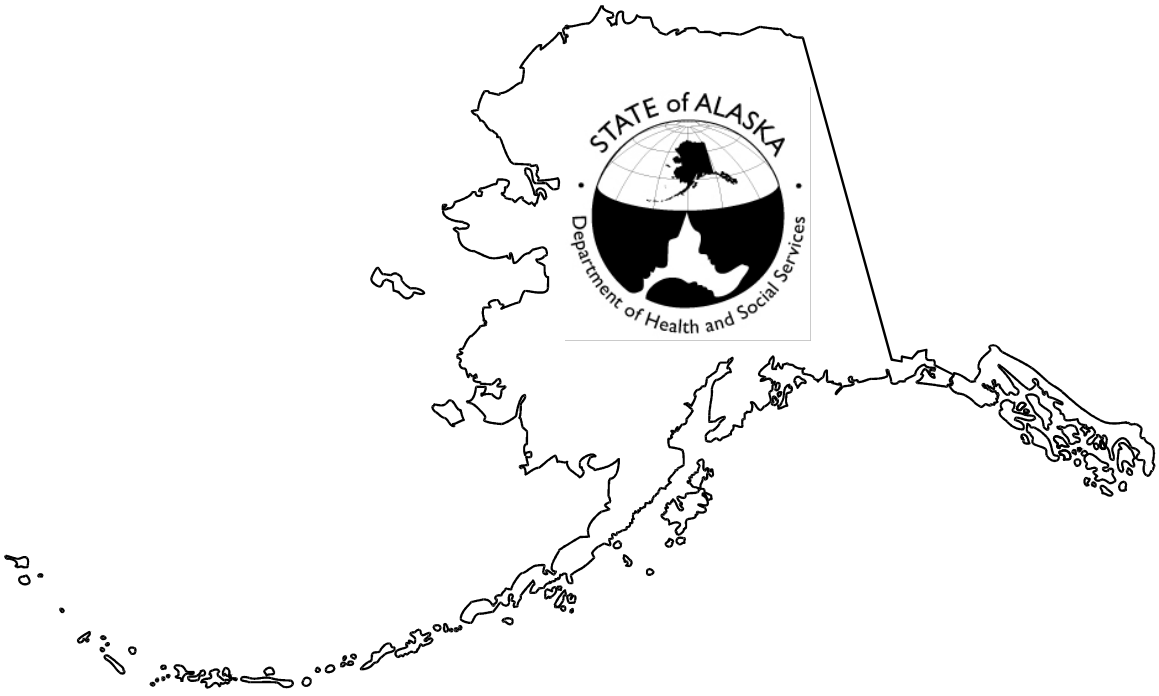
Incidence of Cancers Associated with Screening and Modifiable Risk Factors: Alaska 2010-2014



Alaska Cancer Registry
Section of Chronic Disease Prevention and Health Promotion
Alaska Department of Health and Social Services

June 2017

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June 2017

A Publication of the

Alaska Cancer Registry

State of Alaska
Bill Walker, Governor

Department of Health and Social Services
Valerie Davidson, Commissioner

Division of Public Health
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Executive Summary

This screening and risk factors report summarizes the most recently available information about incidence rates for selected cancer in Alaska. Many partners in Alaska are working to reduce cancer risk and find cancers earlier, thus increasing the number of people who survive cancer and improving the quality of life for cancer survivors. Information included in this report serves as a valuable resource for the planning and evaluation of these efforts.

Data are from the Alaska Cancer Registry (ACR), a population-based cancer surveillance system that is funded by the Centers for Disease Control and Prevention (CDC). ACR collects data on all newly diagnosed cases of cancer for the State of Alaska. Data are from cancer cases diagnosed from 2010-2014, the most recent 5-year time period available from the ACR database.

This report presents late-stage cancer incidence rates for Alaska by Behavioral Health Systems Regions for the screening-amenable cancers of female breast, cervical, colorectal, and lung, and compares them to the late-stage incidence rate of the state of Alaska as a whole for these cancers. It also presents cancer incidence rates for Alaska by Behavioral Health Systems Regions for cancers that are associated with modifiable risk factors including tobacco use, obesity, HPV infection, and UV radiation exposure, and compares them to the incidence rate of the state of Alaska as a whole for these cancers. Key results by region are as follows:

Northwest Region:
This region has statistically significantly higher rates of colorectal cancer and lung cancer for both late-stage and overall incidence than the state rates. The high late-stage rates suggest that this region could benefit from increased screening for both colorectal cancer and lung cancer. Based on risk factors for these 2 cancers, the high overall rates suggest that this region could benefit from obesity intervention programs as well as tobacco cessation programs.

Y-K Delta Region:
This region has statistically significantly higher rates of colorectal cancer for both late-stage and overall incidence than the state rates. The high late-stage rate suggests that this region could benefit from increased screening for colorectal cancer. Based on risk factors for this cancer, the high overall rate suggests that this region could benefit from obesity intervention programs as well as tobacco cessation programs.

Anchorage Region:
This region has a statistically significantly higher rate of melanoma skin cancer than the rest of the state. Based on risk factors for this cancer, the high overall rate suggests that this region could benefit from a UV light protection program.

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Introduction

Background

This screening and risk factors report summarizes the most recently available information about incidence rates for selected cancer in Alaska. The report can be used by the Alaska Comprehensive Cancer Partnership stakeholders – clinical and public health professionals as well as other health advocacy partners and the public – to support continued planning and evaluation of cancer prevention and control efforts.

The Alaska Comprehensive Cancer Control Plan[1] includes many guiding principles, one of which is to identify disparities in cancer burden and address them through planning and implementation of goals and strategies. This report supports the plan by presenting cancer incidence statistics by geographic area for several cancers with the following characteristics:

- Cancers for which screening tests are available and recommended, also known as "screening-amenable cancers".
- Cancers that are associated with modifiable "risk factors" (such as smoking).

The purpose of this report is to establish a baseline for comparison with future reports to monitor the effectiveness of the state of Alaska and local communities in cancer prevention and control. Such goals are accomplished through screening programs for the early detection of certain cancers, as well as public health programs that focus on changing personal behaviors that are considered risk factors for certain cancers. One measure of effectiveness of these public health programs is to monitor the change in cancer incidence over time. For example, the Alaska Cancer Registry's 2013 annual report includes incidence trends during 1996-2013 for the leading 20 cancers.[2] Effective screening programs should result in more cancers being found early, thus late-stage cancer rates should decrease. In this report, late-stage age-adjusted incidence rates are presented for screening-amenable cancers. Effective comprehensive control and prevention programs focusing on reducing behavioral risk should result in fewer cancers, thus overall cancer incidence should decrease. In this report, overall age-adjusted incidence rates are presented for cancers associated with modifiable risk factors.

Screening-Amenable Cancers

Certain types of cancers can be detected through a variety of screening techniques. Some cancers are more screening-amenable than others, and only certain age groups are recommended to get screened. Over time, screening recommendations for certain cancers as well as target age groups have changed. The Alaska Comprehensive Cancer Control Plan uses the current screening recommendations from the U.S. Preventive Services Task Force (USPSTF). USPSTF is an independent volunteer panel of experts in prevention and evidence-based medicine. It works to improve public health by making evidence-based recommendations about clinical preventive services such as screenings, counseling, and preventive medications.[3]

[1] http://dhss.alaska.gov/dph/Chronic/Documents/Cancer/assets/AlaskaCancerPlan2016-2020.pdf

[2] http://dhss.alaska.gov/dph/Chronic/Documents/Cancer/data/CancerInAlaska2013.pdf

[3] https://www.uspreventiveservicestaskforce.org/Page/Name/about-the-uspstf

In 2016, USPSTF released recommendations on screening for breast cancer. It recommends that women 50 to 74 years old receive mammograms every other year.[4] Based on this recommendation, ACR selected the measure of late-stage breast cancer incidence rate among women 50 to 74 years old as the indicator for inadequate breast cancer screening.

In 2012, USPSTF released recommendations on screening for cervical cancer. It recommends that women 21 to 65 years old receive Pap smears every 3 years. However, for women who want to have a longer interval between screening tests, it recommends women 30 to 65 years old get both a Pap smear and human papillomavirus (HPV) test every 5 years.[5] Based on these recommendations, ACR selected the measure of late-stage cervical cancer incidence rate among women 21 to 65 years old as the indicator for inadequate cervical cancer screening.

In 2016, USPSTF released recommendations on screening for colorectal cancer. It recommends that both men and women receive screening starting at age 50 and continue through age 75. There are various screening methods (colonoscopy, flexible sigmoidoscopy, etc.) and each has its own recommended repeat-screening interval.[6] Based on this recommendation, ACR selected the measure of late-stage colorectal cancer incidence rate among people 50 to 75 years old as the indicator for inadequate colorectal cancer screening.

In 2013, USPSTF released recommendations on screening for lung cancer. It recommends that both men and women 55 to 80 years old receive annual screening with low-dose computed tomography (LDCT). The screening recommendation is only for adults who have a 30 pack-year smoking history and currently smoke or have quit within the past 15 years. The number of "pack years" is equal to the number of cigarette packs (assuming 20 cigarettes per pack) smoked per day multiplied by the number of years smoked. A person who smoked a pack a day for 30 years as well as a person who smoked 2 packs a day for 15 years both have a 30 pack-year smoking history. Screening should be discontinued once a person has not smoked for 15 years or develops a health problem that substantially limits life expectancy or the ability or willingness to have curative lung surgery.[7] Based on this recommendation, ACR selected the measure of late-stage lung cancer incidence rate among people 55 to 80 years old as the indicator for inadequate lung cancer screening.

Although there have been recommendations in the past on screening for prostate cancer for older men using the prostate-specific antigen (PSA) test, USPSTF currently does not recommend this screening. Therefore ACR did not include late-state prostate cancer incidence rates in this report.

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[4] https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/breast-cancer-screening1

[5] https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/cervical-cancer-screening

[6] https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/colorectal-cancer-screening2#tab

[7] https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/lung-cancer-screening

Cancers Associated with Modifiable Risk Factors

Many cancers have modifiable risk factors, such as tobacco use, obesity, HPV infections, and excessive sun exposure. ACR reviewed these specific risk factors and the cancers with which they are associated.

Tobacco use is a leading cause of cancer and of death from cancer. People who use tobacco, especially cigarettes, or who are regularly exposed to secondhand smoke, have an increased risk of cancer because tobacco has many chemicals that damage human DNA. People who quit smoking regardless of age have significant increases in life expectancy. Quitting smoking after being diagnosed by cancer greatly increases the potential for survival. Besides lung cancer, tobacco use greatly increases the risk for cancers of the oral cavity, throat, larynx, esophagus, bladder, kidney, liver, stomach, pancreas, colon & rectum, and cervix, as well as acute myeloid leukemia (AML).[8]

People who are obese may have an increased risk of several types of cancer, including breast (in women past menopause), colon & rectum, endometrium (lining of the uterus), esophagus, kidney, pancreas, and gallbladder. Conversely, eating a healthy diet, being physically active, and maintaining a healthy weight may help reduce the risk of some cancers and other illnesses.[9]

Infection with high-risk types of HPV cause nearly all cervical cancers. They also cause most cancers of the anus and many cancers of the oropharynx, vagina, vulva, and penis. High-risk HPVs spread through direct sexual contact, including vaginal, oral, and anal sex. Several vaccines have been developed that prevent infection with the types of HPV that cause most HPV-associated cancers. It is recommended that children be vaccinated at age 11 or 12, but children as young as age 9 and adults as old as 26 can also be vaccinated.[10]

The sun, sunlamps, and tanning booths all produce ultraviolet (UV) radiation. Exposure to UV radiation causes skin damage that can lead to skin cancer.[11] Sun and UV radiation exposure are associated with an increased risk of squamous cell carcinoma and basal cell carcinoma. Intermittent acute sun exposure leading to sunburn is associated with an increased risk of melanoma.[12]

Based on this information, ACR selected the following 9 cancer primary sites for all age groups as indicators for cancers associated with modifiable risk factors:

- Bladder (tobacco use)
- Cervix (tobacco use, HPV)
- Colorectal (tobacco use, obesity)
- Endometrium (obesity)

[8] https://www.cancer.gov/about-cancer/causes-prevention/risk/tobacco
[9] https://www.cancer.gov/about-cancer/causes-prevention/risk/obesity
[10] https://www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents#hpv
[11] https://www.cancer.gov/about-cancer/causes-prevention/risk/sunlight
[12] https://www.cancer.gov/types/skin/hp/skin-prevention-pdq

- Esophagus (tobacco use, obesity)
- Kidney & renal pelvis (tobacco use, obesity)
- Lung & bronchus (tobacco use)
- Melanoma of the skin (UV radiation)
- Oral cavity & pharynx (tobacco use, HPV)

Geographic Areas Used in Analysis

This report presents cancer incidence statistics for Alaska's 10 Behavioral Health Systems Regions (BHSRs). These regions are an aggregate of Alaska's current 29 boroughs and census areas (BCAs) and are used instead of BCAs to provide more robust statistics. ACR suppresses data for geographic areas with less than 6 cases. Many BCAs have small populations and so for the more uncommon cancers, data for these particular BCAs would be suppressed. Combining BCAs into larger BHSRs minimizes the number of geographic areas with suppressed data and maximizes areas with sufficient number of cases to provide statistically reliable rates.

Figure 1 illustrates the geographic location of the 10 BHSRs and Table 1 lists the 29 BCAs associated with each of the BHSRs.

Figure 1: Alaska Behavioral Health Systems Regions Map

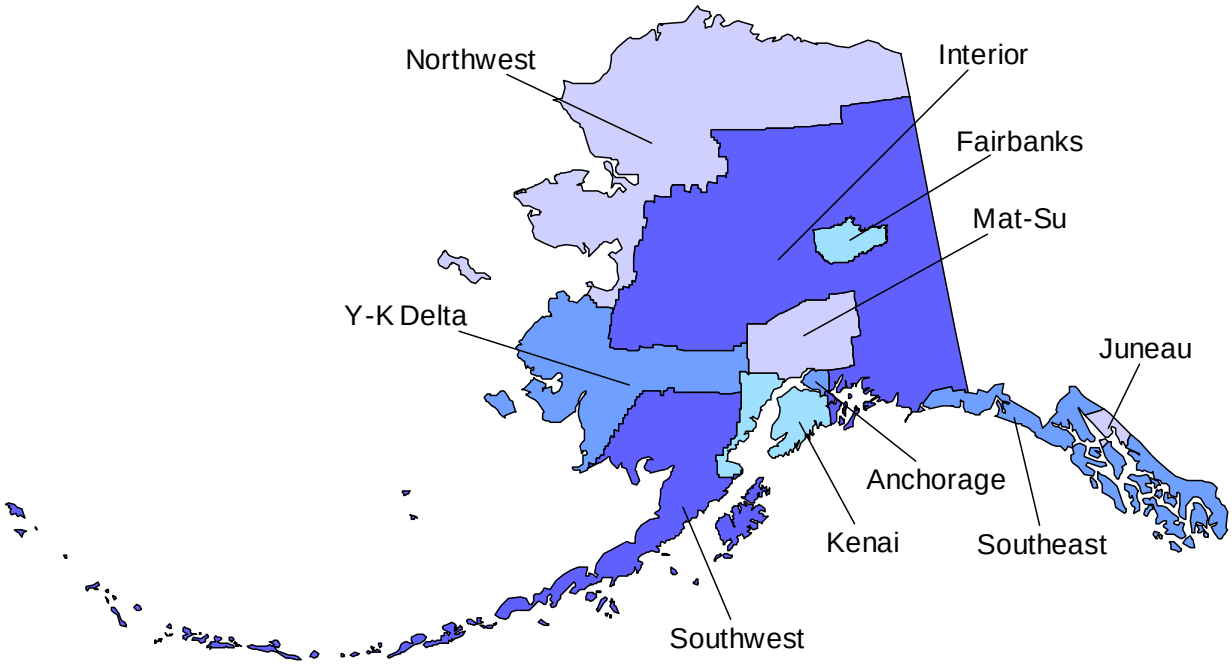

Table 1: Alaska Behavioral Health Systems Regions by Borough/Census Area with 2014 Alaska Resident Populations

Behavioral Health Systems Region	Boroughs/Census Areas	Population
State of Alaska		**737,046**
Anchorage	Anchorage Municipality	**300,357**
Fairbanks	Fairbanks North Star Borough	**99,371**
Interior	Denali Borough	1,903
	Southeast Fairbanks Census Area	6,978
	Valdez-Cordova Census Area	9,493
	Yukon-Koyukuk Census Area	5,563
Total		**23,937**
Juneau	Juneau City and Borough	**32,625**
Kenai Peninsula	Kenai Peninsula Borough	**57,638**
Mat-Su	Matanuska-Susitna Borough	**98,285**
Northwest	Nome Census Area	9,833
	North Slope Borough	9,713
	Northwest Arctic Borough	7,748
Total		**27,294**
Southeast	Haines Borough	2,566
	Hoonah-Angoon Census Area	2,091
	Ketchikan Gateway Borough	13,781
	Petersburg Borough	3,184
	Prince of Wales-Hyder Census Area	6,384
	Sitka City and Borough	8,881
	Skagway Municipality	1,038
	Wrangell City and Borough	2,360
	Yakutat City and Borough	634
Total		**40,919**
Southwest	Aleutians East Borough	3,317
	Aleutians West Census Area	5,751
	Bristol Bay Borough	946
	Dillingham Census Area	4,994
	Kodiak Island Borough	14,007
	Lake and Peninsula Borough	1,629
Total		**30,644**
Y-K Delta	Bethel Census Area	17,923
	Kusilvak Census Area	8,053
Total		**25,976**

Population data source: National Center for Health Statistics via SEER*Stat software (Surveillance, Epidemiology, and End Results Program, National Cancer Institute).

Methods & Definitions

Age-adjusted Rates

A "crude" cancer rate is calculated by taking the number of cancer cases for a given population and dividing it by the total number of people in that population. However, cancer incidence rates in this report are calculated using the direct method and age-adjusted to the standard 2000 U.S. population; they are expressed as number of cases per 100,000 persons.

Age adjustment (sometimes called age standardization) is a statistical process that allows communities and states with different age structures to be compared. Age adjustment removes the influence of the differences in age distributions that occur from one population to another. Since the risk of developing cancer is strongly associated with age, a geographic area with a high proportion of elderly residents could not be accurately compared with a younger-age populated area unless rates were adjusted to a standard reference population – the older community group would always naturally have a higher cancer rate even if the two communities had the same cancer risk.

Effectively, rates for a specific age group in the population of interest are multiplied by the number of people in the same age group in a standard population (in this case, the U.S. 2000 population). Age adjustment is an internationally approved statistical method to remove confounding caused by age.

Confidence Intervals

Upper and lower confidence intervals for age-adjusted incidence rates were calculated using the method of Tiwari et al.[13] The "margin of error" is a common term for the "plus or minus" value around a point estimate, which in total represents the confidence interval. The confidence interval helps to understand the size of uncertainty of the "true value" in a population. Readers are advised to consider the precision of point estimates.

Our report uses 95% confidence intervals. If there is no bias in the data collection system, there is a 95% chance (95 times out of 100 time) that the confidence interval around an estimate will include the true value.

Uncertainty in our estimates occurs because the number of cases of cancer diagnosed is likely to change each year based on random variation. For example, perhaps 2 cases of cervical cancer were diagnosed in early January of the current year instead of December of the previous year because the physicians (or the patients) were on vacation at the end of the previous year. Therefore, the incidence of cervical cancer in the previous year would appear slightly lower than it might have been otherwise. The effect of random variation can be much greater when numbers of cases are small: if the 2 cervical cancers were 2 of only 4 for the entire year, then

[13] Tiwari RC, Clegg LX, Zou Z. Efficient interval estimation for age-adjusted cancer rates. *Stat Methods Med Res* 2006 Dec;15(6):547-69.

attributing those cases to the current year instead of the previous year more drastically affects the estimate of cervical cancer incidence than if those cases were 2 of 40 cervical cancers for the year.

Confidence intervals are also used as another way to test statistical significance. Generally, if the confidence intervals of two different rates overlap, we cannot be certain that there is a true difference between them. However, if the confidence intervals do not overlap, then we believe the true values of results for the two groups are different.

Data suppression

To help ensure the confidentiality of cancer patients, data are suppressed for a given geographic area if there are less than 6 cases. This is the same suppression rule used by the North American Association of Central Cancer Registries (NAACCR).

Incidence

An incident case is defined as a newly diagnosed primary cancer. A primary cancer, or site, is the cancer of origin, as opposed to a cancer that has spread, or metastasized, from another site. Since individuals can have more than one primary cancer, diagnosed either sequentially or at the same time, the number of incident cases may be greater than the number of persons who were diagnosed with cancer.

This report includes all cancer cases newly diagnosed from 2010 to 2014. Only Alaska residents are included in the incidence data. Incidence data are presented as the number of cases and age-adjusted incidence rates.

The Alaska Cancer Registry follows standard protocols so that its incidence rates can be compared with those from other registries and the U.S. as a whole. These include the following:

- Most cancers are grouped by the organ where they arise. The organ of origination is called the primary site.
- Rates are reported only for malignant cancers (those that have penetrated the basement membrane). The exception to this is cancer of the bladder, for which in situ cases are included with invasive cases because generally in situ bladder cancer is as aggressive as malignant bladder cancer.

Stage at Time of Diagnosis

"Staging" measures the extent of disease at the time of initial diagnosis. Summary staging attempts to group cases with similar prognoses into categories of:

- *In situ:* non-invasive
- *Localized:* cancer confined to the primary site
- *Regional:* direct extension of tumor to adjacent organs, tissues, or lymph nodes
- *Distant:* metastasis to tissues or lymph nodes remote from the primary site
- *Unstaged:* information about the extent of disease is not available

“Late stage” age-adjusted rates are presented for screening-amenable cancers. Late stage is a combination of Regional and Distant stages, while “early stage” is a combination of In Situ and Localized stage. The exception to the early stage definition is cervical cancer, which does not include In Situ cases; In Situ cervical cancer is not reportable under state and federal law.

“Percent of total number of cases” are presented for late-stage screening-amenable cancers. They are calculated by dividing the number of late stage cases by the number of early stage, late stage, and unstaged cases for each geographic area. This value expressed as an equation based on the definitions of early and late stage is as follows:

$$\% \text{ of Total} = \frac{\text{Regional + Distant}}{\text{In Situ + Localized + Regional + Distant + Unstaged}}$$

Limitations to Data Interpretation

In non-census years, state and borough/census area population figures are estimates. Because rates are calculated from population data, any errors in the population estimates will impact the rates.

Age-adjusted rates calculated based on the occurrence of fewer than 20 cancer cases may be statistically unreliable and should be used with caution. When comparing rates among Alaska Behavioral Health Systems Regions, factors such as the number of cases and the upper and lower confidence intervals should be considered. Interpretation without consideration of these factors may be misleading or inaccurate.

Results

Screening-Amenable Cancers

Tables 2 through 5 illustrate the age-adjusted rate, upper and lower confidence intervals, counts, and percent of total number of cases for late stage cases for each of the 4 screening-amenable cancers for diagnosis years 2010-2014 by Behavioral Health Systems Region.

Breast Cancer: Females Age 50-74 (Table 2)

There were 461 cases of late-stage female breast cancer diagnosed in Alaska from 2010-2014. They comprised 26.1% of the total number (all stages) of female breast cases. No region had a statistically significantly higher or lower rate than the state rate. Data for 1 region (Y-K Delta) were suppressed due to the small number of cases.

Cervical Cancer: Females Age 21-65 (Table 3)

There were 44 cases of late-stage cervical cancer diagnosed in Alaska from 2010-2014. They comprised 46.8% of the total number of cervical cases. No region had a statistically significantly higher or lower rate than the state rate. Data for 7 regions (Interior, Juneau, Kenai Peninsula, Northwest, Southeast, Southwest, and Y-K Delta) were suppressed due to the small number of cases.

Colorectal Cancer: Age 50-75 (Table 4)

There were 508 cases of late-stage colorectal cancer diagnosed in Alaska from 2010-2014. They comprised 53.9% of the total number of colorectal cases. Two regions (Northwest and Y-K Delta) had statistically significantly higher rates compared to the state rate.

Lung & Bronchus Cancer: Ages 55-80 (Table 5)

There were 999 cases of late-stage lung cancer diagnosed in Alaska from 2010-2014. They comprised 75.1% of the total number of lung cases. One region (Northwest) had a statistically significantly higher rate compared to the state rate. One region (Juneau) had a statistically significantly lower rate compared to the state rate.

Data Tables

Table 2: Late-stage **female breast** cancer incidence. Alaska resident females age 50-74, by Behavioral Health Systems Region, diagnosis years 2010-2014.

Geographic Area	Rate	Lower CI	Upper CI	Count	% of Total
State of Alaska	105.4	95.6	115.9	461	26.1%
Anchorage	108.9	93.5	126.2	191	24.1%
Fairbanks	79.1	56.4	108.3	43	22.2%
Interior	106.0	58.3	176.3	16	26.7%
Juneau	80.1	47.5	127.3	19	23.2%
Kenai Peninsula	124.0	91.4	164.3	52	29.7%
Mat-Su	119.0	92.2	151.2	71	30.0%
Northwest	121.5	63.6	211.9	14	33.3%
Southeast	101.9	68.1	146.5	31	27.7%
Southwest	118.2	70.2	187.5	20	33.9%
Y-K Delta	^	^	^	^	^

^ indicates statistics not displayed due to a low number of cases (less than 6).
Rates are per 100,000 and age-adjusted to the 2000 U.S. population.

Table 3: Late-stage **cervical** cancer incidence. Alaska resident females age 21-65, by Behavioral Health Systems Region, diagnosis years 2010-2014.

Geographic Area	Rate	Lower CI	Upper CI	Count	% of Total
State of Alaska	4.2	3.0	5.7	44	46.8%
Anchorage	3.5	2.0	5.8	16	44.4%
Fairbanks	6.6	2.8	12.9	8	66.7%
Interior	^	^	^	^	^
Juneau	^	^	^	^	^
Kenai Peninsula	^	^	^	^	^
Mat-Su	5.9	2.5	11.9	8	40.0%
Northwest	^	^	^	^	^
Southeast	^	^	^	^	^
Southwest	^	^	^	^	^
Y-K Delta	^	^	^	^	^

^ indicates statistics not displayed due to a low number of cases (less than 6).
Rates are per 100,000 and age-adjusted to the 2000 U.S. population.
Percent of Total does not include in situ cases in the denominator.

Table 4: Late-stage **colorectal** cancer incidence. Alaska residents age 50-75, by Behavioral Health Systems Region, diagnosis years 2010-2014.

Geographic Area	Rate	Lower CI	Upper CI	Count	% of Total
State of Alaska	61.2	55.6	67.1	508	53.9%
Anchorage	56.0	47.5	65.6	178	52.7%
Fairbanks	70.5	53.6	91.0	66	58.4%
Interior	88.2	57.6	128.9	29	59.2%
Juneau	47.3	26.4	77.2	17	45.9%
Kenai Peninsula	55.1	40.3	73.5	50	56.2%
Mat-Su	50.6	37.5	66.7	57	46.3%
Northwest	119.2	75.7	177.7	29	55.8%
Southeast	62.2	43.2	86.6	38	56.7%
Southwest	57.5	32.8	93.0	19	51.4%
Y-K Delta	115.1	73.4	172.3	25	65.8%

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

Table 5: Late-stage **lung & bronchus** cancer incidence. Alaska residents age 55-80, by Behavioral Health Systems Region, diagnosis years 2010-2014.

Geographic Area	Rate	Lower CI	Upper CI	Count	% of Total
State of Alaska	175.4	163.8	187.7	999	75.1%
Anchorage	158.5	140.9	177.7	349	73.9%
Fairbanks	162.7	129.0	201.9	99	70.2%
Interior	219.8	159.9	294.3	54	77.1%
Juneau	62.4	34.6	103.3	19	47.5%
Kenai Peninsula	186.9	152.6	226.3	121	77.1%
Mat-Su	190.2	158.5	226.2	149	76.0%
Northwest	389.9	287.9	514.8	60	84.5%
Southeast	212.2	168.0	264.1	91	77.1%
Southwest	199.9	134.5	284.2	39	84.8%
Y-K Delta	139.3	80.8	222.3	18	90.0%

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

Cancers Associated with Modifiable Risk Factors

Tables 6 through 14 illustrate the age-adjusted rate, upper and lower confidence intervals, and counts for malignant cases for each of the 9 cancers associated with modifiable risk factors for diagnosis years 2010-2014 by Behavioral Health Systems Region.

Bladder Cancer (Table 6)
Risk factor: tobacco use
There were 589 cases of bladder cancer diagnosed in Alaska from 2010-2014. One region (Northwest) had a statistically significantly lower rate than the state rate. Data for 1 region (Y-K Delta) was suppressed due to the small number of cases.

Cervical Cancer (Table 7)
Risk factors: tobacco use, HPV
There were 106 cases of cervical cancer diagnosed in Alaska from 2010-2014. No region had a statistically significantly higher or lower rate than the state rate. Data for 5 regions (Interior, Northwest, Southeast, Southwest, and Y-K Delta) were suppressed due to the small number of cases.

Colorectal Cancer (Table 8)
Risk factors: tobacco use, obesity
There were 1,381 cases of colorectal cancer diagnosed in Alaska from 2010-2014. Two regions (Northwest and Y-K Delta) had statistically significantly higher rates compared to the state rate. One region (Anchorage) had a statistically significantly lower rate compared to the state rate.

Endometrium Cancer (Table 9)
Risk factor: obesity
There were 402 cases of endometrium cancer diagnosed in Alaska from 2010-2014. No region had a statistically significantly higher or lower rate than the state rate. Data for 1 region (Y-K Delta) was suppressed due to the small number of cases.

Esophagus Cancer (Table 10)
Risk factors: tobacco use, obesity
There were 188 cases of esophagus cancer diagnosed in Alaska from 2010-2014. No region had a statistically significantly higher or lower rate than the state rate. Data for 2 regions (Southwest and Y-K Delta) were suppressed due to the small number of cases.

Kidney & Renal Pelvis Cancer (Table 11)
Risk factors: tobacco use, obesity
There were 549 cases of kidney cancer diagnosed in Alaska from 2010-2014. Two regions (Fairbanks and Juneau) had statistically significantly lower rates than the state rate.

Lung & Bronchus Cancer (Table 12)
Risk factor: tobacco use
There were 1,718 cases of lung cancer diagnosed in Alaska from 2010-2014. One region (Northwest) had a statistically significantly higher rate that the state rate. One region (Juneau) had a statistically significantly lower rate that the state rate.

Melanoma Skin Cancer (Table 13)
Risk factor: UV radiation
There were 747 cases of melanoma skin cancer diagnosed in Alaska from 2010-2014. One region (Anchorage) had a statistically significantly higher rate than the state rate. One region (Northwest) had a statistically significantly lower rate than the rest of the state, but this rate is based on only 7 cases and so may not be statistically reliable.

Oral Cavity & Pharynx Cancer (Table 14)
Risk factors: tobacco use, HPV
There were 413 cases of oral cancer diagnosed in Alaska from 2010-2014. No region had a statistically significantly higher or lower rate than the state rate.

Data Tables

Table 6: Alaska **bladder** cancer incidence by Behavioral Health Systems Region, diagnosis years 2010-2014.

Geographic Area	Rate	Lower CI	Upper CI	Count
State of Alaska	21.2	19.4	23.1	589
Anchorage	21.1	18.3	24.2	234
Fairbanks	24.4	18.8	30.9	76
Interior	25.1	15.6	38.0	25
Juneau	15.1	8.7	24.1	20
Kenai Peninsula	21.6	16.3	27.9	66
Mat-Su	23.4	18.3	29.4	86
Northwest	11.6	5.6	21.1	12
Southeast	23.8	17.3	32.0	49
Southwest	20.0	10.8	32.9	17
Y-K Delta	^	^	^	^

^ indicates statistics not displayed due to a low number of cases (less than 6).
Rates are per 100,000 and age-adjusted to the 2000 U.S. population. Incidence rates include malignant and in situ cases.

Table 7: Alaska **cervical** cancer incidence by Behavioral Health Systems Region, diagnosis years 2010-2014.

Geographic Area	Rate	Lower CI	Upper CI	Count
State of Alaska	6.4	5.2	7.8	106
Anchorage	6.3	4.5	8.6	43
Fairbanks	7.1	3.8	12.2	14
Interior	^	^	^	^
Juneau	7.5	2.7	16.7	6
Kenai Peninsula	6.4	2.7	12.9	8
Mat-Su	8.3	5.0	13.1	20
Northwest	^	^	^	^
Southeast	^	^	^	^
Southwest	^	^	^	^
Y-K Delta	^	^	^	^

^ indicates statistics not displayed due to a low number of cases (less than 6).
Rates are per 100,000 and age-adjusted to the 2000 U.S. population. Incidence rates are for malignant cases only.

Table 8: Alaska **colorectal** cancer incidence by Behavioral Health Systems Region, diagnosis years 2010-2014.

Geographic Area	Rate	Lower CI	Upper CI	Count
State of Alaska	44.8	42.3	47.5	1,381
Anchorage	39.9	36.1	43.8	497
Fairbanks	46.9	39.4	55.3	167
Interior	53.8	40.6	70.0	67
Juneau	37.2	27.1	49.7	53
Kenai Peninsula	42.4	34.9	51.0	131
Mat-Su	42.6	35.9	50.1	174
Northwest	95.1	72.9	121.2	79
Southeast	44.4	35.6	54.8	98
Southwest	46.1	32.8	62.8	53
Y-K Delta	84.3	63.2	109.6	62

Rates are per 100,000 and age-adjusted to the 2000 U.S. population. Incidence rates are for malignant cases only.

Table 9: Alaska **endometrium** cancer incidence by Behavioral Health Systems Region, diagnosis years 2010-2014.

Geographic Area	Rate	Lower CI	Upper CI	Count
State of Alaska	22.9	20.6	25.4	402
Anchorage	23.9	20.2	28.0	169
Fairbanks	25.1	18.3	33.6	53
Interior	24.4	12.4	43.0	14
Juneau	21.3	12.7	33.9	20
Kenai Peninsula	25.6	18.0	35.4	41
Mat-Su	19.9	14.3	26.9	49
Northwest	13.8	5.2	29.4	7
Southeast	25.7	17.1	37.4	31
Southwest	21.9	11.9	37.4	15
Y-K Delta	^	^	^	^

^ indicates statistics not displayed due to a low number of cases (less than 6).
Rates are per 100,000 and age-adjusted to the 2000 U.S. population. Incidence rates are for malignant cases only.

Table 10: Alaska **esophagus** cancer incidence by Behavioral Health Systems Region, diagnosis years 2010-2014.

Geographic Area	Rate	Lower CI	Upper CI	Count
State of Alaska	6.0	5.1	7.0	188
Anchorage	5.3	4.0	6.9	65
Fairbanks	7.5	4.6	11.3	24
Interior	6.7	2.6	14.1	8
Juneau	6.6	3.0	12.6	10
Kenai Peninsula	4.7	2.6	7.9	17
Mat-Su	8.5	5.7	12.2	35
Northwest	5.3	1.7	12.4	6
Southeast	5.8	3.0	10.2	14
Southwest	^	^	^	^
Y-K Delta	^	^	^	^

^ indicates statistics not displayed due to a low number of cases (less than 6).
Rates are per 100,000 and age-adjusted to the 2000 U.S. population. Incidence rates are for malignant cases only.

Table 11: Alaska **kidney & renal pelvis** cancer incidence by Behavioral Health Systems Region, diagnosis years 2010-2014.

Geographic Area	Rate	Lower CI	Upper CI	Count
State of Alaska	16.6	15.1	18.1	549
Anchorage	18.2	15.8	20.9	235
Fairbanks	12.2	8.9	16.2	54
Interior	17.8	10.5	28.1	22
Juneau	9.4	5.1	16.0	16
Kenai Peninsula	16.7	12.2	22.2	54
Mat-Su	19.9	15.5	25.1	82
Northwest	11.8	6.3	20.3	15
Southeast	16.2	11.2	22.8	37
Southwest	13.4	7.1	22.8	17
Y-K Delta	18.0	9.9	29.8	17

^ indicates statistics not displayed due to a low number of cases (less than 6).
Rates are per 100,000 and age-adjusted to the 2000 U.S. population. Incidence rates are for malignant cases only.

Table 12: Alaska **lung & bronchus** cancer incidence by Behavioral Health Systems Region, diagnosis years 2010-2014.

Geographic Area	Rate	Lower CI	Upper CI	Count
State of Alaska	60.2	57.1	63.4	1,718
Anchorage	57.2	52.5	62.2	626
Fairbanks	56.8	48.1	66.5	183
Interior	71.7	55.8	90.6	86
Juneau	42.8	31.3	56.8	56
Kenai Peninsula	61.6	52.7	71.5	198
Mat-Su	67.3	58.5	76.9	258
Northwest	102.9	79.5	130.2	81
Southeast	65.6	54.8	78.0	146
Southwest	52.2	37.1	70.8	53
Y-K Delta	52.9	34.9	75.8	31

Rates are per 100,000 and age-adjusted to the 2000 U.S. population. Incidence rates are for malignant cases only.

Table 13: Alaska **melanoma** skin cancer incidence by Behavioral Health Systems Region, diagnosis years 2010-2014.

Geographic Area	Rate	Lower CI	Upper CI	Count
State of Alaska	23.1	21.4	25.0	747
Anchorage	27.1	24.1	30.3	344
Fairbanks	26.6	21.3	32.8	108
Interior	16.9	10.5	26.1	23
Juneau	23.7	16.7	32.9	42
Kenai Peninsula	17.4	12.7	23.3	51
Mat-Su	23.8	19.1	29.4	100
Northwest	6.0	2.0	13.5	7
Southeast	21.7	15.6	29.4	46
Southwest	17.5	9.9	28.4	21
Y-K Delta	^	^	^	^

^ indicates statistics not displayed due to a low number of cases (less than 6).
Rates are per 100,000 and age-adjusted to the 2000 U.S. population. Incidence rates are for malignant cases only.

Table 14: Alaska **oral cavity & pharynx** cancer incidence by Behavioral Health Systems Region, diagnosis years 2010-2014.

Geographic Area	Rate	Lower CI	Upper CI	Count
State of Alaska	11.5	10.4	12.8	413
Anchorage	10.7	8.9	12.7	152
Fairbanks	10.6	7.7	14.2	51
Interior	17.1	9.9	27.3	21
Juneau	7.7	3.7	13.9	12
Kenai Peninsula	14.6	10.7	19.6	53
Mat-Su	14.5	11.0	18.8	67
Northwest	11.3	5.0	21.4	10
Southeast	9.5	5.9	14.6	24
Southwest	13.1	6.6	23.0	17
Y-K Delta	6.4	2.1	14.6	6

Rates are per 100,000 and age-adjusted to the 2000 U.S. population. Incidence rates are for malignant cases only.

Discussion & Conclusions

This report describes geographic patterns in cancer sites that are amenable to interventions including cancer screening, as well as modifiable risk factors of tobacco use, obesity, HPV infection, and excessive UV light exposure.

Based on late-stage incidence rates for screening-amenable cancers, there do appear to be some geographic disparities.

- For colorectal cancer, the Northwest and Y-K Delta regions had statistically significantly higher late-stage rates compared to the state rate. This suggests that these regions could benefit from increased screening for colorectal cancer.
- For lung cancer, the Northwest region had a statistically significantly higher late-stage rate compared to the state rate. This suggests that this region could benefit from increased screening for lung cancer.
- There were no statistically significant geographic disparities for high late-stage incidence rates for breast and cervical cancers.

Based on incidence rates for modifiable risk factors, there also appear to be some geographic disparities.

- For colorectal cancer incidence, the Northwest and Y-K Delta regions have a statistically significantly higher incidence rate than the state rate, which is a similar finding for late-stage incidence. As obesity and tobacco use are risk factors for colorectal cancer, this suggests that these regions could benefit from obesity intervention programs as well as tobacco cessation programs.
- For lung cancer incidence, the Northwest region has a statistically significantly higher rate compared to the state rate, which is a similar finding for late-stage incidence. As tobacco use is a risk factor for lung cancer, this suggests that this region could benefit from tobacco cessation programs, as previously stated.
- For melanoma of the skin, the Anchorage region had a statistically significantly higher incidence rate than the rest of the state. As UV light exposure is a risk factor for melanoma, this suggests that this region could benefit from UV light protection programs.
- There were no statistically significant geographic disparities for high incidence rates for cancers of the bladder, cervix, endometrium, esophagus, kidney, or oral cavity.