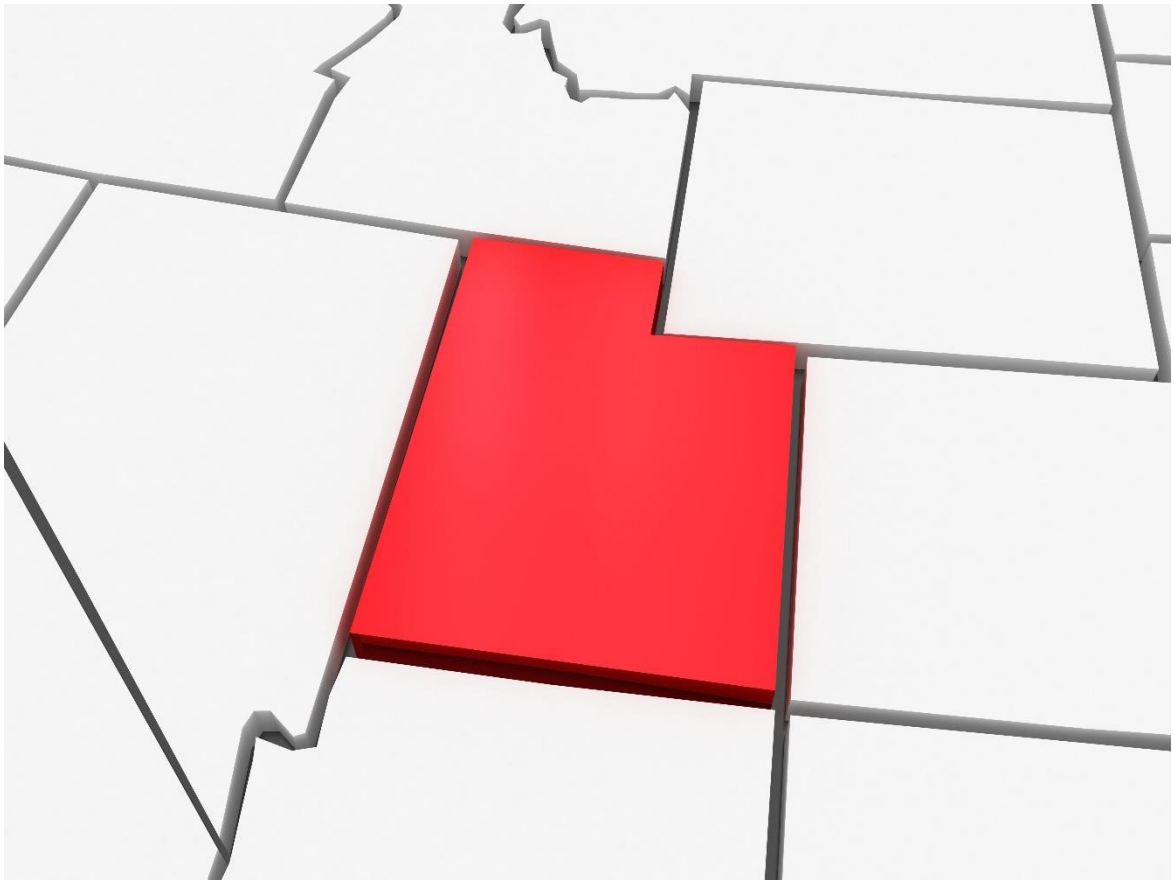
Cancer in Utah: An Overview of Incidence and Mortality 2004-2013

A publication of the Utah Cancer Registry



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Preface

The Utah Cancer Registry (UCR), Utah's statewide, population-based cancer registry, has operated at the University of Utah since 1966. The UCR is authorized by Utah Administrative Code Rule R384-100, the Cancer Reporting Rule[1], to collect and manage state-wide cancer incidence and mortality data on behalf of the Utah Department of Health (UDOH). Reportable cases include in situ and invasive neoplasms (with certain exceptions) as well as benign brain and central nervous system tumors. The Utah Cancer Reporting Rule states that "through the routine reporting of cancer cases, trends in cancer incidence and mortality can be monitored and prevention and control measures evaluated."

Cancer surveillance in Utah is possible only with the cooperation of health care providers throughout the state who report cancer case data to UCR. UCR relies on the expertise of hospital tumor registrars who identify and code cases for submission to the registry. We thank these professionals for their contributions to cancer surveillance. UCR also acknowledges the U.S. National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) program (Contract No. HHSN261201300017I), the University of Utah Health Sciences, Huntsman Cancer Institute, and the UDOH for support of our surveillance, public health, and research activities.

The cancer surveillance process involves multiple steps in which cancer case information is reported, compiled, and reviewed for quality assurance. Therefore the most recent available SEER cancer incidence and mortality data for other regions of the U.S. are for 2013. This report summarizes cancer incidence, mortality, and trends in Utah for the period 2004-2013.

Summary

In 2013, 9,473 new cases of invasive cancer were diagnosed in Utah, and there were 1,917 in situ cancers and reportable benign brain and central nervous system tumors. Cancer is the second leading cause of death in Utah, after heart disease; 2,971 Utahns died of cancer in 2013.

The burden of cancer differs somewhat for women compared to men and by ethnic group. The cancer site accounting for the largest number of incident cases among Utah women was breast cancer. Breast cancer also was responsible for the most cancer deaths for women. Among men in Utah, prostate cancer was the most frequently diagnosed site, but lung cancer was the leading cause of cancer death among men. Overall age-adjusted cancer incidence among Hispanics in Utah was 16.9% lower than incidence in non-Hispanic whites, and cancer mortality for Hispanics was 12.7% lower. Patterns of cancer incidence and mortality by sex, ethnicity, age, and geography are described in more detail in Chapter 1.

Utahns experience 7% lower cancer incidence and 21% lower cancer mortality compared to residents of other U.S. regions. (The comparison group are other regions that contribute data to the National Cancer Institute's Surveillance, Epidemiology, and End Results Program, or SEER, data set.) Utah's incidence and mortality from lung cancer, a major cause of cancer death nation-wide, are 50% lower than in other regions of the U.S. Utah's low prevalence of cigarette smoking is an important contributing factor to its relatively low rates of lung cancer incidence and death. Cancers of other body sites affected by smoking also have relatively low incidence in Utah. A few cancers have relatively high incidence in Utah, notably melanoma of the skin. Comparisons of cancer in Utah to other regions of the U.S. are presented in Chapter 2.

Cancer incidence trends over time are affected by changes in health behavior and by participation in cancer screening. Prostate cancer shows a trend of decreased incidence in recent years, related to changes in screening practices. Incidence of melanoma of the skin is trending upward, but with no significant change in mortality. Liver cancer incidence and mortality are both increasing. Ten-year trends for several cancer sites of interest for the Utah public health community are described in Chapter 3.

In conclusion, cancer continues to be a significant public health burden in Utah. A distinct feature of cancer patterns in Utah is that the population suffers fewer diagnoses of and deaths from smoking-related cancer compared to other regions of the U.S.

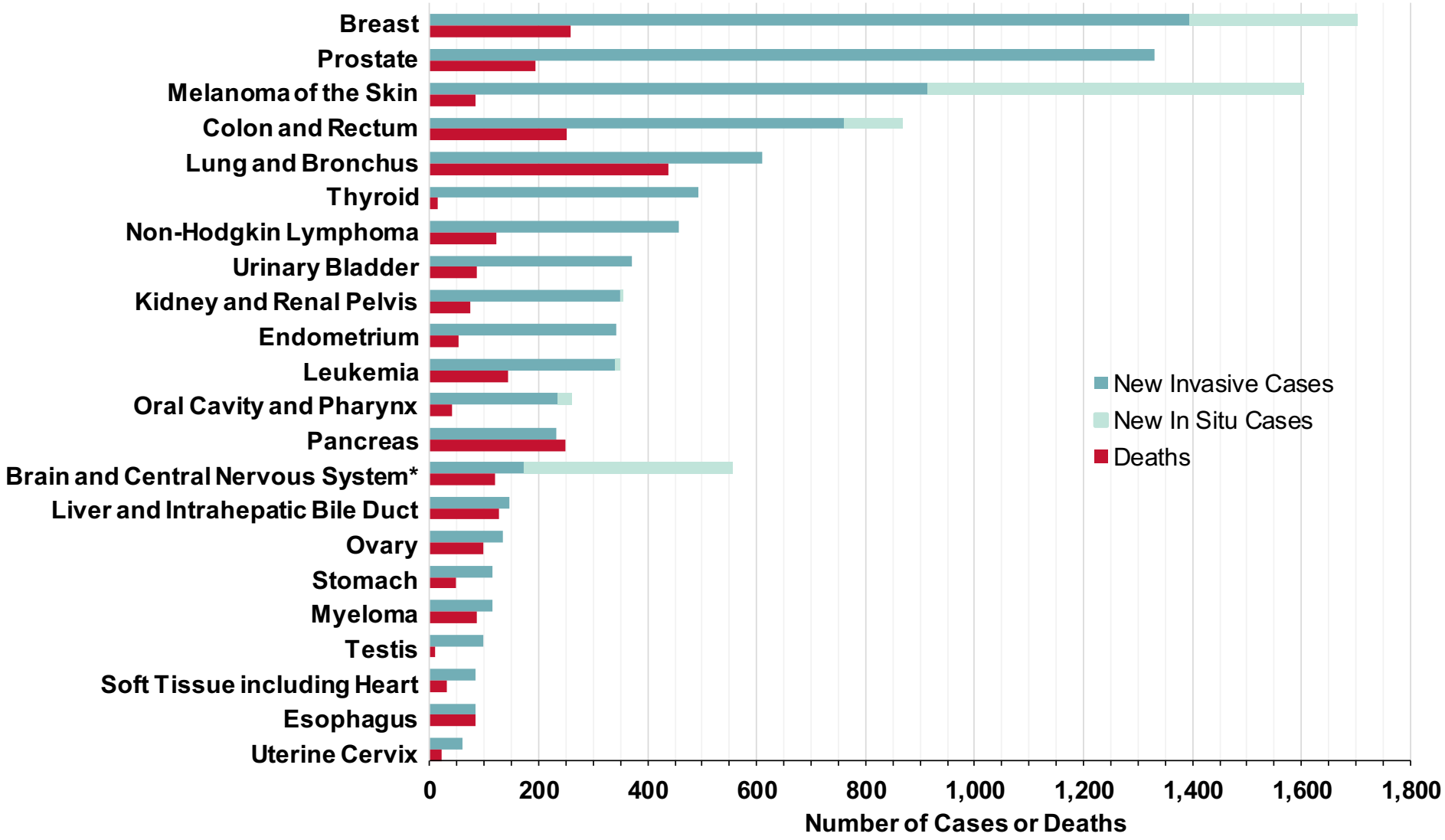

Figure 1. Cancer Incidence and Mortality for Common Sites, Utah 2013

* Brain and central nervous system "in situ" case count includes benign.

1. The Burden of Cancer in Utah

1.1 Cancer Diagnoses and Deaths in Utah by Cancer Site, 2013

In 2013, 9,473 new cases of invasive cancer were diagnosed in Utah, and there were 1,917 in situ cancers and reportable benign brain and central nervous system tumors. In the Utah population, estimated at 2,900,872 in 2013 by the U.S. Census[2], this equates to age-adjusted incidence of 465 reportable invasive, in situ, and benign diagnoses per 100,000 population, or a five-year average incidence for 2009-2013 of 478 per 100,000. The cancer sites accounting for the largest number of new invasive cases, in order, are female breast with 1,384 cases, prostate with 1,329 cases, melanoma of the skin with 915 cases, colon and rectum with 760 cases, and lung with 611 cases (Figure 1). In situ cancers are frequently diagnosed for breast cancer and melanoma but are less common for other cancer sites. If in situ cancers are included in the counts, the top five sites remain the same, but the order changes as the number of melanoma cases then exceeds cases of prostate cancer. The most frequently diagnosed invasive cancers in Utah in 2013, breast and prostate, together represent 29% of all invasive cancer diagnoses.

Cancer continues to be a leading cause of death in Utah, accounting for 18.2% of deaths[3]. Cancer as a cause of death is exceeded only by heart disease, which accounts for 20.5% of deaths in Utah. In 2013, 2,971 Utahns died of cancer. Lung cancer was the cause of 437 deaths in Utah in 2013, the largest number for any cancer site (Figure 1). The next leading causes of cancer deaths were three sites that each accounted for similar numbers of deaths: breast cancer (255 deaths in women), colorectal cancer (252 deaths), and pancreatic cancer (249 deaths). Appendix A, Table A1 reports the number of incident cancers and cancer deaths for 2013 for many cancer sites; Table A2 reports cancer incidence and mortality rates per 100,000 population per year.

1.2 Cancer in Utah by Sex

In 2013, women in Utah had a total of 4,622 invasive cancers diagnosed and 1,395 deaths due to cancer. The site with the largest number of diagnoses by far was breast cancer, which was also was responsible for the most cancer deaths among women (Table 1). The second most commonly diagnosed invasive cancer among Utah women was thyroid cancer. Thyroid cancer was rarely fatal however, with fewer than 10 deaths. Melanoma of the skin, colorectal cancer, and endometrial cancer were the other sites in the top five invasive cancers for women, each with over 300 incident invasive cases. Lung cancer was responsible for the second-highest number of cancer deaths among women, 196. Details of cancer incidence rates by cancer site among women in Utah are shown in Appendix A, Table A3.

Table 1. Cancer in Utah Women: Ten Most Frequent Sites

Cancer Site	Invasive Cases 2013	In Situ Cases 2013	Incidence Rate*	Deaths 2013
Breast	1,384	306	136.8	255
Thyroid	387	0	29.0	^
Melanoma	368	234	43.3	16
Colorectal	346	50	30.1	110
Endometrium	341	^	25.9	53
Lung	284	^	24.3	196
NH Lymphoma	194	0	15.1	55
Leukemia	139	5	10.6	66
Ovary	134	^	11.4	97
Kidney	121	^	9.8	26

* Rate per 100,000 population per year 2009-2013, age standardized

^ Number suppressed due to small cell size

Men in Utah experienced 4,851 invasive cancer diagnoses and 1,576 cancer deaths in 2013. Prostate cancer was the most frequently diagnosed site for men, with 1,329 invasive cases (Table 2) and was responsible for 193 deaths. Melanoma of the skin, 547 cases, was the second most commonly diagnosed invasive cancer for Utah males, and almost as many cases of in situ melanoma were diagnosed in men. The next most frequent sites of invasive cancer diagnosis for men in Utah were, in order, colorectal, lung, and bladder. There were 241 lung cancer deaths among Utah men in 2013,

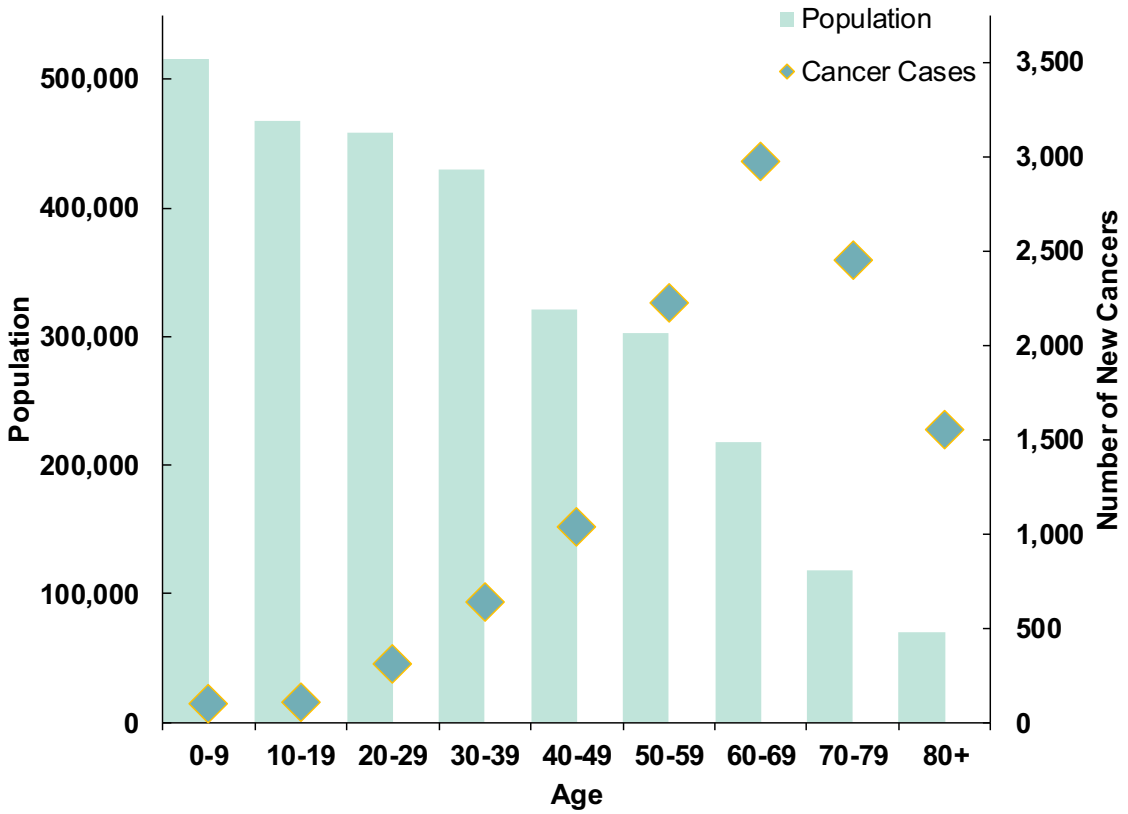

Figure 2. Utah Population Age Distribution and Incident Cancers by Age, 2013

more deaths than any other cancer site. Details of incidence rates by cancer site among men in Utah are shown in Appendix A, Table A4.

1.3 Cancer in Utah by Age

Cancer incidence is much lower among children than adults, and cancer diagnoses are less frequent among young adults than in the older population. In 2013 there were 205 incident cancers among the approximately one million Utahns younger than 20 years of age (Figure 2). Cancer incidence increases with age so that the population aged 50 and older, who represent only 24% of the Utah population, experience 81% of the incident cancer diagnoses.

1.4 Cancer in Utah by Ethnicity

Some cancers differ in incidence or mortality by race or ethnic group[4]. The largest race and ethnic group in Utah in 2013 were the 79.7% who described

Table 2. Cancer in Utah Men: Ten Most Frequent Sites

Cancer Site	Invasive Cases, 2013	In Situ Cases, 2013	Incidence Rate*	Deaths, 2013
Prostate	1,329	0	144.4	193
Melanoma	547	457	79.5	67
Colorectal	414	58	38.5	142
Lung	327	0	34.4	241
Bladder	302	0	30.2	64
NH Lymphoma	262	0	23.4	67
Kidney	228	^	17.9	48
Leukemia	201	^	17.1	77
Oral	138	15	12.4	20
Pancreas	121	0	12.5	125

* Rate per 100,000 population per year 2009-2013, age standardized
^ Number suppressed due to small cell size

themselves as white and non-Hispanic[2]. The next largest race or ethnic group were Hispanic or Latino residents of Utah, who were 13.4% of the population. No other race or ethnic group makes up more than 2.2% of the Utah population. Because estimates of cancer incidence in small populations may be unreliable, when describing cancer in Utah by race and ethnicity we focus on the two largest groups.

Table 3. Cancer in Utah by Ethnicity

Ethnicity	Invasive Cases 2013	In Situ Cases 2013	Incidence Rate*	Deaths 2013
White non-Hispanic	8,389	1,726	484.7	2,711
Hispanic or Latino	662	105	414.5	160

* Rate per 100,000 population per year 2009-2013, all reportable cancers, age-standardized

When the number of incident invasive cancers in Utah is compiled by ethnicity (Table 3), the total among Hispanics appears smaller than would be expected based on their proportion of the overall population. The discrepancy is explained partly by the fact that the Hispanic population of Utah includes more young people. As noted above, cancer incidence becomes high in the population aged 50 and older. Only 13.8% of Utah Hispanics are 50 or older, compared to the 24% of Utahns of all race and ethnic groups who are 50 or older. After taking into account age differences, overall cancer incidence among Hispanics in Utah remains somewhat lower than that of non-Hispanic whites. Age-adjusted cancer incidence for Hispanics is 16.9% lower, while cancer mortality for Hispanics is 12.7% lower. Hispanics experience lower incidence of several major cancer sites including melanoma, breast, and prostate. Cancer incidence by ethnicity for specific cancer sites is further described in Chapter 3 and in Appendix A, Tables A5 and A6.

1.5 Cancer in Utah by Geography

Utah is a geographically large state of 84,899 square miles. Most of its 2013 population of 2.9 million residents were concentrated around urban areas. The majority of the population (89%) live in ten counties that are considered metropolitan, meaning that either the county contains a metropolitan area of 50,000 or more people, or most of the county population is within commuting distance of a metropolitan area[5]. The 14 counties in which the largest nearby urban core contains between 10,000 and 50,000 residents are termed micropolitan. These counties are home to 10% of Utahns. Five counties are considered rural, with no nearby urban core exceeding 10,000 residents, and these counties account for less than 1% of the state's population.

The cancer incidence rate in Utah is higher within metropolitan counties than in non-metropolitan counties. In 2013, residents of metropolitan counties in Utah experienced 9,986 incident cancer diagnoses (Table 4). Metropolitan counties had a cancer incidence rate of 481 per 100,000 for the period 2009 - 2013. Residents of non-metropolitan counties experienced 1,404 incident cancers in 2013, and had an incidence rate of 456 per 100,000 per year for 2009-2013. Additional details about cancer incidence in Utah's counties are provided in Appendix A, Tables A7 and A8.

Table 4. Cancer in Metropolitan and Non-Metropolitan Counties of Utah

County Type	Invasive Cases 2013	In Situ Cases 2013	Incidence Rate*
Metropolitan	8,260	1,726	481.1
Non-metropolitan	1,213	191	455.9

* Rate per 100,000 population per year 2009-2013, all reportable cancers, age-standardized

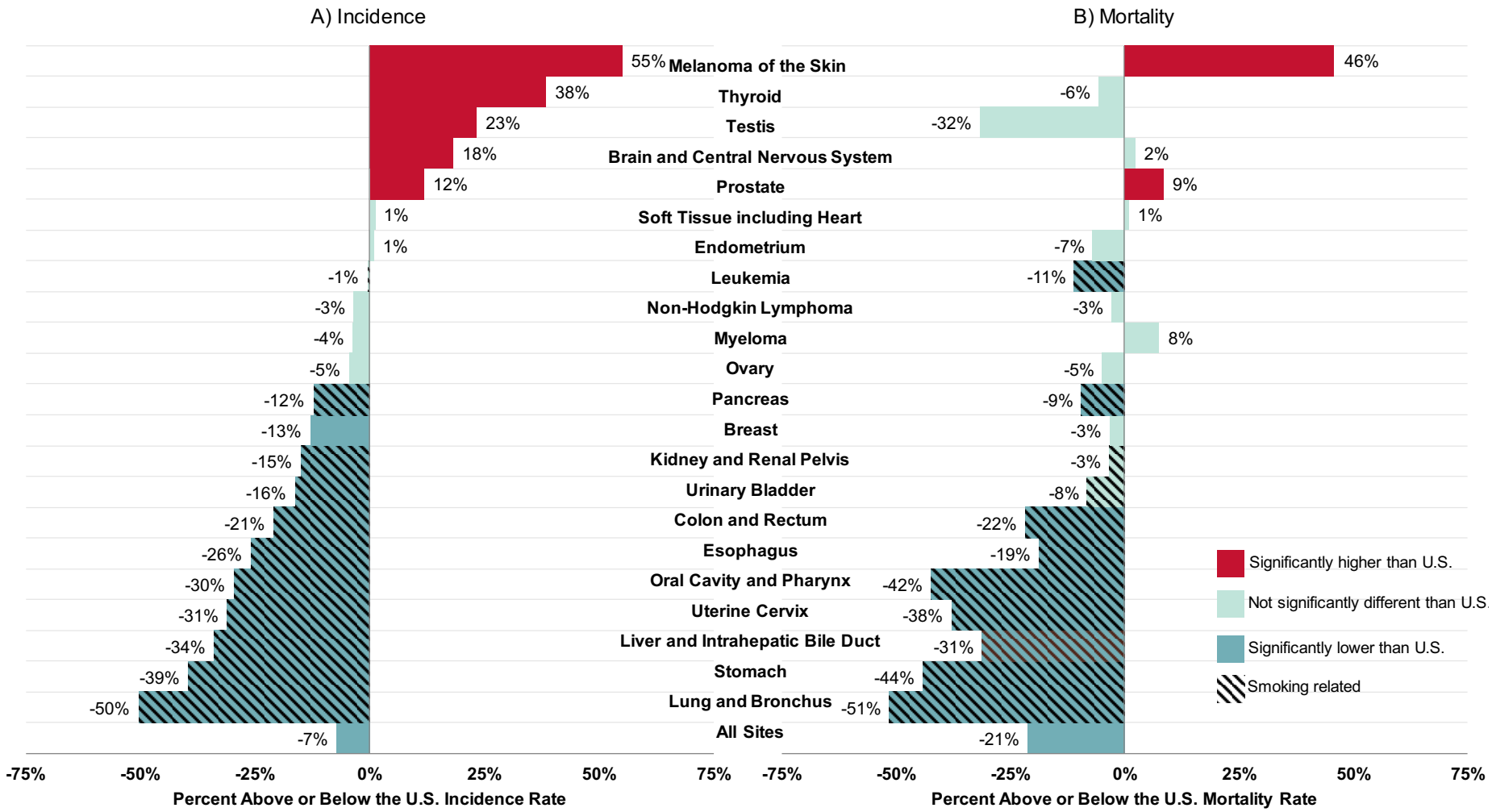

Figure 3. Cancer Incidence and Mortality in Utah Compared to Other U.S. Regions, 2013

2. Cancer in Utah Compared to Other U.S. Regions

2.1 Overall Cancer Incidence and Mortality, Utah Compared to Other U.S. Regions

Utahns experienced 7% lower age-adjusted cancer incidence overall for 2013 compared to residents of other U.S. regions that contribute data to the SEER program (Figure 3). Utah's age-adjusted cancer mortality is a striking 21% lower than other regions of the U.S. Appendix A, Table A2 reports cancer incidence and mortality rates for Utah and other U.S. regions.

2.2 Cancer Sites with Relatively Low Incidence in Utah

Utah's incidence and mortality from lung cancer in 2013 were each approximately 50% lower than in other regions of the U.S. (Figure 3). Utah's historically low prevalence of cigarette smoking is believed to be the major contributing factor to these differences in a disease that is an important cause of cancer death. In Utah in 2014, 9.7% of adults reported being current smokers[6], contrasted with 16.8% in the U.S.[7]. Smoking is also known to increase risk of cancer of several other sites, including the oral cavity and pharynx, esophagus, stomach, colon and rectum, liver, pancreas, lung, cervix, kidney, urinary bladder, and leukemia[8]. Incidence and mortality for each of these cancers are also significantly lower in Utah than other U.S. regions. The proportion of U.S. adults who are current smokers is trending downward[7]. Thus current cancer incidence in Utah for smoking-related sites gives an indication of what can be expected in other U.S. regions in the future if smoking rates continue to decline.

2.3 Cancer Sites with Relatively High Incidence in Utah

Despite Utah's overall lower cancer incidence and mortality, several specific cancer sites have higher incidence compared to other U.S. regions (Figure 3). Most striking among these is melanoma of the skin. Overall, Utahns have 55% higher melanoma incidence and 46% higher melanoma mortality than the other regions compared. Melanoma incidence is higher for non-Hispanic white populations than other racial and ethnic groups in the U.S.[9], so Utah's relatively large population proportion of non-Hispanic whites is a contributing factor to high melanoma incidence. The magnitude of difference in melanoma risk between Utah and other U.S. regions changes somewhat when race and ethnicity are taken into account, as addressed in Chapter 3 of this report, but an excess of melanoma is still apparent for both non-Hispanic white and Hispanic Utahns.

Utah residents are exposed to substantial amounts of ultraviolet energy from the sun's rays due to the state's high elevation above sea level and sunny climate. Research indicates that an individual's history of intermittent sun exposure, for example sunburns, increases risk for melanoma[10]. However, when population incidence rates of melanoma in geographic areas with higher ultraviolet exposure are compared to areas with lower, the association with increased melanoma risk is not consistent[11]. Thus, sunny climate and altitude may not completely account for Utah's remaining excess of melanoma. Reporting of melanoma diagnoses to central cancer registries throughout the U.S. is recognized to be somewhat incomplete, with completeness varying among registries[12,13]. Variation in completeness of reporting across registries is an additional factor that may explain some of the excess melanoma incidence in Utah.

Other cancer sites with relatively high incidence in Utah include thyroid cancer, testicular cancer, and cancers of the brain and nervous system. None of these sites have higher mortality in Utah compared to other regions. Incidence and mortality for prostate cancer in Utah are both significantly higher than other U.S. regions, by 12% and 9% respectively.

3. Cancer Sites of Special Interest

Several cancer sites are of special interest to the public health community because cancer screening, prevention, or control programs are being implemented and/or because of recent changes in incidence or mortality. In this chapter, we provide further information about incidence of selected cancers by ethnicity and by stage at diagnosis.

3.1 Prostate Cancer

Prostate cancer is the most frequent invasive cancer diagnosis for men and is a significant source of cancer mortality. Prostate cancer incidence in Utah declined steeply over the time period 2010-2013 (Figure 4). The incidence of prostate cancer in the U.S. shows a similar decline over the same time period[14,15]. This decrease in prostate cancer diagnosis was concurrent with changes in recommendations regarding prostate cancer screening using a blood test for prostate specific antigen or PSA. Screening with the PSA test was first recommended by the American Cancer Society in 1992[16]. Widespread use of PSA screening is believed to be the cause of an increase in prostate cancer incidence observed in the U.S. in the 1990s[16]. Assessments of new data in 2011 - 2012 led the U.S. Preventive Services Task Force to conclude that evidence did not support a benefit of screening in terms of mortality reduction[17]. Reduced use of screening related to the changed recommendations is thought to drive the recent trend of lower prostate cancer incidence.

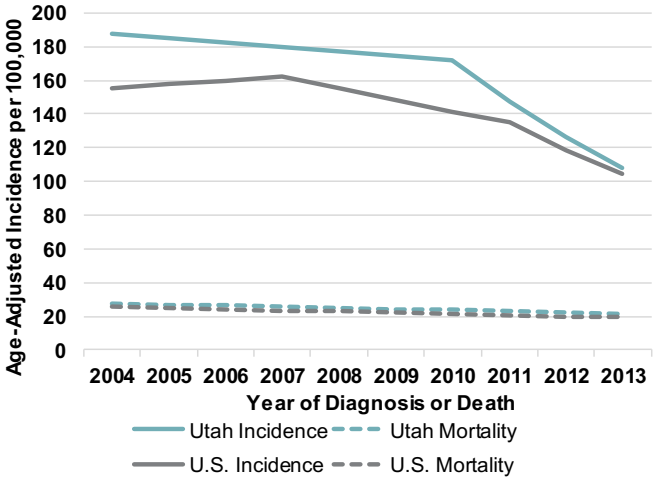

Figure 4. Prostate Cancer Incidence and Mortality Trends, U.S. and Utah

Age-adjusted prostate cancer incidence in Utah had been as much as 20% higher than elsewhere in the U.S. during the time period when PSA screening was in wide use. After the decline in screening and incidence that started in 2011, the overall difference between Utah and other U.S. regions also declined, to 3.5% (Figure 4). However, when racial and ethnic differences between

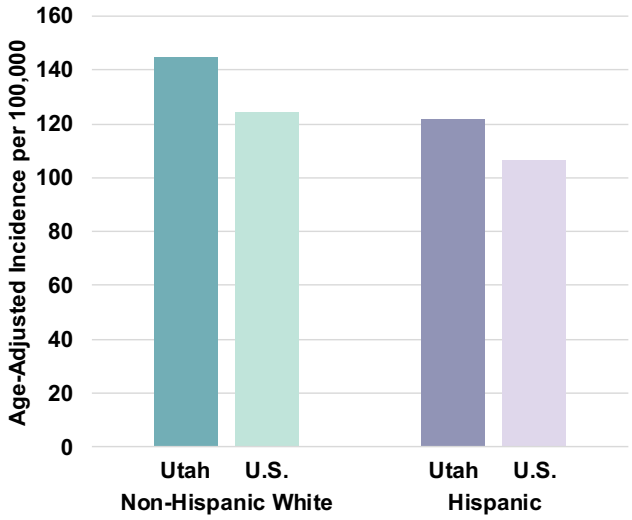

Figure 5. Prostate Cancer Incidence by Ethnicity, U.S. and Utah 2013

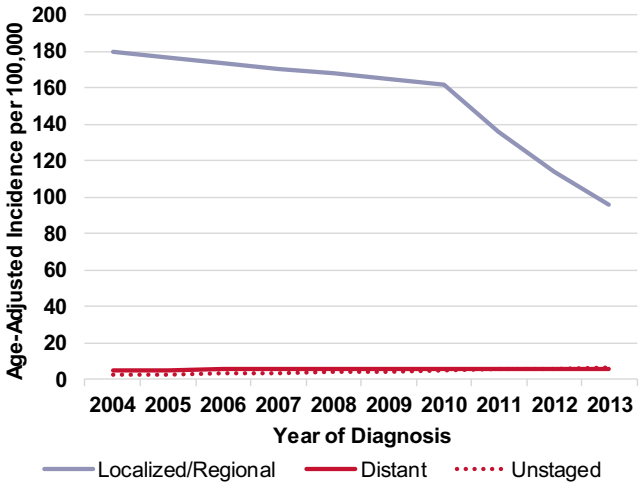

Figure 6. Prostate Cancer Incidence Trends by Stage at Diagnosis, Utah

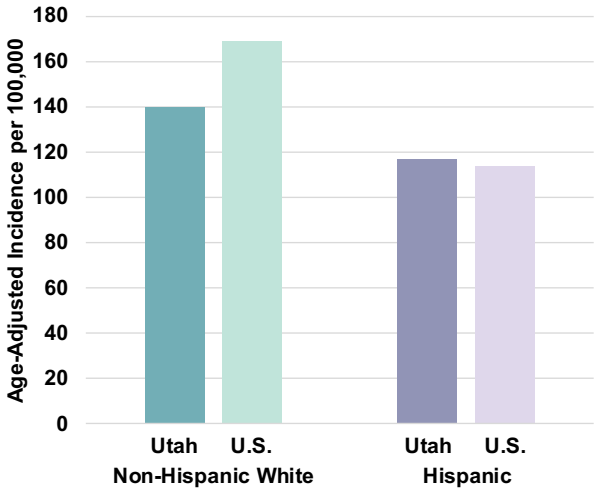

Figure 7. Female Breast Cancer Incidence by Ethnicity, U.S. and Utah, 2013

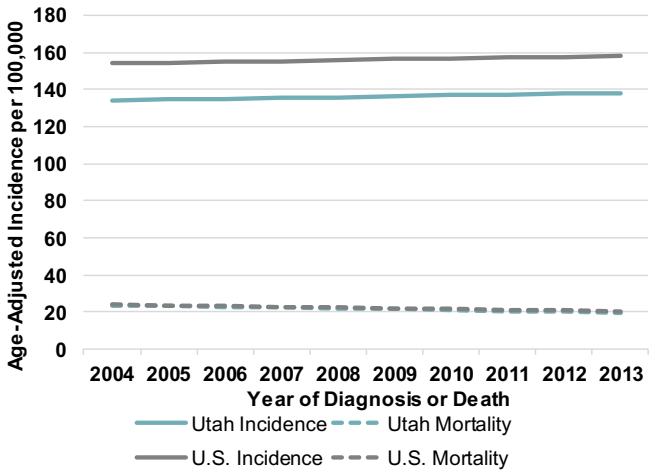

Figure 8. Female Breast Cancer Incidence and Mortality Trends, U.S. and Utah

states are taken into account, prostate cancer incidence among non-Hispanic whites and among Hispanics in Utah in 2013 were each more than 10% higher than other U.S. regions (Figure 5). Prostate cancer mortality in Utah has declined steadily, by 2.7% annual average percent change over the last 10 years (Figure 4).

When stage at diagnosis is considered, the trend of decreased incidence of prostate cancer in Utah seems to be specific to cancers with localized or regional stage, which displayed an annual average percent change of -16.1% per year for 2011-2013 (Figure 6). Distant stage prostate cancer accounts for a relatively small proportion of cases and the trend for this stage was unchanged 2004-2013. Prostate cancers with unknown stage at diagnosis, also a relatively small proportion of cases, had a trend of increasing incidence over the same period.

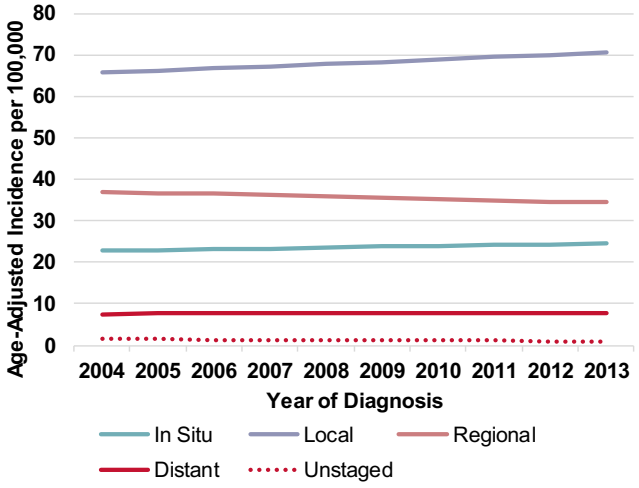

Figure 9. Female Breast Cancer Incidence Trends by Stage at Diagnosis, Utah

3.2 Breast Cancer

Breast cancer incidence for non-Hispanic whites in Utah is lower than for other U.S. regions (Figure 7). Early age at first birth and/or high parity are protective factors for breast cancer risk[18], so the relatively high birth rate among Utah non-Hispanic whites likely contributes to this difference. Breast cancer incidence among Utah Hispanics was comparable to other regions.

Female breast cancer trends over the last 10 years indicate no overall change in incidence in Utah or the U.S. (Figure 8). Changes in recommendations regarding mammography screening for breast cancer were actively debated during this time period[19,20] Issues included the time interval between screens and what age groups should participate in screening. However, overall participation in screening changed relatively little[21,22] through this time period. Breast cancer mortality has decreased over this time period, with an annual average percent change of -2.0% in Utah and -1.7% in other U.S. regions. Likely contributing factors to the breast cancer mortality decline include continued long-term effects of cancer screening and consequent early detection as well as improvement in dissemination of effective treatments[23].

Examination of breast cancer trends by stage at diagnosis revealed that incidence of in situ and local breast tumors both trended up slightly in Utah with annual average percent change of 0.9% and 0.8%, respectively (Figure 9). Neither trend was statistically significant. These stages are both characteristic of screen-detected breast tumors. Breast cancers diagnosed at regional stage decreased non-significantly, a -0.8% annual average percent change. Relatively few breast cancers are diagnosed at distant stage, and incidence of distant-stage breast cancer changed little over the last decade.

3.3 Melanoma of the Skin

The Centers for Disease Control and Prevention (CDC) ranks Utah as the highest of any U.S. state on reported age-adjusted incidence of melanoma[24]. Utah's overall melanoma incidence is 55% higher relative to the comparison group of other SEER regions in the U.S. (Figure 3). However, these comparisons do not account for differences in racial and ethnic composition of the state populations. When melanoma is examined by ethnic group, incidence in Utah's largest ethnic group, non-Hispanic whites, does exceed that of other U.S. regions, but by 22%, not 55% (Figure 10). For Hispanics in Utah, the contrast is stronger, with 88% higher incidence compared to Hispanics in other regions. Melanoma incidence among Utah Hispanics is only about one-fifth the rate in non-Hispanic whites.

Melanoma incidence increased over the ten-year period, with annual average percent change of 3.5% in Utah and 2.3% in other U.S. regions (Figure 11). Melanoma mortality did not significantly change.

Men have an overall higher incidence of melanoma of the skin than women, both in Utah and in other regions of the U.S. Melanoma diagnosed at in situ stage increased substantially among Utah men from 24.3 per 100,000 in 2004 to 41.1 per 100,000 in 2013 (Figure 12a). Local-stage melanoma among men also increased, and incidence of local melanoma was essentially identical to that of in situ melanoma in 2013. Regional and distant-stage melanomas increased non-significantly over time among men. Among women, in situ and local melanoma increased significantly over time, with annual average percent change of 2.4% and 4.0% respectively (Figure 12b). Incidence of melanoma with regional stage at diagnosis trended non-significantly downward among women. Whereas the continued increase in melanoma in Utah is of public health concern, the stage-specific analysis indicates that most of the increase and most incident cases are at treatable in situ and local stages. Increasing melanoma awareness among the population and among primary care providers can contribute to increasing incidence at in situ and local stages[25,26].

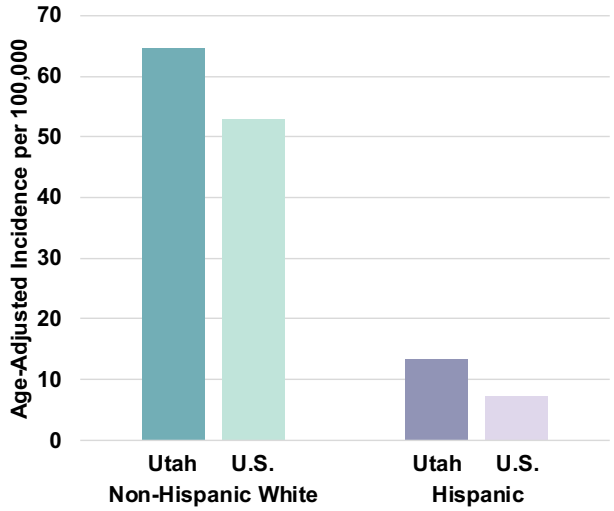

Figure 10. Melanoma of the Skin Incidence by Ethnicity, U.S. and Utah 2013

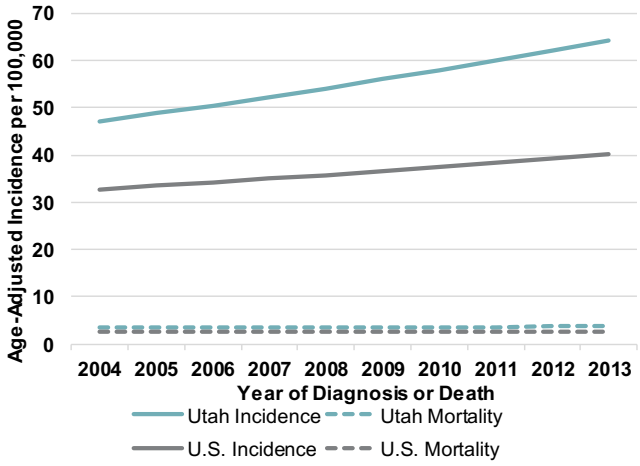

Figure 11. Melanoma of the Skin Incidence and Mortality Trends, U.S. and Utah

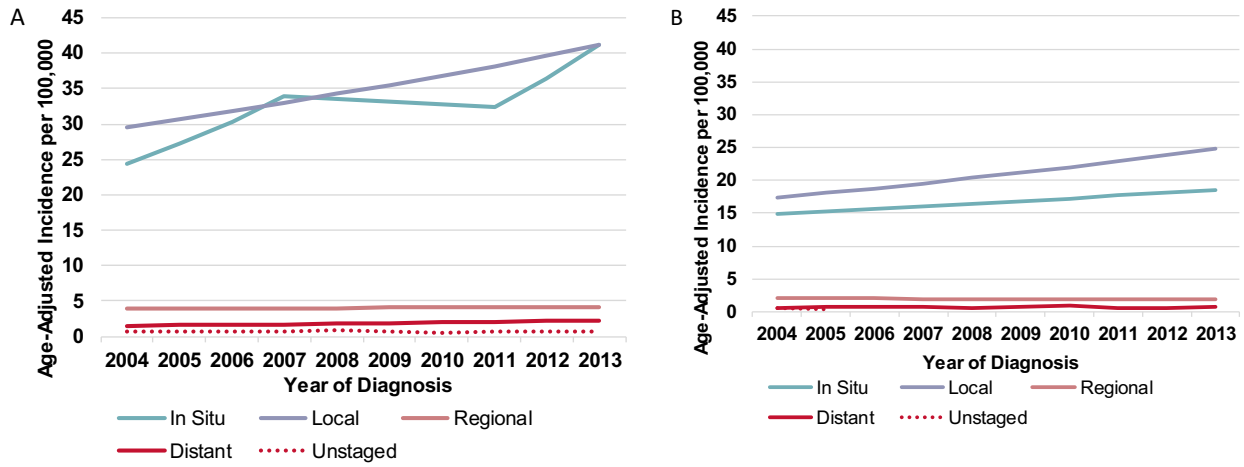

Figure 12. Melanoma of the Skin Incidence Trends by Stage at Diagnosis Among A) Men and B) Women in Utah

3.4 Lung Cancer

As noted in Chapter 2, lung cancer incidence in Utah is markedly lower than other U.S. regions. When examined by ethnicity, it is among non-Hispanic whites that Utah contrasts strongly with other regions (Figure 13), whereas lung cancer incidence in Utah Hispanics is similar to other U.S. regions. Lung cancer incidence has trended downward over the last ten years (Figure 14), with a significant -3.0% annual percent change in other U.S. regions over the period 2008-2013, but less change (-0.7% annual percent change) in Utah's already low incidence. Lung cancer mortality has decreased significantly both in Utah and in other U.S. regions. Lung cancer is more frequent among men than among women, and distant stage is the most common stage at diagnosis for lung cancer (Figure 15). Thus, it is notable that when trends by stage at diagnosis are examined, incidence of distant-stage lung cancer among Utah men is trending downward significantly. There were no significant trends in lung cancer by stage at diagnosis among women.

Both earlier detection and more effective treatment are likely contributing factors to Utah's trend of decreasing lung cancer mortality. Evidence of the first

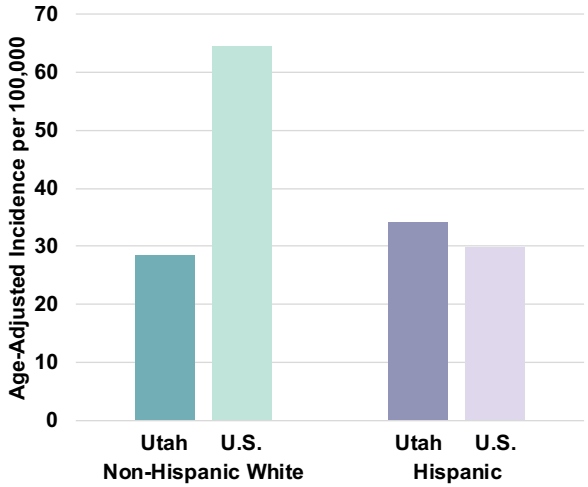

Figure 13. Lung Cancer Incidence by Ethnicity, U.S. and Utah 2013

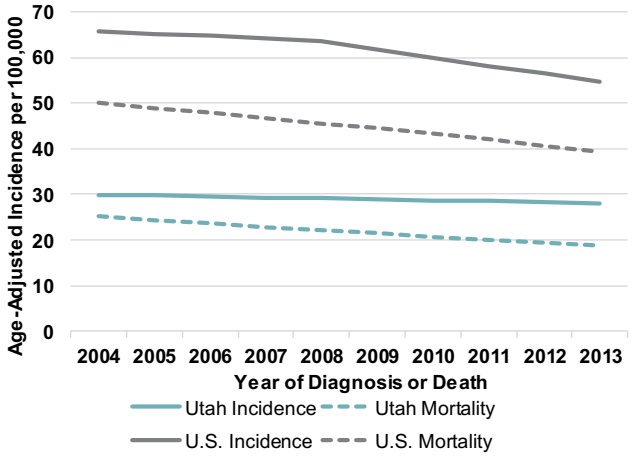

Figure 14. Lung Cancer Incidence and Mortality Trends, U.S. and Utah

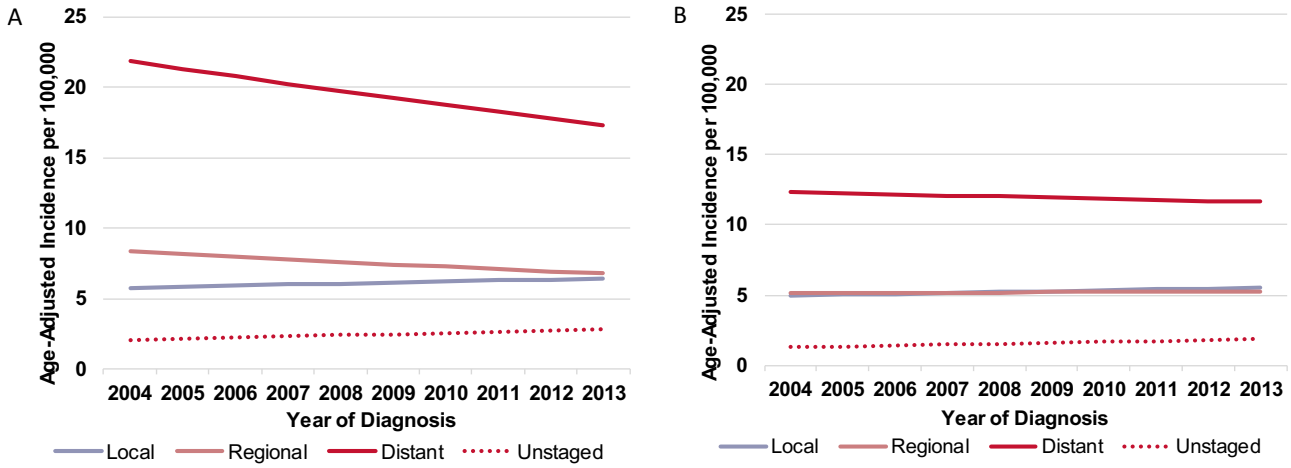

Figure 15. Lung Cancer Incidence Trends by Stage at Diagnosis Among A) Men and B) Women in Utah

effective lung cancer screening approach, using low-dose computed tomography (CT), became available in 2011[27]. CT screening was being used in the community as early as 2010[28], although national organizations did not finalize formal recommendations for implementation of lung cancer CT screening until 2013 and 2014[29,30]. Thus CT screening may contribute to the trends shown in Figures 14 and 15. Continued examination of lung cancer incidence and mortality trends in the future will reveal the full impact of CT screening for lung cancer. More effective and targeted lung cancer treatment regimens may also contribute to decreasing lung cancer mortality.

3.5 Liver Cancer

An increase in liver cancer incidence has been identified as an important cancer trend nationally[31]. Although Utah is among the states with the lowest liver cancer incidence, statistically significant trends of increasing liver cancer incidence (7.3% annual average percent change) and mortality (5.2% annual average percent change) are observed within the state (Figure 16).

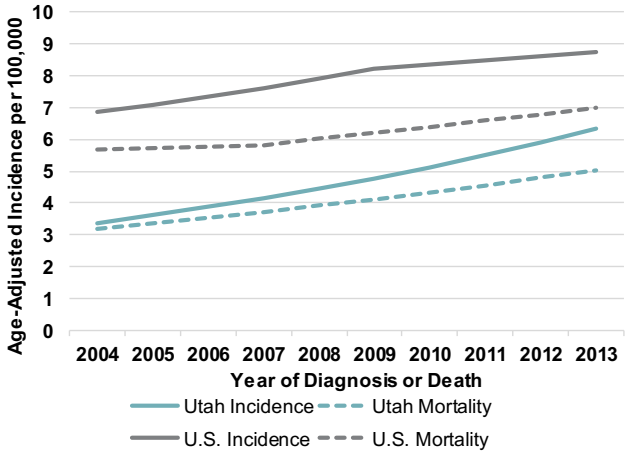

Figure 16. Liver Cancer Incidence and Mortality Trends, U.S. and Utah

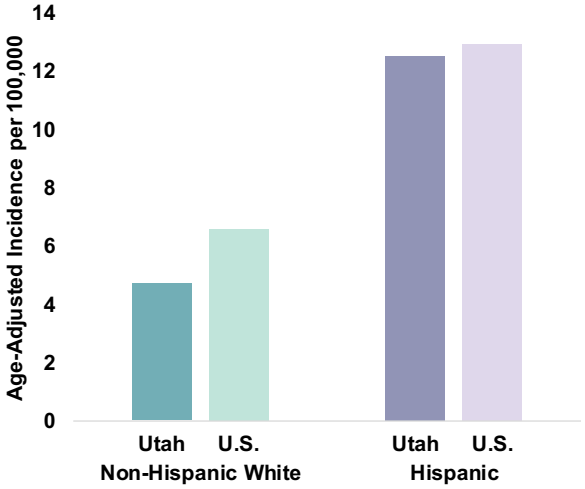

Figure 17. Liver Cancer Incidence by Ethnicity, U.S. and Utah 2013

Chronic infection with hepatitis C virus (HCV) has high prevalence among Americans born in 1945-1965[32]. HCV is believed to be the major contributing factor to the recent increase of liver cancer diagnoses[31].

As in other regions of the U.S., non-Hispanic whites in Utah have a lower incidence of liver cancer than Hispanics (Figure 17). Utah men have higher liver cancer incidence than women, and most of the increase in incidence is observed among men (Figure 18).

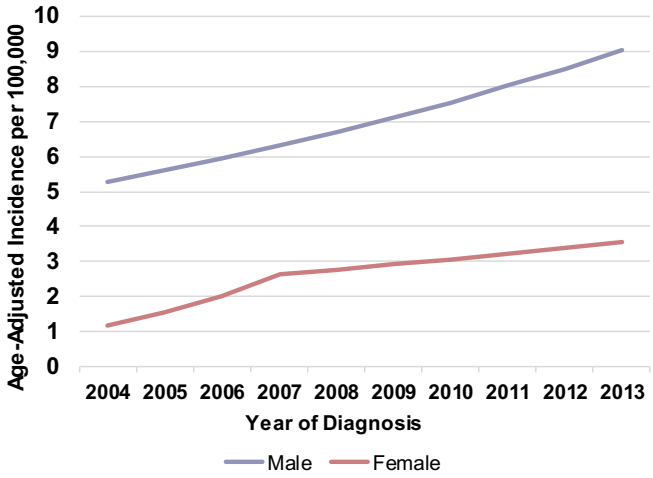

Figure 18. Liver Cancer Incidence Trends by Sex, Utah

Appendix A. Cancer Case Counts, Incidence, and Mortality in Utah, Detailed Tables

Table A1. New Cancer Cases and Deaths from Cancer in Utah by Cancer Site and Sex, 2013[a]

Cancer Site		Males and Females			Females			Males		
		New Cases		Deaths	New Cases		Deaths	New Cases		Deaths
		Invasive	In Situ		Invasive	In Situ		Invasive	In Situ	
All Sites	All Sites	9,473	1,917	2,971	4,622	1,081	1,395	4,851	836	1,576
Oral Cavity and Pharynx	Oral Cavity and Pharynx	195	23	34	57	8	14	138	15	20
Digestive System	Esophagus	83	^	83	15	0	16	68	^	67
	Stomach	114	^	49	47	^	23	67	0	26
	Small Intestine	77	^	~	37	0	^	40	^	^
	Colon and Rectum	760	108	252	346	50	110	414	58	142
	Anus, Anal Canal and Anorectum	40	15	~	27	5	^	13	10	^
	Liver	129	0	91	36	0	34	93	0	57
	Intrahepatic Bile Duct	17	0	35	12	0	16	5	0	19
	Gallbladder	19	^	~	13	^	^	6	0	^
	Other Biliary	29	0	~	12	0	^	17	0	^
	Pancreas	231	^	249	110	^	124	121	0	125
	Retroperitoneum	^	^	~	8	0	^	^	^	0
	Peritoneum, Omentum and Mesentery	^	^	~	11	0	^	^	^	0
	Other Digestive Organs	15	0	~	6	0	^	9	0	^
Respiratory System	Nose, Nasal Cavity and Middle Ear	15	0	~	7	0	^	8	0	^
	Larynx	40	^	~	9	^	^	31	^	^
	Lung and Bronchus	611	^	437	284	^	196	327	0	241
	Pleura	0	0	0	0	0	0	0	0	0
	Trachea, Mediastinum and Other Respiratory	^	^	~	^	^	0	5	0	^
Bones and Joints	Bones and Joints	33	0	~	12	0	^	21	0	^
Soft Tissue including Heart	Soft Tissue including Heart	84	0	32	47	0	10	37	0	22
Skin excluding Basal and Squamous	Melanoma of the Skin	915	691	83	368	234	16	547	457	67
	Other Non-Epithelial Skin	62	0	~	21	0	^	41	0	20
Breast	Breast	1,395	^	~	1,384	306	255	11	^	^
Female Genital System	Uterine Cervix	60	0	22	60	0	22	0	0	0
	Endometrium	341	^	53	341	^	53	0	0	0
	Ovary	134	^	97	134	^	97	0	0	0
	Vagina	9	7	~	9	7	^	0	0	0
	Vulva	27	32	~	27	32	^	0	0	0
	Other Female Genital Organs	12	^	~	12	^	^	0	0	0
Male Genital System	Prostate	1,329	0	193	0	0	0	1,329	0	193
	Testis	98	0	~	0	0	0	98	0	^
	Penis	7	7	~	0	0	0	7	7	^
	Other Male Genital Organs	^	^	0	0	0	0	^	^	0
Urinary System	Urinary Bladder	370	0	85	68	0	21	302	0	64
	Kidney and Renal Pelvis	349	^	74	121	^	26	228	^	48
	Ureter	^	^	~	^	^	0	^	^	^
	Other Urinary Organs	^	^	0	^	^	0	5	0	0
Eye and Orbit	Eye and Orbit	35	^	~	15	^	^	20	^	^
Brain and Central Nervous System	Brain and Central Nervous System	173	382	120	80	263	49	93	119	71
Endocrine System	Thyroid	493	0	~	387	0	^	106	0	^
	Other Endocrine including Thymus	14	156	~	8	94	^	6	62	^
Lymphoma	Hodgkin Lymphoma	58	0	~	28	0	^	30	0	^
	Non-Hodgkin Lymphoma	456	0	122	194	0	55	262	0	67
Myeloma	Myeloma	114	0	86	56	0	37	58	0	49
Leukemia	Leukemia	340	^	143	139	5	66	201	^	77
Miscellaneous	Miscellaneous	124	143	239	63	58	95	61	85	144

[a] Data Source: SEER*Stat Database: Incidence - SEER 18 Registries Research Data

^ Statistic suppressed due to small cell size (<5 cases) or allows inference of a small cell

~ Statistic suppressed due to small cell size (<10 deaths) or allows inference of a small cell

Table A2. Cancer Incidence and Mortality Rates by Cancer Site in Utah and Other U.S. Regions, 2009-2013[a]

Cancer Site		Incidence per 100,000 Population						Mortality per 100,000 Population					
		Utah		U.S.[b]		Percent Diff.[e]	95% CI[d]	Utah		U.S.[b]		Percent Diff.[e]	95% CI[d]
		Rate[c]	95% CI[d]	Rate[c]	95% CI[d]			Rate[c]	95% CI[d]	Rate[d]	95% CI[e]		
All Sites	All Sites	477.9	(473.9,482.0)	515.1	(514.4,515.7)	-7.2%	(-8.0%,-6.4%)	128.1	(125.9,130.3)	162.5	(162.1,162.8)	-21.2%	(-22.3%,-20.0%)
Oral Cavity and Pharynx	Oral Cavity and Pharynx	8.7	(8.2,9.3)	11.5	(11.4,11.6)	-24.4%	(-28.4%,-20.1%)	1.6	(1.4,1.9)	2.4	(2.4,2.5)	-33.6%	(-41.3%,-24.9%)
Digestive System	Esophagus	3.2	(2.9,3.6)	4.4	(4.3,4.4)	-25.9%	(-32.3%,-18.9%)	3.1	(2.8,3.4)	3.8	(3.8,3.9)	-18.7%	(-26.2%,-10.4%)
	Stomach	4.6	(4.2,5.0)	7.5	(7.5,7.6)	-39.4%	(-43.5%,-35.1%)	2.1	(1.8,2.4)	3.7	(3.7,3.8)	-44.1%	(-49.4%,-38.2%)
	Small Intestine	2.8	(2.5,3.2)	2.2	(2.2,2.3)	27.9%	(12.8%,45.1%)	0.3	(0.2,0.4)	0.4	(0.3,0.4)	-29.2%	(-48.8%,-2.0%)
	Colon and Rectum	34.0	(32.9,35.1)	43.0	(42.8,43.2)	-20.9%	(-23.1%,-18.6%)	11.5	(10.9,12.2)	14.7	(14.6,14.8)	-21.7%	(-25.6%,-17.7%)
	Anus, Anal Canal and Anorectum	1.7	(1.5,1.9)	2.8	(2.8,2.9)	-40.0%	(-46.2%,-33.0%)	0.2	(0.1,0.3)	0.2	(0.2,0.3)	-34.6%	(-54.9%,-5.0%)
	Liver	4.7	(4.4,5.2)	7.6	(7.5,7.7)	-37.6%	(-41.6%,-33.2%)	3.3	(3.0,3.7)	5.1	(5.1,5.2)	-35.6%	(-40.7%,-30.0%)
	Intrahepatic Bile Duct	0.9	(0.7,1.1)	0.9	(0.8,0.9)	-1.2%	(-19.3%,21.0%)	1.3	(1.1,1.5)	1.5	(1.5,1.5)	-15.6%	(-27.9%,-1.3%)
	Gallbladder	1.0	(0.8,1.2)	1.2	(1.2,1.3)	-20.6%	(-33.3%,-5.5%)	0.4	(0.3,0.5)	0.6	(0.6,0.6)	-35.4%	(-49.6%,-17.2%)
	Other Biliary	1.4	(1.2,1.6)	1.9	(1.9,2.0)	-28.8%	(-38.0%,-18.3%)	0.4	(0.3,0.6)	0.4	(0.4,0.4)	0.8%	(-25.5%,36.4%)
	Pancreas	11.0	(10.4,11.6)	12.5	(12.4,12.6)	-12.3%	(-16.9%,-7.4%)	9.8	(9.2,10.4)	10.8	(10.8,10.9)	-9.5%	(-14.6%,-4.0%)
	Retroperitoneum	0.5	(0.4,0.7)	0.4	(0.4,0.4)	37.5%	(1.9%,85.5%)	~	(~,~)	0.1	(0.1,0.1)	~	(~,~)
	Peritoneum, Omentum and Mesentery	0.6	(0.4,0.7)	0.6	(0.5,0.6)	-2.9%	(-24.3%,24.4%)	0.2	(0.1,0.3)	0.2	(0.2,0.3)	-19.2%	(-45.5%,19.6%)
	Other Digestive Organs	0.4	(0.3,0.6)	0.6	(0.6,0.6)	-29.3%	(-44.5%,-9.9%)	0.3	(0.2,0.4)	0.3	(0.3,0.3)	-12.0%	(-37.3%,23.4%)
Respiratory System	Nose, Nasal Cavity and Middle Ear	0.6	(0.5,0.7)	0.7	(0.7,0.7)	-17.0%	(-33.3%,3.3%)	~	(~,~)	0.1	(0.1,0.2)	~	(~,~)
	Larynx	1.8	(1.6,2.1)	3.5	(3.4,3.5)	-46.7%	(-51.8%,-41.1%)	0.3	(0.2,0.5)	1.0	(0.9,1.0)	-64.2%	(-70.4%,-56.7%)
	Lung and Bronchus	28.9	(27.9,29.9)	58.1	(57.9,58.4)	-50.3%	(-51.6%,-49.1%)	20.3	(19.5,21.2)	41.8	(41.6,42.0)	-51.4%	(-52.8%,-49.9%)
	Pleura	0.0	(0.0,0.1)	0.0	(0.0,0.0)	-37.8%	(-79.4%,87.1%)	~	(~,~)	0.1	(0.1,0.1)	~	(~,~)
	Trachea, Mediastinum and Other Respiratory	0.2	(0.1,0.3)	0.2	(0.2,0.2)	-9.6%	(-40.8%,38.1%)	~	(~,~)	0.1	(0.1,0.1)	~	(~,~)
Bones and Joints	Bones and Joints	1.2	(1.0,1.4)	0.9	(0.9,0.9)	31.5%	(9.6%,57.6%)	0.4	(0.3,0.5)	0.4	(0.4,0.5)	-17.2%	(-36.7%,8.4%)
Soft Tissue including Heart	Soft Tissue including Heart	3.4	(3.1,3.8)	3.4	(3.3,3.4)	1.2%	(-8.4%,11.9%)	1.3	(1.1,1.5)	1.3	(1.3,1.3)	0.9%	(-14.3%,18.8%)
Skin excluding Basal and Squamous	Melanoma of the Skin	59.6	(58.1,61.0)	38.4	(38.2,38.6)	55.1%	(50.5%,59.8%)	3.7	(3.4,4.1)	2.6	(2.5,2.6)	46.0%	(29.8%,64.2%)
	Other Non-Epithelial Skin	2.7	(2.4,3.0)	2.0	(2.0,2.1)	33.0%	(16.4%,52.0%)	0.9	(0.7,1.1)	0.9	(0.9,0.9)	-2.6%	(-20.5%,19.3%)
Breast	Breast (Female)	136.8	(133.8,139.8)	157.0	(156.5,157.5)	-12.9%	(-14.7%,-11.0%)	20.7	(19.6,21.9)	21.5	(21.3,21.6)	-3.3%	(-8.6%,2.2%)
	Breast (Male)	1.2	(1.0,1.6)	1.3	(1.3,1.4)	-5.5%	(-25.9%,20.5%)	0.2	(0.1,0.4)	0.3	(0.3,0.3)	-10.1%	(-47.4%,53.7%)
Female Genital System	Uterine Cervix	5.2	(4.6,5.8)	7.5	(7.4,7.7)	-31.0%	(-37.2%,-24.1%)	1.4	(1.1,1.8)	2.3	(2.2,2.4)	-37.9%	(-47.6%,-26.3%)
	Endometrium	25.9	(24.6,27.2)	25.6	(25.4,25.8)	1.1%	(-3.9%,6.3%)	4.1	(3.6,4.6)	4.4	(4.3,4.5)	-6.9%	(-17.8%,5.4%)
	Ovary	11.4	(10.6,12.3)	12.0	(11.8,12.1)	-4.5%	(-11.4%,2.9%)	7.2	(6.5,7.9)	7.5	(7.4,7.6)	-4.8%	(-13.5%,4.7%)
	Vagina	1.1	(0.9,1.4)	1.5	(1.4,1.5)	-23.9%	(-38.2%,-6.2%)	~	(~,~)	0.2	(0.2,0.3)	~	(~,~)
	Vulva	4.5	(4.0,5.1)	6.5	(6.4,6.6)	-30.6%	(-37.4%,-23.2%)	0.2	(0.1,0.4)	0.5	(0.4,0.5)	-51.1%	(-66.7%,-28.3%)
	Other Female Genital Organs	1.0	(0.8,1.3)	1.2	(1.1,1.2)	-13.6%	(-31.6%,9.3%)	0.2	(0.1,0.4)	0.2	(0.2,0.3)	-11.7%	(-47.7%,49.0%)
Male Genital System	Prostate	144.4	(141.2,147.7)	129.1	(128.6,129.6)	11.9%	(9.2%,14.7%)	22.3	(20.9,23.8)	20.6	(20.4,20.8)	8.5%	(1.5%,16.1%)
	Testis	6.9	(6.3,7.6)	5.6	(5.5,5.7)	23.4%	(11.4%,36.7%)	0.2	(0.1,0.3)	0.3	(0.3,0.3)	-31.6%	(-57.0%,8.7%)
	Penis	1.3	(1.0,1.6)	1.4	(1.3,1.4)	-7.6%	(-26.8%,16.7%)	~	(~,~)	0.2	(0.1,0.2)	~	(~,~)
	Other Male Genital Organs	0.3	(0.2,0.5)	0.3	(0.3,0.4)	-12.1%	(-45.7%,42.3%)	0.0	(0.0,0.1)	0.0	(0.0,0.0)	-100.0%	(~,~)
Urinary System	Urinary Bladder	16.9	(16.1,17.7)	20.1	(20.0,20.3)	-16.2%	(-19.8%,-12.5%)	4.0	(3.6,4.4)	4.3	(4.2,4.4)	-8.1%	(-16.4%,1.1%)
	Kidney and Renal Pelvis	13.6	(12.9,14.3)	16.0	(15.9,16.1)	-15.0%	(-18.9%,-10.9%)	3.6	(3.2,4.0)	3.7	(3.6,3.8)	-3.4%	(-12.6%,6.8%)
	Ureter	0.7	(0.5,0.8)	0.8	(0.8,0.8)	-17.0%	(-33.2%,3.1%)	0.1	(0.1,0.2)	0.1	(0.1,0.1)	8.8%	(-40.2%,98.2%)
	Other Urinary Organs	0.4	(0.3,0.5)	0.4	(0.4,0.5)	-9.8%	(-33.0%,21.4%)	~	(~,~)	0.1	(0.1,0.1)	~	(~,~)
Eye and Orbit	Eye and Orbit	1.3	(1.1,1.5)	1.0	(0.9,1.0)	31.5%	(8.9%,58.8%)	0.1	(0.1,0.2)	0.1	(0.1,0.1)	23.2%	(-35.1%,133.8%)
Brain and Central Nervous System	Brain and Central Nervous System	21.3	(20.5,22.2)	18.0	(17.9,18.2)	18.3%	(13.3%,23.5%)	4.3	(4.0,4.7)	4.2	(4.2,4.3)	2.3%	(-6.5%,11.9%)
Endocrine System	Thyroid	19.0	(18.3,19.8)	13.7	(13.6,13.9)	38.5%	(31.9%,45.4%)	0.5	(0.4,0.6)	0.5	(0.5,0.5)	-5.7%	(-27.9%,23.5%)
	Other Endocrine including Thymus	6.7	(6.2,7.2)	4.9	(4.9,5.0)	35.2%	(24.7%,46.6%)	0.3	(0.2,0.4)	0.3	(0.3,0.3)	-9.6%	(-36.8%,29.2%)
Lymphoma	Hodgkin Lymphoma	2.6	(2.3,2.8)	2.6	(2.6,2.7)	-2.4%	(-12.4%,8.9%)	0.3	(0.2,0.4)	0.4	(0.3,0.4)	-25.0%	(-45.7%,3.8%)
	Non-Hodgkin Lymphoma	18.9	(18.1,19.7)	19.5	(19.4,19.7)	-3.4%	(-7.5%,0.9%)	5.7	(5.2,6.2)	5.9	(5.8,5.9)	-2.9%	(-10.4%,5.3%)
Myeloma	Myeloma	6.2	(5.8,6.7)	6.5	(6.4,6.6)	-3.7%	(-10.7%,3.8%)	3.5	(3.1,3.9)	3.2	(3.2,3.3)	7.6%	(-3.5%,20.0%)
Leukemia	Leukemia	13.6	(12.9,14.3)	13.7	(13.6,13.8)	-0.5%	(-5.4%,4.6%)	5.9	(5.4,6.4)	6.6	(6.6,6.7)	-11.0%	(-17.5%,-4.1%)
Miscellaneous	Miscellaneous	12.6	(12.0,13.3)	16.5	(16.4,16.6)	-23.5%	(-27.1%,-19.8%)	10.5	(9.9,11.1)	11.6	(11.5,11.7)	-10.2%	(-15.1%,-4.9%)

[a] Data Source: SEER*Stat Database: Incidence - SEER 18 Registries Research Data
[b] U.S. Regions contributing data are 18 registries participating in the SEER program; values shown here are calculated after excluding Utah
[c] Rate per 100,000 population per year
[d] CI: confidence interval
[e] Percent difference comparing Utah to other U.S. SEER Regions; calculated as rate ratio minus one.
~ Statistic suppressed due to small cell size (<10 deaths) or allows inference of a small cell

Table A3. Cancer Incidence and Mortality Rates among Females in Utah and Other U.S. Regions, 2009-2013[a]

Cancer Site		Incidence per 100,000 Population						Mortality per 100,000 Population					
		Utah		U.S.[b]		Percent Diff.[e]	95% CI[d]	Utah		U.S.[b]		Percent Diff.[e]	95% CI[d]
		Rate[c]	95% CI[d]	Rate[c]	95% CI[d]			Rate[c]	95% CI[d]	Rate[d]	95% CI[e]		
All Sites	All Sites	443.5	(438.1,448.9)	490.1	(489.2,491.0)	-9.5%	(-10.6%,-8.4%)	109.8	(107.1,112.5)	139.5	(139.0,139.9)	-21.3%	(-23.0%,-19.5%)
Oral Cavity and Pharynx	Oral Cavity and Pharynx	5.3	(4.7,5.9)	6.5	(6.4,6.6)	-18.2%	(-26.1%,-9.4%)	1.2	(0.9,1.5)	1.3	(1.3,1.4)	-9.7%	(-28.1%,13.3%)
Digestive System	Esophagus	1.0	(0.8,1.3)	1.8	(1.7,1.8)	-42.9%	(-53.1%,-30.4%)	1.1	(0.8,1.3)	1.5	(1.4,1.5)	-27.7%	(-41.8%,-10.3%)
	Stomach	3.3	(2.8,3.8)	5.4	(5.3,5.5)	-39.5%	(-45.9%,-32.4%)	1.4	(1.1,1.8)	2.7	(2.7,2.8)	-48.1%	(-55.5%,-39.3%)
	Small Intestine	2.4	(2.0,2.8)	2.0	(1.9,2.0)	21.6%	(1.1%,46.2%)	0.2	(0.1,0.3)	0.3	(0.3,0.3)	-35.5%	(-60.2%,4.6%)
	Colon and Rectum	30.1	(28.7,31.5)	37.6	(37.4,37.8)	-20.0%	(-23.3%,-16.5%)	10.1	(9.3,10.9)	12.4	(12.3,12.6)	-19.1%	(-24.9%,-12.9%)
	Anus, Anal Canal and Anorectum	1.9	(1.5,2.2)	2.6	(2.6,2.7)	-29.0%	(-39.4%,-17.0%)	0.2	(0.1,0.3)	0.3	(0.3,0.3)	-41.8%	(-64.0%,-5.9%)
	Liver	2.4	(2.0,2.8)	3.7	(3.6,3.7)	-34.3%	(-42.6%,-24.7%)	2.1	(1.7,2.5)	2.6	(2.6,2.7)	-21.6%	(-33.4%,-7.8%)
	Intrahepatic Bile Duct	0.8	(0.6,1.1)	0.8	(0.7,0.8)	4.3%	(-22.3%,39.8%)	1.2	(0.9,1.5)	1.3	(1.3,1.4)	-12.2%	(-30.1%,10.3%)
	Gallbladder	1.2	(0.9,1.5)	1.5	(1.4,1.5)	-18.5%	(-34.3%,1.3%)	0.5	(0.3,0.7)	0.7	(0.7,0.8)	-30.2%	(-48.8%,-4.8%)
	Other Biliary	1.3	(1.0,1.6)	1.6	(1.5,1.6)	-18.8%	(-34.0%,0.0%)	0.5	(0.3,0.7)	0.4	(0.4,0.4)	30.4%	(-14.5%,98.8%)
	Pancreas	9.7	(9.0,10.6)	11.1	(11.0,11.3)	-12.5%	(-19.1%,-5.4%)	8.6	(7.9,9.4)	9.6	(9.5,9.7)	-10.1%	(-17.4%,-2.2%)
	Retroperitoneum	0.5	(0.3,0.7)	0.4	(0.3,0.4)	42.6%	(-6.5%,117.3%)	~	(~,~)	0.1	(0.0,0.1)	~	(~,~)
	Peritoneum, Omentum and Mesentery	1.0	(0.7,1.3)	1.0	(0.9,1.0)	1.5%	(-21.8%,31.8%)	0.3	(0.2,0.5)	0.4	(0.3,0.4)	-16.2%	(-45.6%,29.0%)
	Other Digestive Organs	0.3	(0.2,0.5)	0.5	(0.5,0.6)	-40.0%	(-58.0%,-14.4%)	0.2	(0.1,0.3)	0.2	(0.2,0.3)	-23.8%	(-54.9%,28.8%)
Respiratory System	Nose, Nasal Cavity and Middle Ear	0.5	(0.3,0.7)	0.5	(0.5,0.5)	-7.5%	(-35.4%,32.5%)	~	(~,~)	0.1	(0.1,0.1)	~	(~,~)
	Larynx	0.8	(0.6,1.1)	1.3	(1.2,1.3)	-37.1%	(-50.3%,-20.5%)	~	(~,~)	0.4	(0.3,0.4)	~	(~,~)
	Lung and Bronchus	24.3	(23.1,25.6)	50.1	(49.8,50.4)	-51.5%	(-53.2%,-49.6%)	15.8	(14.8,16.9)	34.3	(34.1,34.5)	-53.8%	(-55.8%,-51.7%)
	Pleura	0.0	(0.0,0.1)	0.0	(0.0,0.0)	-23.3%	(-86.5%,336.3%)	0.0	(0.0,0.1)	0.0	(0.0,0.0)	-100.0%	(~,~)
	Trachea, Mediastinum and Other Respiratory	0.1	(0.0,0.2)	0.1	(0.1,0.1)	-26.7%	(-66.6%,60.7%)	~	(~,~)	0.0	(0.0,0.1)	~	(~,~)
Bones and Joints	Bones and Joints	0.7	(0.5,0.9)	0.8	(0.8,0.8)	-13.6%	(-33.8%,12.7%)	0.2	(0.1,0.4)	0.3	(0.3,0.3)	-25.3%	(-51.0%,13.9%)
Soft Tissue including Heart	Soft Tissue including Heart	2.9	(2.5,3.3)	2.9	(2.8,2.9)	0.3%	(-13.6%,16.5%)	1.1	(0.8,1.3)	1.1	(1.1,1.2)	-7.9%	(-27.3%,16.9%)
Skin excluding Basal and Squamous	Melanoma of the Skin	43.3	(41.6,45.0)	30.0	(29.8,30.2)	44.4%	(37.8%,51.3%)	1.9	(1.6,2.3)	1.6	(1.5,1.6)	21.3%	(-1.1%,48.8%)
	Other Non-Epithelial Skin	2.1	(1.7,2.5)	1.4	(1.4,1.5)	44.5%	(16.7%,79.1%)	0.3	(0.2,0.4)	0.4	(0.4,0.4)	-33.1%	(-55.5%,0.6%)
Breast	Breast (Female)	136.8	(133.8,139.8)	157.0	(156.5,157.5)	-12.9%	(-14.7%,-11.0%)	20.7	(19.6,21.9)	21.5	(21.3,21.6)	-3.3%	(-8.6%,2.2%)
Female Genital System	Uterine Cervix	5.2	(4.6,5.8)	7.5	(7.4,7.7)	-31.0%	(-37.2%,-24.1%)	1.4	(1.1,1.8)	2.3	(2.2,2.4)	-37.9%	(-47.6%,-26.3%)
	Endometrium	25.9	(24.6,27.2)	25.6	(25.4,25.8)	1.1%	(-3.9%,6.3%)	4.1	(3.6,4.6)	4.4	(4.3,4.5)	-6.9%	(-17.8%,5.4%)
	Ovary	11.4	(10.6,12.3)	12.0	(11.8,12.1)	-4.5%	(-11.4%,2.9%)	7.2	(6.5,7.9)	7.5	(7.4,7.6)	-4.8%	(-13.5%,4.7%)
	Vagina	1.1	(0.9,1.4)	1.5	(1.4,1.5)	-23.9%	(-38.2%,-6.2%)	~	(~,~)	0.2	(0.2,0.3)	~	(~,~)
	Vulva	4.5	(4.0,5.1)	6.5	(6.4,6.6)	-30.6%	(-37.4%,-23.2%)	0.2	(0.1,0.4)	0.5	(0.4,0.5)	-51.1%	(-66.7%,-28.3%)
	Other Female Genital Organs	1.0	(0.8,1.3)	1.2	(1.1,1.2)	-13.6%	(-31.6%,9.3%)	0.2	(0.1,0.4)	0.2	(0.2,0.3)	-11.7%	(-47.7%,49.0%)
Urinary System	Urinary Bladder	5.8	(5.2,6.5)	8.6	(8.5,8.8)	-32.9%	(-38.6%,-26.6%)	1.8	(1.4,2.2)	2.1	(2.1,2.2)	-16.6%	(-30.5%,-0.1%)
	Kidney and Renal Pelvis	9.8	(9.0,10.6)	11.0	(10.8,11.1)	-10.9%	(-17.6%,-3.7%)	2.3	(2.0,2.8)	2.3	(2.3,2.4)	0.2%	(-15.6%,18.8%)
	Ureter	0.4	(0.3,0.6)	0.5	(0.5,0.6)	-16.3%	(-41.7%,20.0%)	~	(~,~)	0.1	(0.1,0.1)	~	(~,~)
	Other Urinary Organs	0.2	(0.1,0.3)	0.2	(0.2,0.2)	-23.9%	(-56.2%,32.1%)	~	(~,~)	0.1	(0.1,0.1)	~	(~,~)
Eye and Orbit	Eye and Orbit	0.9	(0.7,1.2)	0.8	(0.7,0.8)	20.0%	(-10.1%,60.1%)	~	(~,~)	0.1	(0.1,0.1)	~	(~,~)
Brain and Central Nervous System	Brain and Central Nervous System	24.8	(23.6,26.1)	19.9	(19.7,20.1)	24.9%	(18.0%,32.3%)	3.5	(3.1,4.0)	3.5	(3.4,3.5)	1.5%	(-11.5%,16.5%)
Endocrine System	Thyroid	29.0	(27.6,30.4)	20.4	(20.2,20.6)	42.1%	(34.4%,50.3%)	0.4	(0.3,0.6)	0.5	(0.5,0.6)	-23.7%	(-46.7%,9.3%)
	Other Endocrine including Thymus	7.0	(6.4,7.7)	5.3	(5.2,5.4)	33.0%	(19.4%,48.2%)	0.2	(0.1,0.4)	0.3	(0.2,0.3)	-10.7%	(-47.4%,51.6%)
Lymphoma	Hodgkin Lymphoma	2.4	(2.1,2.9)	2.3	(2.2,2.4)	6.4%	(-9.6%,25.3%)	0.2	(0.1,0.3)	0.3	(0.3,0.3)	-30.6%	(-58.0%,14.6%)
	Non-Hodgkin Lymphoma	15.1	(14.1,16.1)	16.1	(16.0,16.3)	-6.7%	(-12.5%,-0.4%)	4.6	(4.1,5.2)	4.6	(4.5,4.6)	1.3%	(-10.4%,14.5%)
Myeloma	Myeloma	4.7	(4.2,5.3)	5.2	(5.1,5.3)	-8.4%	(-18.3%,2.8%)	2.8	(2.4,3.2)	2.6	(2.5,2.6)	7.6%	(-8.7%,26.9%)
Leukemia	Leukemia	10.6	(9.8,11.4)	10.7	(10.5,10.8)	-0.9%	(-8.3%,7.2%)	4.5	(4.0,5.1)	5.0	(4.9,5.1)	-9.9%	(-19.9%,1.3%)
Miscellaneous	Miscellaneous	10.7	(9.9,11.6)	13.9	(13.8,14.1)	-22.9%	(-28.1%,-17.4%)	8.3	(7.6,9.1)	9.4	(9.3,9.5)	-11.4%	(-18.7%,-3.6%)

[a] Data Source: SEER*Stat Database: Incidence - SEER 18 Registries Research Data

[b] U.S. Regions contributing data are 18 registries participating in the SEER program; values shown here are calculated after excluding Utah

[c] Rate per 100,000 population per year

[d] CI: confidence interval

[e] Percent difference comparing Utah to other U.S. SEER Regions; calculated as rate ratio minus one.

~ Statistic suppressed due to small cell size (<10 deaths) or allows inference of a small cell

Table A4. Cancer Incidence and Mortality Rates among Males in Utah and Other U.S. Regions, 2009-2013[a]

Cancer Site		Incidence per 100,000 Population						Mortality per 100,000 Population					
		Utah		U.S.[b]		Percent Diff.[e]	95% CI[d]	Utah		U.S.[b]		Percent Diff.[e]	95% CI[d]
		Rate[c]	95% CI[d]	Rate[c]	95% CI[d]			Rate[c]	95% CI[d]	Rate[d]	95% CI[e]		
All Sites	All Sites	525.3	(519.1,531.6)	557.4	(556.4,558.5)	-5.8%	(-6.9%,-4.6%)	152.1	(148.6,155.7)	195.0	(194.4,195.6)	-22.0%	(-23.6%,-20.4%)
Oral Cavity and Pharynx	Oral Cavity and Pharynx	12.4	(11.5,13.4)	17.3	(17.1,17.5)	-28.1%	(-32.6%,-23.2%)	2.0	(1.7,2.5)	3.7	(3.6,3.8)	-45.0%	(-52.5%,-36.4%)
Digestive System	Esophagus	5.8	(5.1,6.4)	7.5	(7.4,7.7)	-23.8%	(-31.1%,-15.7%)		(4.8,6.1)	6.7	(6.6,6.9)	-19.1%	(-27.4%,-9.8%)
	Stomach	6.1	(5.4,6.8)	10.3	(10.1,10.4)	-41.0%	(-46.0%,-35.6%)	2.9	(2.4,3.4)	5.0	(4.9,5.1)	-42.4%	(-49.4%,-34.5%)
	Small Intestine	3.4	(2.9,3.9)	2.6	(2.5,2.6)	30.9%	(10.2%,55.6%)	0.3	(0.2,0.5)	0.4	(0.4,0.5)	-28.6%	(-53.4%,9.6%)
	Colon and Rectum	38.5	(36.8,40.2)	49.6	(49.3,49.9)	-22.4%	(-25.4%,-19.3%)	13.0	(12.0,14.1)	17.5	(17.4,17.7)	-25.6%	(-30.5%,-20.4%)
	Anus, Anal Canal and Anorectum	1.5	(1.2,1.8)	3.0	(2.9,3.1)	-50.2%	(-57.3%,-41.9%)	~	(~,~)	0.2	(0.2,0.2)	~	(~,~)
	Liver	7.2	(6.6,8.0)	12.1	(12.0,12.3)	-40.3%	(-44.7%,-35.6%)	4.6	(4.1,5.2)	8.0	(7.9,8.1)	-42.4%	(-47.7%,-36.6%)
	Intrahepatic Bile Duct	0.9	(0.7,1.2)	1.0	(0.9,1.0)	-5.6%	(-28.8%,25.3%)	1.3	(1.0,1.7)	1.7	(1.6,1.8)	-21.0%	(-36.3%,-2.0%)
	Gallbladder	0.7	(0.5,0.9)	0.9	(0.9,0.9)	-23.7%	(-43.1%,2.4%)	0.3	(0.1,0.4)	0.5	(0.4,0.5)	-47.1%	(-64.9%,-20.2%)
	Other Biliary	1.5	(1.2,1.9)	2.4	(2.3,2.5)	-38.1%	(-48.5%,-25.6%)	0.3	(0.2,0.5)	0.5	(0.5,0.5)	-32.1%	(-55.7%,4.0%)
	Pancreas	12.5	(11.5,13.5)	14.2	(14.1,14.4)	-12.4%	(-18.8%,-5.6%)	11.3	(10.3,12.3)	12.4	(12.2,12.5)	-9.0%	(-16.1%,-1.3%)
	Retroperitoneum	0.6	(0.4,0.8)	0.4	(0.4,0.4)	34.1%	(-12.8%,106.4%)	~	(~,~)	0.1	(0.1,0.1)	~	(~,~)
	Peritoneum, Omentum and Mesentery	0.1	(0.0,0.2)	0.1	(0.1,0.1)	-28.3%	(-69.2%,66.8%)	~	(~,~)	0.1	(0.1,0.1)	~	(~,~)
	Other Digestive Organs	0.6	(0.4,0.8)	0.7	(0.7,0.8)	-20.6%	(-43.0%,10.5%)	0.4	(0.2,0.6)	0.4	(0.4,0.4)	-4.5%	(-38.8%,49.2%)
Respiratory System	Nose, Nasal Cavity and Middle Ear	0.7	(0.5,1.0)	0.9	(0.9,1.0)	-22.3%	(-41.2%,2.7%)	~	(~,~)	0.2	(0.2,0.2)	~	(~,~)
	Larynx	3.0	(2.6,3.5)	6.1	(6.0,6.3)	-50.7%	(-55.9%,-45.0%)	0.6	(0.4,0.8)	1.7	(1.7,1.8)	-67.0%	(-73.2%,-59.4%)
	Lung and Bronchus	34.4	(32.8,36.1)	68.9	(68.5,69.3)	-50.0%	(-51.7%,-48.3%)	25.8	(24.4,27.3)	51.8	(51.5,52.2)	-50.2%	(-52.1%,-48.2%)
	Pleura	0.0	(0.0,0.1)	0.0	(0.0,0.1)	-51.0%	(-87.6%,93.8%)	~	(~,~)	0.1	(0.1,0.2)	~	(~,~)
	Trachea, Mediastinum and Other Respiratory	0.3	(0.1,0.4)	0.3	(0.3,0.3)	-5.0%	(-42.1%,56.0%)	~	(~,~)	0.1	(0.1,0.1)	~	(~,~)
Bones and Joints	Bones and Joints	1.7	(1.4,2.1)	1.1	(1.0,1.1)	65.4%	(29.5%,111.2%)	0.5	(0.3,0.7)	0.6	(0.5,0.6)	-15.2%	(-40.0%,19.8%)
Soft Tissue including Heart	Soft Tissue including Heart	4.0	(3.5,4.6)	4.0	(3.9,4.1)	-0.6%	(-13.1%,13.7%)	1.6	(1.3,2.0)	1.5	(1.5,1.6)	7.5%	(-14.2%,34.8%)
Skin excluding Basal and Squamous	Melanoma of the Skin	79.5	(77.0,82.0)	50.1	(49.8,50.5)	58.5%	(52.5%,64.9%)	5.9	(5.2,6.6)	3.8	(3.7,3.9)	54.8%	(34.1%,78.7%)
	Other Non-Epithelial Skin	3.5	(3.0,4.0)	2.8	(2.8,2.9)	22.1%	(3.1%,44.6%)	1.7	(1.3,2.1)	1.6	(1.6,1.7)	2.6%	(-18.6%,29.2%)
Breast	Breast (Male)	1.2	(1.0,1.6)	1.3	(1.3,1.4)	-5.5%	(-25.9%,20.5%)	0.2	(0.1,0.4)	0.3	(0.3,0.3)	-10.1%	(-47.4%,53.7%)
Male Genital System	Prostate	144.4	(141.2,147.7)	129.1	(128.6,129.6)	11.9%	(9.2%,14.7%)	22.3	(20.9,23.8)	20.6	(20.4,20.8)	8.5%	(1.5%,16.1%)
	Testis	6.9	(6.3,7.6)	5.6	(5.5,5.7)	23.4%	(11.4%,36.7%)	0.2	(0.1,0.3)	0.3	(0.3,0.3)	-31.6%	(-57.0%,8.7%)
	Penis	1.3	(1.0,1.6)	1.4	(1.3,1.4)	-7.6%	(-26.8%,16.7%)	~	(~,~)	0.2	(0.1,0.2)	~	(~,~)
	Other Male Genital Organs	0.3	(0.2,0.5)	0.3	(0.3,0.4)	-12.1%	(-45.7%,42.3%)	0.0	(0.0,0.1)	0.0	(0.0,0.0)	-100.0%	(~,~)
Urinary System	Urinary Bladder	30.2	(28.6,31.8)	35.4	(35.2,35.7)	-14.9%	(-18.9%,-10.6%)	6.8	(6.1,7.7)	7.4	(7.3,7.6)	-8.2%	(-17.8%,2.5%)
	Kidney and Renal Pelvis	17.9	(16.8,19.1)	22.0	(21.7,22.2)	-18.4%	(-23.0%,-13.5%)	5.0	(4.4,5.7)	5.4	(5.3,5.5)	-6.8%	(-17.6%,5.5%)
	Ureter	0.9	(0.7,1.2)	1.2	(1.1,1.2)	-20.2%	(-39.0%,4.4%)	~	(~,~)	0.1	(0.1,0.2)	~	(~,~)
	Other Urinary Organs	0.6	(0.4,0.9)	0.7	(0.7,0.8)	-10.6%	(-36.5%,25.9%)	~	(~,~)	0.2	(0.2,0.2)	~	(~,~)
Eye and Orbit	Eye and Orbit	1.7	(1.4,2.1)	1.2	(1.2,1.3)	37.6%	(7.3%,76.5%)	~	(~,~)	0.1	(0.1,0.1)	~	(~,~)
Brain and Central Nervous System	Brain and Central Nervous System	17.6	(16.5,18.7)	15.9	(15.7,16.1)	10.7%	(3.5%,18.3%)	5.3	(4.7,5.9)	5.2	(5.1,5.3)	1.9%	(-9.5%,14.8%)
Endocrine System	Thyroid	9.1	(8.4,9.9)	6.9	(6.8,7.0)	32.8%	(20.2%,46.6%)	0.6	(0.4,0.9)	0.5	(0.5,0.5)	19.4%	(-20.8%,80.1%)
	Other Endocrine including Thymus	6.5	(5.8,7.2)	4.7	(4.6,4.8)	38.0%	(22.1%,55.8%)	0.3	(0.2,0.5)	0.3	(0.3,0.3)	-6.0%	(-42.9%,54.7%)
Lymphoma	Hodgkin Lymphoma	2.7	(2.3,3.1)	3.0	(2.9,3.0)	-10.1%	(-22.3%,4.0%)	0.3	(0.2,0.5)	0.4	(0.4,0.5)	-25.3%	(-50.7%,13.1%)
	Non-Hodgkin Lymphoma	23.4	(22.0,24.7)	23.8	(23.5,24.0)	-1.7%	(-7.2%,4.1%)	7.0	(6.3,7.8)	7.6	(7.4,7.7)	-7.3%	(-16.8%,3.2%)
Myeloma	Myeloma	8.0	(7.2,8.8)	8.2	(8.0,8.3)	-2.7%	(-11.9%,7.5%)	4.3	(3.8,5.0)	4.1	(4.0,4.2)	5.4%	(-8.8%,21.8%)
Leukemia	Leukemia	17.1	(16.0,18.3)	17.5	(17.3,17.7)	-2.3%	(-8.5%,4.4%)	7.6	(6.9,8.5)	8.8	(8.7,9.0)	-13.6%	(-21.7%,-4.7%)
Miscellaneous	Miscellaneous	15.0	(13.9,16.2)	20.1	(19.9,20.3)	-25.3%	(-30.0%,-20.3%)	13.1	(12.1,14.2)	14.7	(14.5,14.8)	-10.4%	(-17.0%,-3.3%)

[a] Data Source: SEER*Stat Database: Incidence - SEER 18 Registries Research Data

[b] U.S. Regions contributing data are 18 registries participating in the SEER program; values shown here are calculated after excluding Utah

[c] Rate per 100,000 population per year

[d] CI: confidence interval

[e] Percent difference comparing Utah to other U.S. SEER Regions; calculated as rate ratio minus one.

~ Statistic suppressed due to small cell size (<10 deaths) or allows inference of a small cell

Table A5. Cancer Incidence and Mortality Rates among Non-Hispanic Whites in Utah and Other U.S. Regions, 2009-2013[a]

Cancer Site		Incidence per 100,000 Population				Mortality per 100,000 Population			
		Utah		U.S.[b]		Utah		U.S.[b]	
		Rate[c]	95% CI[d]	Rate[c]	95% CI[d]	Rate[c]	95% CI[d]	Rate[c]	95% CI[d]
All Sites	All Sites	484.7	(480.4,489.1)	553.3	(552.4,554.1)	129.4	(127.1,131.7)	170.6	(170.2,171.1)
Oral Cavity and Pharynx	Oral Cavity and Pharynx	8.9	(8.3,9.5)	13.1	(13.0,13.2)	1.6	(1.4,1.9)	2.5	(2.5,2.6)
Digestive System	Esophagus	3.3	(3.0,3.7)	4.9	(4.8,5.0)	3.2	(2.9,3.6)	4.3	(4.3,4.4)
	Stomach	4.0	(3.6,4.4)	5.9	(5.8,6.0)	1.8	(1.6,2.1)	2.7	(2.7,2.8)
	Small Intestine	2.9	(2.6,3.3)	2.3	(2.2,2.3)	0.2	(0.2,0.4)	0.4	(0.3,0.4)
	Colon and Rectum	33.8	(32.7,35.0)	43.0	(42.7,43.2)	11.2	(10.6,11.9)	14.7	(14.6,14.9)
	Anus, Anal Canal and Anorectum	1.7	(1.5,2.0)	3.2	(3.1,3.3)	0.2	(0.1,0.3)	0.3	(0.3,0.3)
	Liver	3.9	(3.5,4.3)	5.8	(5.7,5.9)	2.7	(2.4,3.1)	4.0	(4.0,4.1)
	Intrahepatic Bile Duct	0.8	(0.6,1.0)	0.8	(0.8,0.9)	1.3	(1.0,1.5)	1.4	(1.4,1.4)
	Gallbladder	0.9	(0.7,1.1)	1.0	(1.0,1.0)	0.4	(0.2,0.5)	0.5	(0.5,0.5)
	Other Biliary	1.3	(1.1,1.6)	1.8	(1.7,1.8)	0.4	(0.3,0.6)	0.4	(0.4,0.4)
	Pancreas	10.8	(10.2,11.5)	12.6	(12.5,12.8)	9.8	(9.2,10.5)	11.1	(11.0,11.2)
	Retroperitoneum	0.5	(0.4,0.7)	0.4	(0.4,0.4)	~	(~,~)	0.1	(0.1,0.1)
	Peritoneum, Omentum and Mesentery	0.6	(0.4,0.7)	0.6	(0.6,0.6)	0.2	(0.1,0.3)	0.3	(0.3,0.3)
	Other Digestive Organs	0.4	(0.3,0.6)	0.6	(0.5,0.6)	0.3	(0.2,0.4)	0.3	(0.3,0.3)
Respiratory System	Nose, Nasal Cavity and Middle Ear	0.6	(0.4,0.7)	0.7	(0.7,0.8)	~	(~,~)	0.1	(0.1,0.2)
	Larynx	1.8	(1.6,2.1)	3.8	(3.7,3.8)	0.3	(0.2,0.5)	1.0	(1.0,1.0)
	Lung and Bronchus	28.4	(27.4,29.5)	64.5	(64.2,64.8)	20.6	(19.7,21.5)	46.7	(46.5,46.9)
	Pleura	0.0	(0.0,0.1)	0.0	(0.0,0.0)	~	(~,~)	0.1	(0.1,0.1)
	Trachea, Mediastinum and Other Respiratory	0.2	(0.1,0.3)	0.2	(0.2,0.2)	~	(~,~)	0.1	(0.1,0.1)
Bones and Joints	Bones and Joints	1.2	(1.0,1.5)	1.0	(1.0,1.1)	0.4	(0.3,0.5)	0.5	(0.4,0.5)
Soft Tissue including Heart	Soft Tissue including Heart	3.6	(3.2,4.0)	3.5	(3.4,3.6)	1.4	(1.2,1.6)	1.3	(1.3,1.4)
Skin excluding Basal and Squamous	Melanoma of the Skin	64.7	(63.1,66.3)	53.0	(52.7,53.2)	4.1	(3.7,4.6)	3.5	(3.4,3.6)
	Other Non-Epithelial Skin	2.8	(2.5,3.2)	2.3	(2.2,2.3)	0.9	(0.7,1.1)	1.1	(1.1,1.1)
Breast	Breast (Female)	139.4	(136.2,142.7)	169.1	(168.4,169.8)	21.7	(20.4,23.0)	22.3	(22.1,22.5)
Female Genital System	Uterine Cervix	4.7	(4.2,5.4)	7.1	(6.9,7.2)	1.3	(1.0,1.7)	2.1	(2.0,2.2)
	Endometrium	25.6	(24.2,27.0)	26.8	(26.6,27.1)	3.9	(3.4,4.5)	4.2	(4.1,4.3)
	Ovary	11.6	(10.7,12.6)	12.8	(12.6,13.0)	7.5	(6.7,8.2)	8.2	(8.1,8.4)
	Vagina	1.1	(0.8,1.4)	1.6	(1.5,1.6)	~	(~,~)	0.2	(0.2,0.3)
	Vulva	4.7	(4.1,5.3)	8.0	(7.9,8.2)	0.2	(0.1,0.4)	0.6	(0.5,0.6)
	Other Female Genital Organs	1.0	(0.8,1.3)	1.3	(1.2,1.4)	0.2	(0.1,0.4)	0.3	(0.2,0.3)
Male Genital System	Prostate	144.6	(141.2,148.0)	124.4	(123.9,125.0)	22.6	(21.2,24.1)	19.9	(19.6,20.1)
	Testis	7.4	(6.7,8.2)	7.3	(7.1,7.4)	0.2	(0.1,0.4)	0.3	(0.3,0.3)
	Penis	1.2	(0.9,1.6)	1.4	(1.3,1.4)	~	(~,~)	0.1	(0.1,0.2)
	Other Male Genital Organs	0.2	(0.1,0.4)	0.3	(0.3,0.4)	0.0	(0.0,0.1)	0.0	(0.0,0.0)
Urinary System	Urinary Bladder	17.5	(16.7,18.4)	23.8	(23.6,24.0)	4.1	(3.7,4.5)	4.9	(4.9,5.0)
	Kidney and Renal Pelvis	13.3	(12.6,14.0)	16.7	(16.5,16.9)	3.6	(3.2,3.9)	3.9	(3.8,3.9)
	Ureter	0.7	(0.5,0.8)	0.9	(0.9,1.0)	0.1	(0.1,0.2)	0.1	(0.1,0.1)
	Other Urinary Organs	0.4	(0.3,0.6)	0.5	(0.4,0.5)	~	(~,~)	0.1	(0.1,0.1)
Eye and Orbit	Eye and Orbit	1.3	(1.1,1.6)	1.2	(1.1,1.2)	0.1	(0.1,0.2)	0.1	(0.1,0.1)
Brain and Central Nervous System	Brain and Central Nervous System	22.1	(21.2,23.0)	20.0	(19.9,20.2)	4.6	(4.2,5.0)	5.1	(5.0,5.1)
Endocrine System	Thyroid	19.6	(18.7,20.4)	15.4	(15.2,15.5)	0.5	(0.4,0.7)	0.5	(0.5,0.5)
	Other Endocrine including Thymus	6.4	(6.0,7.0)	4.6	(4.5,4.7)	0.3	(0.2,0.4)	0.3	(0.3,0.3)
Lymphoma	Hodgkin Lymphoma	2.6	(2.3,2.9)	3.1	(3.0,3.1)	0.3	(0.2,0.4)	0.4	(0.3,0.4)
	Non-Hodgkin Lymphoma	19.2	(18.3,20.0)	20.9	(20.8,21.1)	5.9	(5.4,6.4)	6.3	(6.2,6.3)
Myeloma	Myeloma	6.2	(5.7,6.7)	5.9	(5.8,5.9)	3.5	(3.1,3.9)	3.1	(3.0,3.1)
Leukemia	Leukemia	14.0	(13.2,14.7)	14.7	(14.6,14.9)	6.2	(5.7,6.7)	7.1	(7.0,7.2)
Miscellaneous	Miscellaneous	12.4	(11.7,13.1)	17.5	(17.3,17.6)	10.4	(9.7,11.0)	12.4	(12.2,12.5)

[a] Data Source: SEER*Stat Database: Incidence - SEER 18 Registries Research Data
[b] U.S. Regions contributing data are 18 registries participating in the SEER program; values shown here are calculated after excluding Utah
[c] Rate per 100,000 population per year
[d] CI: confidence interval
~ Statistic suppressed due to small cell size (<10 deaths) or allows inference of a small cell

Table A6. Cancer Incidence and Mortality Rates among Hispanics in Utah and Other U.S. Regions, 2009-2013[a]

Cancer Site		Incidence per 100,000 Population				Mortality per 100,000 Population			
		Utah		U.S.[b]		Utah		U.S.[b]	
		Rate[c]	95% CI[d]	Rate[c]	95% CI[d]	Rate[c]	95% CI[d]	Rate[c]	95% CI[d]
All Sites	All Sites	414.5	(398.4,431.1)	381.8	(380.1,383.5)	114.8	(105.4,124.6)	118.8	(117.9,119.8)
Oral Cavity and Pharynx	Oral Cavity and Pharynx	6.6	(4.7,9.0)	6.8	(6.6,7.0)	^	(^,^)	1.5	(1.4,1.6)
Digestive System	Esophagus	2.3	(1.3,3.9)	2.8	(2.7,3.0)	1.8	(0.9,3.1)	2.3	(2.1,2.4)
	Stomach	9.8	(7.3,12.9)	10.7	(10.4,11.0)	5.6	(3.6,8.2)	5.8	(5.6,6.0)
	Small Intestine	3.1	(1.7,5.0)	1.7	(1.5,1.8)	^	(^,^)	0.3	(0.2,0.3)
	Colon and Rectum	35.5	(30.7,40.7)	36.1	(35.6,36.6)	13.6	(10.6,17.1)	11.7	(11.4,12.0)
	Anus, Anal Canal and Anorectum	1.2	(0.5,2.3)	1.9	(1.8,2.0)	^	(^,^)	0.1	(0.1,0.2)
	Liver	11.8	(9.1,14.9)	11.9	(11.6,12.2)	8.0	(5.8,10.8)	7.6	(7.4,7.9)
	Intrahepatic Bile Duct	0.8	(0.2,1.9)	1.1	(1.0,1.2)	^	(^,^)	1.7	(1.6,1.8)
	Gallbladder	1.6	(0.7,3.0)	2.2	(2.1,2.3)	^	(^,^)	1.0	(0.9,1.1)
	Other Biliary	2.1	(1.0,3.7)	2.6	(2.5,2.8)	^	(^,^)	0.6	(0.5,0.6)
	Pancreas	15.4	(12.1,19.2)	11.1	(10.8,11.4)	10.6	(7.9,13.9)	9.0	(8.8,9.3)
	Retroperitoneum	0.7	(0.2,1.7)	0.3	(0.3,0.4)	0.0	(0.0,0.5)	0.1	(0.0,0.1)
	Peritoneum, Omentum and Mesentery	0.4	(0.1,1.2)	0.5	(0.4,0.6)	0.0	(0.0,0.5)	0.2	(0.1,0.2)
	Other Digestive Organs	0.5	(0.1,1.4)	0.7	(0.6,0.8)	^	(^,^)	0.3	(0.2,0.3)
Respiratory System	Nose, Nasal Cavity and Middle Ear	0.9	(0.3,1.9)	0.6	(0.5,0.7)	0.0	(0.0,0.5)	0.1	(0.1,0.2)
	Larynx	1.7	(0.9,3.0)	2.4	(2.2,2.5)	^	(^,^)	0.7	(0.6,0.7)
	Lung and Bronchus	34.2	(29.1,39.7)	29.7	(29.2,30.3)	17.9	(14.3,22.1)	18.7	(18.4,19.1)
	Pleura	0.0	(0.0,0.5)	0.0	(0.0,0.0)	0.0	(0.0,0.5)	0.1	(0.1,0.1)
	Trachea, Mediastinum and Other Respiratory	0.0	(0.0,0.5)	0.2	(0.1,0.2)	0.0	(0.0,0.5)	0.1	(0.0,0.1)
Bones and Joints	Bones and Joints	1.0	(0.5,1.8)	0.8	(0.8,0.9)	^	(^,^)	0.4	(0.3,0.4)
Soft Tissue including Heart	Soft Tissue including Heart	2.3	(1.4,3.5)	3.0	(2.9,3.2)	^	(^,^)	1.1	(1.0,1.2)
Skin excluding Basal and Squamous	Melanoma of the Skin	13.5	(10.7,16.6)	7.2	(6.9,7.4)	^	(^,^)	0.8	(0.7,0.9)
	Other Non-Epithelial Skin	1.8	(0.9,3.4)	1.1	(1.0,1.2)	^	(^,^)	0.4	(0.4,0.5)
Breast	Breast (Female)	116.8	(106.1,128.2)	113.7	(112.6,114.9)	11.2	(7.9,15.3)	14.7	(14.3,15.2)
Female Genital System	Uterine Cervix	7.5	(5.5,10.1)	9.4	(9.1,9.7)	^	(^,^)	2.6	(2.5,2.8)
	Endometrium	25.6	(20.8,31.2)	21.5	(21.0,22.0)	4.5	(2.4,7.5)	3.6	(3.4,3.8)
	Ovary	10.9	(7.8,14.8)	10.6	(10.3,11.0)	6.0	(3.4,9.5)	5.9	(5.6,6.2)
	Vagina	1.7	(0.6,3.6)	1.4	(1.3,1.5)	0.0	(0.0,0.9)	0.2	(0.2,0.3)
	Vulva	2.6	(1.3,4.7)	3.6	(3.4,3.8)	0.0	(0.0,0.9)	0.3	(0.3,0.4)
	Other Female Genital Organs	0.8	(0.3,2.0)	0.9	(0.8,1.0)	0.0	(0.0,0.9)	0.2	(0.1,0.2)
Male Genital System	Prostate	121.4	(107.8,136.0)	106.7	(105.3,108.1)	18.1	(12.2,25.4)	17.7	(17.1,18.3)
	Testis	4.8	(3.6,6.6)	5.0	(4.8,5.2)	^	(^,^)	0.3	(0.3,0.4)
	Penis	3.1	(1.3,6.0)	1.6	(1.4,1.8)	0.0	(0.0,1.1)	0.3	(0.2,0.3)
	Other Male Genital Organs	0.2	(0.0,1.5)	0.3	(0.2,0.3)	0.0	(0.0,1.1)	^	(^,^)
Urinary System	Urinary Bladder	10.0	(7.4,12.9)	11.1	(10.8,11.4)	2.4	(1.1,4.3)	2.4	(2.2,2.5)
	Kidney and Renal Pelvis	17.0	(14.0,20.5)	15.5	(15.2,15.9)	4.7	(3.0,6.9)	3.6	(3.4,3.8)
	Ureter	0.8	(0.2,2.1)	0.4	(0.4,0.5)	0.0	(0.0,0.5)	0.1	(0.0,0.1)
	Other Urinary Organs	0.0	(0.0,0.5)	0.2	(0.2,0.3)	^	(^,^)	0.1	(0.0,0.1)
Eye and Orbit	Eye and Orbit	1.1	(0.4,2.2)	0.7	(0.6,0.8)	0.0	(0.0,0.5)	0.0	(0.0,0.1)
Brain and Central Nervous System	Brain and Central Nervous System	16.9	(14.0,20.2)	13.9	(13.6,14.2)	2.6	(1.6,4.2)	2.9	(2.8,3.1)
Endocrine System	Thyroid	18.7	(16.0,21.7)	11.8	(11.5,12.0)	^	(^,^)	0.6	(0.5,0.7)
	Other Endocrine including Thymus	7.9	(6.2,9.9)	4.8	(4.6,4.9)	^	(^,^)	0.2	(0.2,0.3)
Lymphoma	Hodgkin Lymphoma	2.7	(1.7,4.0)	2.2	(2.1,2.3)	^	(^,^)	0.4	(0.4,0.5)
	Non-Hodgkin Lymphoma	17.7	(14.5,21.5)	17.7	(17.4,18.1)	4.2	(2.6,6.4)	5.3	(5.1,5.5)
Myeloma	Myeloma	6.1	(4.2,8.5)	6.0	(5.8,6.2)	1.9	(0.9,3.5)	2.9	(2.7,3.0)
Leukemia	Leukemia	8.6	(6.5,11.0)	10.7	(10.4,11.0)	2.5	(1.3,4.3)	4.9	(4.7,5.1)
Miscellaneous	Miscellaneous	12.9	(9.9,16.3)	13.3	(12.9,13.6)	10.6	(8.0,13.8)	8.3	(8.0,8.6)

[a] Data Source: SEER*Stat Database: Incidence - SEER 18 Registries Research Data
[b] U.S. Regions contributing data are 18 registries participating in the SEER program; values shown here are calculated after excluding Utah
[c] Rate per 100,000 population per year
[d] CI: confidence interval
~ Statistic suppressed due to small cell size (<10 deaths) or allows inference of a small cell

Table A7. Cancer in Utah Counties: Population and Cancer Counts, 2013[a]

Population Type	County	Population	New Cases	
			Invasive	In Situ
Metropolitan Counties	Box Elder	50,864	191	30
	Cache	117,326	305	66
	Davis	322,754	1,042	234
	Juab	10,327	32	9
	Morgan	10,198	41	11
	Salt Lake	1,080,866	3,653	760
	Tooele	60,718	190	47
	Utah	551,926	1,264	257
	Washington	147,719	735	140
	Weber	238,422	807	172
Micropolitan Counties	Beaver	6,462	35	9
	Carbon	20,931	118	17
	Duchesne	20,106	74	13
	Emery	10,716	43	5
	Grand	9,367	40	^
	Iron	46,706	179	23
	Kane	7,242	41	^
	Millard	12,628	58	10
	San Juan	14,990	48	6
	Sanpete	28,243	86	14
	Sevier	20,844	84	8
	Summit	38,453	151	42
	Uintah	35,690	115	16
	Wasatch	26,563	79	11
Rural Counties	Daggett	1,130	9	0
	Garfield	5,065	22	^
	Piute	1,523	11	^
	Rich	2,276	6	0
	Wayne	2,732	14	6

^ Statistic suppressed due to small cell size (<5 cases) or allows inference of a small cell

[a] Data Source: SEER*Stat Database: Incidence - SEER 18 Registries Research Data

Table A8. Cancer Incidence in Utah by Metropolitan and Non-Metropolitan Counties, 2009-2013[a]

Cancer Site		New Cases, 2013		Incidence per 100,000 Population, 2009-2013			
		Metropolitan	Non-Metropolitan	Metropolitan		Non-Metropolitan	
				Rate[c]	95% CI[d]	Rate[c]	95% CI[d]
All Sites	All Sites	9,986	1,404	481.1	(476.7,485.4)	455.9	(444.8,467.2)
Oral Cavity and Pharynx	Oral Cavity and Pharynx	192	26	8.6	(8.1,9.2)	9.2	(7.7,10.9)
Digestive System	Esophagus	74	11	3.2	(2.9,3.6)	3.4	(2.5,4.5)
	Stomach	104	11	4.6	(4.2,5.0)	4.4	(3.3,5.6)
	Small Intestine	74	^	2.9	(2.6,3.3)	2.5	(1.7,3.4)
	Colon and Rectum	748	120	33.7	(32.6,34.9)	35.9	(32.8,39.2)
	Anus, Anal Canal and Anorectum	51	^	1.8	(1.5,2.0)	1.2	(0.7,1.9)
	Liver	112	17	4.8	(4.4,5.3)	4.4	(3.4,5.6)
	Intrahepatic Bile Duct	13	^	0.9	(0.7,1.1)	0.8	(0.4,1.4)
	Gallbladder	18	^	0.9	(0.7,1.1)	1.3	(0.8,2.1)
	Other Biliary	22	7	1.3	(1.1,1.6)	1.8	(1.2,2.7)
	Pancreas	207	25	11.2	(10.6,11.9)	9.3	(7.8,11.1)
	Retroperitoneum	12	0	0.5	(0.4,0.7)	0.5	(0.2,1.1)
	Peritoneum, Omentum and Mesentery	9	^	0.5	(0.4,0.7)	0.8	(0.4,1.3)
	Other Digestive Organs	14	^	0.5	(0.4,0.6)	0.1	(0.0,0.5)
Respiratory System	Nose, Nasal Cavity and Middle Ear	12	^	0.6	(0.5,0.8)	0.4	(0.2,0.9)
	Larynx	34	10	1.8	(1.5,2.1)	2.2	(1.5,3.1)
	Lung and Bronchus	527	87	28.3	(27.2,29.4)	32.7	(29.8,35.8)
	Pleura	0	0	0.0	(0.0,0.1)	0.0	(0.0,0.3)
	Trachea, Mediastinum and Other	5	^	0.2	(0.1,0.3)	0.2	(0.1,0.6)
Bones and Joints	Bones and Joints	31	^	1.3	(1.1,1.5)	0.7	(0.3,1.3)
Soft Tissue including Heart	Soft Tissue including Heart	75	9	3.5	(3.1,3.9)	2.7	(1.9,3.7)
Skin excluding Basal and Squamous	Melanoma of the Skin	1,423	183	60.3	(58.8,61.9)	54.5	(50.7,58.5)
	Other Non-Epithelial Skin	55	7	2.7	(2.4,3.1)	2.3	(1.6,3.3)
Breast	Breast	1,510	193	138.8	(135.6,142.1)	122.6	(114.6,131.1)
Female Genital System	Uterine Cervix	54	6	5.0	(4.4,5.7)	6.6	(4.8,8.8)
	Endometrium	304	41	25.9	(24.5,27.3)	25.7	(22.2,29.7)
	Ovary	121	14	11.4	(10.5,12.3)	11.8	(9.3,14.6)
	Vagina	10	6	1.1	(0.8,1.4)	1.2	(0.6,2.3)
	Vulva	52	7	4.5	(3.9,5.1)	4.7	(3.2,6.6)
	Other Female Genital Organs	11	^	1.1	(0.8,1.4)	0.9	(0.3,1.9)
Male Genital System	Prostate	1,135	194	147.1	(143.6,150.7)	128.6	(120.4,137.2)
	Testis	90	8	7.0	(6.4,7.7)	6.1	(4.4,8.3)
	Penis	13	^	1.4	(1.0,1.7)	1.0	(0.4,2.0)
	Other Male Genital Organs	^	0	0.3	(0.1,0.5)	0.4	(0.1,1.2)
Urinary System	Urinary Bladder	318	52	16.9	(16.1,17.8)	16.6	(14.5,18.9)
	Kidney and Renal Pelvis	306	49	13.6	(12.8,14.3)	14.0	(12.1,16.1)
	Ureter	13	^	0.7	(0.5,0.9)	0.5	(0.2,1.0)
	Other Urinary Organs	7	0	0.4	(0.3,0.6)	0.3	(0.1,0.7)
Eye and Orbit	Eye and Orbit	31	6	1.2	(1.0,1.5)	1.6	(1.0,2.4)
Brain and Central Nervous	Brain and Central Nervous System	493	62	21.6	(20.7,22.5)	19.2	(16.9,21.6)
Endocrine System	Thyroid	453	40	19.4	(18.6,20.3)	16.0	(14.0,18.3)
	Other Endocrine including Thymus	147	23	6.7	(6.2,7.2)	6.1	(4.8,7.5)
Lymphoma	Hodgkin Lymphoma	55	^	2.5	(2.3,2.9)	2.5	(1.8,3.5)
	Non-Hodgkin Lymphoma	397	59	19.1	(18.2,20.0)	17.5	(15.4,19.8)
Myeloma	Myeloma	100	14	6.2	(5.7,6.8)	6.2	(5.0,7.7)
Leukemia	Leukemia	308	41	13.3	(12.6,14.1)	15.3	(13.4,17.5)
Miscellaneous	Miscellaneous	226	41	12.6	(11.9,13.3)	12.9	(11.1,15.0)

^ Statistic suppressed due to small cell size (<5 cases) or allows inference of a small cell.

[a] Data Source: SEER*Stat Database: Incidence - SEER 18 Registries Research Data

[b] U.S. Regions contributing data are 18 registries participating in the SEER program; values shown here are calculated after excluding Utah

[c] Rate per 100,000 population per year

[d] CI: confidence interval

Appendix B. Data and Methods

B1. Compiling Cancer Surveillance Data

Reports of all newly diagnosed, that is to say incident, cases of reportable neoplasms among Utah residents are collected from health care providers state-wide by the Utah Cancer Registry (UCR) as authorized by the Utah Administrative Code Rule R384-100, the Cancer Reporting Rule[1]. Reportable cancer diagnoses are primary, malignant cancers. Both invasive and in situ tumors are reportable, except in-situ cervical cancers. Basal cell and squamous cell carcinomas of the skin are excluded from reporting. Benign tumors are reportable only if occurring in the central nervous system. Cancer case reports received from providers are consolidated, edited, and reviewed for quality assurance by the UCR staff. Annually, UCR and 17 other registries that participate in the U.S. National Cancer Institute Surveillance, Epidemiology, and End Results (SEER) Program submit de-identified data that become the SEER public-use data set[33]. The 18 SEER registries represent approximately 28% of the US population. Because of the time needed to receive reports from providers and to compile, edit, and quality assure cancer case data, there is a delay of over two years between the end of the calendar year of cancer diagnoses and the data becoming available in the public use data set. Therefore, this report is based on cancer diagnoses through the end of 2013.

B2. Data Accessed for this Report

Data describing incident cancers and cancer mortality (deaths) were accessed from the SEER dataset[33] using the SEER*Stat statistical software[34]. Cases diagnosed from January 1, 2004 to December 31, 2013 were included. Cancers in this report are grouped following the conventions of the SEER program[35], using primary site and histology codes defined in the International Classification of Diseases for Oncology (ICD-O), Third Edition[36].

Mortality data are provided to SEER by the National Center for Health Statistics (NCHS) of the U.S. Centers for Disease Control and Prevention (CDC). Mortality data presented in this report were for deaths from January 1, 2004 to December 31, 2013.

The population denominator for cancer incidence and mortality is the current population of the geographic area in the same year as the cancer case diagnosis or death. The population counts are provided for SEER by the U.S. Census Bureau's Population Estimates Program, in collaboration with the National Center for Health Statistics. These population data are based on the actual Census population from 2010, and estimates for other years.

B3. Statistical Analysis

Counts of incident cancers and cancer mortality were reported for the most recent complete year available, 2013. Counts of incident cases were presented for all reportable cancer diagnoses, both invasive and in situ for most sites, unless otherwise noted, and including benign for central nervous system. Cancer incidence and mortality rates per 100,000 population were calculated in the SEER*Stat statistical software[34]. Cancer incidence rates represent both invasive and in situ for most sites, unless otherwise noted, and benign for central nervous system. Cancer incidence and mortality rates for specific cancer sites were summarized over the five-year period 2009-2013 in order to have sufficient numbers to generate reliable 95% confidence intervals. Incidence and mortality rates were age-adjusted within the SEER*Stat software by calculating incidence for 19 five-year age groups using the regional population denominator and then standardizing to the 2000 U.S. Standard Population.

Incidence and mortality rates were calculated for the population of Utah. For comparisons between Utah other U.S. regions, we calculated incidence and mortality rates for the 17 other SEER registry regions collectively. The SEER 18 regions are estimated to represent 28% of the U.S. population. Percent difference in cancer incidence and mortality between Utah and other U.S. regions was calculated as risk ratio for Utah compared to the other regions minus one.

Incidence and mortality trends were analyzed using JoinPoint analysis, 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[37]. Rates were calculated utilizing SEER*Stat software and analyzed using the JoinPoint Regression Program. The program estimates an annual percent change statistic for each segment and estimates statistical significance of the trend.

Appendix C. Definitions and Abbreviations

Age-adjusted or Age-Standardized
Age-adjustment is applied to allow populations with different age distributions to be compared. Incidence and mortality rates were age-adjusted within the SEER*Stat software by calculating incidence and mortality for 19 five-year age groups using the regional population denominator and then standardizing to the 2000 U.S. Standard Population.

Annual Percent Change or Annual Average Percent Change
The percent increase or decrease in cancer incidence or mortality rates per year over a stated time period. It is calculated by fitting a straight line to the natural logarithm of the incidence or mortality rate for each calendar year.

Benign
A tumor or growth that does not exhibit potential to invade beyond the tissue of origin.

Confidence Interval
The range of possible variation due to chance around an estimate of cancer incidence or mortality. Incidence or mortality may differ between two geographic regions or between two ethnic groups due to chance alone. A value falling outside the 95% confidence interval is unlikely to be explained by chance. Estimates of cancer incidence for rare cancers or for small populations will have wider confidence intervals.

Distant Stage
Cancer that has spread from the original (primary) site to distant organs or distant lymph nodes. Also known as distant metastasis.

Incident or Incidence
Incident disease refers to newly diagnosed disease. Surveillance of cancer is based on incidence, that is to say the number of newly diagnosed or incident cases in a specified year, in a defined population at risk for the disease, in a specified time period.

In situ
Cancer with malignant appearance of the cells, that is to say potential to invade, but the cancerous growth or tumor is confined to the layer of cells in which it began, and has not spread to surrounding tissue.

Invasive
Cancer that has spread beyond the layer of tissue in which it developed and is growing into surrounding tissues. Includes local, regional, and distant stage cancers.

Local Stage
Cancer that is invasive but is confined entirely to the organ in which it began, without evidence of spread.

Malignant
Tumors that have the ability to invade and destroy nearby tissue or to spread to other parts of the body.

Mortality
The occurrence of deaths from a disease. In this report, mortality refers to deaths from cancer, in a specified time period within a defined population.

Neoplasm
An abnormal growth of cells. Neoplasms may be benign or malignant.

Primary

Cancer in the part of the body where the cancer first began. Recurrence of the same cancer or spread of the cancer to another body site is not considered a new cancer and is not counted as a primary cancer for cancer surveillance purposes.

Regional Stage
Cancer that has spread beyond the original (primary) site to nearby lymph nodes or organs and tissues.

SEER
Surveillance, Epidemiology, and End Results Program. The Surveillance, Epidemiology, and End Results (SEER) Program of the National Cancer Institute includes 18 central cancer registries in the United States, covering approximately 28% of the US population, that compile cancer incidence and survival information for defined geographic regions.

Stage
A measure of cancer progression, detailing the degree to which the cancer has advanced. Stage at diagnosis is reported to cancer registries. Stage is based on the size of the tumor, whether lymph nodes contain cancer, and whether the cancer has spread from the original site to other parts of the body.

UCR
Utah Cancer Registry. The Utah Cancer Registry is a population-based, central cancer registry for the state of Utah.

UDOH
Utah Department of Health.

Unstaged
Cancer for which there is not enough information to indicate a stage at diagnosis.

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