. Lancet Oncol. 2017 Jun;18(6):719-731.

Poynter JN, Richardson M, Roesler M, Blair CK, Hirsch B, Nguyen P, Cioc A, Cerhan JR**,** Warlick E. Chemical exposures and risk of acute myeloid leukemia and myelodysplastic syndromes in a population-based study. Int J Cancer. 2017 Jan 1;140(1):23-33. doi: 10.1002/ijc.30420.

Poynter JN, Richardson M, Langer E, Hooten AJ, Roesler M, Hirsch B, Nguyen PL, Cioc A, Warlick E, Ross JA. Association between mitochondrial DNA haplogroup and myelodysplastic syndromes. Genes Chromosomes Cancer. 2016 Sep;55(9):688-93. doi: 10.1002/gcc.22370.

Midkiff KD, Andrews EB, Gilsenan AW, Deapen DM, Harris H, Schymura MJ, Hornicek FJ. The experience of accommodating privacy restrictions during implementation of larg-scale surveillance study of an osteoporosis medication. Pharmacoepidemiol Drug Saf. 2016 Aug;25(8):960-8.

Poynter JN, Richardson M, Blair CK, Roesler MA, Hirsch BA, Nguyen P, Cioc A, Warlick E, Cerhan JR, Ross JA. Obesity over the life course and risk of acute myeloid leukemia and myelodysplastic syndromes. Cancer Epidemiol. 2016 Feb;40:134-40. doi: 10.1016/j.canep.2015.12.005.

Allen EM, Alexander BH, MacLehose RF, Nelson HH, Ramachandran G, Mandel JH. Cancer incidence among Minnesota Taconite Mining Industry Workers. Ann Epidemiol. 2015;25(11): 811-815.

Smith AR, Warlick ED, Roesler MA, Poynter JN, Richardson M, Nguyen P, Cioc A, Hirsch B, Ross JA. Factors associated with hematopoietic cell transplantation (HCT) among patients in a population-based study of myelodysplastic syndrome (MDS) in Minnesota. Ann Hematol. 2015 Oct;94(10):1667-75. doi: 10.1007/s00277-015-2422-z.

Bertrand KA, Scott CG, Tamimi RM, Jensen MR, Pankratz VS, Norman AD, Visscher DW, Couch FJ, Shepherd J, Chen YY, Fan B, Wu FF, Ma L, Beck AH, Cummings SR, Kerlikowske K, Vachon CM. Dense and Non-Dense Mammographic Area and Risk of Breast Cancer by Age and Tumor characteristics. Cancer Epidemiol Biomarkers prev. 2015 May;24(5): 798-809.

Pease DF, Ross JA, Poynter JN, Nguyen PL, Hirsch B, Cioc A, Roesler MA, Warlick ED. Differences in community and academic practice patterns for newly diagnosed myelodysplastic syndromes (MDS) patients. Cancer Epidemiol. 2015 Apr;39(2):222-8. doi: 10.1016/j.canep.2015.01.006.

Gleason MK, Ross JA, Warlick ED, Lund TC, Verneris MR, Wiernik A, Spellman S, Haagenson MD, Lenvik AJ, Litzow MR, Epling-Burnette PK, Blazar BR, Weiner LM, Weisdorf DJ, Vallera DA, Miller JS. CD16xCD33 bispecific killer cell engager (BiKE) activates NK cells against primary MDS and MDSC CD33+ targets. Blood. 2014 May 8;123(19):3016-26. doi: 10.1182/blood-2013-10-533398.

Wiernik A, Foley B, Zhang B, Verneris MR, Warlick E, Gleason MK, Ross JA, Luo X, Weisdorf DJ, Walcheck B, Vallera DA, Miller JS. Targeting natural killer cells to acute myeloid leukemia in vitro with a CD16 x 33 bispecific killer cell engager and ADAM17 inhibition. Clin Cancer Res. 2013 Jul 15;19(14):3844-55. doi: 10.1158/1078-0432.CCR-13-0505.

Musselman JR, Blair CK, Cerhan JR, Nguyen P, Hirsch B, Ross JA. Risk of adult acute and chronic myeloid leukemia with cigarette smoking and cessation. Cancer Epidemiol. 2013 Aug;37(4):410-6. doi: 10.1016/j.canep.2013.03.012.

Andrews EB, Gilsenan AW, Midkiff K, Sherrill B, Wu Y, Mann BH, Masica D. The US Postmarketing Surveillance Study of Adult Osteosarcoma and Teriparatide; Study Design and Findings From the First 7 years. J bone Miner Res 2012 Dec;27(12) 2429-2437.

Johnson KJ, Blair CM, Fink JM, Cerhan JR, Roesler MA, Hirsch BA, Nguyen PL, Ross JA. Medical conditions and risk of adult myeloid leukemia. Cancer Causes Control. 2012 Jul;23(7):1083-9. doi: 10.1007/s10552-012-9977-y.

Copeland G, Lake A, Firth R, Wohler B,Wu XC, Stroup A, Russell C, Boyuk K, Schymura M, Hofferkamp J, Kohler B (eds). Cancer in North America: 2005-2009. Volume One: Combined Cancer Incidence for the United States, Canada and North America. Springfield, IL: North American Association of Central Cancer Registries, Inc. June 2012.

Copeland G, Lake A, Firth R, Wohler B,Wu XC, Stroup A, Russell C, Boyuk K, Schymura M, Hofferkamp J, Kohler B (eds). Cancer in North America: 2005-2009. Volume Two: Registry-specific Cancer Incidence in the United States and Canada. Springfield, IL: North American Association of Central Cancer Registries, Inc. June 2012.

Copeland G, Lake A, Firth R, Wohler B,Wu XC, Stroup A, Russell C, Boyuk K, Schymura M, Hofferkamp J, Kohler B (eds). Cancer In North America, 2005-2009. Volume Three: Registry-specific Cancer Mortality in the United States and Canada. Springfield, IL: North American Association of Central Cancer Registries, Inc. June 2012.

Ross JA. Birth weight and childhood leukemia: time to tackle bigger lessons. Pediatri Blood Cancer. 2012 Jan;58(1):1-2.

Lazovich D, Vogel RI, Berwick M, Weinstock MA, Warshaw EM, Anderson KE. Melanoma risk in relation to use of sunscreen or other sun protection methods. Cancer Epidemiol Biomarkers Prev. 2011 Dec;20(12):2583-93.

Enewold LR, Zhou J, Devesa SS, Berrington de Gonzalez A, Anderson WF, Zahm SH, Stojadinovic A, Peoples GE, Mrrogi AJ, Potter JF, McGlynn KA, Zhu Kangmin. Thyroid Cancer Incidence among Active Duty U.S. Military Personnel, 1990-2004. Cancer Epidemiol Biomarkers Prev. 2011 Nov;20(11):2369-76.

Genkinger JM, Spiegelman D, Anderson KE, Bernstein L, van den Brandt PA, Calle EE, English DR, Folsom AR, Freudenheim JL, Fuchs CS, Giles GG, Giovannucci E, Horn-Ross PL, Larsson SC, Leitzmann M, Mannisto S, Marshall JR, Miller AB, Patel AV, Rohan TE, Stolzenberg-Solomon RZ, Verhage BA, Virtamo J, Willcox BJ, Wolk A, Ziegler RG, Smith-Warner SA. A pooled analysis of 14 cohort studies of anthropometric factors and pancreatic cancer risk. Int J Cancer. 2011 Oct 1;129(7):1708-17.

Ross JA, Blair CK, Cerhan JR, Soler JT, Hirsch BA, Roesler MA, Higgins RR, Nguyen PL. Nonsteroidal anti-inflammatory drug and acetaminophen use and risk of adult myeloid leukemia. Cancer Epidemiol Biomarkers Prev. 2011 Aug;20(8):1741-50.

Von Behren J, Spector LG, Mueller BA, Carozza SE, Chow EJ, Fox EE, Horel S, Johnson KJ, McLaughlin C, Puumala SE, Ross JA, Reynolds P. Birth order and risk of childhood cancer: a pooled analysis from five US States. Int J Cancer. 2011 Jun 1;128(11):2709-16.

Kohler BA, Ward E, McCarthy BJ, Schymura MJ, Ries LA, Eheman C, Jemal A, Anderson RN, Ajani UA, Edwards BK. Annual report to the nation on the status of cancer, 1975-2007, featuring tumors of the brain and other nervous system. J Natl Cancer Inst. 2011 May 4;103(99):714-36. Epub 2011 Mar 31.

Cicek MS, Lindor NM, gallinger S, Bapat B, Hopper JL, Jenkins MA, Young J, Buchanan D, Walsh MD, Le Marchand L, Burnett T, Newcomb PA, Grady WM, Haile RW, Casey G, Plummer SJ, Krumroy LA, Baron JA, Thibodeau SN. Quality assessment and correlation of microsatellite instability and immunohistochemical markers among population- and clinic-based colorectal tumors results from the Colon Cancer Family Registry. J Mol Diagn. 2011 May;13(3):271-81.

Holmes RS, Zheng Y, Baron JA, Lin L, Mckeown-Eyssen G, Newcomb PA, Stern MC, Haile RW, Grady WM, Potter JD, Le Marchand L, Campbell PT, Figueiredo JC, Limburg PJ, Jenkins MA, Hopper JL, Ulrich CM. Use of folic acid-containing supplements after a diagnosis of colorectal cancer in the colon cancer family registry. Cancer Epidemiol Biomarkers Prev. 2010 Aug;19(8):2023-34.

Lindor NM, Rabe KG, Petersen GM, Chen H, Bapat B, Hopper J, Young J, Jenkins M, Potter J, Newcomb P, Templeton A, Le Marchand L, Grove J, Burgio MR, Haile R, green J, Woods MO, Seminara D, Limburg PJ, Thibodeau SN. Parent of origin effects on age at colorectal cancer diagnosis. Int J Cancer. 2010 Jul 15;127(2):361-6.

Carozza SE, Puumala SE, Chow EJ, Fox EE, Horel S, Johnson KJ, McLaughlin CC, Reynolds P, Von Behren J, Mueller BA, Spector LG. Parental education attainment as an indicator of socioeconomic status and risk of childhood cancers. Br J Cancer. 2010 Jun 29;103(1):136-42.

Lazovich D, Vogel RI, Berwick M, Weinstock MA, Anderson KE, Warshaw EM. Indoor tanning and risk of melanoma: a case-control study in a highly exposed population. Cancer Epidemiol Biomarkers Prev. 2010 Jun;19(6):1557-68.

Chow EJ, Puumala SE, Mueller BA, Carozza SE, Fox EE, Horel S, Johnson KJ, McLaughlin CC, Reynolds P, Von Behren J, Spector LG. Childhood cancer in relation to parental race and ethnicity: a 5-state pooled analysis. Cancer. 2010 Jun 15;116(12)3045-53.

Pande M, Lynch PM, Hopper JL, Jenkins MA, Gallinger S, Haile RW, Le Marchand L, Lindor NM, Campbell PT, Newcomb PA, Potter JD, Baron JA, Frazier ML, Amos CI. Smoking and colorectal cancer in Lynch syndrome: results from the Colon Cancer Family Registry and the University of Texas M.S. Anderson Cancer Center. Clin Cancer Res. 2010 Feb 15;16(4):1331-9.

Edwards BK, Ward E, Kohler BA, Eheman C, Zauber AG, Anderson RN, Jemal A, Schymura MJ, Lansdorp-Vogelaar I, Seeff LC, van Ballegooijen M, Goede SL, Ries LA. Annual report to the nation on the status of cancer, 1975-2006, featuring colorectal cancer trends and impact of interventions (risk factors, screening, and treatment) to reduce future rates. Cancer. 2010 Feb 1;1163(3):544-73.

Poynter JN, Jacobs ET, Figueiredo JC, Lee WH, Conti DV, Campbell PT, Levine AJ, Limburg P, Le Marchand L, Cotterchio M, Newcomb PA, Potter JD, Jenkins MA, Hopper JL, Duggan DJ, Baron JA, Haile RW. Genetic

variation in the vitamin D receptor (VR) and the vitamin D-binding protein (GC) and risk for colorectal cancer: results from the Colon Cancer Family Registry. Cancer Epidemiol Biomarkers Prev. 2010 Feb;19(2):525-36.

Campbell PT, Jacobs ET, Ulrich CM, Figueiredo JC, Poynter JN, McLaughlin JR, Haile RW, Jacobs EJ, Newcomb PA, Potter JD, Le Marchand L, Green RC, Parfrey P, Younghusband HB, Cotterchio M, Gallinger S, Jenkins MA, Hopper JL, Baron JA, Thibodeau SN, Lindor NM, Limburg PJ, Martinez ME. Case-control study of overweight, obesity, and colorectal cancer risk, overall and by tumor microsatellite instability status. J Natl Cancer Inst. 2010. 102(6):391-400.

Poynter JN, Haile RW, Siegmund KD, Campbell PT, Figueiredo JC, Limburg P, Young J, Le Marchand L, Potter JD, Cotterchio M, Casey G, Hopper JL, Jenkins MA, Thibodeau SN, Newcomb PA, Baron JA. Associations between smoking, alcohol consumption, and colorectal cancer, overall and by tumor microsatellite instability status. Cancer Epidemiol Biomarkers Prev. 2009 Oct;18(10):2745-50.

Spector LG, Puumala SE, Carozza SE, Chow EJ, Fox EE, Horel S, Johnson KJ, McLaughlin CC, Reynolds P, Behren JV, Mueller BA. Cancer risk among children with very low birth weights. Pediatrics. 2009 Jul;124(1):96-104.

Johnson KJ, Carozza SE, Chow EJ, Fox EE, Horel S, McLaughlin CC, Mueller BA, Puumala SE, Reynolds P, Von Behren J, Spector LG. Parental age and risk of childhood cancer: a pooled analysis. Epidemiology. 2009 Jul;20(4):475-83.

Kadlubar S, Anderson JP, Sweeney c, Gross MD, Lang NP, Kadlubar FF, Anderson KE. Phenotypic CYP2A6 variation and the risk of pancreatic cancer. JOP. 2009 May 18;10(3):263-70.

Puumala SE, Carozza SE, chow EJ, Fox EE, Horel S, Johnson KJ, McLaughlin C, Mueller BA, Reynolds P, Von Behren J, Spector LG. Childhood cancer among twins and higher order multiples. Cancer Epidemiol Biomarkers Prev. 2009 Jan;18(1):162-8.

Genkinger JM, Spiegelman D, Anderson KE, Bergkvist L, Bernstein L, van den Brandt PA, English DR, Freudenheim JL, Fuchs CS, Giles GG, Giovannucci E, Hankinson SE, Horn-Ross PL, Leitzmann M, Mannisto S, Marshall JR, McCullough ML, Miller AB, Reding DJ, Robien K, Rohan TE, Schatzkin A, Stevens VL, Stolzenberg-Solomon RZ, Verhage BA, Wolk A, Ziegler RG, Smith-Warner SA. Alcohol intake and pancreatic cancer risk: a pooled analysis of fourteen cohort studies. Cancer Epidemiol Biomarkers Prev. 2009 Mar;18(3):765-76.

Stolzenberg-Solomon RZ, Hayes RB, Horst RL, Anderson KE, Hollis BW, Silverman DT.
Serum vitamin D and risk of pancreatic cancer in the prostate, lung, colorectal, and ovarian screening trial. Cancer Res. 2009 Feb 15;69(4):1439-47.

Ahang J, Dhakal IB, Gross MD, Lang NP, Kadlubar FF, Harnack LJ, Anderson KE. Physical activity, diet, and pancreatic cancer: a population-based, case-control study in Minnesota. Nutr Cancer. 2009;61(4):457-65
Jemal A, Thun MJ, Ries LA, Howe HL, Weir HK, Center MM, Ward E, Wu XC, Eheman C, Anderson R, Ajani UA, Kohler B, Edwards BK. Annual report to the nation on the status of cancer, 1975-2005, featuring trends in lung cancer, tobacco use, and tobacco control. J Natl Cancer Inst. 2008 Dec 3;100(23):1672-94.

Watson M, Saraiya M, Ahmed F, Cardinez CJ, Reichman ME, Weir HK, Richards TB. Using population-based cancer registry data to assess the burden of human papillomavirus-associated cancers in the United States: overview of methods. Cancer. 2008 Nov 15;113(10 Suppl):2841-54.

Ryerson AB, Peters ES, Coughlin SS, Chen VW, Gillison ML, Reichman ME, Wu X, Chaturvedi AK, Kawaoka K. Burden of potentially human papillomavirus-associated cancers of the oropharynx and oral cavity in the US, 1998-2003. Cancer. 2008 Nov 15;113(10 Suppl):2901-9.

Brunner WM, Williams AN, Bender AP. Investigation of exposures to commercial asbestos in northeastern Minnesota iron miners who developed mesothelioma. Regul Toxicol Pharmacol. 2008 Oct;52(1 Suppl) :S116-20.

Slattery ML, Wolff RK, Curtin K, Fitzpatrick F, Herrick J, Potter JD, Caan BJ, Samowitz WS. Colon tumor mutations and epigenetic changes associated with genetic polymorphism: Insight into disease pathways. Mutat Res. 2008 Oct 15.

Trivers KF, Sabatino SA, Stewart SL. Trends in esophageal cancer incidence by histology, United States, 1998-2003. Int J Cancer. 2008 Sept 15;123(6):1422-1428.

Stewart SL, Cardinez CJ, Richardson LC, Norman L, Kaufmann R, Pechacek TF, Thompson TD, Weir HK, Sabatina SA. Surveillance for Cancers Associated with Tobacco Use – United States, 1999-2004. MMWR 2008;57(ss08):1-33.

Li J, Thompson T, Miller JW, Pollack LA, Stewart SL. Cancer incidence among children and adolescents in the United States, 2001-2003. Pediatrics. 2008 Jun;121(6):1470-7.

Yamamoto JF, Goodman MT. Patterns of leukemia in the United States by subtype and demographic characteristics, 1997-2002. Cancer Causes Control 2008 May;19(4):379-90.

Slattery ML, Folson AR, Wolff R, Herrick J, Caan BJ, Potter JD. Transcription factor 7-like 2 polymorphism and colon cancer. Cancer Epidemiol Biomarkers Prev. 2008 Apr;17(4):978-82.

Harper S, Lynch J, Meersman SC, Breen N, Davis WW, Reichman ME. An overview of methods for monitoring social disparities in cancer with an example using trends in lung cancer incidence by area-socioeconomic position and race-ethnicity, 1992-2004. Am J Epidemiol. 2008 Apr 15;167(8):889-99.

Carozza SE, Li B, Elgethun K, Whitworth R. Risk of childhood cancer associated with residence in agriculturally intense areas of the United States. Environ Health Perspect 2008 Apr;116(4):559-65.

Liang S, Banerjee S, Bushhouse S, Finley A, Carlin BP. Hierarchical Multiresolution Approaches for Dense Point-Level Breast Cancer Treatment Data. Comput Stat Data Anal. 2008 Jan 20;52(5): 2650-2668.

Applications requesting data for research as of June 2018

Year	Nature of Study	Status (Institution)
2017	Observational Study Assessing Incidence of Osteosarcoma Among Forteo (Teriparatide) Users by Linking State Cancer Registry Data to Large National Pharmacy Database Data	Completed: Observational study to estimate the incidence of osteosarcoma in patients who have received treatment with Forteo over time as compared to a general population comparator cohort. (IMS Health)
2016	Socioeconomic Status and Childhood Cancer Risk: A Multi-Level Analysis	Completed: Linkage project. MCSS facilitated and oversaw linkage of MCSS records with birth files maintained by the Center for Health Statistics. A University of Minnesota doctoral student was deputized by MDH and provided technical support and guidance during the linkage process. MCSS provided the physical space and computer software necessary for conducting the linkage. This ensured that all identifiable non-public data remained within MDH's premises and that data security policies and practices were followed. (U of MN)
2016	Cancer incidence study of Marines/Navy personnel and civilian employees exposed to contaminated drinking water at USMC Base Camp Lejeune	In process: Retrospective cohort study of Marines/Navy personnel to determine whether residential exposures to drinking water contaminants at Camp Lejeune are associated with increased risks of specific cancers.
2016	Assessing the Incidence of Osteosarcoma Among Teriparatide Users Using Medicare Part D and State Cancer Registry Data	Completed: Population-based cohort study with a data linkage component to improve upon the ongoing Osteosarcoma Surveillance Study and the Forteo Patient Registry study currently being conducted by RTI-HS. Exposure to Forteo ascertained from Medicare Part D prescription drug claims, and the outcome of interest (cases of osteosarcoma) will be through linkage with state cancer registries including MCSS. (RTI Health Solutions, for Eli Lilly)
2014	The Evaluation of Life and Health Outcomes after Melanoma Diagnosis	On hold: This is an expansion of the case-control study of melanoma conducted by the University of Minnesota between 2004 and 2009 entitled "Indoor Tanning Use, DNA Repair, and Risk of Melanoma." The information gained from this study will lead to strategies to improve quality of life and reduce risk of future skin cancer. (U of MN)

Year	Nature of Study	Status (Institution)
2013	Atherosclerosis Risk in Communities Study (ARIC)	Ongoing: Linkage project to ascertain first and subsequent primary cancers in the Minnesota ARIC cohort, including details related to staging, histology, and first course of treatment in cohort members. (U of MN)
2013	American Cancer Society CPS-3	Ongoing: Linkage project. A large American Cancer society prospective study including approximately 300,000 men and women ages 30-65 enrolled from across the United States from 2006-2013. The broad objective is to prospectively examine associations between risk of developing cancer and a wide range of lifestyle, nutritional, medical, environmental, genetic and other factors that may cause or prevent cancer. (American Cancer Society - National Home Office)
2012	Medullary Thyroid Carcinoma Surveillance	Ongoing: This study is an FDA post-marketing requirement. It is working to establish a registry of incident cases of MTC in adults in the United States in order to characterize their medical histories and possible risk factors, including history of treatment with Liraglutide, a treatment for type 2 diabetes, as well as similar drugs manufactured by other drug companies. The Minnesota conduct of this study is on hold because of contract issues related to adding the additional manufacturers. (United BioSource Corporation)
2012	Continued Follow-Up of PLCO Participants	Ongoing: The Data Use Application has been approved and contract-writing is in process. This study is a continued follow-up of the cohort of men and women who enrolled in the Prostate Lung Colorectal and Ovarian (PLCO) Cancer Screening Trial initiated by the NCI in 1993. The purpose of the study is to determine whether screening reduces the disease specific mortality rate for prostate, lung, colorectal, and ovarian cancers. (National Cancer Institute)

Year	Nature of Study	Status (Institution)
2012	Assisted Reproductive Technology	Completed: Linkage project. This is a multi-state study that linked women who have received ART with records of MN women who have given birth. The linked birth records were linked with MCSS to determine cancer incidence among children born as a result of ART. Control births were also chosen. This tested the null hypothesis that use of ART has no childhood cancer effect on the offspring. (U of MN)
2011	Adenoma Detection Rates and Missed Cancers	Completed: This study has linked 60,000 records with MCSS to determine patient, procedure and physician related risk factors for colorectal cancer subsequent to colonoscopies in average risk patients. (VA Medical Center and University of Minnesota).
2010	Predictors of Myelodysplastic Syndrome (MDS) in Minnesota	Completed: This study used rapid ascertainment to identify adult patients diagnosed with MDS between April 2010 and October 2014. This case-control study looked at both genetic and environmental predictors for MDS. It is the first population-based study looking for etiologic risk factors of MDS. (U of MN)
2010	Forteo Patient Registry	Ongoing: MCSS has linked its database annually with a registry of patients taking the osteoporosis drug Forteo, a biosynthetic human parathyroid hormone used to treat osteoporosis, to estimate the incidence of osteosarcoma in patients who have been treated with Forteo. (RTI Health Solutions, for Eli Lilly)
2010	American Cancer Society CPSII Nutrition Survey	Ongoing: Linkage with more than 500 Minnesotans who completed nutritional surveys to verify and update their cancer status. (American Cancer Society - National Home Office)
2009	Mortality and Cancer Incidence Studies of Workers in the Minnesota Taconite Industry	Ongoing: A cohort of taconite workers is being linked to MCSS to investigate whether 1) taconite industry workers have an increased risk of mesothelioma specifically associated with exposure to mineral fibers in the dust from mining and processing taconite, and 2) the incidence of other cancers is associated with exposure to dust from the taconite industry. (U of MN)

Year	Nature of Study	Status (Institution)
2009	Cancer Incidence in 3M Chemical Workers	Ongoing: MCSS will link its database with a list of fluorochemical-exposed workers (approximately 7,500) to identify any increased cancer risks. (U of MN)
2009	Cancer Epidemiology in Adventists, a low risk group	Ongoing: MCSS oversees a linkage between its database and a list of Adventists who had consented to participate in the study, to identify incident cancers among cohort members and investigate cancer risk associated with dietary and other lifestyle factors. (Loma Linda University)
2007	Mayo Mammography Health Study Linkage	Ongoing: MCSS will be linking its database at intervals with records of more than 21,000 women who received routine mammography and consented to participate in the study. The aim is to assess whether changes in breast density over time are associated with breast cancer. The secondary aim is to examine whether breast density responses that accompany HRT initiation are associated with breast cancer risk. (Mayo Clinic)
2007	Forteo Post-Approval Surveillance Study: Case Series	Ongoing: MCSS is identifying cases of adult osteosarcoma and inviting them or their next-of-kin to participate in an interview. The goal is to discover whether this type of cancer might be associated with the use of a drug called Forteo, a biosynthetic human parathyroid hormone used to treat osteoporosis. (RTI Health Solutions, for Eli Lilly)
2007	Occupational and Demographic Factors of Iron Miners that Developed Mesothelioma in Minnesota (1988-2006)	Completed: Linkage study to establish the detailed protocol for a future case-control study to evaluate the role (if any) of historical exposure to taconite dust as a factor in mesothelioma occurrence and to describe, within data privacy limitations, the miners that have developed mesothelioma. (MN Dept. of Health)
2006	Birth Factors and Childhood cancers in Minnesota: A Data Linkage Study.	Completed: A linkage study of over 2400 cases of cancer diagnosed in children in Minnesota to their birth files and additionally to select controls from the birth files to identify certain birth risk factors and the development of cancer.

Year	Nature of Study	Status (Institution)
2005	Predictors of Adult Leukemia	Completed: MCSS used rapid ascertainment to identify patients diagnosed with chronic or acute myelogenous or monocytic leukemia between June 2005 and November 2009. The study looked for associations with farming exposures, nonsteroidal anti-inflammatory drug use, and genetic markers. (U of MN)
2005	Breast and Prostate Cancer Data Quality and Patterns of Care	Completed: A collaborative agreement between CDC and seven population-based cancer registries or affiliated research institutions to determine the proportion of patients diagnosed with breast or prostate cancer who received first course of therapy in accordance with guidelines issued by the National Comprehensive Cancer Network. (MN Dept. of Health)
2005	Annual Report to the Nation on the Status of Cancer, 1975-2003, with a Special Feature on Cancer in US/Hispanic/Latino Populations, 1999-2003.	Completed: MCSS submitted data to NAACCR with a county identifier to be used to link with the Bureau of the Census files that include the percent of the county residents that live below poverty, and to the U.S. Department of Agriculture Beale codes to designate urbanicity of the county of the patient's residence at the time of diagnosis. The data was used to facilitate the statistical comparisons among the three population groups: Hispanic/Latino; non-Hispanic White; and non-Hispanic Black.(NAACCR)
2004	Relationship of Increasing Indoor Tanning Use to Melanoma Risk	Completed: MCSS identified patients diagnosed with melanoma skin cancer between April 2003 and March 2008. The study looked for associations between genetic markers, indoor tanning booth use, and other known risk factors and melanoma skin cancer. (U of MN)
2003	Statistical Models for Cancer Control and Epidemiology	Completed: MCSS improved its geocoding information so that cancer treatment and survival could be assessed in relationship to distance from appropriate medical facilities. (U of MN)

Year	Nature of Study	Status (Institution)
2002	Incidence of Endometrial Adenocarcinoma Following Endometrial Ablation in a Low Risk Population	Completed: The MCSS assisted in determining how many women who underwent endometrial ablation subsequently developed endometrial cancer. (St. Luke's Roosevelt Hospital)
2002	Family Health Study/Validation of a Family History of Cancer Questionnaire for Risk Factor Surveillance	Completed: MCSS assisted with assessing the validity of self-reported family history of cancer. (National Cancer Institute)
2001	American Cancer Society CPS-II Nutrition study	Completed: Linkage with more than 500 Minnesotans who completed nutritional surveys to verify and update their cancer status. (American Cancer Society - National Home Office)
2001	National Quality of Life Study	Completed: MCSS identified and invited cancer survivors to participate in this study of behavioral, psychosocial, treatment, and support factors that influence quality of life and cancer survivorship in the U.S. (American Cancer Society - National Home Office)
1999	Minnesota/Wisconsin Men's Health Study	Completed: MCSS identified individuals with prostate cancer diagnosed in 1999 and 2000. The study is looking for associations between genetic markers, exposure variables (pesticides, occupational, farming), and risk of prostate cancer. (U of MN)
1999	Pilot Test for Linking Population-Based Cancer Registries with CCG/POG Pediatric Regis tries	Completed: The MCSS list of cancer patients age 0 - 19 was linked with the CCG/POG databases for Minnesota to describe the completeness of ascertainment for both databases. (MN Dept. of Health)
1998	Evaluation of Treatment Information in the Cancer Registry through Linkage	Completed: MCSS linked the list of cancer patients diagnosed in 1995 with lists of enrollees in several sets of claims and encounter data. The study compared completeness of treatment information between the two sources. (MN Dept. of Health)

Year	Nature of Study	Status (Institution)
1998	Mesothelioma Incidence in the Mining Indus try: A Case Study	Completed: A list of 70,000 individuals who worked in the mining industry was linked with all individuals in MCSS who developed mesotheliomas. The goal was to ascertain if mesotheliomas among miners could be explained by occupational exposure to commercial asbestos. (MN Dept. of Health)
1997	Multi-center, population-based, case-control study of acoustic neuromas and use of cellular phones	Application inactive because of funding issues. (U of IL - Chicago)
1997	Randomized, controlled clinical trial to deter mine whether screening for fecal occult blood reduces colorectal cancer mortality	Completed: MCSS validated cancer incidence in the 46,000 study participants via record linkage. MCSS also linked the study cohort with 1995 MCSS data. (U of MN)
1997	Population-based study of the role of aromatic amines in pancreatic cancer etiology	Completed: MCSS provided rapid ascertainment for identification and recruitment of cases. MCSS also linked the study cases with incidence and mortality data to assist in estimating response rates. (U of MN)
1997	Population-based pilot study of the quality of life in cancer survivors	Completed: MCSS identified and recruited a random sample of cases. (American Cancer Society - National Home Office)
1997	Occupational cohort linkage study to describe cancer incidence in a group of workers	Completed: MCSS linked a list of workers with MCSS data and provided aggregated results to the investigator. (3M)
1997	Occupational cohort linkage study to describe cancer incidence in two groups of workers, and to compare the results of incidence follow-up with the results of mortality follow-up	Completed: MCSS linked lists of workers with MCSS and death certificate data. (MN Dept. of Health)
1997, 2002	Identification and recruitment of families at high risk of colorectal cancer into a Familial Colorectal Cancer Registry (Re-applied in 2002 for extension of funding)	Completed: MCSS identified individuals diagnosed with colorectal cancer between 1997 and 2007, who were then invited to provide information on familial cancer histories and possibly invited to participate in a national database that will be used to investigate the genetics of colorectal cancer. (Mayo Clinic and U of MN)

Year	Nature of Study	Status (Institution)
1996	Multi-center, population-based, case-control study of proximity to toxic waste sites and occurrence of Wilms tumor	Application denied because of major methodological flaws. (Agency for Toxic Substances and Disease Registry)
1996	Randomized trial to assess whether risk-appropriate counseling increases utilization of screening by individuals with a first-degree relative who had colorectal cancer	Application withdrawn before peer review because study was not funded. (MN Dept. of Health)
1995	Record linkage with Indian Health Service patient registries to characterize cancer incidence	Completed: Report describing cancer incidence in American Indians in Minnesota was released Fall 1996. (MN Dept. of Health)
1995	Multi-center, population-based, case-control study of gliomas in rural areas	Completed: MCSS provided rapid ascertainment for identification of cases. (U of MN)
1994	Record linkage with a 14,000-member cohort who completed a nutrition survey (American Cancer Society CPS-II Nutrition study)	Completed: Pilot linkage to estimate sensitivity and specificity of cancer identification using central cancer registries. (American Cancer Society - National Home Office)
1994	Record linkage with the list of women screened through the Minnesota Breast and Cervical Cancer Control Program	Annual linkage project. Most recent linkage completed Fall 2004. (MN Dept. of Health)
1993	Record linkage with a 4,000-member cohort characterized for cardiovascular disease risk factors	Biennial linkage project. Fourth linkage completed fall 2003. (U of MN)
1991	International, population-based, case-control study of renal cell carcinoma	Completed: MCSS provided rapid ascertainment for identification of cases. (U of MN)
1991	National, multi-center, population-based, case-control study of colon cancer	Completed: MCSS provided rapid ascertainment for identification of cases. (U of MN)
1990	Population-based, case-control study of the epidemiology of childhood acute lymphoblastic leukemia	Completed: MCSS provided data on the completeness of ascertainment. (U of MN)

Year	Nature of Study	Status (Institution)
1989	International study of the effectiveness of screening for neuroblastoma at birth Study: Case-Series Registry Study: Case-Series Registry (ART) and the Risk of Childhood Cancer	Completed: Study period 1989-1998. Minnesota was one of the control areas. (U of MN)