

Chapter III: Summary of Data for Specific Cancers

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This chapter provides detailed information on the most common cancers, using cases reported to the Minnesota Cancer Surveillance System (MCSS) and deaths reported to the Minnesota Center for Health Statistics (MCHS). For comparison, incidence rates from the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) Program and mortality rates for the United States are provided. See Chapter I, Introduction, for more information about data sources and other information about interpreting the data. See also the Glossary (Appendix D) and Statistical Methods (Appendix E).

All Cancer Sites Combined

Table III-1.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, All Cancer Sites Combined

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 9,147 | 8,864 | 528.8 | 398.2 | 4,205 | 3,895 | 252.3 | 166.8 |
| 1989 | 9,337 | 8,584 | 533.3 | 381.5 | 4,220 | 3,789 | 252.5 | 160.4 |
| 1990 | 9,722 | 8,926 | 547.2 | 392.8 | 4,256 | 3,857 | 250.3 | 161.8 |
| 1991 | 10,695 | 8,984 | 590.3 | 391.0 | 4,362 | 4,014 | 253.1 | 164.8 |
| 1992 | 11,387 | 9,185 | 620.8 | 393.1 | 4,422 | 4,116 | 252.3 | 166.0 |
| 1993 | 10,646 | 9,151 | 567.6 | 386.9 | 4,317 | 4,088 | 242.7 | 161.7 |
| 1994 | 10,224 | 9,402 | 536.0 | 391.7 | 4,487 | 4,055 | 249.3 | 159.5 |
| 1995 | 10,479 | 9,547 | 542.9 | 392.1 | 4,463 | 4,209 | 243.9 | 162.8 |
| 1996 | 10,337 | 9,689 | 526.5 | 392.6 | 4,541 | 4,309 | 243.4 | 164.8 |
| 1997 | 10,832 | 10,005 | 545.9 | 399.4 | 4,556 | 4,178 | 240.5 | 156.7 |
| 1998 | 10,889 | 10,447 | 539.2 | 411.2 | 4,480 | 4,314 | 233.2 | 158.7 |
| 1999 | 11,359 | 10,548 | 551.8 | 410.2 | 4,575 | 4,301 | 232.5 | 156.9 |
| 2000 | 11,982 | 10,811 | 570.9 | 415.0 | 4,696 | 4,503 | 235.5 | 162.4 |
| 2001 | 12,187 | 11,081 | 570.4 | 419.8 | 4,610 | 4,296 | 226.3 | 153.6 |
| 2002 | 12,299 | 11,151 | 563.4 | 415.2 | 4,745 | 4,455 | 228.8 | 155.8 |
| 2003 | 12,199 | 11,051 | 548.0 | 406.4 | 4,700 | 4,482 | 222.2 | 156.3 |
| 2004 | 12,714 | 11,302 | 560.4 | 409.0 | 4,644 | 4,445 | 215.8 | 152.2 |
| 2005 | 12,713 | 11,360 | 547.5 | 405.2 | 4,464 | 4,359 | 203.2 | 146.6 |
| 2006 | 13,307 | 11,609 | 562.9 | 409.5 | 4,661 | 4,404 | 207.6 | 147.3 |

Table III-1.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, All Cancer Sites Combined

| Age at Diagnosis or Death (years) | Incidence 2000-2006 | | | | Mortality 2000-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 685 | 549 | 18.9 | 15.9 | 103 | 75 | 2.8 | 2.2 |
| 20 – 34 | 1,318 | 1,827 | 50.2 | 73.0 | 169 | 182 | 6.4 | 7.3 |
| 35 – 49 | 5,006 | 8,444 | 166.8 | 286.8 | 1,190 | 1,309 | 39.6 | 44.5 |
| 50 – 64 | 19,364 | 16,274 | 927.2 | 771.8 | 4,910 | 4,506 | 235.1 | 213.7 |
| 65 – 74 | 18,219 | 12,018 | 2,580.3 | 1,499.6 | 5,796 | 4,957 | 820.9 | 618.5 |
| 74 – 85 | 14,609 | 12,055 | 3,289.8 | 1,888.3 | 7,300 | 6,543 | 1,643.9 | 1,024.9 |
| 85 and older | 4,031 | 5,271 | 2,786.3 | 1,557.0 | 3,746 | 4,573 | 2,589.3 | 1,350.9 |

Table III-1.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, All Cancer Sites Combined

| Race and Ethnicity [†] | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|---------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 63,232 | 56,473 | 556.4 | 408.9 | 23,214 | 22,145 | 215.3 | 151.6 |
| American Indian | | | | | | | | |
| Statewide | 480 | 465 | 627.0 | 457.8 | 196 | 183 | 278.7 | 224.8 |
| CHSDA Counties | 314 | 296 | 746.9 | 540.8 | 128 | 128 | 323.8 | 277.7 |
| Asian/Pacific Isl. | 536 | 629 | 284.5 | 245.4 | 231 | 201 | 149.0 | 109.8 |
| Black | 1,385 | 1,014 | 644.8 | 378.5 | 497 | 355 | 294.3 | 183.8 |
| Non-Hispanic White | 59,345 | 53,103 | 551.5 | 407.5 | 22,122 | 21,318 | 214.7 | 151.4 |
| Hispanic (All Races) | 512 | 573 | 338.4 | 342.7 | 154 | 116 | 135.4 | 85.0 |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

[†] Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data. Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

All Cancer Sites Combined

Descriptive Epidemiology

Table III-1.4: Other Minnesota cancer statistics[†], 2004-2006, All Cancer Sites Combined

| | Males | Females |
|--|--------------|--------------|
| Median Age at Diagnosis | 67.0 | 65.0 |
| Median Age at Death | 74.0 | 75.0 |
| Lifetime Risk of Diagnosis | 50.8% | 41.3% |
| Lifetime Risk of Death | 24.7% | 21.1% |
| Annual Percent Change [‡] | | |
| Incidence (1995-2006 males; 2000-2006 females) | 0.5% | -0.5% |
| Mortality (2002-2006 males; 1988-2006 females) | -2.9% | -0.6% |

[†] See Methods section for definition of terms.

[‡]The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-1.5: Average annual incidence and mortality rates[§] in the United States, 2002-2006, All Cancer Sites Combined

| | Males | Females |
|------------------------|-------|---------|
| Incidence | | |
| All Races | 541.8 | 408.5 |
| American Indian | 331.0 | 302.2 |
| Asian/Pacific Islander | 349.1 | 287.5 |
| Black | 633.7 | 398.9 |
| Non-Hispanic White | 564.4 | 437.4 |
| Hispanic (All Races) | 409.7 | 312.5 |
| Mortality | | |
| All Races | 229.9 | 157.8 |
| American Indian | 183.3 | 140.1 |
| Asian/Pacific Islander | 135.4 | 95.1 |
| Black | 304.2 | 183.7 |
| Non-Hispanic White | 231.8 | 161.2 |
| Hispanic (All Races) | 154.7 | 103.9 |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

[§]Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-1.6: Causes of death, Minnesota, 2006

| Rank | Cause of Death | Deaths | % Deaths |
|------|-----------------------------|--------|----------|
| 1 | Cancer | 9,065 | 24.5 |
| 2 | Heart Disease | 7,506 | 20.3 |
| 3 | Cerebrovascular Disease | 2,215 | 6.0 |
| 4 | Accidents | 1,913 | 5.2 |
| 5 | Chronic Lung Disease | 1,770 | 4.8 |
| 6 | Alzheimer's Disease | 1,298 | 3.5 |
| 7 | Diabetes | 1,153 | 3.1 |
| 8 | Pneumonia and Influenza | 629 | 1.7 |
| 9 | Nephritis | 694 | 1.9 |
| 10 | Suicide | 550 | 1.5 |
| | Other Causes and Conditions | 10,170 | 27.5 |
| | Total Deaths | 36,963 | 100.0 |

Incidence and Mortality: Cancer is very common, even after excluding cancers that are rarely life threatening, such as basal and squamous cell carcinomas of the skin and most *in situ* cancers. Based on current rates, five out of ten Minnesota males (51%) and four out of ten Minnesota females (41%) will be diagnosed with a potentially serious cancer during his or her lifetime. Cancer became the leading cause of death in Minnesota in 2000. In 2006, 1,559 more Minnesotans died of cancer than heart disease.

When differences in the racial composition of the populations are not taken into consideration, the overall cancer incidence rate in Minnesota is somewhat higher for males and about the same for females as in the 17 geographic areas participating in the SEER Program. However, when the comparison is limited to the non-Hispanic white populations, Minnesota cancer incidence is two percent lower among males and seven percent lower among females. The cancer mortality rate in Minnesota is four to six percent lower than the national rate for all races combined, and six to seven percent lower for non-Hispanic whites.

Trends: Based on the results of Joinpoint regression, the overall cancer incidence rate among males in Minnesota increased significantly from 1995 to 2006 by 0.5 percent per year. Among females, the overall cancer incidence rate has been stable since 2000. On the other hand, the overall cancer mortality rate among males in Minnesota has been declining since 1988, and since 2002 it has been declining more sharply, by 2.9 percent per year. Among women statewide, the overall cancer mortality rate has been declining steadily by 0.6 percent per year since 1988.

In contrast, the overall cancer incidence rate is declining significantly among both men and women living in the nine geographic areas participating since the early 1970s in the SEER Program; cancer incidence among white males declined by 1.5 percent per year from 1995 to 2006, and among white females declined by 0.5 percent per year from 1998 to 2006. Nationally, the overall cancer mortality rate among whites is declining at a pace similar to what is seen in Minnesota—by 1.8 percent per year among males from 2001 to 2006, and by 1.4 percent per year among females from 2001 to 2006.

Age: The likelihood of being diagnosed with cancer increases with age. Approximately 55 percent of cancers in Minnesota occur among persons age 65 years and older and about 73 percent of cancer deaths occur in this age group. However, as discussed in the sections that follow, the age at which cancer is most likely to occur depends on the type of cancer.

All Cancer Sites Combined

Gender: The overall cancer incidence rate in Minnesota is 36 percent higher among men than women. Men are at greater risk than women for developing most types of cancer; the only common cancers that occur more frequently among women are those of breast, gallbladder, and thyroid. The overall cancer mortality rate in Minnesota is about 42 percent higher among men than women. The gender differences in Minnesota are similar to those reported for the nation.

Race: Cancer risk varies by race and ethnicity. Among both men and women in Minnesota, overall cancer incidence is highest among American Indians living in CHSDA counties and lowest among Hispanics and Asian/Pacific Islanders. Among males, the overall cancer incidence rate is higher among blacks and American Indians statewide than among non-Hispanic whites. Among females, the overall cancer incidence rate is higher among American Indians statewide than non-Hispanic whites, and higher among non-Hispanic whites than blacks.

Cancer incidence among American Indians is about one and a half times higher in Minnesota than in the geographic areas covered by the SEER Program, where the majority of American Indians are from the Southwest. On the other hand, rates among Asian/Pacific Islanders are about 20 percent lower in Minnesota than reported by SEER, where the majority of Asian/Pacific Islanders are from California and the Pacific Northwest. The reasons for these differences are not clear.

Risk Factors

Cancer deaths in the United States are thought to be caused by:

- Tobacco use (approximately 30%);
- Diet and obesity in adults (another 30%). A diet that reduces cancer risk is high in fruits and vegetables, high in legumes and grains (including bread, pasta, and cereals), and low in red meat, salt, and saturated animal fat;
- Sedentary lifestyle, occupational factors, a family history of cancer, infectious agents, and prenatal factors and growth (about 5% each);
- Reproductive factors, socioeconomic status, and alcohol (about 3% each);
- Environmental pollution and ionizing and ultraviolet radiation (about 2% each);
- Prescription drugs and medical procedures (about 1%); and

- Salt and other food additives or contaminants (about 1%).

Early Detection / Prevention

Cancers detected at an early stage of development are more likely to be cured. However, there are relatively few types of cancer for which screening has been shown to be effective in reducing mortality among asymptomatic persons with an average risk of developing the cancer, and not all organizations are in agreement about screening recommendations. The U.S. Preventive Services Task Force (<http://www.ahrq.gov/clinic/uspstfix.htm>), an independent panel of experts, recommends routine screening for cancers of the colon and rectum, female breast, and cervix. The American Cancer Society (ACS) (<http://www.cancer.org>) also recommends that people ages 20 and over having periodic health exams should receive a cancer-related checkup, and suggests that men age 50 and older should discuss screening for prostate cancer with their physician. Recommended screening ages and intervals can be found on the ACS web site.

Prompt reporting of symptoms may also lead to earlier diagnosis of cancer. The resources above also provide information on the early warning signs of cancer.

Childhood Cancers

Table III-2.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Cancers among Children less than 15 Years of Age

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 95 | 69 | 19.4 | 14.7 | 19 | 10 | 3.8 | 2.2 |
| 1989 | 92 | 74 | 18.3 | 15.6 | 17 | 12 | 3.4 | 2.4 |
| 1990 | 92 | 68 | 17.7 | 13.6 | 15 | 12 | 2.9 | 2.5 |
| 1991 | 82 | 72 | 15.6 | 14.4 | 16 | 13 | 3.1 | 2.6 |
| 1992 | 81 | 65 | 15.3 | 12.9 | 12 | 13 | 2.3 | 2.6 |
| 1993 | 86 | 66 | 16.2 | 13.1 | 12 | 10 | 2.2 | 2.0 |
| 1994 | 98 | 75 | 18.4 | 14.8 | 12 | 13 | 2.2 | 2.6 |
| 1995 | 85 | 58 | 16.0 | 11.7 | 15 | 9 | 2.8 | 1.8 |
| 1996 | 89 | 69 | 16.8 | 13.7 | 19 | 7 | 3.6 | 1.4 |
| 1997 | 78 | 71 | 14.7 | 14.2 | 15 | 13 | 2.8 | 2.6 |
| 1998 | 90 | 71 | 16.9 | 14.0 | 9 | 12 | 1.7 | 2.3 |
| 1999 | 74 | 69 | 13.7 | 13.4 | 12 | 7 | 2.2 | 1.4 |
| 2000 | 99 | 79 | 18.3 | 15.4 | 20 | 8 | 3.7 | 1.5 |
| 2001 | 99 | 75 | 18.4 | 14.5 | 9 | 11 | 1.7 | 2.2 |
| 2002 | 105 | 65 | 19.6 | 12.7 | 13 | 11 | 2.4 | 2.2 |
| 2003 | 78 | 67 | 14.5 | 13.1 | 18 | 16 | 3.4 | 3.1 |
| 2004 | 102 | 84 | 19.1 | 16.4 | 11 | 10 | 2.1 | 2.0 |
| 2005 | 82 | 66 | 15.4 | 12.9 | 11 | 7 | 2.1 | 1.4 |
| 2006 | 84 | 66 | 15.8 | 12.9 | 17 | 9 | 3.2 | 1.7 |

Table III-2.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Cancers among Children less than 15 Years of Age

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 4 | 218 | 161 | 25.1 | 19.4 | 27 | 16 | 3.1 | 1.9 |
| 5 – 9 | 112 | 76 | 13.0 | 9.2 | 26 | 16 | 3.0 | 1.9 |
| 10 – 14 | 121 | 111 | 12.9 | 12.5 | 17 | 21 | 1.8 | 2.4 |

Table III-2.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Cancers among Children less than 15 Years of Age

| Race and Ethnicity [†] | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|---------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 451 | 348 | 16.9 | 13.6 | 70 | 53 | 2.6 | 2.1 |
| American Indian | | | | | | | | |
| Statewide | 6 | 3 | ~ | ~ | 1 | 0 | ~ | ~ |
| CHSDA Counties | 3 | 1 | ~ | ~ | 1 | 0 | ~ | ~ |
| Asian/Pacific Isl. | 24 | 21 | 17.8 | 16.4 | 7 | 4 | ~ | ~ |
| Black | 23 | 22 | 10.7 | 11.4 | 6 | 3 | ~ | ~ |
| Non-Hispanic White | 350 | 274 | 16.4 | 13.4 | 52 | 44 | 2.5 | 2.1 |
| Hispanic (All Races) | 32 | 29 | 19.2 | 19.2 | 2 | 3 | ~ | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

[†] Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data. Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Childhood Cancers

Table III-2.4: Number of new cases and deaths and incidence and mortality rates[§] by type of cancer, Minnesota, 2002-2006, Cancers among Children less than 15 Years of Age

| Cancer Type† | Incidence | | | | Mortality | | | |
|------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| Bone & Joint | 14 | 13 | 0.6 | 0.5 | 4 | 3 | 0.1 | 0.1 |
| Brain | 81 | 68 | 3.0 | 2.7 | 10 | 16 | 0.4 | 0.6 |
| Hodgkin Lymphoma | 23 | 13 | 0.8 | 0.5 | 0 | 0 | 0.0 | 0.0 |
| Kidney | 36 | 22 | 1.3 | 0.9 | 6 | 0 | 0.2 | 0.0 |
| Leukemia | 148 | 117 | 5.5 | 4.6 | 27 | 20 | 1.0 | 0.8 |
| ALL | 103 | 84 | 3.9 | 3.3 | 14 | 7 | 0.5 | 0.3 |
| NHL | 27 | 12 | 1.0 | 0.5 | 3 | 1 | 0.1 | 0.0 |
| Soft Tissue | 35 | 44 | 1.3 | 1.7 | 4 | 1 | 0.2 | 0.0 |

Source: MCSS (September 2009) and the Minnesota Center for Health Statistics. Cases were microscopically confirmed (1998-2004) or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. population.

† Brain includes other nervous system; Kidney includes renal pelvis; ALL is acute lymphocytic leukemia; NHL is non-Hodgkin lymphoma.

Table III-2.5: Other Minnesota cancer statistics†, 2004-2006, Cancers among Children less than 15 Years of Age

| | Males | Females |
|-----------------------------|--------|---------|
| Risk of Diagnosis by Age 15 | 0.3% | 0.2% |
| Risk of Death by Age 15 | < 0.0% | < 0.0% |
| Annual Percent Change‡ | | |
| Incidence (1988-2006) | -0.2% | -0.2% |
| Mortality (1988-2006) | -1.1% | -1.4% |

† See Appendix D or E for definition of terms.

‡ The average *annual percent change* in the age-adjusted rate during the segment ending in 2004 from Joinpoint regression.

Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-2.6: Five-year relative survival, Cancers among Children less than 15 Years of Age

| Cancer Type | 5-Year Relative Survival‡ (%) |
|--------------------------------|-------------------------------|
| Bone and Joint | 71.8 |
| Brain and Other Nervous System | 73.8 |
| Hodgkin Lymphoma | 95.4 |
| Leukemia | 83.6 |
| Acute Lymphocytic | 89.0 |
| Non-Hodgkin Lymphoma | 86.3 |
| All Childhood Cancers | 81.3 |

‡ Among SEER 9 cases diagnosed 1999-2005 followed into 2006, from *SEER Cancer Statistics Review, 1975-2006*.

Table III-2.7: Average annual incidence and mortality rates[§] in the United States, 2002-2006, Cancers among Children less than 15 Years of Age

| | Males | Females |
|-----------------------|-------|---------|
| Incidence† | | |
| All Childhood Cancers | | |
| All Races | 16.1 | 14.0 |
| White‡ | 16.9 | 14.6 |
| Bone and Joint | 0.7 | 0.7 |
| Brain | 3.4 | 3.0 |
| Hodgkin Lymphoma | 0.7 | 0.4 |
| Kidney | 0.7 | 0.8 |
| Leukemia | 5.5 | 4.5 |
| Acute Lymphocytic | 4.4 | 3.5 |
| NHL | 1.1 | 0.6 |
| Soft Tissue | 1.1 | 1.0 |
| Mortality | | |
| All Races | 2.6 | 2.2 |
| White‡ | 2.7 | 2.3 |

Source: *SEER Cancer Statistics Review, 1975-2006*. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. population.

† Brain includes other nervous system; Kidney includes renal pelvis; NHL is non-Hodgkin lymphoma.

‡ All whites, including persons of Hispanic ethnicity.

Childhood Cancers

Descriptive Epidemiology

Incidence and Mortality: Each year, about 160 children under 15 years of age are diagnosed with cancer in Minnesota, and 25 children die of cancer each year. Of all cancers diagnosed in the state, 0.7 percent or seven out of every 1,000 are in children. Based on current incidence and mortality rates in Minnesota, it is estimated that one of every 400 children will be diagnosed with cancer before age 15. Cancer is the leading cause of death from disease among children. The overall childhood cancer rate in Minnesota is similar or somewhat lower than nationally.

Cancer Types: The cancers diagnosed among children are different than those diagnosed among adults. While breast, prostate, lung cancer, and colorectal are the most common among adults, children with cancer are more likely to be diagnosed with leukemia (33% of childhood cancers), brain cancer (19%), or lymphomas (9%). The rates and distribution of specific cancer types among children in Minnesota are similar to what is seen nationally.

Trends: The overall childhood cancer incidence and mortality rates in Minnesota have been fairly stable or decreasing since cancer reporting was implemented in 1988. Nationally, the overall cancer incidence rate in children ages 0-14 years increased significantly by 0.6 percent per year from 1975 to 2006. In contrast, the U.S. childhood cancer mortality rate declined by 2.9 percent per year from 1975 to 1997, and by 0.9 percent per year from 1997 to 2006.

Age: The overall cancer incidence rate is nearly twice as high among children under five years of age compared to those five to 14 years old. However, the age distribution varies by cancer type.

Gender: Boys are somewhat more likely to develop childhood cancer than girls.

Race: There are too few cases of childhood cancer among children of color in Minnesota to meaningfully assess race differences in childhood cancer rates in the state.

Risk Factors

Despite active research, the causes of most childhood cancers remain unknown. Although genetics and ionizing radiation have been associated with increased risk for certain childhood cancers, it is likely that these factors only account for a small percentage of cases. Burkitt's lymphoma, a form of non-Hodgkin lymphoma that is common among children in Africa, has been associated with Epstein-Barr virus. Because childhood leukemia has sometimes been reported to cluster geographically and temporally, it too, has been suspected of being associated directly or indirectly with exposure to a virus. However, a viral agent has yet to be identified, and the theory remains controversial. Recent research funded by the

National Cancer Institute has not found an association between childhood cancer and radon, ultrasound during pregnancy, residential magnetic field exposure from power lines, or specific occupational exposures of parents.

Early Detection / Prevention

There are no screening methods to detect cancer in asymptomatic children, and cancer is often difficult to diagnose in children until they are quite ill. Sudden, unexplained symptoms such as loss of energy, bruising, persistent localized pain or limping, rapid weight loss, or frequent headaches with vomiting should be brought to the attention of a physician.

Brain and Other Nervous System

Table III-3.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Brain and Other Nervous System Cancer

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 161 | 132 | 8.4 | 6.1 | 129 | 103 | 7.0 | 4.7 |
| 1989 | 147 | 115 | 7.4 | 5.1 | 100 | 94 | 5.4 | 4.3 |
| 1990 | 168 | 136 | 8.4 | 6.2 | 124 | 96 | 6.6 | 4.2 |
| 1991 | 168 | 127 | 8.4 | 5.7 | 119 | 100 | 6.5 | 4.4 |
| 1992 | 174 | 114 | 8.5 | 5.0 | 122 | 104 | 6.4 | 4.5 |
| 1993 | 172 | 136 | 8.4 | 5.9 | 126 | 120 | 6.4 | 5.1 |
| 1994 | 179 | 113 | 8.3 | 4.8 | 129 | 100 | 6.4 | 4.3 |
| 1995 | 173 | 129 | 7.9 | 5.5 | 114 | 103 | 5.7 | 4.3 |
| 1996 | 162 | 113 | 7.7 | 4.8 | 118 | 90 | 5.8 | 3.7 |
| 1997 | 165 | 134 | 7.4 | 5.5 | 119 | 96 | 5.7 | 3.9 |
| 1998 | 188 | 134 | 8.5 | 5.4 | 130 | 103 | 6.2 | 4.0 |
| 1999 | 195 | 152 | 8.6 | 6.2 | 139 | 104 | 6.4 | 4.2 |
| 2000 | 192 | 118 | 8.4 | 4.7 | 159 | 98 | 7.2 | 3.8 |
| 2001 | 189 | 141 | 8.1 | 5.5 | 147 | 99 | 6.5 | 3.8 |
| 2002 | 204 | 162 | 8.6 | 6.4 | 126 | 108 | 5.5 | 4.1 |
| 2003 | 180 | 134 | 7.3 | 5.2 | 134 | 105 | 5.5 | 4.0 |
| 2004 | 202 | 135 | 8.4 | 5.2 | 129 | 98 | 5.5 | 3.6 |
| 2005 | 165 | 118 | 6.7 | 4.4 | 112 | 90 | 4.8 | 3.2 |
| 2006 | 198 | 156 | 8.0 | 5.8 | 128 | 84 | 5.3 | 2.9 |

Table III-3.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Brain and Other Nervous System Cancer

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 99 | 88 | 2.7 | 2.5 | 15 | 23 | 0.4 | 0.7 |
| 20 – 34 | 101 | 73 | 3.8 | 2.9 | 19 | 8 | 0.7 | 0.3 |
| 35 – 49 | 212 | 135 | 7.1 | 4.6 | 119 | 67 | 4.0 | 2.3 |
| 50 – 64 | 259 | 168 | 12.4 | 8.0 | 210 | 138 | 10.1 | 6.5 |
| 65 – 74 | 156 | 128 | 22.1 | 16.0 | 143 | 104 | 20.3 | 13.0 |
| 74 – 85 | 98 | 99 | 22.1 | 15.5 | 101 | 112 | 22.7 | 17.5 |
| 85 and older | 24 | 14 | 16.6 | 4.1 | 22 | 33 | 15.2 | 9.7 |

Table III-3.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Brain and Other Nervous System Cancer

| Race and Ethnicity† | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|----------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 949 | 705 | 7.8 | 5.4 | 629 | 485 | 5.3 | 3.6 |
| American Indian | | | | | | | | |
| Statewide | 3 | 5 | ~ | ~ | 0 | 2 | ~ | ~ |
| CHSDA Counties | 1 | 2 | ~ | ~ | 0 | 2 | ~ | ~ |
| Asian/Pacific Isl. | 12 | 9 | 3.5 | ~ | 6 | 5 | ~ | ~ |
| Black | 23 | 13 | 4.8 | 4.2 | 6 | 5 | ~ | ~ |
| Non-Hispanic White | 883 | 663 | 8.0 | 5.6 | 609 | 469 | 5.5 | 3.7 |
| Hispanic (All Races) | 21 | 12 | 6.9 | 3.2 | 6 | 4 | ~ | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

† Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data. Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Brain and Other Nervous System

Descriptive Epidemiology

Table III-3.4: Other Minnesota cancer statistics†, 2004-2006, Brain and Other Nervous System Cancer

| | Males | Females |
|---|--------------|---------|
| Median Age at Diagnosis | 53.0 | 55.0 |
| Median Age at Death | 64.0 | 66.0 |
| Lifetime Risk of Diagnosis | 0.7% | 0.5% |
| Lifetime Risk of Death | 0.5% | 0.4% |
| Annual Percent Change‡ | | |
| Incidence (1988-2006) | -0.3% | -0.4% |
| Mortality (1988-2006 males; 2003-2006 females) | -1.0% | -8.4% |

† See Methods section for definition of terms.

‡The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-3.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Brain and Other Nervous System Cancer

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | 7.6 | 5.4 |
| Non-Hispanic White | 8.9 | 6.3 |
| Mortality | | |
| All Races | 5.3 | 3.5 |
| Non-Hispanic White | 5.9 | 4.0 |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-3.6: Distribution of Brain and Other Nervous System Cancer cell types, Minnesota, 2002-2006

| Cell Type | Histology Codes† | Cases | % |
|-------------------|--|-------|-------|
| Glioblastoma | 9440-9442 | 720 | 43.5 |
| Astrocytoma (all) | 9400, 9401, 9410-9411, 9420- 9421, 9423-9430 | 457 | 27.6 |
| Oligodendroglioma | 9450-51, 9460 | 129 | 7.8 |
| Ependymoma | 9391-9394 | 88 | 5.3 |
| Mixed glioma | 9382 | 76 | 4.6 |
| Medulloblastoma | 9470-9472 | 41 | 2.5 |
| Other glioma | 9380, 9381 | 18 | 1.1 |
| All others | | 125 | 7.6 |
| Total | | 1,654 | 100.0 |

†International Classification of Diseases for Oncology, 3rd edition.

Incidence and Mortality: An average of 331 cases of invasive brain and other nervous system cancer are diagnosed in Minnesota each year, and 223 deaths are caused by these cancers. They account for 1.4 percent of all new cancers diagnosed and 2.5 percent of cancer deaths in the state. Incidence and mortality rates in Minnesota are similar to those for the U.S. for all races combined, but are significantly lower for non-Hispanic whites. Based on SEER data, the 5-year relative survival rate for brain cancers diagnosed between 1990-2005 was 35.5 percent, but was considerably higher among children ages 0-14 (73.8%).

Trends: The incidence of invasive brain and other nervous system cancer in Minnesota has been stable since cancer reporting was implemented in 1988. The mortality rate declined significantly by 1.2 percent per year among women until 2003.

Age: The incidence rate for brain and nervous system cancer increases only modestly with age. The majority (57%) of brain and nervous system cancers are diagnosed between the ages of 20 and 64 years.

Gender: Brain and nervous system cancers are about 44 percent more common among males than females.

Race: There are too few cases of brain cancer in Minnesota among persons of color to assess racial disparities. National data show that non-Hispanic whites are at higher risk of developing and dying from these cancers than those of other racial/ethnic groups.

Risk Factors

The causes of most brain cancers are unknown. Ionizing radiation is the only well-established environmental risk factor for brain and nervous system cancers. Cell phones, which use radio waves, have been studied as a possible risk factor for brain cancers, but a consistent link has not been found. Information on this subject can be found on the NCI factsheet "Cell Phones and Cancer Risk" (<http://www.cancer.gov/cancertopics/factsheet/risk/cellphones>). Occupational exposure to vinyl chloride and exposure to electromagnetic fields have been proposed as potential risk factors for brain cancers, but research is not conclusive. These types of cancers are difficult to investigate due in part to their morphologic, genetic, and etiologic diversity.

Early Detection / Prevention

Brain cancer is usually only detected once it becomes symptomatic. In most cases, the histologic type and location of the tumor is more important than early detection.

Breast

Table III-4.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Breast Cancer

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 16 | 2,861 | 0.9 | 132.6 | 6 | 765 | 0.4 | 34.3 |
| 1989 | 13 | 2,773 | 0.7 | 127.3 | 5 | 716 | 0.3 | 32.0 |
| 1990 | 14 | 2,906 | 0.8 | 132.3 | 2 | 746 | 0.1 | 32.8 |
| 1991 | 18 | 2,923 | 1.0 | 130.8 | 6 | 786 | 0.4 | 33.8 |
| 1992 | 12 | 2,951 | 0.6 | 130.7 | 3 | 726 | 0.2 | 30.4 |
| 1993 | 15 | 3,024 | 0.8 | 131.5 | 5 | 732 | 0.3 | 30.0 |
| 1994 | 22 | 2,978 | 1.2 | 127.1 | 9 | 708 | 0.5 | 28.9 |
| 1995 | 24 | 3,170 | 1.3 | 133.9 | 4 | 773 | 0.2 | 31.0 |
| 1996 | 18 | 3,154 | 0.9 | 130.5 | 7 | 725 | 0.4 | 28.5 |
| 1997 | 16 | 3,239 | 0.9 | 132.2 | 11 | 678 | 0.6 | 26.1 |
| 1998 | 23 | 3,509 | 1.2 | 140.5 | 5 | 720 | 0.2 | 26.9 |
| 1999 | 21 | 3,493 | 1.0 | 138.6 | 4 | 670 | 0.2 | 24.9 |
| 2000 | 30 | 3,655 | 1.5 | 142.6 | 8 | 729 | 0.4 | 26.8 |
| 2001 | 27 | 3,643 | 1.3 | 139.6 | 10 | 685 | 0.5 | 24.9 |
| 2002 | 27 | 3,604 | 1.2 | 135.3 | 2 | 640 | 0.1 | 22.6 |
| 2003 | 22 | 3,399 | 1.0 | 125.7 | 8 | 639 | 0.4 | 22.8 |
| 2004 | 25 | 3,377 | 1.1 | 122.7 | 1 | 655 | 0.1 | 22.4 |
| 2005 | 36 | 3,474 | 1.6 | 124.2 | 6 | 656 | 0.3 | 22.3 |
| 2006 | 30 | 3,536 | 1.4 | 124.6 | 5 | 609 | 0.2 | 20.5 |

Table III-4.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Breast Cancer

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 0 | 2 | 0.0 | 0.1 | 0 | 0 | 0.0 | 0.0 |
| 20 – 34 | 3 | 285 | 0.1 | 11.4 | 0 | 26 | 0.0 | 1.0 |
| 35 – 49 | 13 | 3,528 | 0.4 | 119.8 | 1 | 359 | 0.0 | 12.2 |
| 50 – 64 | 38 | 6,048 | 1.8 | 286.8 | 13 | 874 | 0.1 | 41.5 |
| 65 – 74 | 30 | 3,304 | 4.2 | 412.3 | 6 | 623 | 0.8 | 77.7 |
| 74 – 85 | 40 | 2,909 | 9.0 | 455.7 | 6 | 742 | 1.4 | 116.2 |
| 85 and older | 16 | 1,314 | 11.1 | 388.2 | 6 | 575 | 4.1 | 169.9 |

Table III-4.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Breast Cancer

| Race and Ethnicity† | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|----------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 140 | 17,390 | 1.3 | 126.3 | 22 | 3,199 | 0.2 | 22.1 |
| American Indian | | | | | | | | |
| Statewide | 0 | 105 | ~ | 92.5 | 0 | 14 | ~ | 13.3 |
| CHSDA Counties | 0 | 57 | ~ | 95.5 | 0 | 7 | ~ | ~ |
| Asian/Pacific Isl. | 2 | 150 | ~ | 50.8 | 1 | 19 | ~ | 7.9 |
| Black | 0 | 290 | ~ | 98.6 | 1 | 75 | ~ | 27.5 |
| Non-Hispanic White | 136 | 16,479 | 1.3 | 127.1 | 20 | 3,062 | 0.2 | 22.2 |
| Hispanic (All Races) | 2 | 154 | ~ | 88.7 | 1 | 29 | ~ | 22.4 |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

† Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data.

Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Breast

Table III-4.4: Other Minnesota cancer statistics†, 2004-2006, Breast Cancer

| | Males | Females |
|--|-------------|--------------|
| Median Age at Diagnosis | 72.0 | 61.0 |
| Median Age at Death | 76.0 | 70.0 |
| Lifetime Risk of Diagnosis | 0.2% | 12.8% |
| Lifetime Risk of Death | < 0.0% | 2.9% |
| Annual Percent Change‡ | | |
| Incidence (1988-2006 males; 2004-2006 females) | 3.1% | 0.8% |
| Mortality (1988-2006) | -0.3% | -2.7% |

† See Methods section for definition of terms.

‡The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-4.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Breast Cancer

| | Males | Females |
|---------------------|-------|---------|
| Incidence | | |
| All Races | 1.2 | 123.8 |
| Non-Hispanic White† | 1.2 | 134.0 |
| Mortality | | |
| All Races | 0.3 | 24.5 |
| Non-Hispanic White† | 0.3 | 24.5 |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

†Data for males are based on all whites, including persons of Hispanic ethnicity.

Table III-4.6: Extent of disease at diagnosis and five-year relative survival, Breast Cancer

| Stage at Diagnosis | Percent of Cases† (%) | 5-Year Relative Survival‡ (%) |
|--------------------|-----------------------|-------------------------------|
| <i>In Situ</i> | 18.7 | - |
| Localized | 50.0 | 98.3 |
| Regional | 25.4 | 83.5 |
| Distant | 3.9 | 23.3 |
| Unknown | 2.0 | 57.7 |

†Among Minnesota cases diagnosed 2004-2006.

‡Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

Descriptive Epidemiology

Incidence and Mortality: Breast cancer is the most commonly diagnosed cancer among women. Based on current rates, 1 out of 8 women will be diagnosed with this disease. Nonetheless, female breast cancer rates have changed markedly since cancer reporting was implemented in Minnesota in 1988. Due to steady

declines in mortality, breast cancer accounted for 14 percent of cancer deaths among women in 2006 instead of 20 percent in 1988. Breast cancer incidence among women began declining sharply around 2001, and accounted for 30 percent of cancer diagnoses among women in 2006 instead of 34 percent in 2001. Among non-Hispanic white women, incidence rates are five percent lower in Minnesota than in the SEER Program, and mortality rates are six percent lower in Minnesota than in the U.S.

Trends: Incidence rates for invasive breast cancer among Minnesota women decreased significantly by 3.9 percent per year from 2000-2004 and then stabilized, while the mortality rate decreased significantly by 2.7 percent per year from 1988 to 2006. The sharp decrease in mortality among women has resulted from a combination of increased breast cancer screening with mammography and improvement in the medical management of this disease.

Age: Breast cancer risk increases with age. Almost 80 percent of cases are diagnosed after 50 years of age.

Race: Although incidence rates are 22 percent lower among black compared to non-Hispanic white women, mortality rates are 24 percent higher among black women. The breast cancer incidence rate among Hispanic women is 30 percent lower than among non-Hispanic white women, but the mortality rate is slightly higher. This indicates disparities in survival from breast cancer among populations of color.

Risk Factors

Cumulative exposure of the breast tissue to estrogen is a strong predictor of risk. Therefore, early age at menarche, late onset of menopause, late childbearing, and having fewer children increase risk. Studies have indicated that use of hormone replacement therapy increases risk for breast cancer, while use of tamoxifen, an anti-estrogen, reduces risk among high-risk women. Other risk factors include benign breast disease with atypical hyperplasia, obesity, alcohol consumption, physical inactivity, and higher socioeconomic status. Family history, especially of premenopausal breast cancer, is strongly associated with increased breast cancer risk. Mutations in the BRCA1 or BRCA2 gene are specific inherited risk factors. Known risk factors account for only 30 to 50 percent of breast cancers.

Early Detection / Prevention

The U.S. Preventive Services Task Force (USPSTF) revised its recommendations on mammography in 2009. It recommends that biennial screening begin at age 50, and that younger women discuss the benefits and harms of screening with their physician to make an informed decision. More information on the rationale for this change can be found on the USPSTF web site (<http://www.ahrq.gov/clinic/uspstf/uspstfbrca.htm>).

Cervix Uteri

Table III-5.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Cervix Uteri Cancer

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|-------------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | - | 213 | - | 9.9 | - | 46 | - | 2.1 |
| 1989 | - | 204 | - | 9.3 | - | 43 | - | 2.0 |
| 1990 | - | 248 | - | 11.1 | - | 51 | - | 2.4 |
| 1991 | - | 202 | - | 9.2 | - | 41 | - | 1.8 |
| 1992 | - | 167 | - | 7.3 | - | 44 | - | 1.9 |
| 1993 | - | 198 | - | 8.7 | - | 36 | - | 1.5 |
| 1994 | - | 205 | - | 8.9 | - | 46 | - | 2.0 |
| 1995 | - | 201 | - | 8.4 | - | 51 | - | 2.2 |
| 1996 | - | 200 | - | 8.2 | - | 61 | - | 2.6 |
| 1997 | - | 175 | - | 7.3 | - | 45 | - | 1.8 |
| 1998 | - | 142 | - | 5.8 | - | 37 | - | 1.5 |
| 1999 | - | 176 | - | 7.0 | - | 49 | - | 1.9 |
| 2000 | - | 173 | - | 6.9 | - | 42 | - | 1.5 |
| 2001 | - | 175 | - | 6.9 | - | 35 | - | 1.3 |
| 2002 | - | 170 | - | 6.7 | - | 34 | - | 1.3 |
| 2003 | - | 173 | - | 6.7 | - | 48 | - | 1.8 |
| 2004 | - | 162 | - | 6.2 | - | 52 | - | 1.9 |
| 2005 | - | 169 | - | 6.3 | - | 48 | - | 1.7 |
| 2006 | - | 159 | - | 6.1 | - | 45 | - | 1.6 |

Table III-5.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Cervix Uteri Cancer

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|--------------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | - | 4 | - | 0.1 | - | 0 | - | 0.0 |
| 20 – 34 | - | 146 | - | 5.8 | - | 11 | - | 0.4 |
| 35 – 49 | - | 316 | - | 10.7 | - | 45 | - | 1.5 |
| 50 – 64 | - | 227 | - | 10.8 | - | 78 | - | 3.7 |
| 65 – 74 | - | 76 | - | 9.5 | - | 41 | - | 5.1 |
| 74 – 85 | - | 41 | - | 6.4 | - | 30 | - | 4.7 |
| 85 and older | - | 23 | - | 6.8 | - | 22 | - | 6.5 |

Table III-5.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Cervix Uteri Cancer

| Race and Ethnicity [†] | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|---------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | - | 833 | - | 6.4 | - | 227 | - | 1.6 |
| American Indian | | | | | | | | |
| Statewide | - | 18 | - | 12.4 | - | 8 | - | ~ |
| CHSDA Counties | - | 10 | - | 14.3 | - | 5 | - | ~ |
| Asian/Pacific Isl. | - | 32 | - | 12.9 | - | 10 | - | 6.0 |
| Black | - | 45 | - | 13.4 | - | 8 | - | ~ |
| Non-Hispanic White | - | 681 | - | 5.8 | - | 196 | - | 1.5 |
| Hispanic (All Races) | - | 39 | - | 16.9 | - | 5 | - | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

[†] Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data. Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Cervix Uteri

Table III-5.4: Other Minnesota cancer statistics†, 2004-2006, Cervix Uteri Cancer

| | Males | Females |
|----------------------------|-------|--------------|
| Median Age at Diagnosis | - | 48.0 |
| Median Age at Death | - | 60.0 |
| Lifetime Risk of Diagnosis | - | 0.5% |
| Lifetime Risk of Death | - | 0.2% |
| Annual Percent Change‡ | | |
| Incidence (1988-2006) | - | -2.9% |
| Mortality (1988-2006) | - | -1.6% |

† See Methods section for definition of terms.

‡The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-5.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Cervix Uteri Cancer

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | - | 8.2 |
| Non-Hispanic White | - | 7.1 |
| Mortality | | |
| All Races | - | 2.5 |
| Non-Hispanic White | - | 2.1 |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-5.6: Extent of disease at diagnosis and five-year relative survival, Cervix Uteri Cancer

| Stage at Diagnosis | Percent of Cases† (%) | 5-Year Relative Survival‡ (%) |
|--------------------|-----------------------|-------------------------------|
| <i>In Situ</i> | ~ | - |
| Localized | 48.8 | 91.5 |
| Regional | 32.9 | 57.7 |
| Distant | 13.5 | 17.2 |
| Unknown | 4.9 | 56.7 |

†Among Minnesota cases diagnosed 2004-2006.

‡Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

~*In situ* cervical cancers are not collected.

Descriptive Epidemiology

Incidence and Mortality: Each year in Minnesota an average of 167 new cases of cervical cancer are diagnosed among women, and 45 deaths occur. Incidence rates in Minnesota are 20 percent lower than those reported by SEER. Minnesota has one of the lowest cervical cancer mortality rates in the U.S., nearly 40 percent lower than those reported nationally.

Trends: The invasive cervical cancer incidence rate has decreased significantly by 2.9 percent per year in

Minnesota since 1988 while the mortality rate decreased significantly by 1.6 percent per year. Nationally, the incidence rate declined by 3.5 percent per year from 1996 to 2006, and mortality declined by 2.3 percent per year from 1990 to 2006. These declines are attributed to the widespread adoption of cervical cancer screening with the Pap test.

Age: The incidence rate for invasive cervical cancer increases with age beginning at age 20, and starts to decrease after age 50. Approximately 56 percent of diagnoses are among women less than 50 years of age. The median age at diagnosis for cervical cancer is one of the youngest of all cancers.

Race: Cervical cancer incidence is highest among women of color, both in Minnesota and nationally. Although based on relatively small numbers of cases, women of color in Minnesota are more than two times more likely to be diagnosed with invasive cervical cancer than non-Hispanic white women, and disparities in the mortality rate may be even greater. Women of color are also less likely than non-Hispanic white women to be diagnosed before the cancer has spread to lymph nodes or other organs.

Risk Factors

Up to 95 percent of cervical cancers are caused by the human papilloma virus (HPV), a sexually transmitted infection. HPV infections appear to be very common, usually regressing without any symptoms. However, in a small percentage of women the infection becomes persistent, and abnormalities develop that can eventually become malignant. Because Pap tests can identify lesions in a pre-malignant state when they can be removed with minimally invasive procedures, any factors interfering with routine screening, such as low socioeconomic status and lack of access to medical care, increase risk for this cancer.

Early Detection / Prevention

Cervical cancer can be prevented through screening with the Pap test. The U.S. Preventive Services Task Force issued guidelines in January 2003 recommending that women should receive regular Pap tests starting at age 21 or within 3 years of the onset of sexual activity, whichever comes first. In June 2006, the FDA approved a vaccine to prevent infection with two HPV strains causing about 70 percent of cervical cancers. It is the first vaccine targeted specifically to preventing cancer. For more information on the HPV vaccine, visit the MDH web site at <http://www.health.state.mn.us/divs/idepc/dtopics/vpds/hpv>.

Colon and Rectum

Table III-6.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Colon and Rectum Cancer

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 1,254 | 1,235 | 74.1 | 52.0 | 507 | 482 | 31.0 | 19.5 |
| 1989 | 1,291 | 1,179 | 75.4 | 48.8 | 515 | 518 | 30.9 | 20.5 |
| 1990 | 1,218 | 1,229 | 70.4 | 50.5 | 497 | 462 | 29.4 | 18.3 |
| 1991 | 1,230 | 1,218 | 69.8 | 49.6 | 482 | 496 | 28.6 | 19.3 |
| 1992 | 1,291 | 1,179 | 72.5 | 47.3 | 464 | 522 | 27.4 | 20.0 |
| 1993 | 1,176 | 1,174 | 64.3 | 46.3 | 416 | 473 | 23.6 | 17.5 |
| 1994 | 1,181 | 1,190 | 63.3 | 46.2 | 446 | 432 | 24.9 | 15.7 |
| 1995 | 1,245 | 1,178 | 66.2 | 44.9 | 470 | 517 | 25.7 | 18.6 |
| 1996 | 1,117 | 1,180 | 58.4 | 45.0 | 454 | 461 | 24.6 | 16.3 |
| 1997 | 1,250 | 1,259 | 65.0 | 47.2 | 466 | 461 | 25.0 | 16.3 |
| 1998 | 1,216 | 1,304 | 61.6 | 48.5 | 462 | 498 | 24.3 | 17.4 |
| 1999 | 1,253 | 1,223 | 62.3 | 44.7 | 426 | 475 | 22.1 | 16.6 |
| 2000 | 1,275 | 1,275 | 61.9 | 46.1 | 429 | 497 | 21.7 | 17.1 |
| 2001 | 1,263 | 1,236 | 59.9 | 44.4 | 410 | 458 | 20.3 | 15.4 |
| 2002 | 1,269 | 1,272 | 59.1 | 45.2 | 451 | 481 | 21.5 | 16.0 |
| 2003 | 1,293 | 1,215 | 58.9 | 42.6 | 473 | 487 | 22.5 | 16.0 |
| 2004 | 1,299 | 1,234 | 57.8 | 42.9 | 371 | 425 | 17.0 | 13.7 |
| 2005 | 1,250 | 1,191 | 54.3 | 40.5 | 383 | 408 | 17.6 | 12.7 |
| 2006 | 1,224 | 1,195 | 52.7 | 40.9 | 393 | 429 | 17.6 | 13.8 |

Table III-6.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Colon and Rectum Cancer

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 4 | 2 | 0.1 | 0.1 | 1 | 1 | 0.0 | 0.0 |
| 20 – 34 | 53 | 66 | 2.0 | 2.6 | 16 | 17 | 0.7 | 0.7 |
| 35 – 49 | 537 | 483 | 17.9 | 16.4 | 115 | 109 | 3.8 | 3.7 |
| 50 – 64 | 1,836 | 1,208 | 87.9 | 57.3 | 433 | 327 | 22.7 | 15.5 |
| 65 – 74 | 1,677 | 1,386 | 237.5 | 172.9 | 492 | 392 | 75.0 | 48.9 |
| 74 – 85 | 1,624 | 1,903 | 365.7 | 298.1 | 631 | 659 | 151.5 | 103.2 |
| 85 and older | 604 | 1,059 | 417.5 | 312.8 | 383 | 725 | 280.4 | 214.2 |

Table III-6.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Colon and Rectum Cancer

| Race and Ethnicity† | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|----------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 6,335 | 6,107 | 56.4 | 42.4 | 2,071 | 2,230 | 19.3 | 14.4 |
| American Indian | | | | | | | | |
| Statewide | 53 | 50 | 69.9 | 59.6 | 26 | 14 | 36.2 | 19.0 |
| CHSDA Counties | 41 | 35 | 99.6 | 71.8 | 18 | 10 | 46.7 | 25.6 |
| Asian/Pacific Isl. | 65 | 62 | 36.5 | 29.7 | 19 | 26 | 12.8 | 13.5 |
| Black | 118 | 91 | 56.3 | 38.9 | 39 | 39 | 24.0 | 19.6 |
| Non-Hispanic White | 5,980 | 5,777 | 56.1 | 41.8 | 1,975 | 2,145 | 19.2 | 14.4 |
| Hispanic (All Races) | 49 | 49 | 43.7 | 35.8 | 11 | 6 | 11.5 | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

† Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data.

Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented

Colon and Rectum

Table III-6.4: Other Minnesota cancer statistics†, 2004-2006, Colon and Rectum Cancer

| | Males | Females |
|--|--------------|--------------|
| Median Age at Diagnosis | 69.0 | 74.0 |
| Median Age at Death | 74.0 | 79.5 |
| Lifetime Risk of Diagnosis | 5.8% | 5.3% |
| Lifetime Risk of Death | 2.1% | 2.1% |
| Annual Percent Change‡ | | |
| Incidence (1988-2006 males, 1998-2006 females) | -1.7% | -2.0% |
| Mortality (1988-2006) | -2.9% | -2.0% |

† See Methods section for definition of terms.

‡The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-6.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Colon and Rectum Cancer

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | 57.3 | 42.8 |
| Non-Hispanic White | 58.1 | 43.3 |
| Mortality | | |
| All Races | 21.9 | 15.4 |
| Non-Hispanic White | 21.7 | 15.1 |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-6.6: Extent of disease at diagnosis and five-year relative survival, Colon and Rectum Cancer

| Stage at Diagnosis | Percent of Cases† (%) | 5-Year Relative Survival‡ (%) |
|--------------------|-----------------------|-------------------------------|
| <i>In Situ</i> | 3.2 | - |
| Localized | 42.8 | 90.8 |
| Regional | 32.2 | 69.5 |
| Distant | 15.7 | 11.3 |
| Unknown | 6.1 | 38.4 |

†Among Minnesota cases diagnosed 2004-2006.

‡Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

Descriptive Epidemiology

Incidence and Mortality: Approximately 2,500 cases of invasive colon and rectum cancer are diagnosed and 860 deaths occur each year in Minnesota. Minnesota rates are slightly lower than national rates. Colorectal cancer is the second leading cause of cancer-related death in Minnesota; only lung cancer kills more Minnesotans.

Trends: Colon and rectum cancer rates have declined sharply over the last decade in Minnesota and nationally.

Research indicates that these declines may be due in part to increased screening and polyp removal, which may prevent the progression of polyps to invasive cancers. Other factors, such as use of hormone replacement therapy among women and use of aspirin to prevent heart disease, may also reduce the risk of colorectal cancer.

Age: About 65 percent of diagnoses and 75 percent of deaths occur among persons 65 years and older.

Gender: Colorectal cancer rates are about 34 percent higher among men than women.

Race: In Minnesota, American Indians have the highest incidence and mortality rates. Among American Indians, colorectal cancer rates in Minnesota are more than twice that of the U.S. as a whole.

Risk Factors

A personal or family history of colorectal cancer, adenomatous polyposis coli or inflammatory bowel disease increases colorectal cancer risk. Other risk factors include obesity, physical inactivity, alcohol consumption, tobacco, high fat and low fiber diets, as well as a diet low in fruits and vegetables. Because screening can prevent colorectal cancer by removing precancerous polyps, not being screened is actually a risk factor for the disease. Studies suggest that estrogen and progestin hormone therapy and nonsteroidal anti-inflammatory drugs, such as aspirin, may reduce colorectal cancer risk.

Early Detection / Prevention

Many colorectal cancers could be prevented through screening. For asymptomatic persons at average risk, screening is recommended to begin at age 50 with one of several options. In March 2008, the American Cancer Society revised their screening guidelines for this cancer to separate the available tests into those that can prevent colorectal cancer by finding precancerous polyps (sigmoidoscopy, colonoscopy, colonography, and double contrast barium enema), and those whose primary benefit is finding cancer at an early stages (fecal occult blood test, fecal immunochemical test, and stool DNA test). They recommend screening tests that can find precancerous polyps if these tests are available and you are willing to have a more invasive test at longer intervals. For more information, talk to your doctor or view the ACS guidelines at <http://www.cancer.org>.

Corpus Uteri

Table III-7.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Corpus Uteri and Uterus, NOS Cancer

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | - | 561 | - | 26.2 | - | 115 | - | 4.8 |
| 1989 | - | 547 | - | 25.3 | - | 96 | - | 4.0 |
| 1990 | - | 551 | - | 25.2 | - | 82 | - | 3.3 |
| 1991 | - | 588 | - | 27.0 | - | 117 | - | 4.8 |
| 1992 | - | 585 | - | 25.8 | - | 104 | - | 4.1 |
| 1993 | - | 586 | - | 25.4 | - | 97 | - | 3.7 |
| 1994 | - | 594 | - | 25.3 | - | 89 | - | 3.4 |
| 1995 | - | 632 | - | 26.9 | - | 99 | - | 3.9 |
| 1996 | - | 635 | - | 26.6 | - | 114 | - | 4.2 |
| 1997 | - | 648 | - | 26.6 | - | 96 | - | 3.5 |
| 1998 | - | 650 | - | 26.5 | - | 112 | - | 4.1 |
| 1999 | - | 670 | - | 26.8 | - | 122 | - | 4.6 |
| 2000 | - | 628 | - | 24.7 | - | 99 | - | 3.5 |
| 2001 | - | 705 | - | 27.2 | - | 111 | - | 4.0 |
| 2002 | - | 759 | - | 28.7 | - | 114 | - | 3.9 |
| 2003 | - | 670 | - | 25.0 | - | 138 | - | 4.9 |
| 2004 | - | 771 | - | 28.1 | - | 135 | - | 4.6 |
| 2005 | - | 783 | - | 28.0 | - | 120 | - | 4.2 |
| 2006 | - | 761 | - | 26.4 | - | 140 | - | 4.7 |

Table III-7.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Corpus Uteri and Uterus, NOS Cancer

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | - | 1 | - | 0.0 | - | 0 | - | 0.0 |
| 20 – 34 | - | 43 | - | 1.7 | - | 8 | - | 0.3 |
| 35 – 49 | - | 462 | - | 15.7 | - | 30 | - | 1.0 |
| 50 – 64 | - | 1,573 | - | 74.6 | - | 176 | - | 8.3 |
| 65 – 74 | - | 823 | - | 102.7 | - | 130 | - | 16.2 |
| 74 – 85 | - | 627 | - | 98.2 | - | 188 | - | 29.4 |
| 85 and older | - | 215 | - | 63.5 | - | 115 | - | 34.0 |

Table III-7.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Corpus Uteri and Uterus, NOS Cancer

| Race and Ethnicity† | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|----------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | - | 3,744 | - | 27.2 | - | 647 | - | 4.5 |
| American Indian | | | | | | | | |
| Statewide | - | 25 | - | 23.2 | - | 4 | - | ~ |
| CHDA Counties | - | 16 | - | 28.0 | - | 2 | - | - |
| Asian/Pacific Isl. | - | 40 | - | 16.2 | - | 8 | - | ~ |
| Black | - | 46 | - | 20.3 | - | 12 | - | 5.5 |
| Non-Hispanic White | - | 3,545 | - | 27.3 | - | 618 | - | 4.4 |
| Hispanic (All Races) | - | 40 | - | 23.8 | - | 3 | - | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

[†] Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data.

Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Corpus Uteri

Table III-7.4: Other Minnesota cancer statistics†, 2004-2006, Corpus Uteri and Uterus, NOS Cancer

| | Males | Females |
|----------------------------|-------|---------|
| Median Age at Diagnosis | - | 62.0 |
| Median Age at Death | - | 74.0 |
| Lifetime Risk of Diagnosis | - | 3.1% |
| Lifetime Risk of Death | - | 0.6% |
| Annual Percent Change‡ | | |
| Incidence (1988-2006) | - | 0.3% |
| Mortality (1988-2006) | - | 0.5% |

† See Methods section for definition of terms.

‡ The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-7.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Corpus Uteri and Uterus, NOS Cancer

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | - | 23.3 |
| Non-Hispanic White | - | 25.0 |
| Mortality | | |
| All Races | - | 4.1 |
| Non-Hispanic White | - | 3.9 |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§ Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-7.6: Extent of disease at diagnosis and five-year relative survival, Corpus Uteri and Uterus, NOS Cancer

| Stage at Diagnosis | Percent of Cases† (%) | 5-Year Relative Survival‡ (%) |
|--------------------|-----------------------|-------------------------------|
| <i>In Situ</i> | 2.0 | - |
| Localized | 70.9 | 95.7 |
| Regional | 15.9 | 67.4 |
| Distant | 7.3 | 17.4 |
| Unknown | 4.0 | 56.1 |

† Among Minnesota cases diagnosed 2004-2006.

‡ Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

Descriptive Epidemiology

Incidence and Mortality: Cancer of the corpus uteri is often referred to as endometrial cancer, since the cells of the lining of the uterus, or endometrium, are the most likely to become malignant. About 710 cases of uterine cancer are diagnosed among women in Minnesota each year and about 120 women die from the disease. Rates in Minnesota are somewhat higher than what is reported nationally. It should be noted that the risk of developing uterine cancer among women with a uterus is actually

higher than rates presented for all women because the number of women who have had hysterectomies is not known, and therefore has not been subtracted from the denominator used for calculating rates.

Trends: Uterine cancer incidence rates increased significantly by 0.4 percent per year from 1988-2004 while mortality rates remained stable.

Age: Nearly 46 percent of diagnoses and 70 percent of deaths occur among women 65 years of age or older.

Race: In Minnesota, uterine cancer incidence rates are highest among non-Hispanic white women. Race-specific incidence rates are similar to those reported by SEER. There are too few deaths due to uterine cancer among women of color in Minnesota to assess disparities. However, black women in the U.S. have the highest mortality rate, reflecting a marked disparity in survival between white and black women. Based on SEER data, the 5-year relative survival rate for uterine cancer is 85 percent for white women, and only 61 percent for black women.

Risk Factors

A high cumulative exposure to estrogen is the major risk factor for uterine cancer. Estrogen exposure may be increased by estrogen replacement therapy, tamoxifen, early menarche, late menopause, never having children, a history of failure to ovulate, and obesity. Increased production of endogenous estrogens due to estrogen-secreting ovarian tumors or polycystic ovarian syndrome also increases risk. Other factors associated with an increased likelihood of developing uterine cancer include obesity, high body mass, and a high fat diet. Hormone replacement therapy (HRT), which is a combination of progesterone and estrogen replacement therapy, is thought to largely offset the increased risk related to HRT using only estrogen. Research has not implicated estrogen exposures in the development of the other types of uterine corpus cancer, which are more aggressive and have a poorer prognosis. Other risk factors for uterine cancer include infertility and hereditary nonpolyposis colon cancer (HNPCC). Pregnancy and use of oral contraceptives provide protection against endometrial cancer.

Early Detection / Prevention

There are no proven screening methods for detecting asymptomatic uterine cancer. However, vaginal bleeding or other abnormal discharge after menopause is a warning sign and should be promptly reported to a physician.

Esophagus

Table III-8.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Esophagus Cancer

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 106 | 31 | 6.2 | 1.4 | 94 | 46 | 5.5 | 2.0 |
| 1989 | 110 | 50 | 6.1 | 2.1 | 129 | 31 | 7.6 | 1.2 |
| 1990 | 123 | 44 | 7.0 | 1.8 | 98 | 44 | 5.6 | 1.8 |
| 1991 | 106 | 37 | 5.9 | 1.5 | 129 | 41 | 7.2 | 1.5 |
| 1992 | 104 | 41 | 5.6 | 1.6 | 110 | 47 | 6.0 | 1.8 |
| 1993 | 118 | 29 | 6.2 | 1.2 | 116 | 29 | 6.3 | 1.2 |
| 1994 | 121 | 37 | 6.4 | 1.5 | 116 | 32 | 6.2 | 1.2 |
| 1995 | 139 | 51 | 7.1 | 2.0 | 155 | 40 | 8.1 | 1.6 |
| 1996 | 149 | 46 | 7.6 | 1.8 | 138 | 43 | 7.2 | 1.6 |
| 1997 | 142 | 46 | 7.2 | 1.7 | 145 | 46 | 7.3 | 1.6 |
| 1998 | 156 | 41 | 7.7 | 1.6 | 160 | 44 | 8.1 | 1.6 |
| 1999 | 174 | 54 | 8.4 | 1.9 | 140 | 40 | 6.9 | 1.4 |
| 2000 | 157 | 52 | 7.5 | 1.9 | 179 | 53 | 8.6 | 1.9 |
| 2001 | 158 | 62 | 7.4 | 2.2 | 140 | 51 | 6.6 | 1.7 |
| 2002 | 200 | 47 | 9.3 | 1.7 | 174 | 56 | 8.1 | 1.9 |
| 2003 | 200 | 46 | 8.8 | 1.7 | 170 | 48 | 7.7 | 1.7 |
| 2004 | 200 | 61 | 8.6 | 2.1 | 189 | 37 | 8.4 | 1.3 |
| 2005 | 236 | 59 | 10.0 | 2.0 | 189 | 46 | 8.3 | 1.5 |
| 2006 | 218 | 52 | 8.9 | 1.8 | 184 | 50 | 7.8 | 1.7 |

Table III-8.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Esophagus Cancer

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 0 | 0 | 0.0 | 0.0 | 1 | 0 | 0.0 | 0.0 |
| 20 – 34 | 3 | 1 | 0.1 | 0.0 | 3 | 1 | 0.1 | 0.0 |
| 35 – 49 | 96 | 8 | 3.2 | 0.3 | 63 | 7 | 2.1 | 0.2 |
| 50 – 64 | 379 | 72 | 18.1 | 3.4 | 288 | 58 | 13.8 | 2.8 |
| 65 – 74 | 284 | 72 | 40.2 | 9.0 | 249 | 49 | 35.3 | 6.1 |
| 74 – 85 | 231 | 70 | 52.0 | 11.0 | 226 | 69 | 50.9 | 10.8 |
| 85 and older | 61 | 42 | 42.2 | 12.4 | 76 | 53 | 52.5 | 15.7 |

Table III-8.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Esophagus Cancer

| Race and Ethnicity† | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|----------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 1,054 | 265 | 9.1 | 1.9 | 906 | 237 | 8.0 | 1.6 |
| American Indian | | | | | | | | |
| Statewide | 9 | 4 | ~ | ~ | 6 | 2 | ~ | ~ |
| CHSDA Counties | 9 | 3 | ~ | ~ | 5 | 1 | ~ | ~ |
| Asian/Pacific Isl. | 6 | 1 | ~ | ~ | 8 | 0 | ~ | ~ |
| Black | 26 | 5 | 12.8 | ~ | 16 | 4 | 9.3 | ~ |
| Non-Hispanic White | 1,001 | 250 | 9.1 | 1.8 | 874 | 228 | 8.1 | 1.7 |
| Hispanic (All Races) | 6 | 2 | ~ | ~ | 2 | 0 | ~ | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

† Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data.

Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Esophagus

Table III-8.4: Other Minnesota cancer statistics†, 2004-2006, Esophagus Cancer

| | Males | Females |
|----------------------------|-------------|---------|
| Median Age at Diagnosis | 65.0 | 73.0 |
| Median Age at Death | 68.0 | 75.0 |
| Lifetime Risk of Diagnosis | 1.0% | 0.3% |
| Lifetime Risk of Death | 0.9% | 0.2% |
| Annual Percent Change‡ | | |
| Incidence (1988-2006) | 2.7% | 1.1% |
| Mortality (1988-2006) | 1.5% | 0.2% |

† See Methods section for definition of terms.

‡ The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-8.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Esophagus Cancer

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | 7.7 | 2.0 |
| Non-Hispanic White | 8.3 | 2.0 |
| Mortality | | |
| All Races | 7.8 | 1.7 |
| Non-Hispanic White | 8.1 | 1.7 |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§ Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-8.6: Extent of disease at diagnosis and five-year relative survival, Esophagus Cancer

| Stage at Diagnosis | Percent of Cases† (%) | 5-Year Relative Survival‡ (%) |
|--------------------|-----------------------|-------------------------------|
| <i>In Situ</i> | 1.2 | - |
| Localized | 17.5 | 37.1 |
| Regional | 34.1 | 18.5 |
| Distant | 35.5 | 3.1 |
| Unknown | 11.7 | 11.7 |

† Among Minnesota cases diagnosed 2004-2006.

‡ Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

Descriptive Epidemiology

Incidence and Mortality: Each year, about 265 cases of esophageal cancer are diagnosed in Minnesota and about 230 deaths result from this disease. Rates are similar to those reported by SEER. Based on SEER data, the 5-year relative survival rate for esophageal cancer is 17 percent overall, and 37 percent when diagnosed at the localized stage. Most esophageal cancers are diagnosed when the tumor has already spread to adjacent tissues (34.1%) or distant (35.5%) organs.

Trends: The incidence rate among Minnesota males has significantly increased by an average of 2.7 percent per year since cancer reporting was initiated in 1988, accompanied by a statistically significant increase in mortality of 1.5 percent per year. Rates among Minnesota females have also increased during this same time period, although the increases are not statistically significant.

Age: In Minnesota, less than 10 percent of esophageal cancer cases are diagnosed among persons younger than 50 years of age.

Gender: Esophageal cancer rates are five times higher among males than females.

Race: In Minnesota, there are too few cases among persons of color to assess race/ethnic differences in esophagus cancer rates. Nationally, black men have the highest incidence and mortality rates among males, and black women have the highest incidence and mortality rates among females.

Risk Factors

Cigarette smoking and long-term alcohol consumption are major risk factors for this disease and are thought to be responsible for 80 to 90 percent of squamous cell carcinomas of the esophagus in the U.S. Chronic gastric reflux, including Barrett's esophagus, is a major risk factor as well, especially for adenocarcinomas of the esophagus. In epidemiologic studies of esophageal adenocarcinoma, elevated body mass index (BMI) has been consistently shown to be a significant risk factor. Chronic injury to the esophagus through ingestion of hot food or beverages or accidental ingestion of caustic substances like lye may also increase risk. Research suggests that nutritional deficiencies related to lack of fresh fruits and vegetables and overall deficiencies of certain vitamins and minerals, including vitamins A and C, iron, and riboflavin are associated with increased risk of disease, and may explain some of the wide international variation in the occurrence of this cancer.

Early Detection / Prevention

No screening tests are recommended to screen the general population for esophageal cancer. However, persons who are at high risk for esophageal cancer, such as those with Barrett esophagus, should be followed closely to determine the advisability of having regular endoscopic examinations.

Hodgkin Lymphoma

Table III-9.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Hodgkin Lymphoma

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 77 | 69 | 3.9 | 2.9 | 14 | 15 | 0.7 | 0.6 |
| 1989 | 72 | 58 | 3.3 | 2.6 | 18 | 13 | 1.0 | 0.6 |
| 1990 | 88 | 53 | 4.1 | 2.3 | 14 | 16 | 0.8 | 0.7 |
| 1991 | 72 | 70 | 3.4 | 3.1 | 17 | 12 | 0.9 | 0.5 |
| 1992 | 74 | 73 | 3.4 | 3.1 | 23 | 11 | 1.1 | 0.4 |
| 1993 | 78 | 72 | 3.6 | 3.0 | 22 | 18 | 1.2 | 0.7 |
| 1994 | 85 | 62 | 3.8 | 2.6 | 13 | 13 | 0.7 | 0.5 |
| 1995 | 78 | 48 | 3.5 | 2.0 | 8 | 13 | 0.4 | 0.5 |
| 1996 | 75 | 67 | 3.2 | 2.8 | 11 | 11 | 0.6 | 0.4 |
| 1997 | 72 | 63 | 3.1 | 2.6 | 7 | 15 | 0.3 | 0.6 |
| 1998 | 83 | 68 | 3.5 | 2.8 | 19 | 9 | 0.9 | 0.3 |
| 1999 | 80 | 80 | 3.4 | 3.2 | 18 | 12 | 0.9 | 0.5 |
| 2000 | 111 | 67 | 4.6 | 2.7 | 12 | 12 | 0.6 | 0.5 |
| 2001 | 73 | 60 | 3.1 | 2.4 | 19 | 3 | 0.9 | 0.1 |
| 2002 | 77 | 63 | 3.2 | 2.5 | 12 | 9 | 0.5 | 0.3 |
| 2003 | 94 | 79 | 3.8 | 3.1 | 15 | 18 | 0.7 | 0.7 |
| 2004 | 85 | 70 | 3.4 | 2.7 | 9 | 9 | 0.4 | 0.3 |
| 2005 | 77 | 65 | 3.1 | 2.5 | 8 | 11 | 0.3 | 0.4 |
| 2006 | 72 | 53 | 2.9 | 2.1 | 12 | 13 | 0.6 | 0.5 |

Table III-9.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Hodgkin Lymphoma

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 59 | 44 | 1.6 | 1.3 | 1 | 1 | 0.0 | 0.0 |
| 20 – 34 | 109 | 106 | 4.2 | 4.2 | 10 | 8 | 0.4 | 0.3 |
| 35 – 49 | 113 | 69 | 3.8 | 2.3 | 9 | 8 | 0.3 | 0.3 |
| 50 – 64 | 52 | 44 | 2.5 | 2.1 | 7 | 13 | 0.3 | 0.6 |
| 65 – 74 | 33 | 29 | 4.7 | 3.6 | 8 | 12 | 1.1 | 1.5 |
| 74 – 85 | 32 | 32 | 7.2 | 5.0 | 15 | 13 | 3.4 | 2.0 |
| 85 and older | 7 | 7 | 4.8 | 1.8 | 6 | 5 | 4.1 | 1.5 |

Table III-9.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Hodgkin Lymphoma

| Race and Ethnicity† | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|----------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 405 | 330 | 3.3 | 2.6 | 56 | 60 | 0.5 | 0.4 |
| American Indian | | | | | | | | |
| Statewide | 2 | 3 | ~ | ~ | 0 | 1 | ~ | ~ |
| CHSDA Counties | 1 | 2 | ~ | ~ | 0 | 0 | ~ | ~ |
| Asian/Pacific Isl. | 6 | 6 | ~ | ~ | 1 | 1 | ~ | ~ |
| Black | 7 | 8 | ~ | ~ | 2 | 0 | ~ | ~ |
| Non-Hispanic White | 368 | 302 | 3.4 | 2.7 | 50 | 57 | 0.5 | 0.5 |
| Hispanic (All Races) | 12 | 5 | 5.1 | ~ | 2 | 3 | ~ | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

† Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data.

Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Hodgkin Lymphoma

Table III-9.4: Other Minnesota cancer statistics†, 2004-2006, Hodgkin Lymphoma

| | Males | Females |
|----------------------------|--------------|---------|
| Median Age at Diagnosis | 41.0 | 35.0 |
| Median Age at Death | 72.0 | 69.0 |
| Lifetime Risk of Diagnosis | 0.3% | 0.2% |
| Lifetime Risk of Death | 0.1% | 0.1% |
| Annual Percent Change‡ | | |
| Incidence (1988-2006) | -0.7% | -0.5% |
| Mortality (1988-2006) | -3.4% | -2.4% |

† See Methods section for definition of terms.

‡The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-9.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Hodgkin Lymphoma

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | 3.1 | 2.5 |
| Non-Hispanic White | 3.6 | 3.0 |
| Mortality | | |
| All Races | 0.5 | 0.4 |
| Non-Hispanic White | 0.6 | 0.4 |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-9.6: Five-year relative survival# by gender and age at diagnosis, Hodgkin Lymphoma

| Age at Diagnosis (years) | Males (%) | Females (%) |
|--------------------------|-----------|-------------|
| < 45 | 90.5 | 93.2 |
| 45-54 | 80.0 | 87.3 |
| 55-64 | 69.2 | 80.1 |
| 65-74 | 53.8 | 60.3 |
| 75+ | 35.7 | 41.2 |
| All Ages | 83.0 | 86.7 |

#Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

Descriptive Epidemiology

Incidence and Mortality: Lymphomas are malignancies of the white blood cells. There are two kinds of malignant lymphomas: Hodgkin lymphoma contains Reed-Sternberg cells, and non-Hodgkin lymphoma does not. Hodgkin lymphoma is less common, accounting for only 12 percent of lymphomas and 0.6 percent of all cancer diagnoses. Approximately 150 cases are diagnosed each year in Minnesota and 23 people die from the disease. Rates are similar to those reported nationally. The SEER 5-year relative survival rate for Hodgkin

lymphoma is about 85 percent for both males and females.

Trends: The incidence rate of Hodgkin lymphoma in Minnesota has been stable among both men and women since cancer reporting was implemented in 1988. In the SEER 9 areas, incidence rates are significantly increasing among women and significantly decreasing among men. The mortality rate of Hodgkin lymphoma is declining sharply among both men and women in Minnesota, although the decrease is not statistically significant among women. The is similar to national mortality trends.

Age: Approximately 68 percent of newly diagnosed cases of Hodgkin lymphoma occur in persons less than 50 years old. Hodgkin lymphoma has a unique age distribution -- incidence peaks at about age 30, declines until age 55, and then increases to a second peak at age 75. This indicates that there may be two different etiologies for this cancer.

Gender: As with many cancers, the incidence of Hodgkin lymphoma is about 30 percent higher among males than females.

Race: Based on cases reported to SEER, the incidence rate of Hodgkin lymphoma is highest among non-Hispanic whites; rates among blacks and Hispanics are 25 percent lower than among non-Hispanic whites.

Risk Factors

No major risk factors for Hodgkin lymphoma have been identified, although the unusual epidemiologic patterns of the disease suggest that Hodgkin lymphoma pathogenesis may involve an infectious agent. An increased rate of Hodgkin lymphoma has been noted among people who have had infectious mononucleosis, caused by the Epstein-Barr virus. The risk of developing Hodgkin lymphoma appears to be as much as 4 times higher in people who have had mononucleosis than in people who have not. Research suggests that risk is also increased among individuals with certain primary immunodeficiencies. Siblings of persons with Hodgkin lymphoma have an increased risk of the disease that does not appear to be genetic, but may be due to the same childhood exposures, such as infections. There does not appear to be a connection between Hodgkin lymphoma and lifestyle factors such as smoking, diet, exercise, and alcohol intake. Hodgkin lymphoma occurs at a higher rate in people with a higher socioeconomic background.

Early Detection / Prevention

No strategies for the early detection of Hodgkin lymphoma have been identified.

Kaposi Sarcoma (all sites)

Table III-10.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Kaposi Sarcoma (all sites)

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 24 | 4 | 1.2 | 0.1 | 0 | 0 | - | - |
| 1989 | 35 | 2 | 1.6 | 0.1 | 0 | 0 | - | - |
| 1990 | 35 | 3 | 1.5 | 0.1 | 0 | 0 | - | - |
| 1991 | 41 | 0 | 2.0 | 0.0 | 0 | 0 | - | - |
| 1992 | 46 | 2 | 2.0 | 0.1 | 0 | 0 | - | - |
| 1993 | 37 | 1 | 1.5 | 0.0 | 0 | 0 | - | - |
| 1994 | 36 | 1 | 1.5 | 0.0 | 0 | 0 | - | - |
| 1995 | 36 | 6 | 1.5 | 0.2 | 0 | 0 | - | - |
| 1996 | 16 | 0 | 0.8 | 0.0 | 0 | 0 | - | - |
| 1997 | 20 | 0 | 0.9 | 0.0 | 0 | 0 | - | - |
| 1998 | 9 | 1 | 0.4 | 0.0 | 0 | 0 | - | - |
| 1999 | 8 | 0 | 0.3 | 0.0 | 0 | 0 | 0.0 | 0.0 |
| 2000 | 14 | 1 | 0.6 | 0.0 | 0 | 0 | 0.0 | 0.0 |
| 2001 | 14 | 1 | 0.6 | 0.0 | 1 | 0 | 0.0 | 0.0 |
| 2002 | 11 | 2 | 0.5 | 0.1 | 0 | 0 | 0.0 | 0.0 |
| 2003 | 7 | 2 | 0.3 | 0.0 | 0 | 1 | 0.0 | 0.0 |
| 2004 | 12 | 2 | 0.5 | 0.1 | 0 | 0 | 0.0 | 0.0 |
| 2005 | 9 | 2 | 0.3 | 0.1 | 1 | 0 | 0.0 | 0.0 |
| 2006 | 10 | 1 | 0.4 | 0.0 | 0 | 1 | 0.0 | 0.0 |

Table III-10.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Kaposi Sarcoma (all sites)

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0.0 | 0.0 |
| 20 – 34 | 11 | 2 | 0.4 | 0.1 | 0 | 0 | 0.0 | 0.0 |
| 35 – 49 | 25 | 0 | 0.8 | 0.0 | 1 | 0 | 0.0 | 0.0 |
| 50 – 64 | 7 | 0 | 0.3 | 0.0 | 0 | 0 | 0.0 | 0.0 |
| 65 – 74 | 2 | 0 | 0.3 | 0.0 | 0 | 0 | 0.0 | 0.0 |
| 74 – 85 | 3 | 4 | 0.7 | 0.6 | 0 | 0 | 0.0 | 0.0 |
| 85 and older | 1 | 3 | 0.7 | 0.9 | 0 | 2 | 0.0 | 0.6 |

Table III-10.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Kaposi Sarcoma (all sites)

| Race and Ethnicity [†] | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|---------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 49 | 9 | 0.4 | ~ | 1 | 2 | ~ | ~ |
| American Indian | | | | | | | | |
| Statewide | 0 | 0 | ~ | ~ | 0 | 0 | ~ | ~ |
| CHSDA Counties | 0 | 0 | ~ | ~ | 0 | 0 | ~ | ~ |
| Asian/Pacific Isl. | 0 | 0 | ~ | ~ | 0 | 0 | ~ | ~ |
| Black | 11 | 0 | 3.6 | ~ | 0 | 0 | ~ | ~ |
| Non-Hispanic White | 30 | 8 | 0.3 | ~ | 1 | 2 | ~ | ~ |
| Hispanic (All Races) | 7 | 1 | ~ | ~ | ~ | ~ | ~ | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

[†] Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data.

Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

- Data not available. Kaposi sarcoma did not have a unique cause of death code until 1999.

Kaposi Sarcoma (all sites)

Table III-10.4: Other Minnesota cancer statistics†, 2004-2006, Kaposi Sarcoma (all sites)

| | Males | Females |
|-----------------------------|---------------|---------|
| Median Age at Diagnosis | 44.0 | 81.0 |
| Median Age at Death | 47.0 | 95.0 |
| Lifetime Risk of Diagnosis | < 0.0% | < 0.0% |
| Lifetime Risk of Death | < 0.0% | < 0.0% |
| Annual Percent Change‡ | | |
| Incidence (1991-2006 males) | -12.6% | ~ |
| Mortality (1988-2006) | ~ | ~ |

† See Methods section for definition of terms.

‡The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-10.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Kaposi Sarcoma (all sites)

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | 1.2 | 0.1 |
| Non-Hispanic White | 0.9 | 0.1 |
| Mortality | | |
| All Races | ~ | ~ |
| Non-Hispanic White | ~ | ~ |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

~ Data not available

Table III-10.6: Five-year relative survival‡ by gender and age at diagnosis, Kaposi Sarcoma (all sites)

| Age at Diagnosis (years) | Males (%) | Females (%) |
|--------------------------|-----------|-------------|
| < 45 | 56.8 | 38.3 |
| 45-54 | 58.9 | - |
| 55-64 | 72.7 | - |
| 65-74 | 82.9 | 71.0 |
| 75+ | 89.2 | 76.5 |
| All Ages | 59.6 | 62.0 |

‡Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

-Data not available.

Descriptive Epidemiology

Incidence and Mortality: Kaposi sarcoma (KS) is a cancer of the connective tissue that typically causes raised, dark lesions on the skin. When these become widespread and affect other organs, the disease can be fatal. KS used to be extremely rare, primarily occurring in elderly men of Jewish or Italian descent or in persons taking immunosuppressive medications. However, infection with the human immunodeficiency virus (HIV)

greatly increases the risk of developing KS, and in fact, the unusual development of KS among young men was one of the first signs of the AIDS epidemic. Over the most recent 5-year period, 2002-2006, an average of 12 cases of KS were diagnosed in Minnesota each year. Deaths from KS cannot be readily assessed because those associated with AIDS are likely to have AIDS listed as the underlying cause of death rather than KS. Incidence rates among non-Hispanic white males in Minnesota are two-thirds lower than reported by SEER.

Trends: The incidence of KS has been dramatically affected by the AIDS epidemic. In the SEER 9 areas, incidence rates increased more than 20-fold from 0.4 new cases per 100,000 men per year in 1975-1979 to 12.6 in 1990-1991, and then decreased to 1.2 in 2004-2006. Decreases in incidence are thought to be due to the introduction of medications that better protect the immune system once HIV infection has occurred. KS incidence rates in Minnesota have followed a somewhat similar pattern with a statistically significant decrease of 12.6 percent per year among males from 1991-2006.

Age: About 75 percent of men diagnosed with KS in Minnesota are between 20 and 49 years of age.

Gender: In Minnesota, 5 times more cases of KS were diagnosed among males than among females.

Race: Based on a fairly limited number of cases, it appears that KS incidence rates in Minnesota are considerably higher among black males than non-Hispanic white males. This is similar to what is reported by the SEER 17 areas.

Risk Factors

Research indicates that the vast majority of KS cases are caused by infection with a virus in the herpes family, called human herpesvirus 8 (HHV-8). This virus is spread by sexual contact, as is HIV. Although as many as 10 percent of the U.S. population are infected with HHV-8, researchers believe that only those with suppressed immune systems will go on to develop KS.

Early Detection / Prevention

There is no test to identify persons with KS before the lesions develop. The best protection against KS is to avoid behaviors that increase risk for HIV infection, such as unprotected sexual intercourse and needle-sharing.

Kidney and Renal Pelvis

Table III-11.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Kidney and Renal Pelvis Cancer

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 284 | 160 | 16.2 | 7.3 | 136 | 65 | 7.9 | 2.8 |
| 1989 | 257 | 147 | 14.6 | 6.5 | 90 | 70 | 5.3 | 2.9 |
| 1990 | 289 | 164 | 15.8 | 7.0 | 116 | 72 | 6.8 | 2.9 |
| 1991 | 308 | 148 | 16.7 | 6.3 | 141 | 86 | 8.0 | 3.5 |
| 1992 | 311 | 200 | 16.7 | 8.6 | 132 | 98 | 7.4 | 4.0 |
| 1993 | 282 | 159 | 14.9 | 6.7 | 128 | 78 | 7.0 | 3.1 |
| 1994 | 336 | 175 | 17.4 | 7.3 | 114 | 79 | 6.2 | 3.1 |
| 1995 | 347 | 195 | 17.8 | 8.1 | 113 | 76 | 6.1 | 2.9 |
| 1996 | 304 | 161 | 15.2 | 6.6 | 126 | 87 | 6.6 | 3.2 |
| 1997 | 290 | 209 | 14.4 | 8.4 | 141 | 90 | 7.3 | 3.4 |
| 1998 | 323 | 213 | 15.5 | 8.4 | 102 | 89 | 5.2 | 3.2 |
| 1999 | 340 | 224 | 16.0 | 8.9 | 129 | 68 | 6.4 | 2.4 |
| 2000 | 389 | 237 | 18.0 | 9.2 | 134 | 103 | 6.5 | 3.7 |
| 2001 | 406 | 224 | 18.5 | 8.6 | 117 | 82 | 5.5 | 3.0 |
| 2002 | 428 | 256 | 19.1 | 9.6 | 147 | 74 | 6.9 | 2.5 |
| 2003 | 466 | 274 | 20.3 | 10.2 | 144 | 77 | 6.7 | 2.7 |
| 2004 | 479 | 269 | 20.1 | 9.8 | 129 | 91 | 5.8 | 3.1 |
| 2005 | 467 | 295 | 19.4 | 10.6 | 135 | 81 | 5.8 | 2.6 |
| 2006 | 534 | 303 | 21.7 | 10.8 | 158 | 88 | 6.7 | 2.9 |

Table III-11.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Kidney and Renal Pelvis Cancer

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 36 | 23 | 1.0 | 0.7 | 6 | 0 | 0.2 | 0.0 |
| 20 – 34 | 32 | 35 | 1.2 | 1.4 | 3 | 1 | 0.1 | 0.0 |
| 35 – 49 | 333 | 164 | 11.1 | 5.6 | 52 | 15 | 1.7 | 0.5 |
| 50 – 64 | 861 | 428 | 41.2 | 20.3 | 192 | 56 | 9.2 | 2.7 |
| 65 – 74 | 582 | 330 | 82.4 | 41.2 | 189 | 94 | 26.8 | 11.7 |
| 74 – 85 | 449 | 325 | 101.1 | 50.9 | 197 | 141 | 44.4 | 22.1 |
| 85 and older | 81 | 92 | 56.0 | 27.2 | 74 | 104 | 51.1 | 30.7 |

Table III-11.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Kidney and Renal Pelvis Cancer

| Race and Ethnicity† | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|----------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 2,374 | 1,397 | 20.1 | 10.2 | 713 | 411 | 6.4 | 2.8 |
| American Indian | | | | | | | | |
| Statewide | 41 | 27 | 44.5 | 23.0 | 10 | 4 | 13.3 | ~ |
| CHSDA Counties | 27 | 19 | 52.4 | 30.9 | 9 | 3 | ~ | ~ |
| Asian/Pacific Isl. | 11 | 7 | 5.0 | ~ | 4 | 2 | ~ | ~ |
| Black | 66 | 26 | 25.4 | 8.6 | 9 | 6 | ~ | ~ |
| Non-Hispanic White | 2,202 | 1,305 | 19.9 | 10.1 | 682 | 397 | 6.4 | 2.8 |
| Hispanic (All Races) | 29 | 18 | 15.3 | 10.0 | 8 | 2 | ~ | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

† Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data.

Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Kidney and Renal Pelvis

Table III-11.4: Other Minnesota cancer statistics†, 2004-2006, Kidney and Renal Pelvis Cancer

| | Males | Females |
|---|-------------|-------------|
| Median Age at Diagnosis | 63.0 | 65.0 |
| Median Age at Death | 69.0 | 77.0 |
| Lifetime Risk of Diagnosis | 2.1% | 1.2% |
| Lifetime Risk of Death | 0.7% | 0.4% |
| Annual Percent Change‡ | | |
| Incidence (1998-2006 males; 1988-2006 females) | 3.8% | 2.8% |
| Mortality (1988-2006) | -0.8% | -0.8% |

† See Methods section for definition of terms.

‡The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-11.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Kidney and Renal Pelvis Cancer

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | 18.6 | 9.5 |
| Non-Hispanic White | 19.4 | 9.9 |
| Mortality | | |
| All Races | 6.0 | 2.7 |
| Non-Hispanic White | 6.1 | 2.8 |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-11.6: Extent of disease at diagnosis and five-year relative survival, Kidney and Renal Pelvis Cancer

| Stage at Diagnosis | Percent of Cases† (%) | 5-Year Relative Survival‡ (%) |
|--------------------|-----------------------|-------------------------------|
| <i>In Situ</i> | 2.7 | - |
| Localized | 60.7 | 90.4 |
| Regional | 17.9 | 62.3 |
| Distant | 14.5 | 10.4 |
| Unknown | 4.2 | 37.5 |

†Among Minnesota cases diagnosed 2004-2006.

‡Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

Descriptive Epidemiology

Incidence and Mortality: Approximately 750 cases of kidney and renal pelvis cancer are diagnosed each year in Minnesota, and 225 deaths result from this disease. Minnesota rates are slightly higher than those reported nationally, but the differences are not statistically significant for either incidence or mortality. The SEER 5-year relative survival rate for kidney and renal pelvis

cancers is 90.4 percent for localized tumors. The rate drops to 62.3 percent for tumors diagnosed at the regional stage. More than half of all kidney and renal pelvis cancers are diagnosed while in the localized stage in Minnesota.

Trends: Incidence rates increased significantly by 3.8 percent each year from 1998 to 2006 among Minnesota men and by 2.8 percent per year from 1988-2006 among women. Mortality rates remained relatively stable for both genders. These trends are similar to those reported by the SEER Program.

Age: About 84 percent of kidney cancers are diagnosed among persons 50 years of age or older.

Gender: Rates of kidney and renal pelvis cancer are about twice as high in men as in women.

Race: Incidence rates of kidney and renal pelvis cancer in Minnesota are highest among American Indian males and females and African American males, and are considerably higher in these groups than among non-Hispanic whites of the same sex. Although this is similar to the pattern seen nationally, the increase in risk among these groups compared to non-Hispanic whites is much greater in Minnesota than seen in the SEER Program. The relatively small number of deaths from kidney and renal pelvis cancer among persons who are not non-Hispanic white in Minnesota makes race/ethnic comparisons of mortality risk difficult.

Risk Factors

Cigarette smoking is strongly related to kidney and renal pelvis cancers. Smokers have twice the risk for kidney cancer and four times the risk for renal pelvis cancer compared to nonsmokers. Obesity is also positively associated with kidney cancer, but relationships to dietary factors are not well established. Hypertension and/or the medications used to treat it may increase risk for kidney cancer, but the cause-effect relationships have not been clearly identified. Occupationally-related risks for renal pelvis cancers resemble those of bladder cancer and include exposure to certain dyes and organic solvents such as trichloroethylene. People with advanced kidney disease and with certain inherited medical conditions may be at higher risk for kidney cancer.

Early Detection / Prevention

Screening for kidney cancer is not recommended. It is often difficult for a physical examination to detect asymptomatic tumors until they are quite large. Smoking cessation is the best step in preventing cancers of the kidney and renal pelvis.

Larynx

Table III-12.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Larynx Cancer

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 154 | 23 | 8.7 | 1.1 | 33 | 4 | 1.9 | 0.2 |
| 1989 | 152 | 26 | 8.6 | 1.2 | 31 | 8 | 1.8 | 0.3 |
| 1990 | 134 | 38 | 7.3 | 1.7 | 38 | 12 | 2.3 | 0.5 |
| 1991 | 132 | 28 | 7.1 | 1.3 | 35 | 11 | 1.9 | 0.4 |
| 1992 | 137 | 24 | 7.4 | 1.1 | 30 | 9 | 1.6 | 0.4 |
| 1993 | 123 | 26 | 6.6 | 1.2 | 38 | 7 | 2.1 | 0.3 |
| 1994 | 150 | 38 | 7.8 | 1.7 | 32 | 13 | 1.8 | 0.5 |
| 1995 | 135 | 30 | 7.0 | 1.3 | 27 | 4 | 1.4 | 0.2 |
| 1996 | 122 | 33 | 6.2 | 1.4 | 33 | 7 | 1.8 | 0.3 |
| 1997 | 157 | 31 | 7.8 | 1.2 | 36 | 9 | 1.8 | 0.3 |
| 1998 | 136 | 31 | 6.7 | 1.3 | 51 | 8 | 2.6 | 0.3 |
| 1999 | 136 | 29 | 6.6 | 1.2 | 45 | 10 | 2.2 | 0.4 |
| 2000 | 116 | 30 | 5.3 | 1.2 | 27 | 7 | 1.4 | 0.3 |
| 2001 | 125 | 32 | 5.7 | 1.3 | 45 | 12 | 2.2 | 0.5 |
| 2002 | 123 | 35 | 5.5 | 1.4 | 30 | 9 | 1.4 | 0.3 |
| 2003 | 126 | 31 | 5.6 | 1.2 | 21 | 9 | 1.0 | 0.4 |
| 2004 | 136 | 35 | 5.9 | 1.3 | 37 | 7 | 1.7 | 0.2 |
| 2005 | 146 | 41 | 5.9 | 1.5 | 39 | 11 | 1.7 | 0.4 |
| 2006 | 149 | 34 | 6.2 | 1.2 | 45 | 8 | 1.8 | 0.3 |

Table III-12.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Larynx Cancer

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0.0 | 0.0 |
| 20 – 34 | 2 | 1 | 0.1 | 0.0 | 0 | 0 | 0.0 | 0.0 |
| 35 – 49 | 57 | 24 | 1.9 | 0.8 | 9 | 3 | 0.3 | 0.1 |
| 50 – 64 | 254 | 73 | 12.2 | 3.5 | 61 | 8 | 2.9 | 0.4 |
| 65 – 74 | 216 | 40 | 30.6 | 5.0 | 38 | 19 | 5.4 | 2.4 |
| 74 – 85 | 126 | 32 | 28.4 | 5.0 | 51 | 9 | 11.5 | 1.4 |
| 85 and older | 25 | 6 | 17.3 | 1.8 | 13 | 5 | 9.0 | 1.5 |

Table III-12.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Larynx Cancer

| Race and Ethnicity [†] | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|---------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 680 | 176 | 5.9 | 1.3 | 172 | 44 | 1.5 | 0.3 |
| American Indian | | | | | | | | |
| Statewide | 12 | 4 | 15.5 | ~ | 4 | 0 | ~ | ~ |
| CHSDA Counties | 7 | 4 | ~ | ~ | 3 | 0 | ~ | ~ |
| Asian/Pacific Isl. | 7 | 0 | ~ | ~ | 0 | 0 | ~ | ~ |
| Black | 19 | 12 | 8.7 | 4.6 | 6 | 2 | ~ | ~ |
| Non-Hispanic White | 623 | 158 | 5.7 | 1.2 | 160 | 42 | 1.5 | 0.3 |
| Hispanic (All Races) | 8 | 2 | ~ | ~ | 0 | 0 | ~ | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

[†] Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data.

Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Larynx

Table III-12.4: Other Minnesota cancer statistics†, 2004-2006, Larynx Cancer

| | Males | Females |
|----------------------------|--------------|---------|
| Median Age at Diagnosis | 65.0 | 62.5 |
| Median Age at Death | 68.0 | 70.0 |
| Lifetime Risk of Diagnosis | 0.6% | 0.2% |
| Lifetime Risk of Death | 0.2% | < 0.0% |
| Annual Percent Change‡ | | |
| Incidence (1988-2006) | -2.1% | -0.3% |
| Mortality (1988-2006) | -0.8% | -0.7% |

† See Methods section for definition of terms.

‡The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-12.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Larynx Cancer

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | 6.2 | 1.3 |
| Non-Hispanic White | 6.4 | 1.4 |
| Mortality | | |
| All Races | 2.3 | 0.5 |
| Non-Hispanic White | 2.1 | 0.5 |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-12.6: Extent of disease at diagnosis and five-year relative survival, Larynx Cancer

| Stage at Diagnosis | Percent of Cases† (%) | 5-Year Relative Survival‡ (%) |
|--------------------|-----------------------|-------------------------------|
| <i>In Situ</i> | 8.3 | - |
| Localized | 59.6 | 77.9 |
| Regional | 16.6 | 42.1 |
| Distant | 11.8 | 32.4 |
| Unknown | 3.7 | 45.6 |

†Among Minnesota cases diagnosed 2004-2006.

‡Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

Descriptive Epidemiology

Incidence and Mortality: About 170 cases of laryngeal cancer are diagnosed in Minnesota each year and 43 deaths are caused by this cancer. Incidence and mortality rates in Minnesota are significantly lower by 10-30 percent than nationally. Based on SEER data, the 5-year relative survival rate for laryngeal cancer is 77.9 percent when diagnosed at an early stage. Survival decreases significantly when the cancer has progressed to involve nearby tissues or lymph nodes.

Trends: The laryngeal cancer incidence rate in Minnesota decreased significantly by 2.1 percent each year among males, but did not decrease significantly among women. Nationally, incidence of this cancer is decreasing significantly among both men and women, by 2.7 percent and 2.5 percent each year, respectively. Similarly, laryngeal cancer mortality in the U.S. as a whole is decreasing significantly by 2.3 percent each year among males and by 1.8 percent among females, compared to much lower and non-significant declines in Minnesota. This pattern echoes what is being seen for lung and bronchus cancer, also strongly related to tobacco use, where progress in Minnesota is not keeping up with the nation.

Age: Incidence rates for laryngeal cancer generally increase with age, with nearly 90 percent of cases occurring among those age 50 years and older.

Gender: Incidence and mortality rates for laryngeal cancer are more than four times higher among males than females in Minnesota.

Race: The laryngeal cancer incidence rate in American Indian men in Minnesota is more than twice as high as among non-Hispanic white men, but in general, there are too few cases among people of color in the state to assess racial disparities. Nationally, black males have the highest incidence rate, about 60 percent higher than whites, and American Indians have among the lowest.

Risk Factors

Smoking and alcohol use are the best established risk factors for laryngeal cancer, and research shows that these exposures act synergistically to increase risk. Smokers have an almost ten-fold greater risk of developing this cancer than nonsmokers, and risk increases with increased smoking. Heavy drinkers have two to five times greater risk of laryngeal cancer than nondrinkers. Occupational exposure to asbestos, nickel, and mustard gas may increase risk of laryngeal cancer. Recent studies indicate that human papilloma virus (HPV) may be associated with certain head and neck cancers, including laryngeal cancer.

Early Detection / Prevention

There are no methods to detect laryngeal cancer early in asymptomatic individuals. However, risk of developing the disease can be reduced by cessation of smoking and heavy alcohol use.

Leukemia

Table III-13.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Leukemia

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 302 | 259 | 17.1 | 11.2 | 167 | 154 | 10.2 | 6.4 |
| 1989 | 314 | 209 | 17.7 | 8.9 | 191 | 174 | 11.0 | 7.2 |
| 1990 | 336 | 250 | 18.3 | 10.6 | 212 | 169 | 12.3 | 6.9 |
| 1991 | 305 | 258 | 16.3 | 10.8 | 214 | 166 | 12.3 | 6.5 |
| 1992 | 374 | 246 | 20.2 | 10.1 | 222 | 171 | 12.7 | 6.7 |
| 1993 | 313 | 244 | 16.5 | 10.0 | 213 | 155 | 11.9 | 5.7 |
| 1994 | 390 | 276 | 20.1 | 11.3 | 211 | 155 | 11.6 | 6.0 |
| 1995 | 368 | 254 | 18.8 | 10.0 | 260 | 170 | 14.2 | 6.2 |
| 1996 | 361 | 267 | 18.4 | 10.3 | 226 | 191 | 12.1 | 7.2 |
| 1997 | 388 | 261 | 19.6 | 9.7 | 211 | 166 | 11.1 | 6.0 |
| 1998 | 366 | 298 | 17.9 | 11.4 | 192 | 163 | 10.0 | 5.7 |
| 1999 | 380 | 295 | 18.4 | 11.1 | 244 | 192 | 12.3 | 6.7 |
| 2000 | 384 | 269 | 18.2 | 9.9 | 229 | 185 | 11.7 | 6.6 |
| 2001 | 452 | 290 | 21.3 | 10.7 | 229 | 156 | 11.4 | 5.5 |
| 2002 | 409 | 277 | 18.9 | 10.0 | 227 | 196 | 11.0 | 6.6 |
| 2003 | 428 | 305 | 19.4 | 11.2 | 236 | 182 | 11.3 | 6.1 |
| 2004 | 483 | 326 | 21.4 | 11.7 | 232 | 168 | 10.8 | 5.8 |
| 2005 | 424 | 332 | 18.3 | 11.7 | 203 | 186 | 9.5 | 6.2 |
| 2006 | 481 | 309 | 20.3 | 10.6 | 236 | 152 | 10.7 | 5.0 |

Table III-13.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Leukemia

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 179 | 142 | 4.9 | 4.1 | 33 | 25 | 0.9 | 0.7 |
| 20 – 34 | 85 | 44 | 3.2 | 1.8 | 28 | 13 | 1.1 | 0.5 |
| 35 – 49 | 190 | 133 | 6.3 | 4.5 | 58 | 38 | 1.9 | 1.3 |
| 50 – 64 | 541 | 296 | 25.9 | 14.0 | 146 | 97 | 7.0 | 4.6 |
| 65 – 74 | 471 | 305 | 66.7 | 38.1 | 235 | 156 | 33.3 | 19.5 |
| 74 – 85 | 543 | 399 | 122.3 | 62.5 | 325 | 264 | 73.2 | 41.4 |
| 85 and older | 216 | 230 | 149.3 | 67.9 | 191 | 194 | 132.0 | 57.3 |

Table III-13.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Leukemia

| Race and Ethnicity† | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|----------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 2,225 | 1,549 | 19.7 | 11.0 | 1,134 | 884 | 10.7 | 5.9 |
| American Indian | | | | | | | | |
| Statewide | 22 | 10 | 26.4 | 8.7 | 8 | 6 | ~ | ~ |
| CHSDA Counties | 14 | 7 | 29.7 | ~ | 4 | 3 | ~ | ~ |
| Asian/Pacific Isl. | 29 | 18 | 11.2 | 4.7 | 14 | 13 | 8.3 | 4.7 |
| Black | 45 | 28 | 13.7 | 8.9 | 16 | 8 | 5.2 | ~ |
| Non-Hispanic White | 2,062 | 1,444 | 19.5 | 10.9 | 1,081 | 854 | 10.7 | 6.0 |
| Hispanic (All Races) | 19 | 25 | 7.3 | 9.5 | 11 | 3 | 8.3 | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

† Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data. Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Leukemia

Table III-13.4: Other Minnesota cancer statistics†, 2004-2006, Leukemia

| | Males | Females |
|----------------------------|--------------|--------------|
| Median Age at Diagnosis | 66.0 | 70.0 |
| Median Age at Death | 76.0 | 77.0 |
| Lifetime Risk of Diagnosis | 2.1% | 1.4% |
| Lifetime Risk of Death | 1.2% | 0.8% |
| Annual Percent Change‡ | | |
| Incidence (1988-2006) | 0.7% | 0.5% |
| Mortality (1988-2006) | -0.7% | -0.9% |

† See Methods section for definition of terms.

‡The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-13.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Leukemia

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | 15.8 | 9.5 |
| Non-Hispanic White | 16.9 | 9.9 |
| Mortality | | |
| All Races | 9.8 | 5.5 |
| Non-Hispanic White | 10.3 | 5.7 |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-13.6: Distribution of cancer type and five-year relative survival, Leukemia

| | Percent of Cases† (%) | 5-Year Relative Survival‡ (%) |
|---------------------|-----------------------|-------------------------------|
| Acute lymphocytic | 9.0 | 66.3 |
| Chronic lymphocytic | 43.6 | 78.8 |
| Acute myeloid | 24.5 | 23.4 |
| Chronic myeloid | 13.5 | 53.3 |
| All other leukemia | 9.4 | ~ |
| Total | 100.0 | 54.0 |

†Among Minnesota cases diagnosed 2002-2006.

‡Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

~Data are not available

Descriptive Epidemiology

Incidence and Mortality: About 750 cases of leukemia are diagnosed each year in Minnesota, and 405 deaths occur annually as a result of the disease. Leukemias account for 3 percent of all new cancers and 4 percent of cancer deaths. The most common types among adults are chronic lymphocytic (CLL) and acute myeloid leukemias. Among non-Hispanic whites, the incidence rate in

Minnesota is 13 percent higher than in the SEER 17 areas and the mortality rate is approximately four percent higher. Almost all of the excess is due to higher rates of CLL in Minnesota. Geographic variation in CLL is very hard to interpret, since rates are strongly affected by medical practices. About 20 percent of CLL is discovered while the person is being evaluated for another illness. Based on SEER cases of leukemia diagnosed between 1999 and 2005, the overall 5-year relative survival rate is 54.0 percent. Leukemias are a diverse group of cancers that should be considered individually based on histopathologic type. Each subtype has different etiology, treatment, and prognosis.

Trends: The leukemia incidence rate in Minnesota has increased somewhat since reporting was initiated in 1988. Small but steady and statistically significant increases in the incidence of leukemia are also seen in the SEER 9 areas once trends are adjusted for delays in reporting. Conversely, the leukemia mortality rate in Minnesota has decreased somewhat since 1988. This is also consistent with national trends, which show a statistically significant decrease in leukemia mortality from 2001 to 2006. Mortality rates among children decreased dramatically since the 1960s, primarily due to treatment advances.

Age: While leukemia is the most common childhood cancer, over 90 percent of cases occur in adults. Leukemia incidence is higher among children ages 19 and under than among persons age 20-34 years, and then increases steadily with age.

Gender: Leukemia rates are more than 80 percent higher among males than females, but this may vary according to subtype.

Race: Although based on relatively small numbers, American Indian males have the highest incidence of leukemia in Minnesota, considerably higher than among non-Hispanic whites. In the SEER 17 area non-Hispanic whites have the highest incidence rate.

Risk Factors

The causes of most of these cancers are unknown. Occupational exposures to benzene and radiation are the most established risk factors. Persons with certain chromosomal abnormalities are more likely to be diagnosed with leukemia. Cigarette smoking and ionizing radiation may be associated with leukemia. Leukemia may also occur as a side effect of cancer treatment. Certain leukemias may be caused by human T-cell lymphotropic virus type I (HTLV-I).

Early Detection / Prevention

Symptoms of leukemia often resemble those of less serious health conditions, making early detection difficult.

Liver and Bile Duct

Table III-14.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Liver and Bile Duct Cancer

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 57 | 32 | 3.1 | 1.4 | 59 | 44 | 3.5 | 1.9 |
| 1989 | 66 | 45 | 3.7 | 2.0 | 71 | 24 | 4.1 | 1.0 |
| 1990 | 73 | 32 | 4.0 | 1.5 | 86 | 57 | 4.9 | 2.4 |
| 1991 | 74 | 32 | 4.1 | 1.3 | 58 | 51 | 3.3 | 2.1 |
| 1992 | 79 | 45 | 4.3 | 1.9 | 74 | 52 | 4.1 | 2.1 |
| 1993 | 55 | 38 | 3.0 | 1.5 | 85 | 52 | 4.8 | 2.0 |
| 1994 | 71 | 38 | 3.6 | 1.5 | 87 | 57 | 4.6 | 2.3 |
| 1995 | 77 | 38 | 4.0 | 1.5 | 95 | 49 | 5.0 | 1.9 |
| 1996 | 85 | 42 | 4.2 | 1.6 | 96 | 52 | 4.9 | 2.0 |
| 1997 | 78 | 44 | 3.9 | 1.8 | 105 | 61 | 5.3 | 2.3 |
| 1998 | 82 | 41 | 3.9 | 1.6 | 85 | 71 | 4.3 | 2.6 |
| 1999 | 106 | 52 | 4.9 | 2.0 | 103 | 53 | 5.0 | 1.9 |
| 2000 | 118 | 51 | 5.5 | 2.0 | 119 | 64 | 5.8 | 2.3 |
| 2001 | 117 | 50 | 5.4 | 1.9 | 124 | 71 | 5.8 | 2.6 |
| 2002 | 130 | 49 | 5.8 | 1.8 | 136 | 61 | 6.2 | 2.1 |
| 2003 | 125 | 55 | 5.4 | 2.0 | 152 | 71 | 6.9 | 2.5 |
| 2004 | 148 | 51 | 6.2 | 1.8 | 120 | 91 | 5.2 | 3.2 |
| 2005 | 127 | 64 | 5.2 | 2.3 | 156 | 88 | 6.8 | 2.9 |
| 2006 | 188 | 53 | 7.5 | 1.9 | 152 | 77 | 6.3 | 2.6 |

Table III-14.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Liver and Bile Duct Cancer

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 17 | 5 | 0.5 | 0.1 | 8 | 1 | 0.2 | 0.0 |
| 20 – 34 | 11 | 6 | 0.4 | 0.2 | 5 | 3 | 0.2 | 0.1 |
| 35 – 49 | 68 | 29 | 2.3 | 1.0 | 62 | 20 | 2.1 | 0.7 |
| 50 – 64 | 295 | 71 | 14.1 | 3.4 | 232 | 66 | 11.1 | 3.1 |
| 65 – 74 | 164 | 67 | 23.2 | 8.4 | 168 | 66 | 23.8 | 12.0 |
| 74 – 85 | 134 | 64 | 30.2 | 10.0 | 176 | 124 | 39.6 | 19.4 |
| 85 and older | 29 | 30 | 20.0 | 8.9 | 65 | 78 | 44.9 | 23.0 |

Table III-14.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Liver and Bile Duct Cancer

| Race and Ethnicity [†] | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|---------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 718 | 272 | 6.1 | 2.0 | 716 | 388 | 6.3 | 2.7 |
| American Indian | | | | | | | | |
| Statewide | 10 | 7 | 8.6 | ~ | 11 | 9 | 13.3 | ~ |
| CHSDA Counties | 4 | 4 | ~ | ~ | 4 | 4 | ~ | ~ |
| Asian/Pacific Isl. | 47 | 16 | 22.3 | 7.5 | 54 | 22 | 29.2 | 10.7 |
| Black | 69 | 20 | 32.4 | 7.9 | 67 | 16 | 33.8 | 7.1 |
| Non-Hispanic White | 553 | 224 | 5.0 | 1.7 | 567 | 335 | 5.3 | 2.4 |
| Hispanic (All Races) | 34 | 4 | 18.0 | ~ | 15 | 6 | 11.1 | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

[†] Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data.

Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Liver and Bile Duct

Table III-14.4: Other Minnesota cancer statistics†, 2004-2006, Liver and Bile Duct Cancer

| | Males | Females |
|----------------------------|-------------|-------------|
| Median Age at Diagnosis | 62.0 | 67.0 |
| Median Age at Death | 67.0 | 74.0 |
| Lifetime Risk of Diagnosis | 0.7% | 0.3% |
| Lifetime Risk of Death | 0.7% | 0.4% |
| Annual Percent Change‡ | | |
| Incidence (1988-2006) | 3.9% | 1.6% |
| Mortality (1988-2006) | 3.1% | 2.5% |

† See Methods section for definition of terms.

‡The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-14.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Liver and Bile Duct Cancer

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | 10.2 | 3.6 |
| Non-Hispanic White | 7.5 | 2.6 |
| Mortality | | |
| All Races | 7.5 | 3.2 |
| Non-Hispanic White | 6.4 | 2.8 |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-14.6: Extent of disease at diagnosis and five-year relative survival, Liver and Bile Duct Cancer

| Stage at Diagnosis | Percent of Cases† (%) | 5-Year Relative Survival‡ (%) |
|--------------------|-----------------------|-------------------------------|
| <i>In Situ</i> | 0.0 | - |
| Localized | 37.4 | 25.7 |
| Regional | 31.4 | 8.5 |
| Distant | 17.9 | 2.4 |
| Unknown | 13.3 | 5.8 |

†Among Minnesota cases diagnosed 2004-2006.

‡Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

Descriptive Epidemiology

Incidence and Mortality: Unlike the SEER Program, MCSS does not register cancers that are diagnosed based on clinical observation only (ie., are not microscopically confirmed)(see Chapter I). Since data from the SEER Program show that about 20 percent of liver cancers are not microscopically confirmed, Minnesota incidence rates cannot be reliably compared to those reported by SEER. Mortality data, however, are comparable. On average,

about 220 Minnesotans die of liver cancer each year. Liver cancer mortality rates among non-Hispanic whites are about 15 percent lower in Minnesota than in the U.S., and the difference is statistically significant. The liver is a common site of metastasis for tumors originating in other tissues. Mortality rates should be interpreted with caution because cause of death can be misclassified in secondary liver cancers.

Trends: Liver cancer is one of the few anatomic sites where both the incidence and mortality rate are significantly increasing. This is seen in both Minnesota and nationally. The liver cancer mortality rate in Minnesota significantly increased since 1988 by 3.1 percent per year for males and 2.5 percent per year for females, with similar trends for incidence.

Age: Nearly 50 percent of liver cancers are diagnosed among persons age 65 years or older.

Gender: Rates of liver and bile duct cancer are roughly three times higher among males than females.

Race: Both in Minnesota and nationally, non-Hispanic whites are at the lowest risk of liver cancer, while each of the other race/ethnic groups has higher risk. The rank ordering of risk among race/ethnic groups is somewhat different in Minnesota than nationally. This may reflect relatively small numbers of cases among some race/ethnic groups in Minnesota, or differences in the risk factors for race/ethnic groups in Minnesota and nationally.

Risk Factors

Hepatitis B and C infections are the most important risk factors for liver cancer worldwide. Cirrhosis, often caused by chronic alcohol intake or infection with hepatitis B and C, increases risk. Aflatoxins produced by a fungus that contaminates wheat, peanuts, soybeans, corn, and rice are strongly associated with liver cancer. Industrial exposure to vinyl chloride or exposure to thorium dioxide (previously used in X-ray dye) increases the risk of developing liver and bile duct cancer. Studies examining drinking water contaminated with arsenic have also reported elevated risk of liver cancer.

Early Detection / Prevention

There are no screening tests for liver cancer in asymptomatic individuals. In the U.S., government agencies have worked to reduce exposure to certain chemicals and aflatoxins. Vaccination against hepatitis B is recommended, particularly in early infancy. There is currently no vaccine for hepatitis C.

Lung and Bronchus

Table III-15.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Lung and Bronchus Cancer

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 1,394 | 776 | 78.9 | 35.4 | 1,193 | 618 | 69.2 | 27.9 |
| 1989 | 1,344 | 779 | 75.4 | 35.3 | 1,182 | 627 | 68.4 | 27.6 |
| 1990 | 1,419 | 829 | 77.9 | 37.4 | 1,223 | 684 | 69.5 | 29.7 |
| 1991 | 1,346 | 863 | 73.7 | 38.2 | 1,222 | 708 | 68.6 | 30.5 |
| 1992 | 1,397 | 921 | 75.7 | 40.5 | 1,233 | 772 | 68.3 | 32.3 |
| 1993 | 1,418 | 882 | 75.2 | 38.1 | 1,244 | 797 | 68.0 | 33.2 |
| 1994 | 1,359 | 1,023 | 71.3 | 43.4 | 1,226 | 812 | 66.2 | 33.4 |
| 1995 | 1,454 | 953 | 75.3 | 39.8 | 1,228 | 839 | 65.2 | 34.0 |
| 1996 | 1,402 | 1,071 | 71.5 | 44.3 | 1,238 | 884 | 64.7 | 35.3 |
| 1997 | 1,477 | 1,033 | 75.1 | 42.3 | 1,259 | 859 | 65.0 | 33.9 |
| 1998 | 1,474 | 1,094 | 73.3 | 43.7 | 1,242 | 929 | 63.2 | 36.1 |
| 1999 | 1,496 | 1,150 | 73.2 | 45.4 | 1,293 | 906 | 64.5 | 34.5 |
| 2000 | 1,513 | 1,171 | 73.0 | 45.8 | 1,224 | 971 | 60.3 | 36.8 |
| 2001 | 1,526 | 1,247 | 72.3 | 48.0 | 1,263 | 996 | 60.8 | 37.2 |
| 2002 | 1,529 | 1,301 | 71.5 | 49.4 | 1,261 | 1,066 | 60.1 | 38.9 |
| 2003 | 1,560 | 1,353 | 71.7 | 50.6 | 1,267 | 1,017 | 59.5 | 36.9 |
| 2004 | 1,562 | 1,355 | 70.9 | 49.7 | 1,296 | 1,060 | 59.7 | 38.1 |
| 2005 | 1,596 | 1,325 | 70.4 | 48.4 | 1,272 | 1,009 | 57.6 | 35.7 |
| 2006 | 1,497 | 1,385 | 64.7 | 49.5 | 1,277 | 1,076 | 56.5 | 37.2 |

Table III-15.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Lung and Bronchus Cancer

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 5 | 2 | 0.1 | 0.1 | 1 | 0 | 0.0 | 0.0 |
| 20 – 34 | 16 | 20 | 0.6 | 0.8 | 3 | 9 | 0.1 | 0.4 |
| 35 – 49 | 365 | 422 | 12.2 | 14.3 | 241 | 228 | 8.0 | 7.7 |
| 50 – 64 | 2,141 | 1,869 | 102.5 | 88.6 | 1,507 | 1,211 | 72.2 | 57.4 |
| 65 – 74 | 2,527 | 2,158 | 357.9 | 269.3 | 1,923 | 1,513 | 272.4 | 188.8 |
| 74 – 85 | 2,246 | 1,834 | 505.8 | 287.3 | 2,076 | 1,642 | 467.5 | 257.2 |
| 85 and older | 444 | 414 | 306.9 | 122.3 | 622 | 625 | 429.9 | 184.6 |

Table III-15.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Lung and Bronchus Cancer

| Race and Ethnicity† | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|----------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 7,744 | 6,719 | 69.8 | 49.5 | 6,373 | 5,228 | 58.7 | 37.4 |
| American Indian | | | | | | | | |
| Statewide | 91 | 93 | 135.1 | 98.3 | 66 | 69 | 101.6 | 82.6 |
| CHSDA Counties | 66 | 72 | 169.3 | 139.7 | 45 | 55 | 115.8 | 113.6 |
| Asian/Pacific Isl. | 54 | 49 | 33.2 | 24.0 | 43 | 26 | 29.9 | 14.4 |
| Black | 178 | 127 | 96.1 | 56.6 | 131 | 95 | 75.9 | 43.5 |
| Non-Hispanic White | 7,350 | 6,374 | 69.4 | 49.2 | 6,105 | 5,019 | 58.7 | 37.4 |
| Hispanic (All Races) | 36 | 44 | 30.9 | 35.4 | 27 | 15 | 24.8 | 13.7 |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

† Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data.

Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Lung and Bronchus

Table III-15.4: Other Minnesota cancer statistics†, 2004-2006, Lung and Bronchus Cancer

| | Males | Females |
|--|--------------|-------------|
| Median Age at Diagnosis | 70.0 | 70.0 |
| Median Age at Death | 72.0 | 72.0 |
| Lifetime Risk of Diagnosis | 7.5% | 6.0% |
| Lifetime Risk of Death | 6.7% | 5.0% |
| Annual Percent Change‡ | | |
| Incidence (1988-2006) | -0.6% | 2.0% |
| Mortality (1988-2006 males; 1994-2006 females) | -1.1% | 0.9% |

† See Methods section for definition of terms.

‡The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-15.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Lung and Bronchus Cancer

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | 77.7 | 52.5 |
| Non-Hispanic White | 82.2 | 59.0 |
| Mortality | | |
| All Races | 70.5 | 40.9 |
| Non-Hispanic White | 72.9 | 44.2 |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-15.6: Extent of disease at diagnosis and five-year relative survival, Lung and Bronchus Cancer

| Stage at Diagnosis | Percent of Cases† (%) | 5-Year Relative Survival‡ (%) |
|--------------------|-----------------------|-------------------------------|
| <i>In Situ</i> | 0.1 | - |
| Localized | 18.6 | 52.7 |
| Regional | 24.3 | 23.7 |
| Distant | 51.9 | 3.5 |
| Unknown | 5.1 | 8.5 |

†Among Minnesota cases diagnosed 2004-2006.

‡Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

Descriptive Epidemiology

Incidence and Mortality: Lung and bronchus cancer is the second most commonly diagnosed cancer among men and among women, and is the leading cause of cancer death for each gender. It accounts for 12 percent of cancers and 26 percent of cancer deaths in Minnesota. Over the five-year period 2002-2006, an average of 2,893 Minnesotans were diagnosed with lung and bronchus cancer each year, and 2,320 deaths occurred annually.

Mortality rates among non-Hispanic whites in Minnesota are 20 percent lower than national rates for men, and 15 percent lower for women. Based on SEER data, the 5-year relative survival rate for lung and bronchus cancer is 52.7 percent for localized tumors, 23.7 percent for regional tumors, and 3.5 percent for distant tumors. Most cases (51.9% in Minnesota) are diagnosed at the distant stage.

Trends: Lung cancer trends are markedly different for men and women. Lung cancer mortality rates in Minnesota have been decreasing significantly since 1988 among males, but continue to increase significantly among women. The increase in the mortality rate for women began in slow down in 1994, but is still increasing significantly by 0.9 percent each year. Among white women in the U.S. as a whole, female lung cancer mortality decreased significantly by 0.6 percent per year from 2002 to 2006.

Age: The incidence rate for lung and bronchus cancer increases with age. About 90 percent of cases are diagnosed between 50 and 85 years of age.

Gender: Lung and bronchus cancer mortality rates are about 60 percent higher among men than women.

Race: In Minnesota, American Indian males and females and black males have the highest incidence and mortality rates of lung and bronchus cancer, while Asian/Pacific Islander men and women have the lowest. Nationally, incidence rates are lowest among Hispanics and Asian/Pacific Islanders and highest in blacks.

Risk Factors

Smoking is the leading cause of lung and bronchus cancer worldwide, accounting for 80 to 90 percent of all lung cancers. Radon, an invisible, odorless gas has been recognized by the National Academy of Sciences as the second leading cause of lung cancer in the U.S. Passive smoking also contributes to development of the disease among nonsmokers. Occupational exposure to asbestos, arsenic, chromium, and metal dust, and environmental exposures to air pollution also increase risk of lung and bronchus cancer.

Early Detection / Prevention

Smoking cessation is the best way to prevent lung and bronchus cancer. An estimated 35 percent of homes in Minnesota have elevated levels of radon. Homeowners are encouraged to test their homes for radon. If it is present, a qualified contractor can usually mitigate the problem. For more information, contact the MDH Indoor Air Unit at (651) 201-4601 (or toll free at 1-800-798-9050). Screening for lung and bronchus cancer has not yet been proven to improve survival, even among smokers.

Melanoma of the Skin

Table III-16.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Melanoma of the Skin

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 259 | 254 | 14.3 | 11.7 | 49 | 52 | 2.8 | 2.4 |
| 1989 | 250 | 251 | 13.4 | 11.6 | 61 | 42 | 3.6 | 1.9 |
| 1990 | 261 | 253 | 14.0 | 11.1 | 51 | 45 | 2.8 | 2.1 |
| 1991 | 225 | 237 | 11.7 | 10.7 | 62 | 32 | 3.5 | 1.4 |
| 1992 | 292 | 232 | 14.8 | 9.9 | 54 | 43 | 3.0 | 1.9 |
| 1993 | 330 | 274 | 16.8 | 11.8 | 59 | 44 | 3.1 | 1.8 |
| 1994 | 302 | 269 | 15.4 | 11.4 | 58 | 36 | 3.0 | 1.5 |
| 1995 | 352 | 297 | 17.5 | 12.3 | 72 | 38 | 3.7 | 1.5 |
| 1996 | 413 | 276 | 19.7 | 11.3 | 80 | 36 | 4.1 | 1.4 |
| 1997 | 395 | 345 | 18.9 | 14.1 | 69 | 43 | 3.6 | 1.6 |
| 1998 | 355 | 360 | 16.7 | 14.6 | 72 | 56 | 3.6 | 2.1 |
| 1999 | 427 | 388 | 19.5 | 15.5 | 67 | 52 | 3.2 | 1.9 |
| 2000 | 475 | 402 | 21.5 | 15.8 | 71 | 48 | 3.3 | 1.8 |
| 2001 | 477 | 448 | 21.2 | 17.3 | 75 | 45 | 3.6 | 1.7 |
| 2002 | 449 | 397 | 19.6 | 15.3 | 79 | 34 | 3.7 | 1.3 |
| 2003 | 466 | 439 | 20.2 | 16.6 | 62 | 45 | 2.7 | 1.6 |
| 2004 | 527 | 443 | 22.4 | 16.6 | 72 | 60 | 3.3 | 2.2 |
| 2005 | 525 | 475 | 21.9 | 17.7 | 62 | 44 | 2.7 | 1.5 |
| 2006 | 633 | 518 | 26.2 | 19.2 | 83 | 44 | 3.5 | 1.5 |

Table III-16.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Melanoma of the Skin

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 12 | 29 | 0.3 | 0.8 | 3 | 0 | 0.1 | 0.0 |
| 20 – 34 | 113 | 321 | 4.3 | 12.8 | 10 | 14 | 0.4 | 0.6 |
| 35 – 49 | 484 | 706 | 16.1 | 24.0 | 41 | 32 | 1.4 | 1.1 |
| 50 – 64 | 849 | 578 | 40.7 | 27.4 | 102 | 61 | 4.9 | 2.9 |
| 65 – 74 | 498 | 267 | 70.5 | 33.3 | 79 | 42 | 11.2 | 5.2 |
| 74 – 85 | 483 | 262 | 108.8 | 41.0 | 76 | 47 | 17.1 | 7.4 |
| 85 and older | 161 | 109 | 111.3 | 32.2 | 47 | 31 | 32.5 | 9.2 |

Table III-16.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Melanoma of the Skin

| Race and Ethnicity† | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|----------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 2,600 | 2,272 | 22.1 | 17.1 | 358 | 227 | 3.2 | 1.6 |
| American Indian | | | | | | | | |
| Statewide | 2 | 3 | ~ | ~ | 0 | 0 | ~ | ~ |
| CHSDA Counties | 2 | 1 | ~ | ~ | 0 | 0 | ~ | ~ |
| Asian/Pacific Isl. | 6 | 10 | ~ | 3.6 | 1 | 1 | ~ | ~ |
| Black | 2 | 3 | ~ | ~ | 2 | 1 | ~ | ~ |
| Non-Hispanic White | 2,537 | 2,191 | 23.0 | 18.1 | 354 | 222 | 3.3 | 1.7 |
| Hispanic (All Races) | 1 | 10 | ~ | 4.9 | 0 | 3 | ~ | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

† Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data.

Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Melanoma of the Skin

Table III-16.4: Other Minnesota cancer statistics†, 2004-2006, Melanoma of the Skin

| | Males | Females |
|----------------------------|-------------|-------------|
| Median Age at Diagnosis | 62.0 | 51.0 |
| Median Age at Death | 68.0 | 66.0 |
| Lifetime Risk of Diagnosis | 2.2% | 1.6% |
| Lifetime Risk of Death | 0.3% | 0.2% |
| Annual Percent Change‡ | | |
| Incidence (1988-2006) | 3.4% | 3.4% |
| Mortality (1988-2006) | < 0.0% | -0.9% |

† See Methods section for definition of terms.

‡The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-16.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Melanoma of the Skin

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | 25.0 | 15.8 |
| Non-Hispanic White | 33.2 | 22.0 |
| Mortality | | |
| All Races | 3.9 | 1.7 |
| Non-Hispanic White | 4.8 | 2.1 |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-16.6: Extent of disease at diagnosis and five-year relative survival, Melanoma of the Skin

| Stage at Diagnosis | Percent of Cases† (%) | 5-Year Relative Survival‡ (%) |
|--------------------|-----------------------|-------------------------------|
| <i>In Situ</i> | 39.3 | - |
| Localized | 50.8 | 98.1 |
| Regional | 5.4 | 61.9 |
| Distant | 1.7 | 15.3 |
| Unknown | 2.8 | 75.4 |

†Among Minnesota cases diagnosed 2004-2006.

‡Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

Descriptive Epidemiology

Incidence and Mortality: Over the five-year period 2002-2006, an average of 975 new cases of invasive melanoma of the skin were diagnosed each year in Minnesota, and about 120 deaths were caused by the disease annually. Invasive melanoma accounts for 4.1 percent of cancers and 1.3 percent of cancer deaths in Minnesota. Incidence and mortality rates among non-Hispanic whites are about 25 percent lower in Minnesota

than nationally, and the differences are statistically significant for both males and females.

Trends: The incidence of invasive melanoma of the skin in Minnesota has been increasing significantly by 3.4 percent per year since 1988 among both men and women, while mortality rates have remained stable. Nationally, the incidence rate for melanoma increased by 2.5 percent per year from 1981-2006, while mortality rates were stable from 1990 to 2006.

Age: About 65 percent of melanomas are diagnosed among persons 50 years of age or older. Even so, melanoma is one of the most common cancers among persons ages 20-49.

Gender: The incidence rate of melanoma of the skin is 35 percent higher among men than women. However, until age 50, the incidence rate is higher for women.

Race: Melanoma of the skin is primarily a cancer of white populations. Ethnic background is a determinant of melanoma incidence among white populations.

Risk Factors

Excessive exposure to sunlight and other sources of ultraviolet radiation, including tanning beds, particularly intense intermittent exposure early in life, is the primary risk factor for melanoma. Pigmentary traits, such as fair skin and light eyes, and genetic conditions of dysplastic nevi are associated with melanoma. Individuals with a personal or family history of melanoma or who are immunosuppressed also have increased risk of developing melanomas.

Early Detection / Prevention

The most effective way to identify early melanoma is through the recognition of changes in skin growth or appearance of new growths. The American Cancer Society recommends that people ages 20 and over having periodic health exams should receive a cancer-related checkup, including a skin examination. The ABCD rule can outline warning signals of melanoma: **A**symmetry: one half of the mole does not match the other half; **B**order irregularity: mole edges are ragged or notched; **C**olor: mole pigmentation is not uniform; and, **D**iameter: diameter of the mole is greater than six millimeters (about ¼ inch). Sudden or progressive changes in the size, shape, or color of moles should be examined by a physician. The risk of developing melanoma is reduced by avoiding prolonged exposure to intense sunlight. If it isn't possible to stay in the shade, wear protective clothing, sunglasses, and sunscreen. It is especially important that parents protect their children from excess sun exposure.

Mesothelioma (all sites)

Table III-17.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Mesothelioma (all sites)

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 26 | 8 | 1.5 | 0.4 | - | - | - | - |
| 1989 | 34 | 8 | 1.9 | 0.3 | - | - | - | - |
| 1990 | 33 | 11 | 1.9 | 0.5 | - | - | - | - |
| 1991 | 39 | 13 | 2.1 | 0.6 | - | - | - | - |
| 1992 | 33 | 15 | 1.8 | 0.6 | - | - | - | - |
| 1993 | 41 | 14 | 2.2 | 0.6 | - | - | - | - |
| 1994 | 39 | 9 | 2.1 | 0.4 | - | - | - | - |
| 1995 | 47 | 9 | 2.5 | 0.4 | - | - | - | - |
| 1996 | 48 | 5 | 2.4 | 0.2 | - | - | - | - |
| 1997 | 39 | 17 | 2.0 | 0.7 | - | - | - | - |
| 1998 | 57 | 12 | 2.9 | 0.4 | - | - | - | - |
| 1999 | 57 | 9 | 2.8 | 0.4 | 51 | 7 | 2.6 | 0.3 |
| 2000 | 58 | 14 | 2.9 | 0.5 | 44 | 8 | 2.2 | 0.3 |
| 2001 | 40 | 7 | 1.9 | 0.3 | 36 | 6 | 1.7 | 0.2 |
| 2002 | 52 | 14 | 2.5 | 0.5 | 34 | 12 | 1.6 | 0.4 |
| 2003 | 52 | 17 | 2.5 | 0.6 | 53 | 13 | 2.6 | 0.4 |
| 2004 | 48 | 18 | 2.3 | 0.6 | 45 | 11 | 2.2 | 0.4 |
| 2005 | 49 | 16 | 2.2 | 0.5 | 41 | 15 | 1.9 | 0.4 |
| 2006 | 42 | 23 | 2.0 | 0.8 | 50 | 15 | 2.4 | 0.5 |

Table III-17.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Mesothelioma (all sites)

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0.0 | 0.0 |
| 20 – 34 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0.0 | 0.0 |
| 35 – 49 | 7 | 8 | 0.2 | 0.3 | 4 | 2 | 0.1 | 0.1 |
| 50 – 64 | 41 | 16 | 2.0 | 0.8 | 30 | 10 | 1.5 | 0.5 |
| 65 – 74 | 59 | 20 | 8.4 | 2.5 | 61 | 16 | 8.7 | 2.0 |
| 74 – 85 | 102 | 26 | 23.0 | 4.1 | 92 | 18 | 20.7 | 2.8 |
| 85 and older | 34 | 18 | 23.5 | 5.3 | 36 | 20 | 24.9 | 5.9 |

Table III-17.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Mesothelioma (all sites)

| Race and Ethnicity† | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|----------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 243 | 88 | 2.3 | 0.6 | 223 | 66 | 2.1 | 0.3 |
| American Indian | | | | | | | | |
| Statewide | 1 | 0 | ~ | ~ | 1 | 0 | ~ | ~ |
| CHSDA Counties | 0 | 0 | ~ | ~ | 0 | 0 | ~ | ~ |
| Asian/Pacific Isl. | 0 | 0 | ~ | ~ | 0 | 0 | ~ | ~ |
| Black | 3 | 1 | ~ | ~ | 0 | 0 | ~ | ~ |
| Non-Hispanic White | 239 | 87 | 2.4 | 0.6 | 222 | 66 | 2.2 | 0.5 |
| Hispanic (All Races) | 0 | 0 | ~ | ~ | ~ | ~ | ~ | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

† Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data. Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

- Data not available. Mesothelioma did not have a unique cause of death code until 1999.

Mesothelioma (all sites)

Table III-17.4: Other Minnesota cancer statistics†, 2004-2006, Mesothelioma (all sites)

| | Males | Females |
|---|-------|--------------|
| Median Age at Diagnosis | 77.0 | 76.0 |
| Median Age at Death | 77.0 | 78.0 |
| Lifetime Risk of Diagnosis | 0.3% | 0.1% |
| Lifetime Risk of Death | 0.3% | 0.1% |
| Annual Percent Change‡ | | |
| Incidence (1999-2006 males; 1988-2006 females) | -3.7% | 1.9% |
| Mortality (1999-2006) | -0.2% | 10.2% |

† See Methods section for definition of terms.

‡The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-17.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Mesothelioma (all sites)

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | 2.0 | 0.4 |
| Non-Hispanic White | 2.2 | 0.5 |
| Mortality | | |
| All Races | ~ | ~ |
| Non-Hispanic White | ~ | ~ |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§Rates are per 100,000 persons and are age-adjusted to the 2000 US population.
~ Data not available

Table III-19.6: Five-year relative survival‡ by gender and age at diagnosis, Mesothelioma

| Age at Diagnosis (years) | Males (%) | Females (%) |
|--------------------------|-----------|-------------|
| < 45 | 36.8 | 43.7 |
| 45-54 | 10.7 | 24.9 |
| 55-64 | 7.0 | 17.5 |
| 65-74 | 5.9 | 4.5 |
| 75+ | 2.4 | 4.2 |
| All Ages | 5.6 | 14.3 |

‡Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

Descriptive Epidemiology

Incidence and Mortality: Mesothelioma is a cancer of the lining of the chest and abdominal cavity. About 65 Minnesotans are diagnosed with mesothelioma each year. The average survival time after diagnosis with mesothelioma is about one year. Mesothelioma incidence rates in Minnesota are somewhat higher than those

reported by SEER, but the differences are not statistically significant.

Trends: The incidence of mesothelioma among males increased significantly in Minnesota by an average of 4.5 percent per year from 1988 to 1999, and then began to decrease. Although the decline is not yet statistically significant, it appears that rates for this cancer may have peaked. In the SEER 9 area, mesothelioma incidence rates among males peaked in 1992. Because the delay between exposure to asbestos and development of mesothelioma is 30-50 years, it is likely that increasing rates reflected exposures that occurred before the hazards of asbestos were well known. Incidence rates among women in Minnesota have been stable. Although mesothelioma mortality among Minnesota women showed a statistically significant increase from 1999 to 2006, it is likely that this reflects random variation in small numbers.

Age: About 75 percent of mesotheliomas diagnosed in Minnesota are among persons age 65 years and older. This reflects both the long delay between exposure and diagnosis, and the fact that asbestos use in the U.S. has dropped by 98 percent since the early 1970s.

Gender: Mesothelioma is about four times more common among men than women, reflecting that most exposures to asbestos occurred occupationally in jobs primarily held by men.

Race: National data indicate that mesothelioma incidence is highest among non-Hispanic whites.

Risk Factors

Mesothelioma is thought to be caused almost exclusively by inhalation of asbestos fibers, which can damage mesothelial tissues. Asbestos was widely used in manufacturing during and following World War II. Occupations which may have involved exposure to asbestos include mining, ship building, and railroad, factory, and construction work. Family members of people working with asbestos are also at increased risk because fibers may be brought into the home on work clothes. Persons exposed to asbestos are also at greater risk of developing lung cancer. The combination of exposure to asbestos and smoking is associated with a 50-90 fold increase in the risk of lung cancer. More asbestos information can be found on the Minnesota Department of Health web site (<http://www.health.state.mn.us/divs/ch/asbestos>) and on fact sheets developed by the National Cancer Institute (<http://cis.nci.nih.gov>).

Early Detection / Prevention

There are no effective screening tests for mesothelioma in the general population.

Multiple Myeloma

Table III-18.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Multiple Myeloma

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 135 | 89 | 7.9 | 3.7 | 77 | 72 | 4.6 | 3.0 |
| 1989 | 112 | 84 | 6.5 | 3.5 | 74 | 70 | 4.4 | 2.9 |
| 1990 | 105 | 85 | 6.1 | 3.6 | 99 | 80 | 6.2 | 3.3 |
| 1991 | 126 | 103 | 7.0 | 4.4 | 98 | 72 | 5.8 | 2.9 |
| 1992 | 136 | 103 | 7.7 | 4.2 | 119 | 85 | 6.8 | 3.4 |
| 1993 | 122 | 114 | 6.6 | 4.6 | 89 | 92 | 4.9 | 3.5 |
| 1994 | 112 | 96 | 6.2 | 3.8 | 111 | 89 | 6.4 | 3.2 |
| 1995 | 109 | 91 | 5.8 | 3.7 | 86 | 90 | 4.7 | 3.5 |
| 1996 | 132 | 96 | 7.0 | 3.9 | 91 | 96 | 5.0 | 3.6 |
| 1997 | 122 | 130 | 6.3 | 5.1 | 107 | 77 | 5.7 | 2.9 |
| 1998 | 125 | 103 | 6.2 | 4.0 | 73 | 96 | 4.0 | 3.6 |
| 1999 | 128 | 100 | 6.2 | 3.8 | 86 | 91 | 4.5 | 3.2 |
| 2000 | 118 | 98 | 5.8 | 3.7 | 113 | 85 | 5.7 | 2.9 |
| 2001 | 148 | 124 | 7.1 | 4.6 | 89 | 88 | 4.4 | 3.2 |
| 2002 | 133 | 113 | 6.2 | 4.1 | 110 | 85 | 5.4 | 2.9 |
| 2003 | 173 | 111 | 7.8 | 4.1 | 104 | 89 | 5.0 | 3.1 |
| 2004 | 158 | 120 | 7.1 | 4.4 | 102 | 85 | 4.7 | 2.8 |
| 2005 | 164 | 123 | 7.2 | 4.3 | 108 | 88 | 4.9 | 3.0 |
| 2006 | 175 | 124 | 7.4 | 4.2 | 112 | 100 | 5.0 | 3.3 |

Table III-18.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Multiple Myeloma

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0.0 | 0.0 |
| 20 – 34 | 7 | 2 | 0.3 | 0.1 | 0 | 0 | 0.0 | 0.0 |
| 35 – 49 | 68 | 38 | 2.3 | 1.3 | 16 | 9 | 0.5 | 0.3 |
| 50 – 64 | 232 | 157 | 11.1 | 7.4 | 117 | 72 | 5.6 | 3.4 |
| 65 – 74 | 228 | 161 | 32.3 | 20.1 | 132 | 104 | 18.7 | 13.0 |
| 74 – 85 | 216 | 168 | 48.6 | 26.3 | 195 | 167 | 43.9 | 26.2 |
| 85 and older | 52 | 65 | 35.9 | 19.2 | 76 | 95 | 52.5 | 28.1 |

Table III-18.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Multiple Myeloma

| Race and Ethnicity† | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|----------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 803 | 591 | 7.1 | 4.2 | 536 | 447 | 5.0 | 3.0 |
| American Indian | | | | | | | | |
| Statewide | 4 | 8 | ~ | ~ | 5 | 5 | ~ | ~ |
| CHSDA Counties | 3 | 5 | ~ | ~ | 3 | 3 | ~ | ~ |
| Asian/Pacific Isl. | 4 | 8 | ~ | ~ | 2 | 4 | ~ | ~ |
| Black | 34 | 24 | 18.5 | 10.5 | 15 | 12 | 8.4 | 6.9 |
| Non-Hispanic White | 743 | 534 | 6.9 | 4.0 | 510 | 422 | 5.0 | 3.0 |
| Hispanic (All Races) | 7 | 8 | ~ | ~ | 4 | 2 | ~ | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

† Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data.

Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Multiple Myeloma

Table III-18.4: Other Minnesota cancer statistics†, 2004-2006, Multiple Myeloma

| | Males | Females |
|----------------------------|-------|---------|
| Median Age at Diagnosis | 69.0 | 72.0 |
| Median Age at Death | 75.0 | 77.0 |
| Lifetime Risk of Diagnosis | 0.8% | 0.6% |
| Lifetime Risk of Death | 0.6% | 0.5% |
| Annual Percent Change‡ | | |
| Incidence (1988-2006) | 0.2% | 0.6% |
| Mortality (1988-2006) | -0.8% | -0.2% |

† See Methods section for definition of terms.

‡The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-18.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Multiple Myeloma

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | 7.1 | 4.6 |
| Non-Hispanic White | 6.6 | 4.0 |
| Mortality | | |
| All Races | 4.5 | 3.0 |
| Non-Hispanic White | 4.3 | 2.7 |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-18.6: Five-year relative survival‡ by gender and age at diagnosis, Multiple Myeloma

| Age at Diagnosis (years) | Males (%) | Females (%) |
|--------------------------|-----------|-------------|
| < 45 | 61.3 | 58.6 |
| 45-54 | 52.2 | 53.3 |
| 55-64 | 45.1 | 43.5 |
| 65-74 | 32.6 | 35.0 |
| 75+ | 20.3 | 20.3 |
| All Ages | 38.3 | 35.7 |

‡Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

Descriptive Epidemiology

Incidence and Mortality: Multiple myeloma is a malignancy of the plasma cells, a component of the immune system, which can lead to the formation of multiple tumors in the bone marrow. Over the five-year period 2002-2006, about 280 cases of multiple myeloma were diagnosed in Minnesota each year, and 195 deaths were caused by this cancer annually. Incidence rates in Minnesota are similar to those reported nationally, but mortality is significantly higher by 13 percent for both sexes combined. Based on SEER data for multiple

myeloma cases diagnosed between 1999 and 2005, the overall 5-year relative survival rate was 38.3 percent for males and 35.7 percent for females.

Trends: Incidence and mortality rates of multiple myeloma have been stable in Minnesota since cancer reporting was initiated in 1988. Long-term trends reported by SEER show a steady and statistically significant increase in myeloma incidence since 1975, but a significant decrease in mortality starting in the mid-1990s for males, and in 2001 for females. Decreasing mortality may reflect recent improvements in treatment for this cancer.

Age: Multiple myeloma incidence rates increase dramatically with age, with less than ten percent of cases occurring among those less than 50 years of age. The median age at diagnosis is about 70 years.

Gender: Rates of multiple myeloma are about 70 percent higher among males than females.

Race: Both in Minnesota and nationally, blacks are at the greatest risk for multiple myeloma, with rates that are roughly twice those of each of the other race/ethnic groups.

Risk Factors

Very little is known about the etiology of this cancer. Approximately 20 percent of individuals with monoclonal gammopathy of unknown significance or extramedullary plasmacytoma will go on to develop multiple myeloma. Certain autoimmune conditions and chronic immune system stimulation may increase risk of multiple myeloma. Specific viruses, particularly those that cause immunosuppression, may play a role in myeloma risk. Exposure to ionizing radiation and various occupational exposures have been linked with this cancer, but are likely to account for only a small percentage of cases.

Early Detection / Prevention

There are currently no proven screening methods for detecting multiple myeloma in asymptomatic individuals. The manifestations of multiple myeloma are variable and can be very difficult to diagnose. There are often no symptoms in the early stages of the disease. However, some common early symptoms of multiple myeloma include bone pain, anemia, kidney failure, and increased susceptibility to infection.

Non-Hodgkin Lymphoma

Table III-19.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Non-Hodgkin Lymphoma

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 401 | 346 | 23.0 | 15.0 | 174 | 183 | 10.3 | 7.4 |
| 1989 | 387 | 363 | 21.7 | 15.6 | 177 | 179 | 10.5 | 7.2 |
| 1990 | 387 | 370 | 21.4 | 15.9 | 179 | 163 | 10.7 | 6.5 |
| 1991 | 441 | 376 | 23.8 | 15.7 | 187 | 189 | 10.7 | 7.4 |
| 1992 | 429 | 389 | 23.3 | 15.8 | 192 | 216 | 10.9 | 8.3 |
| 1993 | 460 | 401 | 23.8 | 16.5 | 223 | 213 | 12.1 | 8.2 |
| 1994 | 505 | 418 | 26.0 | 17.2 | 216 | 210 | 11.8 | 8.1 |
| 1995 | 481 | 410 | 24.3 | 16.2 | 215 | 210 | 11.6 | 7.9 |
| 1996 | 494 | 418 | 24.8 | 16.5 | 232 | 261 | 12.1 | 9.7 |
| 1997 | 499 | 453 | 24.5 | 17.7 | 234 | 218 | 12.3 | 8.0 |
| 1998 | 525 | 457 | 25.9 | 17.6 | 259 | 204 | 13.3 | 7.3 |
| 1999 | 517 | 465 | 24.8 | 17.7 | 215 | 219 | 11.0 | 7.8 |
| 2000 | 523 | 486 | 24.4 | 18.3 | 243 | 216 | 12.0 | 7.6 |
| 2001 | 542 | 502 | 25.0 | 18.7 | 215 | 214 | 10.5 | 7.3 |
| 2002 | 594 | 495 | 26.9 | 18.3 | 231 | 198 | 11.2 | 6.5 |
| 2003 | 582 | 475 | 25.9 | 17.0 | 209 | 182 | 9.9 | 6.1 |
| 2004 | 618 | 531 | 27.1 | 19.2 | 218 | 185 | 10.2 | 6.2 |
| 2005 | 610 | 476 | 26.1 | 16.8 | 193 | 173 | 8.7 | 5.6 |
| 2006 | 607 | 496 | 26.0 | 17.1 | 215 | 154 | 9.7 | 4.9 |

Table III-19.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Non-Hodgkin Lymphoma

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 51 | 24 | 1.4 | 0.7 | 4 | 1 | 0.1 | 0.1 |
| 20 – 34 | 84 | 68 | 3.2 | 2.7 | 16 | 8 | 0.6 | 0.3 |
| 35 – 49 | 392 | 277 | 13.1 | 9.4 | 62 | 37 | 2.1 | 1.3 |
| 50 – 64 | 851 | 575 | 40.7 | 27.3 | 211 | 96 | 10.1 | 4.6 |
| 65 – 74 | 668 | 570 | 94.6 | 71.1 | 234 | 163 | 33.1 | 20.3 |
| 74 – 85 | 719 | 678 | 161.9 | 106.2 | 364 | 333 | 82.0 | 52.2 |
| 85 and older | 246 | 281 | 170.0 | 83.0 | 175 | 254 | 121.0 | 75.0 |

Table III-19.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Non-Hodgkin Lymphoma

| Race and Ethnicity† | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|----------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 3,011 | 2,473 | 26.4 | 17.7 | 1,066 | 892 | 9.9 | 6.7 |
| American Indian | | | | | | | | |
| Statewide | 16 | 15 | 18.3 | 15.1 | 7 | 3 | ~ | ~ |
| CHSDA Counties | 6 | 6 | ~ | ~ | 4 | 1 | ~ | ~ |
| Asian/Pacific Isl. | 23 | 36 | 9.4 | 14.1 | 5 | 10 | ~ | 5.9 |
| Black | 53 | 38 | 18.9 | 12.9 | 17 | 9 | 8.7 | ~ |
| Non-Hispanic White | 2,853 | 2,306 | 26.5 | 17.4 | 1,029 | 864 | 10.0 | 5.9 |
| Hispanic (All Races) | 27 | 35 | 15.8 | 27.8 | 8 | 4 | ~ | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

[†] Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data.

Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Non-Hodgkin Lymphoma

Table III-19.4: Other Minnesota cancer statistics[†], 2004-2006, Non-Hodgkin Lymphoma

| | Males | Females |
|--|--------------|--------------|
| Median Age at Diagnosis | 67.0 | 69.0 |
| Median Age at Death | 75.0 | 80.0 |
| Lifetime Risk of Diagnosis | 2.8% | 2.2% |
| Lifetime Risk of Death | 1.1% | 0.9% |
| Annual Percent Change [‡] | | |
| Incidence (1988-2006 males; 2001-2006 females) | 0.9% | -1.4% |
| Mortality (1998-2006.00 males; 1996-2006 females) | -4.0% | -4.9% |

[†] See Methods section for definition of terms.

[‡]The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-19.5: Average annual incidence and mortality rates[§] in the United States, 2002-2006, Non-Hodgkin Lymphoma

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | 23.5 | 16.4 |
| Non-Hispanic White | 25.2 | 17.5 |
| Mortality | | |
| All Races | 9.0 | 5.7 |
| Non-Hispanic White | 9.5 | 6.0 |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

[§]Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-19.6: Five-year relative survival[‡] by gender and age at diagnosis, Non-Hodgkin Lymphoma

| Age at Diagnosis (years) | Males (%) | Females (%) |
|--------------------------|-----------|-------------|
| < 45 | 71.0 | 80.4 |
| 45-54 | 71.4 | 80.9 |
| 55-64 | 68.2 | 76.4 |
| 65-74 | 61.1 | 67.9 |
| 75+ | 51.1 | 52.4 |
| All Ages | 65.2 | 69.4 |

[‡]Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

Descriptive Epidemiology

Incidence and Mortality: Lymphomas are malignancies of the white blood cells, also called lymphocytes, and are of two types: Hodgkin lymphoma and non-Hodgkin lymphoma (NHL). NHL is more common, accounting for over 85 percent of lymphomas. Many subtypes of NHL have been identified which vary in both the specific type of lymphocyte involved and in prognosis. Over the five-year period 2002-2006, NHL accounted for about

four percent of all new cancers and cancer deaths in the state. Incidence and mortality rates in Minnesota are almost the same as those reported nationally among women, but are a statistically significant five percent higher for men.

Trends: The incidence rate for NHL in Minnesota increased significantly among men by 0.9 percent each year from 1988 to 2006. NHL incidence increased similarly among women until 2001, when it appears to have stabilized. However, mortality rates have been decreasing significantly by 4.9 percent each year for women since 1996, and by 4.0 percent each year for men since 1998. A similar pattern in mortality is seen nationally. NHL incidence rates in the geographic areas reporting to the SEER Program increased by almost 80 percent from 1975 to the mid-1990s, making it one of the fastest increasing cancers. The recent sharp decline in mortality in the face of continuing increases in incidence is thought to be due to improved treatment with monoclonal antibodies and radioimmunotherapy.

Age: The majority of NHL is diagnosed among persons ages 65 years and older. However, it is one of the most common forms of childhood cancer.

Gender: NHL rates are about 50 percent higher among men than women.

Race: Non-Hispanic white males are at greatest risk for NHL, both in Minnesota and nationally.

Risk Factors

The causes of NHL are relatively unknown, and most patients with NHL have no known risk factors. Congenital immunodeficiency, immunosuppression following organ transplantation, and certain autoimmune diseases are associated with increased risk for NHL. Similarly, persons infected with the human immunodeficiency virus, the cause of AIDS, are 60 times more likely to develop certain types of NHL. Other infectious agents have been associated with NHL in Japan, the Caribbean, and Africa, but appear to play a minor role in the U.S. *Helicobacter pylori* bacteria has been identified as causing some lymphomas of the stomach. Chemotherapy and radiation therapy for other cancers may also increase risk for NHL. Herbicides, pesticides, and nitrates in drinking water have been studied, but their causal association with NHL is still unclear.

Early Detection / Prevention

There are no established methods to detect NHL early through population-based screening.

Oral Cavity and Pharynx

Table III-20.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Oral Cavity and Pharynx Cancer

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 340 | 168 | 19.6 | 7.6 | 70 | 44 | 4.1 | 1.8 |
| 1989 | 365 | 169 | 21.0 | 7.5 | 59 | 38 | 3.3 | 1.7 |
| 1990 | 377 | 177 | 20.8 | 7.5 | 83 | 41 | 4.7 | 1.6 |
| 1991 | 359 | 167 | 19.9 | 7.2 | 69 | 57 | 3.8 | 2.3 |
| 1992 | 326 | 160 | 17.4 | 7.0 | 72 | 44 | 4.0 | 1.8 |
| 1993 | 327 | 143 | 17.6 | 6.0 | 64 | 43 | 3.5 | 1.8 |
| 1994 | 329 | 195 | 17.2 | 8.2 | 66 | 39 | 3.5 | 1.5 |
| 1995 | 348 | 155 | 17.8 | 6.3 | 66 | 37 | 3.5 | 1.4 |
| 1996 | 328 | 184 | 16.5 | 7.6 | 67 | 39 | 3.4 | 1.5 |
| 1997 | 342 | 147 | 16.8 | 5.8 | 77 | 50 | 3.8 | 1.9 |
| 1998 | 337 | 156 | 16.3 | 6.2 | 80 | 43 | 4.0 | 1.6 |
| 1999 | 347 | 158 | 16.4 | 6.2 | 60 | 33 | 3.0 | 1.3 |
| 2000 | 349 | 172 | 15.9 | 6.6 | 66 | 36 | 3.1 | 1.2 |
| 2001 | 349 | 175 | 15.7 | 6.5 | 72 | 45 | 3.4 | 1.6 |
| 2002 | 342 | 207 | 15.1 | 7.4 | 81 | 45 | 3.8 | 1.5 |
| 2003 | 329 | 174 | 14.1 | 6.2 | 82 | 42 | 3.6 | 1.4 |
| 2004 | 363 | 205 | 15.2 | 7.5 | 70 | 42 | 3.2 | 1.4 |
| 2005 | 370 | 206 | 15.1 | 7.3 | 77 | 35 | 3.1 | 1.1 |
| 2006 | 390 | 213 | 15.8 | 7.3 | 75 | 44 | 3.1 | 1.5 |

Table III-20.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Oral Cavity and Pharynx Cancer

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 4 | 10 | 0.1 | 0.3 | 1 | 0 | 0.0 | 0.0 |
| 20 – 34 | 44 | 33 | 1.7 | 1.3 | 4 | 0 | 0.2 | 0.0 |
| 35 – 49 | 274 | 146 | 9.1 | 5.0 | 35 | 11 | 1.2 | 0.4 |
| 50 – 64 | 705 | 287 | 33.8 | 13.6 | 130 | 41 | 6.2 | 1.9 |
| 65 – 74 | 375 | 202 | 53.1 | 25.2 | 91 | 57 | 12.9 | 7.1 |
| 74 – 85 | 303 | 198 | 68.2 | 31.0 | 79 | 45 | 17.8 | 7.0 |
| 85 and older | 89 | 129 | 61.5 | 38.1 | 45 | 54 | 31.1 | 16.0 |

Table III-20.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Oral Cavity and Pharynx Cancer

| Race and Ethnicity [†] | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|---------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 1,794 | 1,005 | 15.1 | 7.1 | 385 | 208 | 3.4 | 1.4 |
| American Indian | | | | | | | | |
| Statewide | 19 | 9 | 20.5 | ~ | 4 | 1 | ~ | ~ |
| CHSDA Counties | 12 | 4 | 26.1 | ~ | 2 | 1 | ~ | ~ |
| Asian/Pacific Isl. | 37 | 27 | 13.2 | 9.9 | 12 | 1 | 6.1 | ~ |
| Black | 50 | 27 | 19.9 | 8.1 | 5 | 4 | ~ | ~ |
| Non-Hispanic White | 1,662 | 919 | 14.8 | 6.9 | 360 | 198 | 3.3 | 1.4 |
| Hispanic (All Races) | 13 | 11 | 4.1 | 7.4 | 3 | 4 | ~ | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

[†] Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data.

Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Oral Cavity and Pharynx

Table III-20.4: Other Minnesota cancer statistics[†], 2004-2006, Oral Cavity and Pharynx Cancer

| | Males | Females |
|---|--------------|--------------|
| Median Age at Diagnosis | 61.0 | 65.0 |
| Median Age at Death | 66.0 | 72.0 |
| Lifetime Risk of Diagnosis | 1.5% | 0.8% |
| Lifetime Risk of Death | 0.4% | 0.2% |
| Annual Percent Change [‡] | | |
| Incidence (2003-2006 males; 1988-2006 females) | 2.5% | -0.3% |
| Mortality (1988-2006) | -1.3% | -1.9% |

[†] See Methods section for definition of terms.

[‡]The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-20.5: Average annual incidence and mortality rates[§] in the United States, 2002-2006, Oral Cavity and Pharynx Cancer

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | 15.4 | 6.1 |
| Non-Hispanic White | 16.7 | 6.5 |
| Mortality | | |
| All Races | 3.9 | 1.5 |
| Non-Hispanic White | 3.8 | 1.5 |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

[§]Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-20.6: Extent of disease at diagnosis and five-year relative survival, Oral Cavity and Pharynx Cancer

| Stage at Diagnosis | Percent of Cases [†] (%) | 5-Year Relative Survival [‡] (%) |
|--------------------|-----------------------------------|---|
| <i>In Situ</i> | 4.0 | - |
| Localized | 39.6 | 82.7 |
| Regional | 37.6 | 54.3 |
| Distant | 11.8 | 31.8 |
| Unknown | 7.0 | 53.4 |

[†]Among Minnesota cases diagnosed 2004-2006.

[‡]Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

Descriptive Epidemiology

Incidence and Mortality: Over the five-year period 2002-2006, an average of 560 cases of oral cavity and pharynx cancer were diagnosed each year in Minnesota, and 120 people died from this cancer annually. It accounts for 2.3 percent of all cancers and 1.3 percent of cancer deaths in the state. The incidence rate of oral cavity and pharynx cancer in Minnesota is significantly

lower than those reported by SEER among males, but not females. The mortality rate in Minnesota is significantly lower than the U.S. rate. Based on SEER data, the 5-year relative survival rate for oral cavity and pharynx cancer is 82.7 percent for localized tumors. In Minnesota, about 40 percent of these cancers are diagnosed when still localized.

Trends: The incidence rate of oral cavity and pharynx cancer in Minnesota has been stable among women; among males, the rate declined significantly from 1988 to 2003, and then increased slightly. Mortality rates decreased significantly among both males and females each year from 1988 to 2006 (1.3 percent per year for males and 1.9 percent for females). These are similar to national trends.

Age: Less than 20 percent of cases of oral cavity and pharynx cancer are diagnosed among those less than 50 years of age. Incidence rates steadily increase with age.

Gender: Rates of oral cavity and pharynx cancer are two times higher among males than females.

Race: Among Minnesota males, American Indians have the highest incidence rates of cancer of the oral cavity and pharynx, followed by blacks, non-Hispanic whites and Asian/Pacific Islanders. Rates among American Indians living in CHSDA counties in Minnesota are nearly three times higher than among American Indians in the geographic areas covered by SEER. This may reflect different levels of tobacco use among Northern Plains Indians compared to those in the Southwest U.S., where the majority of American Indians reported by SEER are located.

Risk Factors

Tobacco use and heavy alcohol consumption are the most important risk factors for development of oral cavity and pharynx cancer, accounting for nearly 75 percent of cases in the U.S. Human papillomaviruses (HPV) may be an etiologic factor for certain types of oral cancer. Diets low in fruits and vegetables are also associated with increased risk of disease.

Early Detection / Prevention

Most cases of oral cavity and pharynx cancer are preventable. The single most effective measure to lowering risk of developing this cancer is to reduce exposure to tobacco and alcohol.

Ovary

Table III-21.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Ovary Cancer

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | - | 345 | - | 16.0 | - | 238 | - | 10.5 |
| 1989 | - | 354 | - | 16.3 | - | 239 | - | 10.3 |
| 1990 | - | 328 | - | 15.0 | - | 198 | - | 8.7 |
| 1991 | - | 356 | - | 15.9 | - | 240 | - | 9.9 |
| 1992 | - | 352 | - | 15.4 | - | 230 | - | 9.7 |
| 1993 | - | 346 | - | 15.1 | - | 221 | - | 9.1 |
| 1994 | - | 377 | - | 16.4 | - | 237 | - | 9.6 |
| 1995 | - | 389 | - | 16.6 | - | 217 | - | 8.8 |
| 1996 | - | 346 | - | 14.6 | - | 252 | - | 10.0 |
| 1997 | - | 322 | - | 13.1 | - | 218 | - | 8.4 |
| 1998 | - | 338 | - | 13.6 | - | 252 | - | 9.4 |
| 1999 | - | 358 | - | 14.2 | - | 225 | - | 8.6 |
| 2000 | - | 325 | - | 12.6 | - | 240 | - | 8.8 |
| 2001 | - | 364 | - | 14.0 | - | 249 | - | 9.1 |
| 2002 | - | 350 | - | 13.3 | - | 237 | - | 8.7 |
| 2003 | - | 360 | - | 13.2 | - | 253 | - | 9.0 |
| 2004 | - | 355 | - | 12.7 | - | 252 | - | 8.8 |
| 2005 | - | 364 | - | 13.2 | - | 261 | - | 8.9 |
| 2006 | - | 344 | - | 12.1 | - | 247 | - | 8.3 |

Table III-21.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Ovary Cancer

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | - | 23 | - | 0.7 | - | 0 | - | 0.0 |
| 20 – 34 | - | 60 | - | 2.4 | - | 8 | - | 0.3 |
| 35 – 49 | - | 280 | - | 9.5 | - | 81 | - | 2.8 |
| 50 – 64 | - | 621 | - | 29.5 | - | 325 | - | 15.4 |
| 65 – 74 | - | 337 | - | 42.1 | - | 315 | - | 39.3 |
| 74 – 85 | - | 319 | - | 50.0 | - | 326 | - | 51.1 |
| 85 and older | - | 133 | - | 39.3 | - | 195 | - | 57.6 |

Table III-21.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Ovary Cancer

| Race and Ethnicity† | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|----------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | - | 1,773 | - | 12.9 | - | 1,250 | - | 8.7 |
| American Indian | | | | | | | | |
| Statewide | - | 11 | - | 12.5 | - | 5 | - | ~ |
| CHSDA Counties | - | 7 | - | ~ | - | 4 | - | ~ |
| Asian/Pacific Isl. | - | 15 | - | 4.4 | - | 5 | - | ~ |
| Black | - | 25 | - | 8.1 | - | 15 | - | 7.2 |
| Non-Hispanic White | - | 1,685 | - | 13.0 | - | 1,217 | - | 8.9 |
| Hispanic (All Races) | - | 16 | - | 8.6 | - | 6 | - | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS. Cases with borderline malignancy or histologies 8442, 8451, 8462, 8472, and 8373 were excluded.

§ Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

† Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data.

Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Ovary

Table III-21.4: Other Minnesota cancer statistics†, 2004-2006, Ovary Cancer

| | Males | Females |
|----------------------------|-------|--------------|
| Median Age at Diagnosis | - | 61.0 |
| Median Age at Death | - | 71.0 |
| Lifetime Risk of Diagnosis | - | 1.4% |
| Lifetime Risk of Death | - | 1.2% |
| Annual Percent Change‡ | | |
| Incidence (1988-2006) | - | -1.5% |
| Mortality (1988-2006) | - | -0.8% |

† See Methods section for definition of terms.

‡The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-21.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Ovary Cancer

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | - | 13.1 |
| Non-Hispanic White | - | 14.1 |
| Mortality | | |
| All Races | - | 8.8 |
| Non-Hispanic White | - | 9.3 |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-21.6: Extent of disease at diagnosis and five-year relative survival, Ovary Cancer

| Stage at Diagnosis | Percent of Cases† (%) | 5-Year Relative Survival‡ (%) |
|--------------------|-----------------------|-------------------------------|
| <i>In Situ</i> | 0.7 | - |
| Localized | 15.9 | 93.8 |
| Regional | 22.7 | 72.8 |
| Distant | 54.8 | 28.2 |
| Unknown | 6.0 | 27.3 |

†Among Minnesota cases diagnosed 2004-2006.

‡Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

Descriptive Epidemiology

Incidence and Mortality: Ovarian cancer accounts for 3.1 percent of cancers and 5.6 percent of cancer deaths among Minnesota women. Over the five-year period 2002-2006, an average of 355 cases were diagnosed each year, and 250 deaths occurred annually. Among non-Hispanic white women, the incidence rate was a statistically significant eight percent lower in Minnesota than in the SEER 17 area, and mortality was five percent lower in Minnesota than in the U.S., but the difference

was not statistically significant. Based on SEER cases diagnosed in 1999-2005, the 5-year relative survival rate is 93.8 percent for localized tumors and 72.8 percent for regional tumors. However, more than half of ovarian cancers are diagnosed when the tumor has already spread to other organs, when 5-year survival is lower (28.2%).

Trends: Since cancer reporting was initiated in Minnesota in 1988, ovarian cancer incidence and mortality rates have declined significantly by 1.5 percent per year and 0.8 percent per year, respectively. This is consistent with national trends.

Age: The majority of ovarian cancers develop after menopause. About 80 percent of cases in Minnesota are diagnosed in women age 50 years or older.

Race: In Minnesota, ovarian cancer incidence rates are highest among non-Hispanic white women and are between 25 and 50 percent lower among women in each of the other race/ethnic groups. Too few deaths from ovarian cancer occurred among women of color in Minnesota to calculate reliable mortality rates. Based on mortality rates in the U.S., non-Hispanic white women are the most likely to die of ovarian cancer.

Risk Factors

As with breast cancer, the risk for ovarian cancer is somewhat higher among women who begin menstruating at an early age, have no children or have their first child after the age of 30 years, or begin menopause after the age of 50 years. Infertility, use of fertility drugs, and use of unopposed estrogen replacement therapy may also increase risk for ovarian cancer, but research studies have shown conflicting results. On the other hand, long-term use of oral contraceptives reduces risk. Women who have had breast cancer or have a family history of breast or ovarian cancer are at increased risk for ovarian cancer, which may be linked to mutations in the BRCA1 or BRCA2 genes. A family history of colorectal cancer may also increase risk for ovarian cancer.

Early Detection / Prevention

Routine pelvic examination can help detect abnormalities in the size, shape, and consistency of the ovaries, and is recommended for all women age 18 years and older. However, most early stage ovarian tumors cannot be palpated. Screening is not recommended for women without strong known risk factors. Several large studies are underway to learn the best ways to find ovarian cancer in its earliest stage.

Pancreas

Table III-22.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Pancreas Cancer

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 177 | 156 | 10.2 | 6.8 | 201 | 221 | 11.9 | 9.1 |
| 1989 | 158 | 159 | 8.9 | 6.9 | 211 | 211 | 12.4 | 8.5 |
| 1990 | 153 | 137 | 8.8 | 5.8 | 200 | 223 | 11.9 | 8.9 |
| 1991 | 161 | 142 | 8.7 | 6.0 | 187 | 220 | 10.6 | 8.8 |
| 1992 | 207 | 172 | 11.2 | 7.2 | 231 | 236 | 13.0 | 9.2 |
| 1993 | 167 | 154 | 9.0 | 6.4 | 217 | 228 | 12.3 | 8.8 |
| 1994 | 173 | 152 | 9.0 | 6.3 | 242 | 238 | 13.2 | 9.0 |
| 1995 | 180 | 163 | 9.3 | 6.6 | 211 | 240 | 11.2 | 9.0 |
| 1996 | 208 | 181 | 10.7 | 7.1 | 234 | 233 | 12.4 | 8.7 |
| 1997 | 184 | 170 | 9.3 | 6.6 | 230 | 247 | 11.9 | 8.9 |
| 1998 | 209 | 192 | 10.4 | 7.2 | 261 | 258 | 13.4 | 9.0 |
| 1999 | 210 | 183 | 10.1 | 6.9 | 232 | 268 | 11.6 | 9.4 |
| 2000 | 221 | 232 | 10.6 | 8.6 | 242 | 270 | 11.9 | 9.4 |
| 2001 | 207 | 207 | 9.8 | 7.8 | 237 | 243 | 11.6 | 8.4 |
| 2002 | 208 | 215 | 9.4 | 8.0 | 257 | 269 | 12.0 | 9.4 |
| 2003 | 251 | 246 | 11.5 | 8.9 | 233 | 277 | 10.9 | 9.3 |
| 2004 | 255 | 219 | 11.3 | 7.6 | 271 | 239 | 12.5 | 7.9 |
| 2005 | 264 | 260 | 11.2 | 9.1 | 265 | 297 | 11.8 | 9.7 |
| 2006 | 266 | 258 | 11.4 | 8.9 | 263 | 301 | 11.4 | 9.8 |

Table III-22.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Pancreas Cancer

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 0 | 1 | 0.0 | 0.0 | 0 | 0 | 0.0 | 0.0 |
| 20 – 34 | 9 | 5 | 0.3 | 0.2 | 4 | 1 | 0.2 | 0.0 |
| 35 – 49 | 90 | 59 | 3.0 | 2.0 | 65 | 45 | 2.2 | 1.5 |
| 50 – 64 | 404 | 276 | 19.3 | 13.1 | 354 | 233 | 16.9 | 11.1 |
| 65 – 74 | 359 | 332 | 50.8 | 41.4 | 344 | 300 | 48.7 | 37.4 |
| 74 – 85 | 301 | 358 | 67.8 | 56.1 | 371 | 457 | 83.5 | 71.6 |
| 85 and older | 81 | 167 | 56.0 | 49.3 | 151 | 347 | 104.4 | 102.5 |

Table III-22.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Pancreas Cancer

| Race and Ethnicity† | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|----------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 1,244 | 1,198 | 11.0 | 8.5 | 1,289 | 1,383 | 11.7 | 9.2 |
| American Indian | | | | | | | | |
| Statewide | 8 | 11 | ~ | 11.5 | 9 | 11 | ~ | 14.0 |
| CHSDA Counties | 4 | 7 | ~ | ~ | 5 | 8 | ~ | ~ |
| Asian/Pacific Isl. | 16 | 16 | 11.7 | 8.3 | 9 | 9 | ~ | ~ |
| Black | 42 | 37 | 21.5 | 17.0 | 35 | 25 | 20.4 | 13.6 |
| Non-Hispanic White | 1,157 | 1,120 | 10.7 | 8.3 | 1,227 | 1,335 | 11.7 | 9.3 |
| Hispanic (All Races) | 15 | 8 | 9.4 | ~ | 9 | 2 | ~ | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

[†] Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data.

Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Pancreas

Table III-22.4: Other Minnesota cancer statistics†, 2004-2006, Pancreas Cancer

| | Males | Females |
|----------------------------|-------------|-------------|
| Median Age at Diagnosis | 68.0 | 73.0 |
| Median Age at Death | 72.0 | 78.0 |
| Lifetime Risk of Diagnosis | 1.3% | 1.2% |
| Lifetime Risk of Death | 1.4% | 1.4% |
| Annual Percent Change‡ | | |
| Incidence (1988-2006) | 1.2% | 2.1% |
| Mortality (1988-2006) | -0.2% | 0.3% |

† See Methods section for definition of terms.

‡The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-22.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Pancreas Cancer

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | 13.1 | 10.4 |
| Non-Hispanic White | 13.3 | 10.2 |
| Mortality | | |
| All Races | 12.3 | 9.3 |
| Non-Hispanic White | 12.4 | 9.2 |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-22.6: Extent of disease at diagnosis and five-year relative survival, Pancreas Cancer

| Stage at Diagnosis | Percent of Cases† (%) | 5-Year Relative Survival‡ (%) |
|--------------------|-----------------------|-------------------------------|
| <i>In Situ</i> | 0.3 | - |
| Localized | 7.3 | 22.2 |
| Regional | 34.6 | 8.7 |
| Distant | 49.0 | 1.8 |
| Unknown | 8.8 | 4.9 |

†Among Minnesota cases diagnosed 2004-2006.

‡Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

Descriptive Epidemiology

Incidence and Mortality: Over the five-year period 2002-2006, about 490 cases of pancreatic cancer were diagnosed and microscopically confirmed in Minnesota each year, and about 535 Minnesotans died from this disease annually. Incidence rates in Minnesota are about 10 percent lower than those reported by SEER, most likely because clinically diagnosed cases are not included in MCSS rates. Mortality rates for this cancer are similar in Minnesota and the U.S. Pancreatic cancer is one of the

most rapidly fatal cancers and generally remains asymptomatic until well advanced. Based on SEER cases diagnosed 1999-2005, the 5-year relative survival rate is 22.2 percent for localized tumors and 8.7 percent for regional tumors. Most pancreatic cancers are diagnosed at the regional (34.6%) or distant stage (49.0%).

Trends: The incidence rate of pancreatic cancer in Minnesota increased significantly each year in both males (1.2%) and females (2.1%) from 1988-2006, while mortality rates were stable. Nationally, both incidence and mortality rates have increased significantly in the past decade among non-Hispanic whites, but trends vary by race/ethnicity and geographic area.

Age: Pancreatic cancer is extremely rare in early life. Incidence rates increase sharply after age 50 years and continue to increase steadily with age. The median age at diagnosis is 68 years for men and 73 years for women in Minnesota.

Gender: Rates are about 30 percent higher among males than females.

Race: In Minnesota, pancreatic cancer incidence and mortality rates are two times higher among black men and women than among non-Hispanic whites. Nationally, blacks are about 30 percent more likely to be diagnosed or die of pancreatic cancer than non-Hispanic whites.

Risk Factors

Cigarette smoking is the most consistent risk factor for pancreatic cancer, with a two- to three-fold risk for smokers relative to nonsmokers. An estimated 20 to 30 percent of pancreas cancers are caused by smoking. Little is known about the etiology of this disease, but research has suggested that obesity, diabetes mellitus, and occupational exposures to certain chemicals and petroleum can increase risk of developing pancreatic cancer. Data suggest an increased risk for pancreas cancer associated with meat consumption, and this may in part be due to cooking and processing methods such as grilling and frying.

Early Detection / Prevention

At present, only biopsy yields a certain diagnosis. Because of the “silent” early course of the disease, the need for biopsy may become obvious only with advanced disease. Researchers are focusing on ways to diagnose pancreatic cancer before symptoms occur.

Prostate

Table III-23.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Prostate Cancer

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 2,457 | - | 147.1 | - | 586 | - | 38.2 | - |
| 1989 | 2,626 | - | 154.8 | - | 636 | - | 41.5 | - |
| 1990 | 2,973 | - | 173.0 | - | 607 | - | 38.6 | - |
| 1991 | 3,830 | - | 214.9 | - | 646 | - | 41.1 | - |
| 1992 | 4,241 | - | 233.9 | - | 611 | - | 37.5 | - |
| 1993 | 3,777 | - | 203.9 | - | 604 | - | 37.2 | - |
| 1994 | 3,211 | - | 170.8 | - | 673 | - | 40.9 | - |
| 1995 | 3,279 | - | 172.2 | - | 653 | - | 39.4 | - |
| 1996 | 3,229 | - | 166.6 | - | 681 | - | 39.5 | - |
| 1997 | 3,453 | - | 175.6 | - | 596 | - | 34.3 | - |
| 1998 | 3,424 | - | 172.0 | - | 598 | - | 33.9 | - |
| 1999 | 3,640 | - | 179.4 | - | 565 | - | 31.2 | - |
| 2000 | 4,083 | - | 197.7 | - | 598 | - | 32.6 | - |
| 2001 | 4,169 | - | 197.9 | - | 598 | - | 31.9 | - |
| 2002 | 4,210 | - | 194.5 | - | 601 | - | 31.3 | - |
| 2003 | 3,892 | - | 175.7 | - | 545 | - | 27.8 | - |
| 2004 | 4,083 | - | 180.4 | - | 558 | - | 27.9 | - |
| 2005 | 4,197 | - | 180.7 | - | 491 | - | 24.2 | - |
| 2006 | 4,546 | - | 191.3 | - | 484 | - | 23.3 | - |

Table III-23.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Prostate Cancer

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 3 | - | 0.1 | - | 0 | - | 0.0 | - |
| 20 – 34 | 3 | - | 0.1 | - | 0 | - | 0.0 | - |
| 35 – 49 | 512 | - | 17.1 | - | 7 | - | 0.2 | - |
| 50 – 64 | 7,342 | - | 351.5 | - | 178 | - | 8.5 | - |
| 65 – 74 | 7,592 | - | 1,075.2 | - | 477 | - | 67.6 | - |
| 74 – 85 | 4,520 | - | 1,017.9 | - | 1,042 | - | 234.6 | - |
| 85 and older | 956 | - | 660.8 | - | 975 | - | 673.9 | - |

Table III-23.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Prostate Cancer

| Race and Ethnicity† | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|----------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 20,928 | - | 184.5 | - | 2,679 | - | 26.8 | - |
| American Indian | | | | | | | | |
| Statewide | 125 | - | 171.7 | - | 9 | - | ~ | - |
| CHSDA Counties | 80 | - | 194.3 | - | 8 | - | ~ | - |
| Asian/Pacific Isl. | 86 | - | 57.0 | - | 12 | - | 11.9 | - |
| Black | 440 | - | 223.5 | - | 52 | - | 50.8 | - |
| Non-Hispanic White | 19,642 | - | 181.4 | - | 2,593 | - | 26.8 | - |
| Hispanic (All Races) | 117 | - | 103.5 | - | 13 | - | 18.2 | - |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

† Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data. Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Prostate

Table III-23.4: Other Minnesota cancer statistics†, 2004-2006, Prostate Cancer

| | Males | Females |
|----------------------------|--------------|---------|
| Median Age at Diagnosis | 68.0 | - |
| Median Age at Death | 81.0 | - |
| Lifetime Risk of Diagnosis | 20.6% | - |
| Lifetime Risk of Death | 3.3% | - |
| Annual Percent Change‡ | | |
| Incidence (1995-2006) | 1.1% | - |
| Mortality (1995-2006) | -4.2% | - |

† See Methods section for definition of terms.

‡The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-23.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Prostate Cancer

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | 159.3 | - |
| Non-Hispanic White | 156.1 | - |
| Mortality | | |
| All Races | 25.6 | - |
| Non-Hispanic White | 23.7 | - |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-23.6: Extent of disease at diagnosis and five-year relative survival, Prostate Cancer

| Stage at Diagnosis | Percent of Cases† (%) | 5-Year Relative Survival‡ (%) |
|--------------------|-----------------------|-------------------------------|
| <i>In Situ</i> | 0.0 | - |
| Localized/Regional | 93.8 | 100.0 |
| Distant | 3.3 | 30.2 |
| Unknown | 2.9 | 72.8 |

†Among Minnesota cases diagnosed 2004-2006.

‡Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

Descriptive Epidemiology

Incidence and Mortality: Prostate cancer is the most common cancer among Minnesota men, accounting for one out of every three cancers diagnosed and 12 percent of cancer deaths among males. Based on current rates, one out of five men will be diagnosed with prostate cancer in their lifetime and 1 out of 30 will die of the disease. Prostate cancer rates are significantly higher in Minnesota than nationally. Among non-Hispanic whites, the incidence rate is 16 percent higher in Minnesota than in the SEER Program, while the mortality rate is 13

percent higher in Minnesota than in the U.S. The reason for this increased risk for prostate cancer among Minnesota men is unknown.

Trends: Incidence rates for this cancer have been strongly influenced by the PSA screening test. After its widespread introduction in the late 1980s, the prostate cancer incidence rate in the U.S. increased by an unprecedented 70 percent over a five-year period, peaking in 1992. Minnesota followed a very similar pattern during the period of PSA uptake. However, the prostate cancer incidence rate in Minnesota has continued to increase modestly from 1995 to 2006, while among white males living in the SEER 9 areas, it decreased significantly from 2001 to 2006 by an average of 3.4 percent per year. Prostate cancer mortality decreased significantly in both the U.S. and Minnesota over the last decade, and at a similar pace.

Age: About 60 percent of all newly diagnosed prostate cancers and over 90 percent of deaths occur among men age 65 years and older.

Race: Prostate cancer incidence and mortality rates are highest among black men, both in Minnesota and nationally. In Minnesota, the incidence rate for black men is about 25 percent higher than in non-Hispanic whites. The mortality rate among black men in Minnesota is nearly two times higher than among non-Hispanic white men. In the SEER 17 areas, American Indians have the lowest prostate cancer rates, about 55 percent lower than American Indians statewide in Minnesota.

Risk Factors

Men with a family history of prostate cancer are at increased risk for developing the disease. It is unknown whether this association is genetically related or due to shared behaviors. Other strong risk factors for this disease remain elusive.

Early Detection / Prevention

Prostate cancer can often be detected early by PSA screening. However, it has yet to be shown to lower the prostate cancer mortality rate. The dilemma is that the PSA test cannot distinguish between slow-growing tumors that would never become life-threatening and aggressive tumors that would become symptomatic. Treatment for prostate cancer can result in marked decrease in quality of life because of incontinence and impotence. The American Cancer Society recommends that men 50 years of age or older discuss the risks and benefits of PSA testing with their physicians before deciding whether or not to be screened.

Soft Tissues

Table III-24.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Cancer of the Soft Tissues, including Heart

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 73 | 57 | 4.0 | 2.6 | 26 | 26 | 1.5 | 1.0 |
| 1989 | 59 | 42 | 3.1 | 1.9 | 24 | 26 | 1.3 | 1.3 |
| 1990 | 68 | 57 | 3.5 | 2.5 | 33 | 34 | 1.8 | 1.5 |
| 1991 | 84 | 67 | 4.4 | 2.9 | 27 | 20 | 1.4 | 0.9 |
| 1992 | 72 | 48 | 3.7 | 2.0 | 23 | 36 | 1.4 | 1.5 |
| 1993 | 88 | 59 | 4.6 | 2.5 | 39 | 26 | 2.0 | 1.1 |
| 1994 | 77 | 67 | 3.8 | 2.8 | 26 | 44 | 1.4 | 1.8 |
| 1995 | 59 | 46 | 3.0 | 1.8 | 27 | 31 | 1.4 | 1.2 |
| 1996 | 73 | 61 | 3.5 | 2.5 | 37 | 41 | 2.0 | 1.6 |
| 1997 | 76 | 66 | 3.6 | 2.7 | 32 | 35 | 1.6 | 1.4 |
| 1998 | 73 | 75 | 3.4 | 2.9 | 35 | 33 | 1.7 | 1.3 |
| 1999 | 57 | 58 | 2.7 | 2.3 | 32 | 21 | 1.5 | 0.8 |
| 2000 | 67 | 72 | 2.9 | 2.8 | 43 | 42 | 1.9 | 1.5 |
| 2001 | 88 | 62 | 3.8 | 2.4 | 34 | 36 | 1.5 | 1.3 |
| 2002 | 94 | 78 | 4.0 | 3.0 | 31 | 25 | 1.4 | 0.9 |
| 2003 | 75 | 63 | 3.2 | 2.4 | 37 | 28 | 1.6 | 1.1 |
| 2004 | 88 | 73 | 3.8 | 2.7 | 30 | 30 | 1.3 | 1.0 |
| 2005 | 78 | 83 | 3.3 | 3.0 | 36 | 31 | 1.6 | 1.0 |
| 2006 | 91 | 98 | 3.8 | 3.6 | 36 | 35 | 1.6 | 1.2 |

Table III-24.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Cancer of the Soft Tissues, including Heart

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 54 | 48 | 1.5 | 1.4 | 8 | 2 | 0.2 | 0.1 |
| 20 – 34 | 44 | 35 | 1.7 | 1.4 | 12 | 10 | 0.5 | 0.4 |
| 35 – 49 | 71 | 71 | 2.4 | 2.4 | 22 | 9 | 0.7 | 0.3 |
| 50 – 64 | 90 | 83 | 4.3 | 3.9 | 34 | 42 | 1.6 | 2.0 |
| 65 – 74 | 71 | 63 | 10.1 | 7.9 | 30 | 31 | 4.2 | 3.9 |
| 74 – 85 | 67 | 66 | 15.1 | 10.3 | 46 | 29 | 10.4 | 4.5 |
| 85 and older | 29 | 29 | 20.0 | 8.6 | 18 | 26 | 12.4 | 7.7 |

Table III-24.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Cancer of the Soft Tissues, including Heart

| Race and Ethnicity† | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|----------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 426 | 395 | 3.6 | 2.9 | 170 | 149 | 1.5 | 1.1 |
| American Indian | | | | | | | | |
| Statewide | 5 | 3 | ~ | ~ | 3 | 1 | ~ | ~ |
| CHSDA Counties | 4 | 0 | ~ | ~ | 3 | 1 | ~ | ~ |
| Asian/Pacific Isl. | 13 | 12 | 3.5 | 3.3 | 1 | 1 | ~ | ~ |
| Black | 18 | 9 | 5.2 | ~ | 2 | 5 | ~ | ~ |
| Non-Hispanic White | 376 | 362 | 3.5 | 2.9 | 162 | 141 | 1.5 | 1.0 |
| Hispanic (All Races) | 8 | 5 | ~ | ~ | 2 | 1 | ~ | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

† Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data.

Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Soft Tissues

Table III-24.4: Other Minnesota cancer statistics†, 2004-2006, Cancer of the Soft Tissues, including Heart

| | Males | Females |
|----------------------------|-------|-------------|
| Median Age at Diagnosis | 57.0 | 59.5 |
| Median Age at Death | 71.5 | 69.0 |
| Lifetime Risk of Diagnosis | 0.4% | 0.3% |
| Lifetime Risk of Death | 0.2% | 0.2% |
| Annual Percent Change‡ | | |
| Incidence (1988-2006) | -0.5% | 1.5% |
| Mortality (1988-2006) | -0.3% | -1.0% |

† See Methods section for definition of terms.

‡The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-24.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Cancer of the Soft Tissues, including Heart

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | 3.8 | 2.7 |
| Non-Hispanic White | 4.0 | 2.7 |
| Mortality | | |
| All Races | 1.4 | 1.1 |
| Non-Hispanic White | 1.5 | 1.1 |

Source: Surveillance Research Program, National Cancer Institute SEER*Stat software. Incidence – SEER 17 Regs Limited-Use, Nov 2006 Sub (2000-2004). Underlying mortality data provided by NCHS.

§Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-24.6: Extent of disease at diagnosis and five-year relative survival, Cancer of the Soft Tissues, including Heart

| Stage at Diagnosis | Percent of Cases† (%) | 5-Year Relative Survival‡ (%) |
|--------------------|-----------------------|-------------------------------|
| <i>In Situ</i> | 0.0 | - |
| Localized | 59.5 | ~ |
| Regional | 21.7 | ~ |
| Distant | 11.9 | ~ |
| Unknown | 6.9 | ~ |

†Among Minnesota cases diagnosed 2004-2006.

‡Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from *SEER Cancer Statistics Review, 1975-2006*.

~Data not available.

Descriptive Epidemiology

Incidence and Mortality: Cancers of the soft tissues are malignant tumors that develop from mesenchymal tissues such as fat, muscle, nerve, joint, blood vessel, and deep skin tissues, and are predominantly sarcomas. About 50 percent of these tumors develop in the extremities. Soft

tissue cancers are relatively uncommon. Over the five-year period 2002-2006, an average of 165 cancers of the soft tissues were diagnosed in Minnesota each year, and 65 deaths were caused by these cancers annually. The incidence and mortality rates of soft tissue sarcoma in Minnesota are similar to national rates. Most of these cancers are diagnosed while the tumors are localized (59.5%).

Trends: Incidence and mortality rates of soft issue sarcomas have been fairly stable since cancer reporting was implemented in Minnesota in 1988. The exception is incidence among females, which increased significantly by 1.5 percent per year over the 19 year period. National trends for this cancer were not reported by SEER.

Age: Incidence rates for soft tissue sarcomas increase only moderately with age. Unlike many cancers, the majority of soft tissue sarcomas are diagnosed among persons less than 65 years of age. Approximately 12 percent are diagnosed among persons less than 20 years of age, and 48 percent between the ages of 20 and 64. Rhabdomyosarcoma is the most common type of soft tissue sarcoma in children.

Gender: Rates of soft tissue sarcomas are similar between males and females until age 65 years of age, when rates are higher among males than females.

Race: There are too few cases of soft tissue sarcomas among persons of color in Minnesota to assess racial disparities. National data indicate that both incidence and mortality rates appear to be similar between whites and blacks.

Risk Factors

Ionizing radiation accounts for a small number, less than five percent, of soft tissue sarcomas. Research has linked occupational exposures of dioxin, phenoxyacetic acid, which is found in herbicides, and chlorophenols in wood preservatives to increased risk of disease, particularly angiosarcomas. Genetic conditions can lead to development of soft tissue sarcomas. Researchers have investigated the role of retroviruses in the development of sarcomas, particularly Kaposi's sarcoma which often occurs in AIDS patients, and found that immunosuppression increases disease risk.

Early Detection / Prevention

There are no direct measures currently available to detect soft tissue sarcomas early in development.

Stomach

Table III-25.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Stomach Cancer

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 204 | 121 | 12.0 | 5.0 | 143 | 100 | 8.7 | 4.1 |
| 1989 | 210 | 114 | 12.7 | 4.7 | 116 | 99 | 7.1 | 3.9 |
| 1990 | 176 | 110 | 10.2 | 4.4 | 120 | 85 | 7.2 | 3.4 |
| 1991 | 187 | 102 | 10.8 | 4.0 | 103 | 89 | 6.0 | 3.5 |
| 1992 | 226 | 125 | 12.9 | 5.0 | 141 | 82 | 7.9 | 3.1 |
| 1993 | 195 | 94 | 10.8 | 3.7 | 120 | 87 | 6.8 | 3.3 |
| 1994 | 205 | 116 | 11.3 | 4.4 | 130 | 82 | 7.4 | 3.0 |
| 1995 | 173 | 100 | 9.3 | 3.7 | 123 | 88 | 6.7 | 3.2 |
| 1996 | 195 | 98 | 10.2 | 3.6 | 115 | 77 | 6.3 | 2.8 |
| 1997 | 187 | 104 | 9.8 | 4.0 | 114 | 57 | 6.2 | 2.1 |
| 1998 | 189 | 104 | 9.6 | 3.9 | 91 | 76 | 4.8 | 2.7 |
| 1999 | 204 | 112 | 10.2 | 3.9 | 106 | 74 | 5.3 | 2.6 |
| 2000 | 155 | 118 | 7.7 | 4.3 | 97 | 73 | 4.9 | 2.5 |
| 2001 | 190 | 110 | 9.1 | 3.8 | 107 | 79 | 5.3 | 2.7 |
| 2002 | 182 | 109 | 8.6 | 3.8 | 95 | 75 | 4.6 | 2.5 |
| 2003 | 191 | 101 | 8.7 | 3.5 | 100 | 59 | 4.6 | 2.1 |
| 2004 | 178 | 107 | 8.0 | 3.7 | 114 | 81 | 5.3 | 2.6 |
| 2005 | 153 | 94 | 6.8 | 3.1 | 78 | 64 | 3.5 | 2.1 |
| 2006 | 172 | 97 | 7.3 | 3.4 | 85 | 51 | 3.8 | 1.7 |

Table III-25.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Stomach Cancer

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 0 | 1 | 0.0 | 0.0 | 0 | 1 | 0.0 | 0.0 |
| 20 – 34 | 9 | 15 | 0.3 | 0.6 | 4 | 7 | 0.2 | 0.3 |
| 35 – 49 | 83 | 46 | 2.8 | 1.6 | 33 | 27 | 1.1 | 0.9 |
| 50 – 64 | 230 | 93 | 11.0 | 4.4 | 106 | 48 | 5.1 | 2.3 |
| 65 – 74 | 209 | 94 | 29.6 | 11.7 | 106 | 55 | 15.0 | 6.9 |
| 74 – 85 | 239 | 158 | 53.8 | 24.7 | 141 | 100 | 31.8 | 15.7 |
| 85 and older | 106 | 101 | 73.3 | 29.8 | 82 | 92 | 56.7 | 27.2 |

Table III-25.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Stomach Cancer

| Race and Ethnicity† | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|----------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 876 | 508 | 7.9 | 3.5 | 472 | 330 | 4.4 | 2.2 |
| American Indian | | | | | | | | |
| Statewide | 12 | 12 | 18.2 | 11.9 | 6 | 6 | ~ | ~ |
| CHSDA Counties | 9 | 8 | ~ | ~ | 4 | 4 | ~ | ~ |
| Asian/Pacific Isl. | 32 | 19 | 16.8 | 9.6 | 13 | 17 | 7.7 | 9.6 |
| Black | 25 | 15 | 11.5 | 5.2 | 16 | 10 | 8.7 | 3.3 |
| Non-Hispanic White | 779 | 450 | 7.4 | 3.2 | 429 | 294 | 4.1 | 2.0 |
| Hispanic (All Races) | 18 | 9 | 15.1 | ~ | 8 | 3 | ~ | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

† Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data.

Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Stomach

Table III-25.4: Other Minnesota cancer statistics†, 2004-2006, Stomach Cancer

| | Males | Females |
|----------------------------|--------------|--------------|
| Median Age at Diagnosis | 70.0 | 75.0 |
| Median Age at Death | 73.0 | 77.0 |
| Lifetime Risk of Diagnosis | 0.8% | 0.5% |
| Lifetime Risk of Death | 0.5% | 0.3% |
| Annual Percent Change‡ | | |
| Incidence (1988-2006) | -2.8% | -1.8% |
| Mortality (1988-2006) | -3.8% | -3.5% |

† See Methods section for definition of terms.

‡The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-25.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Stomach Cancer

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | 11.0 | 5.5 |
| Non-Hispanic White | 9.0 | 4.0 |
| Mortality | | |
| All Races | 5.5 | 2.8 |
| Non-Hispanic White | 4.5 | 2.2 |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-25.6: Extent of disease at diagnosis and five-year relative survival, Stomach Cancer

| Stage at Diagnosis | Percent of Cases† (%) | 5-Year Relative Survival‡ (%) |
|--------------------|-----------------------|-------------------------------|
| <i>In Situ</i> | 1.0 | - |
| Localized | 22.3 | 62.5 |
| Regional | 31.6 | 26.6 |
| Distant | 31.0 | 3.4 |
| Unknown | 14.1 | 16.8 |

†Among Minnesota cases diagnosed 2004-2006.

‡Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

Descriptive Epidemiology

Incidence and Mortality: Over the five-year period 2002-2006, stomach cancer accounted for 1.2 percent of all cancers diagnosed in Minnesota, and 1.8 percent of cancer deaths. Among non-Hispanic whites, the incidence of stomach cancer in Minnesota is about 20 percent lower than in the SEER 17 areas, and mortality is about 10 percent lower; both differences are statistically significant for both sexes combined. Based on SEER data, the 5-year relative survival rate for stomach cancer

is 62.5 percent for localized tumors, 26.6 percent for regional tumors, and 3.4 percent for distant tumors. Most cases in Minnesota are diagnosed at the regional (31.6%) or distant (31.0%) stage.

Trends: Rates of stomach cancer in Minnesota decreased significantly by 1.8 percent to 3.8 percent each year from 1988 to 2006. This is similar to national trends. Stomach cancer was the leading cause of cancer-related deaths in the U.S. in 1930. Since then, mortality has dropped to one-fifth that rate.

Age: Rates of stomach cancer increase steadily with age. The median age at diagnosis is 70.0 years for men and 75.0 years for women.

Gender: Stomach cancer rates are about two times higher among males than females.

Race: Incidence rates of stomach cancer are highest among people of color in Minnesota. American Indians have the highest rates, somewhat higher than those among Asian/Pacific Islanders in Minnesota, and also somewhat higher than American Indians in the SEER 17 areas. Incidence among Asian/Pacific Islanders is three times that of non-Hispanic whites, and rates among blacks are about two times that of whites. Too few deaths from stomach cancer occurred among people of color occurred in Minnesota to calculate reliable mortality rates. Nationally, blacks have the highest mortality rates from stomach cancer, followed by Asian/Pacific Islanders.

Risk Factors

Several medical conditions have been linked to the development of stomach cancer. Infection with *Helicobacter pylori*, chronic active gastritis, and gastric adenomatous polyps can increase risk of disease. Individuals with a family history of stomach cancer are at greater risk of developing this cancer than those without a family history. Increased risk of stomach cancer is associated with consumption of salted, smoked, or pickled foods and diets low in fruits and vegetables. Cigarette smoking has also been shown to increase risk of stomach cancer. The sharp decline in stomach cancer since the 1940s is thought to be associated with widespread use of refrigeration and freezing to preserve foods, rather than pickling, salting, and smoking.

Early Detection / Prevention

Endoscopy is sometimes used to screen for stomach cancer. However, there is insufficient evidence to show that screening would result in a decrease in mortality from stomach cancer in a population such as the U.S., where the disease is relatively rare.

Testis

Table III-26.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Testis Cancer

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 123 | - | 5.2 | - | 10 | - | 0.5 | - |
| 1989 | 152 | - | 6.6 | - | 6 | - | 0.3 | - |
| 1990 | 115 | - | 4.9 | - | 6 | - | 0.3 | - |
| 1991 | 135 | - | 5.7 | - | 7 | - | 0.3 | - |
| 1992 | 141 | - | 6.0 | - | 5 | - | 0.2 | - |
| 1993 | 128 | - | 5.3 | - | 4 | - | 0.2 | - |
| 1994 | 151 | - | 6.2 | - | 3 | - | 0.1 | - |
| 1995 | 138 | - | 5.6 | - | 3 | - | 0.1 | - |
| 1996 | 150 | - | 6.1 | - | 6 | - | 0.3 | - |
| 1997 | 151 | - | 6.0 | - | 9 | - | 0.4 | - |
| 1998 | 156 | - | 6.3 | - | 6 | - | 0.3 | - |
| 1999 | 172 | - | 6.9 | - | 6 | - | 0.2 | - |
| 2000 | 218 | - | 8.7 | - | 7 | - | 0.3 | - |
| 2001 | 182 | - | 7.2 | - | 5 | - | 0.2 | - |
| 2002 | 181 | - | 7.1 | - | 7 | - | 0.3 | - |
| 2003 | 181 | - | 7.1 | - | 7 | - | 0.3 | - |
| 2004 | 171 | - | 6.7 | - | 5 | - | 0.2 | - |
| 2005 | 189 | - | 7.4 | - | 4 | - | 0.1 | - |
| 2006 | 145 | - | 5.6 | - | 4 | - | 0.2 | - |

Table III-26.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Testis Cancer

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 56 | - | 1.5 | - | 1 | - | 0.0 | - |
| 20 – 34 | 389 | - | 14.8 | - | 4 | - | 0.2 | - |
| 35 – 49 | 340 | - | 11.3 | - | 10 | - | 0.3 | - |
| 50 – 64 | 68 | - | 3.3 | - | 6 | - | 0.3 | - |
| 65 – 74 | 9 | - | 1.3 | - | 4 | - | 0.6 | - |
| 74 – 85 | 5 | - | 1.1 | - | 1 | - | 0.2 | - |
| 85 and older | 0 | - | 0.0 | - | 1 | - | 0.7 | - |

Table III-26.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Testis Cancer

| Race and Ethnicity† | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|----------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 867 | - | 6.8 | - | 27 | - | 0.2 | - |
| American Indian | | | | | | | | |
| Statewide | 8 | - | ~ | - | 1 | - | ~ | - |
| CHSDA Counties | 4 | - | ~ | - | 0 | - | ~ | - |
| Asian/Pacific Isl. | 5 | - | ~ | - | 2 | - | ~ | - |
| Black | 7 | - | ~ | - | 0 | - | ~ | - |
| Non-Hispanic White | 807 | - | 7.4 | - | 24 | - | 0.2 | - |
| Hispanic (All Races) | 19 | - | 2.5 | - | 0 | - | ~ | - |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

† Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data. Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Testis

Table III-26.4: Other Minnesota cancer statistics†, 2004-2006, Testis Cancer

| | Males | Females |
|----------------------------|--------------|---------|
| Median Age at Diagnosis | 34.0 | - |
| Median Age at Death | 50.0 | - |
| Lifetime Risk of Diagnosis | 0.4% | - |
| Lifetime Risk of Death | < 0.0% | - |
| Annual Percent Change‡ | | |
| Incidence (1988-2006) | 1.5% | - |
| Mortality (1997-2006) | -7.4% | - |

† See Methods section for definition of terms.

‡The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-26.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Testis Cancer

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | 5.4 | - |
| Non-Hispanic White | 7.1 | - |
| Mortality | | |
| All Races | 0.3 | - |
| Non-Hispanic White | 0.3 | - |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-26.6: Extent of disease at diagnosis and five-year relative survival, Testis Cancer

| Stage at Diagnosis | Percent of Cases† (%) | 5-Year Relative Survival‡ (%) |
|--------------------|-----------------------|-------------------------------|
| <i>In Situ</i> | 0.4 | - |
| Localized | 70.2 | 99.2 |
| Regional | 19.7 | 95.9 |
| Distant | 8.9 | 71.0 |
| Unknown | 0.8 | 87.4 |

†Among Minnesota cases diagnosed 2004-2006.

‡Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

Descriptive Epidemiology

Incidence and Mortality: Over the five-year period 2002-2006, testicular cancer accounted for 1.5 percent of cancer diagnoses among Minnesota men. About 175 cases were diagnosed each year, while five deaths occurred annually as a result of testicular cancer. Incidence and mortality rates for testicular cancer among non-Hispanic whites are about the same in Minnesota as nationally. The 5-year relative survival rates reported by SEER among cases diagnosed 1999-2005 are 99.2

percent for localized tumors and 95.9 percent for regional tumors. Most cases in Minnesota are diagnosed while the tumor is localized (70.2%).

Trends: A statistically significant increase of 1.5 percent per year in the incidence of testicular cancer was observed among Minnesota men since 1988, accompanied by a significant decrease of 7.4 percent in mortality starting in 1997. Nationally, among all races, incidence increased significantly by 1.4 percent per year since the mid-1970s, while mortality decreased through the mid-1990s, and then began to level off.

Age: Testicular cancer is most commonly diagnosed between the ages of 20 and 49 years, with the median age at diagnosis being 34.0 years. About 45 percent of cancers are diagnosed among those 20 to 34 years of age.

Race: In Minnesota, too few cases occurred among men of color to assess race/ethnic differences in the risk of testicular cancer. In the U.S., non-Hispanic white men have over five times the risk of developing testicular cancer compared to blacks, more than four times the risk of Asian/Pacific Islanders and nearly two times the risk of American Indian and Hispanic men.

Risk Factors

Cryptorchidism, or undescended testicle(s), is the main risk factor for testicular cancer, accounting for about 14 percent of cases. Personal or family history of testicular cancer and exposure to exogenous hormones *in utero* has been linked to increased risk of disease. Excesses of testicular cancer have been reported among men with certain occupations, including miners, leather or utility workers, and oil and gas workers. However, studies have not yet defined specific chemicals related to risk. Several studies have examined injury and vasectomy as risk factors for testicular cancer, but have not found an increased risk associated with these exposures.

Early Detection / Prevention

Testicular cancer can be found in the early stages of development, and most cancers are found through self-examination. The American Cancer Society recommends testicular examination at routine cancer-related checkups.

Thyroid

Table III-27.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Thyroid Cancer

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 55 | 158 | 2.9 | 7.1 | 5 | 11 | 0.3 | 0.4 |
| 1989 | 60 | 137 | 3.2 | 6.0 | 4 | 10 | 0.3 | 0.4 |
| 1990 | 66 | 155 | 3.3 | 6.7 | 9 | 12 | 0.6 | 0.5 |
| 1991 | 62 | 145 | 3.0 | 6.2 | 9 | 13 | 0.5 | 0.5 |
| 1992 | 70 | 179 | 3.6 | 7.7 | 8 | 11 | 0.5 | 0.4 |
| 1993 | 69 | 171 | 3.2 | 7.3 | 8 | 15 | 0.4 | 0.5 |
| 1994 | 65 | 179 | 3.1 | 7.7 | 9 | 14 | 0.5 | 0.6 |
| 1995 | 58 | 181 | 2.7 | 7.7 | 7 | 11 | 0.4 | 0.4 |
| 1996 | 67 | 200 | 3.0 | 8.2 | 6 | 17 | 0.3 | 0.6 |
| 1997 | 87 | 225 | 3.9 | 9.2 | 13 | 21 | 0.6 | 0.7 |
| 1998 | 85 | 232 | 3.7 | 9.5 | 4 | 9 | 0.2 | 0.3 |
| 1999 | 89 | 233 | 3.9 | 9.5 | 7 | 19 | 0.4 | 0.7 |
| 2000 | 93 | 242 | 3.9 | 9.8 | 12 | 10 | 0.6 | 0.4 |
| 2001 | 87 | 276 | 3.7 | 10.9 | 12 | 14 | 0.6 | 0.5 |
| 2002 | 108 | 274 | 4.4 | 10.8 | 2 | 8 | 0.1 | 0.3 |
| 2003 | 104 | 315 | 4.3 | 12.2 | 7 | 20 | 0.3 | 0.7 |
| 2004 | 115 | 360 | 4.5 | 13.8 | 5 | 16 | 0.2 | 0.5 |
| 2005 | 126 | 334 | 5.0 | 12.9 | 10 | 19 | 0.4 | 0.6 |
| 2006 | 137 | 407 | 5.4 | 15.6 | 11 | 18 | 0.4 | 0.6 |

Table III-27.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Thyroid Cancer

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 14 | 37 | 0.4 | 1.1 | 0 | 0 | 0.0 | 0.0 |
| 20 – 34 | 75 | 364 | 2.9 | 14.5 | 0 | 0 | 0.0 | 0.0 |
| 35 – 49 | 185 | 633 | 6.2 | 21.5 | 8 | 4 | 0.3 | 0.1 |
| 50 – 64 | 182 | 415 | 8.7 | 19.7 | 8 | 13 | 0.4 | 0.6 |
| 65 – 74 | 72 | 122 | 10.2 | 15.2 | 13 | 20 | 1.8 | 2.5 |
| 74 – 85 | 53 | 87 | 11.9 | 13.6 | 6 | 24 | 1.4 | 3.8 |
| 85 and older | 9 | 32 | 6.2 | 9.5 | 0 | 20 | 0.0 | 5.9 |

Table III-27.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Thyroid Cancer

| Race and Ethnicity† | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|----------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 590 | 1,690 | 4.7 | 13.0 | 35 | 81 | 0.3 | 0.5 |
| American Indian | | | | | | | | |
| Statewide | 2 | 14 | ~ | 9.9 | 1 | 1 | ~ | ~ |
| CHSDA Counties | 0 | 6 | ~ | ~ | 0 | 1 | ~ | ~ |
| Asian/Pacific Isl. | 14 | 54 | 5.7 | 15.0 | 1 | 3 | ~ | ~ |
| Black | 12 | 28 | 2.5 | 6.4 | 0 | 2 | ~ | ~ |
| Non-Hispanic White | 539 | 1,524 | 4.8 | 13.1 | 32 | 75 | 0.3 | 0.5 |
| Hispanic (All Races) | 12 | 28 | 3.3 | 10.0 | 1 | 0 | ~ | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

† Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data.

Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Thyroid

Table III-27.4: Other Minnesota cancer statistics†, 2004-2006, Thyroid Cancer

| | Males | Females |
|---|-------------|-------------|
| Median Age at Diagnosis | 52.0 | 45.0 |
| Median Age at Death | 67.0 | 77.0 |
| Lifetime Risk of Diagnosis | 0.4% | 1.2% |
| Lifetime Risk of Death | < 0.0% | 0.1% |
| Annual Percent Change‡ | | |
| Incidence (1995-2006 males; 1988-2006 females) | 4.8% | 5.0% |
| Mortality (1988-2006) | -0.4% | 1.4% |

† See Methods section for definition of terms.

‡The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-27.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Thyroid Cancer

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | 4.9 | 14.2 |
| Non-Hispanic White | 5.7 | 15.7 |
| Mortality | | |
| All Races | 0.5 | 0.5 |
| Non-Hispanic White | 0.5 | 0.5 |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-27.6: Extent of disease at diagnosis and five-year relative survival, Thyroid Cancer

| Stage at Diagnosis | Percent of Cases† (%) | 5-Year Relative Survival‡ (%) |
|--------------------|-----------------------|-------------------------------|
| <i>In Situ</i> | 0.0 | - |
| Localized | 65.3 | 99.8 |
| Regional | 28.5 | 97.0 |
| Distant | 3.4 | 59.0 |
| Unknown | 2.9 | 89.4 |

†Among Minnesota cases diagnosed 2004-2006.

‡Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

Descriptive Epidemiology

Incidence and Mortality: Over the five-year period 2002-2006, thyroid cancer accounted for 1.9 percent of cancers in Minnesota, and 0.3 percent of cancer-related deaths. About 455 cases were diagnosed each year, and about 25 deaths occurred annually as a result of thyroid cancer. Based on SEER data, the 5-year relative survival rate for thyroid cancer is 99.8 percent for localized tumors and 97.0 percent for regional tumors. Most cases

in Minnesota are diagnosed while the tumor is localized (65.3%). Among non-Hispanic whites, incidence rates in Minnesota are significantly lower than in the SEER 17 areas for both men and women, while mortality is only significantly lower among males. In general, incidence rates reflect young women with papillary or follicular carcinomas, while mortality reflects elderly persons with undifferentiated carcinomas.

Trends: Statistically significant increases in thyroid cancer incidence rates of about 5.0 percent per year were observed in both males and females in Minnesota. Despite these marked increases, mortality rates were stable. Nationally, incidence rates have also increased significantly by 6.5 percent per year from 1997-2006. U.S. mortality rates increased significantly by an average of 0.7 percent per year over the last two decades among whites, but not blacks.

Age: Thyroid cancer incidence does not increase dramatically with age. In Minnesota, 81 percent of cases were diagnosed among persons 20 to 64 years of age.

Gender: Thyroid cancer is one of the few cancers that occur more often in women than men. Until age 65, rates among women are two to three times higher than those of men in the same age category.

Race: The incidence rate of thyroid cancer in Minnesota is highest among Asian/Pacific Islander women, followed by non-Hispanic white women. Incidence rates in black women are about 60 percent lower than rates for non-Hispanic white women. There are too few deaths among people of color in Minnesota to assess racial or ethnic disparities in thyroid cancer mortality. National data show a similar race/ethnic pattern as Minnesota.

Risk Factors

The increasing incidence of thyroid cancer is felt to be at least partially explained by the increased use of thyroid ultrasound, which can identify small thyroid nodules that might otherwise have gone undetected. Radiation exposure is a proven risk factor for thyroid cancer, particularly exposure during childhood. Diets low in iodine, which is essential in thyroid gland regulation, can increase risk of developing thyroid cancer. Heritable conditions and family history of thyroid cancer also increase risk.

Early Detection / Prevention

The American Cancer Society recommends that people ages 20 and over having periodic health exams should receive a cancer-related checkup, including a thyroid examination.

Urinary Bladder

Table III-28.1: Number of new cases and deaths and incidence and mortality rates[§] by year, Minnesota, 1988-2006, Urinary Bladder Cancer

| Year of Diagnosis or Death | Incidence | | | | Mortality | | | |
|----------------------------|-----------|---------|-------------|---------|-----------|---------|-------------|---------|
| | New Cases | | Annual Rate | | Deaths | | Annual Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 1988 | 605 | 220 | 35.5 | 9.4 | 130 | 68 | 8.4 | 2.7 |
| 1989 | 640 | 224 | 37.6 | 9.3 | 123 | 51 | 8.0 | 2.0 |
| 1990 | 617 | 239 | 35.8 | 9.9 | 97 | 56 | 6.0 | 2.1 |
| 1991 | 731 | 213 | 42.1 | 8.8 | 110 | 74 | 6.8 | 2.7 |
| 1992 | 683 | 268 | 38.3 | 10.9 | 132 | 60 | 7.9 | 2.1 |
| 1993 | 678 | 235 | 37.3 | 9.2 | 116 | 40 | 7.1 | 1.4 |
| 1994 | 673 | 241 | 36.6 | 9.5 | 132 | 62 | 7.8 | 2.2 |
| 1995 | 683 | 226 | 36.7 | 8.5 | 113 | 63 | 6.7 | 2.1 |
| 1996 | 662 | 274 | 34.9 | 10.6 | 159 | 60 | 9.0 | 2.1 |
| 1997 | 736 | 231 | 38.3 | 8.7 | 136 | 84 | 7.7 | 2.8 |
| 1998 | 752 | 268 | 38.4 | 10.0 | 133 | 63 | 7.3 | 2.0 |
| 1999 | 757 | 263 | 38.2 | 9.8 | 129 | 70 | 6.9 | 2.2 |
| 2000 | 753 | 256 | 37.3 | 9.5 | 146 | 63 | 7.8 | 1.9 |
| 2001 | 814 | 271 | 39.4 | 10.0 | 146 | 51 | 7.4 | 1.6 |
| 2002 | 840 | 296 | 39.7 | 10.4 | 164 | 77 | 8.4 | 2.6 |
| 2003 | 826 | 313 | 38.5 | 11.3 | 149 | 79 | 7.3 | 2.6 |
| 2004 | 927 | 302 | 42.9 | 10.7 | 155 | 61 | 7.6 | 2.0 |
| 2005 | 876 | 296 | 39.9 | 10.1 | 137 | 59 | 6.6 | 1.8 |
| 2006 | 898 | 270 | 40.0 | 9.2 | 148 | 62 | 6.9 | 1.9 |

Table III-28.2: Number of new cases and deaths and average annual incidence and mortality rates[§] by age, Minnesota, 2002-2006, Urinary Bladder Cancer

| Age at Diagnosis or Death (years) | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|-----------------------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| 0 – 19 | 3 | 2 | 0.1 | 0.1 | 0 | 0 | 0.0 | 0.0 |
| 20 – 34 | 17 | 7 | 0.6 | 0.3 | 0 | 1 | 0.0 | 0.0 |
| 35 – 49 | 181 | 77 | 6.0 | 2.6 | 14 | 8 | 0.5 | 0.3 |
| 50 – 64 | 1000 | 316 | 47.9 | 15.0 | 90 | 36 | 4.3 | 1.7 |
| 65 – 74 | 1,309 | 362 | 185.4 | 45.2 | 174 | 67 | 24.6 | 8.4 |
| 74 – 85 | 1,366 | 467 | 307.6 | 73.2 | 269 | 106 | 60.6 | 16.6 |
| 85 and older | 491 | 246 | 339.4 | 72.7 | 206 | 120 | 142.4 | 35.4 |

Table III-28.3: Number of new cases and deaths and average annual incidence and mortality rates[§] by race and ethnicity, Minnesota, 2002-2006, Urinary Bladder Cancer

| Race and Ethnicity† | Incidence 2002-2006 | | | | Mortality 2002-2006 | | | |
|----------------------|---------------------|---------|--------------|---------|---------------------|---------|--------------|---------|
| | Total Cases | | Average Rate | | Total Deaths | | Average Rate | |
| | Males | Females | Males | Females | Males | Females | Males | Females |
| All Races | 4,367 | 1,477 | 40.2 | 10.3 | 753 | 338 | 7.3 | 2.2 |
| American Indian | | | | | | | | |
| Statewide | 11 | 6 | 19.5 | ~ | 1 | 5 | ~ | ~ |
| CHSDA Counties | 8 | 6 | ~ | ~ | 0 | 3 | ~ | ~ |
| Asian/Pacific Isl. | 23 | 6 | 19.3 | ~ | 0 | 2 | ~ | ~ |
| Black | 61 | 22 | 35.2 | 12.2 | 6 | 7 | ~ | ~ |
| Non-Hispanic White | 4,215 | 1,427 | 40.5 | 10.4 | 742 | 321 | 7.5 | 2.1 |
| Hispanic (All Races) | 15 | 8 | 15.3 | ~ | 4 | 3 | ~ | ~ |

Source: MCSS (Sept 2009). Cases were microscopically confirmed or Death Certificate Only (1995+). *In situ* cancers except those of the bladder were excluded. Deaths were from the Minnesota Center for Health Statistics. All analyses were conducted by MCSS.

[§] Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

† Non-Hispanic persons reported with unknown or other race are included in all races combined, but are excluded from race-specific data.

Hispanic includes persons of any race. CHSDA is Contract Health Services Delivery Area, as defined by the Indian Health Services (see Appendix C). See text for comments on the accuracy of race- and ethnic-specific cancer rates.

~ Race-specific rates based on fewer than 10 cases or deaths are not presented.

Urinary Bladder

Table III-28.4: Other Minnesota cancer statistics†, 2004-2006, Urinary Bladder Cancer

| | Males | Females |
|----------------------------|-------------|---------|
| Median Age at Diagnosis | 73.0 | 74.0 |
| Median Age at Death | 78.0 | 82.0 |
| Lifetime Risk of Diagnosis | 4.6% | 1.3% |
| Lifetime Risk of Death | 0.9% | 0.3% |
| Annual Percent Change‡ | | |
| Incidence (1988-2006) | 0.5% | 0.5% |
| Mortality (1988-2006) | -0.3% | -0.7% |

† See Methods section for definition of terms.

‡The average *annual percent change* in the age-adjusted rate over the time period. Statistically significant ($P < 0.05$) trends are in **bold**.

Table III-28.5: Average annual incidence and mortality rates§ in the United States, 2002-2006, Urinary Bladder Cancer

| | Males | Females |
|--------------------|-------|---------|
| Incidence | | |
| All Races | 37.1 | 9.3 |
| Non-Hispanic White | 42.9 | 10.5 |
| Mortality | | |
| All Races | 7.5 | 2.2 |
| Non-Hispanic White | 8.2 | 2.3 |

Source: SEER Cancer Statistics Review, 1975-2006. Incidence data are from the SEER 17 regions, accounting for 26% of the US population, while mortality data are for the entire nation.

§Rates are per 100,000 persons and are age-adjusted to the 2000 US population.

Table III-28.6: Extent of disease at diagnosis and five-year relative survival, Urinary Bladder Cancer

| Stage at Diagnosis | Percent of Cases† (%) | 5-Year Relative Survival‡ (%) |
|----------------------------|-----------------------|-------------------------------|
| <i>In Situ</i> / Localized | 86.8 | ~ |
| <i>In Situ</i> | ~ | 92.7 |
| Localized | ~ | 74.3 |
| Regional | 7.3 | 36.2 |
| Distant | 3.3 | 5.8 |
| Unknown | 2.7 | 56.0 |

†Among Minnesota cases diagnosed 2004-2006.

‡Among SEER 17 cases diagnosed 1999-2005 followed into 2006, from SEER Cancer Statistics Review, 1975-2006.

~ Data not available.

Descriptive Epidemiology

Incidence and Mortality: Over the five-year period 2002-2006, cancer of the urinary bladder accounted for 4.9 percent of newly diagnosed cancers in Minnesota and 2.4 percent of cancer deaths. Approximately 1,170 cases of urinary bladder cancer were diagnosed annually, and 220 deaths occurred each year as a result of this cancer. Among non-Hispanic whites, incidence and mortality

rates in Minnesota are significantly lower among males and similar among females to those reported by SEER and for the U.S. Based on SEER data, the 5-year relative survival rate is 92.7 percent for urinary bladder cancers diagnosed in the *in situ* stage and 74.3 percent for those diagnosed at the localized stage. In Minnesota, about 86.8 percent of cases are diagnosed at these stages.

Trends: The incidence rate of bladder cancer in Minnesota has increased by 0.5 percent a year since 1988 among both men and women, while the mortality rate has been stable. In the SEER 9 areas, incidence has been stable among males for two decades, but has increased significantly among women by 0.2 percent per year since 1975. Nationally, the bladder cancer mortality rate is decreasing slowly but significantly among women. Among U.S. males, mortality decreased significantly from 1993-2003, and then stabilized.

Age: Urinary bladder cancer incidence rates increase sharply with age. About 60 percent of cancers are diagnosed among those 65 to 84 years of age.

Gender: Incidence and mortality rates of urinary bladder cancer are three to four times higher in men than women.

Race: Urinary bladder cancer rates are highest among non-Hispanic white males in Minnesota, followed by black men. There are too few cases among people of color in the state to adequately assess disparities in urinary bladder mortality. Nationally, the highest rates among men are in non-Hispanic whites, and black men and Hispanic men have similar rates, which are about half that of whites.

Risk Factors

Cigarette smoking is a strongly established risk factor for bladder cancer. It accounts for 50 percent of cases among men and about 25 percent among women. Occupational exposures to cyclic chemicals, such as benzene derivatives and arylamines, are known to increase risk. Diets low in fruits and/or vegetables have also been linked to this disease. Chronic bladder inflammation, personal history of bladder cancer, and certain birth defects involving the bladder increase the risk of developing urinary bladder cancer.

Early Detection / Prevention

Screening for cancer of the urinary bladder in the general population is currently not recommended because research has not shown a clear benefit. The most effective way of preventing development of urinary bladder cancer or decreasing risk of disease is not to smoke.