Incidence of Cancers Associated with Screening and Modifiable Risk Factors: Alaska 2015-2019

Alaska Cancer Registry
Health Analytics and Vital Records Section
Alaska Department of Health

February 2023

This page is intentionally blank.

Incidence of Cancers Associated with Screening and Modifiable Risk Factors: Alaska 2015-2019

February 2023

A Publication of the

Alaska Cancer Registry

Michael J. Dunleavy
Governor
State of Alaska

Heidi Hedberg
Commissioner
Department of Health

Travis Erickson
Director
Division of Public Health

This page is intentionally blank.

Incidence of Cancers Associated with Screening and Modifiable Risk Factors: Alaska 2015-2019
A publication of the Alaska Cancer Registry
February 2023

Major contributors
Primary Author:
David O'Brien, PhD, GISP, Data Analyst
Other Alaska Cancer Registry staff:
Rosa Avila, MSPH, PhD, Alaska Cancer Registry Manger
Diane Sallee, CTR, Quality Assurance & Education and Training Coordinator
Belinda Hopkins, Registrar
Jeanette Kroeker Breding, Registrar

Acknowledgements
The Alaska Cancer Registry is a product of collaboration among many reporting sources, including hospitals, physicians, pathology laboratories, tribal agencies, and other state cancer registries in which Alaska residents are diagnosed or treated for cancer. Their cooperation in reporting timely, accurate, and complete cancer data is acknowledged and sincerely appreciated.

We would like to thank the Alaska Comprehensive Cancer Control Program for its review of a preliminary draft of this report.

This report was supported by the Centers for Disease Control and Prevention under cooperative agreement number NU58DP007163. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention.

For more information or additional copies of this report, contact:
Alaska Cancer Registry
Health Analytics and Vital Records Section (HAVRS)
Division of Public Health, Alaska Department of Health
3601 C Street, Suite 250
Anchorage, AK 99503
Email: cancerregistry@alaska.gov

Suggested Citation
O'Brien, DK. *Incidence of Cancers Associated with Screening and Modifiable Risk Factors: Alaska 2015-2019*. Anchorage, Alaska: Alaska Cancer Registry, Health Analytics and Vital Records Section, Division of Public Health, Alaska Department of Health; February 2023.

Copyright Information
All material in this document is in the public domain and may be reproduced or copied without permission; citation as to source, however, is appreciated.

This page is intentionally blank.

Table of Contents

Executive Summary 1
Introduction 3
Background 3
Cancers Associated with Modifiable Risk Factors 3
Screening-Amenable Cancers 5
Geographic Areas Used in Analysis 6
Figure 1: Alaska Behavioral Health Systems Regions Map 6
Table 1: Alaska Behavioral Health Systems Regions by Borough/Census Area 7
Methods & Definitions 8
Results 11
Cancers Associated with Modifiable Risk Factors 11
Bladder Cancer 11
Cervical Cancer 11
Colorectal Cancer 11
Endometrium Cancer 11
Esophagus Cancer 11
Female Breast Cancer 11
Kidney & Renal Pelvis Cancer 12
Liver Cancer 12
Lung & Bronchus Cancer 12
Melanoma Skin Cancer 12
Oral Cavity & Pharynx Cancer 12
Data Tables 13
Table 2: Alaska bladder cancer incidence 13
Table 3: Alaska cervical cancer incidence. 13
Table 4: Alaska colorectal cancer incidence. 14
Table 5: Alaska endometrium cancer incidence. 14
Table 6: Alaska esophagus cancer incidence. 15
Table 7: Alaska female breast cancer incidence. 15
Table 8: Alaska kidney & renal pelvis cancer incidence. 16
Table 9: Alaska liver cancer incidence. 16
Table 10: Alaska lung & bronchus cancer incidence. 17
Table 11: Alaska melanoma skin cancer incidence. 17
Table 12: Alaska oral cavity & pharynx cancer incidence. 18
Screening-Amenable Cancers 19
Breast Cancer: Females Age 50-74 19
Cervical Cancer: Females Age 21-65 19
Colorectal Cancer: Age 45-75 19
Lung & Bronchus Cancer: Ages 50-80 19
Data Tables 20
Table 13: Late-stage female breast cancer incidence. Alaska resident females age 50-74 20
Table 14: Late-stage cervical cancer incidence. Alaska resident females age 21-65 20

Table 15: Late-stage colorectal cancer incidence. Alaska residents age 50-75. 21
Table 16: Late-stage lung & bronchus cancer incidence. Alaska residents age 55-80. 21
Discussion & Conclusions 22

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 2015-2019, the most recent 5-year time period available from the ACR database.

This report is an update of a 2020 report. It 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 statewide rates. 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, alcohol use, obesity, HPV infection, and UV radiation exposure, and compares them to the statewide rates. Key results by region are as follows:

Interior Region:
This region has statistically significantly higher rates of colorectal cancer than the state rate. Based on risk factors for this cancer, the high overall rate suggests that this region could benefit from obesity & alcohol intervention programs as well as tobacco cessation programs.

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 & alcohol 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 & alcohol intervention programs as well as tobacco cessation programs.

Mat-Su Region:
This region has a statistically significantly higher incidence rate of bladder 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 tobacco cessation programs.

There were no statistically significant geographic disparities for high late-stage incidence rates for breast and cervical cancers that would indicate a need for targeted screening. Also, there were no statistically significant geographic disparities for incidence rates for cancers associated with the risk factors for HPV infection or UV radiation exposure.

There are a few differences between the findings in the ACR 2020 report (diagnosis years 2012-2016) and the current report (diagnosis years 2015-2019):

- The 2020 report made the same recommendations for the Mat-Su, Northwest, and Y-K Delta Regions as the current report. The Interior Region recommendation is new for the current report.
- The 2020 report indicated that the Mat-Su Region had a significantly higher incidence rate of lung cancer than the rest of the state. This is no longer the case for the current time period.

Introduction

Background

This screening and risk factors report summarizes the most recently available information about incidence rates for selected cancer in Alaska. Data are from cancer cases diagnosed from 2015-2019, the most recent 5-year time period available from the Alaska Cancer Registry (ACR) database. ACR produced a report in 2020 that covered diagnosis years 2012-2016.[1] 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[2] 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 that are associated with modifiable "risk factors" (such as smoking).
- Cancers for which screening tests are available and recommended, also known as "screening-amenable cancers".

The purpose of this report is to enable a comparison with past and 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.[3] 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.

Cancers Associated with Modifiable Risk Factors

Many cancers have modifiable risk factors, such as tobacco use, alcohol 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

[1] https://health.alaska.gov/dph/VitalStats/Documents/cancerregistry/ACR_Screening%20Report_2012-2016.pdf
[2] https://ftp.cdc.gov/pub/Publications/Cancer/ccc/alaska_ccc_plan-508.pdf
[3] https://health.alaska.gov/dph/VitalStats/Documents/cancerregistry/data/CancerInAlaska2013.pdf

cancers of the mouth (oral cavity), throat (pharynx), larynx, esophagus, bladder, kidney, liver, stomach, pancreas, colon & rectum, and cervix, as well as acute myeloid leukemia (AML).[4]

Drinking alcohol can increase a person's risk of cancer of the oral cavity, pharynx, larynx, esophagus, colon & rectum, liver, and breast in women. The more a person drinks, the higher the risk. The risk of cancer is much higher for those who drink alcohol and also use tobacco. Doctors advise people who drink alcohol to do so in moderate amounts. The federal government's Dietary Guidelines for Americans defines moderate alcohol drinking as up to one drink per day for women and up to two drinks per day for men. It has been suggested that certain substances in red wine have anti-cancer properties. However, there is no evidence that drinking red wine reduces the risk of cancer.[5]

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.[6]

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. Adults ages 27-45 can be vaccinated in consultation with their healthcare provider.[7,8]

The sun, sunlamps, and tanning booths all produce ultraviolet (UV) radiation. Exposure to UV radiation causes skin damage that can lead to skin cancer.[9] 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.[10]

Based on this information, ACR selected the following 11 cancer primary sites for all age groups as indicators for cancers associated with modifiable risk factors:

- Bladder (tobacco use)
- Female breast (alcohol use)
- Cervix (tobacco use, HPV)
- Colorectal (tobacco & alcohol use, obesity)
- Endometrium (obesity)
- Esophagus (tobacco & alcohol use, obesity)
- Kidney & renal pelvis (tobacco use, obesity)
- Liver (alcohol use)
- Lung & bronchus (tobacco use)
- Melanoma of the skin (UV radiation)
- Oral cavity & pharynx (tobacco & alcohol use, HPV)

[4] https://www.cancer.gov/about-cancer/causes-prevention/risk/tobacco
[5] https://www.cancer.gov/about-cancer/causes-prevention/risk/alcohol
[6] https://www.cancer.gov/about-cancer/causes-prevention/risk/obesity
[7] https://www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents#human-papillomaviruses-hpvs
[8] https://www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-vaccine-fact-sheet
[9] https://www.cancer.gov/about-cancer/causes-prevention/risk/sunlight
[10] https://www.cancer.gov/types/skin/hp/skin-prevention-pdq

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 Program recommends following screening guidelines 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. ACR selected cancer types for this report based on USPSFT screening recommendations with a Grade of A or B, meaning that the screening service is recommended and that the net benefit is either moderate or substantial.[11]

In 2016, USPSTF released updated recommendations on screening for breast cancer. It recommends that women 50 to 74 years old receive mammograms every other year.[12] 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 2018, USPSTF released updated recommendations on screening for cervical cancer. It recommends that women 21 to 29 years old receive Pap smears every 3 years. For women 30 to 65 years old, it recommends either Pap smears every 3 years, or human papillomavirus (HPV) test every 5 years, or both Pap smears and HPV testing in combination every 5 years.[13] 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 2021, USPSTF released updated recommendations on screening for colorectal cancer. It recommends that both men and women receive screening starting at age 45 and continue through age 75. There are various screening methods (colonoscopy, flexible sigmoidoscopy, etc.) and each has its own recommended repeat-screening interval.[14] Based on this recommendation, ACR selected the measure of late-stage colorectal cancer incidence rate among people 45 to 75 years old as the indicator for inadequate colorectal cancer screening. The Alaska Native Medical Center recommends that Alaska Native people start getting screened at age 40.[15]

In 2021, USPSTF released updated recommendations on screening for lung cancer. It recommends that both men and women 50 to 80 years old receive annual screening with low-dose computed tomography (LDCT). The screening recommendation is only for adults who have a 20 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 20 years as well as a person who smoked 2 packs a day for 10 years both have a 20 pack-year smoking history.

[11] https://www.uspreventiveservicestaskforce.org/uspstf/about-uspstf
[12] https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/breast-cancer-screening
[13] https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/cervical-cancer-screening
[14] https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/colorectal-cancer-screening
[15] Alaska Native Medical Center. Colorectal Cancer Screening Guidelines. 2021; https://www.anmc.org/files/CRCScreening.pdf

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.[16] Based on this recommendation, ACR selected the measure of late-stage lung cancer incidence rate among people 50 to 80 years old as the indicator for inadequate lung cancer screening.

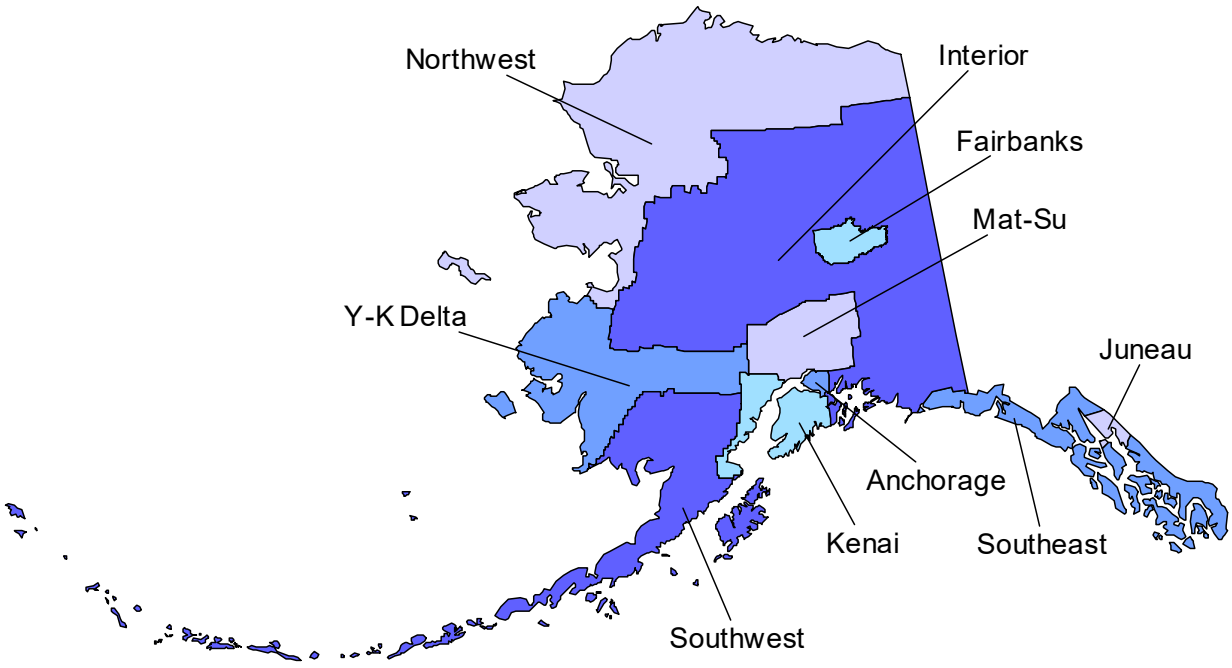
Although there have been recommendations in the past on screening for prostate cancer for older men using the prostate-specific antigen (PSA) test, USPSTF current screening recommendations have a grade of C for men 55-69 years old (net benefit is small) and a grade of D for men over 70 years old (no net benefit, does not recommend this screening).[17] Therefore ACR did not include late-state prostate cancer incidence rates in this report.

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



[16] https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/lung-cancer-screening
[17] https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/prostate-cancer-screening

Table 1: Alaska Behavioral Health Systems Regions by Borough/Census Area with 2019 Alaska Resident Populations

Behavioral Health Systems Region	Boroughs/Census Areas	Population
State of Alaska		**731,545**
Anchorage	Anchorage Municipality	**288,000**
Fairbanks	Fairbanks North Star Borough	**96,849**
Interior	Denali Borough	2,097
	Southeast Fairbanks Census Area	6,893
	Valdez-Cordova Census Area	9,202
	Yukon-Koyukuk Census Area	5,230
Total		**23,422**
Juneau	Juneau City and Borough	**31,974**
Kenai Peninsula	Kenai Peninsula Borough	**58,708**
Mat-Su	Matanuska-Susitna Borough	**108,317**
Northwest	Nome Census Area	10,004
	North Slope Borough	9,832
	Northwest Arctic Borough	7,621
Total		**27,457**
Southeast	Haines Borough	2,530
	Hoonah-Angoon Census Area	2,148
	Ketchikan Gateway Borough	13,901
	Petersburg Borough	3,266
	Prince of Wales-Hyder Census Area	6,203
	Sitka City and Borough	8,493
	Skagway Municipality	1,183
	Wrangell City and Borough	2,502
	Yakutat City and Borough	579
Total		**40,805**
Southwest	Aleutians East Borough	3,337
	Aleutians West Census Area	5,634
	Bristol Bay Borough	836
	Dillingham Census Area	4,916
	Kodiak Island Borough	12,998
	Lake and Peninsula Borough	1,592
Total		**29,313**
Y-K Delta	Bethel Census Area	18,386
	Kusilvak Census Area	8,314
Total		**26,700**

Population data source: National Center for Health Statistics via SEER*Stat software (Surveillance, Epidemiology, and End Results Program, National Cancer Institute), 2021.

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.[18] 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

[18] 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 2015 to 2019. 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

Cancers Associated with Modifiable Risk Factors

Tables 2 through 12 illustrate the age-adjusted rate, upper and lower confidence intervals, and counts for malignant cases for each of the 11 cancers associated with the modifiable risk factors (tobacco & alcohol use, HPV, obesity, and UV radiation) for diagnosis years 2015-2019 by Behavioral Health Systems Region for all ages.

Bladder Cancer (Table 2)
Risk factor: tobacco use
There were 658 cases of bladder cancer diagnosed in Alaska from 2015-2019. One region (Mat-Su) had a statistically significantly higher rate than the state rate. One region (Northwest) had a statistically significantly lower rate than the state rate.

Cervical Cancer (Table 3)
Risk factors: tobacco use, HPV
There were 137 cases of cervical cancer diagnosed in Alaska from 2015-2019. No region had a statistically significantly higher or lower rate than the state rate. Data for five regions (Interior, Northwest, Southeast, Southwest, and Y-K Delta) were suppressed due to the small number of cases.

Colorectal Cancer (Table 4)
Risk factors: tobacco & alcohol use, obesity
There were 1,468 cases of colorectal cancer diagnosed in Alaska from 2015-2019. Three regions (Interior, Northwest, and Y-K Delta) had statistically significantly higher rates compared to the state rate.

Endometrium Cancer (Table 5)
Risk factor: obesity
There were 489 cases of endometrium cancer diagnosed in Alaska from 2015-2019. No region had a statistically significantly higher or lower rate than the state rate. Data for one region (Y-K Delta) was suppressed due to the small number of cases.

Esophagus Cancer (Table 6)
Risk factors: tobacco & alcohol use, obesity
There were 199 cases of esophagus cancer diagnosed in Alaska from 2015-2019. No region had a statistically significantly higher or lower rate than the state rate. Data for one region (Northwest) were suppressed due to the small number of cases.

Female Breast Cancer (Table 7)
Risk factors: alcohol use
There were 2,226 cases of female breast cancer diagnosed in Alaska from 2015-2019. One region (Y-K Delta) had a statistically significantly lower rate than the rest of the state.

Kidney & Renal Pelvis Cancer (Table 8)
Risk factors: tobacco use, obesity
There were 669 cases of kidney cancer diagnosed in Alaska from 2015-2019. No regions had statistically significantly higher or lower rates than the state rate.

Liver Cancer (Table 9)
Risk factors: alcohol use
There were 308 cases of liver cancer diagnosed in Alaska from 2015-2019. Two regions (Mat-Su and Southeast) had a statistically significantly lower rate than the state rate.

Lung & Bronchus Cancer (Table 10)
Risk factor: tobacco use
There were 1,871 cases of lung cancer diagnosed in Alaska from 2015-2019. One region (Northwest) had a statistically significantly higher rate that the state rate.

Melanoma Skin Cancer (Table 11)
Risk factor: UV radiation
There were 499 cases of melanoma skin cancer diagnosed in Alaska from 2015-2019. No region had a statistically significantly higher or lower rate than the state rate.

Oral Cavity & Pharynx Cancer (Table 12)
Risk factors: tobacco & alcohol use, HPV
There were 450 cases of oral cancer diagnosed in Alaska from 2015-2019. No region had a statistically significantly higher or lower rate than the state rate.

Data Tables

Table 2: Alaska **bladder** cancer incidence by Behavioral Health Systems Region, diagnosis years 2015-2019.

Geographic Area	Rate	Lower CI	Upper CI	Count
State of Alaska	19.8	18.2	21.5	658
Anchorage	17.9	15.6	20.5	235
Fairbanks	16.1	12.0	21.1	60
Interior	21.5	13.4	32.6	26
Juneau	13.1	7.9	20.5	22
Kenai Peninsula	25.1	19.8	31.3	90
Mat-Su	*28.7	23.6	34.6	129
Northwest	*8.1	3.1	16.8	8
Southeast	24.3	18.3	31.9	58
Southwest	16.5	9.4	26.5	22
Y-K Delta	11.9	4.3	24.7	8

* Rate is statistically significantly different than the state rate
Rates are per 100,000 and age-adjusted to the 2000 U.S. population. Incidence rates include malignant and in situ cases.

Table 3: Alaska **cervical** cancer incidence by Behavioral Health Systems Region, diagnosis years 2015-2019.

Geographic Area	Rate	Lower CI	Upper CI	Count
State of Alaska	7.8	6.5	9.2	137
Anchorage	8.2	6.2	10.7	58
Fairbanks	4.0	1.7	7.9	9
Interior	^	^	^	^
Juneau	10.0	3.9	20.8	7
Kenai Peninsula	9.4	4.9	16.2	15
Mat-Su	5.6	3.1	9.4	16
Northwest	18.7	8.7	35.2	10
Southeast	7.7	3.1	15.6	8
Southwest	11.3	4.0	24.8	6
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 4: Alaska **colorectal** cancer incidence by Behavioral Health Systems Region, diagnosis years 2015-2019.

Geographic Area	Rate	Lower CI	Upper CI	Count
State of Alaska	41.3	39.1	43.7	1,468
Anchorage	39.1	35.7	42.7	533
Fairbanks	36.6	30.9	43.2	161
Interior	*56.8	43.9	72.4	77
Juneau	35.4	26.7	46.2	63
Kenai Peninsula	41.7	34.8	49.6	147
Mat-Su	34.1	28.9	40.0	176
Northwest	*79.5	61.0	101.3	76
Southeast	36.9	29.6	45.5	98
Southwest	36.8	26.3	50.0	52
Y-K Delta	*102.4	79.5	129.4	85

* Rate is statistically significantly different than the state rate
Rates are per 100,000 and age-adjusted to the 2000 U.S. population. Incidence rates are for malignant cases only.

Table 5: Alaska **endometrium** cancer incidence by Behavioral Health Systems Region, diagnosis years 2015-2019.

Geographic Area	Rate	Lower CI	Upper CI	Count
State of Alaska	25.2	22.9	27.6	489
Anchorage	29.5	25.6	33.8	220
Fairbanks	23.2	17.1	30.7	54
Interior	23.6	12.5	40.8	15
Juneau	30.7	20.0	45.3	28
Kenai Peninsula	20.7	14.8	28.5	45
Mat-Su	24.5	19.1	31.1	75
Northwest	18.0	8.5	33.7	10
Southeast	18.8	11.8	28.7	25
Southwest	16.8	8.2	30.9	12
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 6: Alaska **esophagus** cancer incidence by Behavioral Health Systems Region, diagnosis years 2015-2019.

Geographic Area	Rate	Lower CI	Upper CI	Count
State of Alaska	5.4	4.7	6.3	199
Anchorage	4.9	3.8	6.4	66
Fairbanks	6.0	3.7	9.2	23
Interior	11.5	6.2	19.5	17
Juneau	4.6	1.9	9.3	9
Kenai Peninsula	4.1	2.2	7.0	16
Mat-Su	5.5	3.7	8.0	32
Northwest	^	^	^	^
Southeast	6.7	3.8	11.0	18
Southwest	6.3	2.0	14.1	6
Y-K Delta	5.0	2.0	11.4	7

^ 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 7: Alaska **female breast** cancer incidence by Behavioral Health Systems Region, diagnosis years 2015-2019.

Geographic Area	Rate	Lower CI	Upper CI	Count
State of Alaska	122.5	117.3	127.9	2,226
Anchorage	135.0	126.4	144.0	988
Fairbanks	130.9	115.4	148.0	282
Interior	101.0	76.1	131.5	63
Juneau	118.0	95.0	145.0	100
Kenai Peninsula	126.8	109.9	145.7	230
Mat-Su	111.7	98.7	126.0	297
Northwest	86.4	60.3	119.4	39
Southeast	119.4	99.4	142.4	140
Southwest	100.6	76.2	130.4	67
Y-K Delta	*44.6	26.8	69.4	20

* Rate is statistically significantly different than the state rate
Rates are per 100,000 and age-adjusted to the 2000 U.S. population. Incidence rates are for malignant cases only.

Table 8: Alaska **kidney & renal pelvis** cancer incidence by Behavioral Health Systems Region, diagnosis years 2015-2019.

Geographic Area	Rate	Lower CI	Upper CI	Count
State of Alaska	18.5	17.0	20.0	669
Anchorage	18.7	16.3	21.3	252
Fairbanks	14.4	10.8	18.8	63
Interior	21.5	13.8	31.9	28
Juneau	12.5	7.5	19.7	21
Kenai Peninsula	23.1	18.1	29.1	82
Mat-Su	19.0	15.3	23.4	100
Northwest	20.3	11.8	32.2	21
Southeast	18.5	13.5	24.9	51
Southwest	16.3	10.6	24.2	28
Y-K Delta	23.9	14.0	37.8	23

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

Table 9: Alaska **liver** cancer incidence by Behavioral Health Systems Region, diagnosis years 2015-2019.

Geographic Area	Rate	Lower CI	Upper CI	Count
State of Alaska	7.7	6.8	8.6	308
Anchorage	9.0	7.4	10.7	134
Fairbanks	6.6	4.5	9.5	33
Interior	6.6	2.6	13.7	9
Juneau	10.9	6.4	17.3	21
Kenai Peninsula	8.8	6.0	12.4	38
Mat-Su	*4.4	2.9	6.5	30
Northwest	11.2	5.5	20.0	13
Southeast	*3.3	1.4	6.6	9
Southwest	8.9	4.1	16.6	12
Y-K Delta	11.6	5.0	22.5	9

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

Table 10: Alaska **lung & bronchus** cancer incidence by Behavioral Health Systems Region, diagnosis years 2015-2019.

Geographic Area	Rate	Lower CI	Upper CI	Count
State of Alaska	54.1	51.5	56.8	1,871
Anchorage	53.8	49.6	58.1	705
Fairbanks	45.3	38.3	53.1	179
Interior	61.0	47.1	77.7	78
Juneau	44.6	34.3	57.0	75
Kenai Peninsula	58.0	50.1	67.0	214
Mat-Su	55.7	48.9	63.2	285
Northwest	*93.4	72.7	117.6	83
Southeast	49.0	40.6	58.8	131
Southwest	60.7	46.5	77.7	76
Y-K Delta	61.9	43.5	84.8	45

* Rate is statistically significantly different than the state rate
Rates are per 100,000 and age-adjusted to the 2000 U.S. population. Incidence rates are for malignant cases only.

Table 11: Alaska **melanoma** skin cancer incidence by Behavioral Health Systems Region, diagnosis years 2015-2019.

Geographic Area	Rate	Lower CI	Upper CI	Count
State of Alaska	14.1	12.8	15.5	499
Anchorage	15.1	13.0	17.4	209
Fairbanks	14.8	11.1	19.2	64
Interior	16.2	9.0	26.5	17
Juneau	21.2	14.4	30.2	35
Kenai Peninsula	9.6	6.4	13.9	34
Mat-Su	18.6	14.9	23.0	95
Northwest	^	^	^	^
Southeast	12.4	8.3	18.1	31
Southwest	7.9	3.4	15.3	10
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 12: Alaska **oral cavity & pharynx** cancer incidence by Behavioral Health Systems Region, diagnosis years 2015-2019.

Geographic Area	Rate	Lower CI	Upper CI	Count
State of Alaska	11.6	10.5	12.8	450
Anchorage	11.4	9.7	13.4	171
Fairbanks	12.9	9.6	17.0	57
Interior	17.4	10.1	27.7	20
Juneau	12.9	8.2	19.6	25
Kenai Peninsula	10.3	7.3	14.3	44
Mat-Su	10.2	7.5	13.5	56
Northwest	9.7	4.9	17.4	12
Southeast	12.9	8.9	18.2	37
Southwest	8.4	4.8	14.1	17
Y-K Delta	10.5	5.1	19.5	11

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

Screening-Amenable Cancers

Tables 13 through 16 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 2015-2019 by Behavioral Health Systems Region.

Breast Cancer: Females Age 50-74 (Table 13)

There were 464 cases of late-stage female breast cancer diagnosed in Alaska from 2015-2019. They comprised 25.5% of the total number of (all stages) female breast cases (n=1,818). One region (Juneau) had a statistically significantly lower rate compared to the state rate. Data for one region (Y-K Delta) was suppressed due to the small number of cases.

Cervical Cancer: Females Age 21-65 (Table 14)

There were 42 cases of late-stage cervical cancer diagnosed in Alaska from 2015-2019. They comprised 36.5% of the total number of cervical cases (n=115). No region had a statistically significantly higher or lower rate than the state rate. Data for eight regions (Fairbanks, Interior, Juneau, Kenai Peninsula, Northwest, Southeast, Southwest, and Y-K Delta) were suppressed due to the small number of cases.

Colorectal Cancer: Age 45-75 (Table 15)

There were 633 cases of late-stage colorectal cancer diagnosed in Alaska from 2015-2019. They comprised 57.2% of the total number of colorectal cases (n=1,107). Two regions (Northwest and Y-K Delta) had statistically significantly higher rates compared to the state rate.

Lung & Bronchus Cancer: Ages 50-80 (Table 16)

There were 1,096 cases of late-stage lung cancer diagnosed in Alaska from 2015-2019. They comprised 69.1% of the total number of lung cases (n=1,586). One region (Northwest) had a statistically significantly higher rate compared to the state rate.

Data Tables

Table 13: Late-stage **female breast** cancer incidence. Alaska resident females age 50-74, by Behavioral Health Systems Region, diagnosis years 2015-2019.

Geographic Area	Rate	Lower CI	Upper CI	Count	% of Total[1]
State of Alaska	97.2	88.4	106.7	464	25.5%
Anchorage	119.6	104.0	136.7	221	27.5%
Fairbanks	126.4	98.5	160.0	73	30.5%
Interior	58.7	27.7	110.0	10	16.9%
Juneau	*47.7	24.3	84.5	12	15.6%
Kenai Peninsula	110.3	81.8	145.5	53	27.3%
Mat-Su	67.4	49.6	89.5	50	19.8%
Northwest	62.9	24.3	132.1	7	22.6%
Southeast	59.1	35.6	92.2	20	21.3%
Southwest	73.1	39.6	124.4	14	26.9%
Y-K Delta	^	^	^	^	^

[1] Total = Case count for all stages for each geographic area

* Rate is statistically significantly different than the state rate

^ 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 14: Late-stage **cervical** cancer incidence. Alaska resident females age 21-65, by Behavioral Health Systems Region, diagnosis years 2015-2019.

Geographic Area	Rate	Lower CI	Upper CI	Count	% of Total[1]
State of Alaska	3.8	2.7	5.2	42	36.5%
Anchorage	2.6	1.3	4.6	11	23.4%
Fairbanks	^	^	^	^	^
Interior	^	^	^	^	^
Juneau	^	^	^	^	^
Kenai Peninsula	^	^	^	^	^
Mat-Su	3.9	1.5	8.3	7	43.8%
Northwest	^	^	^	^	^
Southeast	^	^	^	^	^
Southwest	^	^	^	^	^
Y-K Delta	^	^	^	^	^

[1] Total = Case count for all stages (excluding in situ) for each geographic area

^ 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 15: Late-stage **colorectal** cancer incidence. Alaska residents age 45-75, by Behavioral Health Systems Region, diagnosis years 2015-2019.

Geographic Area	Rate	Lower CI	Upper CI	Count	% of Total[1]
State of Alaska	49.7	45.8	53.9	633	57.2%
Anchorage	45.5	39.6	52.2	221	56.1%
Fairbanks	48.5	37.8	61.4	74	57.8%
Interior	69.2	46.7	98.7	33	51.6%
Juneau	32.2	19.3	50.5	20	37.7%
Kenai Peninsula	49.1	37.1	63.7	62	59.0%
Mat-Su	41.0	32.1	51.7	77	59.2%
Northwest	*94.4	63.4	134.8	34	61.8%
Southeast	48.3	34.8	65.5	45	62.5%
Southwest	51.4	33.5	75.6	28	66.7%
Y-K Delta	*124.9	87.1	173.2	39	60.9%

[1] Total = Case count for all stages for each geographic area

* Rate is statistically significantly different than the state rate

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

Table 16: Late-stage **lung & bronchus** cancer incidence. Alaska residents age 50-80, by Behavioral Health Systems Region, diagnosis years 2015-2019.

Geographic Area	Rate	Lower CI	Upper CI	Count	% of Total[1]
State of Alaska	113.3	106.3	120.7	1,096	69.1%
Anchorage	111.9	100.6	124.0	408	70.5%
Fairbanks	94.7	76.6	115.7	108	69.7%
Interior	140.1	102.5	186.7	52	74.3%
Juneau	89.0	61.8	123.5	42	67.7%
Kenai Peninsula	119.8	98.7	144.0	125	70.6%
Mat-Su	109.9	92.6	129.6	159	64.4%
Northwest	*232.8	170.8	308.7	56	75.7%
Southeast	95.2	73.1	121.8	69	61.1%
Southwest	136.2	97.1	185.2	48	68.6%
Y-K Delta	141.0	91.4	206.4	29	74.4%

[1] Total = Case count for all stages for each geographic area

* Rate is statistically significantly different than the state rate

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

Discussion & Conclusions

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

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

- For colorectal cancer incidence, the Interior, Northwest, and Y-K Delta regions have a statistically significantly higher incidence rate than the state rate. The Northwest and Y-K Delta regions also have similar findings 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. The 2020 report noted this for Northwest and Y-K Delta regions, but the Interior region is new for this time period.
- 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. The 2020 report noted this as well. The 2020 report also noted that the Mat-Su region had a statistically significantly higher lung cancer rate, but this is not the case for the current time period.
- For bladder cancer incidence, the Mat-Su region has a statistically significantly higher rate compared to the state rate. As tobacco use is a risk factor for lung cancer, this suggests that this region could benefit from tobacco cessation programs. The 2020 report noted that there were no regions in this category for the previous time period.
- There were no statistically significant geographic disparities for high incidence rates for cancers of the cervix, endometrium, esophagus, female breast, kidney, liver, melanoma of the skin, oral cavity.
- No region had statistically significantly higher incidence rates than the state rate for cancers associated with the risk factors for HPV infection or UV radiation exposure.

Based on late-stage incidence rates for screening-amenable cancers, there also 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. The ACR 2020 report noted this as well.

- 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. The 2020 report noted this as well.
- There were no statistically significant geographic disparities for high late-stage incidence rates for breast and cervical cancers, as was also noted in the 2020 report.