Cancer in Utah

Incidence and Mortality Statistics through 2017



A publication of the Utah Cancer Registry

December 2020

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Preface

This biennial report is compiled by the Utah Cancer Registry, Utah's statewide, population-based cancer registry, as part of its activities to disseminate cancer information for the state. The registry collects and manages data used to monitor trends in cancer incidence and mortality, evaluate cancer prevention and control measures, and facilitate cancer research. Utah Cancer Registry performs this cancer surveillance function on behalf of the Utah Department of Health. The registry has been in existence since 1966 and is operated by the University of Utah. Cancer is a reportable disease as stated in Utah Administrative Code Rule R384-100. Reportable cases include in situ and invasive neoplasms (with certain exceptions) as well as benign and borderline malignant brain and other central nervous system tumors.

Cancer surveillance in Utah is possible only with the cooperation of health care providers throughout the state who report cancer case data. We rely on the expertise of hospital tumor registrars who classify and code cases for submission to the registry. We thank these professionals for their contributions to cancer surveillance in Utah.

We acknowledge the U.S. National Cancer Institute's Surveillance, Epidemiology and End Results program (Contract No. HHSN261201800016I), the Centers for Disease Control and Prevention's National Program of Cancer Registries (Cooperative Agreement No. NU58DP0063200), University of Utah Health, and the Huntsman Cancer Institute for support of our surveillance, public health, and research activities.

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Executive Summary

This report provides the most recent cancer surveillance data for the state of Utah. It describes the number of Utahns diagnosed with cancer during 2017, the number of cancer deaths in 2017, age-adjusted cancer incidence rates averaged over the five-year period 2013-2017, and ten-year trends for cancer incidence and mortality.

In 2017, 13,604 new cancers were diagnosed in Utah. The most commonly diagnosed cancer among Utah women was breast cancer, while prostate cancer was the most frequently diagnosed cancer among men (Chapter 1). Melanoma of the skin was the second most common cancer site for both men and women. The overall incidence of cancer among Hispanic/Latino Utahns is lower than the incidence for non-Hispanic white Utah residents. However, incidence of cancers of the liver, stomach, cervix, and kidney and renal pelvis are higher among Hispanic/Latino Utahns than non-Hispanic whites. Black residents have higher incidence of prostate cancer than other racial groups in Utah, and incidence of breast cancer is lower among American Indians and Alaska natives. For most cancer sites, incidence in rural Utah counties is similar to incidence in urban counties. Cancer sites with higher incidence among rural Utah residents include lung cancer and leukemia.

In 2017, 3,160 Utahns died from cancer, making it the second largest cause of death after heart disease. Lung cancer was the leading cause of cancer death, followed by breast and colorectal cancers. Individuals diagnosed with cancer at early stages can expect survival that is similar to those free of cancer, and there were 113,722 cancer survivors in Utah in 2017.

A number of cancer sites exhibit lower incidence and mortality in Utah compared to the remainder of the United States (U.S.) (Chapter 2). The proportion of Utah residents who smoke cigarettes has for many years been lower than in other areas of the country, contributing to lower incidence and mortality from lung cancer and a number of other smoking-related cancers. However, Utah has higher incidence of certain cancers compared to the remainder of the U.S., notably melanoma of the skin. Utah's melanoma incidence increased significantly during the period 2010 through 2017. Utah's melanoma mortality exceeds that of the remainder of the U.S.

This report summarizes incidence and mortality for breast, prostate, colorectal, and HPV-associated cancers, which account for a large part of the state's cancer burden (Chapter 3). Utah's breast cancer incidence is lower than the remainder of the U.S. Non-Hispanic white women in Utah have higher breast cancer incidence and mortality than Hispanic/Latina women. Changing trends in the utilization of prostate-specific antigen (PSA) screening have resulted in declining prostate cancer incidence in the U.S. and Utah, particularly for early stage diagnoses. A majority of prostate cancer diagnoses are made at the local or regional stage. However, incidence of distant stage prostate cancer has increased in Utah over the ten-year period 2008-2017. Colorectal cancer incidence has declined over several decades with the widespread use of screening, and both colorectal cancer incidence and mortality trended significantly downward over the period 2008-2017. However, colorectal cancer incidence among Utahns aged under 50 increased somewhat from 2008 through 2017.

In conclusion, cancer continues to significantly impact the health of Utahns. Because of Utah's historically low prevalence of cigarette smoking, the burden of cancer is somewhat less than in other U.S. states. Variation in incidence of certain cancer sites is apparent across different race/ethnic groups and rural compared to urban locations in Utah. With Utah's high incidence of melanoma, public health messages about sun protection and melanoma awareness are important. The impact of cancer control efforts is evident in the trend of declining mortality from colorectal cancer.

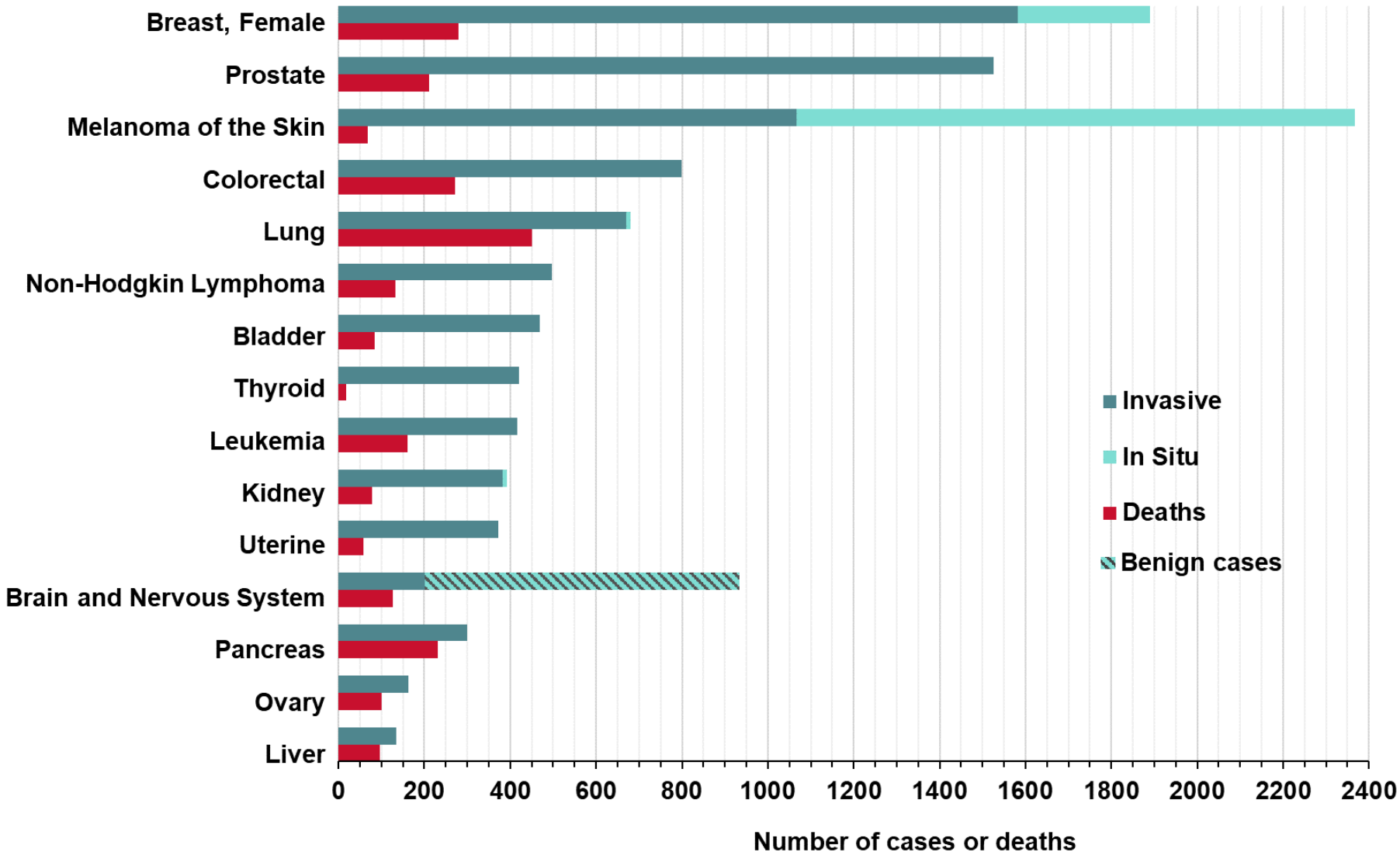


Figure 1.1 Numbers of new cancers and cancer deaths for common sites, Utah 2017

Chapter 1. The Burden of Cancer in Utah

1.1 Cancer diagnoses and deaths in Utah, 2017

In 2017, 13,604 new cancers were diagnosed among Utah residents. Of these, 10,942 were invasive cancers and 2,662 were in situ or benign. The cancer site with the largest number of new invasive cases in 2017 was breast cancer. The other most commonly diagnosed invasive cancers included prostate cancer, melanoma of the skin, colorectal cancer, and lung cancer (Figure 1.1 and Appendix C1). In situ tumors, which are non-invasive and therefore more easily treated, were frequent for melanoma, accounting for over half of the in situ diagnoses, and breast cancer. Tumors that are classified as benign are not reportable to the cancer registry unless they occur in the brain or elsewhere in the central nervous system. In 2017, 732 benign brain and nervous system cases were diagnosed in Utah. Data provided throughout this report include all reportable tumors, i.e. invasive, in situ, and benign brain and central nervous system, except when otherwise noted.

In 2017, 3,160 Utahns died due to cancer. Cancer is the second most common cause of death in Utah, after heart disease,[1] accounting for 17.5% of all deaths in the state.[2] The leading causes of cancer death were lung cancer, breast cancer, colorectal cancer, and pancreatic cancer (Figure 1.1 and Appendix C1). Cancer survival varies considerably by cancer site and is highly dependent upon the stage at which the cancer is diagnosed (Appendix C3). Those diagnosed with cancer at in situ and local stages had overall 95.8% five-year survival relative to comparable-age individuals. On January 1, 2017, there were an estimated 113,722 cancer survivors in the state of Utah. These survivors represented 3.7% of the state's population. There were over 22,000 breast cancer survivors, over 21,000 prostate cancer survivors, and over 17,000 melanoma survivors.

The median age of Utahns in 2017 was 30.9 years, which is younger than in any other state in the U.S.[3] Cancer incidence is highly related to age, with diagnoses being much less frequent among children, adolescents, and young adults than in the older population (Figure 1.2). Utah's relatively young population means that a smaller proportion of individuals are in the older age groups in which cancer diagnoses are more common. In 2017 there were 256 incident cancers among the over 1 million Utahns younger than 20 years of age. Thus residents aged less than 20 years, who represent nearly 33% of Utahns, experience fewer than 2% of cancer diagnoses. Conversely, residents aged 60 and older, who represent only 15% of the Utah population, account for nearly 63% of cancer diagnoses.

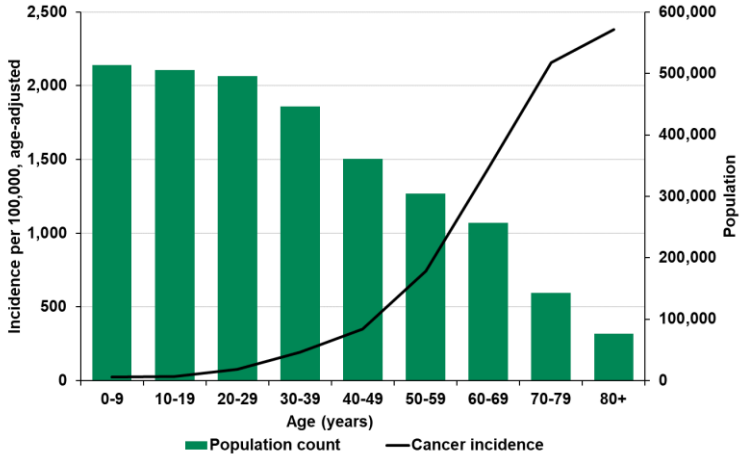


Figure 1.2 Age distribution of the Utah population and cancer incidence by age, 2017

Table 1.1 The ten most commonly diagnosed incident cancers among Utah women

Cancer Type	2017 cases		Incidence Rate[a]	2017 Deaths
	Invasive	In Situ		
Breast	1,582	309	137.0	280
Melanoma of the skin	451	537	59.6	17
Brain and nervous system	85	482[b]	37.0	46
Colorectal	384	0	28.4	129
Uterine	373	0	27.1	58
Thyroid	322	0	27.3	^
Lung	306	^	22.7	201
Non-Hodgkin lymphoma	186	0	14.8	49
Leukemia	173	0	10.6	68
Ovary	163	0	11.3	101

^ Number suppressed due to small cell size.
[a] Incidence rate per 100,000 population per year for all reportable tumors, i.e. invasive, in situ, and benign brain and nervous system. Age-adjusted, for five years 2013-2017.
[b] Includes benign brain and nervous system tumors.

Table 1.2 The ten most commonly diagnosed incident cancers among Utah men

Cancer Type	2017 cases		Incidence Rate[a]	2017 Deaths
	Invasive	In Situ		
Prostate	1,525	0	112.8	212
Melanoma of the skin	616	764	98.6	51
Colorectal	414	0	34.6	143
Bladder	393	0	29.8	63
Brain and nervous system	116	250[b]	24.1	80
Lung	365	0	30.3	250
Non-Hodgkin lymphoma	310	0	23.0	83
Kidney	252	0	19.2	47
Leukemia	243	0	18.5	92
Pancreas	185	0	12.5	141

[a] Incidence rate per 100,000 population per year for all reportable tumors, i.e. invasive, in situ, and benign brain and nervous system. Age-adjusted, for five years 2013-2017.
[b] Includes benign brain and nervous system tumors.

1.2 Cancer in Utah by sex

The most commonly diagnosed cancer sites vary according to sex. In 2017, there were 6,700 cancer diagnoses in Utah women (Appendix C1). Among women in Utah, breast cancer was the most commonly diagnosed cancer, with 1,582 invasive diagnoses and 309 in situ diagnoses, and age-adjusted incidence of 137.0 per 100,000 per year (Table 1.1). Breast cancer comprised 28.2% of all diagnoses among Utah women in 2017. Melanoma of the skin, including 451 invasive and 537 in situ cases, was the second most common cancer diagnosis among women, with age-adjusted incidence of 59.6 per 100,000 per year. The next most commonly diagnosed cancers among Utah women were brain and nervous system, the majority of which were benign, followed by colorectal cancers.

In 2017, 1,478 Utah women died of cancer. There were 280 deaths due to breast cancer, representing 18.9% of all cancer deaths among Utah women. Lung cancer and colorectal cancer were the second and third most common causes of cancer deaths among women, accounting for 13.6% and 8.7% of cancer deaths, respectively. Although melanoma diagnoses were common among Utah women, there were only 17 deaths from melanoma in 2017.

Among Utah men, there were 6,904 cancer diagnoses in 2017. Prostate cancer was the most frequently diagnosed cancer for men, with 1,525 cases and an age-adjusted incidence rate of 112.8 cases per 100,000 per year (Table 1.2). Prostate cancer diagnoses accounted for 22.1% of cancer diagnoses among Utah men in 2017. The second most commonly diagnosed cancer among men was melanoma, with 616 invasive and 764 in situ cases, and an age-adjusted incidence rate of 98.6 cases per 100,000 per year. The third most commonly diagnosed cancer among Utah men was colorectal cancer.

In 2017, 1,682 Utah men died from cancer. While lung cancer was only the fifth most commonly diagnosed cancer among men in Utah, it was the leading cause of cancer death among Utah men, accounting for 14.9% of cancer deaths. The second most common cause of cancer death among Utah men was prostate cancer, representing 12.6% of cancer deaths. Colorectal cancer had the third largest number of deaths among men in the state, accounting for 8.5% of cancer deaths.

Numbers of cancer diagnoses and deaths among Utah men and women for other sites are provided in

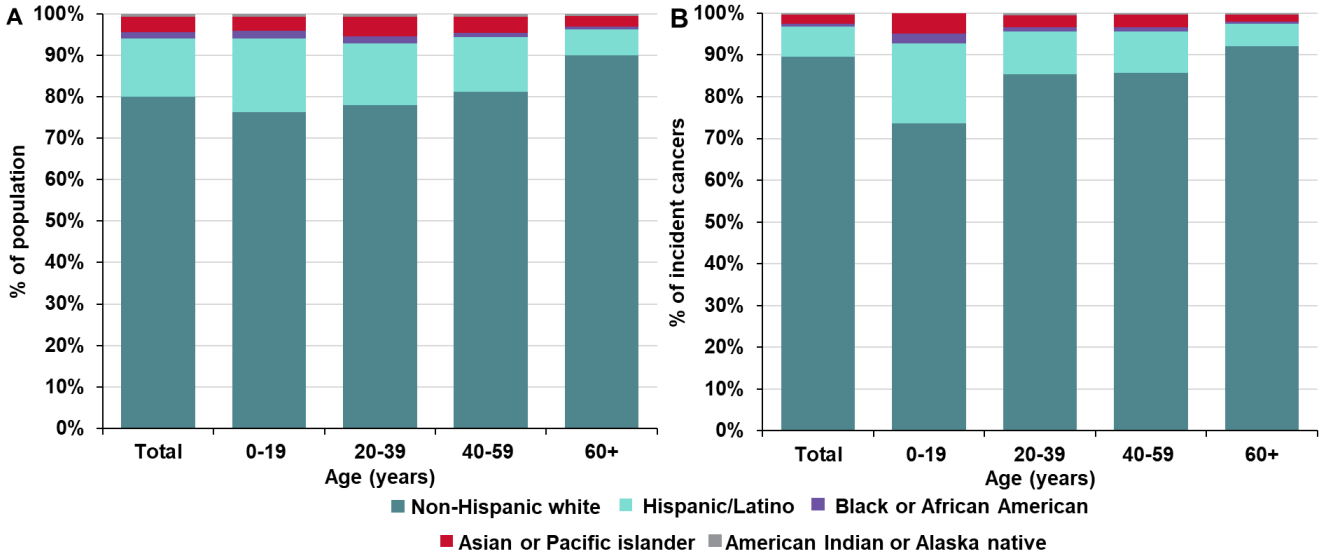


Figure 1.3 Race and Hispanic/Latino ethnicity by age in Utah, 2017 A) total population and B) incident cancer cases

Appendix C1, and incidence and mortality rates by cancer site are in Appendix C2.

1.3 Cancer in Utah by race and ethnicity

A majority of Utah residents are non-Hispanic whites, who were 80.0% of Utah's 2017 population[4] (Figure 1.3 A). Utah's Hispanic/Latino population has been growing rapidly and Hispanics/Latinos of any race comprised 14.0% of Utah's 2017 population. The next largest group in Utah is the Asian and Pacific Islander population, 3.8% of Utahns. Black or African American residents make up 1.4% of the population and American Indian and Alaska Natives represent 0.6%.

The Utah Hispanic/Latino population is younger than the non-Hispanic white population, representing 17.6% of the population younger than age 20 years but only 6.2% of the population ages 60 and older (Figure 1.3 A). With relatively few Hispanics/Latinos in the older age groups that have high cancer incidence rates, only 7.0% of new cancers in the state were diagnosed among Hispanics/Latinos. Hispanics/Latinos account for 18.8% of incident cancer cases aged 19 and younger, but only 5.3% of cases aged 60 and older (Figure 1.3 B). Even when the difference in age distribution is taken into account, Hispanics/Latinos in Utah have lower cancer incidence than non-Hispanic whites; the 2013-2017 age-adjusted cancer incidence rate of 425.7 per 100,000 per year among Utah Hispanics/Latinos was statistically significantly lower than the incidence for Utah non-Hispanic whites (Table 1.3 and Appendix C4). Age-adjusted cancer mortality, 109.1 deaths per 100,000 per year among Hispanics/Latinos, is also statistically significantly lower than the 126.8 per 100,000 per year observed among non-Hispanic whites (Appendix C5).

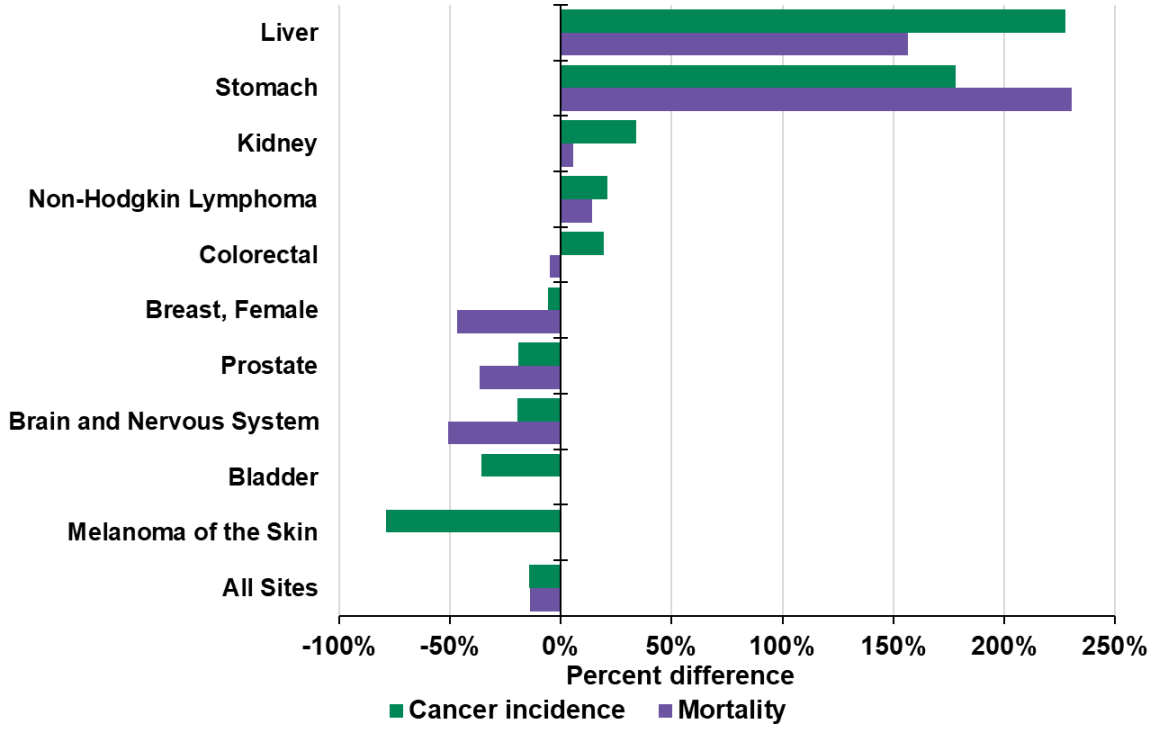


Figure 1.4 Cancer sites with statistically significant differences in age-adjusted incidence or mortality between Hispanics/Latinos and non-Hispanic whites, Utah 2013-2017. Positive percent difference indicates rate higher among Hispanics/Latinos compared to non-Hispanic whites. Negative percent difference indicates lower rate among Hispanics/Latinos.

Table 1.3 Cancer incidence by race and Hispanic/Latino ethnicity in Utah

Race and ethnicity	2017 Cases	Incidence rate[a]
White, non-Hispanic	11,831	496.0
Hispanic/Latino	954	425.7
Black or African American	100	474.7
Asian or Pacific Islander	294	367.7
American Indian or Alaska native	47	293.4

[a] Incidence per 100,000 per year for the period 2013-2017.

When cancer for specific sites is compared between Hispanics/Latinos and non-Hispanic whites in Utah, several differences are noted. Cancer sites with statistically significant differences in incidence or mortality between Utah Hispanics/Latinos and non-Hispanic whites are shown in Figure 1.4. Hispanics/Latinos had significantly lower age-adjusted incidence rates for melanoma, urinary bladder, brain and nervous system, and prostate cancers. Conversely, the 2013 through 2017 incidence rates for liver, stomach, cervical, and kidney and renal pelvis cancers were statistically significantly higher among Hispanics/Latinos compared to non-Hispanic whites. Mortality rates for liver and stomach cancers were also higher among Hispanics/Latinos. Higher incidence of stomach, cervical, and liver cancers among Hispanics/Latinos compared to non-Hispanic whites is consistent with a pattern reported throughout the U.S.[5] Hepatitis C infection, which is known to have high prevalence among Hispanic/Latino immigrants, is thought to contribute to the higher liver cancer incidence among Hispanics/Latinos.[6] Higher stomach cancer incidence in Hispanics/Latinos has been suggested to be related to higher prevalence of H. pylori infection and differences in diet.[5,7] Human papilloma virus (HPV), an important factor influencing cervical cancer incidence, is discussed in Chapter 3.4. Incidence and mortality rates by cancer site for Hispanics/Latinos in Utah are shown in detail in Appendix C4 and Appendix C5.

Utah's residents who are black or African American are another population with an age distribution that is markedly young compared to the state's majority non-Hispanic whites. In contrast to the population aged 0 to 19 years, among whom 1.8% are black, only 0.6% of Utah residents who are ages 60 years and older are black (Figure 1.3 A). Because there are relatively few black individuals in the older age groups that have high cancer incidence, there were only 100 incident cancers reported in black Utahns in 2017 (Table 1.3).

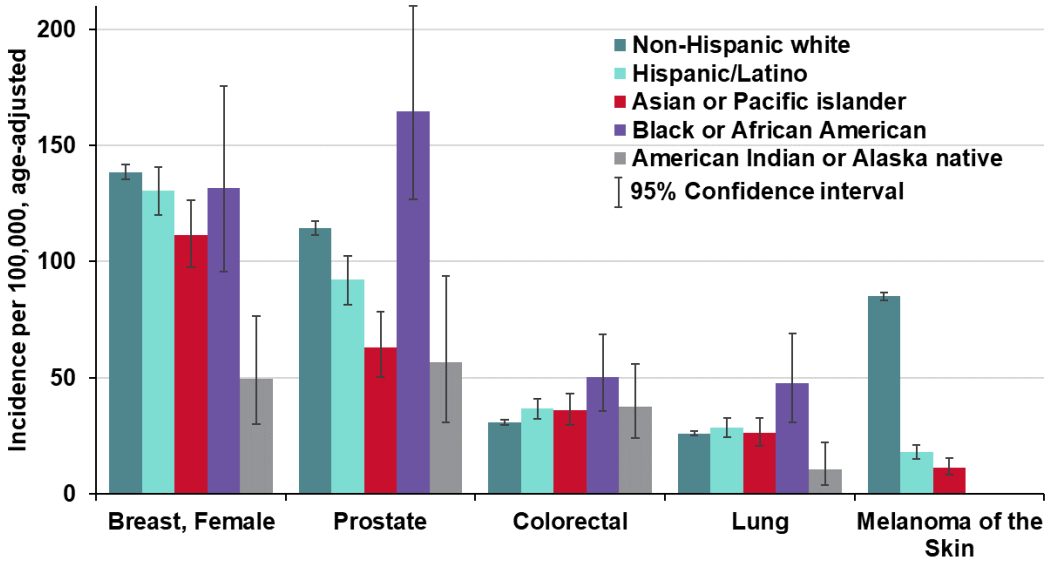


Figure 1.5 Cancer incidence for five major sites by race and ethnicity, Utah 2013-2017

The age-adjusted cancer incidence rate of 474.7 per 100,000 for black Utahns in 2013-2017 did not significantly differ from the rate for non-Hispanic whites. Cancer incidence among Utah Asian and Pacific Islanders was statistically significantly lower than for non-Hispanic whites. The race group with the lowest overall cancer incidence were Utah residents who were American Indian or Alaska natives. American Indians in the U.S. Southwest region, including Utah, have been reported to have significantly lower incidence of cancer overall and lower incidence of breast, prostate, and lung cancers[8,9] compared to non-Hispanic whites.

Comparing cancers with high incidence in the state by race (Figure 1.5), a high incidence of prostate cancer among black individuals and a low incidence of breast cancer among American Indians or Alaska Native individuals are apparent. Incidence of melanoma of the skin is low in all other groups relative to non-Hispanic whites. Because of the small number of annual incident cancers among the non-white race groups in Utah, the estimates of incidence for each of these five cancer sites are imprecise, as indicated by the wide 95% confidence intervals in Figure 1.5. For cancers of other sites with even lower incidence, the annual number of cases in each of the non-white races is so small that it is not feasible to interpret differences across racial groups in Utah.

1.4 Cancer in Utah by geography

Utah is a geographically large state of 84,899 square miles. Roughly 85% of the state's population of over 3.1 million lives in six urban counties along the Wasatch Front. Population size and cancer incidence for rural and urban counties are shown in Appendix C6 and C7. Variation in cancer incidence and mortality between metropolitan and non-metropolitan areas in the U.S. and in Utah has been described.[10,11] The age-adjusted incidence rates for all cancer sites combined from 2013 through 2017 in urban counties was 488.6 per 100,000 per year, somewhat higher than the incidence of 476.0 per 100,000 for rural counties. Cancers with statistically significant differences in age-adjusted incidence or mortality between rural and urban counties are shown in Figure 1.6. The cancer sites that exhibited the strongest contrast of higher age-adjusted incidence in rural counties compared to urban counties were lung cancer and leukemia. The cancers with higher incidence rates in urban counties compared to rural counties include brain and nervous system tumors, uterine cancer, breast cancer, and melanoma.

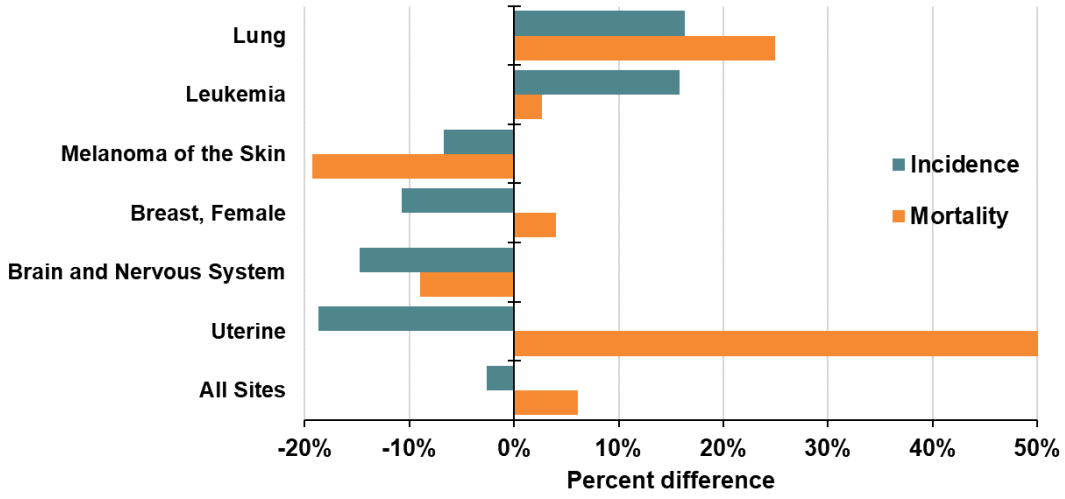


Figure 1.6 Cancer sites with statistically significant differences in age-adjusted incidence or mortality by rural residence, rural compared to urban counties, Utah 2013-2017. Positive percent difference indicates rate higher in rural counties compared to urban counties. Negative percent difference indicates lower rate in rural counties.

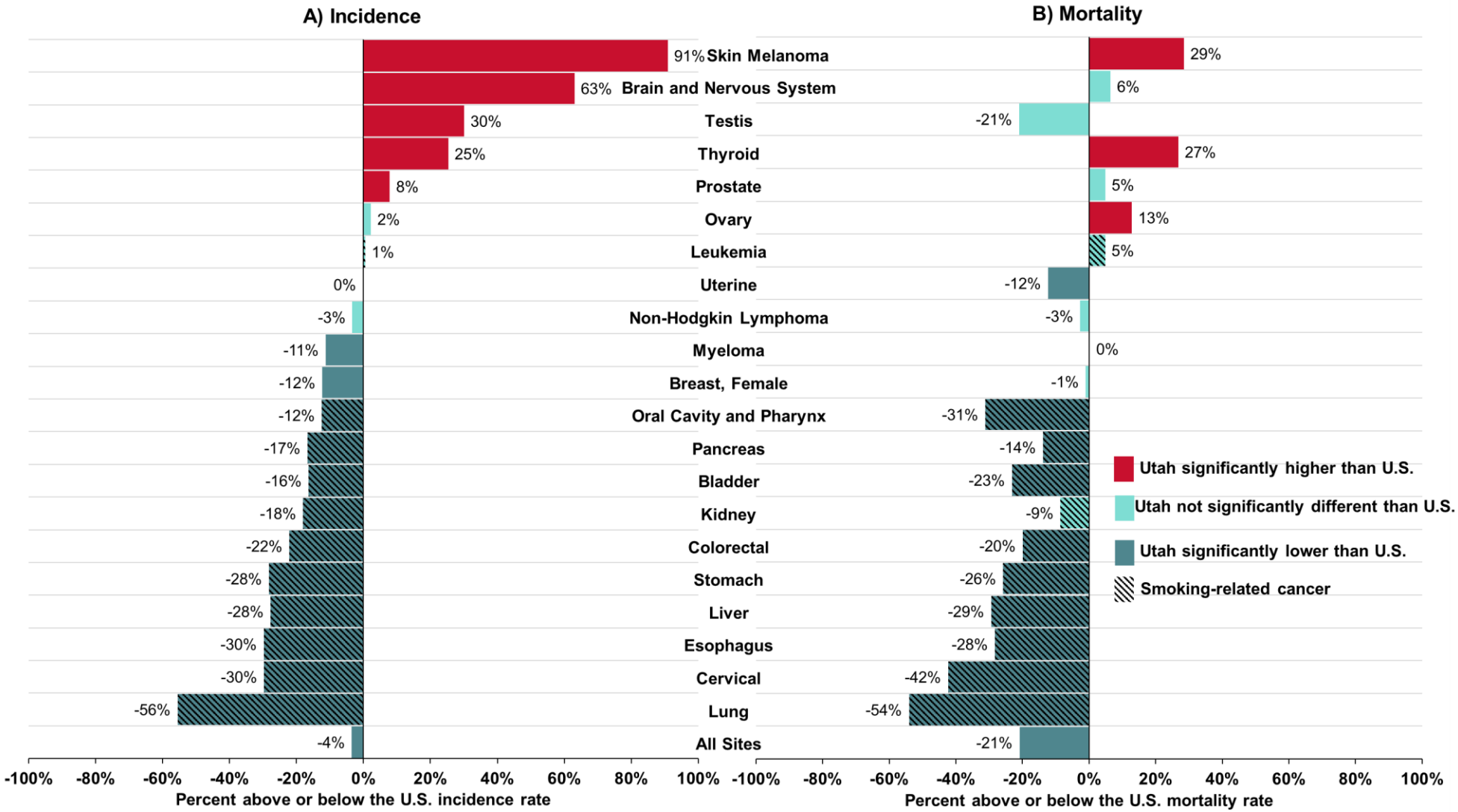


Figure 2.1 Incidence and mortality for common cancers, Utah compared to U.S., 2013-2017. Comparison of A) age-adjusted incidence of all reportable tumors and B) age-adjusted mortality. Positive percent difference indicates rate higher in Utah compared to the U.S. Negative percent difference indicates lower rate in Utah.

Chapter 2. Cancer in Utah Contrasted with the Remainder of the U.S.

2.1 Smoking-related cancers

Cigarette smoking is the primary cause of lung cancer and also increases the risk of cancer of many other sites, including oral cavity and oropharynx, kidney and renal pelvis, colon and rectum, liver, pancreas, cervix, urinary bladder, esophagus, stomach, and leukemia.[12] Utah has for many years had the lowest prevalence of smoking of all U.S. states.[13] For example, only 9% of Utah adults reported being current cigarette smokers in 2018, compared to 14% in the U.S. overall.[14] As a result, of Utah's longstanding low smoking prevalence, lung cancer incidence in Utah was 55.5% lower than the remainder of the U.S., and the lung cancer mortality rate in Utah was 54.1% lower for the period 2013 through 2017 (Figure 2.1). A high proportion of lung cancer cases are fatal (five-year relative survival in Utah is 20.9%; Appendix C3). Despite the low incidence of lung cancer in the state relative to other regions, lung cancer continues to be a leading cause of cancer death in Utah, responsible for 451 deaths in 2017 (Appendix C1). Incidence and mortality for cancers of several other sites strongly affected by cigarette smoking, including bladder, kidney, esophagus, pancreas, and oral cavity and pharynx, were also statistically significantly lower in Utah than other U.S. regions (Figure 2.1). Cigarette smoking is a contributing cause of cancers of the cervix and liver, shown in Figure 2.1 to have lower incidence in Utah, but incidence for these sites is more strongly influenced by other factors, discussed in sections 3.4 and 3.5.

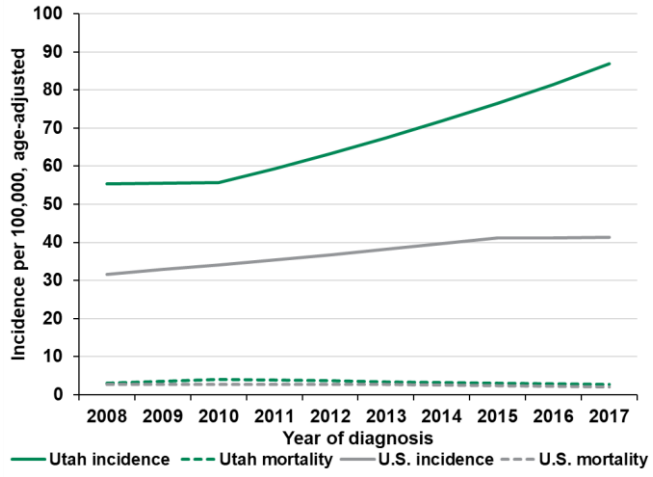


Figure 2.2 Melanoma incidence and mortality trends, Utah and the U.S., 2008-2017

As public health information campaigns and cigarette smoking cessation research have had increasing impact over the past 50 years, the proportion of U.S. adults who are current smokers has decreased. Incidence of smoking-related cancers is trending downward nationally.[15] Incident cancers today are affected by the higher smoking prevalence in past decades. Because of Utah's relatively low smoking prevalence throughout the 20th century, the current incidence and mortality rates for smoking-related cancers in Utah likely provide an indication of what can be expected in other U.S. states in the future. Utah's experience predicts that lung cancer death can be expected to continue to be a significant burden throughout the U.S. despite the decline in cigarette smoking.

2.2 Melanoma of the skin

Melanoma of the skin is of particular interest in Utah because the state exhibits high melanoma incidence relative to other states in the U.S.[16,17] The overall incidence of in situ and invasive melanomas from 2008-2017 in Utah was consistently higher than the incidence in the remainder of the U.S. (Figure 2.2). Melanoma incidence increased at 6.6% annual average percent change for 2010-2017 in Utah and at 3.8% annual percent change in the U.S. for 2008-2015. Despite increasing incidence, there was an indication of a trend of decreasing melanoma mortality over time in both Utah and the U.S. The 2013-2017 melanoma mortality rate was 29.2% higher in Utah than the remainder of the U.S.

Age-adjusted melanoma incidence is higher in non-Hispanic white populations than in other racial and

ethnic groups in the U.S. and in Utah (Figure 2.3 and Figure 1.5).[18] The 2013-2017 melanoma incidence rate in Utah for all races and ethnicities combined is 91.1% higher than in the remainder of the U.S. (Figure 2.1). For non-Hispanic whites in Utah, the excess is 67.0%. Among Hispanics/Latinos, the melanoma incidence for Utah exceeds the rest of the U.S. by 141%.

An increase in melanoma incidence in Utah over the ten-year time period 2008-2017 was observed for in situ cancers (3.9% annual average percent change for 2008-2014, 17.8% for 2014-2017), local stage (6.1% annual average percent change for 2008-2014), and regional stage (3.7% annual percent change for the whole time period) (Figure 2.4). Time trends in incidence of distant stage disease were based on small numbers and did not reach statistical significance.

Several factors likely contribute to Utah's higher incidence of melanoma. The high elevation above sea level of most Utah communities, frequent sunny days, and outdoor recreation opportunities result in high exposure to the sun's ultraviolet (UV) energy. Intermittent sun exposure increases individual risk for melanoma[19] and temporal trends of increases in UV exposure over the 20th century are implicated in

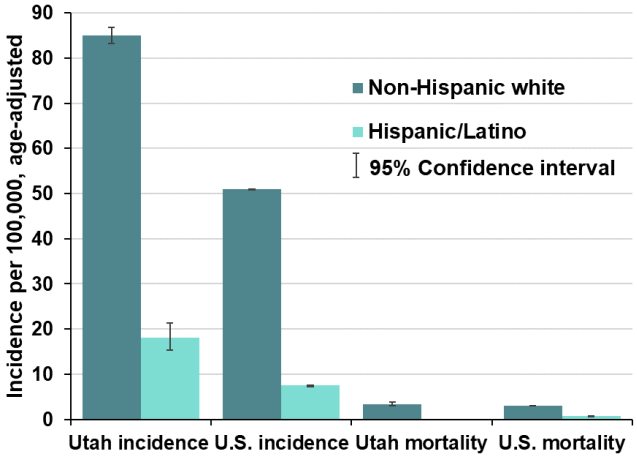


Figure 2.3 Melanoma incidence and mortality, Hispanics/Latinos compared to non-Hispanic whites, Utah 2013-2017

the national trend of increasing melanoma.[20] However, geography may not explain all of difference between Utah and other states in melanoma incidence. Collection of melanoma diagnoses is a challenge for central cancer registries; variability in case ascertainment[21-23] may contribute to differences in reported melanoma incidence across states.

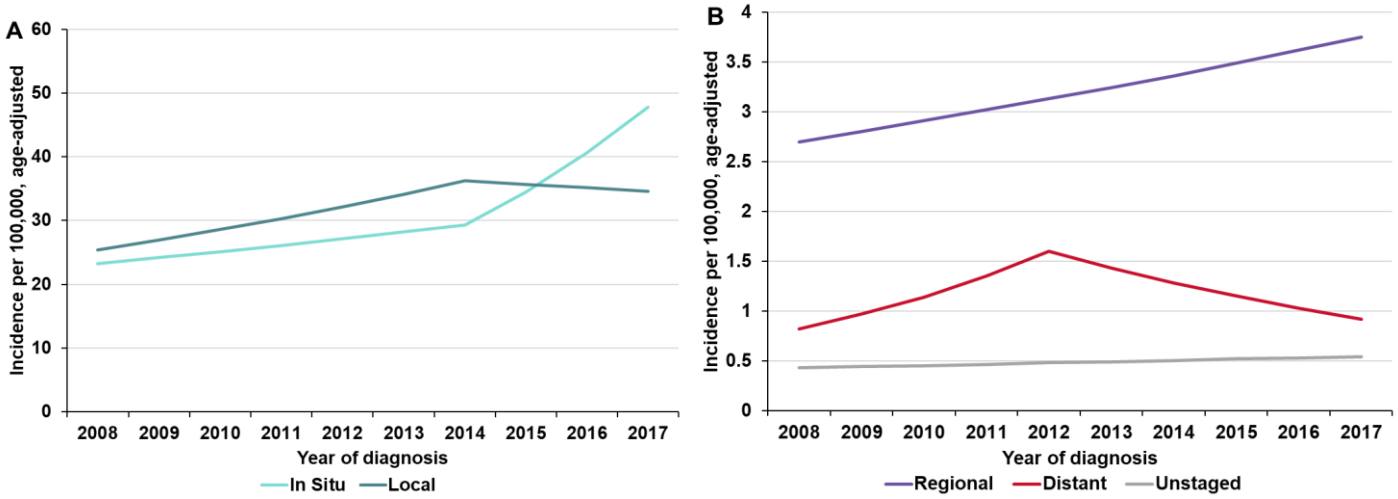


Figure 2.4 Melanoma incidence trends by stage at diagnosis: A) in situ, local and B) regional, distant or unstaged, Utah 2008-2017

In light of the high number of melanoma diagnoses, public health messages that stress sun protection and melanoma awareness are important for Utah residents. Reducing sun exposure, wearing sunscreen and sun-protective clothing, seeking shade, and avoiding tanning beds can reduce the risk of developing skin cancer.[24]

2.3 Thyroid cancer

In 2017, 421 Utah residents were diagnosed with thyroid cancer (Appendix C1). Thyroid cancer incidence is higher in Utah than in the rest of the U.S. (Figure 2.5). Thyroid cancer incidence rates in the U.S. increased over the last 40 years,[25] but plateaued between 2013-2016.[26] More recently, thyroid cancer incidence has begun trending downward in the U.S. as well as among Utah women. The incidence of thyroid cancer for the five-year period 2013-2017 was 17.9 per 100,000 per year in Utah and 14.9 per 100,000 per year in the U.S. (Appendix C2).

Thyroid cancer incidence is higher among women than men in both Utah and the U.S. Reproductive factors such as age at menarche/menopause, parity, and oral contraceptive use have been hypothesized to contribute to the higher incidence among women.[27]

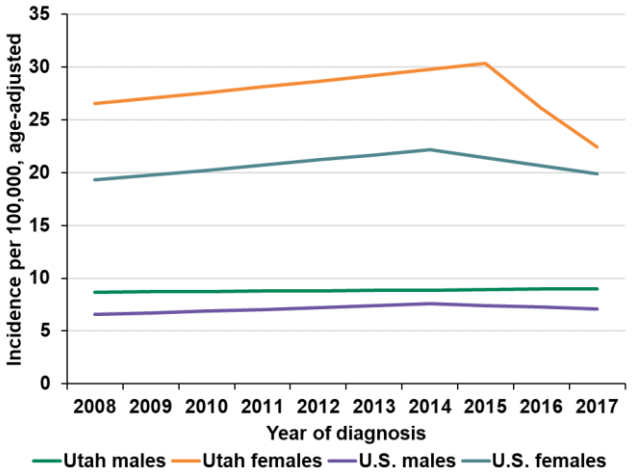


Figure 2.5 Thyroid cancer incidence trends in Utah compared to the U.S. by sex, 2008-2017

Thyroid cancer is diagnosed at relatively younger ages in women compared to men. The incidence of thyroid cancer is highest among women ages 45-64 in Utah (Figure 2.6). Among Utah men, the highest incidence is among those ages 65 or older. Thyroid cancer incidence is similar in Utah Hispanics/Latinos and non-Hispanic whites (Figure 2.7).

The majority of thyroid cancer cases are diagnosed at local stage, and mortality from thyroid cancer is quite low. From 2013 through 2017, mortality was

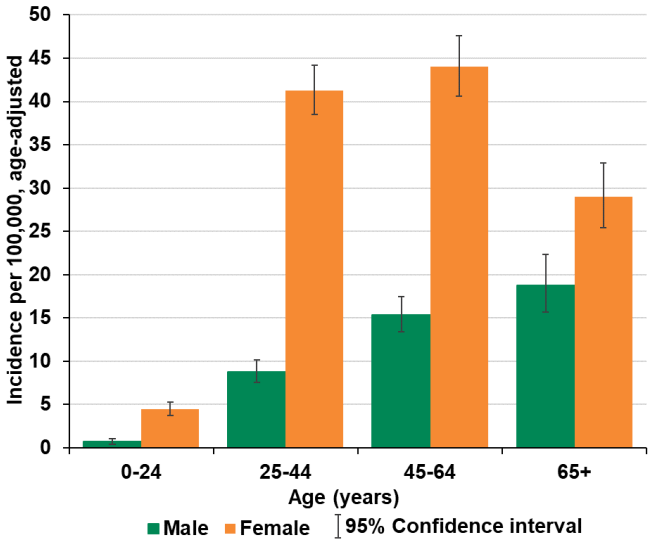


Figure 2.6 Thyroid cancer incidence by age at diagnosis and sex, Utah 2013-2017

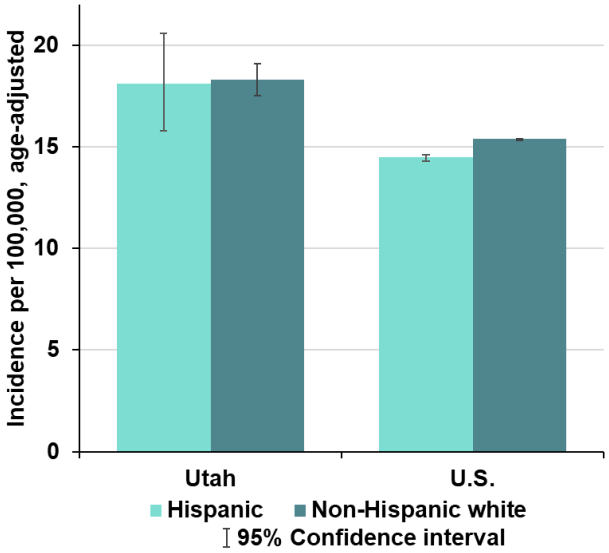


Figure 2.7 Thyroid cancer incidence for non-Hispanic whites and Hispanics/Latinos, Utah and the U.S. 2013-2017

0.8 per 100,000 per year among Utah women, and 0.5 per 100,000 per year among Utah men. Five-year relative survival among Utahns diagnosed with thyroid cancer is 98.8% (Appendix C3).

2.4 Tumors of the brain and nervous system

Utah's incidence of tumors of the brain and other central nervous system appears to exceed that of other U.S. regions by 63% (Figure 2.1). However, mortality from these cancers is essentially identical between Utah and the remainder of the U.S. (Figures 2.1 and 2.8).

The difference in incidence estimates between Utah and other states, with no difference in mortality, may be explained by variation among state registries in their ability to capture data on incidence of benign tumors of the brain and nervous system. Based on registry data from throughout the U.S., an estimated 30.2% of brain and other central nervous system tumors are malignant, with the remainder being benign.[28] Benign tumors, characterized by slow growth and inability to invade other tissues, are not reported to cancer registries when they occur at most body sites. Benign tumors in the brain and nervous system, however, may have serious health consequences including death due to their location in sensitive tissue.[29] Therefore, central cancer registries in the U.S. have included benign tumors of the brain and nervous system as reportable diagnoses since 2004.[30]

Some tumors occurring in the brain and nervous system, and particularly a large proportion of the benign tumors, are diagnosed through radiologic imaging only, with no surgery and no tissue examined by a pathologist that would result in a pathology report. Cancer registry ascertainment procedures use pathology reports to identify most cases, so the absence of a pathology report makes these tumors difficult to capture. Incomplete ascertainment of cases likely results in misleading geographic variation in incidence of benign tumors of the brain and nervous system, with reported differences as high as twofold between states.[30] In the past ten years, Utah's larger hospitals have begun applying informatics tools to electronic radiology reports to identify these tumors[31] and report them to Utah Cancer Registry. The gap between Utah and other states in reported incidence of brain and nervous system tumors (Figure 2.8) developed over the same time period. Thus the apparent higher incidence of brain and nervous system tumors in Utah, and the trend of increasing incidence in the state, are likely due to improved ability to describe the true incidence of benign brain and nervous system tumors and do not represent excess or increasing incidence.

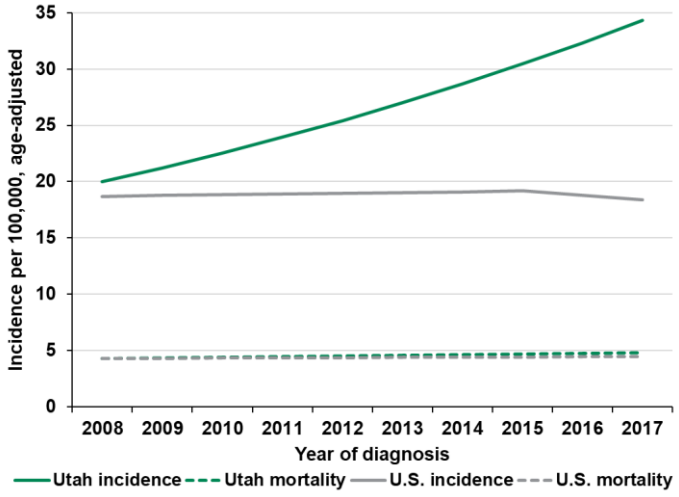


Figure 2.8 Brain and nervous system tumor incidence and mortality trends in Utah and the U.S., 2008-2017

Chapter 3. Cancer Sites of Special Interest

3.1 Breast cancer

Breast cancer was the most commonly diagnosed cancer among women in Utah in 2017, with 1,891 cases reported, and was the cause of death for 280 women, making it the leading cause of cancer death among women in the state. Breast cancer occurs among men but is rare, with only 18 cases in Utah in 2017. The remainder of this section will address female breast cancer only. The incidence of female breast cancer in Utah and in other U.S. states was essentially stable over the ten year period 2008 through 2017 (Figure 3.1). Breast cancer mortality trended slightly downward at -0.6% annual percent change in Utah over the ten year period, but the trend did not reach statistical significance. For the U.S., the breast cancer mortality trend was significantly down, at -1.6% per year for 2008-2013 and -1.2% per year for 2013-2017. The breast cancer mortality trends described for this ten-year period are likely a continuation of the trend of reduced breast cancer mortality that dates back to 1989[32] and is attributed to the introduction of mammography screening. The incidence of female breast cancer in Utah for the period 2013 through 2017 was 137.0 per 100,000 per year, statistically significantly lower than the U.S. incidence of 156.1 per 100,000 per year (Appendix C2). Breast cancer incidence in Utah among non-Hispanic white women, at 138.4 cases per 100,000 per year from

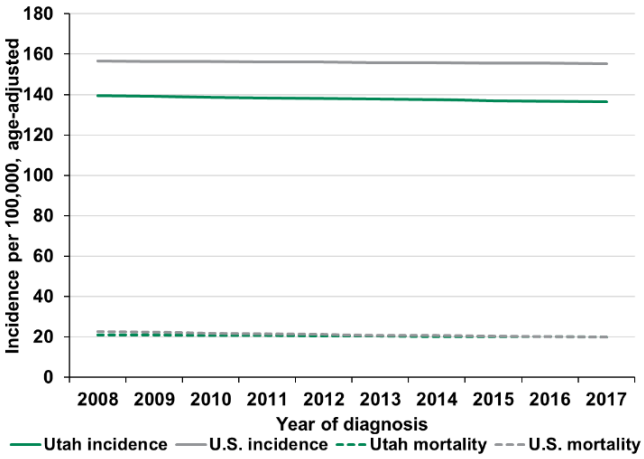


Figure 3.1 Female breast cancer incidence and mortality trends for Utah and the U.S., 2008-2017

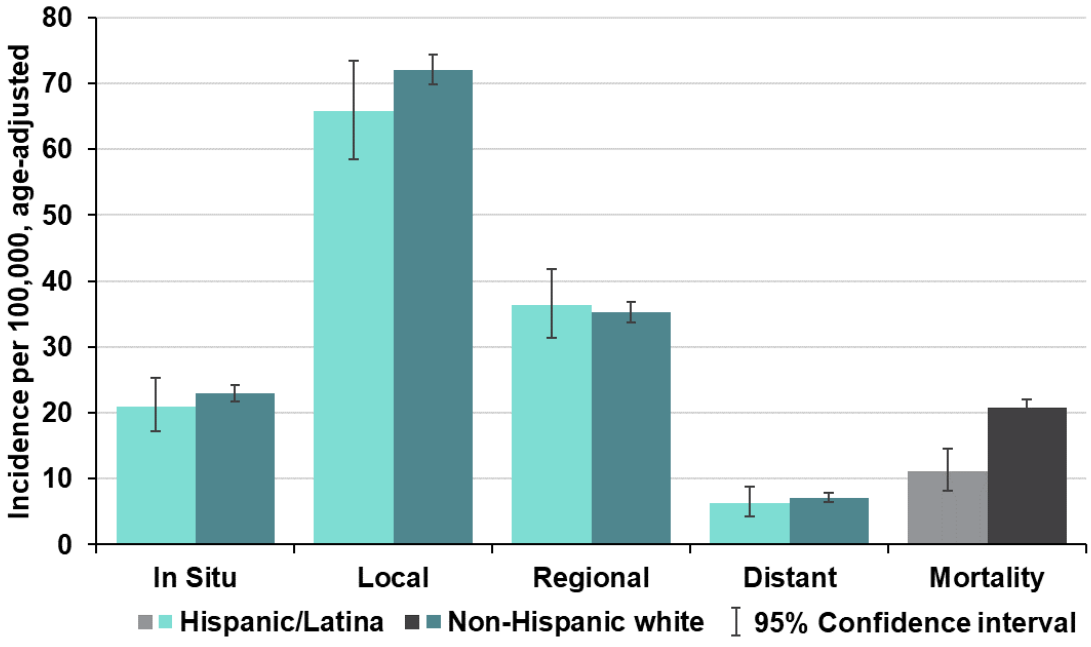


Figure 3.2 Breast cancer incidence by stage at diagnosis and breast cancer mortality for non-Hispanic white and Hispanic/Latina women in Utah, 2013-2017

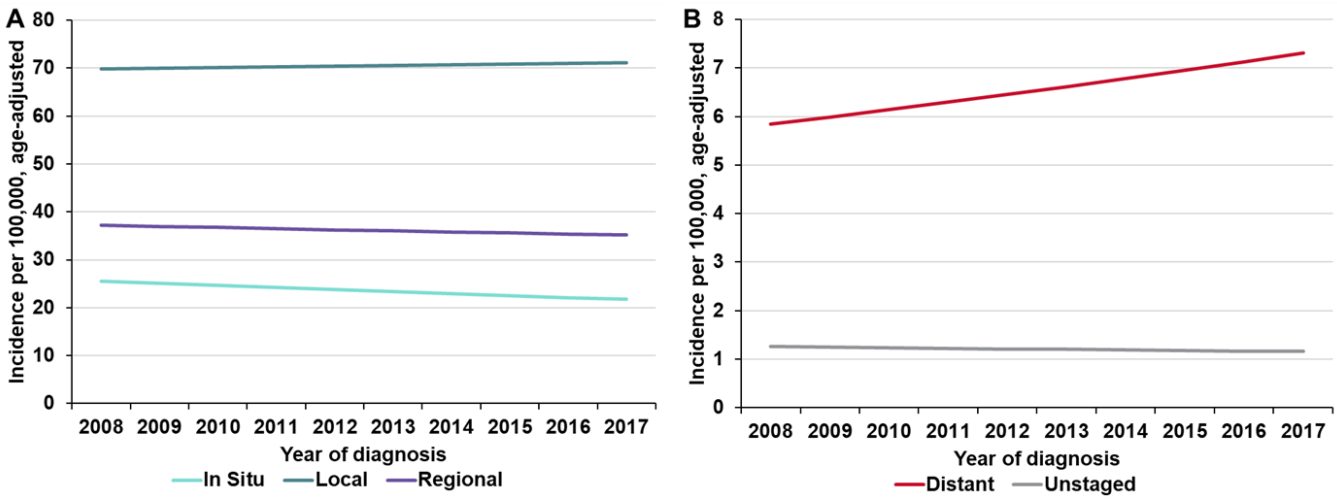


Figure 3.3 Breast cancer incidence trends among women by stage at diagnosis: A) in situ, local, regional, and B) distant or unstaged, Utah 2008-2017

2013-2017, is statistically significantly higher than that among Utah Hispanic/Latina women, at 130.5 per 100,000 per year (Appendix C4). For both Hispanic/Latina and non-Hispanic white Utah women, incidence was highest for local stage at diagnosis (Figure 3.2). Breast cancer mortality was statistically significantly higher among non-Hispanic white women, at 20.8 per 100,000 per year, than among Hispanic/Latina women, at 11.1 per 100,000 per year (Appendix C5).

Trends in Utah female breast cancer incidence by stage at diagnosis for the ten-year period 2008-2017 were -1.8% annual percent change for in situ cancer incidence and less than one percent annual percent change for local and regional stages (Figure 3.3 A). Incidence of distant stage at diagnosis increased by 2.5% per year, while incidence of unstaged breast cancer decreased at an annual percent change of -0.9% (Figure 3.3 B).

The number of cases each year in the distant or unstaged categories are small, so these trends were not statistically significant. The incidence of unstaged cancer has decreased as use of advanced imaging technologies has become more widespread, providing information needed for staging cases who do not receive surgery.[33] Some inoperable tumors that in the past would have lacked information to assign a stage may now be staged as distant using imaging, contributing to the apparent increase in distant stage cancers.

Many women diagnosed with breast cancer are successfully treated and can expect survival similar to women without a cancer diagnosis.[34] However, breast cancer survival is dependent on the stage of cancer at diagnosis. The 69% of women with breast cancer in Utah who are diagnosed at in situ or local stage have 100% five-year relative survival. Among cases diagnosed at regional or distant stage, five-year relative survival is 76.5% (Appendix C3). Women who were 75 years or older at diagnosis and with regional or distant stage had statistically significantly worse relative survival than younger women (Figure 3.4)

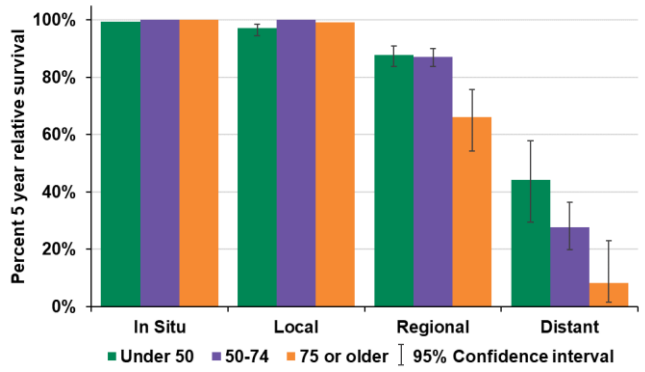


Figure 3.4 Breast cancer relative five-year survival by stage and age at diagnosis in Utah

3.2 Prostate cancer

Prostate cancer is one of the most common cancers in Utah men (Table 1.2), with 1,525 cases diagnosed in 2017 and 212 prostate cancer deaths. Prostate cancer incidence is 7.8% higher in Utah compared to the rest of the U.S. (Figure 2.1).

Across the U.S., the age-adjusted prostate cancer incidence rate declined at an annual percent change of -6.9% from 2008 through 2014, followed by a stable period of incidence from 2014-2017 (Figure 3.5). In Utah, prostate cancer has declined at an annual percent change of -6.1% for the ten-year period 2008-2017. The smaller population of Utah compared to U.S. may affect ability to detect a leveling off of the incidence trend as is described for the rest of the U.S. Prostate cancer mortality trended slightly downward over the period 2008-2017, at -2.5% annual average percent change in Utah and -3.7% for the U.S. The trend in Utah did not reach statistical significance.

The majority of prostate cancers, including 92.3% of cases in Utah, are diagnosed at the local or regional stage. These early-stage prostate cancers have a good prognosis, with a five-year relative survival of 100% for cases diagnosed in Utah (Appendix C3). In contrast, 5-year relative survival for Utah cases diagnosed at distant stage is only 38.4%, similar to

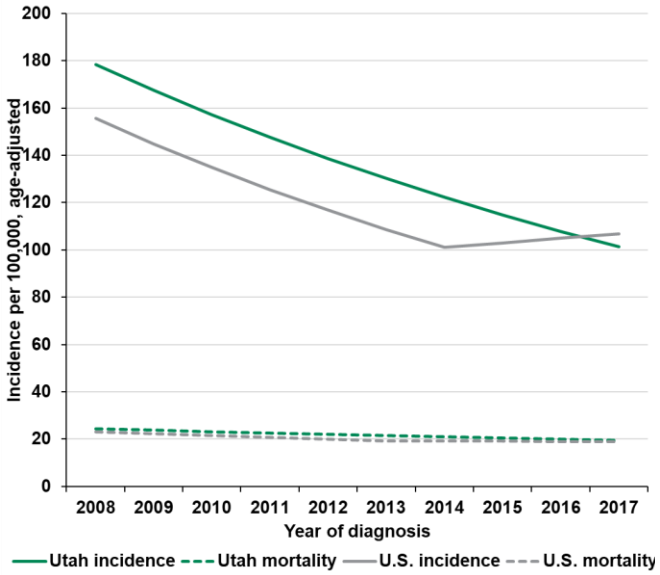


Figure 3.5 Prostate cancer incidence and mortality trends in Utah compared to the U.S., 2008-2017

national statistics.[35] Utah's incidence of local and regional stage prostate cancers trended downward at -7.6% per year (Figure 3.6 A), and -5.6% per year (Figure 3.6 B) respectively over the ten year period. In that same time frame, the incidence of distant stage disease increased by 9.3% per year and the unknown stage disease increased by 6.4% per year.

The higher incidence of prostate cancer in Utah compared to the rest of the U.S. is limited to non-Hispanic white men; no significant difference was

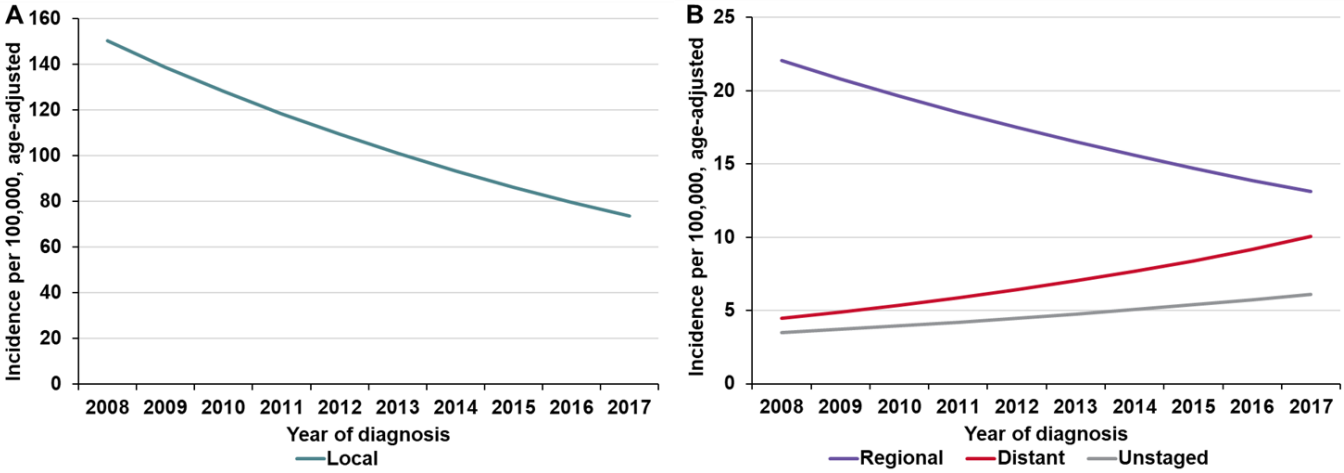


Figure 3.6 Prostate cancer incidence trends by stage at diagnosis: A) local and B) regional, distant, or unstaged, Utah 2008-2017

present for Hispanic/Latino Utah men compared to the rest of the U.S. (Figure 3.7).

Many prostate cancers are initially detected through prostate-specific antigen (PSA) screening, but there is uncertainty about the balance between the benefit of screening for early detection and the risk of over-diagnosis and over-treatment.[36] Evaluation of these risks and benefits led the United States Preventive Services Task Force (USPSTF) to make a recommendation against PSA screening[37] in 2012. The decreasing trends in prostate cancer incidence reported here are consistent with changes resulting from decreasing utilization of PSA screening,[38,39] affecting different stages differently.[40,41] The increase in incidence of distant stage prostate cancer observed in Utah also occurred at the national level. In 2018, the USPSTF again revised their recommendations, acknowledging a small benefit from PSA screening for some men.[42]

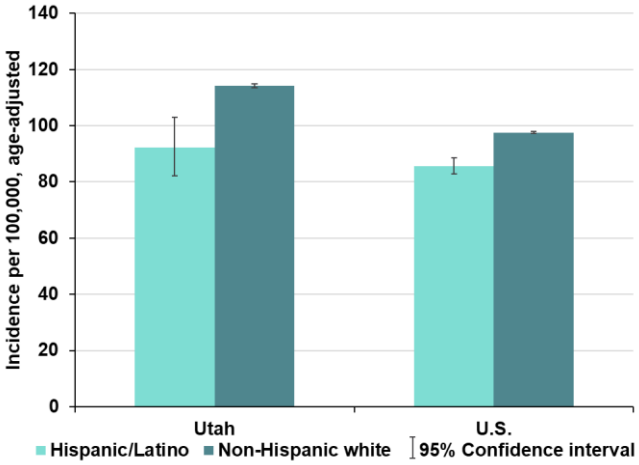


Figure 3.7 Prostate cancer incidence, Hispanics/Latinos compared to non-Hispanic whites in Utah and the U.S., 2013-2017

3.3 Colorectal cancer

Colorectal cancers, or cancers of the colon and rectum, are among the most common cancers in Utah. In 2017, there were 798 colorectal cancer cases diagnosed in the state. Colorectal cancer incidence is declining in Utah with an annual average percent change of -2.4% from 2008 through 2017 (Figure 3.8). Nationally, the incidence rate declined at -5.2% per year from 2008-2010, and -1.6% from 2010-2017,[35] continuing a downward trend that began in the late 1990s. Colorectal cancer mortality also declined in Utah from 2008-2017 at an annual percent change of -1.1%.

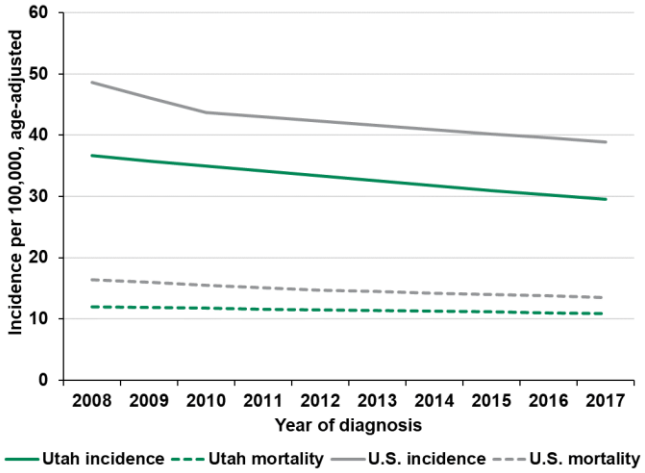


Figure 3.8 Colorectal cancer incidence and mortality trends in Utah compared to the U.S., 2008-2017

Screening procedures are available that can effectively prevent colorectal cancer and colorectal cancer morality. Widespread uptake of screening for individuals aged 50-74 years is thought to be responsible for most of the decades-long decline in colorectal cancer incidence and mortality.[43] Screening can be done either through laboratory evaluation of stool samples, e.g. fecal immunochemical tests (FIT), or through direct visualization procedures, including sigmoidoscopy or colonoscopy.[44] In Utah, the proportion of individuals ages 50-74 who followed colorectal cancer screening guidelines increased from 62.3% in 2010 to 69.9% in 2018.[45]

While the trends of reduced incidence of colorectal cancer in the state of Utah and nationally are promising, the decline in colorectal cancer incidence has been limited to those aged 50 and older (Figure 3.9 B). In the Utah population under age 50, there was a 3.2% annual average increase in colorectal cancer diagnoses at local stage and a 5.9% annual

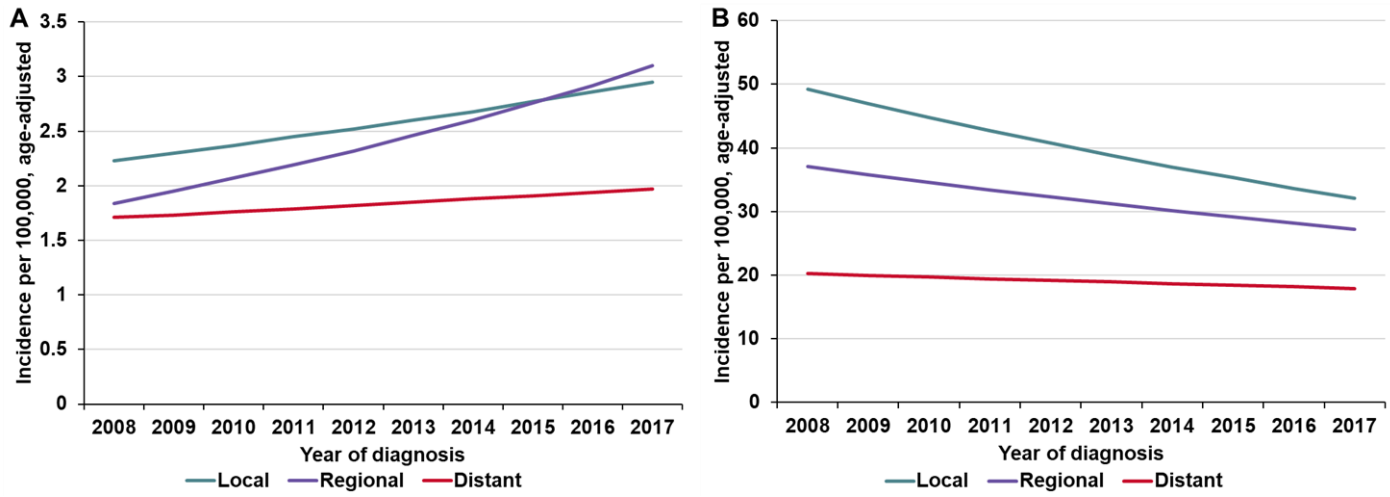


Figure 3.9 Colorectal cancer incidence trends by stage at diagnosis, among individuals aged A) younger than 50 years and B) 50 years and older, Utah 2008-2017

increase in regional diagnoses from 2008 through 2017 (Figure 3.9 A). This trend of increasing colorectal cancer incidence for ages younger than 50 is also apparent nationally,[46] a factor that contributed to the USPSTF considering recommending colorectal cancer screening for individuals ages 45-49. [47]

Both age at diagnosis and stage at diagnosis influence survival outcomes for colorectal cancer. For cases with local stage disease, five-year relative survival is 97% for those diagnosed before age 50, 94% for cases ages 50-74, and 74% for those over 75 (Figure 3.10). For regional stage at diagnosis, the survival rates were overall lower than for local stage and also became worse as age at diagnosis increased. Conversely, for distant stage disease, relative survival was worse for those under age 50 at diagnosis than for those ages 50-74.

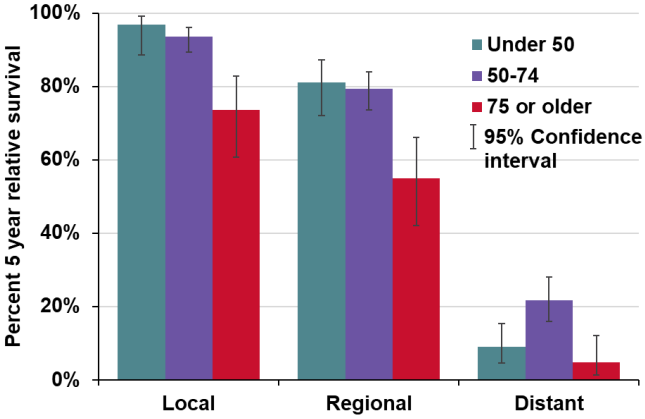


Figure 3.10 Five-year relative survival in Utah residents diagnosed with colorectal cancer by stage and age at diagnosis

3.4 Human Papillomavirus (HPV)-associated cancers

Human Papillomavirus (HPV) infections have been shown to cause certain types of cancer in both men and women.[48] High-risk types of HPV have been found to be a primary cause of cervical, anal, penile, vaginal, and vulvar cancers, and a contributing cause of some head and neck cancers.[49]

From 2013 through 2017, the age-adjusted incidence of HPV-associated cancers in Utah was 8.3 per 100,000 per year, appreciably lower than the incidence of the same cancers in the rest of the U.S. (Figure 3.11). HPV-associated cancers impact

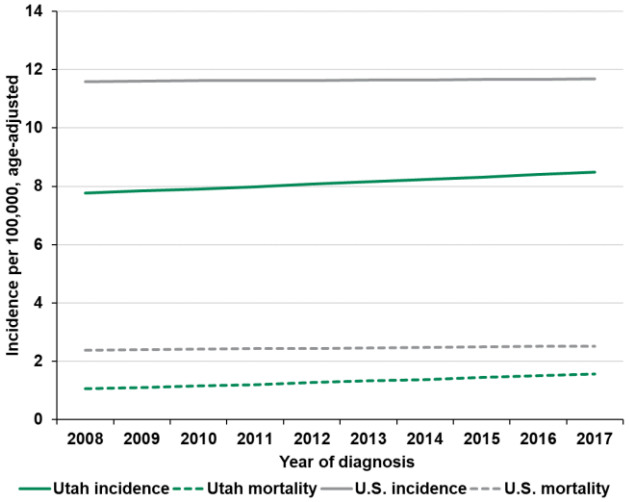


Figure 3.11 Incidence and mortality trends for cancers associated with human papilloma virus (HPV), Utah and the U.S., 2008-2017



Figure 3.12 Incidence of human papilloma virus (HPV)-associated cancers by sex and cancer site, Utah 2013-2017

women at a higher incidence rate (11.3 per 100,000 per year) than men (5.3 per 100,000), as cancers of the cervix and other female genital sites comprise a large proportion of HPV-associated cancers (Figure 3.12). Women also had higher incidence of anal cancers than men, whereas men had higher incidence of head and neck cancers, notably tonsil cancers.

From 2008 through 2017, the incidence of HPV-associated cancers was relatively stable in both Utah and the U.S. In that same timeframe, Utah had a statistically significant increase of 4.5% per year in mortality from HPV-associated cancers, and the U.S. increased by 0.7% per year (Figure 3.11). The Utah mortality trend is based on fewer than 50 deaths per year. Non-Hispanic whites had similar rates of HPV-associated cancers as Hispanics/Latinos among Utah men and women (Figure 3.13), as well as similar mortality rates.

A vaccine to prevent infection with high-risk HPV was approved by the Food and Drug Administration (FDA) in 2006.[50] HPV vaccination is recommended for both males and females at age 11 or 12.[51] In Utah, the percentage of teens aged 13-17 who have received the recommended HPV vaccine is low but is increasing. In 2014, 12.4% of males and 20.4% of females were vaccinated as recommended, and in 2018, the vaccination rate had increased to 38.1% of males and 48.6% of females.[52] HPV-associated cancers may take 10 to 20 years or longer to develop, and therefore it is expected that it will be a number of years before the benefits of recent increases in HPV vaccination become evident in reduced cancer incidence at the population level.[48]

Cervical cancer screening is highly effective for cervical cancer control. Cervical cytology screening, also called a Pap smear, can identify either cancerous

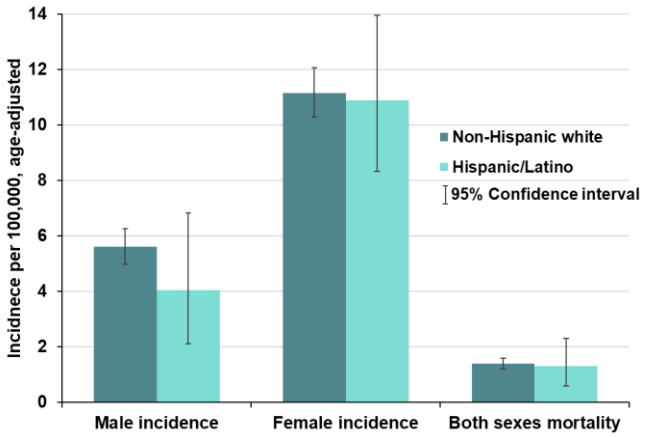


Figure 3.13 Incidence and mortality of human papilloma virus (HPV)-associated cancers, Hispanics/Latinos compared to non-Hispanic whites, Utah 2013-2017

cells or pre-cancerous cells which can be removed before developing into cancer.[53] The USPSTF recommends screening via Pap test and HPV testing. In 2012, 70.7% of Utah women reported having received a Pap test in the last three years, but that number dropped to 63.4% in 2018.[54]

3.5 Liver cancer

Liver cancer is the seventh leading cause of cancer mortality in the U.S.[55] and was a cause of 96 deaths among Utah residents in 2017. The incidence of liver cancer in the U.S. has exhibited an increasing trend, driven by the most frequent type of liver cancer, hepatocellular carcinoma (HCC).[55] In Utah, HCCs make up approximately 95% of all liver cancers. Incidence and mortality from HCC in Utah are lower than in other regions of the U.S. (Figure 3.14), likely related to Utah's low prevalence of unhealthy use of alcohol such as binge drinking[56] as well as lower prevalence of hepatitis infection. However, HCC incidence in Utah increased over the ten-year period examined. The average annual percent change for HCC in Utah was 5.6% for 2008-2015 but then the trend reversed to a non-significant decrease for

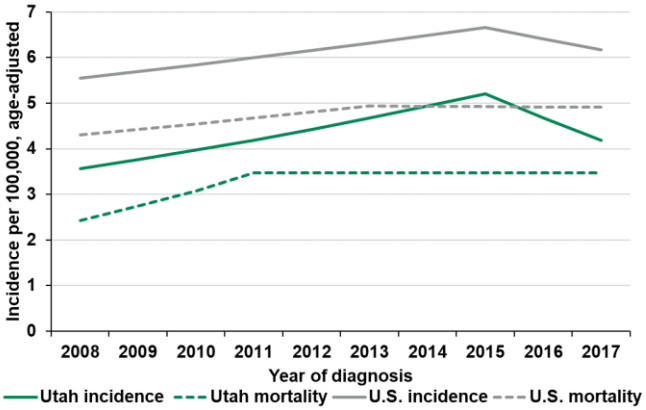


Figure 3.14 Hepatocellular carcinoma liver cancer incidence and liver cancer mortality (all histologies) trends in Utah compared to the U.S., 2008-2017

2015-2017. HCC incidence is lower among non-Hispanic whites than in other ethnic and race groups in Utah (Figure 3.15), similar to a pattern by race and ethnicity that is observed throughout the U.S. There is an indication that HCC incidence among blacks and among Asian and Pacific Islanders in Utah may be higher than elsewhere in the U.S., but the small numbers of cases in Utah make the estimates imprecise.

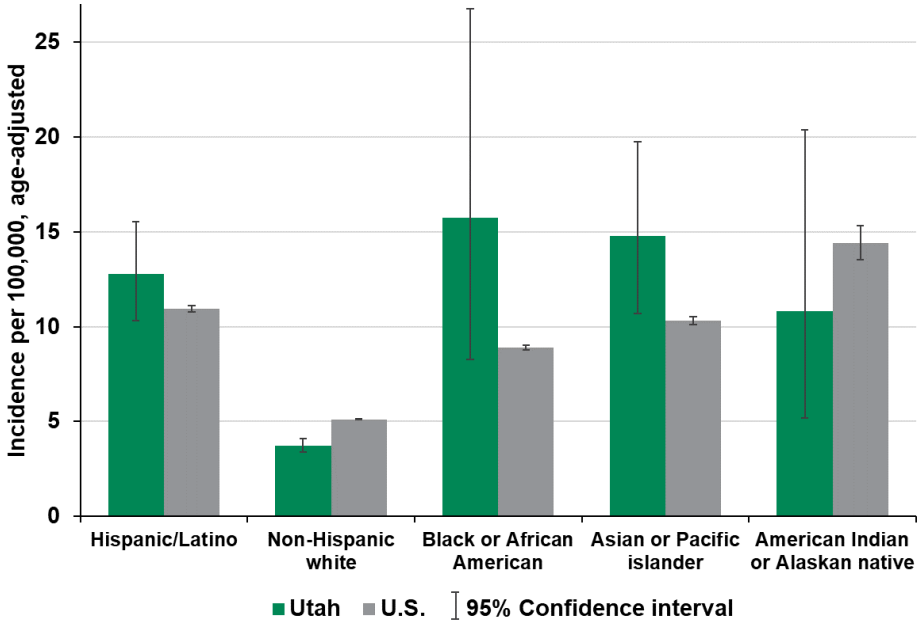


Figure 3.15 Hepatocellular carcinoma liver cancer incidence by race and ethnicity, Utah 2013-2017

Individuals diagnosed with liver cancer have a poor prognosis. Five-year relative survival in Utah was 47.2% among cases diagnosed with liver cancer at local stage (Appendix C3). For cases diagnosed at regional or distant stage, five-year relative survival was 11.6%.

The trend of increase in incidence of HCC in the U.S. is documented to have started as far back as 1992.[6] Contributing factors to the trend include hepatitis C infection, which is prevalent among the cohort born in the U.S. in 1945 to 1965, hepatitis B, which is more frequent among those born outside the U.S., and obesity-related non-alcoholic fatty liver disease.[57] With the introduction of effective treatment for chronic hepatitis infection, the national trend for incidence of liver cancer or HCC has been noted to have plateaued and perhaps started to decline.[58]

Appendix A. Data and Methods

A.1 Compiling cancer surveillance data

The Utah Cancer Registry collects reports of all newly diagnosed cases of reportable neoplasms among Utah residents from health care providers statewide. This information is reported for public health purposes described and authorized under Utah Code Annotated §26-5-2, 26-5-3, and 26-l-30(6)-(8), and by the Utah Administrative Code Rule R384-100, the Cancer Reporting Rule.[59] Reportable cancer diagnoses include primary, malignant cancers. Both invasive and in situ tumors are reportable, with the exception of in situ cervical cancers. Basal cell and squamous cell carcinomas of the skin are not reportable. Benign tumors are reportable only if occurring in the brain or central nervous system; other benign tumors are not counted in Utah cancer registry data. Cancer case reports received from providers are consolidated, edited, and reviewed for quality assurance by Utah Cancer Registry staff.

Annually, Utah and other registries that participate in the U.S. National Cancer Institute's Surveillance Epidemiology and End Results (SEER) Program submit de-identified data to SEER. Additionally, central cancer registries from throughout the U.S. report data to the U.S. Centers for Disease Control and Prevention (CDC) and to the North American Association for Central Cancer Registries (NAACCR), which compiles the data in the Cancer in North America (CiNA) research dataset,[60] which we utilized for this report.

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 when national data become available for analysis. Therefore, this report is based on cancer diagnoses through the end of 2017.

A.2 Data accessed for this report

Data describing incident cancers or deaths were accessed from the CiNA datasets[60] using the SEER*Stat statistical application software.[61] Incident cases and deaths from January 1, 2013 through December 31, 2017 were used to estimate incidence and mortality rates. Diagnoses and deaths from January 1, 2008 through December 31, 2017 were included for description of incidence and mortality trends. 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.[62] The Rural Urban Continuum Codes (RUCC) were used to classify counties in Utah as rural (codes 4-10) or urban (codes 1-3).[63] Mortality data are provided to SEER by the National Center for Health Statistics (NCHS) of the CDC.[64]

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 CiNA 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 Decennial Census population from 2010 and intercensal estimates for other years.

Survival among individuals diagnosed with cancer in Utah was described using incidence and survival data accessed through SEER.[65]

A.3 Statistical analysis

Counts of incident cancers and cancer mortality were reported for the most recent complete year available, 2017, for the population of Utah. Cancer counts and incidence rates presented in this report include all reportable cancer diagnoses, except when

noted separately as invasive, in situ, or benign. Cancer incidence and mortality rates were estimated for Utah compared to rates for the remainder of the U.S., that is to say 49 states, excluding Utah, and the District of Columbia. When cancer counts or incidence rates are reported by race and ethnicity, all individuals who are of Hispanic or Latino ethnicity are counted in that category regardless of their reported race. Counts or rates for race groups white, black or African American, Asian or Pacific Islander, and American Indian or Alaska native exclude Hispanics.

All cancer incidence and mortality rates reported are per 100,000 population and are age-standardized to the 2000 U.S. standard population. Rates were calculated using the SEER*Stat statistical application software.[61] Cancer incidence and mortality rates for specific cancer sites were estimated based on the five-year period 2013 through 2017 to obtain stable estimates for comparisons, e.g. between geographic regions and between race and ethnic groups. Five years were used in order to have sufficient numbers to generate reliable 95% confidence intervals. We identified rates that were statistically significantly different from one another using the rate ratio option in the SEER*Stat program. We estimated the percent difference between rates in two populations as the ratio of the two rates minus one multiplied by 100.

Cancer incidence and mortality rates for specific cancer sites were summarized over the ten-year period 2008 through 2017 for trends. Incidence and mortality trends were analyzed using JoinPoint analysis, 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.[66] 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. On trend graphs in this report, a change in slope of the line is shown only if a statistically significant change was detected by JoinPoint.

Survival of individuals with cancer was described as relative survival, i.e. survival among individuals diagnosed with cancer compared to comparable-age members of the general population. Relative survival was calculated using the Period Survival Method.[67] Period survival calculations allow for the most up-to-date survival estimates for current survival trends, using previous survival estimates to calculate longer-term survival. For this analysis, we used 2016 as the period cohort, so the first year survival estimates were based on 2016 cases, and two year survival was based on 2015 estimates, three year survival was based on 2014 estimates, and so on. These estimates are then combined to produce five-year survival estimates for cases who were diagnosed in 2016.[68] Confidence intervals were calculated at the 95% level. For relative survival estimates that are at or near 100%, confidence intervals were not calculated in SEER*Stat due to adjustments the software made.

Appendix B. Definitions and Abbreviations

Age-adjusted or age-standardized

Age-adjustment or age-standardization is a statistical technique applied to allow for comparison of disease rates between populations with different age distributions. Age-standardized rates and age-adjusted rate differences provided in this report are based on the 2000 U.S. standard population.

Annual percent change or annual average percent change

The annual percent change indicates 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 year.

Benign

A tumor or growth that does not exhibit potential to invade beyond the tissue of origin. Benign tumors are included in cancer registry data only if occurring in the brain or central nervous system.

CiNA

Cancer in North America. A database compiled by the North American Association of Central Cancer Registries from central cancer registries in all 50 states and the District of Columbia. The CiNA database was accessed for this report.

CI

Confidence interval. The range of possible variation in an estimate due to chance. A value falling outside the 95% confidence interval is unlikely to be different due to chance.

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 cancer refers to newly diagnosed disease. Surveillance of cancer is based on the incidence rate, which is the number of newly diagnosed or incident cancer cases in a specified year, in a defined population at risk for the disease.

HPV

Human papilloma virus. A virus that causes most cervical cancer cases and is a contributing cause for several other cancers.

In situ

Cancer that is confined to the layer of cells in which it began. The cancerous growth or tumor exhibits malignant appearance of the cells, indicating potential to invade, but it 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

Cancerous cells that exhibit the ability to invade or spread to other tissues of the body.

Mortality

The occurrence of deaths from a disease in a specified time period within a defined population. In this report mortality is reported for cancer.

Neoplasm

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

NAACCR

North American Association of Central Cancer Registries, a professional organization that includes all central cancer registries in the United States and Canada as members. We utilized CiNA, a research database complied by NAACCR, in preparing this report.

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.

Relative survival

A measure denoting the survival of individuals diagnosed with cancer compared to the general population, matched by age and sex. It is a ratio of the number of cancer cases who survive to the number of comparable general population members who survive.

SEER

The Surveillance, Epidemiology, and End Results Program of the National Cancer Institute. Includes Utah and a number of other central cancer registries in the United States.

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. Cancer staging in this report are all based on the SEER Summary Stage variable.

Unstaged

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

Appendix C. Detailed Tables of Cancer Case Counts, Incidence, and Mortality

Table C1. New cancer cases and deaths from cancer in Utah by cancer site and sex, 2017[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	10,942	2,662	3,160	5,197	1,503	1,478	5,745	1,159	1,682
Bones and Joints	Bones and Joints	47	^	10	18	^	^	29	^	^
Brain and Other Nervous System	Brain and Nervous System	201	732	126	85	482	46	116	250	80
Breast	Breast, Female	1,582	309	280	1,582	309	280	^	^	^
	Breast, Male	18	^	^	^	^	^	18	^	^
Digestive System	Esophagus	90	^	80	15	^	13	75	^	67
	Stomach	122	^	62	42	^	29	80	^	33
	Small Intestine	64	^	^	29	^	^	35	^	^
	Colorectal	798	^	272	384	^	129	414	^	143
	Anus, Anal Canal and Anorectum	34	^	^	23	^	^	11	^	^
	Liver	135	^	96	33	^	32	102	^	64
	Intrahepatic Bile Duct	21	^	31	14	^	12	7	^	19
	Gallbladder	29	^	^	22	^	^	7	^	^
	Other Biliary	29	^	^	14	^	^	15	^	^
	Pancreas	299	^	232	114	^	91	185	^	141
	Retroperitoneum	11	^	^	^	^	^	6	^	^
	Peritoneum, Omentum and Mesentery	13	^	^	10	^	^	^	^	^
	Other Digestive Organs	20	^	14	9	^	^	11	^	^
Endocrine System	Thyroid	421	^	17	322	^	^	99	^	11
	Other Endocrine Including Thymus	15	221	^	6	129	^	9	92	^
Eye and Orbit	Eye and Orbit	21	^	^	11	^	^	10	^	^
Female Genital System	Cervical	89	^	30	89	^	30	^	^	^
	Uterine	373	^	58	373	^	58	^	^	^
	Ovary	163	^	101	163	^	101	^	^	^
	Vagina	7	^	^	7	^	^	^	^	^
	Vulva	29	10	^	29	10	^	^	^	^
	Other Female Genital Organs	26	^	11	26	^	11	^	^	^
Leukemia	Leukemia	416	^	160	173	^	68	243	^	92
Lymphoma	Hodgkin Lymphoma	68	^	^	39	^	^	29	^	^
	Non-Hodgkin Lymphoma	496	^	132	186	^	49	310	^	83
Male Genital System	Prostate	1,525	^	212	^	^	^	1,525	^	212
	Testis	133	^	^	^	^	^	133	^	^
	Penis	8	8	^	^	^	^	8	8	^
	Other Male Genital Organs	7	^	^	^	^	^	7	^	^
Miscellaneous	Miscellaneous	307	^	291	143	^	129	164	^	162
Myeloma	Myeloma	186	^	75	71	^	30	115	^	45
Oral Cavity and Pharynx	Oral Cavity and Pharynx	244	20	45	83	6	20	161	14	25
Respiratory System	Nose, Nasal Cavity and Middle Ear	14	^	^	^	^	^	10	^	^
	Larynx	41	^	15	13	^	^	28	^	12
	Lung	671	9	451	306	6	201	365	^	250
	Pleura	^	^	^	^	^	^	^	^	^
	Trachea, Mediastinum and Other Respiratory	6	^	^	^	^	^	^	^	^
Skin excluding Basal and Squamous	Skin Melanoma	1,067	1,301	68	451	537	17	616	764	51
	Other Non-Epithelial Skin	78	^	16	33	^	^	45	^	12
Soft Tissue Including Heart	Soft Tissue Including Heart	112	^	41	47	^	20	65	^	21
Urinary System	Bladder	468	^	84	75	^	21	393	^	63
	Kidney	383	10	79	131	6	32	252	^	47
	Ureter	8	^	^	^	^	^	^	^	^

[a] Data Sources: SEER*Stat Database: NAACCR Incidence Data – CiNA Analytic File, SEER*Stat Database: Mortality

[b] Brain and Nervous System "In Situ" column count includes benign and borderline tumors

^ Statistic suppressed due to small cell size (<6 cases or <10 deaths) or allows inference of a small cell

Table C2. Cancer incidence and mortality by cancer site in Utah and the U.S., 2013-2017[a]

Cancer Site		Incidence per 100,000 Population					Mortality per 100,000 Population				
		Utah		U.S.		Percent Diff.	Utah		U.S.		Percent Diff.
		Rate[b]	95% CI[c]	Rate[b]	95% CI[c]		Rate[b]	95% CI[c]	Rate[b]	95% CI[c]	
All Sites	All Sites	487.1	(483.2-491.0)	504.9	(504.6-505.2)	-3.5	125.5	(123.5-127.5)	158.6	(158.4-158.7)	-20.9
Bones and Joints	Bones and Joints	1.3	(1.1-1.5)	1.0	(1.0-1.0)	30.0	0.4	(0.3-0.5)	0.5	(0.4-0.5)	-20.0
Brain And Other Nervous System	Brain and Nervous System	30.8	(29.8-31.8)	18.9	(18.8-19.0)	63.0	4.7	(4.3-5.1)	4.4	(4.4-4.4)	6.8
Breast	Breast, Female	137.0	(134.1-139.9)	156.1	(155.9-156.4)	-12.2	20.1	(19.0-21.2)	20.3	(20.2-20.4)	-1.0
Digestive System	Esophagus	3.3	(2.9-3.6)	4.6	(4.6-4.7)	-28.3	2.8	(2.5-3.2)	4.0	(3.9-4.0)	-30.0
	Stomach	4.8	(4.4-5.2)	6.6	(6.6-6.7)	-27.3	2.3	(2.0-2.6)	3.1	(3.0-3.1)	-25.8
	Small Intestine	2.8	(2.5-3.1)	2.5	(2.4-2.5)	12.0	0.4	(0.3-0.5)	0.4	(0.4-0.4)	0.0
	Colorectal	31.3	(30.3-32.3)	40.2	(40.1-40.3)	-22.1	11.2	(10.6-11.8)	14.0	(13.9-14.0)	-20.0
	Anus, Anal Canal and Anorectum	1.5	(1.3-1.7)	2.1	(2.1-2.1)	-28.6	0.2	(0.1-0.3)	0.3	(0.3-0.3)	-33.3
	Liver	5.2	(4.8-5.6)	7.2	(7.2-7.3)	-27.8	3.5	(3.2-3.8)	4.9	(4.9-5.0)	-28.6
	Intrahepatic Bile Duct	1.0	(0.8-1.2)	1.3	(1.3-1.3)	-23.1	1.3	(1.1-1.6)	1.7	(1.6-1.7)	-23.5
	Gallbladder	1.0	(0.8-1.2)	1.1	(1.1-1.2)	-9.1	0.4	(0.3-0.5)	0.6	(0.6-0.6)	-33.3
	Other Biliary	1.1	(1.0-1.3)	1.8	(1.7-1.8)	-38.9	0.3	(0.2-0.4)	0.4	(0.4-0.5)	-25.0
	Pancreas	10.9	(10.3-11.5)	13.0	(13.0-13.1)	-16.2	9.5	(8.9-10.0)	11.0	(11.0-11.0)	-13.6
	Retroperitoneum	0.5	(0.4-0.7)	0.4	(0.4-0.4)	25.0	0.1	(0.0-0.2)	0.1	(0.1-0.1)	0.0
	Peritoneum, Omentum and Mesentery	0.5	(0.4-0.6)	0.5	(0.5-0.5)	0.0	0.2	(0.1-0.3)	0.3	(0.3-0.3)	-33.3
	Other Digestive Organs	0.7	(0.6-0.9)	0.7	(0.6-0.7)	0.0	0.4	(0.3-0.6)	0.4	(0.4-0.4)	0.0
Endocrine System	Thyroid	17.9	(17.2-18.7)	14.3	(14.2-14.4)	25.2	0.6	(0.5-0.8)	0.5	(0.5-0.5)	20.0
	Other Endocrine Including Thymus	8.1	(7.6-8.6)	5.2	(5.2-5.3)	55.8	0.2	(0.2-0.3)	0.3	(0.3-0.3)	-33.3
Eye and Orbit	Eye and Orbit	1.1	(0.9-1.3)	1.0	(0.9-1.0)	10.0	0.1	(0.1-0.2)	0.1	(0.1-0.1)	0.0
Female Genital System	Cervical	5.4	(4.8-6.0)	7.6	(7.6-7.7)	-28.9	1.3	(1.1-1.6)	2.3	(2.2-2.3)	-43.5
	Uterine	27.1	(25.9-28.4)	27.2	(27.1-27.3)	-0.4	4.3	(3.8-4.8)	4.8	(4.8-4.9)	-10.4
	Ovary	11.3	(10.5-12.1)	11.0	(11.0-11.1)	2.7	7.7	(7.1-8.5)	6.9	(6.8-6.9)	11.6
	Vagina	0.5	(0.4-0.8)	0.7	(0.7-0.7)	-28.6	^	^	0.2	(0.2-0.2)	^
	Vulva	2.9	(2.5-3.3)	3.4	(3.4-3.5)	-14.7	0.2	(0.1-0.3)	0.5	(0.5-0.6)	-60.0
	Other Female Genital Organs	1.6	(1.3-1.9)	1.6	(1.6-1.6)	0.0	0.3	(0.2-0.5)	0.4	(0.3-0.4)	-25.0
Leukemia	Leukemia	14.3	(13.6-15.0)	14.2	(14.2-14.3)	0.7	6.7	(6.3-7.2)	6.4	(6.4-6.5)	4.7
Lymphoma	Hodgkin Lymphoma	2.3	(2.1-2.6)	2.7	(2.6-2.7)	-14.8	0.3	(0.2-0.4)	0.3	(0.3-0.3)	0.0
	Non-Hodgkin Lymphoma	18.6	(17.9-19.4)	19.3	(19.2-19.4)	-3.6	5.4	(4.9-5.8)	5.5	(5.5-5.5)	-1.8
Male Genital System	Prostate	112.8	(110.1-115.5)	104.6	(104.4-104.8)	7.8	20.0	(18.8-21.3)	19.1	(19.0-19.2)	4.7
	Testis	7.4	(6.8-8.0)	5.7	(5.6-5.7)	29.8	0.2	(0.1-0.3)	0.3	(0.2-0.3)	-33.3
	Penis	1.3	(1.0-1.6)	1.3	(1.3-1.3)	0.0	^	^	0.2	(0.2-0.2)	^
	Other Male Genital Organs	0.4	(0.2-0.6)	0.3	(0.3-0.3)	33.3	^	^	0.0	(0.0-0.0)	^
Miscellaneous	Miscellaneous	12.3	(11.7-12.9)	16.8	(16.8-16.9)	-26.8	11.0	(10.4-11.6)	11.6	(11.6-11.7)	-5.2
Myeloma	Myeloma	6.1	(5.7-6.6)	6.9	(6.9-7.0)	-11.6	3.3	(3.0-3.6)	3.3	(3.2-3.3)	0.0
Oral Cavity and Pharynx	Oral Cavity and Pharynx	10.6	(10.1-11.2)	12.2	(12.1-12.2)	-13.1	1.7	(1.5-2.0)	2.5	(2.5-2.5)	-32.0
Respiratory System	Nose, Nasal Cavity and Middle Ear	0.7	(0.5-0.8)	0.7	(0.7-0.7)	0.0	0.2	(0.1-0.3)	0.1	(0.1-0.1)	100.0
	Larynx	1.8	(1.5-2.0)	3.5	(3.4-3.5)	-48.6	0.4	(0.3-0.6)	1.0	(1.0-1.0)	-60.0
	Lung	26.1	(25.2-27.1)	58.8	(58.7-58.9)	-55.6	18.5	(17.8-19.3)	40.4	(40.3-40.5)	-54.2
	Pleura	^	^	0.0	(0.0-0.0)	^	^	^	0.1	(0.1-0.1)	^
	Trachea, Mediastinum and Other Respiratory	0.2	(0.1-0.2)	0.2	(0.2-0.2)	0.0	^	^	0.1	(0.1-0.1)	^
Skin excluding Basal and Squamous	Skin Melanoma	77.2	(75.6-78.7)	40.4	(40.3-40.5)	91.1	3.1	(2.7-3.4)	2.4	(2.3-2.4)	29.2
	Other Non-Epithelial Skin	2.7	(2.4-3.0)	1.8	(1.8-1.8)	50.0	0.8	(0.6-1.0)	1.0	(1.0-1.0)	-20.0
Soft Tissue Including Heart	Soft Tissue Including Heart	3.4	(3.1-3.8)	3.3	(3.3-3.4)	3.0	1.4	(1.2-1.6)	1.3	(1.3-1.3)	7.7
Urinary System	Bladder	16.7	(16.0-17.4)	20.0	(19.9-20.0)	-16.5	3.4	(3.0-3.7)	4.4	(4.3-4.4)	-22.7
	Kidney	14.1	(13.5-14.8)	17.2	(17.2-17.3)	-18.0	3.4	(3.1-3.7)	3.7	(3.7-3.7)	-8.1
	Ureter	0.5	(0.4-0.7)	0.9	(0.8-0.9)	-44.4	^	^	0.1	(0.1-0.1)	^

[a] Data Sources: SEER*Stat Database: NAACCR Incidence Data – CiNA Analytic File, SEER*Stat Database: Mortality
[b] Age-adjusted incidence or mortality rate per 100,000 population; Standardized to the 2000 U.S. Standard Population
[c] CI: confidence interval
^ Statistic suppressed due to small cell size (<6 cases or <10 deaths) or allows inference of a small cell

Table C3. 5-year relative survival in Utah, by cancer site and stage at diagnosis, 2016 period[a]

Cancer Site		All Stages at Diagnosis			In Situ or Local[b]			Regional or Distant[b]		
		Average N	Relative Survival[c]	95% CI[d]	Average N	Relative Survival[c]	95% CI[d]	Average N	Relative Survival[c]	95% CI[d]
All Sites	All Sites	10,922	77.2%	(76.6-77.8)	6,199	95.8%	(95.2,96.4)	3,443	54.1%	(52.9,55.3)
Bones and Joints	Bones and Joints	34	68.0%	(56.2-77.3)	0	+	+	0	+	+
Brain And Other Nervous System	Brain and Nervous System	194	42.6%	(37.9-47.2)	156	45.3%	(40.0,50.4)	31	32.7%	(22.0,43.7)
Breast	Breast, Female	1,715	91.7%	(90.4-92.8)	1,132	100.0%	(0.0,100)	570	76.5%	(73.8,78.9)
Digestive System	Esophagus	77	24.6%	(18.0-31.7)	15	47.4%	(27A.8,64.6)	54	15.9%	(9.3,93.3)
	Stomach	101	31.6%	(25.6-37.7)	28	73.9%	(59.1,84.0)	66	15.9%	(10.6,22.2)
	Small Intestine	65	69.8%	(60.9-77.1)	20	84.8%	(65.6,93.8)	44	63.0%	(51.8,72.2)
	Colorectal	752	67.9%	(65.3-70.3)	342	91.1%	(87.7,93.6)	383	51.1%	(47.5,54.6)
	Anus, Anal Canal and Anorectum	44	77.7%	(67.4-85.1)	30	90.5%	(79.8,95.7)	12	52.5%	(31.6,69.7)
	Liver	133	28.1%	(22.7-33.7)	65	47.2%	(37.8,56.0)	53	11.6%	(6.4,18.5)
	Intrahepatic Bile Duct	24	8.0%	(2.6-17.4)	+	+	+	16	10.0%	+
	Gallbladder	25	26.8%	(16.3-38.5)	0	+	+	0	+	+
	Other Biliary	28	18.9%	(10.0-30.0)	0	+	+	0	+	+
	Pancreas	253	10.4%	(8.0-13.1)	28	47.0%	(33.3,59.6)	194	5.7%	(3.8,8.0)
	Retroperitoneum	13	61.8%	(41.1-77.0)	0	+	+	0	+	+
	Peritoneum, Omentum and Mesentery	9	47.3%	(24.2-67.4)	0	+	+	0	+	+
	Other Digestive Organs	12	9.8%	(2.1-24.9)	0	+	+	0	+	+
Endocrine System	Thyroid	526	98.8%	(97.3-99.5)	374	99.9%	(98.3,100)	151	96.3%	(93.3,98.0)
	Other Endocrine Including Thymus	19	84.3%	(68.0-92.7)	0	+	+	0	+	+
Eye and Orbit	Eye and Orbit	31	87.1%	(73.1-94.1)	0	+	+	0	+	+
Female Genital System	Cervical	71	75.7%	(68.0-81.8)	37	90.7%	(81.4,95.4)	32	57.8%	(45.2,68.6)
	Uterine	365	82.9%	(79.8-85.6)	264	95.4%	(92.1,97.3)	92	49.1%	(41.8,56.0)
	Ovary	152	49.0%	(43.6-54.3)	30	93.9%	(82.4,98.0)	113	39.1%	(33.1,45.1)
	Vagina	9	74.0%	(42.6-90.0)	0	+	+	0	+	+
	Vulva	53	90.0%	(80.0-95.2)	45	95.5%	(82.7,98.9)	7	56.8%	(26.4,78.7)
	Other Female Genital Organs	14	40.1%	(22.4-57.3)	0	+	+	0	+	+
Leukemia	Leukemia	337	66.9%	(63.1-70.4)	0	+	+	0	+	+
Lymphoma	Hodgkin Lymphoma	78	96.4%	(91.1-98.5)	12	89.5%	(69.6,96.7)	66	97.1%	(90.8,99.1)
	Non-Hodgkin Lymphoma	421	77.6%	(74.3-80.5)	114	87.8%	(81.5,92.1)	290	75.1%	(71.1,78.6)
Male Genital System	Prostate	1,600	97.4%	(95.8-98.4)	1,281	100.0%	+	298	82.1%	+
	Testis	115	96.8%	(93.6-98.4)	87	100.0%	+	27	86.1%	+
	Penis	15	76.9%	(52.4-89.9)	0	+	+	0	+	+
	Other Male Genital Organs	+	+	+	0	+	+	0	+	+
Miscellaneous	Miscellaneous	276	33.3%	(29.4-37.2)	0	+	+	0	+	+
Myeloma	Myeloma	143	56.1%	(49.9-61.9)	7	66.8%	(35.7,85.4)	136	55.4%	(49.0,61.4)
Oral Cavity and Pharynx	Oral Cavity and Pharynx	231	71.5%	(67.0-75.6)	76	88.6%	(79.9,93.7)	63	74.0%	(65.0,81.1)
Respiratory System	Nose, Nasal Cavity and Middle Ear	16	54.3%	(36.1-69.3)	0	+	+	0	+	+
	Larynx	43	67.0%	(55.0-76.4)	27	77.0%	(59.8,87.5)	14	47.1%	(28.9,63.3)
	Lung	583	20.9%	(18.7-23.3)	101	63.9%	(56.1,70.6)	440	12.8%	(10.7,15.0)
	Pleura	+	+	+	0	+	+	0	+	+
	Trachea, Mediastinum and Other Respiratory	+	+	+	0	+	+	0	+	+
Skin excluding Basal and Squamous	Skin Melanoma	1,499	99.3%	(96.4-99.9)	1,388	100.0%	+	101	62.7%	+
	Other Non-Epithelial Skin	51	87.0%	(74.5-93.6)	0	+	+	0	+	+
Soft Tissue Including Heart	Soft Tissue Including Heart	82	69.8%	(62.0-76.2)	53	78.0%	(68.0,85.2)	27	56.3%	(43.1,67.5)
Urinary System	Bladder	330	81.4%	(77.2-84.9)	288	90.0%	(85.4,93.2)	34	20.6%	(12.1,30.6)
	Kidney	318	74.0%	(70.3-77.4)	207	93.1%	(88.9,95.8)	103	39.9%	(33.6,46.1)
	Ureter	9	59.1%	(31.9-78.5)	0	+	+	0	+	+

[a] Data Source: SEER*Stat Database: SEER Registry Plus Data
[b] SEER Summary Stage 2000
[c] Relative survival compared to general population, matched on age and sex
[d] CI: confidence interval
+The statistic could not be calculated due to small number of cases

Table C4. Cancer incidence for Hispanics/Latinos and non-Hispanic whites, Utah and the U.S. 2013-2017[a]

Cancer Site		Utah				U.S.			
		Hispanic/Latino		Non-Hispanic White		Hispanic/Latino		Non-Hispanic White	
		Rate[b]	95% CI[c]	Rate[b]	95% CI[c]	Rate[b]	95% CI[c]	Rate[b]	95% CI[c]
All Sites	All Sites	425.7	(411.4-440.3)	496.0	(491.8-500.2)	380.7	(379.8-381.7)	525.9	(525.5-526.3)
Bones and Joints	Bones and Joints	1.8	(1.1-2.8)	1.2	(1.0-1.5)	0.9	(0.9-1.0)	1.0	(1.0-1.0)
Brain And Other Nervous System	Brain and Nervous System	25.6	(22.3-29.2)	31.8	(30.7-32.9)	16.1	(16.0-16.3)	20.1	(20.0-20.2)
Breast	Breast, Female	130.5	(120.5-141.0)	138.4	(135.4-141.6)	117.2	(116.5-117.8)	162.7	(162.3-163.0)
Digestive System	Esophagus	2.5	(1.5-3.9)	3.3	(3.0-3.7)	2.8	(2.7-2.8)	5.1	(5.1-5.1)
	Stomach	10.9	(8.6-13.5)	3.9	(3.5-4.3)	9.7	(9.5-9.8)	5.4	(5.4-5.4)
	Small Intestine	2.5	(1.4-3.9)	2.8	(2.5-3.2)	1.8	(1.8-1.9)	2.4	(2.4-2.5)
	Colorectal	36.6	(32.4-41.1)	30.6	(29.6-31.7)	35.3	(35.0-35.6)	40.0	(39.9-40.2)
	Anus, Anal Canal and Anorectum	0.9	(0.3-1.9)	1.6	(1.4-1.9)	1.5	(1.4-1.5)	2.3	(2.3-2.3)
	Liver	13.6	(11.1-16.5)	4.2	(3.8-4.5)	12.1	(11.9-12.3)	5.8	(5.8-5.9)
	Intrahepatic Bile Duct	0.9	(0.3-1.9)	1.0	(0.8-1.2)	1.4	(1.4-1.5)	1.3	(1.2-1.3)
	Gallbladder	2.0	(1.1-3.3)	0.9	(0.7-1.0)	1.9	(1.9-2.0)	0.9	(0.9-0.9)
	Other Biliary	2.2	(1.2-3.7)	1.1	(0.9-1.3)	2.3	(2.2-2.4)	1.6	(1.6-1.7)
	Pancreas	11.1	(8.7-13.9)	10.8	(10.2-11.5)	11.4	(11.3-11.6)	13.0	(12.9-13.1)
	Retroperitoneum	0.6	(0.2-1.2)	0.5	(0.4-0.6)	0.4	(0.4-0.4)	0.4	(0.4-0.4)
	Peritoneum, Omentum and Mesentery	^	^	0.5	(0.4-0.6)	0.4	(0.4-0.4)	0.5	(0.5-0.6)
	Other Digestive Organs	^	^	0.7	(0.5-0.9)	0.8	(0.7-0.8)	0.6	(0.6-0.6)
Endocrine System	Thyroid	18.1	(15.8-20.6)	18.3	(17.5-19.1)	13.4	(13.2-13.6)	15.4	(15.3-15.4)
	Other Endocrine Including Thymus	9.0	(7.4-10.8)	7.9	(7.4-8.4)	5.6	(5.5-5.7)	4.6	(4.6-4.7)
Eye and Orbit	Eye and Orbit	0.8	(0.4-1.6)	1.1	(0.9-1.3)	0.6	(0.6-0.7)	1.1	(1.1-1.1)
Female Genital System	Cervical	6.7	(5.0-8.8)	4.9	(4.3-5.5)	9.5	(9.3-9.7)	7.2	(7.1-7.3)
	Uterine	24.4	(20.3-29.0)	26.9	(25.6-28.3)	24.0	(23.7-24.3)	27.7	(27.6-27.9)
	Ovary	11.2	(8.4-14.5)	11.3	(10.4-12.2)	10.1	(9.9-10.3)	11.5	(11.4-11.6)
	Vagina	^	^	0.5	(0.4-0.7)	0.7	(0.7-0.8)	0.7	(0.7-0.7)
	Vulva	1.4	(0.5-2.9)	3.1	(2.6-3.6)	2.0	(1.9-2.1)	4.0	(3.9-4.0)
	Other Female Genital Organs	2.2	(1.0-4.1)	1.5	(1.2-1.9)	1.3	(1.2-1.4)	1.7	(1.7-1.7)
Leukemia	Leukemia	11.1	(8.9-13.6)	14.6	(13.9-15.3)	11.3	(11.2-11.5)	15.0	(14.9-15.1)
Lymphoma	Hodgkin Lymphoma	2.7	(1.8-4.0)	2.4	(2.2-2.7)	2.4	(2.3-2.4)	2.9	(2.8-2.9)
	Non-Hodgkin Lymphoma	22.5	(19.1-26.2)	18.6	(17.8-19.4)	17.6	(17.4-17.8)	20.2	(20.1-20.2)
Male Genital System	Prostate	92.2	(82.1-103.1)	114.3	(111.5-117.2)	85.6	(84.9-86.3)	97.6	(97.4-97.8)
	Testis	6.4	(5.0-8.3)	7.8	(7.1-8.6)	5.0	(4.9-5.2)	7.0	(6.9-7.1)
	Penis	1.8	(0.6-3.9)	1.3	(1.0-1.6)	1.7	(1.6-1.8)	1.2	(1.2-1.3)
	Other Male Genital Organs	^	^	0.4	(0.3-0.6)	0.2	(0.2-0.2)	0.3	(0.2-0.3)
Miscellaneous	Miscellaneous	12.7	(10.1-15.8)	12.3	(11.6-12.9)	14.0	(13.8-14.2)	17.3	(17.2-17.4)
Myeloma	Myeloma	8.2	(6.2-10.7)	5.9	(5.4-6.3)	6.6	(6.5-6.7)	6.1	(6.1-6.1)
Oral Cavity and Pharynx	Oral Cavity and Pharynx	6.0	(4.4-7.8)	11.1	(10.5-11.7)	7.1	(7.0-7.2)	13.5	(13.4-13.5)
Respiratory System	Nose, Nasal Cavity and Middle Ear	^	^	0.7	(0.6-0.9)	0.6	(0.5-0.6)	0.7	(0.7-0.7)
	Larynx	2.0	(1.1-3.2)	1.8	(1.6-2.1)	2.4	(2.4-2.5)	3.6	(3.6-3.7)
	Lung	28.5	(24.5-33.0)	26.0	(25.0-26.9)	29.8	(29.5-30.0)	63.2	(63.0-63.3)
	Pleura	^	^	^	^	0.0	(0.0-0.0)	0.0	(0.0-0.0)
	Trachea, Mediastinum and Other Respiratory	^	^	0.2	(0.1-0.3)	0.2	(0.2-0.2)	0.2	(0.2-0.2)
Skin excluding Basal and Squamous	Skin Melanoma	18.1	(15.3-21.3)	85.0	(83.3-86.7)	7.5	(7.3-7.6)	50.9	(50.8-51.0)
	Other Non-Epithelial Skin	1.4	(0.6-2.5)	2.8	(2.5-3.2)	0.9	(0.9-1.0)	1.9	(1.9-2.0)
Soft Tissue Including Heart	Soft Tissue Including Heart	2.5	(1.6-3.7)	3.5	(3.2-3.9)	3.1	(3.0-3.1)	3.4	(3.3-3.4)
Urinary System	Bladder	11.2	(8.7-14.1)	17.4	(16.6-18.2)	10.7	(10.6-10.9)	22.5	(22.4-22.6)
	Kidney	18.7	(15.8-22.0)	14.0	(13.3-14.7)	16.9	(16.7-17.1)	17.5	(17.4-17.5)
	Ureter	^	^	0.5	(0.4-0.7)	0.5	(0.5-0.6)	1.0	(1.0-1.0)

[a] Data Source: SEER*Stat Database: NAACCR Incidence Data – CiNA Analytic File
[b] Age-adjusted incidence rate per 100,000 population; Standardized to the 2000 U.S. Standard Population
[c] CI: confidence interval
^ Statistic suppressed due to small cell size (<6 cases) or allows inference of a small cell

Table C5. Cancer mortality for Hispanics/Latinos and non-Hispanic whites, Utah and the U.S. 2013-2017[a]

Cancer Site		Utah				U.S.			
		Hispanic/Latino		Non-Hispanic White		Hispanic/Latino		Non-Hispanic White	
		Rate[b]	95% CI[c]	Rate[b]	95% CI[c]	Rate[b]	95% CI[c]	Rate[b]	95% CI[c]
All Sites	All Sites	109.1	(101.1-117.6)	126.8	(124.7-129.0)	112.3	(111.8-112.9)	163.2	(163.0-163.4)
Bones and Joints	Bones and Joints	^	^	0.4	(0.3-0.6)	0.4	(0.4-0.4)	0.5	(0.5-0.5)
Brain And Other Nervous System	Brain and Nervous System	2.5	(1.5-3.7)	5.0	(4.6-5.5)	3.0	(2.9-3.1)	5.1	(5.0-5.1)
Breast	Breast, Female	11.1	(8.1-14.6)	20.8	(19.6-22.0)	14.1	(13.8-14.3)	20.3	(20.2-20.4)
Digestive System	Esophagus	1.7	(0.8-3.0)	3.0	(2.7-3.4)	2.0	(1.9-2.1)	4.4	(4.4-4.5)
	Stomach	5.9	(4.1-8.1)	1.8	(1.5-2.1)	5.0	(4.9-5.1)	2.3	(2.3-2.4)
	Small Intestine	^	^	0.4	(0.3-0.5)	0.3	(0.2-0.3)	0.4	(0.4-0.4)
	Colorectal	10.6	(8.2-13.3)	11.1	(10.5-11.7)	11.1	(11.0-11.3)	13.9	(13.8-13.9)
	Anus, Anal Canal and Anorectum	^	^	0.2	(0.1-0.3)	0.1	(0.1-0.2)	0.3	(0.3-0.3)
	Liver	7.4	(5.5-9.8)	2.9	(2.6-3.2)	7.5	(7.3-7.6)	4.2	(4.1-4.2)
	Intrahepatic Bile Duct	1.7	(0.8-3.0)	1.3	(1.1-1.5)	1.8	(1.8-1.9)	1.6	(1.6-1.6)
	Gallbladder	^	^	0.3	(0.2-0.5)	0.9	(0.8-0.9)	0.5	(0.5-0.5)
	Other Biliary	^	^	0.2	(0.2-0.4)	0.5	(0.4-0.5)	0.4	(0.4-0.5)
	Pancreas	9.5	(7.2-12.2)	9.5	(8.9-10.1)	8.5	(8.4-8.7)	11.1	(11.1-11.2)
	Retroperitoneum	^	^	0.1	(0.0-0.2)	0.1	(0.1-0.1)	0.1	(0.1-0.1)
	Peritoneum, Omentum and Mesentery	^	^	0.2	(0.1-0.3)	0.2	(0.2-0.2)	0.3	(0.3-0.3)
	Other Digestive Organs	^	^	0.4	(0.3-0.6)	0.3	(0.3-0.4)	0.3	(0.3-0.4)
Endocrine System	Thyroid	^	^	0.7	(0.5-0.8)	0.6	(0.6-0.7)	0.5	(0.5-0.5)
	Other Endocrine Including Thymus	^	^	0.2	(0.1-0.3)	0.2	(0.2-0.3)	0.3	(0.3-0.3)
Eye and Orbit	Eye and Orbit	^	^	0.1	(0.1-0.2)	0.0	(0.0-0.1)	0.1	(0.1-0.1)
Female Genital System	Cervical	^	^	1.3	(1.0-1.6)	2.6	(2.5-2.7)	2.1	(2.0-2.1)
	Uterine	5.6	(3.4-8.4)	4.1	(3.6-4.6)	4.0	(3.9-4.1)	4.5	(4.4-4.5)
	Ovary	5.4	(3.3-8.2)	8.1	(7.3-8.8)	5.2	(5.0-5.3)	7.3	(7.2-7.3)
	Vagina	^	^	^	^	0.2	(0.2-0.2)	0.2	(0.2-0.2)
	Vulva	^	^	0.2	(0.1-0.4)	0.3	(0.3-0.4)	0.6	(0.6-0.6)
	Other Female Genital Organs	^	^	0.3	(0.2-0.5)	0.2	(0.2-0.3)	0.4	(0.4-0.4)
Leukemia	Leukemia	3.9	(2.6-5.6)	7.0	(6.5-7.5)	4.6	(4.5-4.7)	6.8	(6.7-6.8)
Lymphoma	Hodgkin Lymphoma	^	^	0.2	(0.2-0.4)	0.4	(0.3-0.4)	0.3	(0.3-0.3)
	Non-Hodgkin Lymphoma	6.1	(4.3-8.5)	5.4	(5.0-5.9)	4.7	(4.6-4.8)	5.8	(5.7-5.8)
Male Genital System	Prostate	13.2	(8.9-18.5)	20.7	(19.4-22.0)	15.8	(15.4-16.1)	18.0	(17.9-18.1)
	Testis	^	^	0.2	(0.1-0.4)	0.3	(0.2-0.3)	0.3	(0.3-0.3)
	Penis	^	^	^	^	0.3	(0.3-0.4)	0.2	(0.2-0.2)
	Other Male Genital Organs	^	^	^	^	0.0	(0.0-0.0)	0.0	(0.0-0.0)
Miscellaneous	Miscellaneous	9.0	(6.7-11.6)	11.2	(10.6-11.9)	7.8	(7.6-7.9)	12.2	(12.1-12.2)
Myeloma	Myeloma	2.7	(1.5-4.3)	3.2	(2.9-3.6)	2.7	(2.6-2.8)	3.0	(3.0-3.1)
Oral Cavity and Pharynx	Oral Cavity and Pharynx	^	^	1.8	(1.5-2.0)	1.5	(1.5-1.6)	2.6	(2.6-2.7)
Respiratory System	Nose, Nasal Cavity and Middle Ear	^	^	0.2	(0.1-0.3)	0.1	(0.1-0.1)	0.1	(0.1-0.1)
	Larynx	^	^	0.4	(0.3-0.6)	0.7	(0.6-0.7)	1.0	(1.0-1.0)
	Lung	16.0	(13.0-19.5)	18.6	(17.8-19.5)	17.6	(17.4-17.8)	43.6	(43.5-43.7)
	Pleura	^	^	^	^	0.0	(0.0-0.1)	0.1	(0.1-0.1)
	Trachea, Mediastinum and Other Respiratory	^	^	^	^	0.1	(0.0-0.1)	0.1	(0.1-0.1)
Skin excluding Basal and Squamous	Skin Melanoma	^	^	3.4	(3.1-3.8)	0.7	(0.6-0.7)	3.0	(3.0-3.1)
	Other Non-Epithelial Skin	^	^	0.8	(0.6-1.0)	0.5	(0.4-0.5)	1.2	(1.2-1.2)
Soft Tissue Including Heart	Soft Tissue Including Heart	0.9	(0.4-1.8)	1.4	(1.2-1.6)	1.1	(1.0-1.1)	1.3	(1.3-1.4)
Urinary System	Bladder	^	^	3.5	(3.2-3.9)	2.3	(2.3-2.4)	4.8	(4.8-4.8)
	Kidney	3.6	(2.3-5.3)	3.4	(3.1-3.8)	3.5	(3.4-3.6)	3.8	(3.8-3.9)
	Ureter	^	^	^	^	0.1	(0.0-0.1)	0.1	(0.1-0.1)

[a] Data Source: SEER*Stat Database: Mortality
[b] Age-adjusted mortality rate per 100,000 population; Standardized to the 2000 U.S. Standard Population
[c] CI: confidence interval
^ Statistic suppressed due to small cell size (<10 deaths) or allows inference of a small cell

Table C6. Cancer in Utah counties: population and cancer counts, 2017[a]

Population Type	County	Population	New Cases	
			Invasive	In Situ[b]
Urban	Box Elder	53,967	225	39
	Cache	124,564	399	108
	Davis	346,881	1,193	299
	Juab	11,248	41	^
	Morgan	11,875	40	19
	Salt Lake	1,137,820	4,064	982
	Tooele	67,418	231	58
	Utah	606,503	1,563	457
	Washington	165,859	870	179
	Weber	251,866	922	262
Rural	Beaver	6,396	39	^
	Carbon	20,168	114	^
	Daggett	1,022	^	^
	Duchesne	19,915	90	16
	Emery	10,020	41	^
	Garfield	5,061	33	^
	Grand	9,640	46	^
	Iron	50,822	201	39
	Kane	7,537	47	^
	Millard	12,829	57	14
	Piute	1,413	^	^
	Rich	2,402	^	^
	San Juan	15,320	41	^
	Sanpete	29,991	98	16
	Sevier	21,317	108	18
	Summit	41,349	206	76
	Uintah	35,219	123	28
	Wasatch	31,975	118	45
	Wayne	2,721	11	^

[a] Data Source: SEER*Stat Database: Incidence - SEER 18 Registries Research Data
[b] In Situ count includes benign behavior brain and nervous system cancers
^ Statistic suppressed due to small cell size (< 11 cases) or allows inference of a small cell

Table C7. Cancer counts and incidence in urban and rural counties in Utah, 2013-2017[a]

Cancer Site		Cancer Cases		Incidence per 100,000 Population			
		Urban	Rural	Urban		Rural	
				Rate[b]	95% CI[c]	Rate[b]	95% CI[c]
All Sites	All Sites	55,448	7,685	488.6	(484.5-492.7)	476.0	(465.1-487.0)
Bones and Joints	Bones and Joints	166	19	1.3	(1.1-1.5)	1.2	(0.7-1.9)
Brain And Other Nervous System	Brain and Nervous System	3,588	426	31.4	(30.3-32.4)	26.8	(24.2-29.5)
Breast	Breast, Female	8,111	981	138.8	(135.8-141.9)	123.9	(116.1-132.1)
Digestive System	Esophagus	369	54	3.3	(2.9-3.6)	3.2	(2.4-4.2)
	Stomach	518	80	4.7	(4.3-5.2)	5.0	(3.9-6.2)
	Small Intestine	320	37	2.9	(2.5-3.2)	2.3	(1.6-3.3)
	Colorectal	3,439	524	31.0	(30.0-32.1)	33.2	(30.4-36.3)
	Anus, Anal Canal and Anorectum	175	27	1.5	(1.3-1.8)	1.5	(1.0-2.3)
	Liver	610	92	5.2	(4.8-5.7)	5.2	(4.1-6.4)
	Intrahepatic Bile Duct	97	26	0.9	(0.7-1.1)	1.6	(1.0-2.4)
	Gallbladder	107	13	1.0	(0.8-1.2)	0.9	(0.4-1.5)
	Other Biliary	117	22	1.1	(0.9-1.3)	1.4	(0.9-2.2)
	Pancreas	1,199	160	11.0	(10.4-11.7)	9.7	(8.2-11.4)
	Retroperitoneum	60	^	0.5	(0.4-0.7)	^	^
	Peritoneum, Omentum and Mesentery	53	^	0.5	(0.4-0.6)	^	^
	Other Digestive Organs	78	^	0.7	(0.6-0.9)	^	^
Endocrine System	Thyroid	2,186	245	18.1	(17.4-18.9)	16.4	(14.3-18.6)
	Other Endocrine Including Thymus	1,004	114	8.2	(7.7-8.7)	7.4	(6.1-8.9)
Eye and Orbit	Eye and Orbit	126	20	1.1	(0.9-1.3)	1.2	(0.7-1.8)
Female Genital System	Cervical	313	41	5.3	(4.7-5.9)	5.6	(4.0-7.7)
	Uterine	1,682	192	27.7	(26.4-29.1)	22.5	(19.4-26.1)
	Ovary	677	87	11.3	(10.5-12.2)	10.8	(8.6-13.4)
	Vagina	29	^	0.5	(0.3-0.7)	^	^
	Vulva	161	33	2.7	(2.3-3.2)	4.4	(3.0-6.2)
	Other Female Genital Organs	94	13	1.6	(1.3-1.9)	1.5	(0.8-2.7)
Leukemia	Leukemia	1,618	261	14.0	(13.3-14.7)	16.2	(14.3-18.4)
Lymphoma	Hodgkin Lymphoma	303	44	2.3	(2.0-2.5)	2.8	(2.1-3.8)
	Non-Hodgkin Lymphoma	2,091	285	18.7	(17.9-19.6)	17.9	(15.8-20.1)
Male Genital System	Prostate	6,182	941	113.5	(110.6-116.4)	108.1	(101.1-115.4)
	Testis	493	56	7.3	(6.7-8.0)	7.8	(5.8-10.1)
	Penis	71	^	1.4	(1.1-1.7)	^	^
	Other Male Genital Organs	21	^	0.4	(0.2-0.6)	^	^
Miscellaneous	Miscellaneous	1,284	225	12.0	(11.3-12.7)	14.3	(12.4-16.3)
Myeloma	Myeloma	683	93	6.2	(5.8-6.7)	5.6	(4.5-6.9)
Oral Cavity and Pharynx	Oral Cavity and Pharynx	1,203	189	10.5	(10.0-11.2)	11.2	(9.6-13.0)
Respiratory System	Nose, Nasal Cavity and Middle Ear	72	14	0.6	(0.5-0.8)	0.9	(0.5-1.5)
	Larynx	192	42	1.7	(1.4-1.9)	2.4	(1.7-3.3)
	Lung	2,775	486	25.6	(24.6-26.6)	29.8	(27.1-32.6)
	Pleura	^	^	^	^	^	^
	Trachea, Mediastinum and Other Respiratory	19	^	0.1	(0.1-0.2)	^	^
Skin excluding Basal and Squamous	Skin Melanoma	8,818	1,150	77.8	(76.2-79.5)	72.6	(68.3-77.0)
	Other Non-Epithelial Skin	290	41	2.7	(2.4-3.1)	2.6	(1.8-3.5)
Soft Tissue Including Heart	Soft Tissue Including Heart	413	55	3.4	(3.1-3.8)	3.5	(2.6-4.6)
Urinary System	Bladder	1,763	293	16.4	(15.7-17.2)	18.4	(16.3-20.6)
	Kidney	1,614	218	14.2	(13.5-15.0)	13.6	(11.8-15.6)
	Ureter	53	^	0.5	(0.4-0.7)	^	^

[a] Data Source: SEER*Stat Database: NAACCR Incidence Data – CiNA Analytic File
[b] Age-adjusted incidence rate per 100,000 population; Standardized to the 2000 U.S. Standard Population
[c] CI: confidence interval
^ Statistic suppressed due to small cell size (<11 cases) or allows inference of a small cell

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