South Dakota

An Annual Report on Cancer Incidence and Mortality Among South Dakotans, 2016

South Dakota Cancer Registry
April 2019

Cancer In South Dakota 2016

South Dakota Cancer Registry, South Dakota Department of Health

Preface

"Cancer in South Dakota 2016" is the 24th annual report from the South Dakota Cancer Registry (SDCR) in the Office of Chronic Disease Prevention and Health Promotion in the Division of Family and Community Health within the South Dakota Department of Health (DOH). The report contains 2016 cancer incidence and mortality data of South Dakota residents.

Acknowledgements

The South Dakota Cancer Registry acknowledges all the Certified Tumor Registrars in hospital cancer registries who work diligently to maintain quality data, hospitals, clinics, physicians, pathology laboratories and other providers and health entities that submit data to the SDCR, and co-workers in the Department of Health.

Funding Source

This publication was funded by the South Dakota Cancer Registry with a grant from the Centers for Disease Control and Prevention – grant number DP006293.

Changes in Report

Age-adjusted rates were calculated using the 2000 US standard million and the US Census Bureau 2002 – 2016 population estimates for South Dakota. Reports published before 2012 used the 2000 South Dakota census population for age-adjusted calculations and are not comparable to this report.

Requests for Information

Data queries, cancer concerns, information, or requests for additional copies (if available) should be addressed to:

Kay Dosch, MA, CTR, SDCR Coordinator
South Dakota Cancer Registry
615 East 4th Street
Pierre, SD 57501-1700
Phone: (605) 773-6345

Suggested Citation

Cancer in South Dakota, 2016. Department of Health, Pierre, SD. April 2019. All material in this report may be reproduced or copied without permission. However, citation as to source is appreciated.

Web Access: This report is available on the internet at the following URL: http://getscreened.sd.gov/documents/Cancer2016.pdf

The following Department of Health personnel were the main contributors to the development of this report:

Mary Sarvis	SDCR Data Manager
Karen Cudmore	Cancer Programs Director
Kay Dosch	SDCR Coordinator
Mark Gildemaster	Management Analyst
Rebecca Piroutek	Communications Coordinator
Ashley Miller	Epidemiologist

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES (cont'd)

LIST OF FIGURES (cont'd)

I. EXECUTIVE SUMMARY

This report summarizes the burden of cancer in South Dakota and includes cancer incidence and mortality data. The data will enable the many organizations working with cancer prevention and control to identify public health problems, target goals for cancer control, and to inform citizens and health care professionals about risks, early detection, and treatment.

Incidence 2016

- South Dakota had 4,650 reportable invasive cases of cancer diagnosed, which excludes the less life-threatening cancers such as *in situ* cancers (except *in situ* bladder cases) and the common skin cancers.
- Each day 13 cases of cancer were diagnosed in residents of South Dakota; this includes only cases of invasive cancer and *in situ* bladder.
- The five most diagnosed cancer sites (lung, prostate, female breast, colorectal, melanoma) accounted for 53% of all cancer cases.
- Lung cancer was the most common reportable malignancy with 625 cases, 13.4% of all cases.
- Prostate cancer was the second most common reportable cancer with 620 cases, 13.3% of all cases and 25.5% of cases for men.
- Female breast cancer was the third most common reportable malignancy with 571 cases among women, accounting for 12.3% of all cases and 25.8% of cases for women.
- Colon and rectal cancers were the fourth most common malignancy with 406 cases, 8.7% of all cases.
- Melanoma cancers were the fifth most common malignancy with 232 cases, 5.0% of all reported cases.
- Fifty-two percent of all new cancers were diagnosed in males and 48% were in females.
- Males had an age-adjusted incidence rate of 486.4 per 100,000, which was higher than females who had an age-adjusted rate of 422.8 per 100,000.
- Whites accounted for 92.9% of cancer cases with 4,321 cases whereas American Indians were 5.2% with 244 cases.
- The American Indian age-adjusted incidence rate was 502.5, which is higher than the age-adjusted rate among whites of 448.4.
- The South Dakota age-adjusted incidence rate for 2016 was 448.3, significantly higher than the US SEER 2016 age-adjusted incidence rate of 429.9 per 100,000 persons.

Mortality 2016

- Overall, cancer was the second leading cause of death in South Dakota.
- In 2016, 1,722 South Dakotans died from cancer, accounting for one in every four deaths in South Dakota.
- Each day four South Dakotans died from cancer.
- The five cancer sites (lung, colorectal, pancreas, female breast, prostate) caused 53.7% of all cancer deaths.
- Lung and bronchus cancers were the leading cause of cancer deaths at 418 deaths or 24.3% of all cancer deaths. Lung and bronchus cancers caused one in four deaths due to cancer.
- Colorectal cancer was the second leading cause of cancer deaths with 164 deaths, 9.5% of all cancer deaths.
- Pancreatic cancer was the third leading cause of death with 128 deaths, 7.4% of all cancer deaths.
- Female breast cancer was the fourth leading cause of cancer deaths with 109 deaths, 6.3% of all cancer deaths and 14.1% of all female cancer deaths.
- Prostate cancer was the fifth leading cause of death with 107 deaths, 6.2% of all cancer deaths and 11.3% of all male cancer deaths.
- Over half, 55% of all cancer deaths were males and 45% were females.
- Males had an age-adjusted death rate of 198.1 per 100,000 males, 49.3% higher than females with an age-adjusted rate of 132.7 deaths per 100,000 females.
- Whites accounted for 93.8% of deaths with 1,615 deaths, whereas American Indians were 5.2% with 90 deaths.
- The American Indian age-adjusted death rate was 200.8 which is 26.2% higher than the rate among whites at the age-adjusted death rate of 159.1.
- South Dakota's age-adjusted death rate for 2016 was 160.4, no significant difference than the US SEER 2016 rate of 155.9.

Trends

- Melanoma incidence cases have increased significantly since 2009.
- For the last decade, female breast cancer mortality rates have remained steady.
- Fifty percent of cancer deaths occur at age 75 or above.

.

II. INTRODUCTION

A limited cancer data collection system was established in 1992 under South Dakota Codified Laws, SDCL 1-43-1 to 1-43-18, and Administrative Rules ARSD 44:22:01 to 44:22:05, inclusive. The South Dakota Cancer Registry (SDCR) was established in 2001 to develop a statewide, population-based cancer surveillance system. However, the state legislature amended the law to expand reporting to reflect statewide surveillance. SDCL 1-43-14 has been in effect since July 1, 2005:

> *Any hospital licensed pursuant to chapter 34-12, physician licensed pursuant to chapter 36-4, physician assistant licensed pursuant to chapter 36-4A, nurse practitioner or nurse midwife licensed pursuant to chapter 36-9A, pathology laboratory, or free-standing radiology center that detects, diagnoses, or treats a cancer case in South Dakota shall submit a report to the Department of Health as required by § 1-43-11 to 1-43-17, inclusive*.

Reportable cancers for 2016 include benign brain, benign central nervous system and all malignant neoplasms except basal and squamous cell carcinomas of the skin and *in situ* cervical cancers. In addition to receiving cases from hospital cancer registries the SDCR actively follows back pathology reports and abstracts cases from facilities without tumor registries.

The SDCR performs many quality assurance procedures to assure that the data are valid. The data are run through numerous edits and consolidated if received from more than one reporting source. In addition, the SDCR links the incidence data with mortality files to identify persons whose death records show cancer as a cause of death, but these cancers were not reported to the central registry. The SDCR also links the incidence file with the Indian Health Service database to identify any American Indian South Dakotan who was misclassified as another race.

The SDCR uses the cancer incidence data reported as well as the mortality data and health behavior surveys collected by the department's Health Statistics Office and Vital Records to provide useful information for cancer control and prevention programs, researchers, clinicians, and policy makers. The SDCR is able to answer several epidemiological questions such as:

- How many South Dakotans are diagnosed or die from cancer each year?
- What are the most common cancers?
- When are cancers being diagnosed, i.e. at what stage?
- Which cancers are the deadliest?
- Who is most affected by cancer?
- What are the trends in cancer incidence and mortality?
- Where are cancers occurring?
- Where and what are the disparities?
- Are screening efforts working?

Every life is touched by cancer in some way whether one is diagnosed with the disease or has a family member or friend with the disease. Although cancer is primarily a disease of people over 50 years old, the younger a person dies from cancer, the greater the impact on societal and economic costs. Cancer concerns voiced by South Dakotans are a priority for the SDCR.

As the SDCR continues to collect population based data and as more health care entities and providers report cases, more questions can be answered with the data. For example, SDCR can look at modifiable risk factors such as obesity and exercise. The Harvard Report on Cancer Prevention in 1996 researched the risk factors for cancer. The estimated percentages (which are still relevant today) of total cancer deaths attributed to established causes of cancer were:

Risk Factor	Percentage
Tobacco	30%
Adult diet/obesity	30%
Sedentary lifestyle	5%
Occupational factors	5%
Family history of cancer	5%
Viruses/biological agents	5%
Perinatal factors/growth	5%
Reproductive factors	3%
Alcohol	3%
Socioeconomic status	3%
Environmental pollution	2%
Ionizing /UV radiation	2%
Prescription drugs/medical	1%
Salt/food additives/contaminants	1%

The most successful way to prevent cancer is to limit the number of modifiable risk factors by following these guidelines:

- Do not smoke
- Maintain a healthy weight
- Get at least 30 minutes of physical activity every day
- Eat a healthy diet
- Limit alcohol intake to less than one drink a day
- Protect yourself from the sun

Some risk factors for cancer can be avoided, but many cannot. For example, both smoking and inheriting certain genes are risk factors for some types of cancer, but only smoking can be avoided. Risk factors that a person can control are called modifiable risk factors.

Source: National Cancer Institute

The SDCR continuously expands data collection. This will help prevention and control programs to target at risk populations as well as support epidemiologic studies. The end goal is to reduce the cancer burden by producing valid and accurate data reflecting the complete assessment of cancer in South Dakota, and to disseminate the information in a timely manner.

III. TECHNICAL NOTES

Age-adjusted incidence rate: Age-adjusted incidence rates are calculated using the direct method and standardized to the age distribution of the 2000 US standard population (Appendix A). Age adjustment allows rates for one geographic area to be compared with rates from other geographic areas that may have differences in age distributions. Any observed differences in age-adjusted incidence rates between populations are not due to different age structures. Reports prior to 1999 used the 1970 US standard population. In conformity with the National Cancer Institute's (NCI) Surveillance, Epidemiology, and End Results (SEER) Program guidelines, the incidence rates for cancer sites exclude the following:

- *In situ* cases, except bladder
- Basal and squamous cell skin cancers
- Cases with unknown age
- Cases with unknown gender

Age-adjusted mortality rates: Mortality rates are calculated for total cases and separately for males and females. The mortality rates are age-adjusted to the 2000 US standard population using five-year groups and are per 100,000 persons. Rates are presented for 2016 and for the five-year period, 2012-2016.

Age-specific incidence rates: Age specific rates are calculated by dividing the number of cases for a given age group by the total population of that age group and are expressed as an average annual rate per 100,000 persons by age group. Age specific rates exclude the same types of cases that are excluded from age-adjusted incidence rates. These rates, however, are crude rates, i.e. not age-adjusted.

Annual percent change (APC): The annual percent change is the average rate of change in a cancer rate per year in a given time frame indicating how fast or how slowly a cancer rate has increased or decreased each year over a period of years. A negative APC describes a decreasing trend, and a positive APC describes an increasing trend.

Average years of life lost (AYLL): This is the extent to which life is cut short due to premature death. This is obtained by dividing the years of potential life lost (YPLL) by the number of deaths. On average each person who dies from cancer loses 15 years of their life.

Cancer case definitions: A "cancer case" is defined as the primary cancer site, i.e., the site where the cancer started. Since an individual can have more than one primary cancer site, the number of incident cancer cases could be greater than the number of persons who are diagnosed with cancer. A *metastasis* is not a primary site.

Changes in diagnostic criteria: Early detection resulting from either screening or early response to symptoms may result in increasing diagnosis of small tumors that are not yet life-threatening. This may raise incidence and survival rates but without changes in mortality rates. Cancers likely to be affected are breast, colon, cervix uteri, prostate, and melanoma. Prostate cancer is particularly prone to changing diagnostic criteria.

Confidence intervals (CI): A confidence interval tells how confident we are of the accuracy of the calculated rates. The SDCR uses a computed interval with a given probability of 95%, i.e., the true value of the calculated rate is contained within the interval. Thus, given a calculated rate of 191.4 and a confidence interval of 182.1 to 200.8, it is better to say that the true rate will fall between 182.1 and 200.8. The larger the sample size, the shorter the interval size, giving us more certainty that the rate is correct. When CI for percentages contains zero, the rate is considered to be stable. Above zero, the statistical significance is higher and below zero it is lower.

Data source: All data, tables, and figures come from the South Dakota Department of Health, *American Cancer Society Facts and Figures 2016* or *SEER Cancer Statistics Review 1975-2015* and should be cited as such if taken out of this report in part. SEER data represents approximately 10% of the U.S population.

Disparity: Health disparities are differences in the incidence, prevalence, mortality, and burden of diseases and other adverse health conditions that exist among specific population groups in the United States.[1] Health disparities can be defined as a specific group bearing a disproportionate share of negative health outcomes compared to the general population, i.e., disease, disability, and death.[2] Disparity can occur as a result of factors such as poverty, living in geographically underserved areas and belonging to specific minority groups.

Early detection/screening: Improved early detection/screening may produce increases in both incidence and survival rates. Increases may occur as a result of the introduction of new procedures. The interval between the time a cancer is diagnosed by a screening procedure and the time when it would have been diagnosed in the absence of screening procedures is called the lead-time. Changes in lead-time, for example, in breast cancer diagnosis, have led to increased survival rates and reduction of mortality.

Limitations to data interpretation and comparison: A number of factors need to be considered when reviewing cancer statistics and interpreting them. A cancer registry database is a fluid and dynamic database, therefore, the reported number of new cases in a particular race, gender, and age cancer category may change for the calendar year for which the data have already been reported in a previous publication. Additional cancer cases which have been previously overlooked for a given diagnosis year may be found and reported to the central registry. There may also be elimination of duplicate records for the same patient, often due to name changes or spelling corrections.

Metastasis: When cancer spreads from the primary site to other organs or tissues of the body, it is said to metastasize. Cancer usually spreads through the blood or the lymphatic system.

Mortality/incidence ratio (M/I): This ratio is calculated by dividing the number of deaths in a given year by the number of new cancers diagnosed in the same year. The death to case ratio provides a crude indication of the prognosis for patients. A ratio approaching 1.0, when the number of deaths equals the number of cases for a particular type of cancer, indicates a poor prognosis. A lower ratio indicates fewer deaths relative to the number of cases and suggests a better prognosis.

***Percent change*:** This is the difference between two rates expressed as a percentage.

Racial misclassifications: When race is not specified in a source document and the default is to record these cases as white or unknown, the results are considered biased. Numerator error can occur because of misclassification.

Rate comparisons: When comparing age-adjusted rates and age-specific rates based on fewer than 10 cases, rate comparisons are difficult to interpret. In comparing rates among geographic areas such as counties, states and health districts, the absolute numbers and differences in demographics should be considered, as well as clinical significance of the disease. Data quality indicators for each registry should also be reviewed. Interpretations made without considering these factors may be misleading. There will also be differences between mortality statistics published by various agencies and the mortality rates in this report.

Risks and associated risk factors: These were developed using the "American Cancer Society Textbook of Oncology," and the Harvard Cancer Center, *Causes of Human Cancer*.

Stage at time of diagnosis: Staging is the process of describing the extent or spread of disease from the origin, which is the primary site. Summary staging is the standard used for comparison nationally. SEER Summary Stages 2000 are defined as follows:

- ***In Situ:*** Malignant cells are within the cell group from which they arose, without penetration of the basement membrane of the tissue and no stromal invasion. *In situ* is "in place".

- ***Localized:*** The malignant cells are limited to the organ of origin and have spread no farther than the organ in which they started.

- ***Regional:*** The tumor is beyond the limits of the organ of origin by direct extension to adjacent areas with or without lymph node involvement.

- ***Distant:*** The primary tumor has broken away and has traveled, growing secondary tumors in other parts of the body. It has metastasized.

In situ and localized stages are the ***early stages*** of diagnosis. Regional and distant stages are ***late stage*** diagnoses.

Staging: Stage is based on an assessment of the size of the primary tumor, whether it has spread, and, if so, how far. Because an accurate diagnosis is so important to effective treatment, physicians might use physical exams, imaging, lab tests, a biopsy, an analysis of the patient's body fluids, and surgery in various combinations in the staging process. Advancement in diagnostic procedures may change in due time. These advancements might increase the chance that a given cancer will be diagnosed at a more advanced stage, for example with new scanning methods metastases can be detected. Therefore, if someone was previously diagnosed with a localized tumor, they may now be staged as distant. This is called stage migration and can affect the analysis of all solid tumors.

Statistical significance: This determines whether an event happens by chance alone. The null hypothesis states that in a given place and a period of time, all events occur randomly by chance. If not, then there is statistical significance. Confidence intervals are used to test statistical significance in this report. If the confidence intervals of two different rates intersect each other, then there is no statistical difference between the two rates.[3] However, if the confidence intervals do not intersect one another, there is statistical significance. This report looks at the South Dakota rates as compared to the US national rates using SEER data.

In South Dakota, case counts can be very low; therefore, magnitude bias is inherent with confidence intervals and z- tests. For example, in the year 2001, cervical cancer rates were 10 per 100,000 American Indian women, a cervical cancer age-adjusted rate six times higher than white women in South Dakota. However, the case counts were two for American Indians and 10 whites. Small numbers result in wider confidence intervals, thus less confidence in the data.

Years of potential life lost (YPLL): The years of potential life lost is calculated for each individual who dies of a cancer of interest by determining the number of years of additional expected life if that person had lived to 75 years. The YPLL in the general population associated with a particular cancer is the sum of this expectation over all those individuals who died of that cancer in a particular year. YPLL reflects the burden of cancer on younger persons while mortality rates reflect the burden on older persons.

---

[1] *http://epi.grants.cancer.gov/ResPort/HDoverview.html*
[2] *http://www.omni.org/docs/CMHFProceedings.pdf*
[3] BIOSTATISTICS *The Bare Essentials, 2nd edition Norman and Shreiner Page 512*

IV. CANCER INCIDENCE

South Dakota collected 4,650 new reportable cancer cases in 2016. Data at the county level ranged from a low incidence rate of 160.7 in Ziebach County to a high of 795.5 in Hanson County. There were seven counties with rates significantly lower than the state incidence rate of 448.3. Three counties had a significantly higher rate, compared to two counties in 2015.

The United States incidence rate for 2016 was 429.9 and the South Dakota incidence rate was 448.3 per 100,000 persons.

A map displaying the 2016 incidence rates by county can be located on page 14 of this report. On page 15 is a map displaying the mortality rates by county.

Table 1 : Cancer Cases and Incidence Rates by County
South Dakota, 2016 and 2012-2016 Average

County	2016		2012-2016^	
	Cases	Rate	Cases	Rate
South Dakota	4,650	448.3	4,530	452.9
Aurora	20	536.6	19	511.2
Beadle	110	470.7	110	488.8
Bennett	13	390.9	14	428.3
Bon Homme	45	435.9	39	388.1 ▼
Brookings	141	455.2	147	511.1 ▲
Brown	223	472.5	215	460.1
Brule	43	652.3	32	461.3
Buffalo	9	512.6	6	403.9
Butte	58	393.0	59	424.4
Campbell	9	315.6	10	423.7
Charles Mix	53	435.8	60	514.3
Clark	21	345.4	23	440.5
Clay	73	577.3	59	477.3
Codington	172	491.4	162	476.1
Corson	12	306.0	11	278.7 ▼
Custer	58	337.3 ▼	52	373.8 ▼
Davison	138	555.7 ▲	124	497.7
Day	48	484.1	39	415.6
Deuel	28	462.0	29	458.0
Dewey	23	453.6	25	517.5
Douglas	21	451.2	20	463.4
Edmunds	35	584.3	29	492.1
Fall River	49	345.1	59	490.8
Faulk	13	408.0	18	457.4
Grant	43	375.9	48	457.4
Gregory	22	294.9 ▼	33	493.1
Haakon	15	422.1	17	538.6
Hamlin	32	453.5	31	428.0
Hand	20	337.4	22	421.4
Hanson	22	795.5 ▲	20	597.4 ▲
Harding	8	491.9	5	333.7
Hughes	93	426.5	98	464.5
Hutchinson	53	464.6	48	426.3
Hyde	13	495.0	11	510.0
Jackson	9	331.7	12	348.5 ▼
Jerauld	12	255.7 ▼	14	415.1
Jones	7	599.7	7	478.6
Kingsbury	38	482.0	45	595.8 ▲
Lake	70	347.1 ▼	70	403.7 ▼
Lawrence	125	357.1 ▼	126	384.4 ▼
Lincoln	216	390.5	200	424.0 ▼
Lyman	17	372.5	20	446.8
McCook	32	436.5	39	543.4 ▲
McPherson	19	446.6	19	374.9 ▼
Marshall	32	491.3	26	418.6
Meade	118	408.9	120	405.9 ▼
Mellette	11	506.3	11	449.9
Miner	14	354.5	20	552.6
Minnehaha	966	500.2 ▲	971	523.5 ▲
Moody	29	359.4	32	392.5 ▼
Oglala Lakota	34	334.3	39	404.2
Pennington	590	439.6	527	414.9 ▼
Perkins	12	216.5 ▼	15	337.4 ▼
Potter	27	602.1	22	520.9
Roberts	57	449.0	51	400.0 ▼
Sanborn	14	373.5	15	462.0
Spink	50	467.6	46	509.9
Stanley	24	601.8	20	507.0
Sully	9	441.4	7	339.7 ▼
Todd	28	390.3	25	389.5 ▼
Tripp	42	462.0	38	436.2
Turner	53	468.4	57	479.3
Union	91	518.4	96	545.2 ▲
Walworth	29	337.6	30	340.5 ▼
Yankton	133	450.0	113	385.7 ▼
Ziebach	4	160.7 ▼	3	134.6 ▼

* Counts less than three are suppressed. Incidence rates with counts less than 20 are generally considered unstable. ▲ Rate significantly higher. ▼ Rate significantly lower.
^ Number of the cases and rates are averaged over the five-year period.
Rates per 100,000 age-adjusted to 2000 US standard population and SD 2016 estimated population. Source: South Dakota Department of Health

Table 2: Age-adjusted Incidence Rates by County for Selected Sites, 2016

	Colorectal		Lung and Bronchus		Female Breast		Prostate		Bladder		NHL	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
South Dakota	**406**	**39.3**	**625**	**57.9**	**571**	**110.9**	**620**	**112.3**	**220**	**20.5**	**185**	**18.7**
Aurora	0	0.0	4	92.5	4	257.5	4	204.1	0	0.0	*	50.1
Beadle	7	25.9	11	41.1	12	114.5	26	211.5	4	19.0	6	32.0
Bennett	*	64.1	4	116.5	*	48.0	*	54.5	*	23.0	0	0.0
Bon Homme	4	37.0	3	36.8	*	44.2	6	109.4	5	35.6	*	8.1
Brookings	17	54.4	17	57.9	20	125.0	21	131.3	6	21.2	5	18.3
Brown	15	32.4	27	56.1	32	147.5	30	120.9	12	23.2	6	14.3
Brule	*	21.2	7	101.7	8	278.2	6	132.6	*	25.4	*	30.3
Buffalo	0	0.0	*	43.1	*	92.6	*	145.9	0	0.0	0	0.0
Butte	7	47.9	7	44.4	8	89.3	*	25.0	4	24.8	4	29.9
Campbell	*	57.7	*	78.7	*	96.3	0	0.0	*	29.8	0	0.0
Charles Mix	5	32.3	8	59.4	4	68.1	10	160.4	*	9.0	*	16.3
Clark	*	31.3	*	11.5	3	78.8	*	74.6	*	11.5	*	20.5
Clay	6	44.8	16	118.0	8	130.8	7	104.7	*	12.1	*	6.2
Codington	15	40.9	27	75.1	17	103.4	19	103.9	13	38.5	12	34.3
Corson	*	17.1	0	0.0	*	106.4	*	70.1	*	29.7	0	0.0
Custer	7	48.2	9	48.9	4	60.9	9	111.1	0	0.0	*	8.9
Davison	15	59.3	20	76.9	15	119.4	23	186.6	4	15.2	8	39.4
Day	4	64.0	6	63.6	8	144.0	4	63.8	3	20.7	*	8.7
Deuel	3	39.7	5	86.5	3	114.1	3	79.8	0	0.0	*	47.5
Dewey	*	15.8	4	89.1	4	137.9	*	52.9	0	0.0	*	30.7
Douglas	4	67.9	*	21.3	0	0.0	6	222.9	3	62.9	*	20.7
Edmunds	4	48.2	7	119.0	3	78.0	9	258.5	*	12.9	*	9.5
Fall River	4	27.1	11	80.2	7	99.2	7	97.6	0	0.0	0	0.0
Faulk	*	42.3	*	28.1	4	267.1	*	120.0	*	13.3	0	0.0
Grant	6	49.8	6	48.8	5	112.1	8	140.8	3	26.1	*	7.1
Gregory	*	12.2	3	45.8	*	25.2	6	156.7	0	0.0	*	26.8
Haakon	0	0.0	3	131.4	*	55.4	*	93.2	0	0.0	3	93.9
Hamlin	0	0.0	8	96.2	*	84.2	3	81.3	0	0.0	*	12.1
Hand	3	35.7	*	19.6	3	103.0	*	85.7	0	0.0	0	0.0
Hanson	3	198.2	3	163.1	4	263.6	*	30.3	0	0.0	*	22.7
Harding	*	68.6	0	0.0	4	427.9	*	142.1	0	0.0	0	0.0
Hughes	6	29.6	14	63.7	10	88.5	22	198.0	*	9.5	5	23.8
Hutchinson	7	48.6	7	51.4	9	128.1	5	87.7	*	18.7	*	27.9
Hyde	*	50.4	*	31.8	*	195.1	3	221.2	0	0.0	0	0.0
Jackson	*	31.0	0	0.0	*	51.0	0	0.0	0	0.0	*	44.8
Jerauld	0	0.0	*	15.1	*	72.5	0	0.0	*	15.1	*	31.0
Jones	0	0.0	*	58.8	*	131.8	0	0.0	0	0.0	0	0.0
Kingsbury	8	115.1	5	57.1	7	170.0	*	18.7	*	7.5	*	13.9
Lake	9	47.1	18	86.0	4	32.0	10	88.8	*	2.9	3	14.5
Lawrence	19	53.1	11	27.7	19	96.0	9	39.2	5	14.6	5	16.6
Lincoln	14	26.5	25	44.8	28	102.1	37	134.6	7	11.2	7	11.0
Lyman	3	75.6	3	65.7	*	35.2	*	27.3	0	0.0	*	50.9
McCook	4	45.8	*	23.4	3	53.9	6	157.1	*	23.4	0	0.0
McPherson	*	40.5	*	51.7	3	117.4	3	121.3	*	25.5	0	0.0
Marshall	3	47.4	3	38.7	5	161.5	3	91.1	*	20.1	*	14.6
Meade	10	32.2	16	48.2	23	161.3	8	43.3	7	27.3	4	14.4
Mellette	0	0.0	*	65.7	3	240.3	0	0.0	*	66.2	0	0.0
Miner	5	124.3	*	15.2	*	74.3	*	45.6	0	0.0	*	47.0
Minnehaha	73	39.0	134	69.8	93	98.1	138	136.6	43	22.8	44	25.1
Moody	*	17.5	6	74.7	3	65.4	3	76.7	*	14.0	3	54.9
Oglala Lakota	6	57.6	5	57.6	*	34.3	*	33.8	*	16.0	0	0.0
Pennington	39	29.1	78	56.0	98	148.1	55	72.1	41	30.7	18	13.4
Perkins	3	46.7	4	77.9	*	33.9	*	71.8	*	15.5	0	0.0
Potter	*	27.0	5	116.5	3	120.4	4	172.7	*	27.0	*	23.5
Roberts	7	55.9	6	45.1	7	87.9	6	92.1	3	29.8	3	18.9
Sanborn	*	40.2	0	0.0	*	50.4	3	222.7	*	23.0	0	0.0
Spink	4	43.8	4	36.3	3	54.7	11	214.1	4	31.4	*	8.1
Stanley	3	100.7	3	67.4	*	61.5	4	182.8	*	17.6	*	28.8
Sully	0	0.0	*	40.6	*	182.3	0	0.0	*	36.5	0	0.0
Todd	4	45.6	3	56.6	3	73.5	*	66.2	*	17.0	0	0.0
Tripp	*	20.7	8	82.2	*	25.0	9	201.3	0	0.0	*	22.9
Turner	8	78.4	4	33.1	4	82.3	6	83.4	6	41.5	*	11.4
Union	8	51.4	9	61.8	11	106.7	13	136.3	*	10.0	5	24.6
Walworth	*	23.7	*	22.7	4	75.8	5	124.6	*	22.7	0	0.0
Yankton	7	32.3	17	51.0	20	143.9	23	153.4	9	28.5	5	17.2
Ziebach	*	29.6	0	0.0	0	0.0	*	142.1	0	0.0	0	0.0

Note: * Counts less than 3 are suppressed. Incidence rates with counts less than 20 are generally considered unstable.
Rates per 100,000 age-adjusted to the 2000 US standard population and 2016 SD estimated population.
Source: South Dakota Department of Health.

Table 3: Age-adjusted Incidence Rates by Site, Gender and Race, South Dakota, 2016

	TOTAL		MALE		FEMALE		WHITE		AMERICAN INDIAN	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Total	**4,650**	**448.3**	**2,434**	**486.4**	**2,216**	**422.8**	**4,321**	**448.4**	**244**	**502.5**
Oral Cavity	**136**	**12.9**	**103**	**20.4**	**33**	**6.0**	**127**	**12.9**	**7**	**15.6**
Lip	19	2.0	16	3.7	3	0.7	19	2.1	0	0.0
Tongue	42	4.0	31	6.1	11	1.9	38	3.8	4	10.8
Salviary Gland	13	1.2	9	1.8	4	0.7	13	1.4	0	0.0
Floor of Mouth	10	0.9	9	1.6	1	0.2	8	0.8	1	1.7
Gum and Other Mouth	11	0.9	5	0.8	6	0.9	11	1.0	0	0.0
Nasopharynx	2	0.2	2	0.3	0	0.0	2	0.2	0	0.0
Tonsil	21	2.0	17	3.2	4	0.8	21	2.2	0	0.0
Oropharynx	6	0.5	5	0.9	1	0.2	5	0.5	1	1.4
Hypopharynx	8	0.9	6	1.3	2	0.5	6	0.7	1	1.7
Other Oral Cavity & Pharynx	4	0.3	3	0.5	1	0.1	4	0.3	0	0.0
Digestive System	**799**	**76.3**	**440**	**89.5**	**359**	**65.1**	**722**	**73.3**	**57**	**115.5**
Esophagus	46	4.1	31	5.8	15	2.6	42	4.0	3	4.8
Stomach	40	4.1	27	6.1	13	2.3	34	3.6	4	7.5
Small Intestine	26	2.5	17	3.4	9	1.6	25	2.7	0	0.0
Colorectal	406	39.3	213	43.9	193	35.9	369	38.0	29	55.5
Colon Excluding Rectum	299	28.5	151	30.9	148	26.6	274	27.6	19	38.7
Rectum and Rectosigmoid	107	10.9	62	13.0	45	9.3	95	10.4	10	16.8
Anus, Anal Canal and Anorectum	14	1.4	5	1.1	9	1.6	12	1.3	2	3.3
Liver & Intrahepatic Bile Duct	75	6.9	52	10.2	23	3.8	60	5.8	10	23.8
Gallbladder	8	0.9	1	0.2	7	1.5	5	0.6	2	5.6
Other Biliary	13	1.2	10	2.3	3	0.4	13	1.3	0	0.0
Pancreas	152	14.0	79	15.4	73	12.9	145	14.3	5	10.0
Retroperitoneum	6	0.6	3	0.6	3	0.6	6	0.6	0	0.0
Peritoneum, Omentum and Mesentery	13	1.2	2	0.5	11	1.8	11	1.1	2	5.0
Respiratory	**658**	**61.2**	**333**	**67.5**	**325**	**57.0**	**609**	**60.3**	**39**	**92.9**
Nose, Nasal Cavity and Middle Ear	9	0.9	6	1.1	3	0.7	7	0.7	1	1.9
Larynx	23	2.3	19	4.2	4	0.6	21	2.2	2	5.2
Lung and Bronchus	625	57.9	307	61.9	318	55.6	581	57.3	35	82.1
Pleura	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Mediastinum and Other Resp Organs	1	0.1	1	0.3	0	0.0	0	0.0	1	3.6
Bones and Joints	**7**	**0.8**	**7**	**1.6**	**0**	**0.0**	**6**	**0.8**	**1**	**1.0**
Soft Tissue (Including Heart)	**28**	**2.9**	**13**	**2.8**	**15**	**3.0**	**26**	**3.1**	**1**	**1.4**
Skin	**248**	**25.7**	**143**	**30.7**	**105**	**22.4**	**245**	**27.8**	**1**	**1.8**
Melanomas of the Skin	232	24.1	131	28.0	101	21.6	229	26.1	1	1.8
Other Skin	16	1.6	12	2.8	4	0.8	16	1.7	0	0.0
Breast	**575**	**57.1**	**4**	**0.8**	**571**	**110.9**	**536**	**57.7**	**29**	**53.2**
Breast, Female	571	110.9	0	0.0	571	110.9	532	112.5	29	96.2
Breast, Male	4	0.8	4	0.8	0	0.0	4	0.9	0	0.0
Female	**265**	**51.6**			**265**	**51.6**	**250**	**52.6**	**12**	**44.9**
Vulva	26	5.1			26	5.1	25	5.2	1	3.5
Vagina	4	0.7			4	0.7	4	0.7	0	0.0
Cervix Uteri	28	6.7			28	6.7	25	7.1	3	10.4
Corpus and Uterus, NOS	147	27.4			147	27.4	142	28.3	4	14.5
Corpus Uteri	146	27.2			146	27.2	141	28.2	4	14.5
Uterus, NOS	1	0.1			1	0.1	1	0.1	0	0.0
Ovary	55	10.7			55	10.7	50	10.3	4	16.6
Other Female Genital Organs	5	1.1			5	1.1	4	1.0	0	0.0

Table 3: Age-adjusted Incidence Rates by Site, Gender and Race, South Dakota, 2016 (continued)

	TOTAL		MALE		FEMALE		WHITE		AMERICAN INDIAN	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Male	**645**	**118.4**	**645**	**118.4**			**604**	**117.8**	**27**	**126.9**
Penis	5	1.3	5	1.3			3	0.7	1	4.3
Prostate	620	112.3	620	112.3			585	112.5	23	114.0
Testis	18	4.4	18	4.4			15	4.3	3	8.7
Other Male Genital Organs	2	0.4	2	0.4			1	0.2	0	0.0
Urinary	**429**	**40.4**	**288**	**57.4**	**141**	**26.3**	**390**	**39.0**	**30**	**65.1**
Bladder	220	20.5	160	32.8	60	10.6	212	20.9	6	15.9
Kidney and Renal Pelvis	197	18.8	118	22.4	79	15.4	167	17.1	23	45.6
Ureter	8	0.7	7	1.4	1	0.1	7	0.6	1	3.6
Other Urinary Organs	4	0.4	3	0.7	1	0.1	4	0.4	0	0.0
Eye and Orbit	**6**	**0.7**	**3**	**0.7**	**3**	**0.6**	**6**	**0.7**	**0**	**0.0**
Brain and CNS	**66**	**6.9**	**41**	**8.7**	**25**	**5.1**	**63**	**7.3**	**1**	**1.3**
Brain	64	6.6	40	8.4	24	4.8	61	7.0	1	1.3
Meninges and CNS	2	0.3	1	0.3	1	0.2	2	0.3	0	0.0
Endocrine	**137**	**15.9**	**40**	**9.0**	**97**	**23.1**	**127**	**16.9**	**7**	**15.0**
Thyroid	130	15.1	38	8.4	92	22.0	121	16.0	7	15.0
Other Endocrine	7	0.8	2	0.6	5	1.0	6	0.8	0	0.0
Lymphomas	**209**	**21.5**	**106**	**22.9**	**103**	**20.1**	**198**	**22.1**	**6**	**11.5**
Hodgkin's Lymphoma	24	2.8	13	2.9	11	2.7	22	2.9	1	0.9
Non-Hodgkin's Lymphoma	185	18.7	93	20.1	92	17.4	176	19.2	5	10.6
Multiple Myeloma	**76**	**7.3**	**43**	**9.0**	**33**	**6.1**	**70**	**7.2**	**5**	**10.2**
Leukemia	**184**	**18.3**	**122**	**25.6**	**62**	**12.1**	**173**	**18.7**	**9**	**12.3**
Acute Lymphocytic	15	1.7	6	1.3	9	2.2	10	1.4	4	4.6
Chronic Lymphocytic	80	7.6	50	10.5	30	5.3	79	8.0	1	1.4
Other Lymphocytic	3	0.4	3	0.8	0	0.0	3	0.4	0	0.0
Acute Myeloid	48	4.8	34	6.9	14	3.0	45	5.0	2	2.6
Acute Monocytic	3	0.2	2	0.3	1	0.1	3	0.2	0	0.0
Chronic Myeloid	27	2.7	21	4.6	6	1.0	25	2.7	2	3.6
Other Myeloid/Monocytic	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Other Acute Leukemia	4	0.4	3	0.6	1	0.4	4	0.5	0	0.0
Other Leukemia	4	0.4	3	0.6	1	0.2	4	0.5	0	0.0
Myeloproliferative Myelodysplastic	**91**	**8.4**	**52**	**11.0**	**39**	**6.6**	**87**	**8.5**	**3**	**9.2**
Mesothelioma	**7**	**0.6**	**6**	**1.1**	**1**	**0.1**	**7**	**0.6**	**0**	**0.0**
Other Sites	**84**	**7.8**	**45**	**9.2**	**39**	**6.7**	**75**	**7.4**	**9**	**16.5**

Rates per 100,000 age-adjusted to the 2000 US standard population and 2016 SD estimated population.
Source: South Dakota Department of Health

Table 3 above shows incidence and age-adjusted incidence rates for South Dakota in 2016 by primary sites, gender, and race according to SEER site category recodes (Appendix C).

Table 4: Percentage of Selected Cancers by Age Groups in South Dakota, 2016

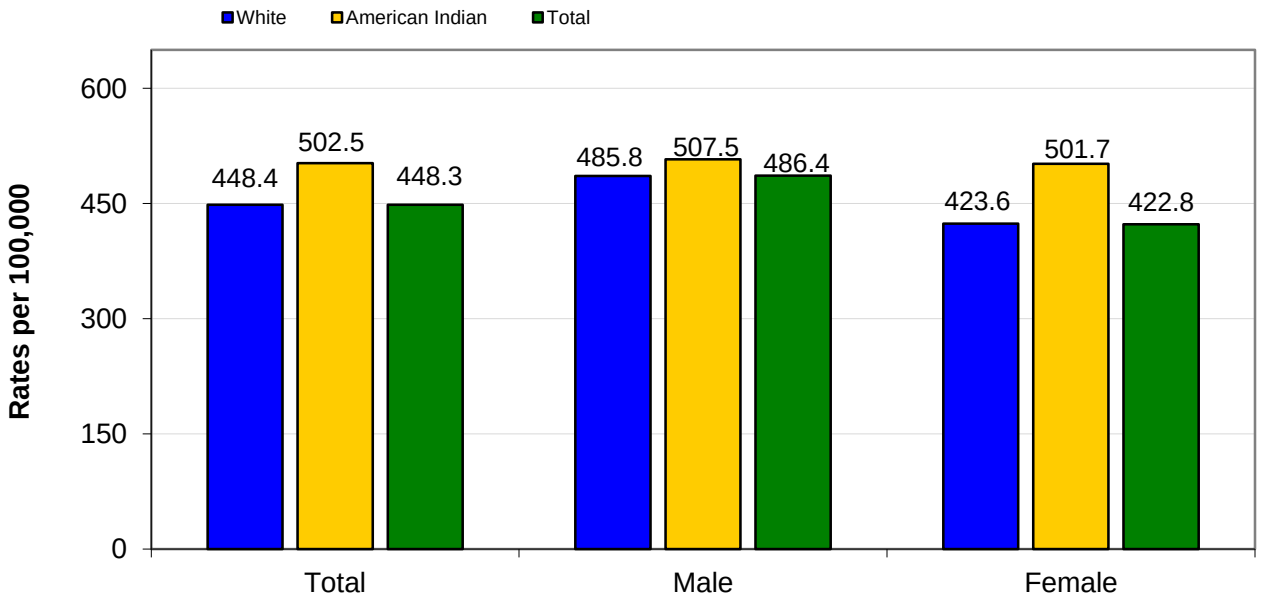
	0-19	20-34	35-49	50-64	65-74	75-84	85+
All Sites	1%	2%	8%	30%	29%	21%	9%
Bladder	0%	0%	4%	20%	32%	28%	17%
Breast, Female	0%	2%	12%	32%	32%	16%	5%
Colorectal	0%	1%	7%	27%	26%	23%	15%
Corpus and Uterus, NOS	0%	1%	8%	39%	28%	19%	5%
Hodgkin's Lymphoma	13%	25%	21%	21%	8%	4%	8%
Kidney and Renal Pelvis	0%	2%	10%	40%	32%	14%	3%
Leukemia	9%	4%	8%	27%	17%	25%	11%
Lung and Bronchus	0%	0%	1%	25%	37%	28%	9%
Melanomas of the Skin	0%	7%	16%	30%	20%	16%	12%
Non-Hodgkin's Lymphoma	2%	1%	11%	21%	31%	26%	8%
Pancreas	1%	0%	3%	27%	32%	24%	14%
Prostate	0%	0%	1%	39%	41%	15%	4%
Thyroid	1%	16%	31%	31%	11%	10%	1%

Source: South Dakota Department of Health

In 2016, 59% of all cancers were diagnosed between ages 50 to 74 (Table 4). Notable were the 12% of female breast and 16% of melanomas of the skin cancers diagnosed between the ages of 35 to 49. In 2016, 38% of the Hodgkin's lymphoma cases were diagnosed in persons under 35 years old, compared to 47% in 2014.

Figure 1 below shows that incidence rates for American Indians in South Dakota were higher than those for whites in 2016. Of the 4,650 newly diagnosed cases in 2016, 244 or 5.2% were American Indians, 110 males, and 134 females.

Figure 1: All Sites Cancer Incidence Rates by Race and Gender, South Dakota, 2016

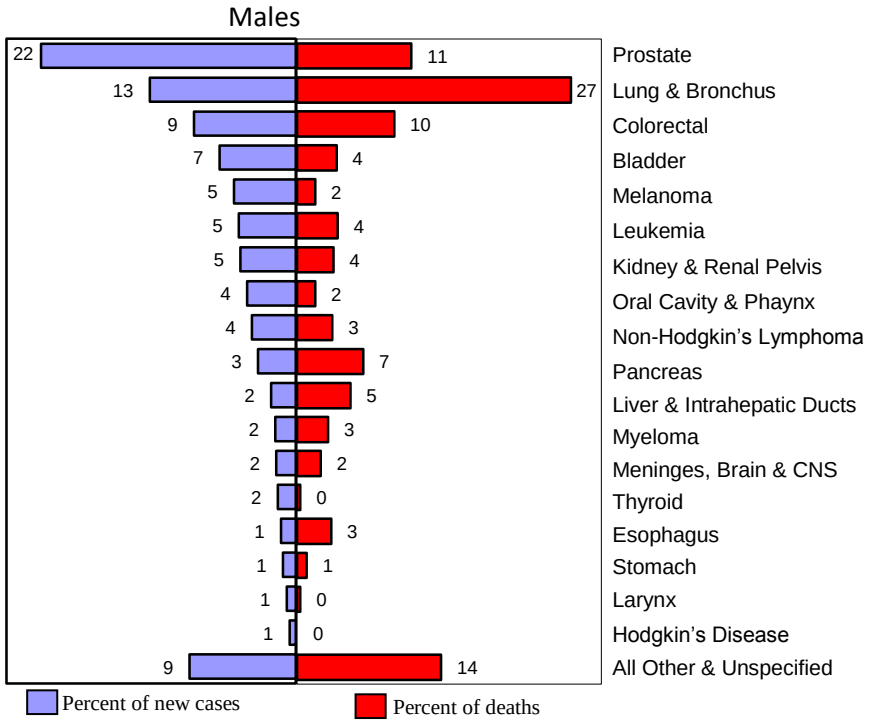


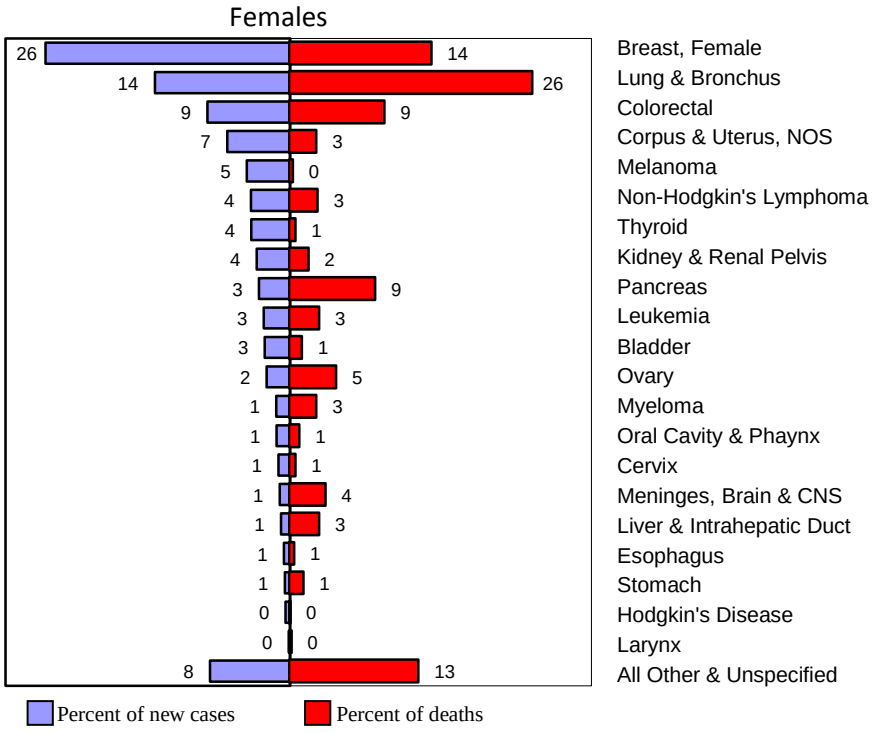
Note: Rates per 100,000 age-adjusted to the 2000 US standard population and 2016 SD estimated population.
Source: South Dakota Department of Health

V. CANCER CASES AND DEATHS BY RANK

Lung and bronchus cancer was the most common cancer diagnosed during 2016. The five most diagnosed cancers were lung and bronchus, prostate, female breast, colorectal, and melanoma, which accounted for 52.8% of the new cases diagnosed and 47.5% of cancer deaths. Figure 2 shows the percent of new cancer cases and deaths by rank and gender.

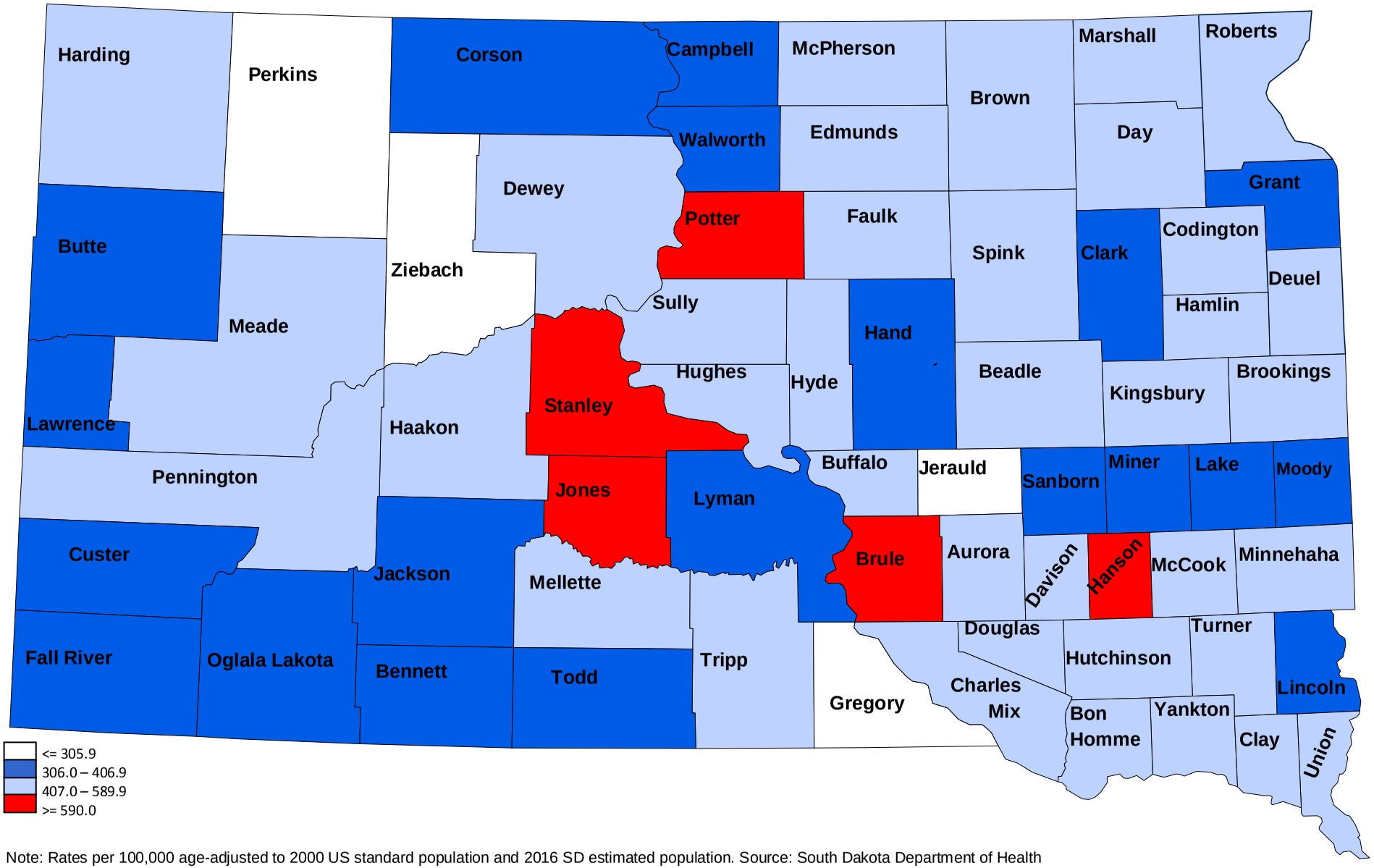
Figure 2: Percent Distribution of Cancer Cases and Deaths by Rank and Gender, South Dakota, 2016





Source: South Dakota Department of Health

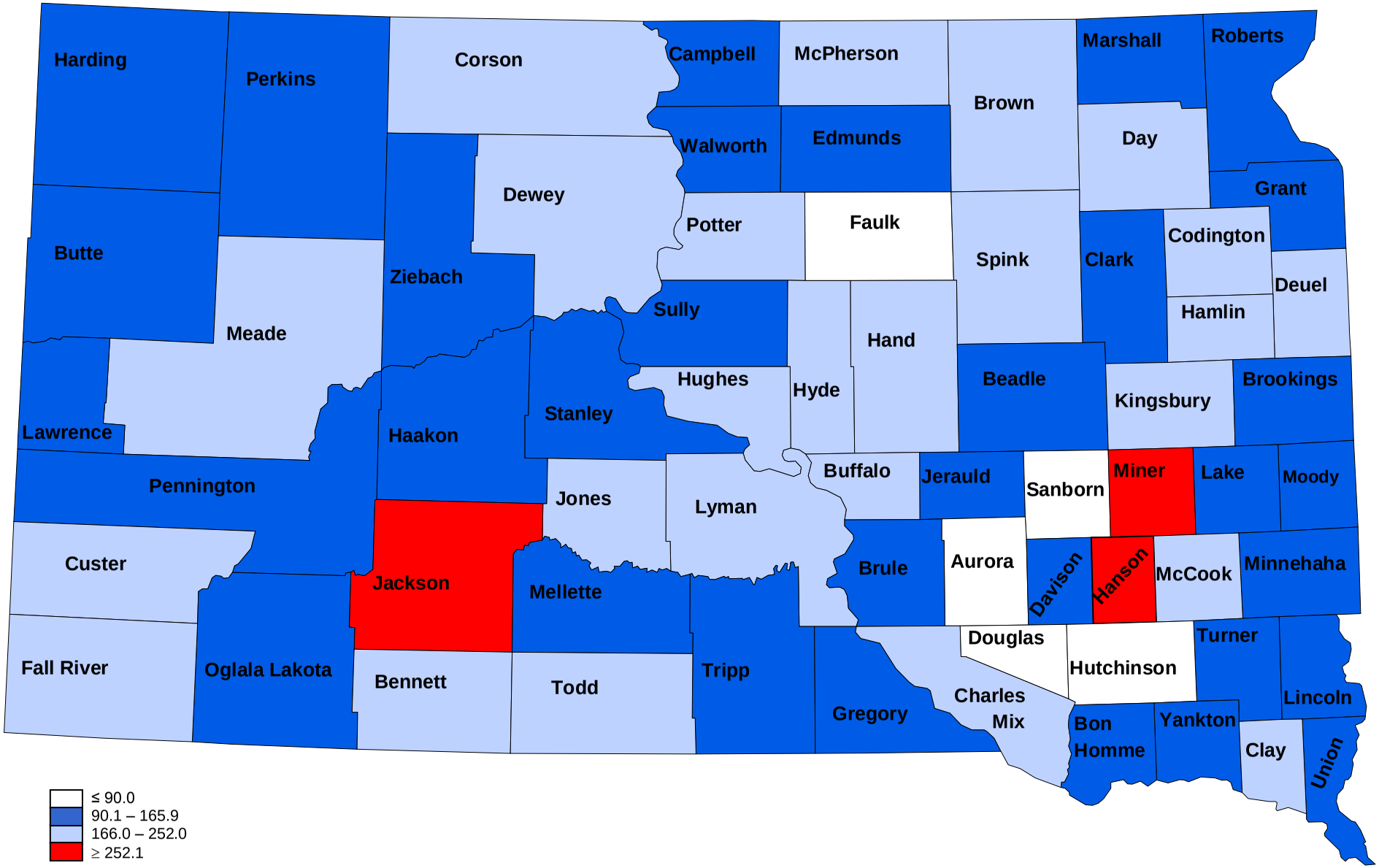
Figure 3: Cancer Incidence Rates by County, South Dakota, 2016



Note: Rates per 100,000 age-adjusted to 2000 US standard population and 2016 SD estimated population. Source: South Dakota Department of Health

South Dakota has an area of 77,121 square miles with a 2016 estimated population of 865,454 persons resulting in a population density of 11 persons per square mile. Population densities range from a low of 0.5 in Harding County to a high of 210.0 persons per square mile in Minnehaha County.

Figure 4: Cancer Mortality Rates by County, South Dakota, 2016



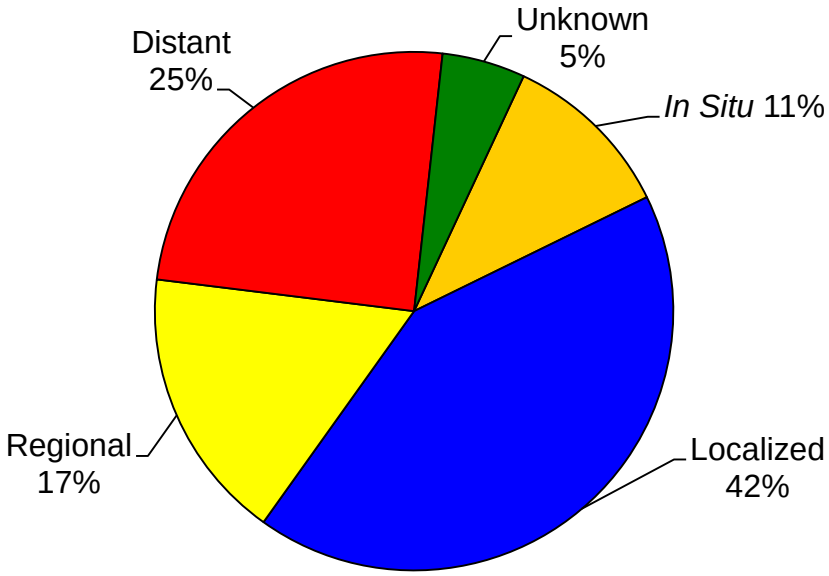
Note: Rates per 100,000 age-adjusted to 2000 US standard population and 2016 SD estimated population. Source: South Dakota Department of Health

South Dakota has an area of 77,121 square miles with a 2016 estimated population of 865,454 persons resulting in a population density of 11 persons per square mile. Population densities range from a low of 0.5 in Harding County to a high of 210.0 persons per square mile in Minnehaha County.

SEER Summary Staging:

- ***In Situ*** - Malignant cells are within the cell groups from which they arose, without penetration of the basement membrane of the tissue and stromal invasion.
- **Localized** - The malignant cells are limited to the organ of origin and have spread no farther than the organ where they began.
- **Regional** - The tumor is beyond the limits of the organ of origin by direct extension to adjacent areas such as the regional lymph nodes, adjacent organs, or tissue.
- **Distant** - The tumor cells have broken away from the primary tumor and traveled to other parts of the body.
- **Unknown** - If extension or metastatic, there is not sufficient evidence available to assign a stage.

Figure 5: Stage at Diagnosis, All Sites, South Dakota, 2016



Source: South Dakota Department of Health

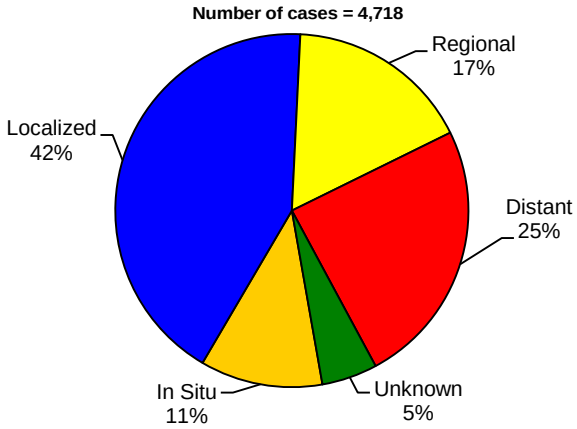
The figure above demonstrates the number of cases diagnosed at each stage of disease. For 2016, there were a total of 5,059 cases reported to the South Dakota State Cancer Registry, which includes *in situ* cases.

Table 5: South Dakota Stage at Diagnosis, All Cases, 2016

Stage	Number of Cases	Percent of Total
In Situ	544	11%
Localized	2127	42%
Regional	865	17%
Distant	1254	25%
Unknown	269	5%

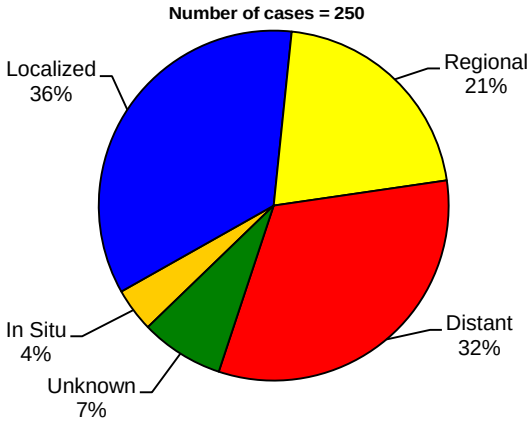
When analyzed by race, 42% of all cancer cases diagnosed for whites were diagnosed at localized stage and 36% for American Indians. American Indians had another 53% diagnosed at the regional and distant stages combined, while the same stages for whites were a combined 42%. Stage at diagnosis by race was as follows:

Figure 6: Stage at Diagnosis in South Dakota, White, 2016



Source: South Dakota Department of Health

Figure 7: Stage at Diagnosis in South Dakota, American Indians, 2016



Source: South Dakota Department of Health

Cases of non-Hodgkin's lymphoma, myeloma, and leukemias are usually at distant stages, and therefore can skew the proportion of all sites diagnosed at distant stages. Some differences in case counts by stage for selected sites are shown in Table 6.

Table 6: Stage at Diagnosis for Selected Sites by Race, South Dakota, 2016

	White						American Indian					
	Localized		Regional		Distant		Localized		Regional		Distant	
	Cases	%	Cases	%	Cases	%	Cases	%	Cases	%	Cases	%
Female Breast	377	18.9%	120	15.0%	23	2.0%	19	21.3%	8	15.4%	1	1.3%
Lung and Bronchus	142	7.1%	130	16.3%	283	24.6%	6	6.7%	8	15.4%	21	26.3%
Prostate	460	23.1%	77	9.6%	34	3.0%	11	12.4%	4	7.7%	5	6.3%
Melanoma of the Skin	197	9.9%	19	2.4%	7	0.6%	1	1.1%	0	0.0%	0	0.0%
Colorectal	144	7.2%	116	14.5%	89	7.7%	9	10.1%	10	19.2%	8	10.0%
Bladder	47	2.4%	16	2.0%	15	1.3%	1	1.1%	0	0.0%	1	1.3%
Non-Hodgkin's Lymphoma	35	1.8%	22	2.8%	105	9.1%	0	0.0%	0	0.0%	5	6.3%
Kidney and Renal Pelvis	110	5.5%	25	3.1%	27	2.3%	19	21.3%	1	1.9%	3	3.8%
Corpus and Uterus, NOS	106	5.3%	18	2.3%	14	1.2%	2	2.2%	1	1.9%	1	1.3%
Leukemia	1	0.1%	2	0.3%	168	14.6%	0	0.0%	0	0.0%	9	11.3%
Thyroid	78	3.9%	33	4.1%	8	0.7%	3	3.4%	2	3.8%	1	1.3%
Pancreas	21	1.1%	46	5.8%	67	5.8%	0	0.0%	1	1.9%	3	3.8%

Source: South Dakota Department of Health

VII. CANCER MORTALITY

Cancer age-adjusted mortality rates for 2016 ranged from a low of 59.9 in Aurora County to a high of 321.6 in Jackson County. South Dakota's age-adjusted mortality rate was 160.4 in 2016 compared to a five-year mortality rate of 160.7.

In 2016, four counties had a significantly lower rate than that of the entire state and none had a significantly higher rate. The five-year rates show six counties having significantly lower rates and three counties with significantly higher rates. South Dakota's mortality rate for 2012-2016 was 160.7 per 100,000 persons.

The United States mortality rate for 2016 was 155.9 and the South Dakota rate was 160.4 per 100,000 persons. When comparing the two rates there is no significant difference.

The South Dakota 2016 mortality rates are displayed in a state map on page 15 of this report.

Table 7 : Cancer Deaths and Mortality Rates by County
South Dakota, 2016 and 2012-2016 Average

County	2016			2012-2016^		
	Deaths	Rate		Deaths	Rate	
South Dakota	1,722	160.4		1,676	160.7	
Aurora	3	59.9	▼	6	137.7	
Beadle	40	158.2		42	164.7	
Bennett	8	236.3		7	210.5	
Bon Homme	18	156.2		16	135.8	
Brookings	47	162.3		50	171.8	
Brown	84	168.9		85	170.3	
Brule	13	156.4		13	171.9	
Buffalo	4	229.6		3	230.4	
Butte	23	155.9		23	156.4	
Campbell	4	143.8		4	136.7	
Charles Mix	25	201.0		23	172.4	
Clark	8	112.3		9	132.6	
Clay	26	213.2		23	185.4	
Codington	74	199.3		66	185.4	▲
Corson	7	205.5		8	199.6	
Custer	30	174.1		22	141.4	
Davison	55	181.9		50	169.8	
Day	17	197.5		13	133.3	
Deuel	14	208.1		9	130.3	
Dewey	9	183.5		10	224.8	
Douglas	5	73.6	▼	9	159.8	
Edmunds	6	98.7		9	125.4	
Fall River	30	231.9		24	188.4	
Faulk	4	86.7		8	175.1	
Grant	14	113.5		15	126.9	▼
Gregory	13	165.1		14	170.8	
Haakon	5	135.6		5	160.8	
Hamlin	15	184.7		12	146.6	
Hand	8	182.5		9	141.9	
Hanson	7	262.5		6	229.1	
Harding	*	118.6		*	59.6	▼
Hughes	39	179.4		35	161.7	
Hutchinson	12	68.4	▼	18	120.5	▼
Hyde	7	251.0		3	119.3	
Jackson	13	321.6		7	199.3	
Jerauld	6	159.5		7	154.8	
Jones	3	200.9		2	117.4	
Kingsbury	19	210.3		16	193.5	
Lake	31	162.0		25	135.9	
Lawrence	46	134.9		52	148.9	
Lincoln	59	114.6	▼	54	119.5	▼
Lyman	9	199.0		8	175.9	
McCook	21	249.9		19	241.3	▲
McPherson	6	109.2		7	108.3	▼
Marshall	16	249.4		11	166.7	
Meade	60	195.7		45	153.3	
Mellette	3	119.4		4	161.5	
Miner	12	320.2		7	178.7	
Minnehaha	308	159.2		317	172.3	
Moody	11	143.3		13	160.3	
Oglala Lakota	15	156.6		19	226.8	▲
Pennington	200	140.9		199	153.4	
Perkins	7	100.1		9	162.0	
Potter	9	167.9		7	137.0	
Roberts	21	147.6		26	182.8	
Sanborn	3	77.7		6	174.3	
Spink	17	179.3		16	162.8	
Stanley	6	145.8		6	164.5	
Sully	3	129.3		4	156.5	
Todd	16	222.0		13	207.1	
Tripp	17	160.6		15	148.7	
Turner	19	131.9		21	163.6	
Union	31	154.6		29	152.1	
Walworth	11	97.5		16	161.7	
Yankton	45	134.8		47	147.4	
Ziebach	3	139.0		*	43.1	▼

* Counts less than three are suppressed. Mortality rates with counts less than 20 are generally considered unstable. ▲ Rate significantly higher; ▼ Rate significantly lower
^ Number of the cases and rates are averaged over the five-year period.
Rates per 100,000 age-adjusted to 2000 US standard population and SD 2016 estimated population. Source: South Dakota Department of Health

Table 8: Age-adjusted Mortality Rates by County for Selected Sites, 2016

	Colorectal		Lung and Bronchus		Female Breast		Prostate		Bladder		NHL	
	Deaths	Rate	Deaths	Rate	Deaths	Rate	Deaths	Rate	Deaths	Rate	Deaths	Rate
South Dakota	**164**	**15.3**	**418**	**38.5**	**109**	**19.3**	**418**	**85.2**	**47**	**4.3**	**55**	**5.4**
Aurora	0	0.0	*	42.4	0	0.0	*	93.2	0	0.0	0	0.0
Beadle	0	0.0	9	30.8	*	17.1	9	77.9	0	0.0	*	7.7
Bennett	0	0.0	*	25.4	0	0.0	*	51.9	*	20.3	0	0.0
Bon Homme	0	0.0	4	35.5	*	18.1	4	74.8	0	0.0	*	8.1
Brookings	7	22.1	7	24.9	4	28.2	7	54.5	*	6.7	0	0.0
Brown	6	12.7	23	48.8	7	25.9	23	108.9	3	5.3	3	6.6
Brule	0	0.0	*	19.3	*	43.7	*	48.0	0	0.0	0	0.0
Buffalo	0	0.0	*	121.6	0	0.0	*	273.4	0	0.0	0	0.0
Butte	7	50.9	4	24.5	0	0.0	4	54.2	0	0.0	*	5.0
Campbell	0	0.0	*	34.6	0	0.0	*	77.1	0	0.0	0	0.0
Charles Mix	*	14.2	3	23.0	*	45.4	3	51.9	0	0.0	*	7.2
Clark	0	0.0	*	29.4	0	0.0	*	68.2	0	0.0	0	0.0
Clay	*	12.4	6	43.2	*	37.4	6	97.9	0	0.0	0	0.0
Codington	10	29.1	16	43.7	8	41.5	16	98.9	*	5.1	4	11.3
Corson	*	41.4	*	35.5	0	0.0	*	71.1	*	36.1	0	0.0
Custer	4	23.3	9	53.3	*	27.6	9	114.6	*	3.7	*	3.9
Davison	8	22.7	17	57.7	*	7.7	17	134.9	*	2.1	0	0.0
Day	*	6.4	3	23.0	0	0.0	3	53.1	*	17.4	0	0.0
Deuel	*	22.0	*	33.3	*	59.7	*	69.1	0	0.0	0	0.0
Dewey	*	22.9	3	49.9	0	0.0	3	104.4	0	0.0	0	0.0
Douglas	*	16.2	0	0.0	*	31.9	0	0.0	0	0.0	0	0.0
Edmunds	*	12.9	*	31.3	0	0.0	*	60.6	0	0.0	0	0.0
Fall River	*	12.7	7	51.1	3	35.6	7	113.3	3	37.4	0	0.0
Faulk	0	0.0	*	28.1	0	0.0	*	55.7	0	0.0	0	0.0
Grant	*	7.6	3	26.6	0	0.0	3	55.6	*	8.1	*	16.2
Gregory	*	12.2	*	12.6	*	41.4	*	27.9	0	0.0	0	0.0
Haakon	*	27.9	*	27.9	*	64.3	*	59.1	0	0.0	0	0.0
Hamlin	*	11.4	5	68.4	0	0.0	5	153.3	0	0.0	0	0.0
Hand	0	0.0	*	31.5	0	0.0	*	71.2	0	0.0	0	0.0
Hanson	*	37.0	*	103.1	*	51.2	*	181.7	*	37.0	0	0.0
Harding	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Hughes	8	39.3	11	45.4	4	38.2	11	101.8	0	0.0	0	0.0
Hutchinson	*	12.8	5	27.7	0	0.0	5	69.0	*	10.2	*	5.9
Hyde	*	50.4	*	31.8	0	0.0	*	69.3	*	31.9	0	0.0
Jackson	0	0.0	3	63.5	0	0.0	3	140.7	*	31.0	0	0.0
Jerauld	*	15.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Jones	*	71.1	*	58.8	0	0.0	*	127.1	0	0.0	0	0.0
Kingsbury	*	13.9	6	68.6	*	30.6	6	135.0	0	0.0	0	0.0
Lake	4	21.1	9	48.5	*	10.3	9	106.7	0	0.0	3	18.4
Lawrence	10	32.1	14	40.0	*	8.4	14	86.9	*	3.2	0	0.0
Lincoln	4	7.0	17	33.3	3	11.3	17	72.8	*	1.3	4	8.3
Lyman	0	0.0	0	0.0	*	70.5	0	0.0	*	24.4	*	22.0
McCook	*	7.6	5	61.6	*	42.0	5	143.9	0	0.0	*	12.4
McPherson	*	25.5	*	25.8	0	0.0	*	59.9	0	0.0	0	0.0
Marshall	*	14.6	5	77.8	*	55.6	5	168.0	0	0.0	0	0.0
Meade	3	10.2	19	57.4	3	16.4	19	121.3	*	6.6	4	12.9
Mellette	0	0.0	*	36.4	0	0.0	*	66.1	*	36.4	0	0.0
Miner	0	0.0	*	38.7	*	22.8	*	109.3	0	0.0	*	59.0
Minnehaha	35	18.1	79	40.8	25	23.4	79	93.9	11	5.3	8	4.5
Moody	0	0.0	3	37.3	*	14.6	3	97.3	0	0.0	*	28.2
Oglala Lakota	0	0.0	5	51.7	*	13.5	5	130.6	0	0.0	0	0.0
Pennington	12	8.8	50	36.3	7	8.2	50	81.0	5	3.3	7	5.6
Perkins	*	10.3	*	17.6	0	0.0	*	36.5	*	10.3	0	0.0
Potter	0	0.0	*	24.8	*	61.3	*	41.8	0	0.0	*	29.4
Roberts	0	0.0	4	29.7	*	8.2	4	57.3	0	0.0	0	0.0
Sanborn	*	40.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Spink	*	13.4	0	0.0	4	92.7	0	0.0	0	0.0	*	6.7
Stanley	*	34.7	*	28.8	0	0.0	*	54.1	0	0.0	0	0.0
Sully	0	0.0	0	0.0	*	71.4	0	0.0	0	0.0	0	0.0
Todd	*	10.9	4	68.2	0	0.0	4	149.4	*	17.0	0	0.0
Tripp	4	30.3	5	54.7	0	0.0	5	115.5	0	0.0	*	11.5
Turner	*	10.2	4	30.0	0	0.0	4	63.9	0	0.0	*	5.1
Union	*	7.3	10	57.7	*	6.9	10	121.8	*	4.4	*	4.5
Walworth	0	0.0	*	11.1	*	41.4	*	27.0	*	11.1	0	0.0
Yankton	5	13.6	8	21.8	4	16.3	8	55.1	*	4.1	*	2.7
Ziebach	0	0.0	*	24.5	0	0.0	*	46.6	0	0.0	*	48.4

Note: * Counts less than 3 are suppressed. Mortality rates with counts less than 20 are generally considered unstable.
Rates per 100,000 age-adjusted to the 2000 US standard population and 2016 SD estimated population.
Source: South Dakota Department of Health

Table 9: Age-adjusted Mortality Rates by Site, Gender, and Race, South Dakota, 2016

	TOTAL		MALE		FEMALE		WHITE		AMERICAN INDIAN	
	Deaths	Rate	Deaths	Rate	Deaths	Rate	Deaths	Rate	Deaths	Rate
Total	**1,722**	**160.4**	**951**	**198.1**	**771**	**132.7**	**1,615**	**159.1**	**90**	**200.8**
Oral Cavity	**25**	**2.3**	**17**	**3.3**	**8**	**1.2**	**22**	**2.1**	**3**	**4.8**
Lip	1	0.1	1	0.2	0	0.0	1	0.1	0	0.0
Tongue	5	0.5	2	0.4	3	0.5	4	0.4	1	1.7
Salivary Gland	2	0.1	1	0.2	1	0.1	2	0.1	0	0.0
Floor of Mouth	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Gum and Other Mouth	5	0.5	2	0.5	3	0.4	4	0.4	1	1.7
Nasopharynx	2	0.1	2	0.3	0	0.0	2	0.2	0	0.0
Hypopharynx	2	0.2	2	0.4	0	0.0	2	0.2	0	0.0
Tonsil	2	0.2	2	0.4	0	0.0	1	0.1	1	1.5
Oropharynx	1	0.1	0	0.0	1	0.2	1	0.1	0	0.0
Other Oral Cavity and Pharynx	5	0.5	5	0.9	0	0.0	5	0.5	0	0.0
Digestive System	**445**	**41.3**	**256**	**52.3**	**189**	**32.2**	**418**	**41.2**	**22**	**43.9**
Esophagus	36	3.2	32	6.3	4	0.6	35	3.3	1	1.8
Stomach	20	2.1	9	1.9	11	2.1	18	1.9	2	3.2
Small Intestine	10	0.9	5	1.1	5	0.8	9	0.8	1	1.7
Colorectal	164	15.3	91	19.2	73	12.1	157	15.5	5	8.0
Colon Excluding Rectum	132	12.3	71	15.3	61	10.0	125	12.3	5	8.0
Rectum and Rectosigmoid	32	3.0	20	3.9	12	2.1	32	3.2	0	0.0
Anus, Anal Canal and Anorectum	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Liver and Intrahepatic Bile Duct	73	6.7	50	9.8	23	3.8	65	6.4	6	14.7
Gallbladder	6	0.6	1	0.2	5	1.0	6	0.6	0	0.0
Other Biliary	7	0.7	5	1.2	2	0.3	7	0.8	0	0.0
Pancreas	128	11.7	62	12.3	66	11.3	120	11.8	7	14.4
Retroperitoneum	1	0.1	1	0.2	0	0.0	1	0.1	0	0.0
Peritoneum, Omentum and Mesentery	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Respiratory	**425**	**39.1**	**237**	**48.3**	**188**	**32.3**	**394**	**38.3**	**28**	**66.7**
Nose, Nasal Cavity and Middle Ear	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Larynx	5	0.4	3	0.4	2	0.4	3	0.3	2	3.3
Lung and Bronchus	418	38.5	232	47.4	186	32.0	390	37.9	25	59.8
Pleura	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Mediastinum and Other Resp Organs	2	0.2	2	0.5	0	0.0	1	0.1	1	3.6
Bones and Joints	**2**	**0.1**	**2**	**0.4**	**0**	**0.0**	**2**	**0.2**	**0**	**0.0**
Soft Tissue	**16**	**1.6**	**9**	**2.0**	**7**	**1.1**	**14**	**1.5**	**2**	**2.5**
Skin	**25**	**2.3**	**19**	**3.8**	**6**	**1.0**	**23**	**2.2**	**2**	**5.6**
Melanoma of the Skin	20	1.8	17	3.4	3	0.6	19	1.8	1	1.9
Other Nonepithelial Skin	5	0.5	2	0.4	3	0.5	4	0.4	1	3.6
Breast	**111**	**10.5**	**2**	**0.4**	**109**	**19.3**	**102**	**10.2**	**6**	**14.8**
Breast, Female	109	19.3			109	19.3	100	18.8	6	25.7
Breast, Male	2	0.4	2	0.4			2	0.5	0	0.0
Female	**67**	**11.7**			**67**	**11.7**	**62**	**11.6**	**4**	**11.0**
Vulva	3	0.4			3	0.4	3	0.4	0	0.0
Vagina	0	0.0			0	0.0	0	0.0	0	0.0
Cervix Uteri	5	0.8			5	0.8	4	0.7	1	2.8
Corpus and Uterus, NOS	21	3.7			21	3.7	21	4.0	0	0.0
Corpus Uteri	15	2.8			15	2.8	15	3.0	0	0.0
Uterus, NOS	6	0.9			6	0.9	6	1.0	0	0.0
Ovary	36	6.5			36	6.5	33	6.4	2	5.5
Other Female Genital Organs	2	0.3			2	0.3	1	0.1	1	2.8

Table 9: Age-adjusted Mortality Rates by Site, Gender, and Race, South Dakota, 2016 (continued)

	TOTAL		MALE		FEMALE		WHITE		AMERICAN INDIAN	
	Deaths	Rate	Deaths	Rate	Deaths	Rate	Deaths	Rate	Deaths	Rate
Male	**111**	**24.1**	**111**	**24.1**			**104**	**23.6**	**6**	**40.6**
Penis	1	0.2	1	0.2			1	0.2	0	0.0
Prostate	107	23.3	107	23.3			100	22.8	6	40.6
Testis	1	0.2	1	0.2			1	0.2	0	0.0
Other Male Genital Organs	2	0.4	2	0.4			2	0.4	0	0.0
Urinary	**100**	**9.1**	**71**	**15.0**	**29**	**4.5**	**96**	**9.3**	**3**	**5.7**
Bladder	47	4.3	37	8.2	10	1.4	45	4.3	1	2.6
Kidney and Renal Pelvis	49	4.5	34	6.8	15	2.6	47	4.6	2	3.1
Ureter	1	0.1	0	0.0	1	0.1	1	0.1	0	0.0
Other Urinary Organs	3	0.2	0	0.0	3	0.4	3	0.3	0	0.0
Eye and Orbit	**2**	**0.3**	**1**	**0.2**	**1**	**0.4**	**2**	**0.3**	**0**	**0.0**
Brain and CNS	**50**	**4.8**	**22**	**4.5**	**28**	**5.4**	**50**	**5.2**	**0**	**0.0**
Brain	49	4.7	22	4.5	27	5.1	49	5.1	0	0.0
Meninges and CNS	1	0.1	0	0.0	1	0.2	1	0.1	0	0.0
Endocrine	**9**	**0.9**	**4**	**0.9**	**5**	**0.9**	**8**	**0.8**	**1**	**3.6**
Thyroid	8	0.8	3	0.8	5	0.9	7	0.8	1	3.6
Other Endocrine	1	0.1	1	0.1	0	0.0	1	0.1	0	0.0
Lymphomas	**56**	**5.5**	**33**	**7.3**	**23**	**3.7**	**55**	**5.6**	**0**	**0.0**
Hodgkin's Disease	1	0.1	0	0.0	1	0.1	1	0.1	0	0.0
Non-Hodgkin's Lymphomas	55	5.4	33	7.3	22	3.6	54	5.6	0	0.0
Multiple Myeloma	**50**	**4.8**	**29**	**6.1**	**21**	**3.7**	**47**	**4.7**	**2**	**5.4**
Leukemia	**61**	**5.7**	**38**	**8.2**	**23**	**3.8**	**58**	**5.7**	**3**	**3.2**
Acute Lymphocytic	3	0.3	2	0.5	1	0.1	2	0.2	1	1.0
Chronic Lymphocytic	13	1.2	6	1.4	7	1.0	13	1.2	0	0.0
Other Lymphocytic	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Acute Myeloid	22	2.1	13	2.8	9	1.7	21	2.2	1	1.4
Acute Monocytic	6	0.5	3	0.6	3	0.4	6	0.5	0	0.0
Chronic Myeloid	4	0.3	3	0.5	1	0.2	4	0.3	0	0.0
Other Myeloid/Monocytic	2	0.2	2	0.4	0	0.0	2	0.2	0	0.0
Other Acute Leukemia	6	0.6	5	1.1	1	0.1	6	0.6	0	0.0
Other Leukemia	5	0.5	4	0.9	1	0.2	4	0.4	1	0.8
Myeloproliferative & Myelodysplastic	**31**	**2.8**	**17**	**3.7**	**14**	**2.3**	**31**	**2.9**	**0**	**0.0**
Mesothelioma	**6**	**0.5**	**5**	**0.9**	**1**	**0.2**	**5**	**0.4**	**1**	**3.6**
Ill-Defined and Unspecified Sites	**130**	**12.4**	**78**	**16.8**	**52**	**9.1**	**122**	**12.4**	**7**	**17.7**

Rates per 100,000 age-adjusted to the 2000 US standard population and 2016 SD estimated population.
Source: South Dakota Department of Health

Table 9 shows death and age-adjusted mortality rates by SEER recode primary sites (Appendix D), gender and race. Approximately 1,700 persons die from cancer in South Dakota each year with a small change in counts. Overall more males than females die from cancer.

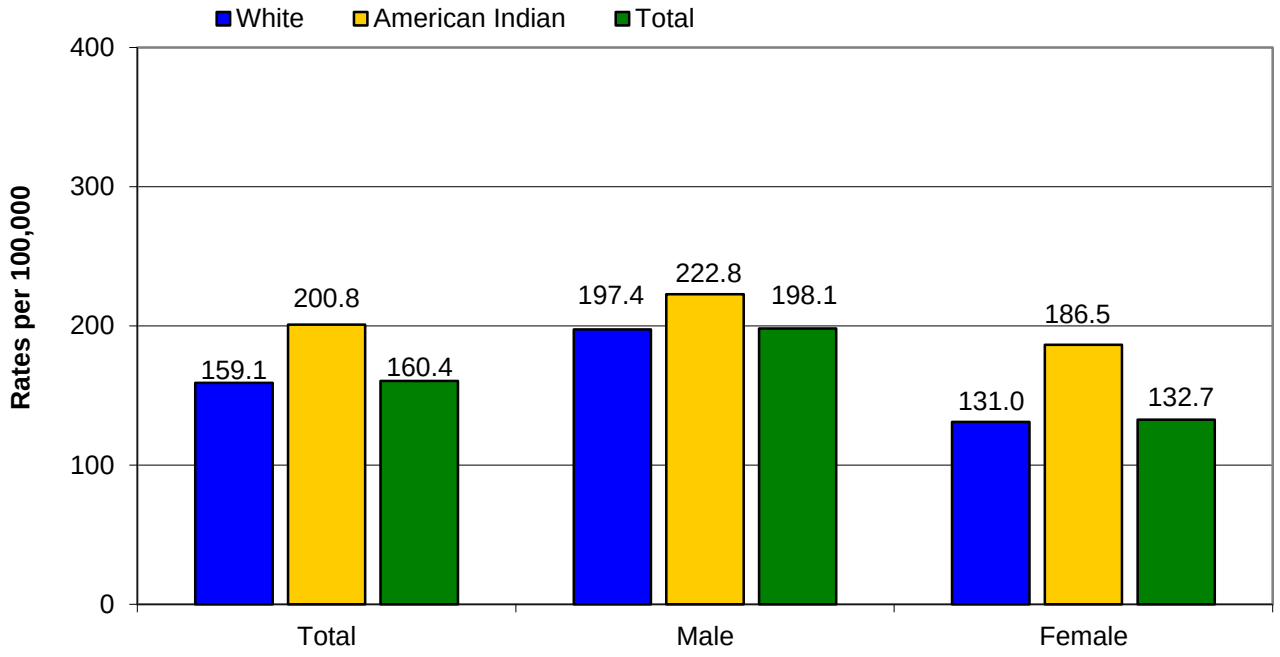
Table 10: Percentage of Cancer Deaths by Age Groups and Selected Primary Sites, South Dakota, 2016

Age Group	0-19	20-34	35-49	50-64	65-74	75-84	85+
All Sites	0%	1%	3%	19%	26%	29%	21%
Bladder	0%	2%	0%	4%	21%	38%	34%
Female Breast	0%	1%	6%	18%	35%	19%	20%
Colorectal	0%	1%	8%	18%	20%	23%	30%
Corpus and Uterus, NOS	0%	0%	5%	33%	33%	10%	19%
Meninges, Brain and CNS	4%	0%	8%	22%	30%	22%	14%
Kidney and Renal Pelvis	0%	0%	2%	24%	31%	27%	16%
Leukemia	2%	3%	3%	10%	23%	30%	30%
Lung and Bronchus	0%	0%	1%	21%	32%	30%	16%
Melanoma of the Skin	0%	0%	5%	30%	20%	30%	15%
Non-Hodgkin's Lymphoma	0%	0%	5%	16%	15%	44%	20%
Pancreas	0%	0%	4%	27%	27%	25%	18%
Prostate	0%	0%	2%	12%	14%	38%	34%

Source: South Dakota Department of Health

Overall, in 2016 more persons 75 to 84 years of age died from cancer in South Dakota than any other age group (Table 10).

Figure 8: All Sites Cancer Mortality Rates by Race, and Gender, South Dakota, 2016



Note: Rates per 100,000 age-adjusted to 2000 US standard population and 2016 SD estimated population.
Source: South Dakota Department of Health

Figure 8 illustrates that American Indian males had a higher mortality rate than any other group. In 2012 American Indian females had a higher mortality rate than their male counterparts.

VIII. YEARS OF POTENTIAL LIFE LOST

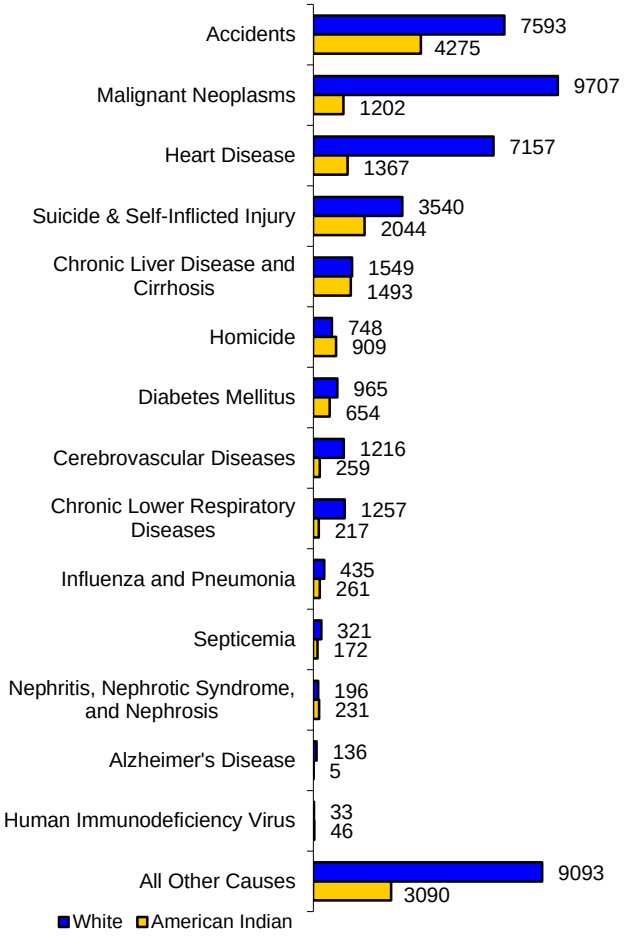
In 2016, accidents out ranked cancer in years of potential years lost (YPLL). For the five-year period 2012 to 2016, cancer ranked number one in YPLL. The number of years lost are shown in Figures 9 and 10 by race. There were 11,115 years of potential years lost due to cancer in 2016, compared to 9,904 years in 2008.

Table 11: Leading Causes of Years of Potential Life Lost (to 75 years of age), South Dakota, 2016

Accidents	12,226
Malignant Neoplasms	11,115
Heart Disease	8,731
Suicide & Self-Inflicted Injury	5,706
Chronic Liver Disease and Cirrhosis	3,058
Homicide	1,710
Diabetes Mellitus	1,624
Cerebrovascular Diseases	1,494
Chronic Lower Respiratory Diseases	1,488
Influenza and Pneumonia	726
Septicemia	533
All Other Causes	13,419

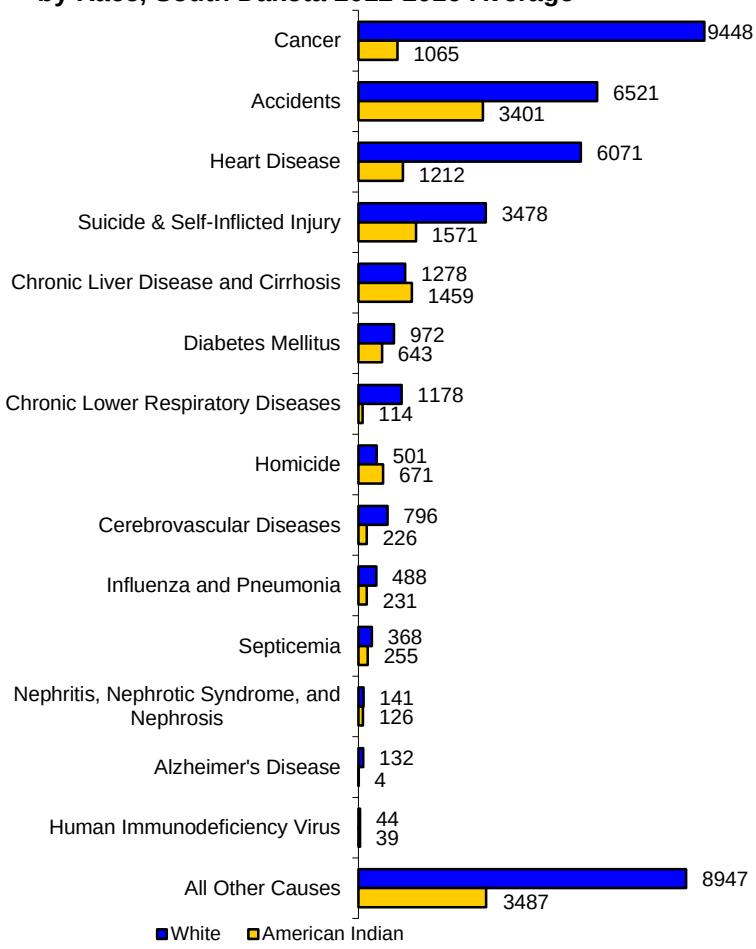
Source: South Dakota Department of Health

Figure 9: Years of Potential Life Lost (YPLL) Before Age 75 for the Leading Causes of Death by Race, South Dakota, 2016



Source: South Dakota Department of Health

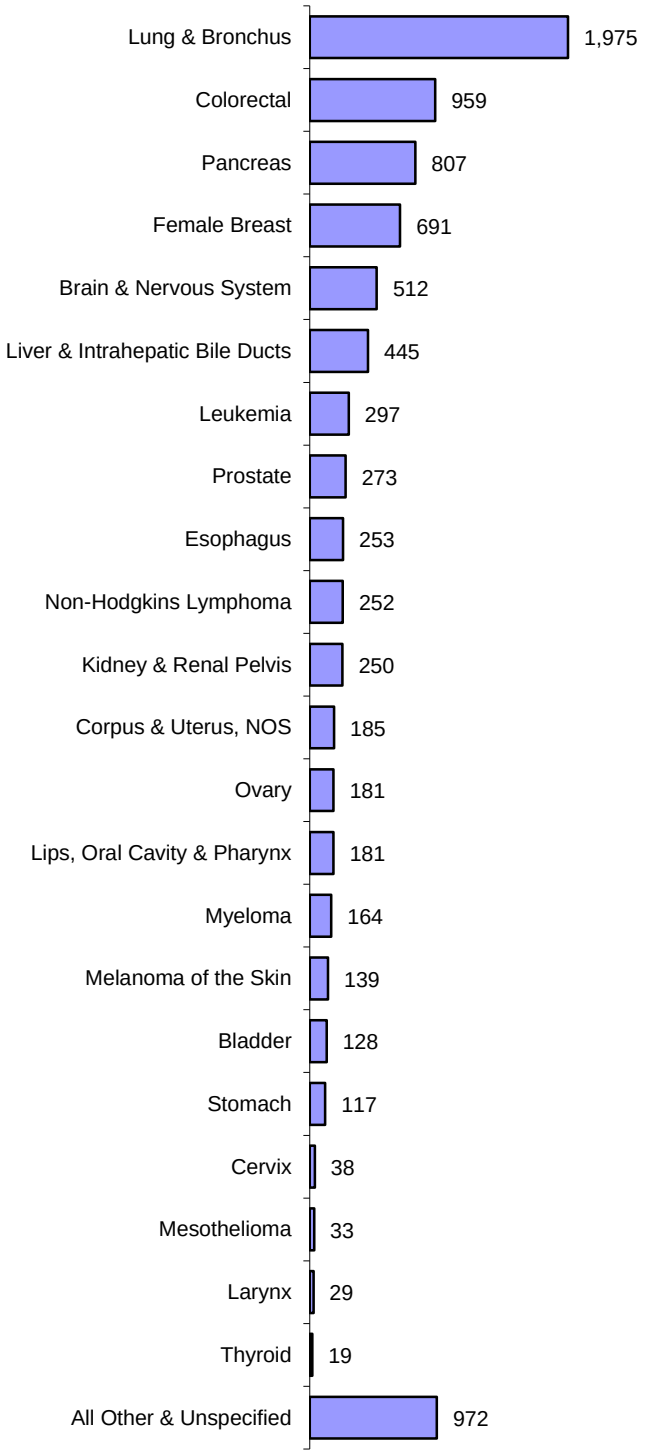
Figure 10: Years of Potential Life Lost (YPLL) Before Age 75 for the Leading Causes of Death by Race, South Dakota 2012-2016 Average*



* Number of years are averaged over the five-year period.
Source: South Dakota Department of Health

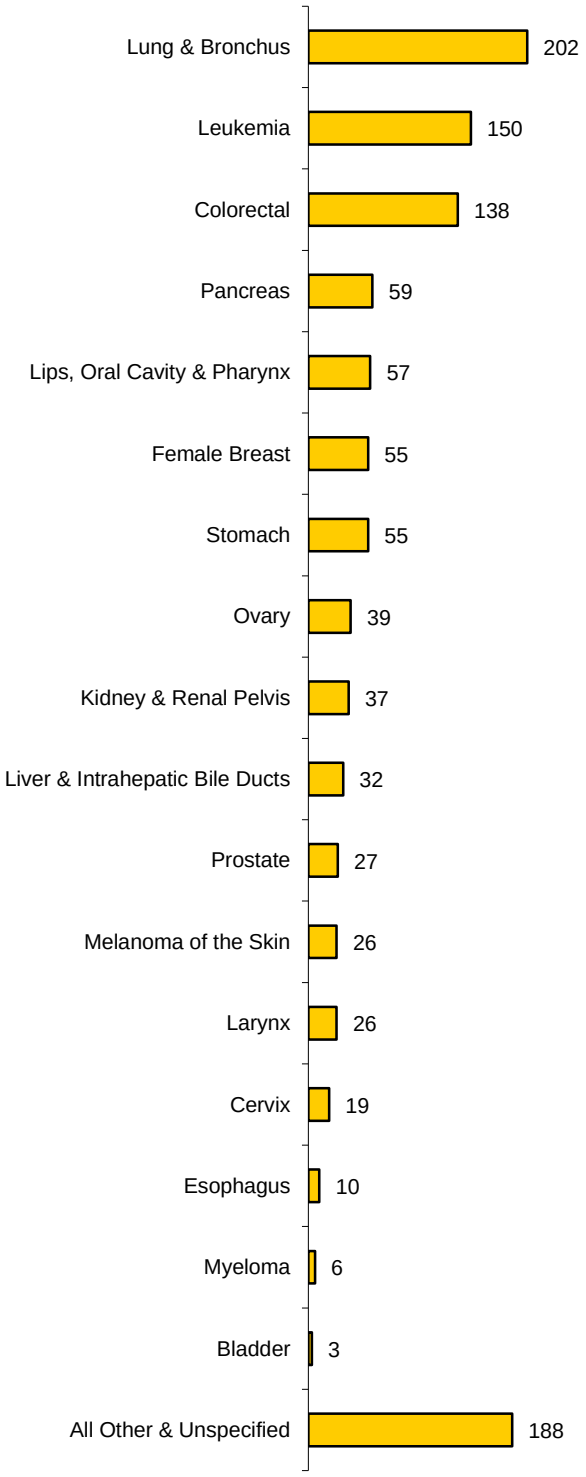
The differences in YPLL in Figures 11 and 12 reflect the number of cancer cases by primary sites by race. For example, the YPLL in 2016 for lung and bronchus for whites was 1,975 for 203 deaths whereas the YPLL for American Indians was 202 years for 21 deaths. Not all cancers were present among the American Indian population during 2016, hence the differences in the cancer sites presented.

Figure 11: Years of Potential Life Lost for Selected Cancers Among Whites, South Dakota, 2016



Source: South Dakota Department of Health

Figure 12: Years of Potential Life Lost for Selected Cancers Among American Indians, South Dakota, 2016

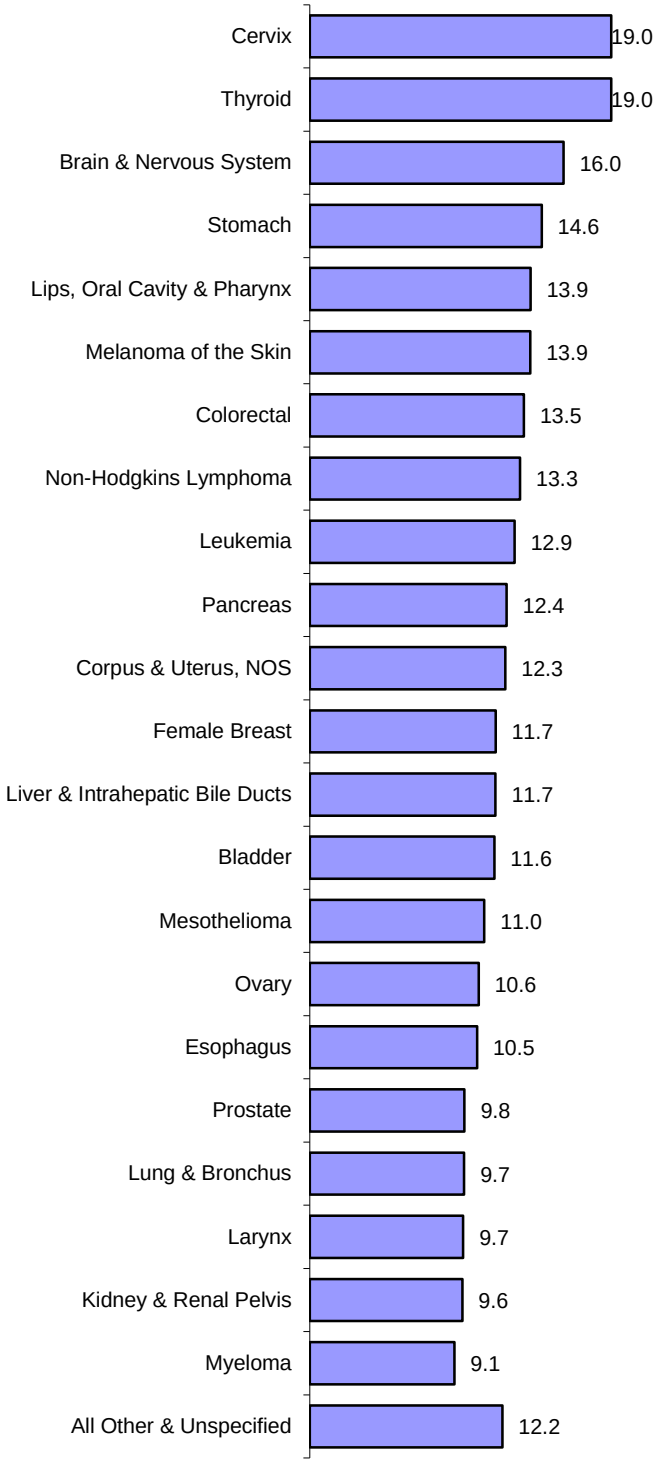


Source: South Dakota Department of Health

IX. AVERAGE YEARS OF LIFE LOST

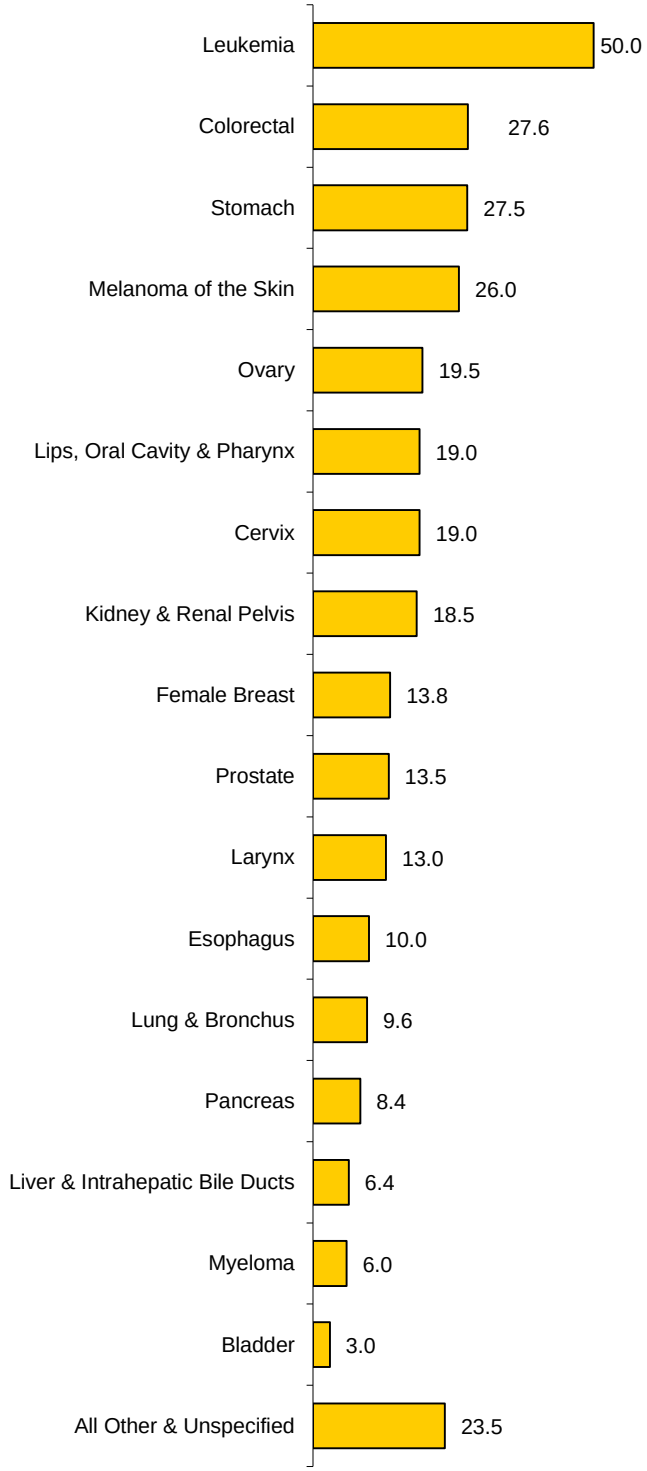
South Dakota's average years of life lost (AYLL) due to cancer in 2016 was 11.6 years, a slight decrease from 12.9 years in 2015. Leukemia cancer ranked first among cancer sites for American Indians at 50.0 years compared to whites where it ranked ninth with an average of 12.9 years.

Figure 13: Average Years of Life Lost for Selected Cancers Among Whites, South Dakota, 2016



Source: South Dakota Department of Health

Figure 14: Average Years of Life Lost for Selected Cancers Among American Indians, South Dakota, 2016



Source: South Dakota Department of Health

This page intentionally left blank.

X. SELECTED CANCER SITES INCIDENCE AND MORTALITY

This section covers the following cancers: bladder, female breast, cervix uteri, colorectal cancer, corpus uterus, kidney and renal pelvis, leukemia, lung and bronchus, melanoma (skin), myeloma, non-Hodgkin's lymphoma, ovary, pancreas, prostate, stomach, and thyroid.

These cancers were selected because of the ranking in the cancer sites reported as well as the importance and impact to society.

Topics for each cancer include incidence and mortality data along with age-adjusted rates, trends, comparison with national data (if available), risks, associated risk factors, and prevention.

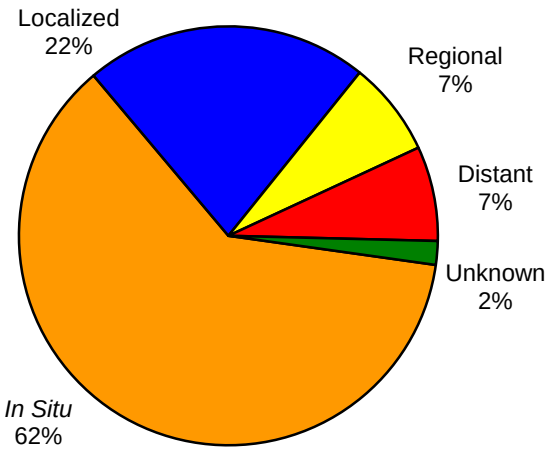
BLADDER

Table 12: Bladder Incidence and Mortality Summary, 2016

Bladder Cancer			Incidence			Mortality		
			Total	Male	Female	**Total**	Male	Female
South Dakota	**Total**	# Cases / Deaths	**220**	160	60	**47**	37	10
		Age-Adjusted Rate	**20.5**	32.8	10.6	**4.3**	8.2	1.4
	White	# Cases / Deaths	**212**	156	56	**45**	35	10
		Age-Adjusted Rate	**20.9**	33.7	10.5	**4.3**	8.2	1.5
	American Indian	# Cases / Deaths	**6**	3	3	**1**	1	0
		Age-Adjusted Rate	**15.9**	21.4	12.8	**2.6**	6.5	0.0
United States	**Total**	Age-Adjusted Rate	**19.0**	32.9	8.3	**4.4**	7.5	2.1
	White	Age-Adjusted Rate	**20.8**	35.9	9.0	**4.6**	8.0	2.2
	American Indian	Age-Adjusted Rate	**9.5**	16.8	4.2	**3.1**	5.6	1.4

[1]Includes *in situ* bladder;rates per 100,000 age-adjusted to 2000 US standard population and 2016 SD estimated population.
US rates www.seer.cancer.gov Source: South Dakota Department of Health

Figure 15: Bladder Cancer Stage at Diagnosis, South Dakota, 2016



Source: South Dakota Department of Health

Descriptive Epidemiology

Stage at Diagnosis: Cancer is categorized as noninvasive and invasive. There were 135 noninvasive bladder cancers reported in 2016. There were 84 invasive. More than half, 62%, of bladder cancer cases in South Dakota were diagnosed at noninvasive, *in situ* stage. Nationally, 50% of the cases of urinary bladder cancer are diagnosed at the *in situ* stage. In South Dakota, 5% of the cases were not diagnosed until the disease had spread to distant sites. In the United States, distant stage accounted for 4% of the bladder cancers reported.

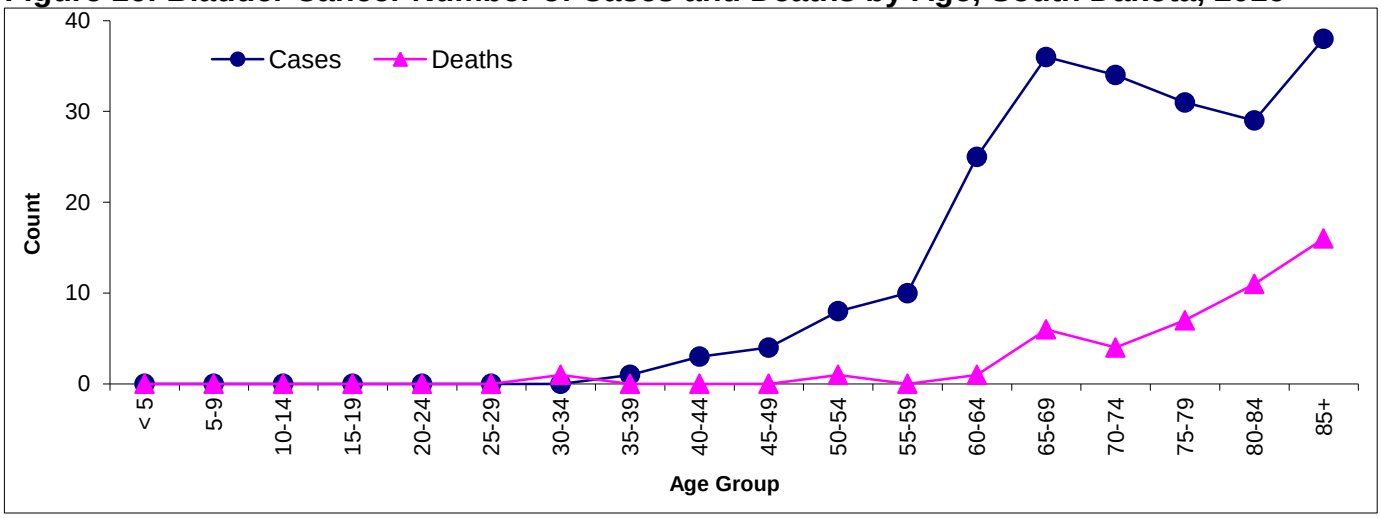
Incidence: In 2016, it was estimated that almost 77,000 cases of bladder cancer would be diagnosed in the United States. There were 220 cases of bladder cancer reported in South Dakota. There were 160 men and 60 women diagnosed with bladder cancer in 2016. Statistically, men were diagnosed about three times as often as women. There were only six American Indian cases diagnosed in 2016. In the United States it was the eighth most frequent cancer. In South Dakota it was the sixth most frequent cancer diagnosed.

Mortality: Advances in intravesical therapy and in the treatment of advanced disease with chemotherapy have reduced the percentage of mortality from bladder cancer. In South Dakota, ages from 75 and above have the highest mortality. In 2016, the South Dakota mortality rate was 4.3 compared to the US rate of 4.4.

Risk and Associated Factors: Bladder cancer was one of the first malignancies associated with industrialization. Cigarette smoking increases the risk of bladder cancer by two times that of a nonsmoker. Work exposure to certain chemicals also increases risk. Some of those with the highest risk are makers of rubber, leather, textiles, paint products, and printing compounds.

Prevention and Early Detection: Avoiding exposure to chemicals and cigarette smoking are two of the most common recommendations for prevention.

Figure 16: Bladder Cancer Number of Cases and Deaths by Age, South Dakota, 2016



Source: South Dakota Department of Health

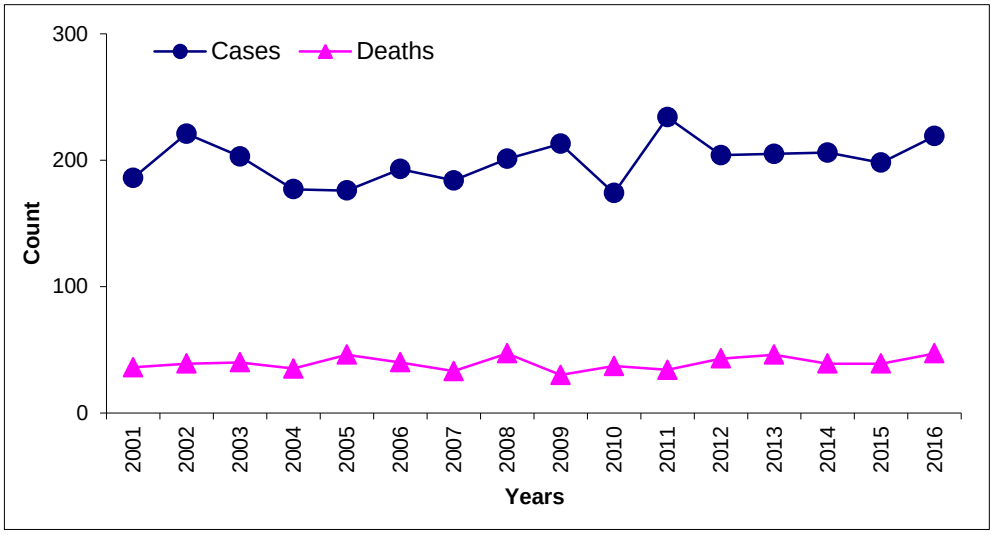


Figure 17: Bladder Cancer Cases and Deaths by Year, South Dakota, 2001 - 2016

Bladder cancer cases increased from 2015 but not as high as 2011 with 234 cases.

Source: South Dakota Department of Health

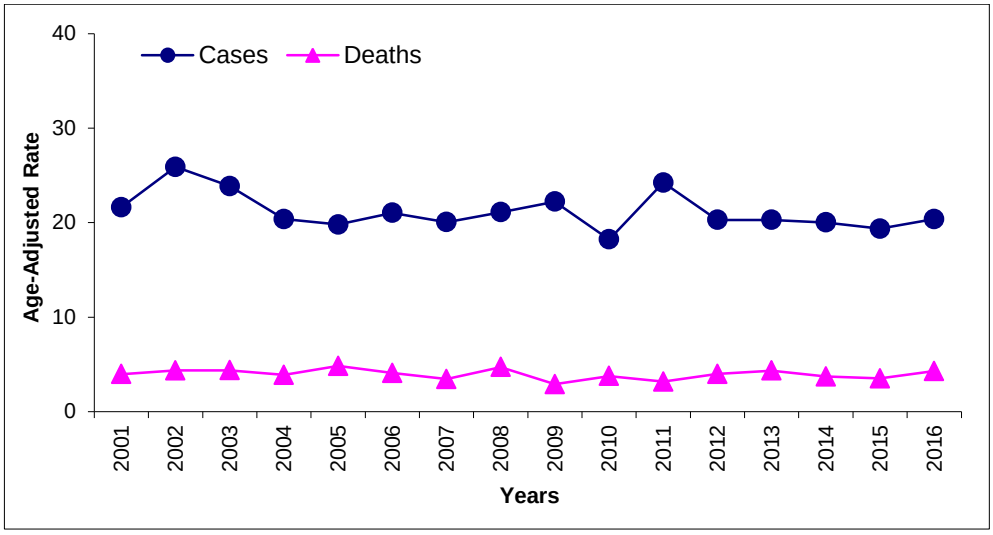


Figure 18: Bladder Cancer Age-Adjusted Rates, Cases, and Deaths by Year, South Dakota, 2001 - 2016

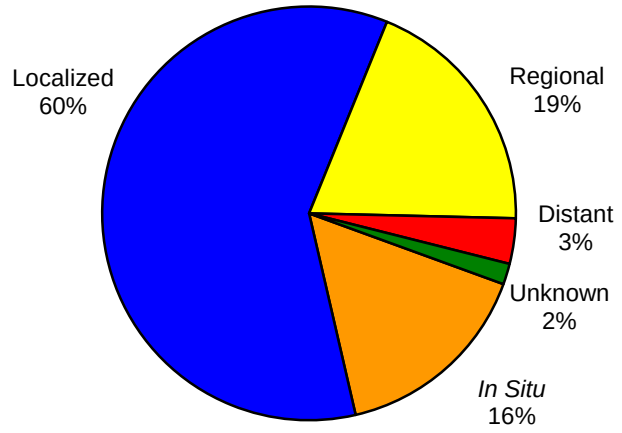
Rates per 100,000 age-adjusted to 2000 US standard population and SD estimated populations.
Source: South Dakota Department of Health

Table 13: Female Breast Incidence and Mortality Summary, 2016

Female Breast Cancer			Incidence	Mortality
South Dakota	Total	# Cases / Deaths	571	109
		Age-Adjusted Rate	110.9	19.3
	White	# Cases / Deaths	532	100
		Age-Adjusted Rate	112.5	18.8
	American Indian	# Cases / Deaths	29	6
		Age-Adjusted Rate	96.2	25.7
United States	Total	Age-Adjusted Rate	126.3	20.0
	White	Age-Adjusted Rate	128.9	19.6
	American Indian	Age-Adjusted Rate	73.6	15.5

Rates per 100,000 age-adjusted to 2000 US standard population and 2016 SD estimated population.
US rates www.seer.cancer.gov Source: South Dakota Department of Health

Figure 19: Female Breast Cancer Stage at Diagnosis, South Dakota, 2016



Source: South Dakota Department of Health

Descriptive Epidemiology

Stage at Diagnosis: Including *in situ* female breast cancer cases there were 678 cases diagnosed in 2016, of which 404 cases were diagnosed at a localized stage. This represents 60% of all reported breast cancer cases. There were 154 cases that had progressed beyond the breast. There were 24 that were diagnosed as a distant stage and 13 that were staged as unknown. The 107 *in situ* female breast cancer cases were reported but were not used in calculating incidence rates.

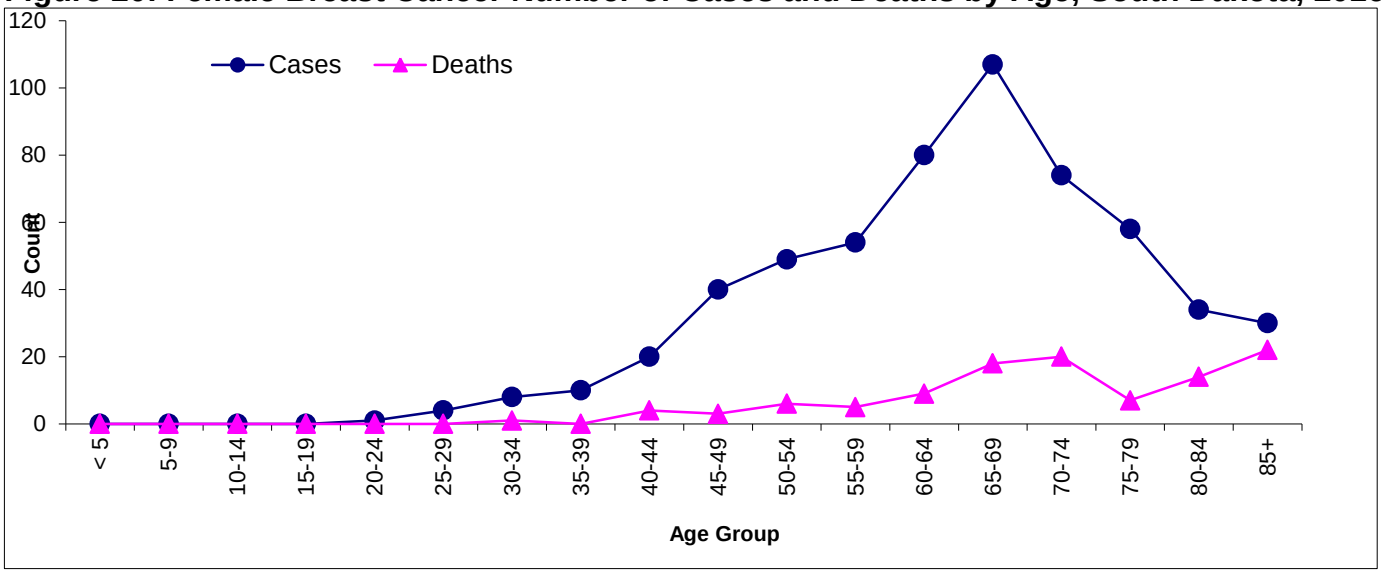
Incidence: National statistics report that female breast cancer is the most common malignant tumor among women. The incidence rate increased from 1947-1990. The rates fell 3.5% per year from 2001-2005. This decrease may be in part due to the lower number of women using hormone replacement therapy. South Dakota had 571 cases of invasive female breast cancer reported in 2016. These cases represented 12.3% of all invasive cancer cases reported in 2016 versus 15% nationally. When just looking at South Dakota women, breast cancer represented 26% of the cancer cases for woman diagnosed in 2016.

Mortality: Breast cancer is the fourth leading cause of death attributed to cancer in South Dakota. Nationwide, breast cancer mortality has been relatively stable overall since 1950. In cancers only of women, it is the second leading cause of cancer deaths. Although mortality has increased among women older than 55 years, it has decreased among women younger than 55 years of age. In 2016, there were 109 deaths. Of those deaths, 100 were white and six were American Indian.

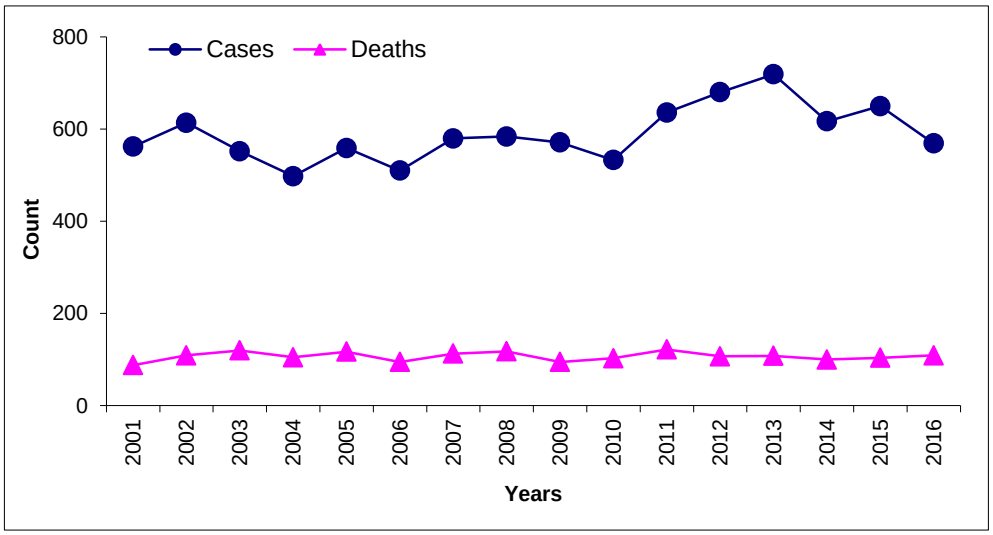
Risk and Associated Factors: Studies have shown that breast cancer risk is due to a combination of factors. The main factors that influence your risk include being a woman and getting older. Most breast cancers are found in women who are 50 years old or older. Lifestyle factors that contribute to an increased risk include: drinking alcohol, being overweight or obese, and being physically inactive. If you have a family history of breast cancer or inherited changes in your BRCA1 and BRCA2 genes, you may have a high risk of getting breast cancer.

Prevention and Early Detection: Prevention and early detection is the key to the survival of breast cancer. Breast cancers found during mammograms are more likely to be smaller and still confined to the breast. Women should talk with their doctor about ways to lower their risk and recommendations about individualized screening.

Figure 20: Female Breast Cancer Number of Cases and Deaths by Age, South Dakota, 2016



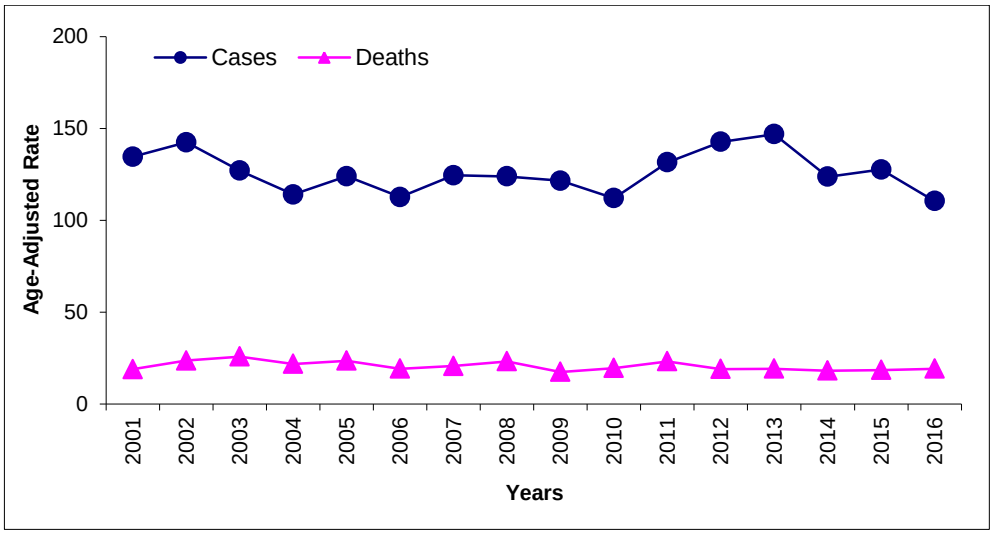
Source: South Dakota Department of Health



Source: South Dakota Department of Health

Figure 21: Female Breast Cancer Cases and Deaths by Year, South Dakota, 2001 - 2016

The incidence of female breast cancer was at an all-time high in 2013.



Rates per 100,000 age-adjusted to 2000 US standard population and SD estimated populations.
Source: South Dakota Department of Health

Figure 22: Female Breast Cancer Age-Adjusted Rates, Cases, and Deaths by Year, South Dakota, 2001 - 2016

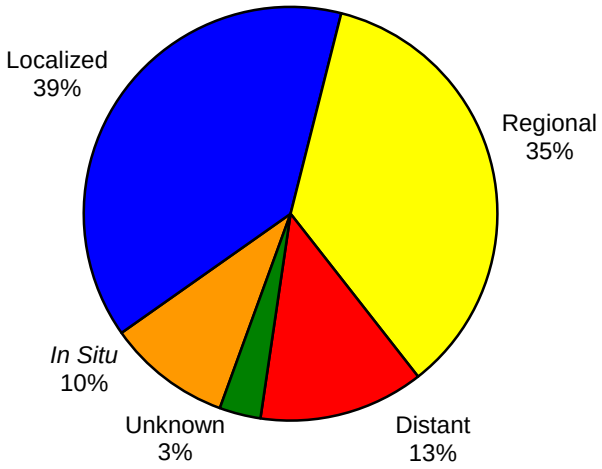
CERVIX UTERI

Table 14: Cervix Uteri Incidence and Mortality Summary, 2016

Cervix Uteri Cancer			Incidence	Mortality
South Dakota	Total	# Cases / Deaths	28	5
		Age-Adjusted Rate	6.7	0.8
	White	# Cases / Deaths	25	4
		Age-Adjusted Rate	7.1	0.7
	American Indian	# Cases / Deaths	3	1
		Age-Adjusted Rate	10.4	2.8
United States	Total	Age-Adjusted Rate	7.3	2.2
	White	Age-Adjusted Rate	7.3	2.2
	American Indian	Age-Adjusted Rate	6.0	2.8

Rates per 100,000 age-adjusted to 2000 US standard population and 2016 SD estimated population.
US rates www.seer.cancer.gov Source: South Dakota Department of Health

Figure 23: Cervix Uteri Cancer Stage at Diagnosis, South Dakota, 2016



Source: South Dakota Department of Health

Descriptive Epidemiology

Stage at Diagnosis: Early stage of diagnosis clearly provides the best opportunity for cure. In South Dakota, 39% of the cases reported were diagnosed at a localized stage. SEER reports that 46% of the cases diagnosed nationally were at a localized stage.

Incidence: In 2016, the incidence rate in South Dakota was 6.7 and the United States rate was 7.3. Both nationally and in South Dakota, cervical cancer was the third most common female genital tract malignancy. Invasive cervical cancer accounted for 0.6% of all cases reported and 1.3% of all females diagnosed with cancer in South Dakota in 2016. SEER incidence reports that 0.2% of cases were younger than 20 years of age.

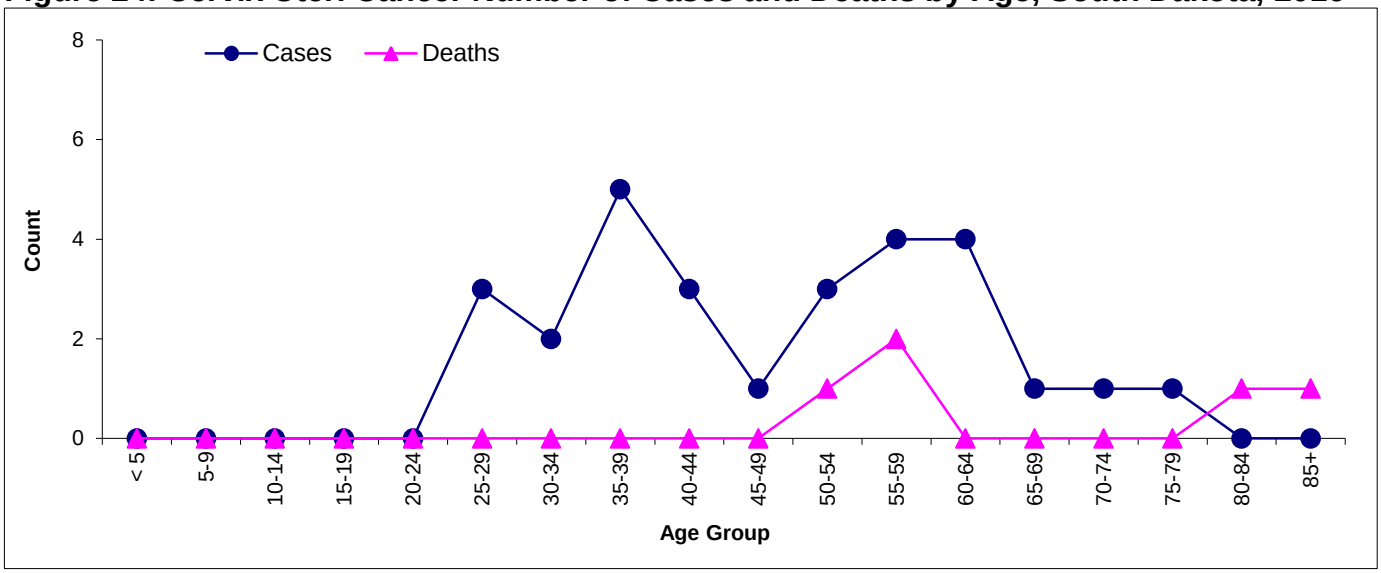
Mortality: In 2016, the mortality rate in South Dakota was 0.8 for cancer of the cervix uteri. The United States rate was 2.2. The stage of disease at diagnosis affects the mortality rate. Cases diagnosed at a localized stage have a 92% survival rate according to the American Cancer Society. Nationally, when diagnosed at a distant stage, the percentage of survival drops to 17% at five years. In South Dakota, there were four cases in 2016 diagnosed at a distant stage.

Risk and Associated Factors: Almost all cervical cancers are caused by human papillomavirus (HPV). HPV is so common that most people get it at some time in their lives.

Prevention and Early Detection: The US Preventive Services Task Force (USPSTF) recommends screening for cervical cancer in women age 21 to 65 years with cytology (Pap test) every three years or, for women age 30 to 65 years who want to lengthen the screening interval, screening with a combination of cytology and human papillomavirus (HPV) testing every five years.

The HPV vaccine protects against the types of HPV that most often cause cervical, vaginal, and vulvar cancers. Many of these cancers could be prevented with vaccination. Vaccination is recommended for boys and girls ages 11 to 12 years, but can be given at age 9 through 26.

Figure 24: Cervix Uteri Cancer Number of Cases and Deaths by Age, South Dakota, 2016



Source: South Dakota Department of Health

Half of the incidence of cervical cancer occurred in women under the age of 50 .

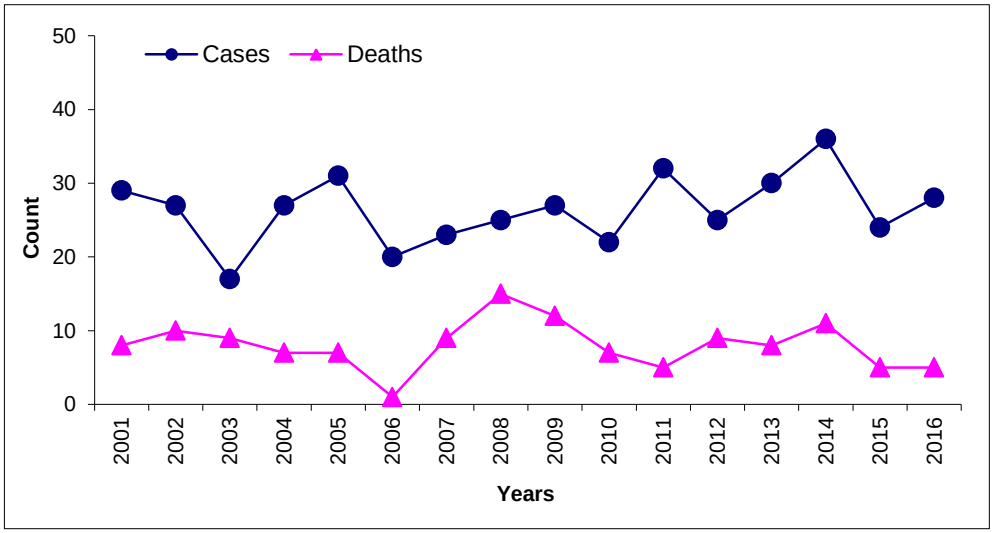


Figure 25: Cervix Uteri Cancer Cases and Deaths by Year, South Dakota, 2001 - 2016

The incidence peak for female cervix uteri cancer was in 2014.

Source: South Dakota Department of Health

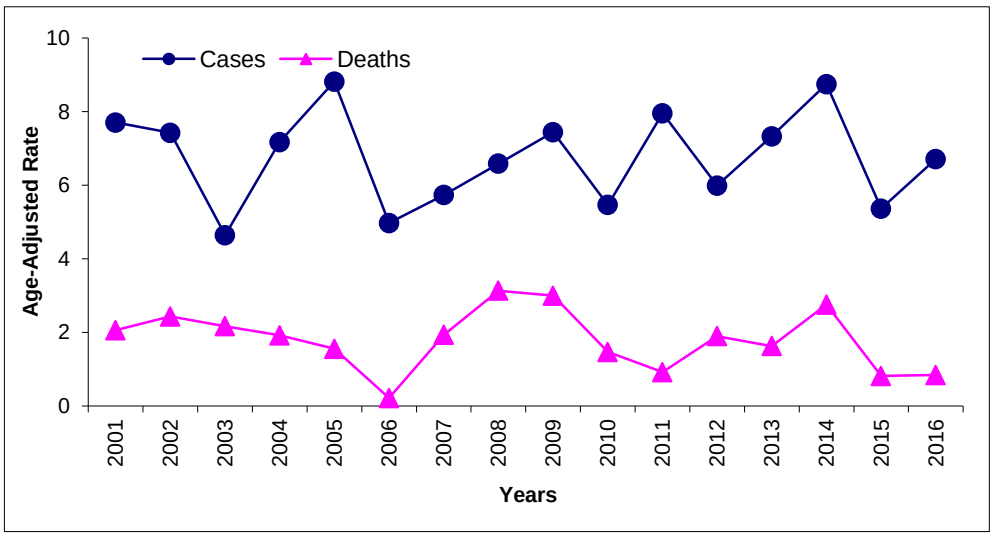


Figure 26: Cervix Uteri Cancer Age-Adjusted Rates, Cases, and Deaths by Year, South Dakota, 2001 - 2016

Rates per 100,000 age-adjusted to 2000 US standard population and SD estimated populations.
Source: South Dakota Department of Health

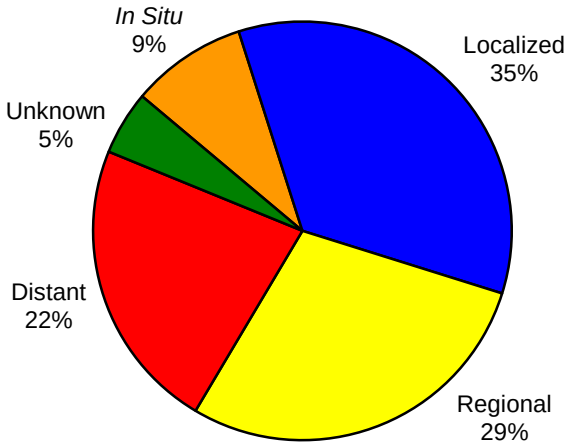
COLORECTAL

Table 15: Colorectal Incidence and Mortality Summary, 2016

Colorectal Cancer			Incidence			Mortality		
			Total	Male	Female	**Total**	Male	Female
South Dakota	**Total**	# Cases / Deaths	**406**	213	193	**164**	91	73
		Age-Adjusted Rate	**39.3**	43.9	35.9	**15.3**	19.2	12.1
	White	# Cases / Deaths	**369**	196	173	**157**	87	70
		Age-Adjusted Rate	**38.0**	42.7	34.5	**15.5**	19.5	12.3
	American Indian	# Cases / Deaths	**29**	13	16	**5**	3	2
		Age-Adjusted Rate	**55.5**	52.5	56.5	**8.0**	10.3	6.2
United States	**Total**	Age-Adjusted Rate	**37.1**	42.3	32.9	**13.7**	16.3	11.5
	White	Age-Adjusted Rate	**36.6**	41.3	32.6	**13.4**	15.9	11.3
	American Indian	Age-Adjusted Rate	**38.4**	41.3	36.6	**14.4**	17.3	12.2

Rates per 100,000 age-adjusted to 2000 US standard population and 2016 SD estimated population.
US rates www.seer.cancer.gov Source: South Dakota Department of Health

Figure 27: Colorectal Cancer Stage at Diagnosis, South Dakota, 2016



Source: South Dakota Department of Health

Descriptive Epidemiology

Stage at Diagnosis: The prognosis of the patient is greatly influenced by the stage of disease at diagnosis. In 2016, 35% (155) of the cases of colorectal cancer were diagnosed at a localized stage. Localized is defined as when the disease is still confined to the colon. The remaining 229 invasive cases (51%) were diagnosed after the disease had spread beyond the colon. Of those 229 cases, 101 were diagnosed at a distant stage when the disease had spread further involving other organs. The SEER National Cancer Institute website states that the five-year survival rate for those who have a distant stage at diagnosis is 14.2% for the 2009-2015 time period.

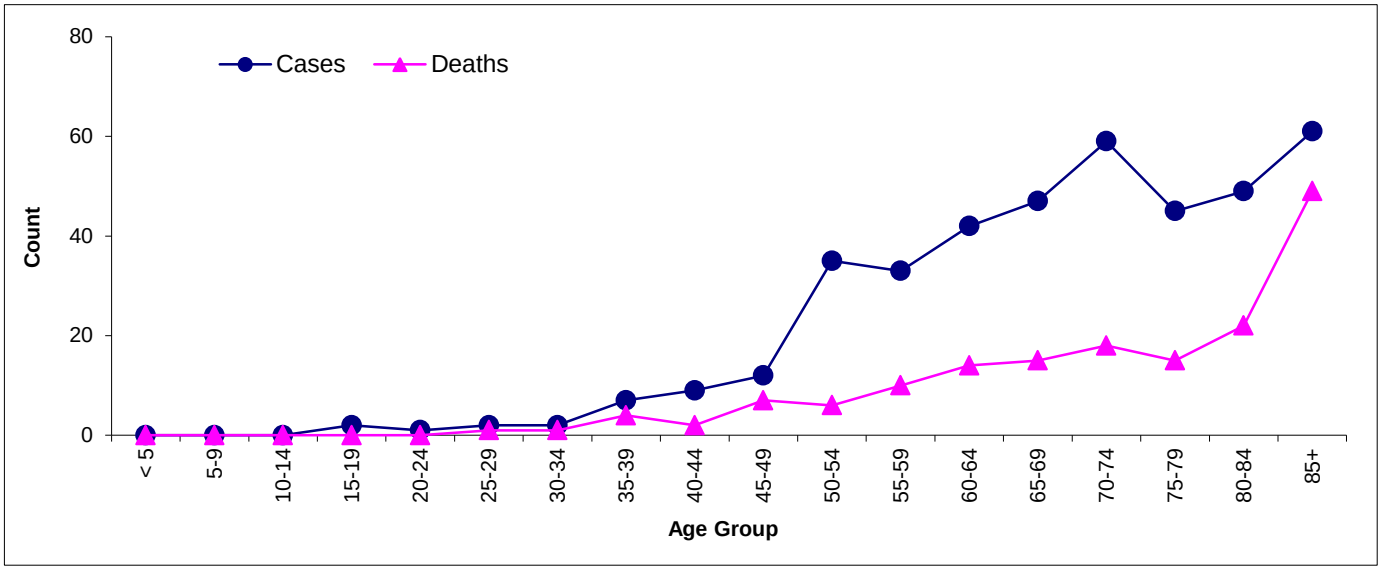
Incidence: Colorectal cancer accounted for 8.8% of all cases reported in South Dakota in 2016. The median age at diagnosis was 71. There were 213 men and 193 women diagnosed with colorectal cancer in 2016 in South Dakota. Overall, colorectal cancer was the fourth most diagnosed cancer. When reviewed by gender, it was the third most diagnosed cancer with 8.8% of the cancers reported in males and 8.7% of the cancers reported in females.

Mortality: Overall incidence and mortality rates for colorectal cancer are decreasing. The overall five-year survival rate for 2009-2015 from SEER was 64.4% for men and women. In 2016, there were a total of 164 deaths that were attributed to colorectal cancer in South Dakota; about 20 more men than women. Of that number, 157 were white and five were American Indian. The median age at death was 75.5. The SEER National Cancer Institute website states that the United States mortality rate was 13.7.

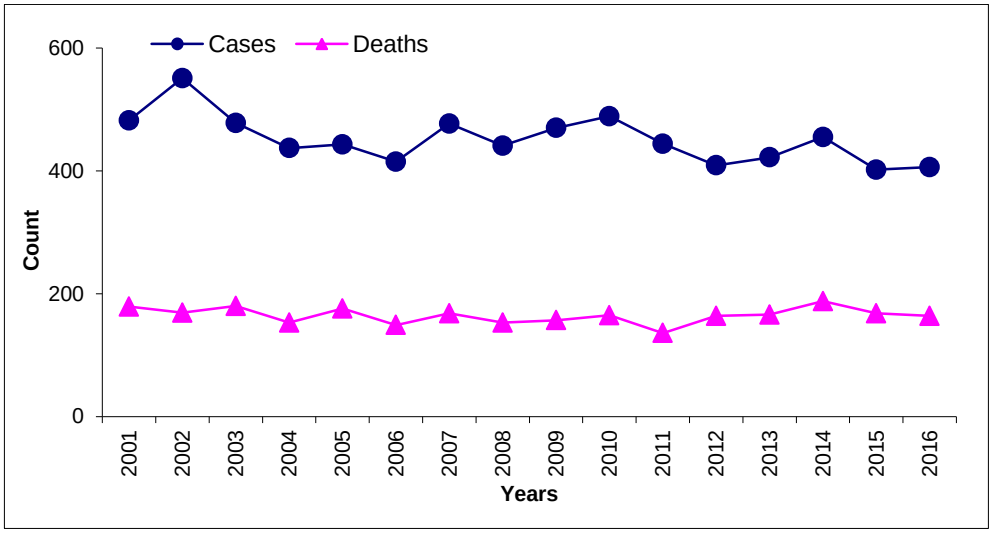
Risk and Associated Factors: Risk for colorectal cancer increases with age. Over 90% of cases occur in people who are 50 years old or older. Lifestyle factors that may contribute to an increased risk include lack of regular physical activity, a diet low in fruit and vegetables, a low-fiber and high-fat diet, overweight and obesity, alcohol consumption, and tobacco use.

Prevention and Early Detection: The USPSTF recommends screening for colorectal cancer starting at age 50 and continuing until age 75. Recommended screening methods include: high-sensitivity fecal occult blood test (FOBT), fecal immunochemical test (FIT), FIT-DNA, colonoscopy, CT colonography, & flexible sigmoidoscopy. The risks and benefits of these screening methods vary.

Figure 28: Colorectal Cancer Number of Cases and Deaths by Age, South Dakota, 2016



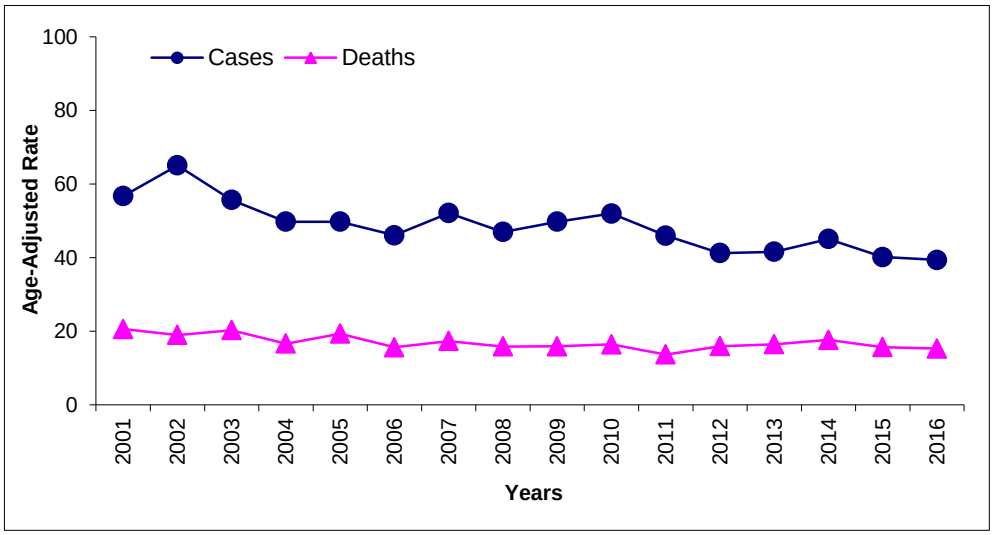
Source: South Dakota Department of Health



Source: South Dakota Department of Health

Figure 29: Colorectal Cancer Cases and Deaths by Year, South Dakota, 2001 – 2016

The incidence peak for colorectal cancer occurred in 2002. Incidences of colorectal cancer appear to escalate after age 50.



Rates per 100,000 age-adjusted to 2000 US standard population and SD estimated populations.
Source: South Dakota Department of Health

Figure 30: Colorectal Cancer Age-Adjusted Rates, Cases, and Deaths by Year, South Dakota, 2001 - 2016

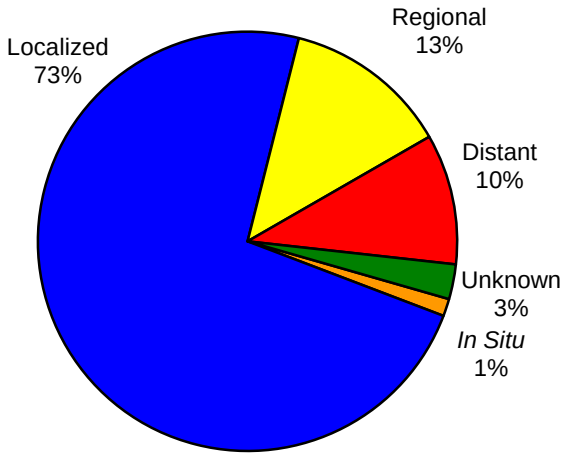
CORPUS and UTERUS, NOS

Table 16: Corpus and Uterus, NOS Incidence and Mortality Summary, 2016

Corpus and Uterus, NOS Cancer			Incidence	Mortality
South Dakota	Total	# Cases / Deaths	147	21
		Age-Adjusted Rate	27.4	3.7
	White	# Cases / Deaths	142	21
		Age-Adjusted Rate	28.3	4.0
	American Indian	# Cases / Deaths	4	0
		Age-Adjusted Rate	14.5	0.0
United States	Total	Age-Adjusted Rate	28.1	5.0
	White	Age-Adjusted Rate	28.6	4.6
	American Indian	Age-Adjusted Rate	20.4	3.8

Rates per 100,000 age-adjusted to 2000 US standard population and 2016 SD estimated population.
US rates www.seer.cancer.gov Source: South Dakota Department of Health

Figure 31: Corpus and Uterus, NOS Cancer Stage at Diagnosis, South Dakota, 2016



Source: South Dakota Department of Health

Descriptive Epidemiology

***Stage at Diagnosis**:* Cancer in the uterus is treated surgically. Staging for these diseases is done following surgery, unless it is obvious that the disease has progressed and advanced. Cases with obvious advanced disease do not benefit from surgical procedures and are staged by physical examination. These cases are treated without operative staging. In South Dakota, during 2016, 73% of corpus uteri cases were diagnosed at a localized stage. Fifteen cases were diagnosed at a distant stage, almost double than in 2015.

Incidence: The uterine cervix is the small cylindrical neck that leads from the uterus, or womb, into the vagina. A knob of the cervix protrudes into the vagina and can be visualized on physical examination. It is lined with epithelial and stromal cells creating a site for epithelial, stromal, and mixed cell malignancies.

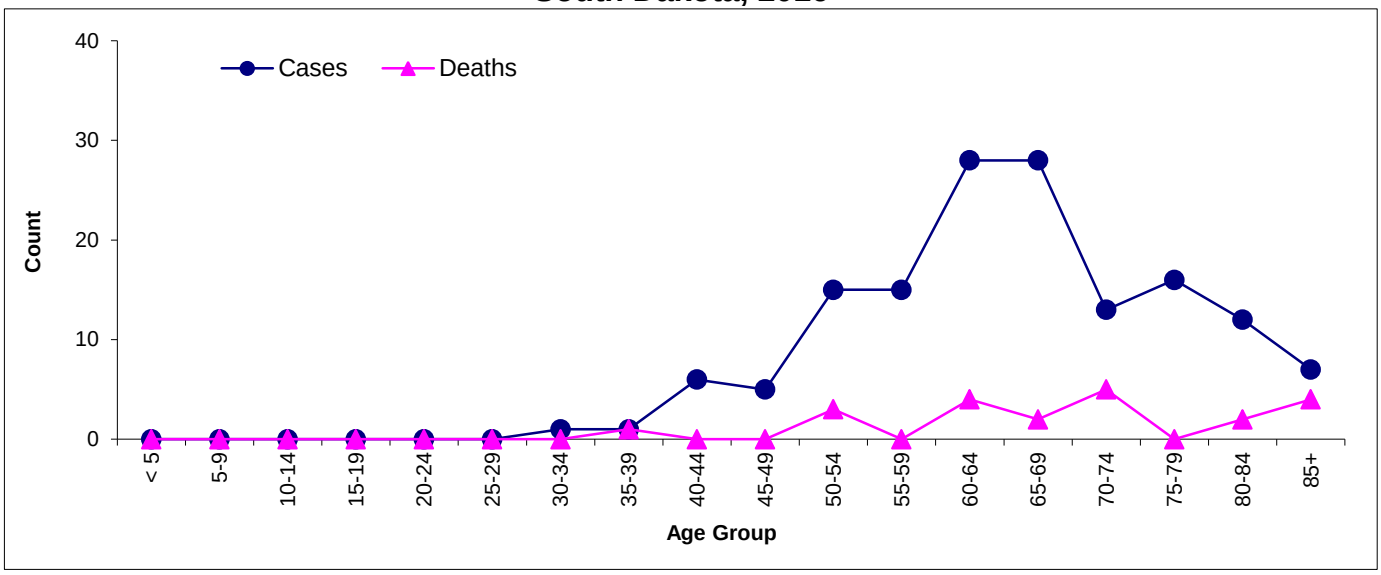
Endometrial carcinoma is one of the female genital cancers. It is ranked fourth among females reported with cancer in South Dakota in 2016. Cancer of the corpus uteri represented 6.7% of all of the cancers diagnosed in South Dakota females in 2016. Endometrial cancer affects primarily postmenopausal women. The median age at diagnosis in South Dakota is 65 years of age.

Mortality: The mortality rate in South Dakota for the reporting period was 3.7 for deaths attributed to uterine cancer. In the United States the rate was 5.0. South Dakota had 21 female deaths attributed to cancer of the uterus in 2016. The stage of disease at diagnosis affects the mortality rate. Overall (all stages included), the five-year relative survival rate was 81.2% in the United States.

Risk and Associated Factors: Risk factors associated with corpus uteri cancer suggest that exposure to estrogen for long periods of time play a critical role. The use of exogenous estrogen replacement therapy accounted for a dramatic rise in the incidence of endometrial cancer in the United States in the 1970s. The use of combination estrogen-progesterone oral contraceptive pills confers protection against endometrial hyperplasia and subsequent development of cancer.

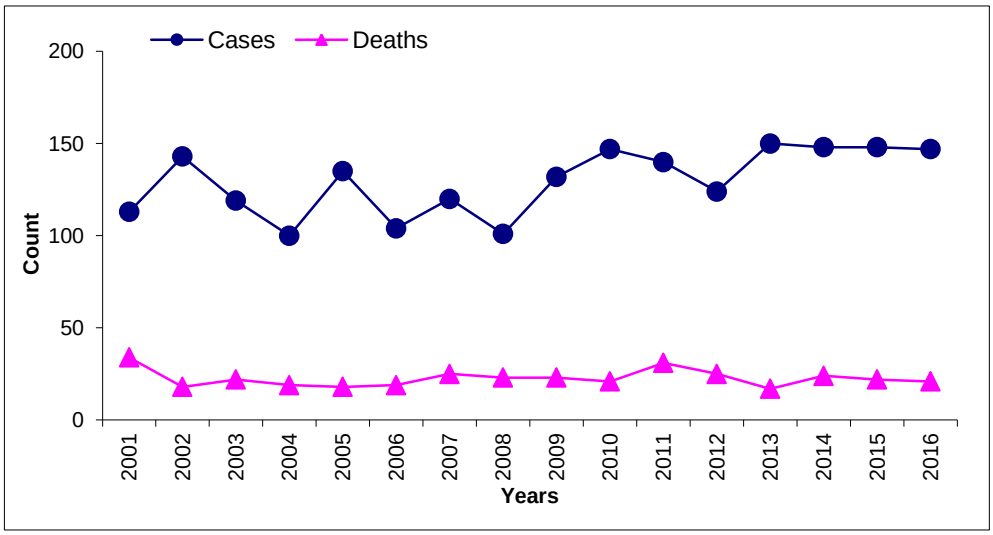
Prevention and Early Detection: Other factors associated with an increased risk of developing uterine cancer include obesity, a high-fat diet and prolonged exposure to the female hormone, estrogen. One pregnancy appears to lower the risk of uterine cancer by 50%.

Figure 32: Corpus and Uterus, NOS Cancer Number of Cases and Deaths by Age, South Dakota, 2016



Source: South Dakota Department of Health

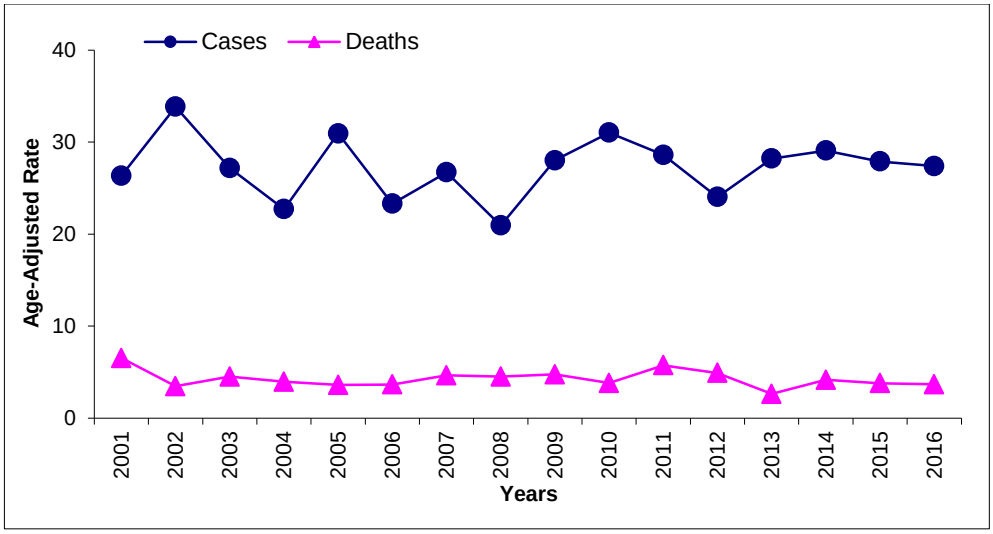
In South Dakota, in 2016 the incidences were the highest in the 60-64 and 65-69 age groups.



Source: South Dakota Department of Health

Figure 33: Corpus and Uterus, NOS Cancer Cases and Deaths by Year, South Dakota, 2001 - 2016

The incidence peak for female corpus and uterus, NOS cancer was in 2013.



Rates per 100,000 age-adjusted to 2000 US standard population and SD estimated populations.
Source: South Dakota Department of Health

Figure 34: Corpus and Uterus, NOS Cancer Age-Adjusted Rates, Cases, and Deaths by Year, South Dakota, 2001 - 2016

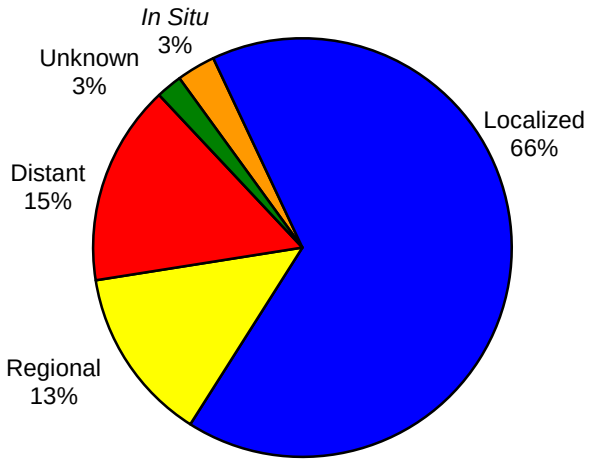
KIDNEY AND RENAL PELVIS

Table 17: Kidney and Renal Pelvis Incidence and Mortality Summary, 2016

Kidney and Renal Pelvis Cancer			Incidence			Mortality		
			Total	Male	Female	**Total**	Male	Female
South Dakota	**Total**	# Cases / Deaths	**197**	118	79	**49**	34	15
		Age-Adjusted Rate	**18.8**	22.4	15.4	**4.5**	6.8	2.6
	White	# Cases / Deaths	**167**	106	61	**47**	32	15
		Age-Adjusted Rate	**17.1**	21.8	12.6	**4.6**	6.7	2.7
	American Indian	# Cases / Deaths	**23**	10	13	**2**	2	0
		Age-Adjusted Rate	**45.6**	42.8	47.6	**3.1**	6.4	0.0
United States	**Total**	Age-Adjusted Rate	**15.9**	21.9	10.7	**3.6**	5.2	2.3
	White	Age-Adjusted Rate	**16.5**	22.6	11.1	**3.7**	5.4	2.3
	American Indian	Age-Adjusted Rate	**18.1**	22.8	13.8	**5.3**	7.8	3.1

Rates per 100,000 age-adjusted to 2000 US standard population and 2016 SD estimated population.
US rates www.seer.cancer.gov Source: South Dakota Department of Health

Figure 35: Kidney and Renal Pelvis Cancer Stage at Diagnosis, South Dakota, 2016



Source: South Dakota Department of Health

Descriptive Epidemiology

Stage at Diagnosis: As with all malignancies, early diagnosis is the key to better prognosis and possible cure. In 2016, 66% of the cases were diagnosed at a localized stage, with another 15% diagnosed at a distant stage. Unfortunately, symptoms do not always reflect the stage of the disease. Blood in the urine is one of the symptoms that frequently present at diagnosis. As with other cancers, renal cancer can spread through the blood-stream and/or lymphatic system. Survival rates associated with kidney cancer depend on how far the disease has progressed, the size of the tumor, and whether or not it has metastasized. The latest five-year survival rate for localized stage kidney cancer is 92.5%. The survival rate for distant stage is 12.0%.

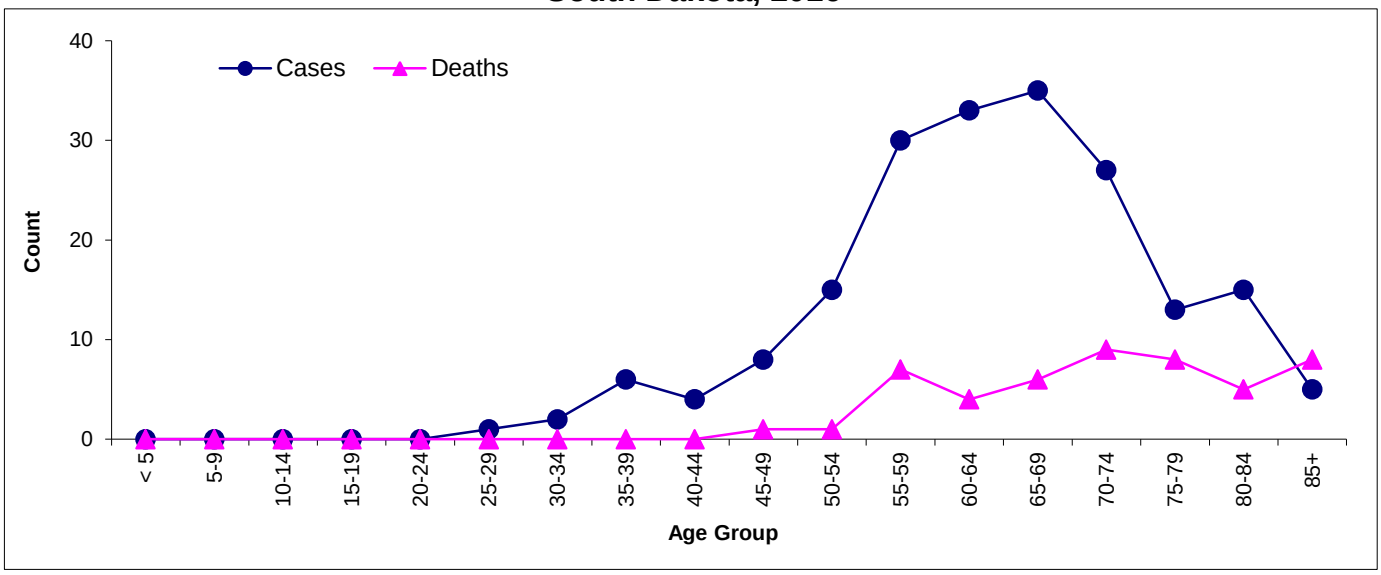
Incidence: In 2016, the American Cancer Society estimated there would be 62,700 new cases of kidney cancer in the United States. This accounts for 3.7% of all reported malignancies in the United States. In South Dakota there were 197 reported cases of kidney cancer in 2016, representing 4.2% of all cancer cases with an age-adjusted rate of 18.8 per 100,000 persons. Kidney cancer develops most often in people over 40. There is no known cause of this disease. Doctors can seldom explain why one person develops kidney cancer and another does not. The median age at diagnosis is 64 in South Dakota, and it was 64 in the United States.

Mortality: This cancer was the ninth leading cause of cancer death for South Dakota in 2016. In the United States, it was the 13th leading cause of death with a median age of death of 71 years.

Risk and Associated Factors: Cigarette smoking increases the risk of developing kidney cancer. The risk seems to increase by the amount one smokes. Obesity is associated with risk, as are exposures to occupational substances such as aniline dyes, benzene, and naphthalene.

Prevention and Early Detection: The main preventive measure is to stop smoking and maintain a healthy weight. It is difficult to diagnose kidney cancer until it becomes symptomatic. There are no known screenings recommended at this time.

Figure 36: Kidney and Renal Pelvis Cancer Number of Cases and Deaths by Age, South Dakota, 2016



Source: South Dakota Department of Health

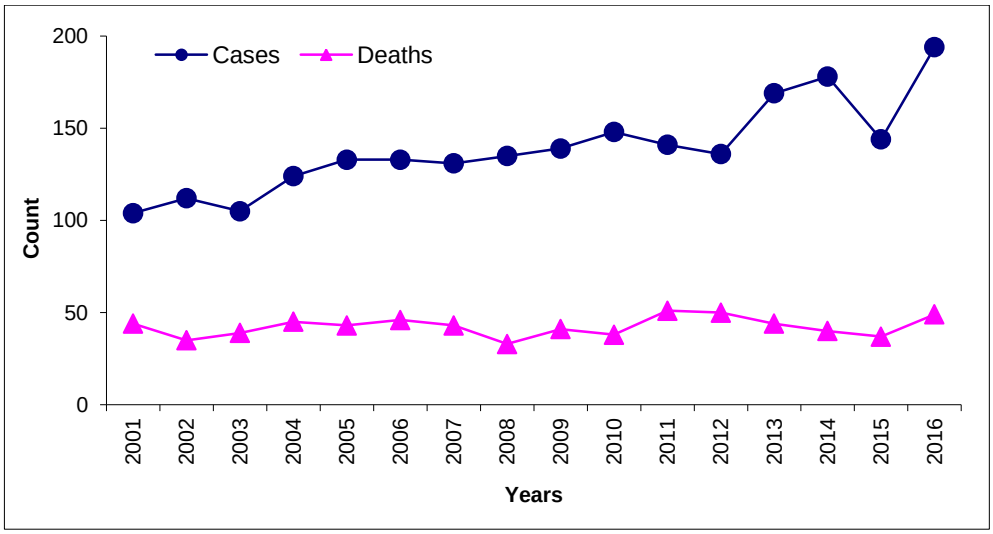


Figure 37: Kidney and Renal Pelvis Cancer Cases and Deaths by Year, South Dakota, 2001 - 2016

The incidence peak for kidney and renal pelvis cancer occurred in 2016.

Source: South Dakota Department of Health

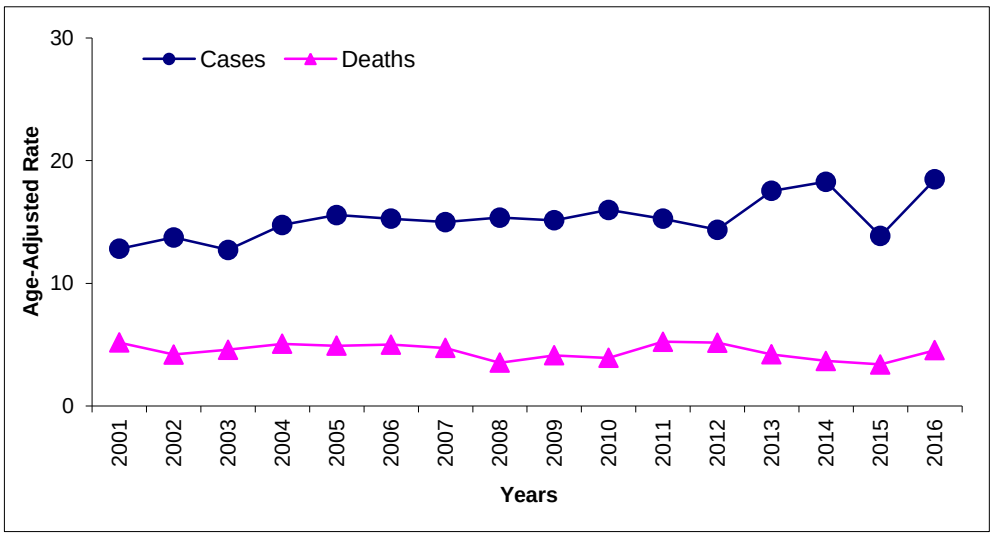


Figure 38: Kidney and Renal Pelvis Cancer Age-Adjusted Rates, Cases, and Deaths by Year, South Dakota, 2001 - 2016

Rates per 100,000 age-adjusted to 2000 US standard population and SD estimated populations.
Source: South Dakota Department of Health

LEUKEMIA

Table 18: Leukemia Incidence and Mortality Summary, 2016

Leukemia			Incidence			Mortality		
			Total	Male	Female	**Total**	Male	Female
South Dakota	**Total**	# Cases / Deaths	**184**	122	62	**61**	38	23
		Age-Adjusted Rate	**18.3**	25.6	12.1	**5.7**	8.2	3.8
	White	# Cases / Deaths	**173**	114	59	**58**	37	21
		Age-Adjusted Rate	**18.7**	25.8	12.7	**5.7**	8.4	3.6
	American Indian	# Cases / Deaths	**9**	7	2	**3**	1	2
		Age-Adjusted Rate	**12.3**	19.9	5.8	**3.2**	2.0	4.3
United States	**Total**	Age-Adjusted Rate	**13.3**	17.1	10.1	**6.3**	8.3	4.7
	White	Age-Adjusted Rate	**13.9**	17.9	10.5	**6.5**	8.6	4.9
	American Indian	Age-Adjusted Rate	**9.3**	12.5	6.9	**3.3**	4.9	2.0

Rates per 100,000 age-adjusted to 2000 US standard population and 2016 SD estimated population.
US rates www.seer.cancer.gov Source: South Dakota Department of Health

Descriptive Epidemiology

Stage at Diagnosis: Leukemias are not staged because they may involve bone marrow throughout the body. Doctors classify them by type and subtype in an attempt to determine the prognosis and a recommended level of treatment. Chronic myelogenous leukemia is grouped by phases and chronic lymphocytic leukemia (CLL) uses a Rai classification. Leukemia is a type of cancer of the blood. It is defined by how quickly the disease progresses. Leukemia is either chronic (disease progresses slowly) or acute (progresses quickly).

Incidence: Leukemias are a diverse group of cancers and are subtyped by histology. Subtypes have different etiology, treatment, and prognosis. Leukemias accounted for 4.0% of the cancers reported in 2016 for South Dakota. The American Cancer Society estimated that there would be 180 new cases of leukemia in South Dakota during 2016 and 60,140 cases nationwide.

Mortality: Leukemia accounted for 4.9% of the cancer deaths in South Dakota in 2016. The subtype of acute myeloid leukemia was the most frequent cause of leukemia death. Over 80% of the deaths associated with leukemia occurred at the age of 65 or older.

Leukemia is clinically and pathologically subdivided into a variety of large groups. The first division is between the acute and chronic forms.

Chronic Leukemia: Early in the disease process, the abnormal blood cells still have normal processes. Slowly, chronic leukemia does get worse. It causes symptoms as the number of abnormal cells in the blood rises. In South Dakota in 2016, there were 104 new cases of chronic leukemia.

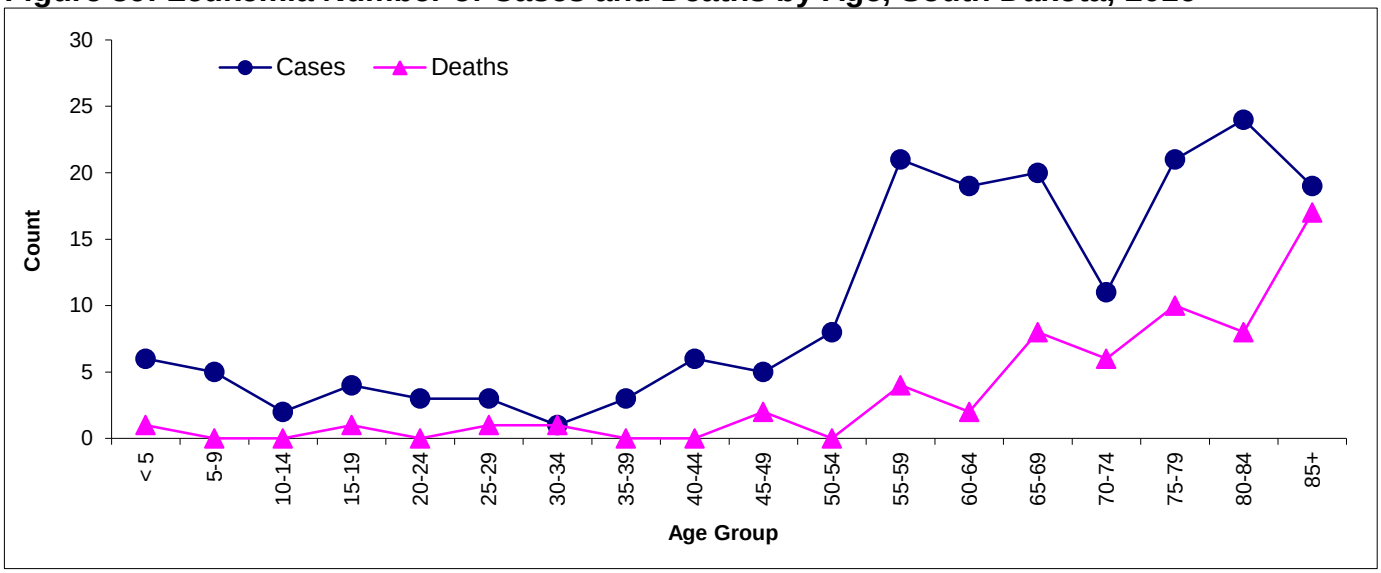
Acute Leukemia: The blood cells are very abnormal. The blood cells cannot carry out their normal processes. The number of abnormal cells increases rapidly. Acute leukemia worsens quickly as do the symptoms. There were 70 new cases of acute leukemia in South Dakota in 2016.

These types of leukemia are further divided by the type of white blood cell that is affected.

Risk and Associated Factors: People who are exposed to very high levels of radiation are more likely to develop leukemia. Working with certain chemicals and exposure to high levels of benzene in the workplace can cause leukemia. Benzene is used widely in the chemical industry. Workers exposed to formaldehyde may also be at greater risk of leukemia. Chromosomal abnormalities, such as Down's syndrome and certain other genetic diseases may increase the risk of leukemia.

Prevention and Early Detection: There are no early detection or prevention strategies. Often symptoms are the same as for many other health problems, thus early detection is difficult. Diagnosis is made using blood tests and bone marrow biopsies.

Figure 39: Leukemia Number of Cases and Deaths by Age, South Dakota, 2016



Source: South Dakota Department of Health

Leukemia is frequently diagnosed in children, but as with all malignancies it is a disease of the elderly. Deaths from leukemia increase after the age of 64.

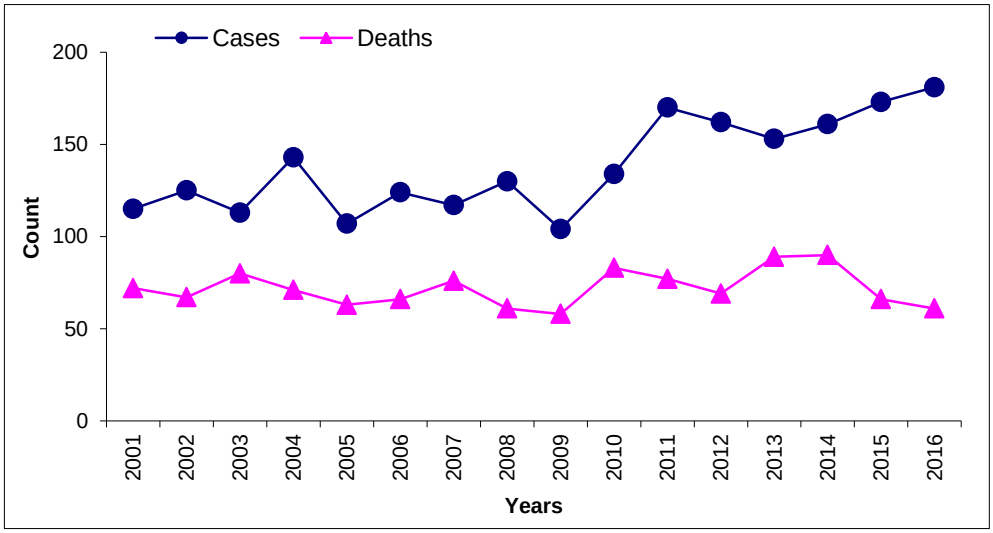


Figure 40: Leukemia Cases and Deaths by Year, South Dakota, 2001 - 2016

The incidence peak for leukemia occurred in 2011.

Source: South Dakota Department of Health

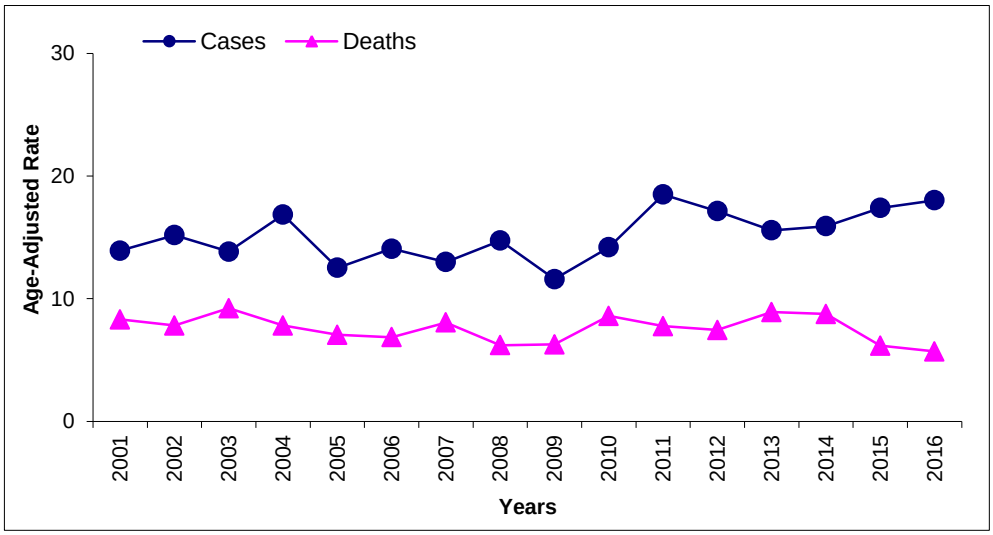


Figure 41: Leukemia Age-Adjusted Rates, Cases, and Deaths by Year, South Dakota, 2001 - 2016

Rates per 100,000 age-adjusted to 2000 US standard population and SD estimated populations.
Source: South Dakota Department of Health

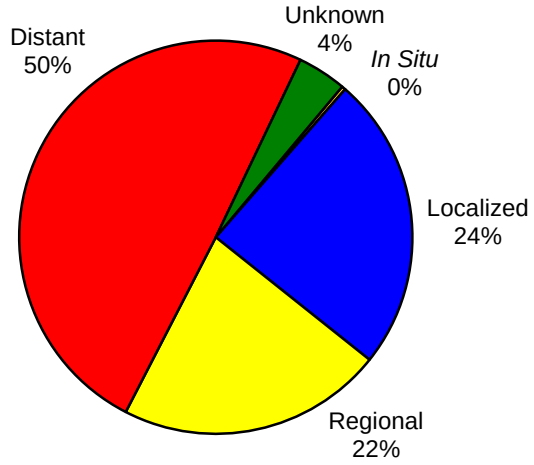
LUNG AND BRONCHUS

Table 19: Lung and Bronchus Incidence and Mortality Summary, 2016

Lung and Bronchus Cancer			Incidence			Mortality		
			Total	Male	Female	**Total**	Male	Female
South Dakota	**Total**	# Cases / Deaths	**625**	307	318	**418**	232	186
		Age-Adjusted Rate	**57.9**	61.9	55.6	**38.5**	47.4	32.0
	White	# Cases / Deaths	**581**	289	292	**390**	218	172
		Age-Adjusted Rate	**57.3**	61.6	54.8	**37.9**	47.0	31.2
	American Indian	# Cases / Deaths	**35**	13	22	**25**	11	14
		Age-Adjusted Rate	**82.1**	77.5	85.8	**59.8**	71.6	54.5
United States	**Total**	Age-Adjusted Rate	**51.7**	58.4	46.7	**38.5**	46.9	31.9
	White	Age-Adjusted Rate	**53.4**	58.8	49.6	**39.3**	47.1	33.2
	American Indian	Age-Adjusted Rate	**35.4**	36.1	35.8	**31.0**	36.3	26.9

Rates per 100,000 age-adjusted to 2000 US standard population and 2016 SD estimated population.
US rates www.seer.cancer.gov Source: South Dakota Department of Health

Figure 42: Lung and Bronchus Cancer Stage at Diagnosis, South Dakota, 2016



Source: South Dakota Department of Health

Descriptive Epidemiology

***Stage at Diagnosis*:** The presentation of lung cancer is extremely variable and depends on local manifestations of the tumor, distant metastases or associated paraneoplastic syndromes. In 2016, 24% of lung cancer patients were diagnosed at a localized stage. The more advanced the stage, the poorer the prognosis is for the patient. In 2016, 309 (50%) cases were diagnosed when the disease had progressed beyond the lung and metastasized to a distant location. Approximately 72% of cases in 2016 were diagnosed after the disease had progressed beyond the lung to lymph nodes, regional areas, or distant sites, such as brain or bone.

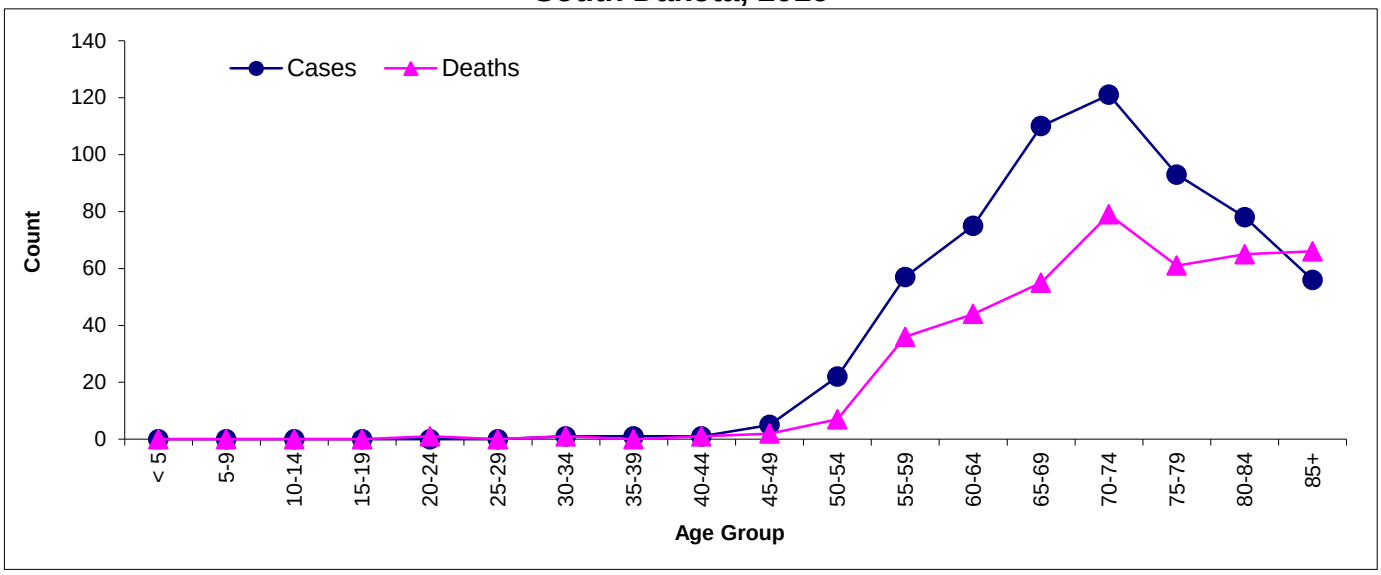
Incidence: Lung cancer is a major public health concern, with an estimated 224,390 new cases in the United States in 2016. Despite the well documented link between tobacco product use and respiratory diseases, including cancer, the outcomes of such efforts to curb the use of tobacco products have been mixed. In South Dakota, there were 625 new invasive lung cancer cases diagnosed in 2016.

Mortality: There were 418 lung cancer deaths in South Dakota in 2016. Incidence and mortality rates have significantly increased during the last century. Lung cancer accounts for approximately 23.5% of all United States deaths attributed to cancer. In South Dakota, lung cancer accounts for 24.3% of deaths from cancer. Lung cancer is the leading cause of cancer deaths in both men and women.

Risk and Associated Factors: Cigarette smoking is the number one risk factor for lung cancer and is linked to approximately 90% of lung cancers. Other risk factors include secondhand smoke exposure, occupational or environmental exposures to substances such as radon, arsenic, benzene, and asbestos, a personal or family history of lung cancer, and previous radiation therapy to the chest.

Prevention and Early Detection: The USPSTF recommends annual screening for lung cancer with low-dose computed tomography (LDCT) in adults aged 55 to 80 years who have a 30 pack/ year smoking history and currently smoke or have quit within the past 15 years. Screening should be discontinued once a person has not smoked for 15 years or develops a health problem that substantially limits life expectancy or the ability or willingness to have curative lung surgery.

Figure 43: Lung and Bronchus Cancer Number of Cases and Deaths by Age, South Dakota, 2016



Source: South Dakota Department of Health

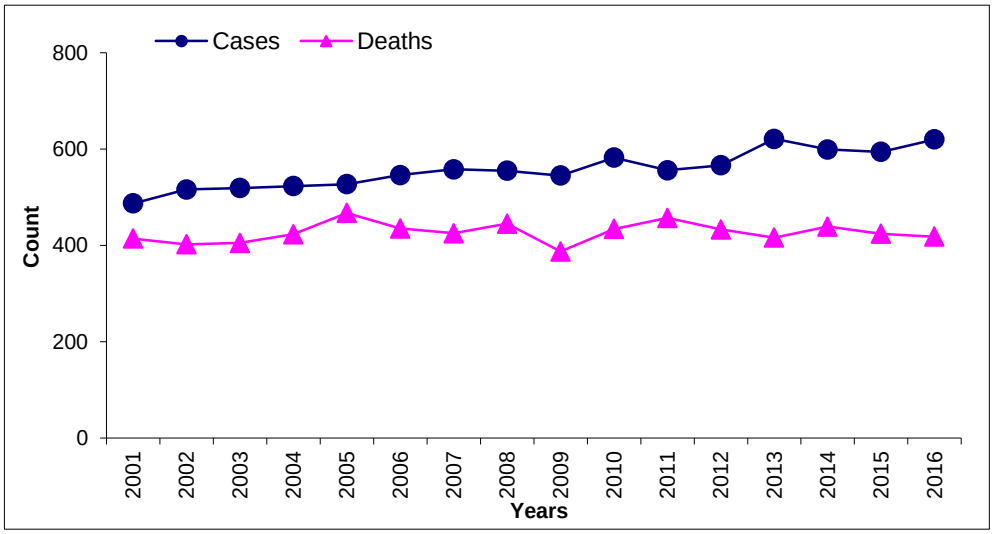


Figure 44: Lung and Bronchus Cancer Cases and Deaths by Year, South Dakota, 2001 - 2016

The number of cases and deaths associated with lung and bronchus cancer remain constant.

Source: South Dakota Department of Health

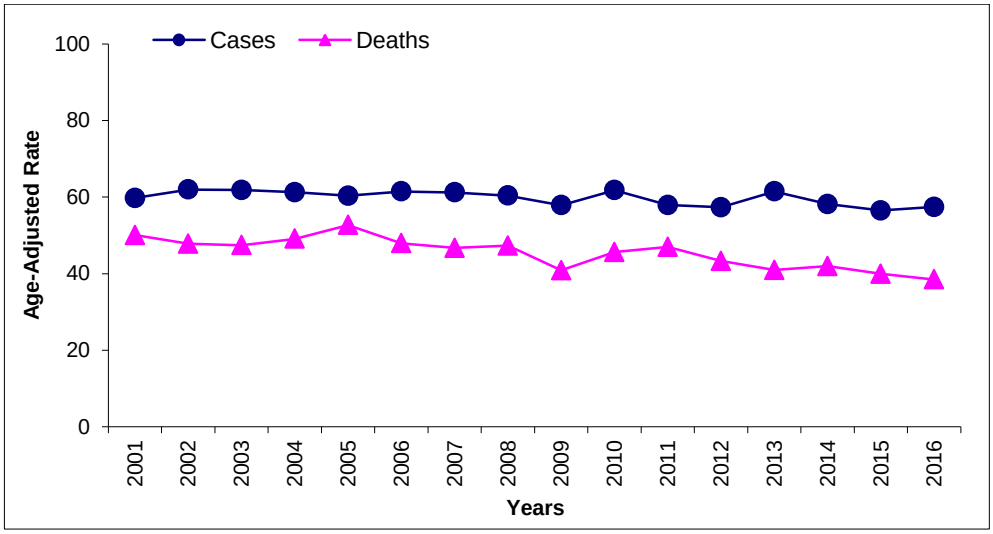


Figure 45: Lung and Bronchus Cancer Age-Adjusted Rates, Cases, and Deaths by Year, South Dakota, 2001 - 2016

Rates per 100,000 age-adjusted to 2000 US standard population and SD estimated populations.
Source: South Dakota Department of Health

MELANOMA OF THE SKIN

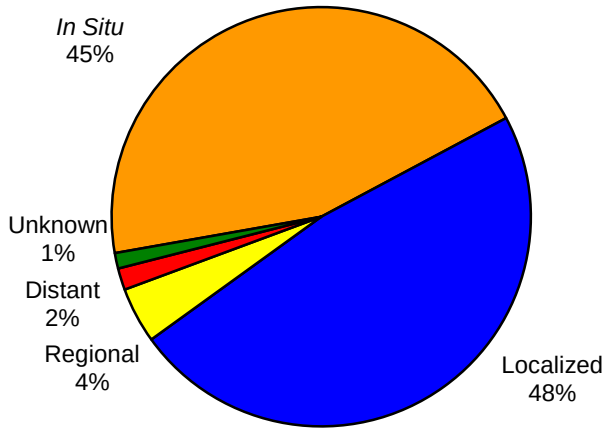
Table 20: Melanoma of the Skin Incidence and Mortality Summary, 2016

Melanoma of the Skin			Incidence			Mortality		
			Total	Male	Female	**Total**	Male	Female
South Dakota	**Total**	# Cases / Deaths	**232**	131	101	**20**	17	3
		Age-Adjusted Rate	**24.1**	28.0	21.6	**1.8**	3.4	0.6
	White	# Cases / Deaths	**229**	130	99	**19**	16	3
		Age-Adjusted Rate	**26.1**	30.0	23.7	**1.8**	3.3	0.6
	American Indian	# Cases / Deaths	**1**	0	1	**1**	1	0
		Age-Adjusted Rate	**1.8**	0.0	3.5	**1.9**	4.0	0.0
United States	**Total**	Age-Adjusted Rate	**22.4**	29.0	17.6	**2.2**	3.2	1.3
	White	Age-Adjusted Rate	**26.7**	33.9	21.4	**2.5**	3.8	1.6
	American Indian	Age-Adjusted Rate	**6.0**	0.0	5.2	**0.9**	-	0.0

Rates per 100,000 age-adjusted to 2000 US standard population and 2016 SD estimated population.
US rates www.seer.cancer.gov *=rates suppressed. Source: South Dakota Department of Health

.

Figure 46: Melanoma of the Skin Stage at Diagnosis, South Dakota, 2016



Source: South Dakota Department of Health

Descriptive Epidemiology

***Stage at Diagnosis*:** Melanoma is staged by the depth of invasion and the extension of the lesion. In 2016, almost half of the melanoma of the skin cases reported for South Dakota were localized. Another 45% were staged as *in situ* disease. The survival rate for localized melanoma is 98.7%. For distant disease, the survival rate is 24.8% at five years.

Incidence: In the United States in 2016, the American Cancer Society estimated that there would be 76,380 new cases of melanoma of the skin. There are three forms of skin cancer: basal cell, squamous cell, and melanoma. Melanoma is by far the most dangerous form of skin cancer. Melanoma is primarily a cancer of the white populations. In 2016, South Dakota's incidence rate was 24.1 and the United States had an incidence rate of 22.4.

***Mortality*:** There were 20 deaths attributed to melanoma of the skin in South Dakota in 2016 with a mortality rate of 1.8 and the United States mortality rate was 2.2. The median age for death in South Dakota for this cancer was 70, the same age as the United States.

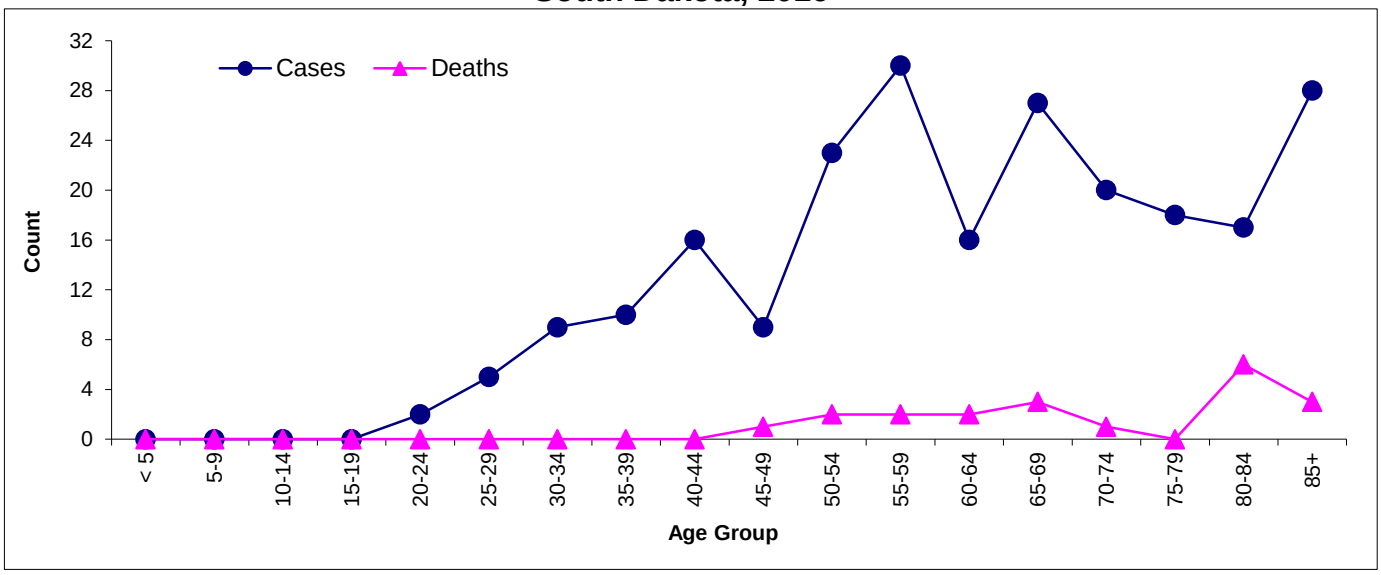
Risk and Associated Factors: Certain factors are more likely to contribute to a higher risk:

- Lighter natural skin color
- Family history of skin cancer
- Personal history of skin cancer
- Exposure to the sun
- History of sunburns early in life
- Skin that burns, freckles, reddens easily
- Blue or green eyes, blond or red hair
- Large number of moles

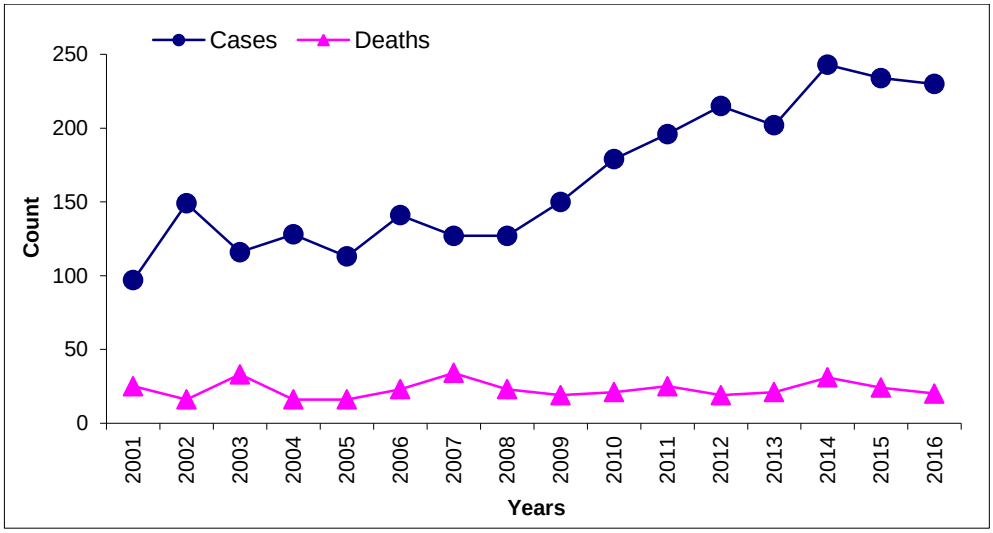
Early Detection and Prevention: The best way to prevent skin cancer is to protect the skin from the sun. The CDC recommends five easy options for protection from sunburn:

- use sun-glasses
- use sunscreen regularly
- stay in the shade
- cover skin
- wear a hat

Figure 47: Melanoma of the Skin Number of Cases and Deaths by Age, South Dakota, 2016



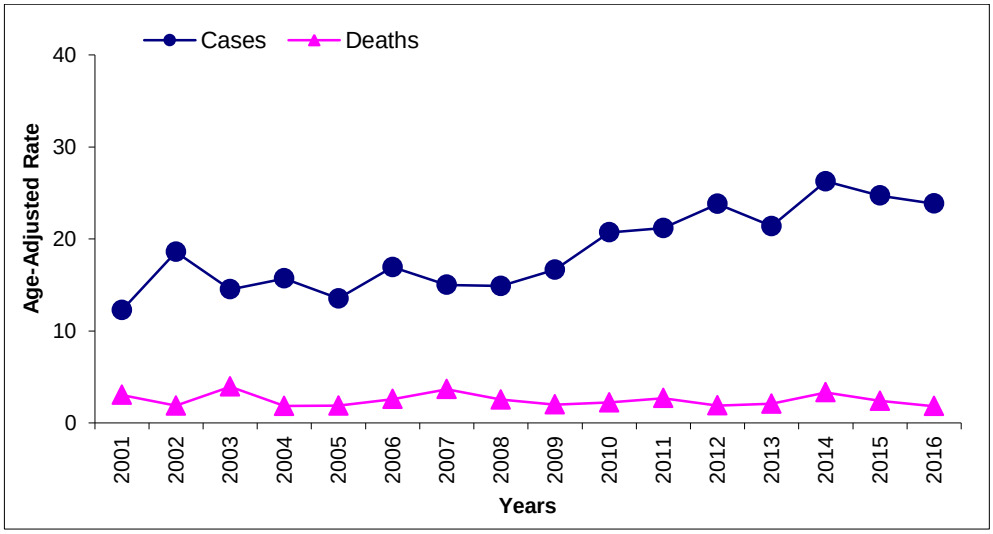
Source: South Dakota Department of Health



Source: South Dakota Department of Health

Figure 48: Melanoma of the Skin Cases and Deaths by Year, South Dakota, 2001 - 2016

The incidence count for melanoma cancers peaked in 2014.



Rates per 100,000 age-adjusted to 2000 US standard population and SD estimated populations.
Source: South Dakota Department of Health

Figure 49: Melanoma of the Skin Age-Adjusted Rates, Cases, and Deaths by Year, South Dakota, 2001 - 2016

MYELOMA §

Table 21: Myeloma Incidence and Mortality Summary, 2016

Myeloma §			Incidence			Mortality		
			Total	Male	Female	**Total**	Male	Female
South Dakota	**Total**	# Cases / Deaths	**76**	43	33	**50**	29	21
		Age-Adjusted Rate	**7.3**	9.0	6.1	**4.8**	6.1	3.7
	White	# Cases / Deaths	**70**	40	30	**47**	27	20
		Age-Adjusted Rate	**7.2**	9.0	5.9	**4.7**	6.0	3.7
	American Indian	# Cases / Deaths	**5**	2	3	**2**	1	1
		Age-Adjusted Rate	**10.2**	12.6	9.7	**5.4**	4.2	6.3
United States	**Total**	Age-Adjusted Rate	**6.8**	8.4	5.5	**3.2**	4.1	2.6
	White	Age-Adjusted Rate	**6.1**	7.8	4.7	**3.0**	3.8	2.4
	American Indian	Age-Adjusted Rate	**5.0**	0.0	4.0	**2.8**	3.2	2.5

Rates per 100,000 age-adjusted to 2000 US standard population and 2016 SD estimated population. § can include NOS, multiple, plasma cell and solitary. US rates www.seer.cancer.gov Source: South Dakota Department of Health

Descriptive Epidemiology

Stage at Diagnosis: Stage of disease for myeloma is always distant per the SEER Summary Staging Manual.

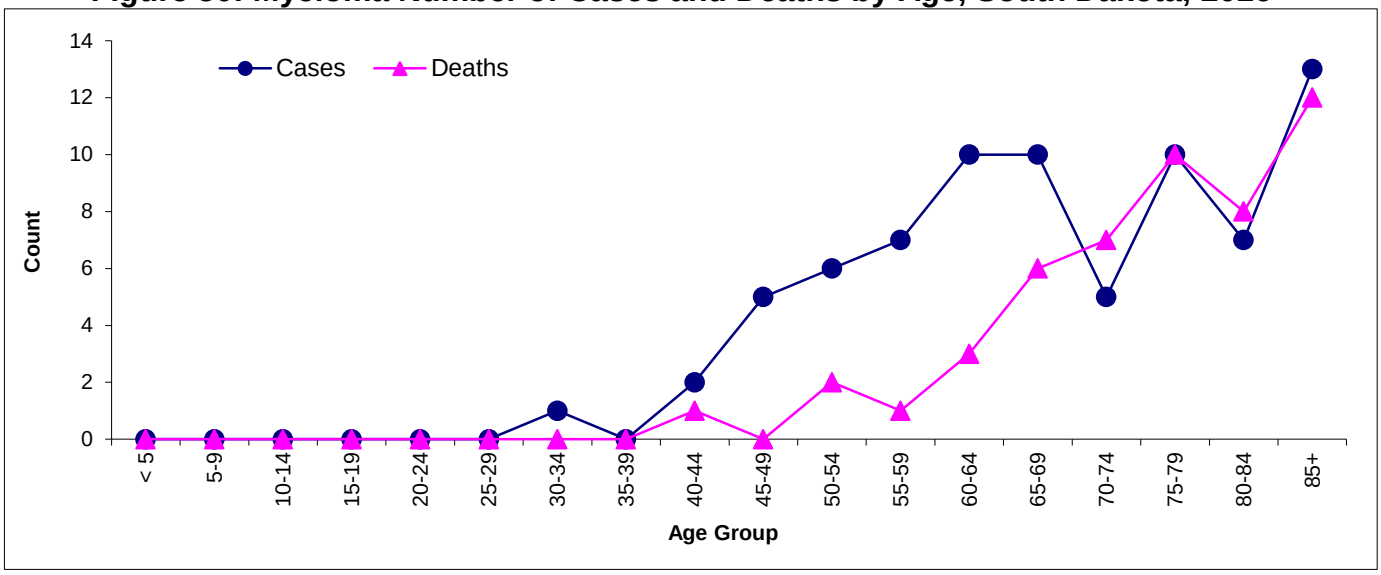
Incidence: Myeloma is a systemic malignancy of plasma cells that is highly treatable, but rarely curable. It is potentially curable when it presents as a solitary plasmacytoma of the bone or as an extramedullary plasmacytoma. In South Dakota during 2016, myeloma accounted for 1.6% of total cancer cases reported. The South Dakota 2016 median age at diagnosis was 68 and the United States median age was 69. The national incidence rate is higher in men (8.4) than women (5.5). In South Dakota the incidence rate is also higher in men (9.0) than women (6.1). Myeloma is more common among the elderly. African Americans have approximately twice the incidence and mortality rates of whites.

***Mortality*:** The median survival prior to the common use of chemotherapy was about seven months. After the introduction of chemotherapy, prognosis improved significantly with a median survival of 24 to 30 months and a 10-year survival of 3%. During 2016, there were 50 deaths attributed to myeloma in South Dakota. Twenty-nine were male and 21 were female. The mortality rate for South Dakota was 4.8. The rate for men was 6.1 and 3.7 for women. These rates compare to United States mortality rates of 3.2 overall, 4.1 for men and 2.6 for women.

Risk and Associated Factors: The etiology of myeloma is relatively unknown. There are many research studies evaluating the exposure of individuals with myeloma to various substances.

Early Detection and Prevention: There is no known test for screening for early detection. Some cases of myeloma progress very slowly, and they are referred to as smoldering or indolent myeloma. The presence of plasma cells and proteinuria do not automatically lead to myeloma, but it can be an early symptom. This disease is often asymptomatic in early stages of the disease. Myeloma is most often diagnosed clinically by radiological procedures and through cytology.

Figure 50: Myeloma Number of Cases and Deaths by Age, South Dakota, 2016



Source: South Dakota Department of Health

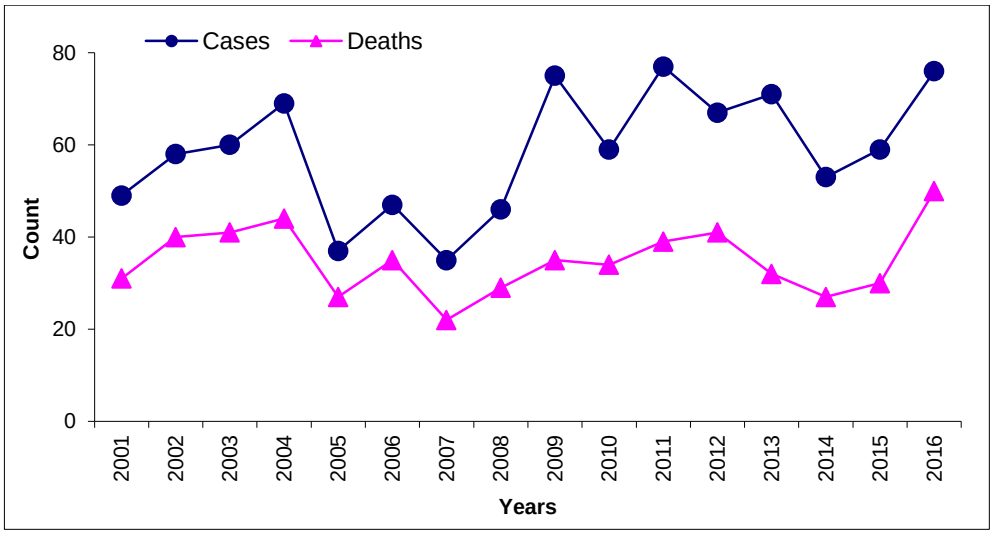


Figure 51: Myeloma Cancer Cases and Deaths by Year, South Dakota, 2001 - 2016

The incidence count for myeloma cancers took a sharp drop from 2004 to 2005 and 2013 to 2014, with an all-time high in 2011. Death counts were at an all-time high in 2016.

Source: South Dakota Department of Health

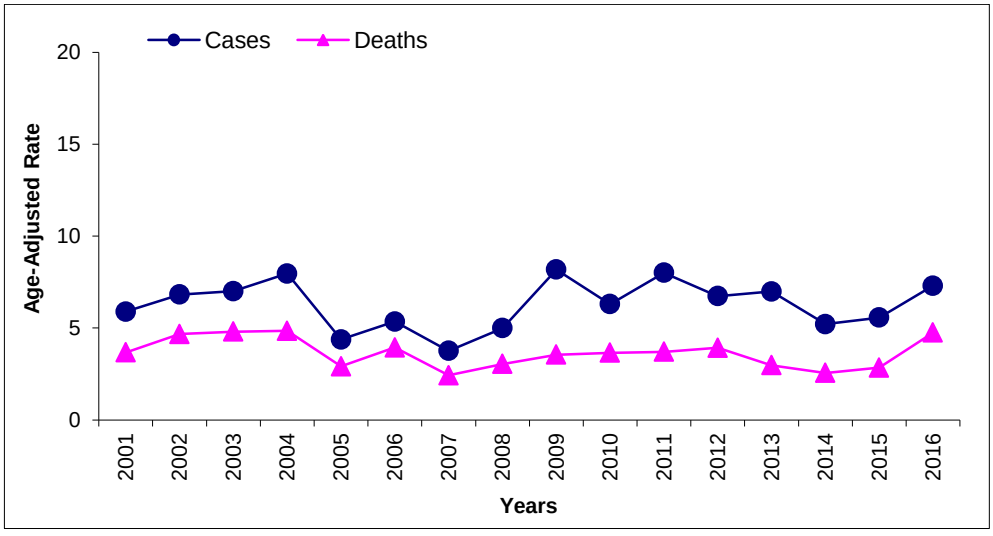


Figure 52: Myeloma Cancer Age-Adjusted Rates, Cases, and Deaths by Year, South Dakota, 2001 - 2016

Rates per 100,000 age-adjusted to 2000 US standard population and SD estimated populations.
Source: South Dakota Department of Health

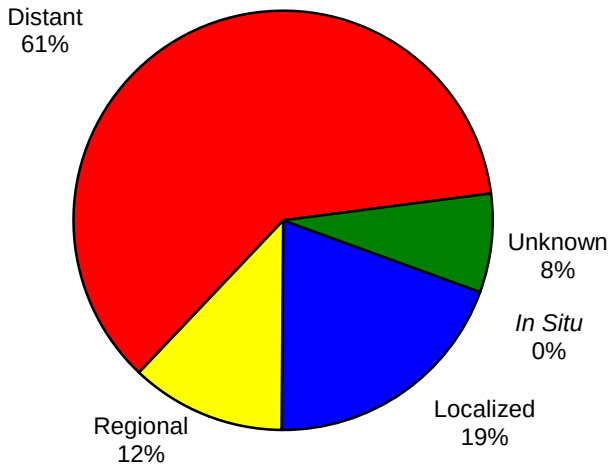
NON-HODGKIN'S LYMPHOMA

Table 22: Non-Hodgkin's Lymphoma Incidence and Mortality Summary, 2016

Non-Hodgkin's Lymphoma			Incidence			Mortality		
			Total	Male	Female	**Total**	Male	Female
South Dakota	**Total**	# Cases / Deaths	**185**	93	92	**55**	33	22
		Age-Adjusted Rate	**18.7**	20.1	17.4	**5.4**	7.3	3.6
	White	# Cases / Deaths	**176**	89	87	**54**	32	22
		Age-Adjusted Rate	**19.2**	20.7	17.7	**5.6**	7.4	3.8
	American Indian	# Cases / Deaths	**5**	2	3	**0**	0	0
		Age-Adjusted Rate	**10.6**	7.4	13.3	**0.0**	0.0	0.0
United States	**Total**	Age-Adjusted Rate	**18.9**	22.7	15.8	**5.4**	6.9	4.2
	White	Age-Adjusted Rate	**19.7**	23.6	16.4	**5.6**	7.2	4.4
	American Indian	Age-Adjusted Rate	**12.3**	11.7	12.8	**4.5**	6.5	2.9

Rates per 100,000 age-adjusted to 2000 US standard population and 2016 SD estimated population.
US rates www.seer.cancer.gov Source: South Dakota Department of Health

Figure 53: Non-Hodgkin's Lymphoma Stage at Diagnosis, South Dakota, 2016



Source: South Dakota Department of Health

Descriptive Epidemiology

Stage at Diagnosis: Stage is based on where lymphoma cells are found (in the lymph or in other organs or tissues). The stage also depends on how many areas are involved. Localized stage only involves a single lymph node region or single extralymphatic organ. When two or more lymph node regions are involved and the regions are on both sides of the diaphragm, the cancer is staged as distant. In 2016, 61% of the cases were diagnosed at a distant stage, an increase from 2011 when 47% were diagnosed at a distant stage.

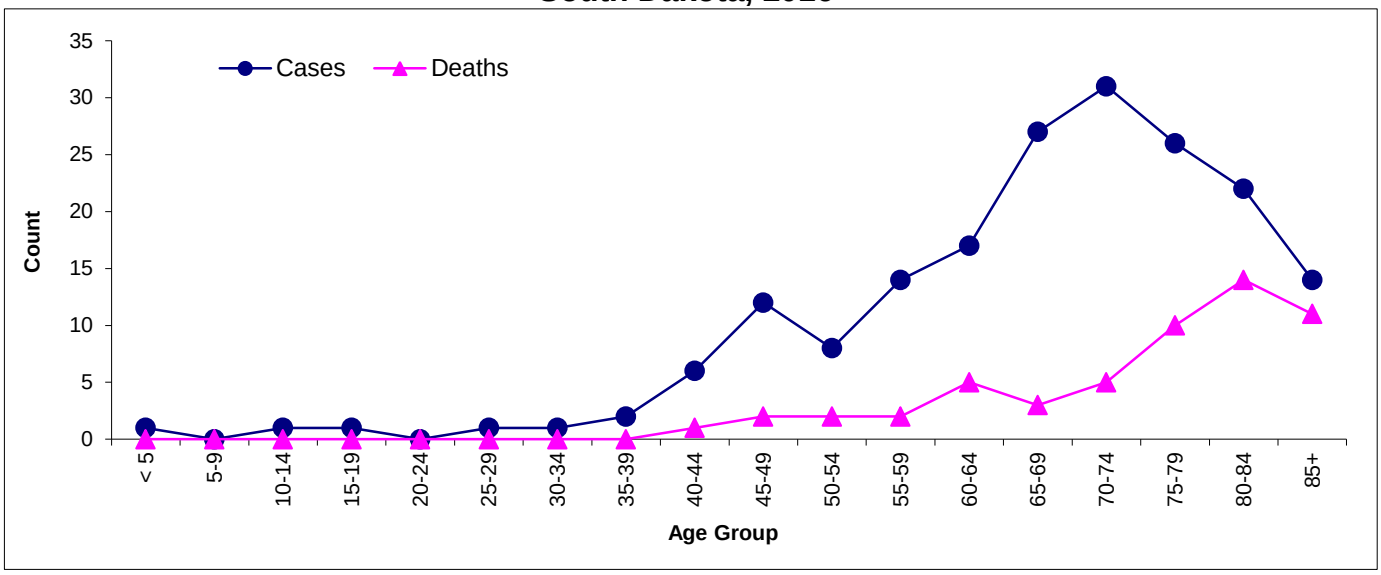
Incidence: Non-Hodgkin's lymphoma is a cancer that originates in the lymphatic system, the disease-fighting network that spreads throughout the body. It develops in lymphocytes, a type of white blood cell. Non-Hodgkin's lymphoma is more than five times as common as the other general type of lymphoma, Hodgkin's disease. The incidence rate has been increasing in the United States since the 1970s. The incidence of non-Hodgkin's lymphoma in South Dakota was 185 cases in 2016. The median age at diagnosis in South Dakota in 2016 was 70 and 67 for the United States.

Mortality: There were 55 deaths reported in South Dakota that were attributed to non-Hodgkin's lymphoma. The median age at death for those whose death was attributed to non-Hodgkin's lymphoma in South Dakota was 79 years of age and 76 for the United States. Nationally, the five-year survival rate is 72.0% for non-Hodgkin's lymphoma.

Risk and Associated Factors: Age is a strong risk factor for this disease, with most cases occurring from age 60 and older. Some studies suggest that exposure to chemicals such as benzene and certain herbicides and insecticides may be linked to an increased risk. Some chemotherapy used to treat other cancers can increase the risk as well as patients having been treated with radiation. The risk is higher for those having been treated with both. Certain infections increase the risk, such as HIV, Epstein - Barr virus, H. pylori bacteria, and Hepatitis C virus.

Early Detection and Prevention: Non-Hodgkin's lymphoma may present with various symptoms. Symptoms may include signs resulting from local effects of cancer growth. Non-Hodgkin's lymphoma can also produce generalized symptoms, such as unexplained weight loss, fever, drenching night sweats, and severe itching.

Figure 54: Non-Hodgkin's Lymphoma Number of Cases and Death by Age, South Dakota, 2016



Source: South Dakota Department of Health

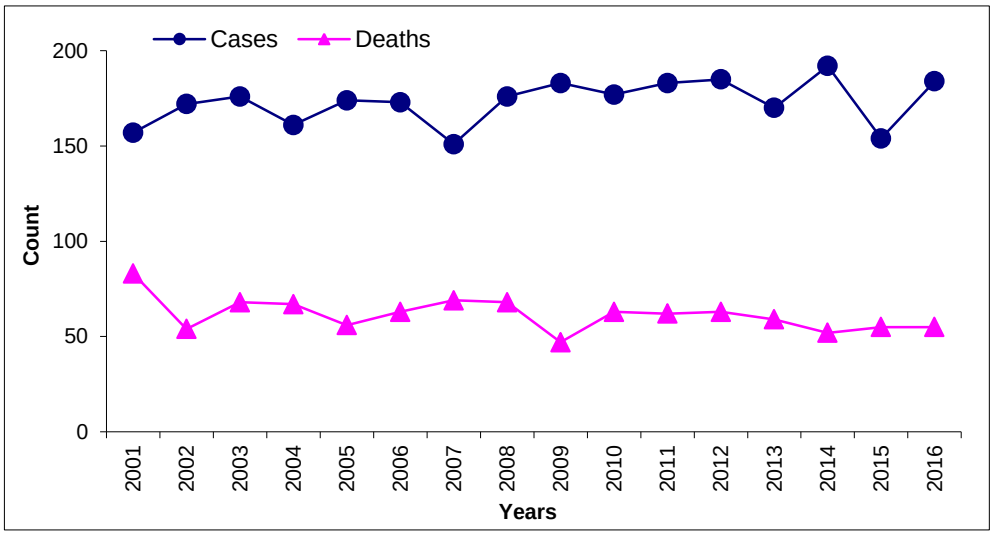


Figure 55: Non-Hodgkin's Lymphoma Cases and Deaths by Year, South Dakota, 2001 – 2016

The number of cases associated with non-Hodgkin's lymphoma cancer remains constant.

Source: South Dakota Department of Health

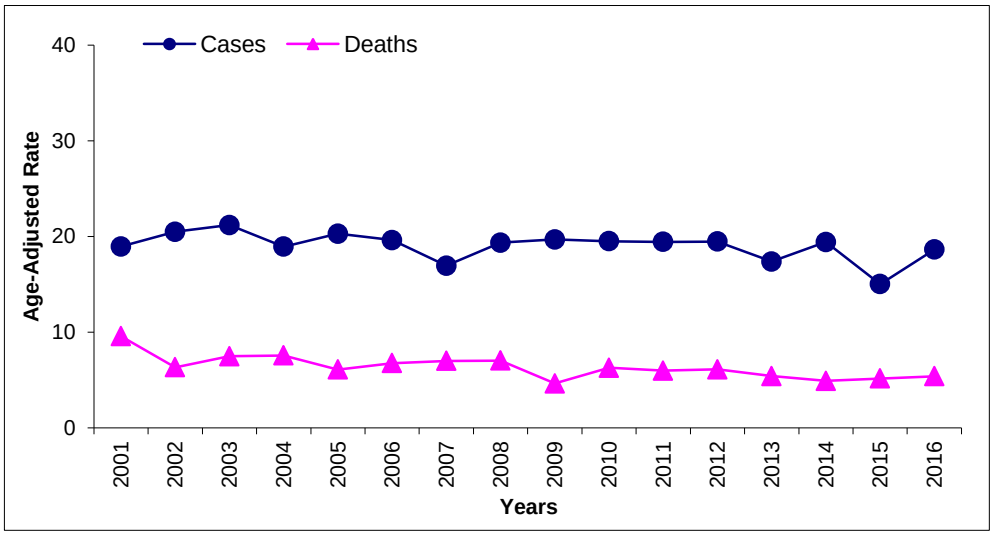


Figure 56: Non-Hodgkin's Lymphoma Age-Adjusted Rates, Cases, and Deaths by Year, South Dakota, 2001 - 2016

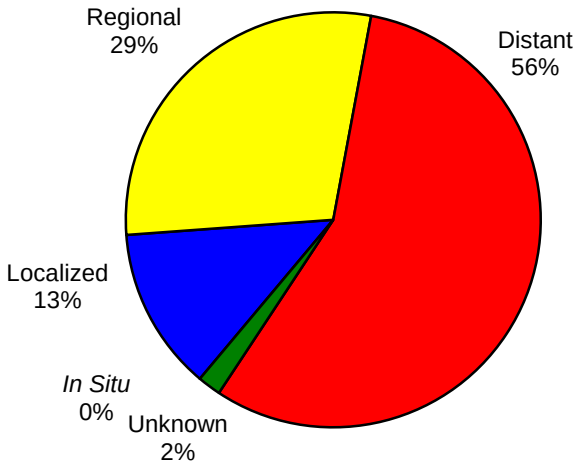
Rates per 100,000 age-adjusted to 2000 US standard population and SD estimated populations.
Source: South Dakota Department of Health

Table 23: Ovarian Incidence and Mortality Summary, 2016

Ovarian Cancer			Incidence	Mortality
South Dakota	Total	# Cases / Deaths	55	36
		Age-Adjusted Rate	10.7	6.5
	White	# Cases / Deaths	50	33
		Age-Adjusted Rate	10.3	6.4
	American Indian	# Cases / Deaths	4	2
		Age-Adjusted Rate	16.6	5.5
United States	Total	Age-Adjusted Rate	10.5	6.8
	White	Age-Adjusted Rate	10.9	7.0
	American Indian	Age-Adjusted Rate	6.4	6.4

Rates per 100,000 age-adjusted to 2000 US standard population and 2016 SD estimated population.
US rates www.seer.cancer.gov Source: South Dakota Department of Health

Figure 57: Ovarian Cancer Stage at Diagnosis, South Dakota, 2016



Source: South Dakota Department of Health

Descriptive Epidemiology

***Stage at Diagnosis*:** Staging of ovarian cancer is done by a surgical procedure to remove as much of the cancer as possible. Surgical staging is of critical importance in the management of this disease. The morbidity associated with ovarian carcinoma is partially attributable to the fact that in the United States two-thirds of the patients present with advanced-stage disease at the time of diagnosis. In 2016, in South Dakota, 31 (56%) of the 55 cases were diagnosed at a distant stage.

Incidence: The incidence of ovarian cancer varies greatly. There were 55 invasive cases of ovarian cancer reported in 2016 in South Dakota. This accounted for 2.5% of the cancer cases diagnosed in 2016 for South Dakota women. The lifetime risk of a woman developing ovarian cancer is 1.4%. No cases were diagnosed at younger than 49 years of age. There were 7 cases diagnosed in the 60-69 age group. The median age at diagnosis in South Dakota was 67 and 63 in the United States.

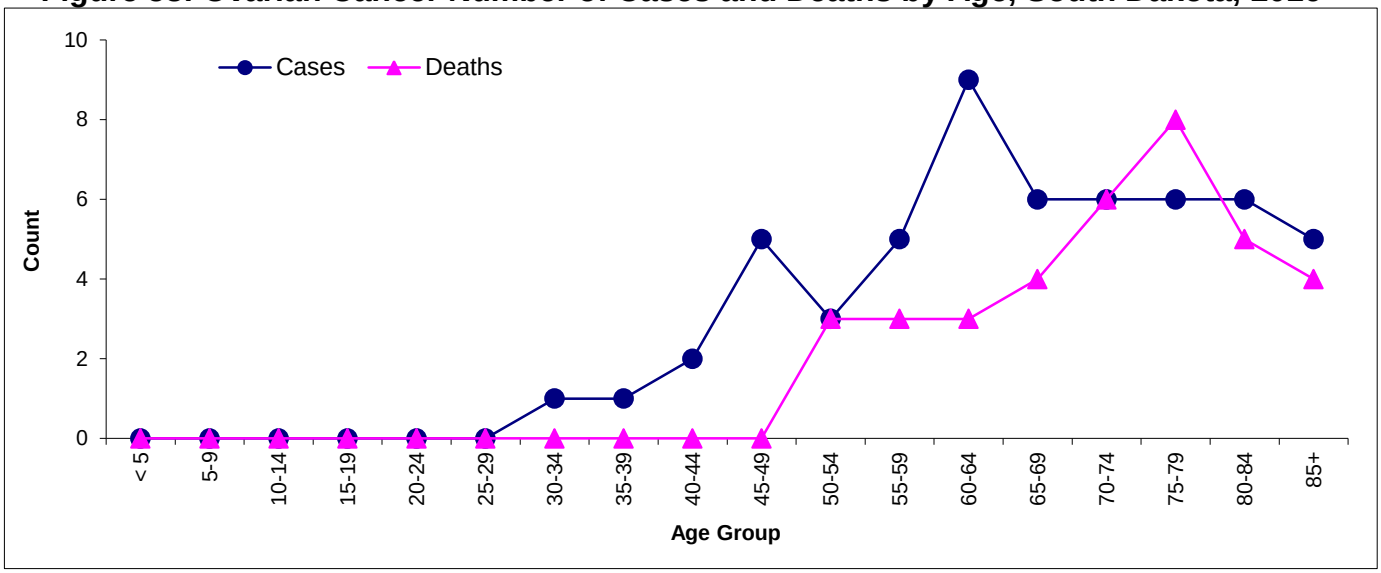
Mortality: Doctors are using dramatic new therapies to fight ovarian cancer, extending the lives of women who five or 10 years ago would have died from the disease. Survival rates for the last several decades are only about 25% for those with advanced disease. Most ovarian cancer presents at advanced disease. Only 28.9% of those diagnosed at late stage survive five years. For those who are diagnosed early, before the disease spreads beyond the ovaries, the disease is 92.4% curable. In South Dakota, 36 patients died in 2016. The mortality rate was 6.5 for women in South Dakota and 6.8 in the United States.

Risk and Associated Factors: Women who have a higher risk for developing ovarian cancer are those with a family history of the disease, those who have used fertility drugs, those who had their first baby after age 30, and those over the age of 65.

Prevention and Early Detection: Factors that may reduce the risk of ovarian cancer are pregnancy lasting full term, use of oral contraceptives, breastfeeding, tubal ligation, hysterectomy, or removal of ovaries in women with inherited risks.

No early stage screening tests have been proven for ovarian cancer and it can be difficult to detect until it has advanced. A combination of imaging and lab tests are the most useful diagnostic tools.

Figure 58: Ovarian Cancer Number of Cases and Deaths by Age, South Dakota, 2016



Source: South Dakota Department of Health

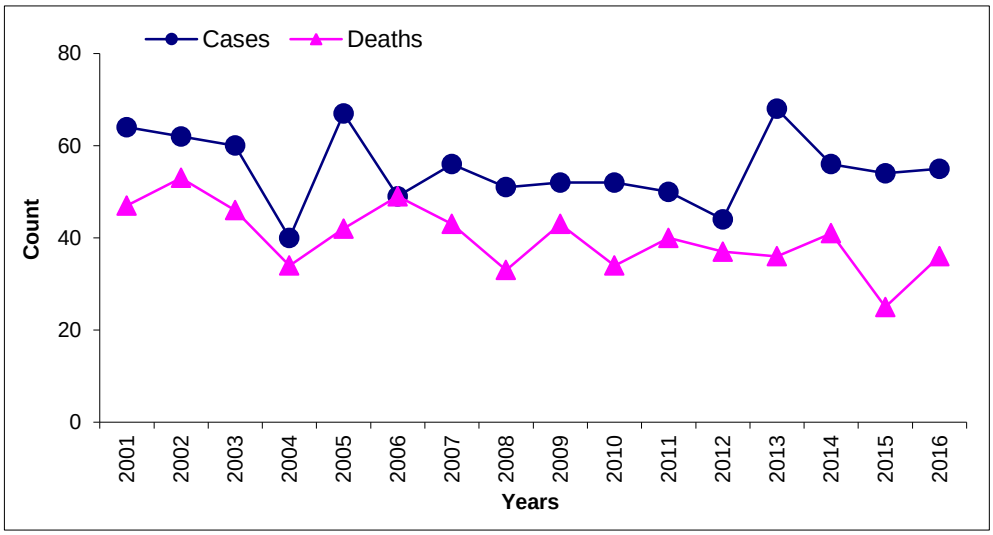


Figure 59: Ovarian Cancer Cases and Deaths by Year, South Dakota, 2001 - 2016

The incidence count for ovarian cancer peaked in 2013.

Source: South Dakota Department of Health

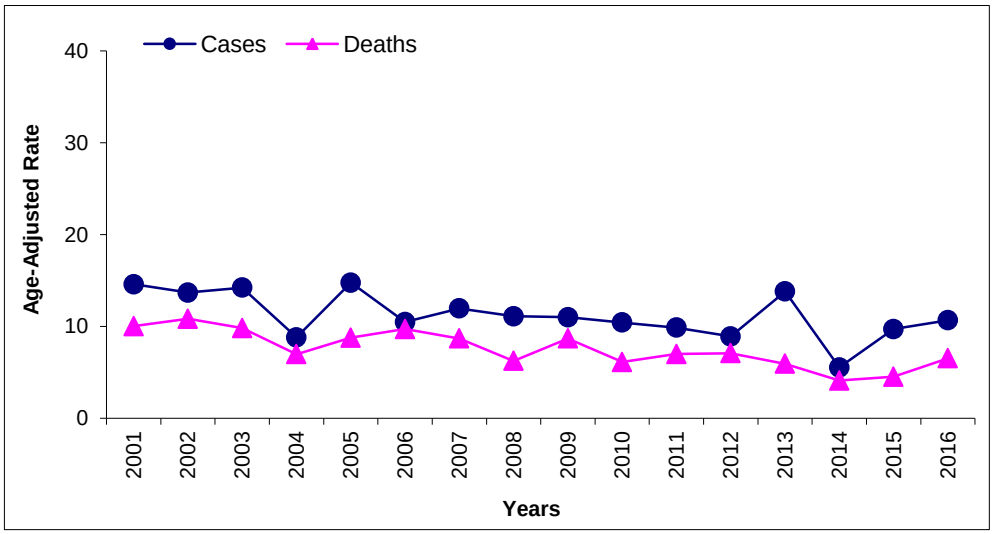


Figure 60: Ovarian Cancer Age-Adjusted Rates, Cases, and Deaths by Year, South Dakota, 2001 - 2016

Rates per 100,000 age-adjusted to 2000 US standard population and SD estimated populations.
Source: South Dakota Department of Health

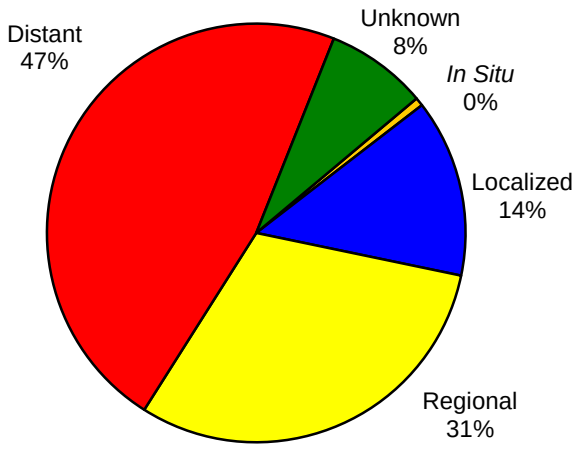
PANCREAS

Table 24: Pancreas Incidence and Mortality Summary, 2016

Pancreas Cancer			Incidence			Mortality		
			Total	Male	Female	**Total**	Male	Female
South Dakota	**Total**	# Cases / Deaths	**152**	79	73	**128**	62	66
		Age-Adjusted Rate	**14.0**	15.4	12.9	**11.7**	12.3	11.3
	White	# Cases / Deaths	**145**	76	69	**120**	59	61
		Age-Adjusted Rate	**14.3**	15.8	13.0	**11.8**	12.5	11.2
	American Indian	# Cases / Deaths	**5**	2	3	**7**	2	5
		Age-Adjusted Rate	**10.0**	7.6	11.4	**14.4**	7.2	19.0
United States	**Total**	Age-Adjusted Rate	**12.7**	14.4	11.3	**11.0**	12.7	9.7
	White	Age-Adjusted Rate	**12.7**	14.4	11.3	**11.0**	12.7	9.5
	American Indian	Age-Adjusted Rate	**12.2**	14.9	9.8	**9.6**	10.7	8.8

Rates per 100,000 age-adjusted to 2000 US standard population and 2016 SD estimated population.
US rates www.seer.cancer.gov Source: South Dakota Department of Health

Figure 61: Pancreatic Cancer Stage at Diagnosis, South Dakota, 2016



Source: South Dakota Department of Health

Descriptive Epidemiology

Stage at Diagnosis: Often pancreatic cancer is diagnosed late in the disease process. Patients who have local stage disease may be acceptable for resection. Only 10 to 20% of patients with pancreatic cancer are candidates for surgical resection. In South Dakota, 78% of new cases were diagnosed at a late stage (regional and distant) in 2016.

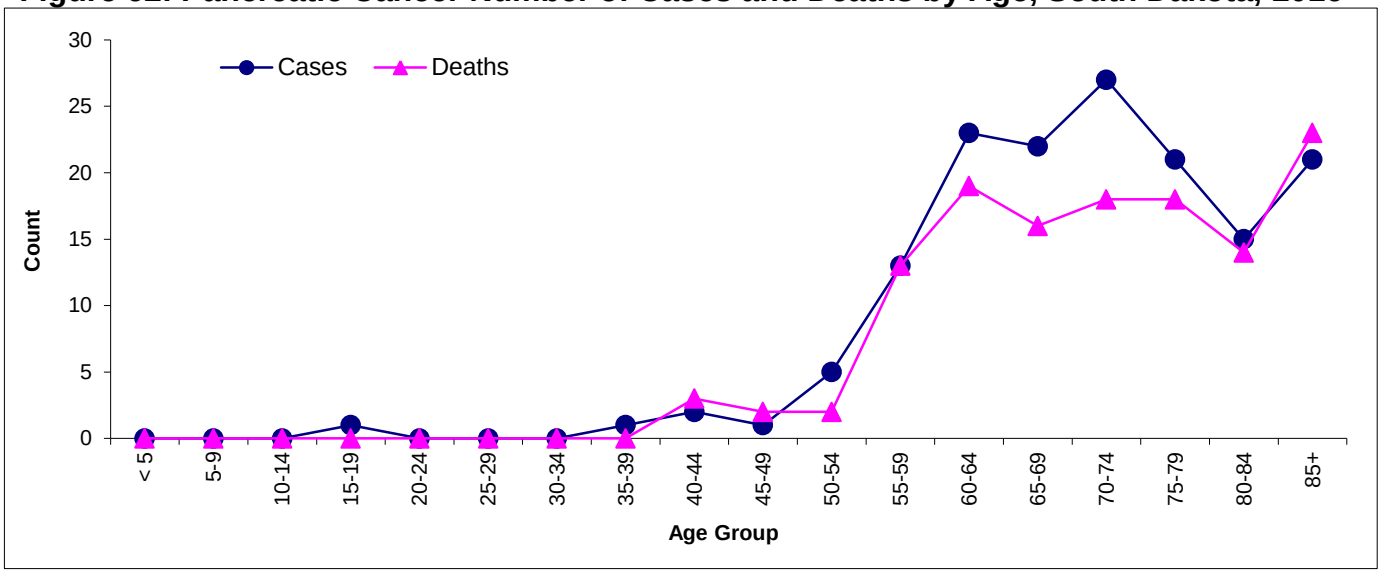
Incidence: The incidence of pancreatic cancer increases steadily with age. An estimated 53,030 new cases of pancreatic cancer were expected to be diagnosed in 2016 in the United States. The majority of the cases occurred in South Dakotans 65 years old or older. One hundred and six cases (69.7%) were diagnosed in 2016 in that age group. This cancer usually occurs more in males than in females and in for 2016 there were 79 men and 73 women diagnosed with pancreatic cancer in South Dakota. Nationally, there was a higher incidence rate in blacks of both genders. The median age at diagnosis was 72 years in South Dakota and 70 in the United States.

Mortality: The overall survival for cancer of the pancreas is poor. Studies reveal that the five-year survival rate is approximately 8.2%. More recently, prospective studies show survival improvement with postoperative chemotherapy. In 2016, there were 128 deaths and the median age at death was 73 in South Dakota and 72 in the United States.

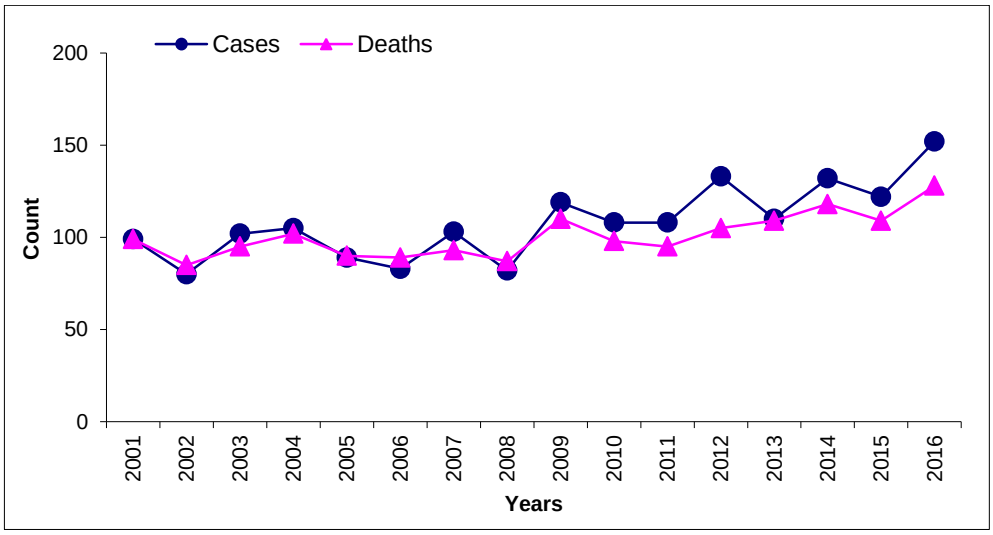
Risk and Associated Factors: The exact causes of pancreatic cancer are unknown. Studies have found that certain factors increase a person's risk of developing pancreatic cancer. As one ages, the incidence of pancreatic cancer increases, especially after the age of 60. Cigarette smokers are two to three times more likely than nonsmokers to develop this cancer. Pancreatic cancer frequently occurs in those with diabetes. Also, African Americans are more likely than Asians, Hispanics, American Indians, or whites to have pancreatic cancer. The risk triples if the person's mother, father, sister, or brother had the disease. Also, a history of colon or ovarian cancer increases the risk. Some evidence shows that chronic pancreatitis may increase the risk.

Prevention and Early Detection: Currently, there are no known screenings for pancreatic cancer. Also, there is no specific prevention except to avoid smoking.

Figure 62: Pancreatic Cancer Number of Cases and Deaths by Age, South Dakota, 2016



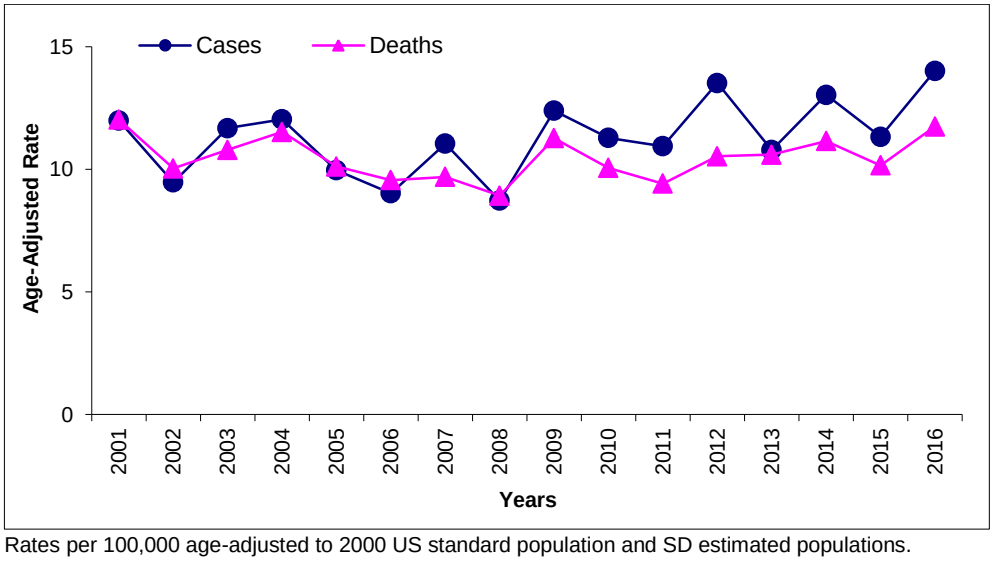
Source: South Dakota Department of Health



Source: South Dakota Department of Health

Figure 63: Pancreatic Cancer Cases and Deaths by Year, South Dakota, 2001 - 2016

The number of cases and deaths associated with cancer of the pancreas reached an all-time high in 2016.



Rates per 100,000 age-adjusted to 2000 US standard population and SD estimated populations.
Source: South Dakota Department of Health

Figure 64: Pancreatic Cancer Age-Adjusted Rates, Cases, and Deaths by Year, South Dakota, 2001 - 2016

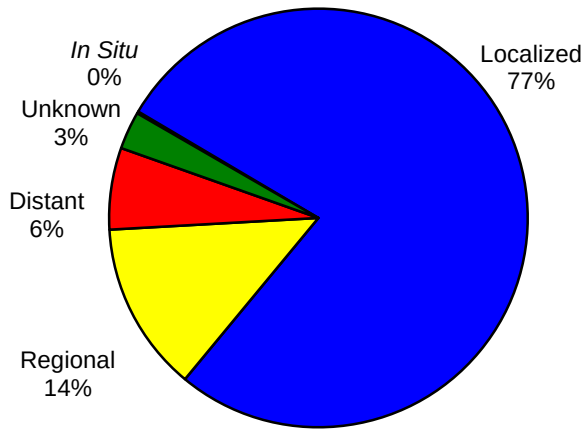
PROSTATE

Table 25: Prostate Incidence and Mortality Summary, 2016

Prostate Cancer			Incidence	Mortality
South Dakota	Total	# Cases / Deaths	620	107
		Age-Adjusted Rate	112.3	23.3
	White	# Cases / Deaths	585	100
		Age-Adjusted Rate	112.5	22.8
	American Indian	# Cases / Deaths	23	6
		Age-Adjusted Rate	114.0	40.6
United States	Total	Age-Adjusted Rate	107.3	19.4
	White	Age-Adjusted Rate	98.9	18.2
	American Indian	Age-Adjusted Rate	54.6	18.3

Rates per 100,000 age-adjusted to 2000 US standard population and 2016 SD estimated population.
US rates www.seer.cancer.gov Source: South Dakota Department of Health

Figure 65: Prostate Cancer Stage at Diagnosis, South Dakota, 2016



Source: South Dakota Department of Health

Descriptive Epidemiology

Stage at Diagnosis: The greatest number of cases was diagnosed at an early stage. In 2016, 78% of the cases were diagnosed as localized (not extending outside the prostate). Frequently older cases may simply be monitored (watchful waiting) by their physician to assess the rate of growth; others may be given hormonal therapy. New treatments for prostate cancer include the de Vinci Robotic assisted prostatectomy, proton therapy, and brachytherapy radiation.

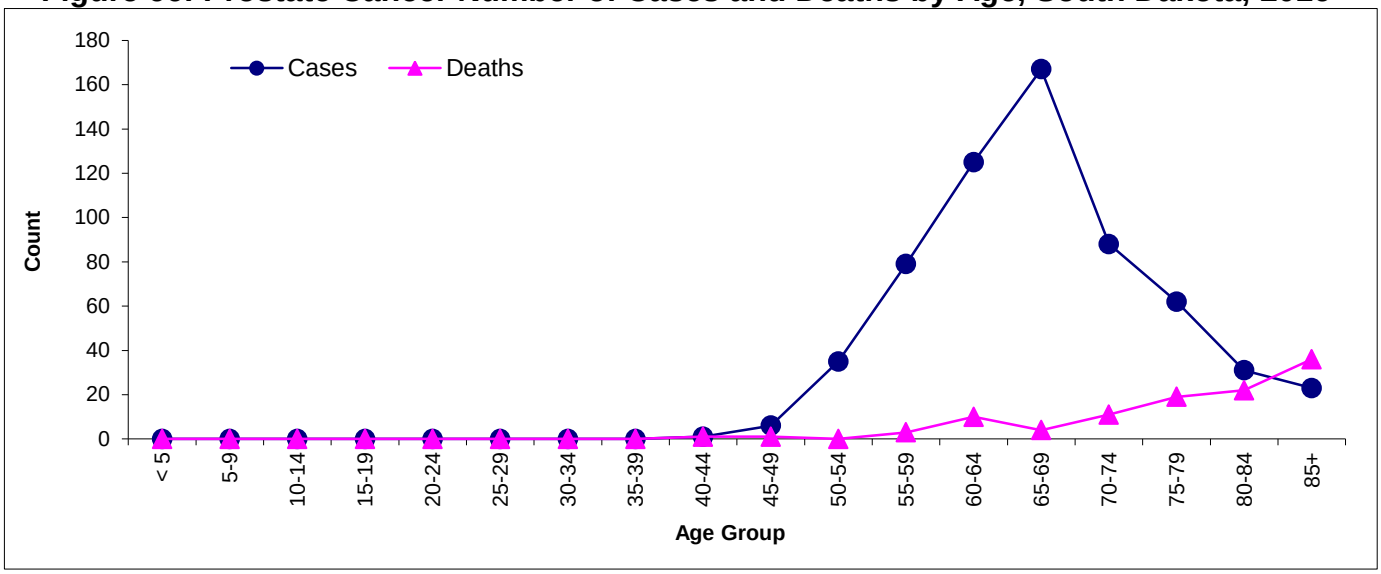
Incidence: Carcinoma of the prostate is predominately a tumor of older men. The median age at diagnosis in South Dakota is 66. Also, in South Dakota the incidence of prostate cancer begins to increase in the 60's age group. Nationwide, eight out of 10 men diagnosed with prostate cancer are over the age of 65. Prostate cancer is the second most diagnosed site of all cancers reported in the state in 2016.

Mortality: Prostate cancer was the second leading cancer death in men in South Dakota in 2016. Prostate cancer can be a slow progressing disease and can be cured or at least controlled in the early stages. The median age of death in South Dakota in 2016 was 81 years old. Many patients have co-morbid conditions and will die of other causes rather than prostate cancer.

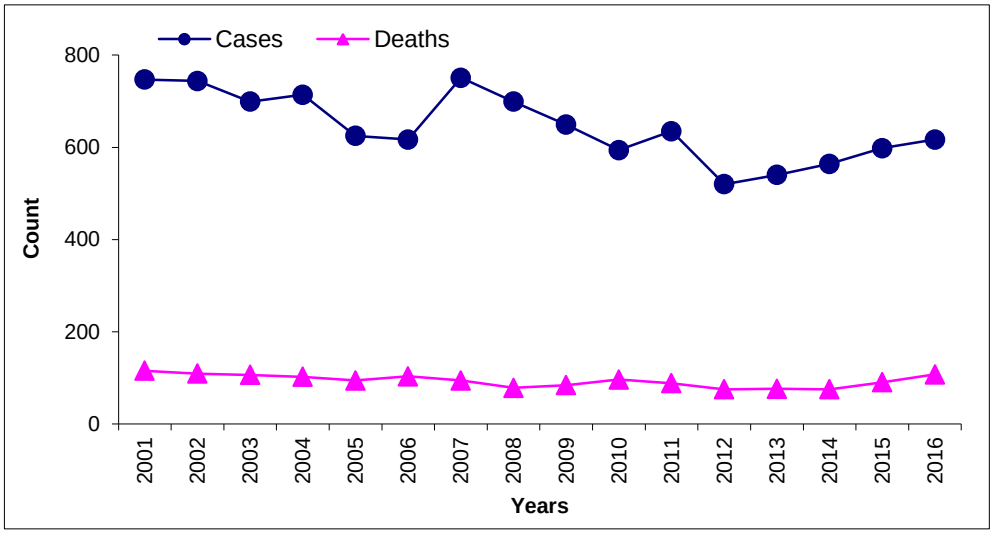
Risk and Associated Factors: A number of risk factors for prostate cancer have been identified. Studies suggest that prostate cancer risk is increased two to five-fold in relatives of men with prostate cancer. Environmental factors, including exposure to heavy metals may increase risk. Smoking has also been indicated as a risk. Diets high in saturated fat intake may also contribute.

Early Detection and Prevention: The availability of the Prostate Specific Antigen (PSA) test as a diagnostic test coupled with increased awareness by the public of the disease has produced an increase in the number of new cases diagnosed each year in the United States. Disease detected by elevated PSA in the presence of a normal palpable gland is the most common presentation of prostate cancer. The American Cancer Society recommends the PSA and digital rectal exam should be offered annually beginning at the age of 50.

Figure 66: Prostate Cancer Number of Cases and Deaths by Age, South Dakota, 2016



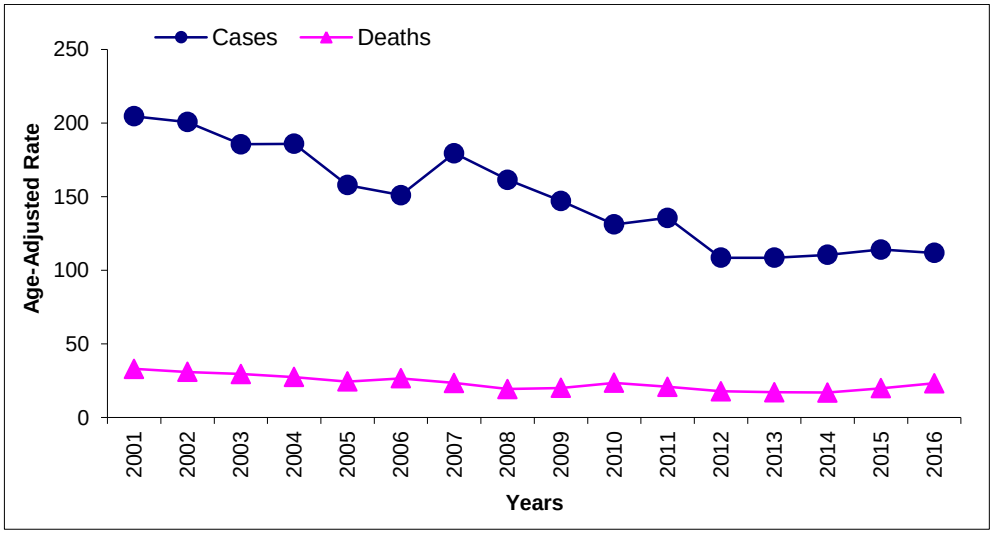
Source: South Dakota Department of Health



Source: South Dakota Department of Health

Figure 67: Prostate Cancer Cases and Deaths by Year, South Dakota, 2001 - 2016

The number of deaths associated with prostate cancer remains constant



Rates per 100,000 age-adjusted to 2000 US standard population and SD estimated populations.
Source: South Dakota Department of Health

Figure 68: Prostate Cancer Age-Adjusted Rates, Cases, and Deaths by Year, South Dakota 2001 - 2016

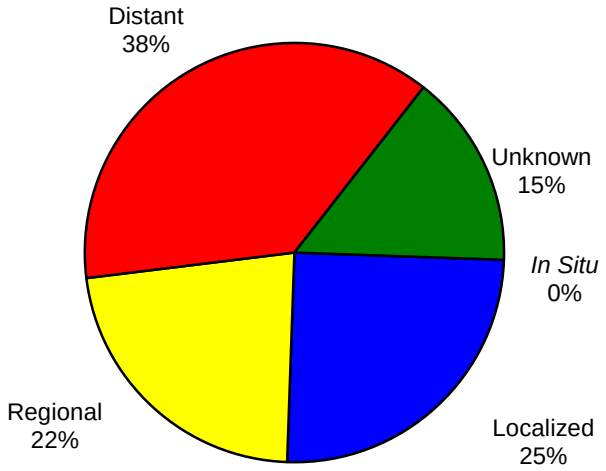
STOMACH

Table 26: Stomach Incidence and Mortality Summary, 2016

Stomach Cancer			Incidence			Mortality		
			Total	Male	Female	**Total**	Male	Female
South Dakota	**Total**	# Cases / Deaths	**40**	27	13	**20**	9	11
		Age-Adjusted Rate	**4.1**	6.1	2.3	**2.1**	1.9	2.1
	White	# Cases / Deaths	**34**	22	12	**18**	9	9
		Age-Adjusted Rate	**3.6**	5.2	2.1	**1.9**	2.0	1.8
	American Indian	# Cases / Deaths	**4**	3	1	**2**	0	2
		Age-Adjusted Rate	**7.5**	13.3	3.5	**3.2**	0.0	6.2
United States	**Total**	Age-Adjusted Rate	**7.1**	9.3	5.3	**3.0**	4.0	2.2
	White	Age-Adjusted Rate	**6.3**	8.3	4.7	**2.6**	3.5	1.9
	American Indian	Age-Adjusted Rate	**6.0**	8.2	4.3	**4.7**	5.6	4.0

Rates per 100,000 age-adjusted to 2000 US standard population and 2013 SD estimated population.
US rates www.seer.cancer.gov Source: South Dakota Department of Health

Figure 69: Stomach Cancer Stage of Diagnosis, South Dakota, 2016



Source: South Dakota Department of Health

Descriptive Epidemiology

***Stage at Diagnosis**:* In 2016, data demonstrates that 10 (25%) cases were diagnosed at a localized stage. When a patient is diagnosed at an early stage, prognosis is much better. Nine cases (22%) were diagnosed at a regional stage. There were 15 (38%) of the cases in South Dakota diagnosed at a distant stage. The prognosis for the distant stage is very poor. The stage is based on whether the tumor has invaded nearby tissues, where the cancer has spread, and if so, to what extent.

Incidence: Stomach cancer only accounted for approximately 1.0% of all cancers in South Dakota in 2016. Of the 40 cases diagnosed in 2016, 27 were male and 13 were female. It is predominately a disease of men. Gastric (stomach) cancer is found more commonly in people between the ages of 50 and 70 years of age. The median age at diagnosis was 68 in the United States and 71 in South Dakota.

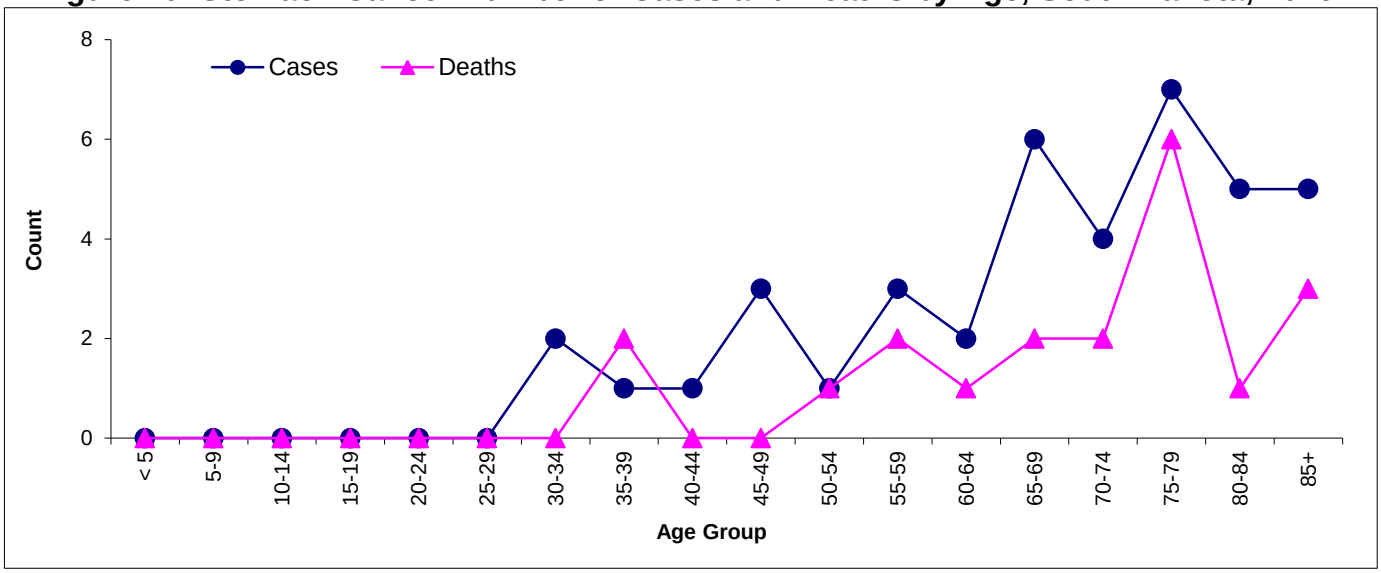
***Mortality**:* Stomach cancer accounted for 1.2% of cancer deaths in South Dakota in 2016. The median age at death was 75 in South Dakota and 71 in the United States. The age-adjusted mortality rate was 1.9 for men and 2.1 in women in South Dakota. These rates are based on patients who died in 2016 in South Dakota. There were two American Indian stomach cancer deaths.

***Risk and Associated Factors**:* Men have twice the risk of women for developing stomach cancer. In recent years, Helicobacter pylori bacteria have received considerable attention as a potential factor. Some researchers suspect this bacterium, which causes stomach inflammation and ulcers, may be an important stomach cancer risk factor. Individuals with pernicious anemia (a vitamin B-12-related disorder) and achlorhydria or gastric atrophy, both of which result in lower than normal amounts of gastric juices, may be at higher risk.

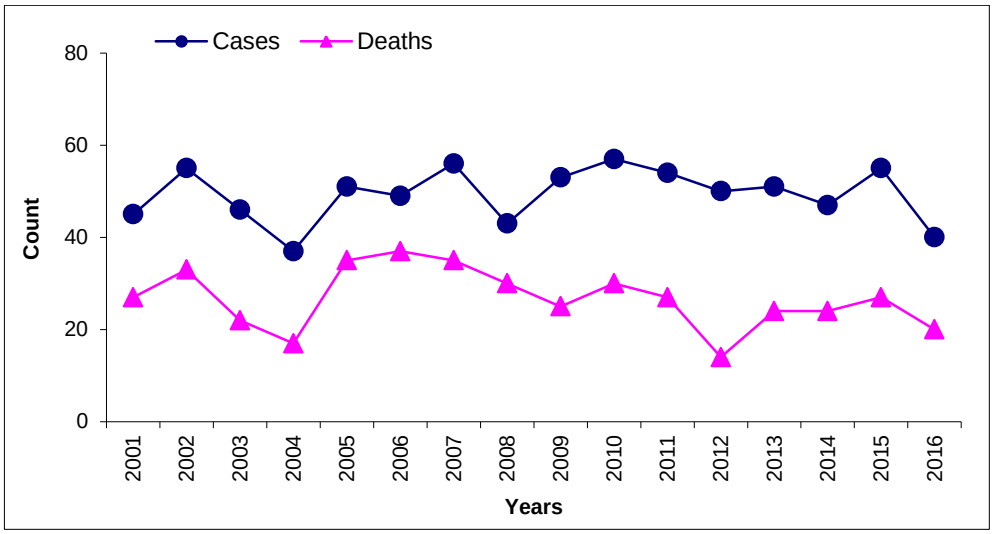
Prevention and Early Detection: Excessive salt intake has been identified as a possible risk factor for stomach cancer. Having a high intake of fresh fruits and vegetables may be associated with a decreased risk of stomach cancer. Studies have suggested that eating foods that contain **beta-carotene**[1] and **vitamin C**[2] may decrease the risk of stomach cancer.

[1]http://www.cancer.gov/Common/PopUps/popDefinition.aspx?id=45328&version=Patient&language=English
[2]http://www.cancer.gov/Common/PopUps/popDefinition.aspx?id=439435&version=Patient&language=English

Figure 70: Stomach Cancer Number of Cases and Deaths by Age, South Dakota, 2016



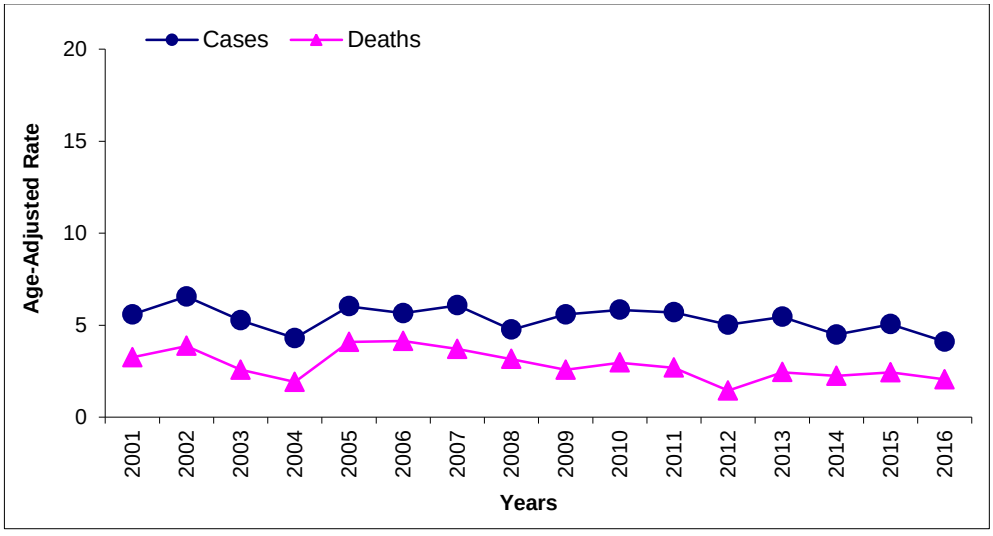
Source: South Dakota Department of Health



Source: South Dakota Department of Health

Figure 71: Stomach Cancer Cases and Deaths by Year, South Dakota, 2001 - 2016

The incidence peak for stomach cancer was in 2010.



Rates per 100,000 age-adjusted to 2000 US standard population and SD estimated populations.
Source: South Dakota Department of Health

Figure 72: Stomach Cancer Age-Adjusted Rates, Cases, and Deaths by Year, South Dakota, 2001 - 2016

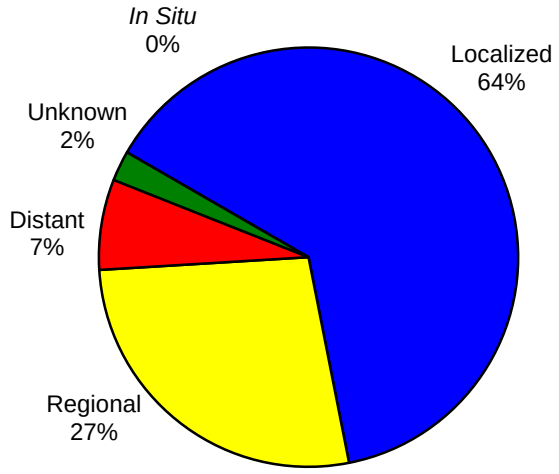
THYROID

Table 27: Thyroid Incidence and Mortality Summary, 2016

Thyroid Cancer			Incidence			Mortality		
			Total	Male	Female	**Total**	Male	Female
South Dakota	**Total**	# Cases / Deaths	**130**	38	92	**8**	3	5
		Age-Adjusted Rate	**15.1**	8.4	22.0	**0.8**	0.8	0.9
	White	# Cases / Deaths	**121**	34	87	**7**	3	4
		Age-Adjusted Rate	**16.0**	8.6	23.9	**0.8**	0.8	0.7
	American Indian	# Cases / Deaths	**7**	2	5	**1**	0	1
		Age-Adjusted Rate	**15.0**	5.4	22.3	**3.6**	0.0	6.3
United States	**Total**	Age-Adjusted Rate	**15.1**	7.8	22.3	**0.5**	0.5	0.5
	White	Age-Adjusted Rate	**15.8**	8.2	23.5	**0.5**	0.6	0.5
	American Indian	Age-Adjusted Rate	**9.0**	4.0	13.7	*****	*	*

Rates per 100,000 age-adjusted to 2000 US standard population and 2016 SD estimated population.
US rates www.seer.cancer.gov *=rate suppressed. Source: South Dakota Department of Health

Figure 73: Thyroid Cancer Stage at Diagnosis, South Dakota, 2016



Source: South Dakota Department of Health

Descriptive Epidemiology

Stage at Diagnosis: In 2016, data demonstrates that 83 (64%) of cases were diagnosed at a localized stage. When a patient is diagnosed at an early stage, the prognosis is much better for a cure. There were 35 (27%) cases diagnosed at a regional stage. Nine cases (7%) were diagnosed at a distant stage.

Incidence: The American Cancer Society estimated 64,300 thyroid cancer cases would be diagnosed in the United States in 2016. Thyroid cancer continues to account for approximately 2.8% of all cancers in South Dakota. Of the 130 cases diagnosed in 2016, 38 were male and 92 were female. The median age at diagnosis was 52 for South Dakota and 51 for the United States. Thyroid cancer is found more commonly in people between the ages of 45 and 70 years of age, with 78% diagnosed before age 65. It is predominately a disease of females as the statistics for South Dakota confirm.

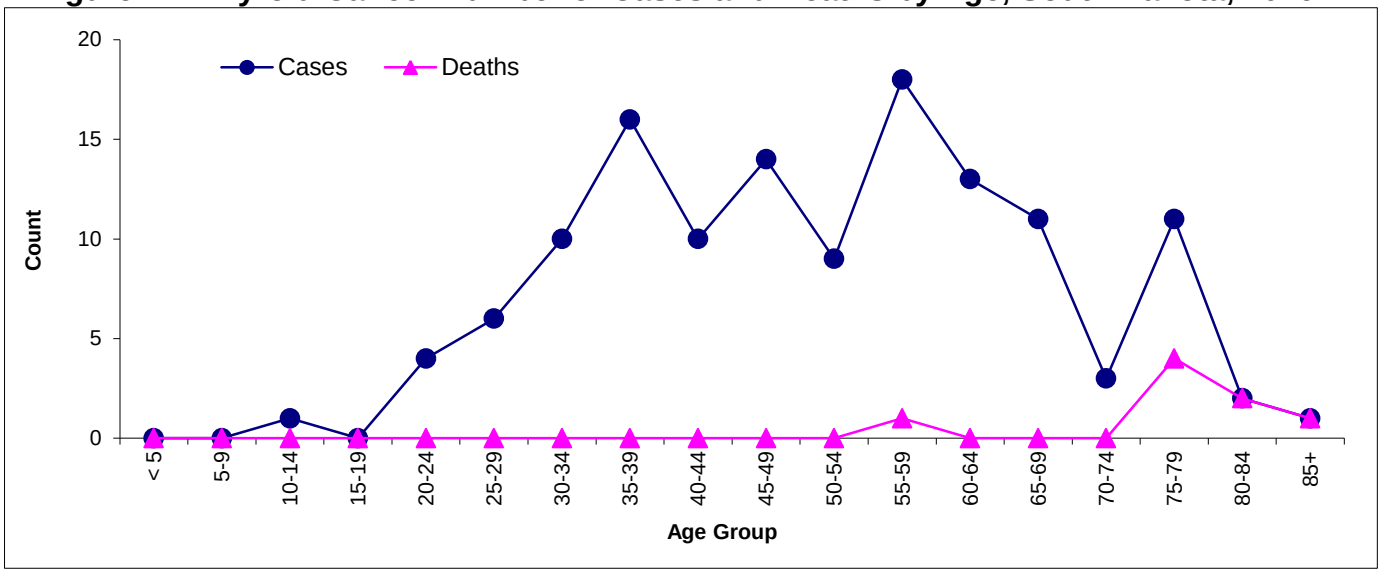
Mortality: South Dakota had only eight deaths attributed to thyroid cancer in 2016. Nationally, the five-year relative survival rates were 99.9% for localized, 98.2% for regional, and 89.1% for the unknown stage.

Risk and Associated Factors: Thyroid cancer accounted for only 2.8% of the cancer cases in South Dakota in 2016. Risk factors include being exposed to radiation to the head and neck in childhood. Other risk factors for the development of thyroid cancer include a history of goiter, family history of thyroid disease, and Asian race.

Early Detection and Prevention: Early detection of cancer of the thyroid is extremely important. There are currently no tests or screenings for early detection of thyroid cancer. Physical examinations may reveal a lump on the side of neck, hoarseness of the voice, and difficulty swallowing. Most cancerous thyroid tumors are slow growing and curable. Prompt attention to signs and symptoms is the best approach to early diagnosis of most thyroid cancers. Signs or symptoms include:

- A lump in the neck, sometimes growing rapidly
- Pain in the neck, sometimes going up to the ears
- Hoarseness
- Trouble swallowing
- Breathing problems (feeling as if one were breathing through a straw)
- A cough that persists and is not due to a cold

Figure 74: Thyroid Cancer Number of Cases and Deaths by Age, South Dakota, 2016



Source: South Dakota Department of Health

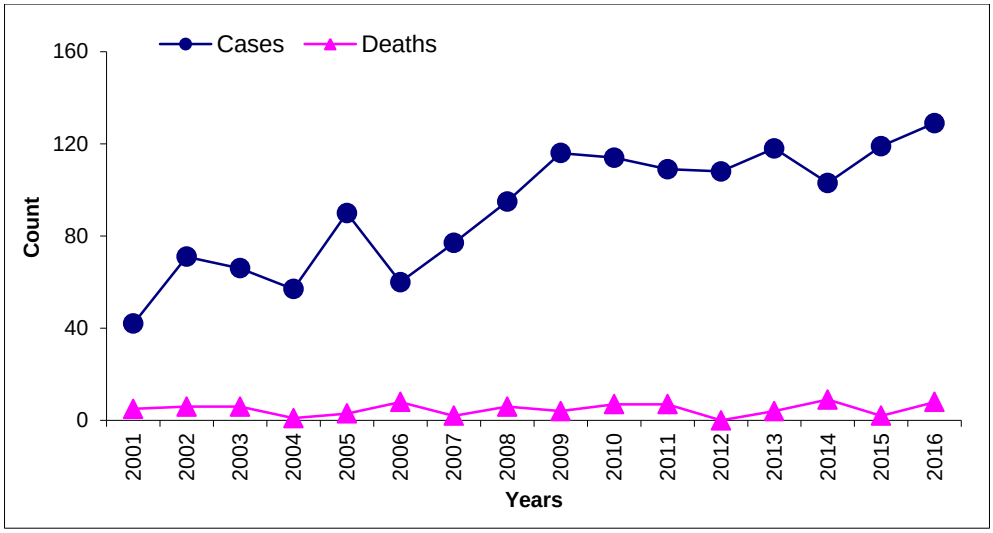


Figure 75: Thyroid Cancer Cases and Deaths by Year, South Dakota, 2001 - 2016

The incidence count for thyroid cancers peaked in 2016.

Source: South Dakota Department of Health

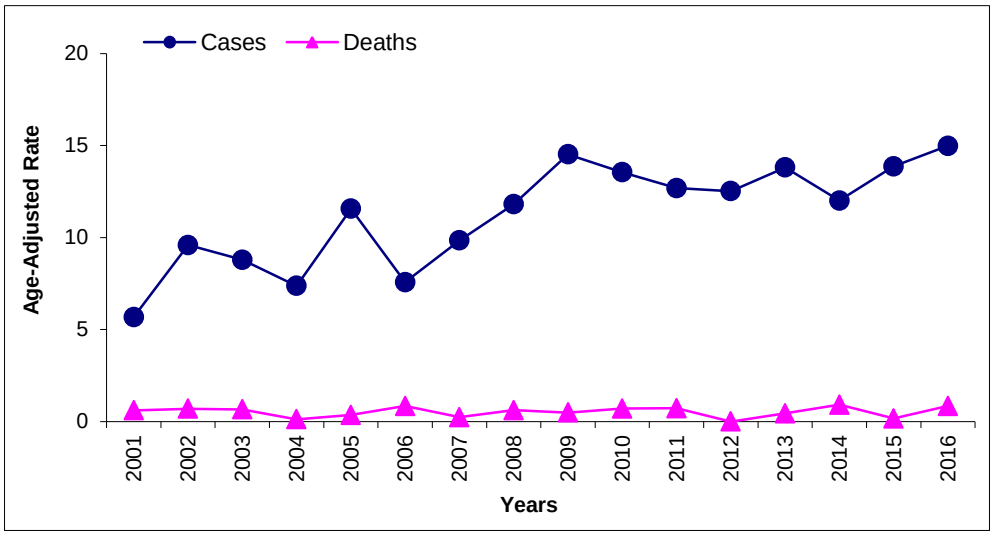


Figure 76: Thyroid Cancer Age-Adjusted Rates, Cases, and Deaths by Year, South Dakota, 2001 - 2016

Rates per 100,000 age-adjusted to 2000 US standard population and SD estimated populations.
Source: South Dakota Department of Health

XI: APPENDICES

Appendix A: 2000 United States Standard Million Population

Age Group	Number in Group
Total	1,000,000
<5	69,135
5-9	72,533
10-14	73,032
15-19	72,169
20-24	66,478
25-29	64,529
30-34	71,044
35-39	80,762
40-44	81,851
45-49	72,118
50-54	62,716
55-59	48,454
60-64	38,793
65-69	34,264
70-74	31,773
75-79	26,999
80-84	17,842
85+	15,508

Appendix B: 2007-2016 South Dakota Estimated Population

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total	797,035	804,532	812,383	814,180	824,082	833,354	844,877	853,175	858,469	865,454
<5	57,448	58,582	59,640	59,621	59,591	59,202	59,957	60,610	61,244	61,369
5-9	51,944	52,692	53,496	55,531	56,389	58,010	59,832	60,148	60,266	60,477
10-14	53,630	52,954	52,576	53,960	54,096	53,956	54,899	55,807	56,525	57,842
15-19	59,858	59,184	58,571	57,628	57,916	57,439	57,419	57,823	56,581	56,838
20-24	62,601	62,764	62,919	57,596	58,178	59,174	60,849	61,697	61,382	61,366
25-29	51,977	53,851	56,270	55,570	56,020	56,397	56,103	55,859	55,656	55,852
30-34	44,439	45,387	46,540	49,859	52,216	53,875	55,411	56,075	56,436	56,414
35-39	46,287	46,003	45,707	45,766	45,524	46,326	47,452	49,007	50,813	52,857
40-44	51,639	49,163	47,626	47,346	47,375	47,570	47,255	46,709	46,136	45,735
45-49	58,653	58,526	57,845	57,519	54,849	52,681	50,182	48,446	47,650	47,699
50-54	56,682	57,673	57,850	59,399	59,960	60,037	59,699	58,976	57,094	54,496
55-59	49,558	51,199	52,996	54,231	56,261	57,577	58,434	58,768	59,517	59,850
60-64	38,305	40,441	42,615	43,573	47,054	48,927	51,222	53,027	54,749	55,854
65-69	29,312	30,956	32,303	31,944	33,144	35,738	37,753	40,473	43,381	46,846
70-74	24,670	24,879	25,236	25,683	25,882	26,396	27,834	28,875	29,750	30,618
75-79	22,574	22,287	21,866	21,724	21,660	21,766	21,939	22,209	22,305	22,243
80-84	18,162	18,253	18,122	18,004	18,102	18,112	18,017	17,795	17,616	17,582
85+	19,296	19,738	20,205	19,226	19,865	20,171	20,620	20,871	21,368	21,516

Appendix C: Race in South Dakota by County, 2016 Estimated Population

	Total	White		Black		American Indian		Asian		Other	
South Dakota	865,454	737,070	85%	17,302	2%	77,711	9%	12,767	1%	20,604	2%
Aurora	2,736	2,594	95%	23	1%	66	2%	19	1%	34	1%
Beadle	18,101	15,680	87%	266	1%	276	2%	1502	8%	377	2%
Bennett	3,460	1,190	34%	17	0%	2,045	59%	19	1%	189	5%
Bon Homme	6,984	6,225	89%	90	1%	554	8%	17	0%	98	1%
Brookings	34,135	31,770	93%	558	2%	385	1%	936	3%	486	1%
Brown	39,128	35,175	90%	662	2%	1,351	3%	1126	3%	814	2%
Brule	5,238	4,511	86%	21	0%	500	10%	22	0%	184	4%
Buffalo	2,043	317	16%	17	1%	1,658	81%	1	0%	50	2%
Butte	10,205	9,611	94%	61	1%	236	2%	36	0%	261	3%
Campbell	1,378	1,342	97%	5	0%	13	1%	8	1%	10	1%
Charles Mix	9,396	6,027	64%	41	0%	2,994	32%	29	0%	305	3%
Clark	3,656	3,519	96%	74	2%	8	0%	20	1%	35	1%
Clay	14,086	12,697	90%	250	2%	451	3%	330	2%	358	3%
Codington	28,063	26,494	94%	214	1%	671	2%	280	1%	404	1%
Corson	4,132	1,298	31%	13	0%	2,652	64%	22	1%	147	4%
Custer	8,596	7,986	93%	52	1%	322	4%	43	1%	193	2%
Davison	19,903	18,653	94%	171	1%	605	3%	133	1%	341	2%
Day	5,571	4,877	88%	25	0%	540	10%	27	0%	102	2%
Deuel	4,231	4,131	98%	34	1%	19	0%	5	0%	42	1%
Dewey	5,742	1,234	21%	25	0%	4,205	73%	15	0%	263	5%
Douglas	2,932	2,805	96%	16	1%	71	2%	7	0%	33	1%
Edmunds	3,952	3,842	97%	17	0%	34	1%	15	0%	44	1%
Fall River	6,849	6,002	88%	93	1%	471	7%	53	1%	230	3%
Faulk	2,354	2,312	98%	9	0%	7	0%	4	0%	22	1%
Grant	7,148	6,905	97%	46	1%	73	1%	23	0%	101	1%
Gregory	4,171	3,698	89%	12	0%	325	8%	17	0%	119	3%
Haakon	1,892	1,772	94%	13	1%	33	2%	11	1%	63	3%
Hamlin	6,028	5,898	98%	27	0%	36	1%	19	0%	48	1%
Hand	3,319	3,246	98%	4	0%	18	1%	15	0%	36	1%
Hanson	3,374	3,291	98%	18	1%	15	0%	21	1%	29	1%
Harding	1,278	1,209	95%	11	1%	28	2%	3	0%	27	2%
Hughes	17,600	14,890	85%	148	1%	1,958	11%	121	1%	483	3%
Hutchinson	7,368	7,103	96%	78	1%	98	1%	17	0%	72	1%
Hyde	1,352	1,200	89%	5	0%	115	9%	3	0%	29	2%
Jackson	3,326	1,424	43%	29	1%	1,718	52%	6	0%	149	4%
Jerauld	2,004	1,956	98%	3	0%	13	1%	5	0%	27	1%
Jones	927	846	91%	6	1%	36	4%	2	0%	37	4%
Kingsbury	5,001	4,836	97%	24	0%	43	1%	29	1%	69	1%
Lake	12,909	12,281	95%	134	1%	134	1%	186	1%	174	1%
Lawrence	25,281	23,670	94%	249	1%	579	2%	251	1%	532	2%
Lincoln	54,469	51,820	95%	740	1%	316	1%	705	1%	888	2%
Lyman	3,894	2,177	56%	24	1%	1,545	40%	13	0%	135	3%
McCook	5,625	5,462	97%	26	0%	57	1%	11	0%	69	1%
McPherson	2,438	2,400	98%	7	0%	5	0%	6	0%	20	1%
Marshall	4,801	4,232	88%	50	1%	418	9%	12	0%	89	2%
Meade	27,693	25,217	91%	525	2%	793	3%	326	1%	832	3%
Mellette	2,102	830	39%	9	0%	1,145	54%	6	0%	112	5%
Miner	2,281	2,201	96%	26	1%	12	1%	10	0%	32	1%
Minnehaha	187,318	163,461	87%	9,770	5%	5,059	3%	4,261	2%	4,767	3%
Moody	6,505	5,170	79%	114	2%	904	14%	115	2%	202	3%
Oglala Lakota	14,415	733	5%	46	0%	13,382	93%	25	0%	229	2%
Pennington	109,372	91,462	84%	1456	1%	11019	10%	1255	1%	4180	4%
Perkins	2,983	2,869	96%	17	1%	55	2%	8	0%	34	1%
Potter	2,299	2,194	95%	9	0%	48	2%	12	1%	36	2%
Roberts	10,255	5,985	58%	72	1%	3822	37%	33	0%	343	3%
Sanborn	2,396	2339	98%	8	0%	10	0%	6	0%	33	1%
Spink	6,420	6,190	96%	41	1%	111	2%	7	0%	71	1%
Stanley	2,993	2,676	89%	26	1%	203	7%	10	0%	78	3%
Sully	1,421	1,348	95%	6	0%	36	3%	1	0%	30	2%
Todd	10,155	930	9%	46	0%	8,913	88%	17	0%	249	2%
Tripp	5,492	4,517	82%	20	0%	785	14%	33	1%	137	2%
Turner	8,317	8,101	97%	33	0%	80	1%	17	0%	86	1%
Union	14,934	14,218	95%	150	1%	130	1%	187	1%	249	2%
Walworth	5,610	4,466	80%	32	1%	808	14%	116	2%	188	3%
Yankton	22,616	20,875	92%	475	2%	700	3%	174	1%	392	2%
Ziebach	2,801	680	24%	13	0%	1,999	71%	3	0%	106	4%

US Census Bureau Estimated Race Population

Appendix D: SEER Incidence Site Analysis Categories

Site Group	ICD-O-3 Site	ICD-O-3 Histology (Type)	Recode
Oral Cavity and Pharynx			
Lip	C000-C009	excluding 9050-9055, 9140, 9590-9992	20010
Tongue	C019-C029		20020
Salivary Gland	C079-C089		20030
Floor of Mouth	C040-C049		20040
Gum and Other Mouth	C030-C039, C050-C059, C060-C069		20050
Nasopharynx	C110-C119		20060
Tonsil	C090-C099		20070
Oropharynx	C100-C109		20080
Hypopharynx	C129, C130-C139		20090
Other Oral Cavity and Pharynx	C140, C142, C148		20100
Digestive System			
Esophagus	C150-C159	excluding 9050-9055, 9140, 9590-9992	21010
Stomach	C160-C169		21020
Small Intestine	C170-C179		21030
Colon and Rectum			
Colon excluding Rectum			
Cecum	C180	excluding 9050-9055, 9140, 9590-9992	21041
Appendix	C181		21042
Ascending Colon	C182		21043
Hepatic Flexure	C183		21044
Transverse Colon	C184		21045
Splenic Flexure	C185		21046
Descending Colon	C186		21047
Sigmoid Colon	C187		21048
Large Intestine, NOS	C188-C189, C260		21049
Rectum and Rectosigmoid Junction			
Rectosigmoid Junction	C199	excluding 9050-9055, 9140, 9590-9992	21051
Rectum	C209		21052
Anus, Anal Canal and Anorectum	C210-C212, C218		21060
Liver and Intrahepatic Bile Duct			
Liver	C220	excluding 9050-9055, 9140, 9590-9992	21071
Intrahepatic Bile Duct	C221		21072
Gallbladder	C239		21080
Other Biliary	C240-C249		21090
Pancreas	C250-C259		21100
Retroperitoneum	C480		21110
Peritoneum, Omentum and Mesentery	C481-C482		21120
Other Digestive Organs	C268-C269, C488		21130
Respiratory System			
Nose, Nasal Cavity and Middle	C300-C301, C310-C319	excluding 9050-9055, 9140, 9590-9992	22010
Larynx	C320-C329		22020
Lung and Bronchus	C340-C349		22030
Pleura	C384		22050
Trachea, Mediastinum and Other Respiratory Organs	C339, C381-C383, C388, C390, C398, C399		22060

Appendix D: SEER Incidence Site Analysis Categories (continued)

Site Group	ICD-O-3 Site	ICD-O-3 Histology (Type)	Recode
Bones and Joints	**C400-C419**	**excluding 9050-9055, 9140, 9590-9992**	**23000**
Soft Tissue including Heart	**C380, C470-C479, C490-C499**	**excluding 9050-9055, 9140, 9590-9992**	**24000**
Skin excluding Basal and Squamous			
Melanoma of the Skin	C440-C449	8720-8790	25010
Other Non-Epithelial Skin	C440-C449	excluding 8000-8005, 8010-8046, 8050-8084, 8090-8110, 8720-8790, 9050-9055, 9140, 9590-9992	25020
Breast	**C500-C509**	**excluding 9050-9055, 9140, 9590-9992**	**26000**
Female Genital System			
Cervix Uteri	C530-C539	excluding 9050-9055, 9140, 9590-9992	27010
Corpus and Uterus, NOS			
Corpus Uteri	C540-C549	excluding 9050-9055, 9140, 9590-9992	27020
Uterus, NOS	C559		27030
Ovary	C569		27040
Vagina	C529		27050
Vulva	C510-C519		27060
Other Female Genital Organs	C570-C579, C589		27070
Male Genital System			
Prostate	C619	excluding 9050-9055, 9140, 9590-9992	28010
Testis	C620-C629		28020
Penis	C600-C609		28030
Other Male Genital Organs	C630-C639		28040
Urinary System			
Urinary Bladder	C670-C679	excluding 9050-9055, 9140, 9590-9992	29010
Kidney and Renal Pelvis	C649, C659		29020
Ureter	C669		29030
Other Urinary Organs	C680-C689		29040
Eye and Orbit	**C690-C699**	**excluding 9050-9055, 9140, 9590-9992**	**30000**
Brain and Other Nervous System			
Brain	C710-C719	excluding 9050-9055,9140,9530-9539, 9590-9992	31010
Cranial Nerves Other Nervous System	C710-C719	9530-9539	31040
	C700-C709, C720-C729	excluding 9050-9055, 9140, 9590-9992	
Endocrine System			
Thyroid	C739	excluding 9050-9055, 9140, 9590-9992	32010
Other Endocrine including Thymus	C379, C740-C749, C750-C759		32020

Appendix D: SEER Incidence Site Analysis Categories (continued)

Site Group	ICD-O-3 Site	ICD-O-3 Histology (Type)	Recode
Lymphoma			
Hodgkin's Lymphoma			
Hodgkin's - Nodal	C024,C098-C099,C111, C142,C379,C422,C770-C779	9650-9667	33011
Hodgkin's - Extranodal	All other sites		33012
Non-Hodgkin's Lymphoma			
NHL - Nodal	C024, C098, C099, C111, C142,C379, C422, C770-C779	9590-9597, 9670-9671, 9673, 9675, 9678-9680, 9684, 9687-9691, 9695, 9698-9702, 9705, 9708-9709, 9712, 9714-9719, 9724-9729, 9735, 9737-9738, 9811-9818, 9823, 9827, 9837	33041
NHL - Extranodal	All sites except C024, C098-C099, C111, C142, C379, C422, C770-C779	9590-9597, 9670-9671, 9673, 9675, 9678-9680, 9684, 9687, 9688, 9689-9691, 9695, 9698-9702,9705, 9708-9709, 9712, 9714-9719, 9724-9729, 9735, 9737,9738	33042
	All sites except C024, C098-C099, C111, C142, C379, C420-C422, C424, C770-C779	9811-9818, 9823, 9827, 9837	
Myeloma		**9731-9732, 9734**	**34000**
Leukemia			
Lymphocytic Leukemia			
Acute Lymphocytic Leukemia		9826, 9835-9836	35011
	C420, C421, C424	9811-9818, 9837	
Chronic Lymphocytic Leukemia	C420, C421, C424	9823	35012
Other Lymphocytic Leukemia		9820, 9832-9834, 9940	35013
Myeloid and Monocytic Leukemia			
Acute Myeloid Leukemia		9840, 9861, 9865-9867, 9869, 9871-9874, 9895-9897, 9898, 9910-9911, 9920	35021
Acute Monocytic Leukemia		9891	35031
Chronic Myeloid Leukemia		9863, 9875-9876, 9945-9946	35022
Other Myeloid/Monocytic Leukemia		9860, 9930	35023
Other Leukemia			
Other Acute Leukemia		9801, 9805-9809, 9931	35041
Aleukemic, subleukemic and NOS		9733, 9742, 9800, 9831, 9870, 9948, 9963-9964	35043
	C420, C421, C424	9827	
Mesothelioma +		**9050-9055**	**36010**
Kaposi Sarcoma +		**9140**	**36020**
Miscellaneous		**9740-9741, 9750-9769, 9950, 9960-9962, 9965-9967, 9970-9971, 9975, 9980, 9982-9987, 9989, 9991-9992**	**37000**
	C760-C768, C809	**Excluding 9050-9055, 9140, 9590-9992**	
	C420-C424		
	C770-C779		
Invalid	**Site or histology code not within valid range or site code not found in this table.**		**99999**

Source: http://seer.cancer.gov/siterecode

+ The Site Recode variable can be created with or without Mesothelioma (9050-9055) and Kaposi Sarcoma (9140) as separate groupings. The table above documents both possibilities.

Appendix E: SEER Cancer Cause of Death Analysis Categories

Cancer Causes of Death	ICD-10
All Malignant Cancers	**C00-C97**
Oral Cavity and Pharynx	
Lip	C00
Tongue	C01-C02
Salivary Gland	C07-C08
Floor of Mouth	C04
Gum and Other Mouth	C03, C05-C06
Nasopharynx	C11
Tonsil	C09
Oropharynx	C10
Hypopharynx	C12-C13
Other Oral Cavity and Pharynx	C14
Digestive System	
Esophagus	C15
Stomach	C16
Small Intestine	C17
Colon and Rectum	
Colon Excluding Rectum	C18, C26.0
Rectum and Rectosigmoid Junction	C19-C20
Anus, Anal Canal and Anorectum	C21
Liver and Intrahepatic Bile Duct	
Liver	C22.0, C22.2-C22.4, C22.7, C22.9
Intrahepatic Bile Duct	C22.1
Gallbladder	C23
Other Biliary	C24
Pancreas	C25
Retroperitoneum	C48.0
Peritoneum, Omentum and Mesentery	C45.1+, C48.1-C48.2
Other Digestive Organs	C26.8-C26.9, C48.8
Respiratory System	
Nose, Nasal Cavity and Middle Ear	C30-C31
Larynx	C32
Lung and Bronchus	C34
Pleura	C38.4, C45.0+
Trachea, Mediastinum and Other Respiratory Organs	C33, C38.1-C38.3, C38.8, C39
Bones and Joints	C40-C41
Soft Tissue including Heart	C47, C49, C38.0, C45.2+
Skin excluding Basal and Squamous	
Melanoma of the Skin	C43
Other Non-Epithelial Skin	C44, C46+
Breast	C50
Female Genital System	
Cervix Uteri	C53
Corpus and Uterus, NOS	
Corpus Uteri	C54
Uterus, NOS	C55
Ovary	C56
Vagina	C52
Vulva	C51
Other Female Genital Organs	C57-C58

Appendix E: SEER Cancer Cause of Death Analysis Categories (Continued)

Cancer Causes of Death	ICD-10
Male Genital System	
Prostate	C61
Testis	C62
Penis	C60
Other Male Genital Organs	C63
Urinary System	
Bladder	C67
Kidney and Renal Pelvis	C64-C65
Ureter	C66
Other Urinary Organs	C68
Eye and Orbit	C69
Brain and Other Nervous System	C70, C71, C72
Endocrine System	
Thyroid	C73
Other Endocrine Including Thymus	C37, C74-C75
Lymphoma	
Hodgkin's Lymphoma	C81
Non-Hodgkin's Lymphoma	C82-C85, C96.3
Myeloma	C90.0, C90.2
Leukemia	
Lymphocytic Leukemia	
Acute Lymphocytic Leukemia	C91.0
Chronic Lymphocytic Leukemia	C91.1
Other Lymphocytic Leukemia	C91.2-C91.4, C91.7, C91.9
Myeloid and Monocytic Leukemia	
Acute Myeloid	C92.0, C92.4-C92.5, C94.0, C94.2
Acute Monocytic Leukemia	C93.0
Chronic Myeloid Leukemia	C92.1
Other Myeloid/Monocytic Leukemia	C92.2-C92.3, C92.7, C92.9, C93.1-C93.2, C93.7, C93.9
Other Acute Leukemia	C94.4, C94.5, C95.0
Aleukemic, Subleukemic and NOS	C90.1, C91.5, C94.1, C94.3, C94.7, C95.1, C95.2, C95.7, C95.9
Mesothelioma (ICD-10 only)+	C45+
Kaposi Sarcoma (ICD-10 only)+	C46+
Miscellaneous Malignant Cancer	C26.1, C45.7**+**, C45.9**+**, C76-C80, C88, C96.0-C96.2, C96.7, C96.9, C97

Source: http://seer.cancer.gov/codrecode

REFERENCES

Bast et Al. Cancer Edition 5. American Cancer Society, 2000.

Beahrs, O.H. et al, AJCC Staging Manual, 5th Edition. American Joint Committee on Cancer, Lippincott, Williams and Wilkins. 1995.

Cancer Facts and Figures, 2016. Atlanta. American Cancer Society. 2016.

Cancer Progress Report, US Department of Health and Human Services, National Cancer Institute. 2005.

Devita, Vincent et al. CANCER Principles and Practice of Oncology. Lippincott. Williams & Wilkins. 2001.

Harvard Center for Cancer Prevention. Harvard Report on Cancer Prevention Volume 1: Causes of Human Cancer, 1996:7 (S1): 7-15.

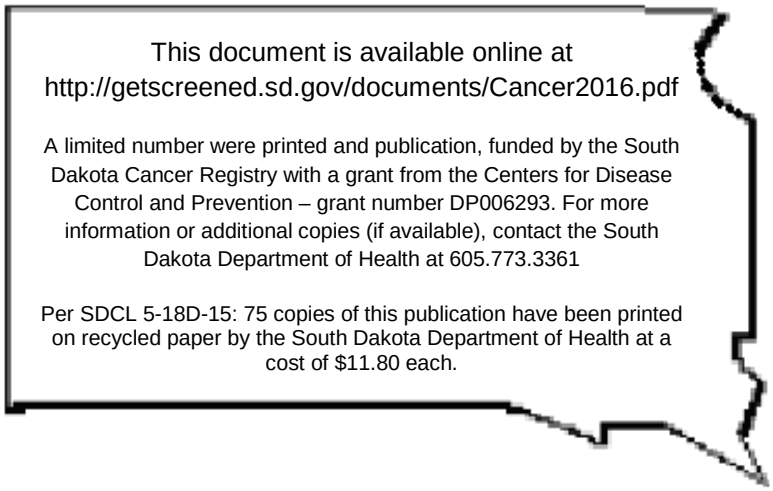
Howlader N, Noone AM, Krapcho M, Garshell J, Miller D, Altekruse SF, Kosary CL, Yu M, Ruhl J, Tatalovich Z,Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2011, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2011/, based on November 2013 SEER data submission, posted to the SEER web site, April 2016.

Jemal A, Simard EP, Dorell C, Noone AM, Markowitz LE, Kohler B, Eheman C, Saraiya M, Bandi P, Saslow D, Cronin KA, Watson M, Schiffman M, Henley SJ, Schymura MJ, Anderson RN, Yankey D, and Edwards BK. Annual Report to the Nation on the Status of Cancer, 1975-2009, Featuring the Burden and Trends in HPV-Associated Cancers and HPV Vaccination Coverage Levels. *J Natl Ca Inst* 2013 Feb;105(3). Epub 2013 Jan 7. Lenhard, Raymond et al. Clinical Oncology. The American Cancer Society. Bethesda, MD. 2001.

Nascar, Philip and Harris Pastides. Fundamentals of Cancer Epidemiology. Aspen Publications, Maryland. 2001.

Schottenfeld, David and Joseph Fraumenis, Cancer Epidemiology and Prevention. 2nd Edition. Oxford University Press. 1996.

Surveillance, Epidemiology, and End Results (SEER) Program of the National Cancer Institute, Cancer Query Systems, http://seer.cancer.gov/canques/



This document is available online at
http://getscreened.sd.gov/documents/Cancer2016.pdf

A limited number were printed and publication, funded by the South Dakota Cancer Registry with a grant from the Centers for Disease Control and Prevention – grant number DP006293. For more information or additional copies (if available), contact the South Dakota Department of Health at 605.773.3361

Per SDCL 5-18D-15: 75 copies of this publication have been printed on recycled paper by the South Dakota Department of Health at a cost of $11.80 each.