Cancer in Utah: An Overview of Cancer Incidence and Mortality from 1973-2010

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Overview
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Cancer continues to be the second leading cause of death in Utah, exceeded only by heart disease. In 2010, 9,233 Utahns were diagnosed with cancer and 2,810 died of cancer. The five year age-adjusted incidence rate in Utah for 2006-2010 was 418.6 cases per 100,000 Utahns, while the age-adjusted mortality rate was 131.3 deaths per 100,000 Utahns.

Utah routinely has one of the lowest cancer incidence and mortality rates in the nation. The five year age-adjusted incidence rate for 2006-2010 was 11% below the national rate while the mortality rate was 26% below the national rate. Utah’s low incidence and mortality rates are driven in part by the exceptionally low rate of tobacco related cancers. In 2006-2010 Utah’s lung cancer incidence and mortality rates were both 57% below the national rate. In addition, the esophageal cancer incidence and mortality rate were both 35% lower than the national rate. Furthermore, Utah’s five year age-adjusted incidence and mortality rates, for 2006-2010, were the lowest in the nation for both lung and colorectal cancers.

In 2010, 4,252 Utah women were diagnosed with cancer and 1,303 died of cancer. The five most common cancer sites in Utah women were breast, thyroid, colorectal, corpus and uterus, and melanoma of the skin. In stark contrast to much of the rest of the United States, lung and bronchus cancer was not among the leading cancer sites. However, it was the second leading cause of cancer death in Utah women in 2010. Breast cancer was the leading cause of death with colorectal and pancreatic cancers following lung cancer.

Prostate cancer was the most common cancer diagnosed in Utah men in 2010. Prostate cancer alone accounted for over 34% of new cancer cases in Utah males. Overall in 2010, 4,981 Utah men were diagnosed with cancer and 1,507 died of cancer. After prostate cancer, melanoma of the skin, colorectal, lung and bronchus, and urinary bladder were the most common cancers diagnosed in Utah men. Prostate, lung and bronchus, and colorectal cancers were also the leading causes of cancer death in Utah men.

Surprisingly, given that Utah has the lowest incidence and mortality rates from lung cancer in the nation; lung cancer incidence in Utah women has been rising for decades. From 1973 to 1987, lung cancer incidence rose by a significant 5.1% on average per year in Utah women. Since 1987 the incidence of female lung cancer has slowed, but it continues to increase by an average of 0.9% each year. The U.S. saw a similar pattern in female lung cancer from 1973 to 2007, but since 2007, lung cancer incidence has been falling in U.S. women by a statistically significant 2.6% per year.

In contrast, Utah men have seen decreasing rates of lung cancer since 1973. From 1993 to 2010 the steady decline accelerated by an average of 2.1% per year. This is greater than the decline experienced nationally in men. Since 1991, the incidence of lung cancer in men has been falling by 1.8% per year nationally. Deaths from lung cancer are also falling in Utah men. From 2000 to 2010, the rate of lung cancer deaths has fallen by 3.4% per year in Utah men. Nationally, the lung cancer death rate is also dropping in men, but not as sharply.

Contrary to Utah’s low lung cancer rates, Utah’s rate of melanoma is among the highest in the nation. The five year, 2006-2010, age-adjusted incidence rate of melanoma of the skin was 61% higher in Utah than the national rate. The Utah mortality rate was also a substantial 30% higher than the national rate. Melanoma rates by sex were similarly much higher than national rates. Utah women experienced melanoma incidence rates which
were 45% above national rates and death rates which were 18% above the national rates. The rate of melanoma in Utah men was even more striking. The five year, 2006-2010, age-adjusted incidence rate in Utah men was 69% higher than national rates and the death rate was 32% higher than national rates.

Melanoma incidence has been rising nationwide for decades. Since 1973 the incidence of melanoma of the skin in Utah women has increased by an average of 2.3% per year. National rates in women have also been rising. From 1996 to 2010 the incidence of melanoma rose by an average of 2% per year in women in the U.S. Utah men also have experienced consistently rising melanoma incidence. From 1973 to 2003 the incidence increased by a significant 3.4% per year on average in Utah men. Since 2003, the rate has continued to rise in Utah men, as well as in men and women nationwide.
Materials and Methods
Materials and Methods:

Cancer data in this report are based on new cases of malignant primary cancer or cancer deaths among Utah residents occurring between January 1, 1973 and the last calendar year with available data. Because of the complexity of the data collection and quality control process, there is a delay between a new cancer diagnosis and the new data being ready for analysis. The standard delay is 22 months after the end of the calendar year of diagnosis.

Data Sources and Statistical Methods:

Incidence Data
Data on all incident cancer cases diagnosed among Utah residents were provided by the Utah Cancer Registry as part of the routine, annual submissions to the National Cancer Institute Surveillance, Epidemiology and End Results (SEER) Program. Limited Utah data were combined with data from the North American Association of Central Cancer Registries (NAACCR), which included 43 additional states and Washington DC, representing approximately 89% of the U.S. population, and made available for analyses using the CINA+ dataset in the SEER*Stat statistical application software. Incident data are presented for all primary, invasive cancers, and are grouped following the conventions of the SEER program, which uses primary site and histology codes defined in the International Classification of Diseases for Oncology (ICD-O), Third Edition (Fritz, et al., 2000).

Mortality Data
Mortality data were provided to SEER by the National Center for Health Statistics (NCHS) as a part of the Centers for Disease Control (CDC). Mortality data was available for all 50 states, as well as Washington DC, and is recorded back to 1969. Mortality (death) rates were calculated in the SEER*Stat statistical application software (not shown). The data in SEER*Stat not only includes all cancer deaths, but deaths from any cause which are based on anatomical site codes from the International Classification of Diseases, Tenth Edition (World Health Organization, 1992).

Trend Analysis
National trend analyses were conducted using data from the original nine SEER registries (excluding Utah) with cancer data available from the early 1970s forward. The nine SEER registries cover approximately 10% of the U.S. population and include Atlanta, Connecticut, Detroit, Hawaii, Iowa, New Mexico, San Francisco-Oakland, Seattle-Puget Sound, and Utah. Long-term incidence and mortality trends were analyzed using JoinPoint analysis (not shown), which is a statistical method that describes changing trends over successive segments of time by selecting the best fitting point or points where the rate of increase or decrease changes significantly (Kim, Fay, Feuer, & Midthune, 2000). Rates were calculated utilizing SEER*Stat software and analyzed using the JoinPoint Regression Program. Significant trends were determined using the annual percent change (APC) statistic for each segment set at p<0.05.
Population Estimates and Denominators
The population figures used to calculate age-adjusted rates were provided by the U.S. Census Bureau’s Population Estimates Program, in collaboration with the National Center for Health Statistics, and with support from the National Cancer Institute through an interagency agreement. These population data are based on intercensal estimates from 2001-2009, the actual census population from 2010, and current estimates for all years after 2010. All of the rates were age-adjusted to the 2000 U.S. Standard Population weights, based on 19 age groups. For additional information about the U.S. population data, please visit the SEER website at http://seer.cancer.gov/popdata/.

Statistical Terms:

Age-adjusted Rates
An age-adjusted rate is a weighted average of age-specific rates, where weights are based on the proportions of persons in each corresponding age group of a standard population. This allows for meaningful comparison of cancer rates between populations and reduces the potential for confounding the effects of age when comparing populations. Age-adjusted rates were calculated by the direct method using the 2000 U.S. standard population in SEER*Stat software. Cancer incidence and mortality rates are expressed per 100,000 persons. Confidence intervals were calculated using the Tiwari method (Tiwari, Clegg, & Zou, 2006). For an in depth description, please visit the SEER website at http://seer.cancer.gov/seerstat/tutorials/aarates/definition.html.

Age-adjusted Rate Ratio
Age-adjusted rate ratios were calculated by dividing the average annual age-adjusted rates in Utah by those for the U.S. and subtracting from one. The age-adjusted rate ratio represents the relative risk of cancer in Utah as compared to the United State. Confidence intervals were calculated using the method described by Boyle and Parkin (Boyle & Parkin, 1991).

Annual Percent Change (APC)
The estimated percent change (APC) indicates the average percent increase or decrease in cancer rates per year over a stated time period. It is calculated by fitting a straight line to the natural logarithm of the data presented by calendar year. The estimated APCs were computed utilizing the JoinPoint Regression Program based on rates calculated in SEER*Stat. For more information on the calculation of APC and trend algorithms please visit the SEER website at http://surveillance.cancer.gov/joinpoint/

Cautions on Interpreting the Data:
When interpreting cancer incidence and mortality data it is imperative to keep in mind that a variety of factors can influence cancer rates. It is important to use caution when interpreting the data and to consider the following:
Completeness
The cancer data this report is based on is dynamic and it is possible that even after the standard reporting delay, a few new cases may be reported. This may have a minor impact on the data in this report, particularly for the most recent years of diagnosis.

Comparability of cancer incidence and mortality
Migration may impact the comparability of cancer incidence and mortality rates. The Utah incidence and mortality rates presented in this report are for Utah residents. It is possible that a Utah resident, who was diagnosed with cancer in Utah, later moved out of state and died or a person could have been diagnosed in another state and moved to Utah and died. In this first instance, the case would be included in the incidence data, but not in the mortality data and in the second the case would be included in the mortality data and not the incidence data.

Small numbers
Caution should be used when interpreting rates based on only a few cases. Due to Utah’s relatively small population, some rare cancers are seen in very small frequencies. In order to protect patient confidentiality and because of the instability of rates based on small numbers, data based on counts smaller than 10 have been suppressed. Additionally, the confidence intervals associated with some cancers are very large, and caution should be used when interpreting the data.

Race and Ethnicity
Cancer incidence and mortality can vary greatly by race/ethnicity. While we would like to present detailed information on specific rates for racial and ethnic groupings, Utah’s small minority populations make it difficult to do so while still maintaining patient confidentiality. Additionally, rates based on small numbers may be unstable and unreliable. According to the 2010 U.S. census (United States Census Bureau, 2010), non-Hispanic Whites account for 80.4% of Utah’s population, and Hispanic Whites (Utah’s largest minority group), account for 13% of Utah’s population. Given Utah’s small minority population, displaying detailed information by racial/ethnic group quickly leads to cell counts that are too small to display publically and rates that may be unstable.

Trends
Trend data should be interpreted with caution. Increases and decreases in rates over time may reflect changes in diagnostic methods or case reporting rather than genuine changes in cancer occurrence.

National Comparisons
Incidence and mortality rates may be influenced by many factors. Rates for certain cancers vary among different racial and ethnic populations. Geographic differences in cancer rates may also result from behavioral or lifestyle differences. For example smoking and obesity rates or cancer screening behavior in a community may impact cancer rates. Caution should be used when comparing rates between different populations.