The Burden of Heart Disease and Stroke in Alaska

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

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The Burden of Heart Disease and Stroke in Alaska, 2019

A report of the Section of Chronic Disease Prevention and Health Promotion

Alaska Department of Health and Social Services

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Executive Summary

Heart disease and stroke are among Alaska's leading causes of death, and critical public health priorities. This report summarizes the most recently available information about heart disease and stroke prevalence, screening, risk factors, illness and death in Alaska. The purpose of this report is to support partners in Alaska who are working to prevent heart disease and stroke.

The report first describes the prevalence and burden of heart disease and stroke in separate sections, and then addresses common risk factors. Rates and numbers of heart disease and stroke-related hospitalizations, outpatient hospital visits, and deaths, as well as prevalence of related risk factors, are described for different population groups and regions. Alaska's evidence-based public health activities to reduce the burden of heart disease and stroke and economic costs are also briefly discussed.

Key findings in this report include:

- *Heart disease.* This term refers to several different heart conditions including ischemic heart disease (also called coronary artery disease [CAD] or coronary heart disease [CHD]), which can lead to a heart attack, angina, heart failure, and other serious problems.
    - *Prevalence in Alaska.* According to the most recently available data, from 2016, 4.3% of adults in Alaska report being diagnosed with heart disease – meaning they have had been diagnosed with a heart attack, coronary heart disease, or both. This translates to more than 24,000 Alaska adults who have been diagnosed with heart disease. The prevalence of heart disease has significantly declined during the past 10 years, by an average of more than 2% per year for coronary heart disease (CHD). This is similar to national trends. Note that because heart disease is often asymptomatic and undiagnosed, this prevalence based on self-report is likely an underestimate.
    - *Heart disease-related deaths (mortality).* Heart disease is the second leading cause of death in Alaska. It was a cause of death for 21,914 Alaskans between 2007 and 2016. For 7,182 Alaskans it was the underlying cause of death (i.e., direct cause), and for 14,732 it was a contributing cause of death. Death rates have declined significantly during recent years.
    - *Heart disease-related hospitalizations and outpatient treatment.* In total, during 2016 heart disease contributed to 70,782 hospital visits. Of those visits, 12,288 were inpatient visits, where the person was admitted to a hospital. Heart disease was the primary diagnosis, or reason care was needed, for 31% of inpatient visits. The remaining 58,494 cases were outpatient visits (i.e., emergency department, outpatient surgery, outpatient observation, imaging labs, or other services), and for about half of these (51%) heart disease was the primary diagnosis.

- *Stroke.* A stroke occurs when a blood vessel that feeds the brain either bursts or is blocked.
    - *Prevalence in Alaska.* According to the most recently available data, from 2016, 2.2% of adults in Alaska report having had a stroke at some point during their lives. This translates to about 15,000 Alaska adults who have suffered from a stroke. The prevalence of stroke

in Alaska has not changed during recent years. Prevalence over recent years has been similar to the U.S.

- *Stroke-related deaths.* Stroke is the fifth leading cause of death in Alaska. It was a cause of death for 4,793 Alaskans between 2007 and 2016: 1,720 as the underlying cause of death (i.e., direct cause), and 3,073 as a contributing cause of death. Despite the unchanged stroke prevalence, stroke-related death rates have declined significantly during recent years.
- *Stroke-related hospitalizations and outpatient treatment.* In total, during 2016 strokes contributed to 10,021 hospital visits – 2,725 of these were inpatient visits, where the person was admitted to a hospital, and 7,296 were outpatient visits (i.e., emergency department, outpatient surgery, outpatient observation, imaging labs, or other services). Stroke was the primary diagnosis in about half of cases for each type of visit.

- *Comparisons by race.* Despite similar prevalence, both heart disease and stroke-related death and hospitalization rates were higher for Alaska Native people in comparison to Whites. Heart disease-related hospitalization rates were also higher among Pacific Islander people than among Whites.
- *Other demographic comparisons.* Prevalence of heart disease and stroke, as well as related hospitalization and death, increased with age: less than 1% of adults ages 18-44 have heart disease or have had a stroke, compared to 19.0% with heart disease and 11.7% who have had a stroke among adults ages 75 and older. Heart disease and stroke-related hospitalization rates were both higher for men than women. Heart disease prevalence and related death rates were higher for men than women, but stroke prevalence and death rates were similar by gender. Prevalence of heart disease was higher among people with fewer economic resources than among those with more resources.
- *Regional comparisons.* The prevalence of heart disease was greater in the Southeast-southern region and Kenai Peninsula region than in the state overall; stroke prevalence was similar across the state's regions. Both heart disease and stroke-related death rates were higher in the Northwest and Yukon-Kuskokwim Delta regions than in the state overall.
- *Screening for hypertension, cholesterol and diabetes.* Most Alaska adults (92%) were current with screening for hypertension, 84% met cholesterol screening recommendations, and 52% have been screened for diabetes in the past three years. Screening rates for all three conditions were lower in the Northwest and Yukon-Kuskokwim Delta regions than in the state overall. Alaska Native adults, rural Alaska residents, and people with fewer economic resources were less likely than the state average to be current with any of the three screenings.
- *Risk factors*. There are six key risk factors for heart disease and stroke. Most Alaska adults (60%) have two or more of them. Only a small minority of adults (12%) have no risk factors. Obesity or overweight was the most common risk factor, affecting nearly two-thirds of Alaska adults, followed by physical inactivity, high blood pressure, high cholesterol, smoking cigarettes, and diabetes.
- *Data gaps*. Currently available information about the prevalence of heart disease in Alaska is based on self-report. The true number of people in Alaska suffering from heart disease is likely to be much greater, because heart disease is often undiagnosed. In the future, health information exchanges that include information about clinical outcomes may help to fill this gap.

Key activities by DHSS and partners to prevent heart disease and stroke in Alaska include:

- Educating and empowering individuals to live healthy lifestyles.
- Supporting healthcare providers and systems to improve screening and management of high blood pressure and ensure optimal treatment of heart disease and stroke.
- Supporting statewide and community partners to promote healthy environments that support physical activity, access to nutritious foods, and smokefree air.

Introduction

This report summarizes the most recently available information about heart disease and stroke prevalence, screening, treatment, risk factors, illness and death in Alaska.

Alaska public health partners and stakeholders – clinical and public health professionals as well as other health advocacy partners and the public – may use this report to inform continued planning and evaluation of heart disease and stroke prevention and control efforts in the state.

What are heart disease and stroke?

The following are some key terms to know.[1]

Heart disease refers to several different types of heart conditions.

> **Ischemic heart disease** (also called **coronary artery disease [CAD]** or **coronary heart disease [CHD]**) is a problem caused by narrowed heart arteries. It can ultimately lead to a **heart attack** (also called a **myocardial infarction**), which is when a part of the heart muscle does not receive enough blood flow. Without blood flow, the heart muscle is damaged.
>
> **Angina** is chest pain or discomfort when the heart does not get enough oxygen-rich blood; it is a symptom of an underlying heart problem, usually CHD.
>
> **Heart failure** is when the heart muscle is weakened and cannot pump enough blood to meet the body's needs for blood and oxygen. Part of the heart muscle can be damaged or die.
>
> **Cardiomyopathy** refers to a number of diverse conditions of the heart muscle where the normal muscle of the heart can thicken, stiffen, thin out or fill with substances the body produces. The ability to pump blood is reduced, leading to irregular heartbeats, backup of blood into the lungs or body, and heart failure.

[1] Content in this section was adapted from the Centers for Disease Control and Prevention (CDC) *About Heart Disease.* Page last reviewed August 10, 2015. https://www.cdc.gov/heartdisease/about.htm (last accessed 7/26/18) and from the American Heart Association *Answers by Heart Fact Sheets* http://www.heart.org/HEARTORG/Conditions/More/ToolsForYourHeartHealth/Answers-by-Heart-Fact-Sheets_UCM_300330_Article.jsp#.W177VtVKg-W (Last accessed 7/26/18)

Cardiac arrhythmia is an abnormal or irregular heart rhythm – it can be fast or slow. If severe or long-lasting, the heart may not be able to pump enough blood to the body.

Other heart disease includes less common types such as rheumatic heart disease (caused by a bacterial infection), congenital heart disease (poorly formed heart structures at birth), and inflammatory heart disease.

Stroke occurs when a blood vessel that feeds the brain either bursts (hemorrhagic stroke) or is blocked (ischemic stroke) causing that part of the brain, and the part of the body it controls, to not work properly.

Hypertension is another term for **high blood pressure** (HBP). Newly updated in 2017, it means having a systolic blood pressure (SBP) greater than or equal to 130 mmHg or diastolic blood pressure (DBP) greater than or equal to 80 mmHg.[2]

Cholesterol is a fat-like substance in the body. High levels in the blood can lead to **atherosclerosis**, also known as hardening of the arteries, when **plaque** made of up cholesterol deposits accumulate in your arteries.

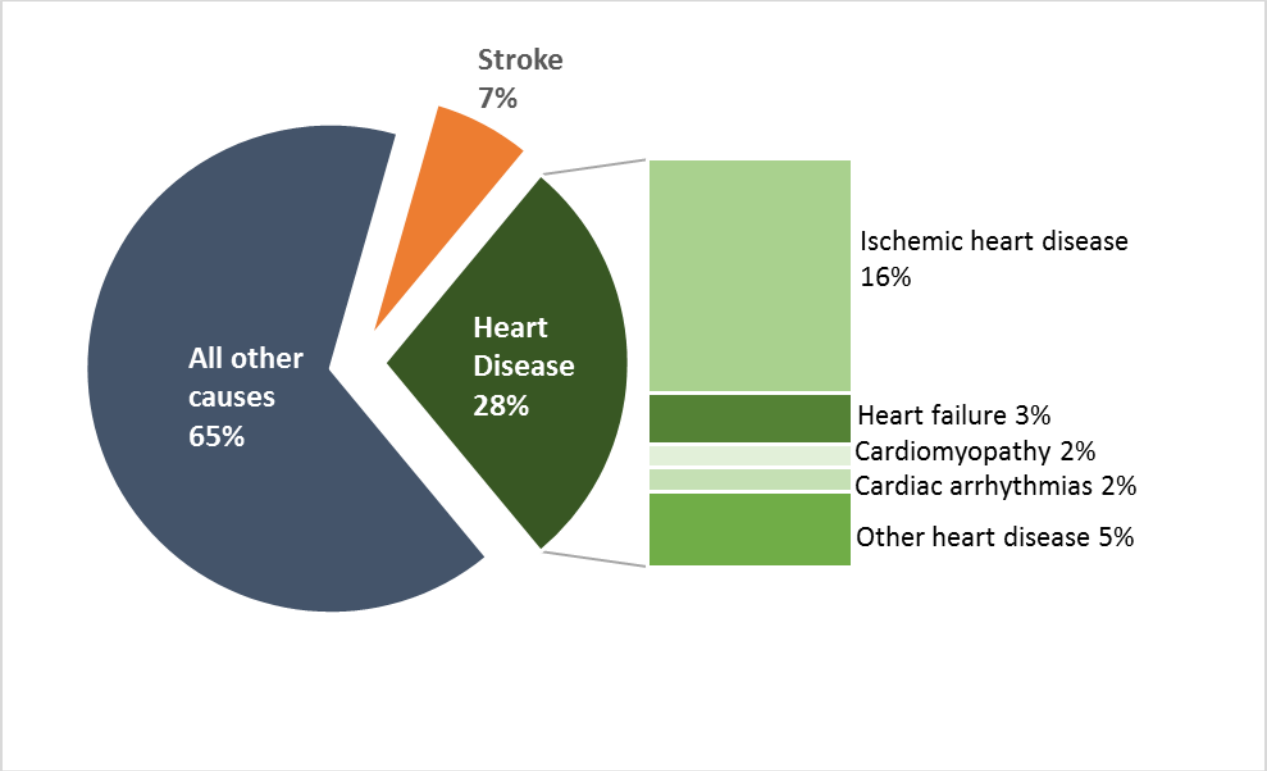
Why are heart disease and stroke an Alaska public health priority?

Heart disease and stroke cause about one-third of the deaths in Alaska (see Figure 1). Heart disease is often called the "silent killer" because there are commonly no warning signs or symptoms, and many people do not know they have it. This report provides the most current data available to describe the prevalence of heart disease and stroke in Alaska, as well as associated risk factors, to help inform actions that can prevent and control them.

Figure 1: Heart disease and stroke contributions to death among Alaskans

Alaska, 2007-2016 combined

[2] Whelton PK, Carey RM, Aronow WS, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/ PCNA guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Hypertension. 2017. https://doi.org/10.1161/ HYP.0000000000000065.



Data source: Alaska Division of Public Health, Health Analytics and Vital Records Section, Mortality Data. Underlying cause.

Alaska has a unique population; one key factor is age. The state is relatively "younger" than other states: in the 2010 U. S. Census, Alaska's median age was 33.8 years, compared to the United States overall median age of 37.2 years. However, during recent years the population is changing: the percent of Alaska's population over age 65 was 8% in 2010 (about 56,000 people) and 11% in 2017 (about 83,000 people).[3] This change means that health conditions that affect older people – such as heart disease and stroke – will become an even greater public health concern for Alaska in the future.

[3] United States Census Bureau. Annual estimates of the resident population for selected age groups for the United States and Alaska: year 2016.

Methods

The following is a summary of the data sources, key definitions, analytic approaches, and notes on presentation of data in this report. Additional detail is available in the Appendix.

Data Sources

- *Prevalence of heart disease and stroke and related risk factors.* The prevalence of these factors in Alaska was obtained from the Alaska Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is an anonymous telephone survey of adults that is sponsored by the Centers for Disease Control and Prevention (CDC), and has been conducted in Alaska since 1991. Data from 2016 were the most recent data available for this report. It is the state's primary source of information on health risks and behaviors among the general population of adults. For the purposes of this report, "heart disease prevalence" and "stroke prevalence" refer to individuals' self-reported health care provider diagnosis of those conditions.
- *Hospitalizations*. Inpatient and outpatient data were provided by the Alaska Health Facilities Data Reporting (HFDR) program for 2016, the most recent data available. Prior years of data were not used because of concerns about completeness of data, as mandatory reporting did not begin until 2015. Additionally, there was a significant change in the hospital data coding system during fall 2015 which substantially affected reporting. Only Alaska residents are included in the hospitalization data.
- *Deaths.* Information on cause of death (mortality) among adults was taken from the death certificate. Unless noted, Alaska statewide and U.S. data were obtained from the CDC WONDER Online Database, which includes data from all vital statistics programs in the U.S. Regional data included in this report, and data describing specific types of heart disease and stroke-related deaths, were obtained directly from the Alaska Health Analytics and Vital Records Section (HAVRS) within the Division of Public Health. Only Alaska residents are included in Alaska-specific rates. Data from 2016 were the most recent data available for this report.

Key Definitions

- *Race and ethnicity*: Identification of race and ethnicity varied by data source. In BRFSS, Alaska Native people includes all individuals who reported American Indian or Alaska Native as one of their race groups, regardless of ethnicity; Hispanic includes all others who identified as Hispanic ethnicity, regardless of race; Black or African American, White and Asian includes those who identified these as their race and were non-Hispanic; and "other" race groups include those who reported Pacific Islander, other, or multiple race groups that did not include Alaska Native or Hispanic ethnicity. In the hospitalization data, race is assigned as noted in the medical record; people with Hispanic ethnicity were reported separately, and all race groups are non-Hispanic. Race and ethnicity are reported as recorded on the death certificate.
- *Alaska regions*: Data are presented geographically in this report for Behavioral Health Systems Regions (BHSR). These are 11 reporting regions in Alaska with at least 20,000 individuals, allowing sufficient population sizes for reporting data on behavioral health services in compliance with the federal Health Insurance Portability and Accountability Act (HIPAA) Privacy Rule. For BRFSS, "rural Alaska" includes those living in Northern and Southwest Alaska, as defined by the sampling regions for Alaska BRFSS. This includes Northwest, Yukon-Kuskokwim (Y-K) Delta, and Southwest regions, as well as Denali Borough, and the Census Areas Yukon-Koyukuk and Southeast Fairbanks.

- *Low SES*: For BRFSS, "low socio-economic status (SES)" includes those who live in a household that is at less than 185% of the federal poverty level, or who have completed less than a high school education.
- *Cause of death*: Only underlying (proximal) cause of death from heart disease and stroke are reported for state trends, gender and race groups. However, for regional presentations, both underlying and contributing cause of death are reported in combination, so that more regions have reportable numbers (i.e., fewer regions have data suppressed due to small numbers). For this reason, death rates shown in tables and figures with regional data will be larger than those displaying statewide data.

Analytic Approaches

- *Confidence intervals.* 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 times) that the confidence interval around an estimate will include the true value. When confidence intervals for two estimates in the same data system do not overlap, those two estimates are "significantly" different from one another.
- *Age adjustment.* 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 chronic disease (e.g., diabetes, heart disease) 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 rate even if the two communities had the same risk.
- *Suppression of small numbers.* Estimates or counts based on small numbers were suppressed based on guidelines from the State of Alaska. See Appendix for more detail.

Notes on Presentation of Data

Throughout this report, visual cues are used to help the reader understand what types of data are being presented:

- Data shown on a vertical axis (i.e., column charts) included both Alaska statewide and U.S. data.
- Trend line charts are also used for Alaska statewide data and include U.S. data when available.
- Data shown on a horizontal axis (i.e., bar charts) are for Alaska alone, including contrasting sub-groups within the state.
- All regional data are presented both with a map to provide geospatial context and a bar chart; colors were assigned by region to provide visual cues about relative rates, but different shades should not be interpreted as statistically significant differences.
- Confidence intervals are displayed in several ways in this report: as "dumbbell" error bars, as shaded areas around a trend line, and sometimes as "±" values around a reported point estimate.
- To summarize data across groups and regions, a color block "patchwork" table is included near the end of this report. Different colors were used to provide visual cues about relative rates, and patterns of risks across groups, but should not be interpreted as statistically significant differences.
- Descriptions of "significant" differences between groups are included in text only when statistically-based approaches found that the differences measured between groups are unlikely

to be due to variability in estimates or chance. Non-significant differences are typically not described in text as being “different” (e.g., higher or lower than other groups).

Heart Disease

Prevalence

About 3.1% of adults in Alaska have ever been diagnosed with a heart attack (see Figure 2). Alaska's rate has not been significantly different than the national rate during any recent years. Like the U.S., Alaska's heart attack prevalence has declined since 2005 at a rate of about 1.7% per year, but the change in prevalence over time for Alaska has not reached statistical significance.[4] Note that because heart disease is often asymptomatic and undiagnosed, this prevalence based on self-report is likely an underestimate.

About 3.0% of adults in Alaska have ever been diagnosed with coronary heart disease (CHD) (see Figure 3). Alaska rates have been similar to or slightly lower than the U.S. rate for recent years. The prevalence of coronary heart disease (CHD) has declined significantly since 2005, at an average annual rate of -2.6%.

We combined measures of heart attack and CHD so that any adult who had either a heart attack or CHD was classified as having heart disease: about one-third of the total number of people who had been diagnosed with either one had both (see Figure 4).

As of 2016, an estimated 4.3% of Alaska's adults have ever been diagnosed with heart disease, which translates to approximately 24,000 people (see Figure 5).

Differences by demographic group.

We examined five years of data combined in order to compare differences among subgroups[5] (see Figure 5). The prevalence of heart disease was significantly higher among males than females (5.2% vs. 3.6%) and increased with age from less than 1% among adults ages 18-44 to 19.0% among people ages 75 and older. Overall, race/ethnicity was associated with the prevalence of heart disease; the prevalence among Asian people was lower than for Alaska Native, Black or African American, Hispanic, and White individuals, but no other comparison groups were significantly different from one another. There were no significant differences in heart disease prevalence

Heart Disease in Alaska

As of 2016:

- 4.3% of adults in Alaska have known heart disease – a diagnosed heart attack, coronary heart disease (CHD), or both.
- This translates to more than 24,000 Alaska adults who have been diagnosed with heart disease.

[4] Reader note: this is the average rate of change from year-to-year, proportionate to the prior year; not a percentage point change in prevalence.

[5] Reader note: the overall prevalence combined from five years of data is different than the current prevalence reported for the most recent year alone and highlighted in the first part of this section.

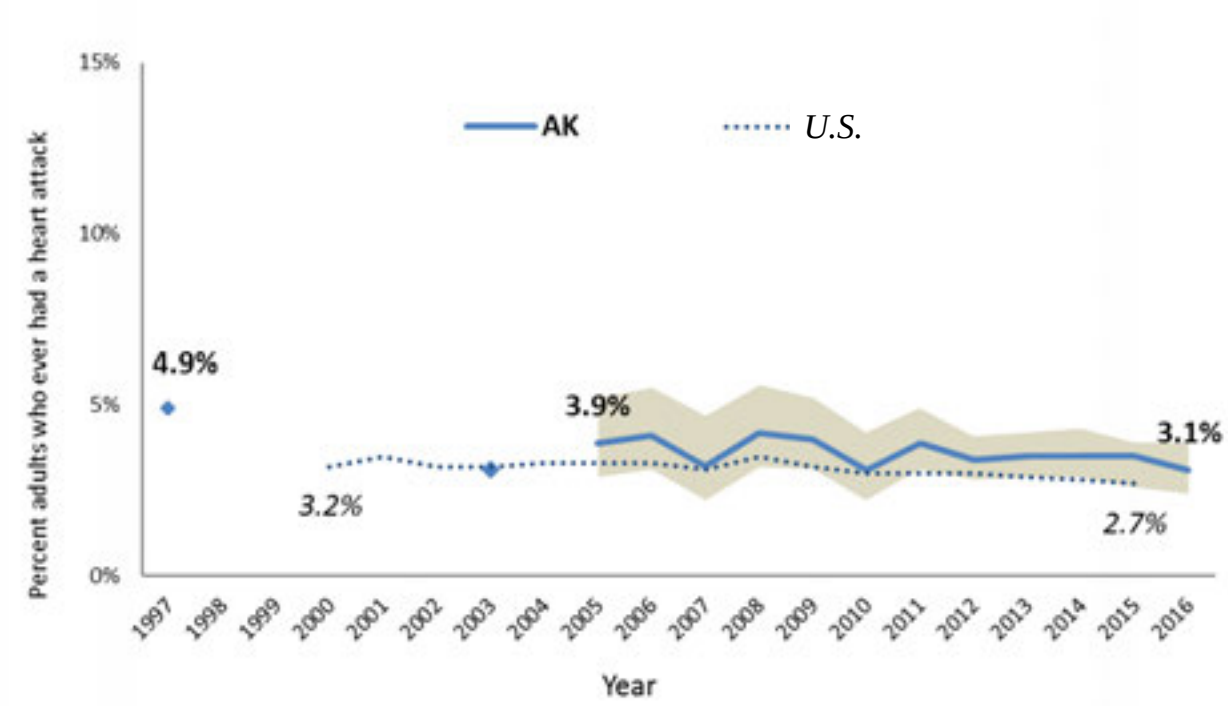
between those living in rural Alaska and the rest of the state. The prevalence of heart disease was higher among people with fewer economic resources ("low SES") than among people with greater resources.

Regional differences.

We combined five years of data to examine the prevalence of heart disease by Alaska's Behavioral Health Systems Regions (see Figure 6). The prevalence of heart disease was greater in the Southeast (SE)-southern region and Kenai Peninsula region than in the state overall.

Figure 2: Prevalence of ever being diagnosed with heart disease among adults: Heart attack

Alaska and U.S., 1997-2016 (U.S. through 2015), age-adjusted



Prevalence estimates are age-adjusted to the U.S. 2000 population, using 4 groups (18-34, 35-44, 45-64, 65+)
Shading shows 95% confidence interval for Alaska's annual rates. 95% confidence interval for U.S. rates averages to ± 3.1%.
Alaska data source: Alaska BRFSS standard question: *Has a doctor, nurse, or other health professional EVER told you that you had any of the following? … a heart attack, also called a myocardial infarction.*
U.S. data source: National Health Interview Survey (NHIS).
Alaska trend was tested using Joinpoint software. Annual Percent Change was -1.7 (non-significant change in prevalence over time during this period at p=.05).

Supporting table for Figure 2:

Prevalence of ever being diagnosed with heart disease among adults: Heart attack

Alaska and U.S., 1997-2016 (U.S. through 2015), age-adjusted

	Alaska			U.S.		
Year	**Annual Prevalence**	**Lower CI**	**Upper CI**	**Annual Prevalence**	***% Difference (AK from U.S.)***	***+ AK higher than U.S. – AK lower than U.S. Blank: no significant difference****
1997	4.9%	3.3%	7.2%			
1998						
1999						
2000				3.2%		
2001				3.5%		
2002				3.2%		
2003	3.1%	2.2%	4.4%	3.2%	-0.1%	
2004				3.3%		
2005	3.9%	2.9%	5.2%	3.3%	0.8%	
2006	4.1%	3.1%	5.5%	3.3%	-0.1%	
2007	3.2%	2.2%	4.7%	3.1%	1.1%	
2008	4.2%	3.2%	5.6%	3.5%	0.5%	
2009	4.0%	3.1%	5.2%	3.2%	-0.1%	
2010	3.1%	2.2%	4.2%	3.0%	0.9%	
2011	3.9%	3.1%	4.9%	3.0%	0.4%	
2012	3.4%	2.8%	4.1%	3.0%	0.5%	
2013	3.5%	2.9%	4.2%	2.9%	0.6%	
2014	3.5%	2.9%	4.3%	2.8%	0.7%	
2015	3.5%	2.6%	3.9%	2.7%	0.4%	
2016	3.1%	2.4%	3.9%			

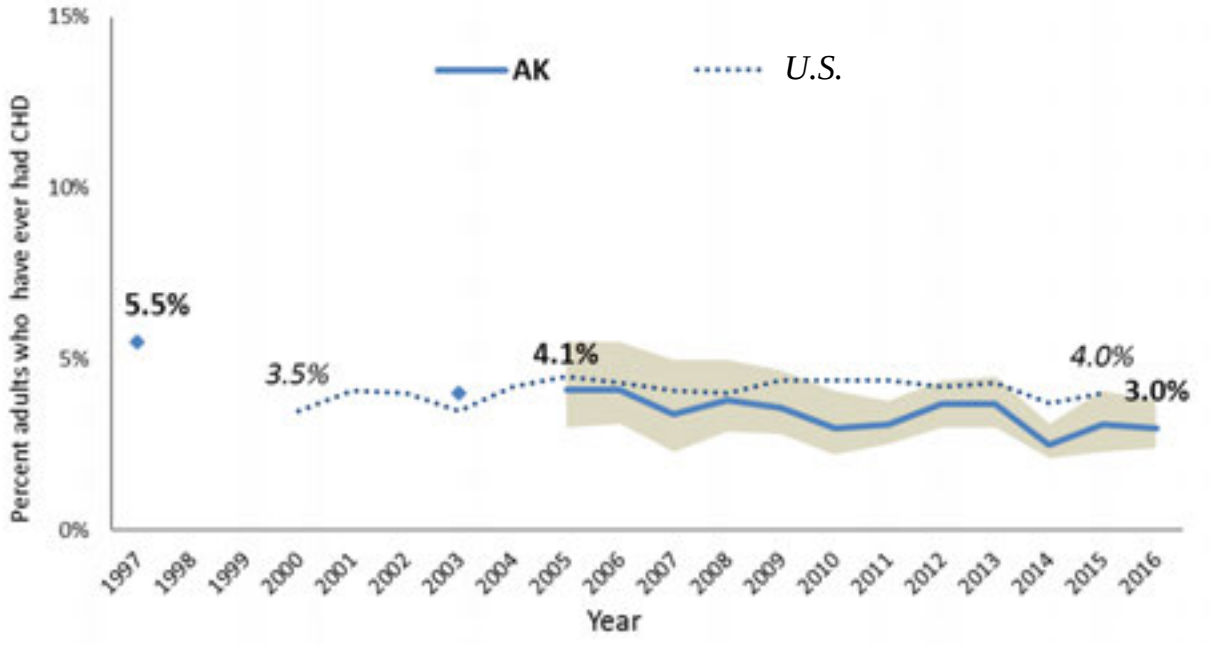
Prevalence estimates are age-adjusted to the U.S. 2000 population, using 4 groups (18-34, 35-44, 45-64, 65+)
95% confidence interval for U.S. rates averages to ± 3.1%.
Alaska data source: Alaska BRFSS standard question: *Has a doctor, nurse, or other health professional EVER told you that you had any of the following? … a heart attack, also called a myocardial infarction.*

U.S. data source: National Health Interview Survey (NHIS).

Alaska Trend was tested using Joinpoint software. Annual Percent Change was -1.7 (non-significant change in prevalence over time during this period at p=.05).

Figure 3: Prevalence of ever being diagnosed with heart disease among adults: Coronary Heart Disease (CHD)

Alaska and U.S., 1997-2016 (U.S. through 2015), age-adjusted



Prevalence estimates are age-adjusted to the U.S. 2000 population, using 4 groups (18-34, 35-44, 45-64, 65+) Shading shows 95% confidence interval for Alaska's annual rates. 95% confidence interval for U.S. rates averages to ± 4.1%.
Alaska data source: Alaska BRFSS standard question: *Has a doctor, nurse, or other health professional EVER told you that you had any of the following? … angina or coronary heart disease.*
U.S. data source: National Health Interview Survey (NHIS).
Alaska trend was tested using Joinpoint software. Annual Percent Change was -2.62 (statistically significant declining trend, p<.05).

Supporting data for Figure 3:

Prevalence of ever being diagnosed with heart disease among adults: Coronary Heart Disease (CHD)

Alaska and U.S., 1997-2016 (U.S. through 2015), age-adjusted

	Alaska			U.S.		
Year	**Annual prevalence**	**Lower CI**	**Upper CI**	**Annual Prevalence**	***% difference (AK from U.S.)***	***+ AK higher than U.S. – AK lower than U.S. Blank: no significant difference****
1997	5.5%	3.8%	7.9%			
1998						
1999						
2000				3.5%		
2001				4.1%		
2002				4.0%		
2003	4.0%	2.9%	5.5%	3.5%	0.5%	
2004				4.2%		
2005	4.1%	3.0%	5.5%	4.5%	-0.4%	
2006	4.1%	3.1%	5.5%	4.3%	-0.9%	
2007	3.4%	2.3%	5.0%	4.1%	-0.3%	
2008	3.8%	2.9%	5.0%	4.0%	-0.4%	
2009	3.6%	2.8%	4.7%	4.4%	-1.4%	
2010	3.0%	2.2%	4.1%	4.4%	-1.3%	
2011	3.1%	2.5%	3.8%	4.4%	-0.7%	-
2012	3.7%	3.0%	4.4%	4.2%	-0.5%	
2013	3.7%	3.0%	4.5%	4.3%	-1.8%	
2014	2.5%	2.1%	3.1%	3.7%	-0.6%	-
2015	3.1%	2.3%	4.1%	4.0%	-1.0%	
2016	3.0%	2.4%	3.8%			

Prevalence estimates are age-adjusted to the U.S. 2000 population, using 4 groups (18-34, 35-44, 45-64, 65+)

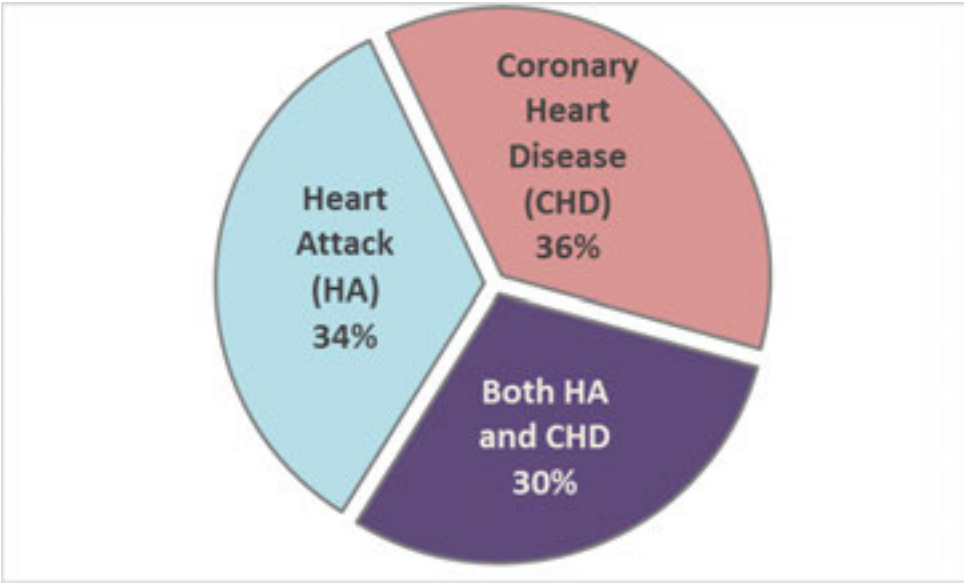
Alaska data source: Alaska BRFSS standard question: *Has a doctor, nurse, or other health professional EVER told you that you had any of the following? … angina or coronary heart disease.*

U.S. data source: National Health Interview Survey (NHIS).

Alaska trend was tested using Joinpoint software. Annual Percent Change was -2.62 (statistically significant declining trend, p<.05).

Figure 4: Heart disease proportions from coronary heart disease and heart attack

Alaska, 2012-2016



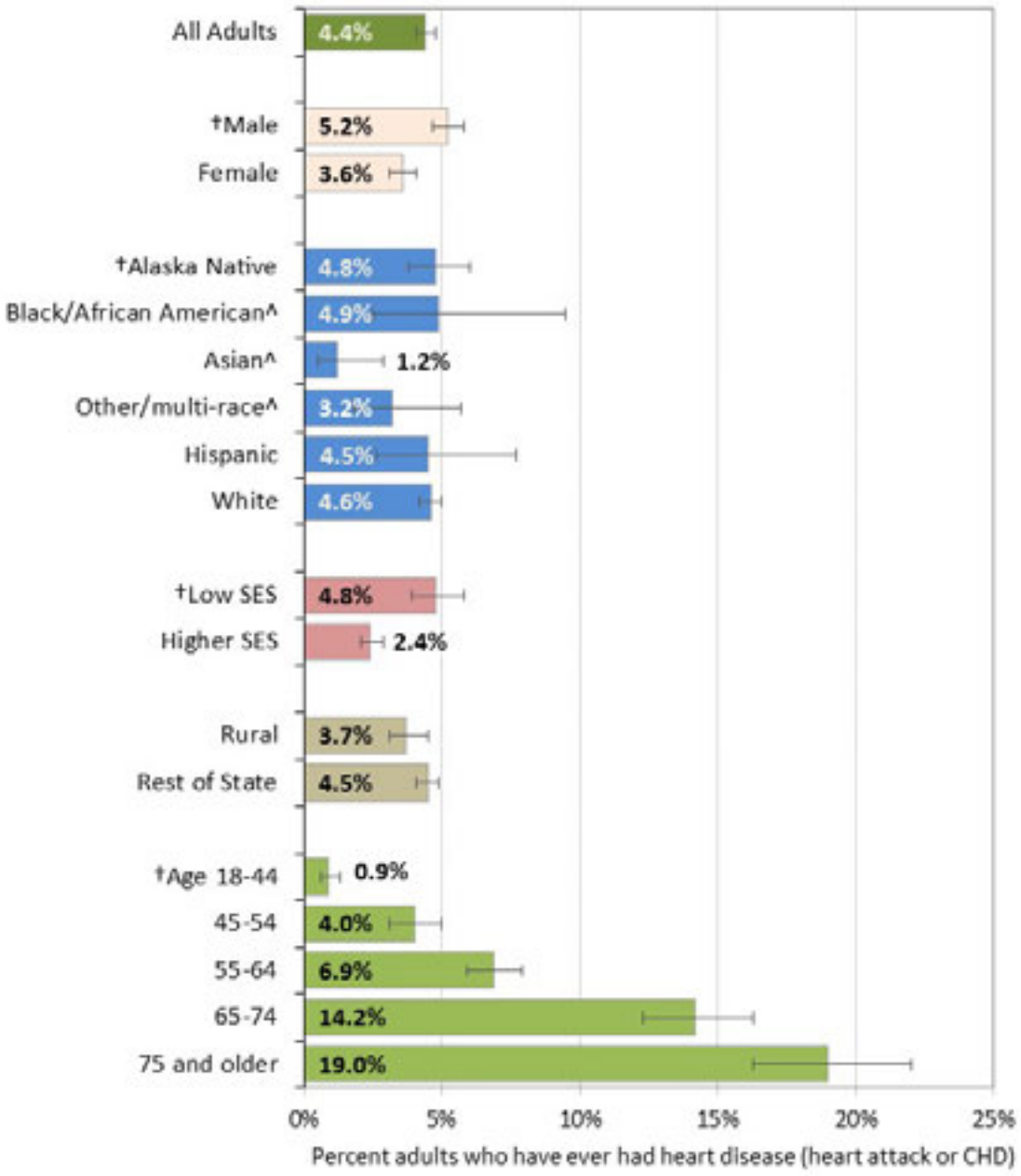
Data source: Alaska BRFSS, Standard data file

Based on BRFSS questions *Has a doctor, nurse, or other health professional EVER told you that you had any of the following? … angina or coronary heart disease.*

… a heart attack, also called a myocardial infarction

Figure 5: Prevalence of ever being diagnosed with heart disease among adults, by demographic group

Alaska, 2012-2016



Data source: Alaska BRFSS, Standard data file. Data are shown in Appendix Table 1.

^ indicates estimates are flagged for reliability, due to small numbers

†indicates intergroup differences from a chi-square test.

Low socio-economic status (SES) includes those who live in a household that is at <185% of the poverty level, or who have completed less than a high school education.

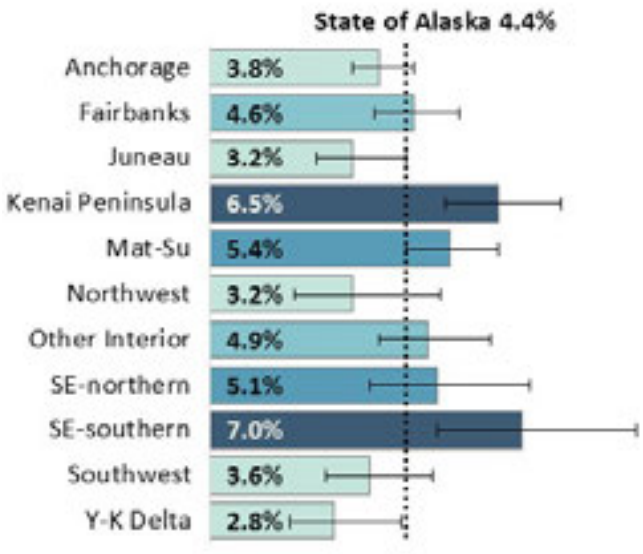
Rural Alaska includes those living in Northern and Southwest Alaska, as defined by the sampling regions for Alaska BRFSS. This includes Northwest, Yukon-Kuskokwim (Y-K) Delta, and Southwest regions, as well as Denali Borough, and the Census Areas Yukon-Koyukuk and SE Fairbanks.

Figure 6: Prevalence of ever being diagnosed with heart disease among adults by Behavioral Health Systems Region

Alaska, 2012-2016

Prevalence of Heart Disease by Behavioral Health Systems Region
Alaska adults, 2012-2016

	Prevalence	Lower CI	Upper CI
State of Alaska	**4.4%**	**4.1%**	**4.8%**
Anchorage	3.8%	3.2%	4.6%
Fairbanks	4.6%	3.7%	5.6%
Juneau	3.2%	2.4%	4.4%
Kenai Peninsula*	6.5%	5.3%	7.9%
Mat-Su	5.4%	4.4%	6.5%
Northwest	3.2%	1.9%	5.2%
Other Interior	4.9%	3.8%	6.3%
SE-northern	5.1%	3.6%	7.2%
SE-southern*	7.0%	5.1%	9.6%
Southwest	3.6%	2.6%	5.0%
Y-K Delta	2.8%	1.8%	4.3%



Data source: Alaska BRFSS Standard File.
*indicates significant difference between region and state overall.

Heart Disease-related Deaths

Heart disease is among Alaska's leading causes of death (mortality). Contribution to death can be indicated on the death certificate in one of two ways:

> **Underlying cause** is the proximal or direct cause of death. This is the disease or injury that initiated the chain of events that led directly and inevitably to death.
>
> **Contributing cause** is any condition or injury that initiated the events leading to death, but which are themselves not the immediate cause of death.

For the purposes of this report, "heart disease-related deaths" can refer to either deaths where heart disease is the underlying cause or a contributing cause. Notes below each table or figure will indicate which classification is used.

In 2016, heart disease was listed as the cause of death for 814 people, making it the second leading cause of death for the state (see Table 1).

Table 1: Leading causes of death in Alaska and the U.S. (2016)

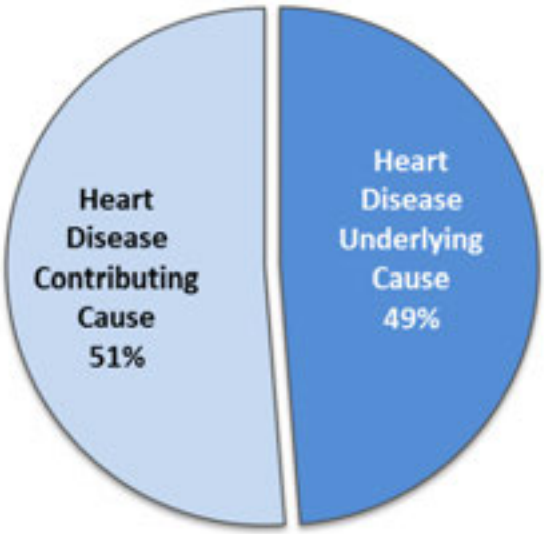
Cause of Death by Rank in Alaska	Alaska Deaths			U.S. Deaths	
	Number	%	Age-adjusted Rate	Age-adjusted Rate	Rank
1. Cancer	974	22%	152.5	155.8	2
2. Diseases of the Heart	**814**	**18%**	**136.3**	**165.5**	**1**
3. Unintentional Injuries	429	9%	61.9	47.4	3
4. Chronic Lower Respiratory Disease	236	5%	40.4	40.6	4
5. Stroke	193	4%	38.2	37.3	5
6. Suicide	186	4%	25.3	13.5	10
7. Chronic Liver Disease and Cirrhosis	123	3%	15.9	10.7	12
8. Diabetes	122	3%	18.6	21.0	7
9. Alzheimer's Disease	109	2%	25.4	30.3	6
10. Influenza and Pneumonia	60	1%	12.4	13.5	8
Subtotal for top 10 causes	3,246	72%			
Total deaths	4,520	100%			

Alaska Data source: State of Alaska, Department of Health and Social Services. Alaska Vital Statistics 2016 Annual Report. Available at http://dhss.alaska.gov/dph/VitalStats/Documents/PDFs/VitalStatistics_AnnualReport_2016.pdf (last accessed 1-18-2019)
Underlying cause. Only Alaska residents are included in Alaska-specific rates.
U.S. data source: Xu JQ, Murphy SL, Kochanek KD, Bastian B, Arias E. Deaths: Final data for 2016. National Vital Statistics Reports; vol 67 no 5. Hyattsville, MD: National Center for Health Statistics. 2018. Available at https://www.cdc.gov/nchs/data/nvsr/nvsr67/nvsr67_05.pdf (last accessed 1-18-2019)

In the past ten years (2007-2016) there were 21,914 total deaths related to heart disease in Alaska – more than 2,100 per year. About half of these deaths (49%) were directly caused by heart disease as indicated on the death certificate (i.e., "underlying cause of death"), and the remaining half (51%) listed heart disease as contributing to the death, but not the direct cause (i.e., "contributing cause of death") (see Figure 7).

Figure 7: Heart disease-related deaths

Alaska, 2012-2016



Data source: Alaska Division of Public Health, Health Analytics and Vital Records Section, Mortality Data.
21,914 total deaths: 7,182 underlying cause; 14,732 contributing cause. Only Alaska residents.

Alaska's heart disease-related deaths rate has consistently been lower than the U.S. rate. As in the U.S., this rate has declined significantly since 1999, an average annual decline of 3.8% per year (see Figure 8).

Demographic differences. Heart disease-related death rates were higher among men than women in both Alaska and the U.S. (see Figure 9). For both men and women, heart disease-related death rates were lower for Alaska than the U.S.

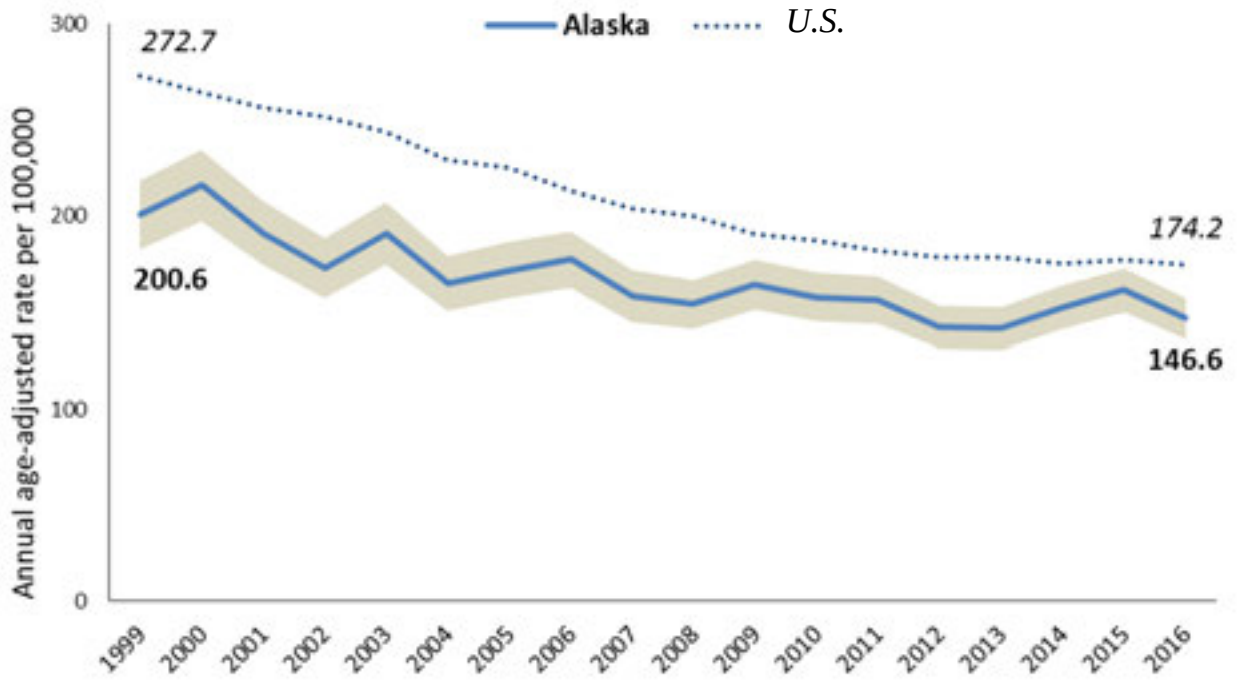
Rates for Alaska were lower than the U.S. for Black/African American and White groups. Among American Indian/Alaska Native people, rates in Alaska were greater than the U.S. Rates were also greater for American Indian/Alaska Native people in Alaska in comparison to all other race groups in

Alaska, which is a departure from historically lower rates.[6] Within both Alaska and the U.S., rates among Asian or Pacific Islander people were lower than for Whites (see Figure 10).

Regional differences. We combined ten years of death data to provide sufficient sample sizes to report rates for Alaska's regions. We also report on both underlying and contributing cause for the same reason, therefore the state overall rate is different than reported in previous sections of this report. Heart disease-related death rates were higher in the Northwest and Yukon-Kuskokwim (Y-K) Delta regions than for the state overall. Rates were lower for the Fairbanks and Kenai Peninsula regions than for the state overall (see Figure 11).

Figure 8: Heart disease-related death rates

Alaska and U.S., 1999-2016, age-adjusted, underlying cause of death



Shading shows 95% confidence interval for Alaska's annual rates.
Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2016 on CDC WONDER Online Database, released December, 2017. Data are from the Multiple Cause of Death Files, 1999-2016, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed at http://wonder.cdc.gov/ucd-icd10.html on Mar 29, 2018.
Rates are per 100,000 and age-adjusted to the 2000 U.S. Standard Population (19 age groups - Census P25-1130). Only Alaska residents are included in Alaska rates.
Alaska trend was tested using Joinpoint software. Annual Percent Change was -3.75 (statistically significant declining trend, p<.05).

[6] McLaughlin, J.B., Middaugh, J.P., Utermohle, C.J., Asay, E.D., Fenaughty, A.M., & Eberhart-Phillips, J.E. (2004). Changing patterns of risk factors and death for coronary heart disease among Alaska Natives, 1979-2002. *Journal of the American Medical Association (JAMA),* 291(21), 2545-2546. doi:10.1001/jama.291.21.2545

Supporting table for Figure 8:

Heart disease-related death rates

Alaska and U.S., 1999-2016, age-adjusted, underlying cause of death

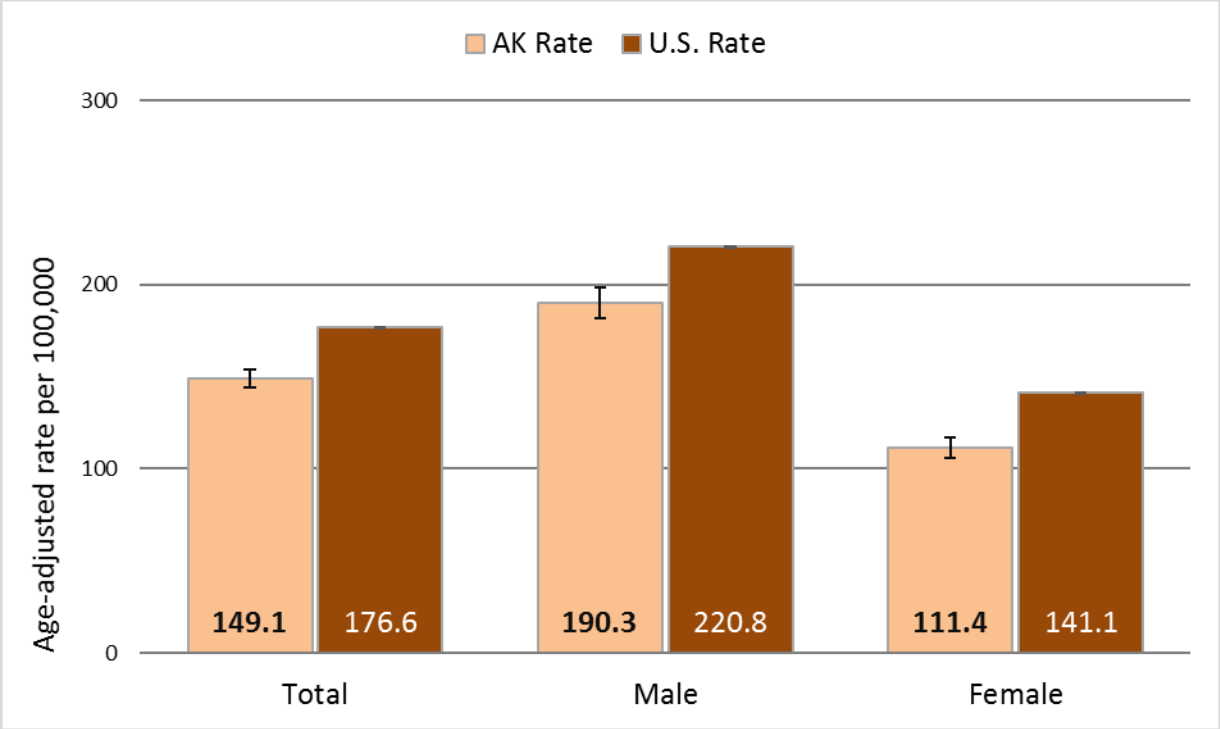
	Alaska				U.S.		
Year	**Annual Rate**	**Lower CI**	**Upper CI**	**Count**	**Annual Rate**	***% difference (AK from U.S.)***	***+ AK higher than U.S. – AK lower than U.S. Blank: no significant difference****
1999	200.6	182.5	218.7	568	272.7	-26%	-
2000	216.0	197.4	234.6	619	264.2	-18%	-
2001	190.8	174.2	207.5	609	256.3	-26%	-
2002	172.8	157.3	188.3	576	251.8	-31%	-
2003	190.8	174.7	206.9	642	243.9	-22%	-
2004	164.9	150.5	179.3	603	229.4	-28%	-
2005	171.8	157.4	186.2	643	225.1	-24%	-
2006	177.2	162.7	191.6	665	213.2	-17%	-
2007	158.2	144.8	171.6	628	203.7	-22%	-
2008	153.9	141.1	166.7	650	200.1	-23%	-
2009	164.0	151.1	176.9	733	190.7	-14%	-
2010	157.8	145.4	170.3	732	187.1	-16%	-
2011	156.2	144.2	168.2	768	181.8	-14%	-
2012	142.1	131.0	153.2	735	178.7	-20%	-
2013	141.9	130.9	152.8	741	178.3	-20%	-
2014	152.4	141.2	163.6	815	175.1	-13%	-
2015	161.3	150.0	172.7	884	177.0	-9%	-
2016	146.6	136.2	157.1	861	174.2	-16%	-

Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2016 on CDC WONDER Online Database, released December, 2017. Data are from the Multiple Cause of Death Files, 1999-2016, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed at http://wonder.cdc.gov/ucd-icd10.html on Mar 29, 2018.
Rates are per 100,000 and age-adjusted to the 2000 U.S. Standard Population (19 age groups - Census P25-1130). Only Alaska residents are included in Alaska rates.

Alaska trend was tested using Joinpoint software. Annual Percent Change was -3.75 (statistically significant declining trend, $p<.05$).

Figure 9: Heart disease-related death rates, by gender

Alaska and U.S., 2012-2016, age-adjusted, underlying cause of death



	Alaska				U.S.		
	Rate	Lower CI	Upper CI	Count	Rate	Lower CI	Upper CI
Total+	**149.1**	**144.2**	**154.0**	**4,036**	**176.6**	**176.4**	**176.8**
Male*+	190.3	181.9	198.7	2,528	220.8	220.4	221.1
Female+	111.4	105.6	117.3	1,508	141.1	140.9	141.3

Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2016 on CDC WONDER Online Database, released December 2017. Data are from the Multiple Cause of Death Files, 1999-2016, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed at http://wonder.cdc.gov/ucd-icd10.html on Apr 3, 2018

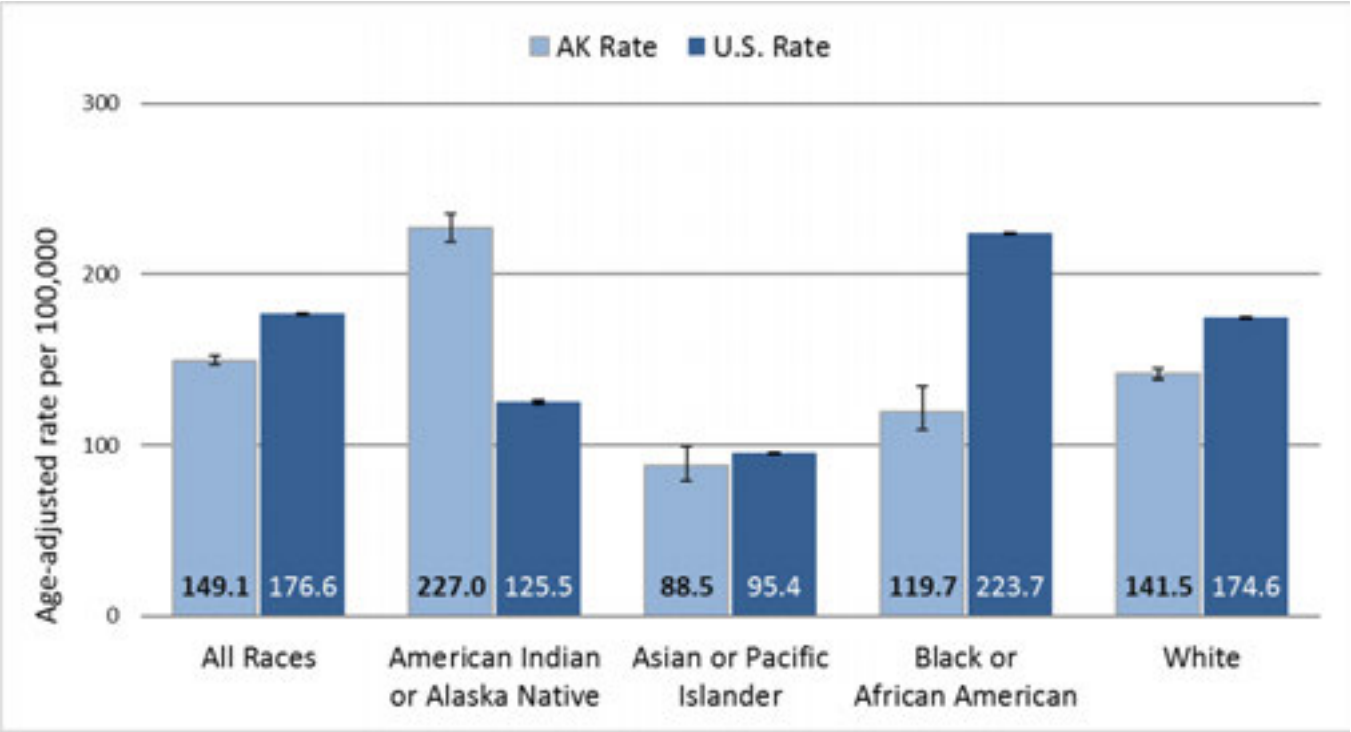
Rates are per 100,000 and age-adjusted to the 2000 U.S. Standard Population (19 age groups - Census P25-1130. Only Alaska residents are included in Alaska rates.

* Within Alaska, rates for males are greater than for females; this is also true for the U.S.

+ Rates for Alaska males and females are lower than for U.S. males and females, respectively, and the total rate is lower in Alaska than for the U.S.

Figure 10: Heart disease-related death rates, by race

Alaska and U.S., 2012-2016, age-adjusted, underlying cause of death



	Alaska				U.S.		
	Rate	Lower CI	Upper CI	Count	Rate	Lower CI	Upper CI
All Races+	**149.1**	**144.2**	**154.0**	**4,036**	**176.6**	**176.4**	**176.8**
American Indian or Alaska Native*	227.0	210.6	243.4	847	125.5	123.5	127.5
Asian or Pacific Islander*	88.5	73.8	103.2	164	95.4	94.7	96.1
Black or African American+	119.7	95.0	144.3	112	223.7	223.0	224.5
White+	141.5	136.0	147.0	2,913	174.6	174.4	174.9

Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2016 on CDC WONDER Online Database, released December, 2017. Data are from the Multiple Cause of Death Files, 1999-2016, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed at http://wonder.cdc.gov/ucd-icd10.html on Apr 3, 2018

Rates are per 100,000 and age-adjusted to the 2000 U.S. Standard Population (19 age groups - Census P25-1130. Only Alaska residents are included in Alaska rates.

* Within Alaska, death rates are higher for American Indian or Alaska Native people in comparison to the state rate and to Whites alone; rates for Asian or Pacific Islander people within Alaska are lower than the state rate and the rate for Whites alone.

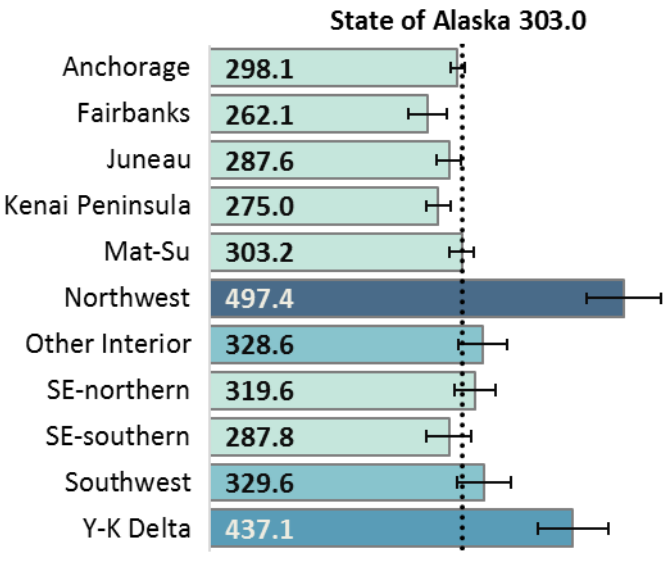
+ Rates in Alaska are lower than the U.S. in total, and also lower among Black or African American and White people in Alaska in comparison to those in the U.S.; rates among American Indian or Alaska Native (AIAN) people in Alaska are greater than for AIAN people in the U.S.

Figure 11: Heart disease-related death rates among adults, by Behavioral Health Systems Region

Alaska, 2007-2016, age-adjusted, underlying and contributing causes of death combined

Heart disease death rate (underlying and contributing causes combined) by Behavioral Health Systems Region, Alaska, 2007-2016

	Rate	Lower CI	Upper CI	Count
State of Alaska	**303.0**	**297.7**	**308.2**	**14,732**
Anchorage	298.1	290.0	306.3	5,807
Fairbanks*	262.1	247.6	276.5	1,509
Juneau	287.6	264.2	311.0	663
Kenai Peninsula*	275.0	260.0	290.0	1,448
Mat-Su	303.2	288.3	318.1	1,876
Northwest*	497.4	452.7	542.2	617
Other Interior	328.6	299.1	358.1	582
SE-northern	319.6	294.9	344.4	682
SE-southern	287.8	260.9	314.6	493
Southwest	329.6	297.6	361.6	548
Y-K Delta*	437.1	395.3	478.8	507



Rates are per 100,000 and age-adjusted to the 2000 U.S. Standard Population (19 age groups - Census P25-1130).
Source: Alaska Division of Public Health, Health Analytics and Vital Records Section, Mortality Data. Underlying and contributing cause. Only Alaska residents are included.
*indicates significant difference between region and state overall.

Heart Disease-related Hospitalizations

We examined heart disease-related hospitalization rates for Alaska residents from 2016, the most recent data available.[7] These datasets include both inpatient (admitted to the hospital) and outpatient (i.e., emergency department, outpatient surgery, outpatient observation, imaging labs, or other services) visits. "Heart disease-related" visits could list heart disease as the primary reason for the visit, or a contributing or complicating factor that was not the primary reason for the visit (i.e., "secondary").

Although only about 5% of heart disease-related hospital visits were inpatient visits where heart disease was the primary cause (3,858 total visits), in total heart disease contributed to the need for hospital treatment in 70,782 visits during 2016 (see Table 2). Of the heart disease-related inpatient visits (17% of total heart disease-related visits), 31% indicated heart disease as the primary cause, in comparison to 52% of the outpatient visits.

Rates of heart disease-related hospitalization were higher for males than females and increased with age.

Total heart disease-related hospitalization rates were higher among Alaska Native and Pacific Islander people than other groups; and lower among Hispanic and Asian people in comparison to other groups (see Table 3).

[7] See description of hospitalization data in Appendix for additional detail.

Table 2: Number and rate of inpatient and outpatient hospital discharges for heart disease, by sex and age

Alaska, 2016

	Inpatient		Outpatient		Total
	Primary	Secondary	Primary	Secondary	
Total					
Discharges	3,858	8,430	30,022	28,472	70,782
Rate per 10,000	52.2	114.0	405.9	384.9	956.9
Males					
Discharges	2,303	5,402	18,098	16,190	41,993
Rate per 10,000	60.3	141.4	473.7	423.7	1099.0
Females					
Discharges	1,555	4,565	11,924	12,280	30,324
Rate per 10,000	43.5	127.6	333.4	343.4	847.9
<18					
Discharges	16	162	302	286	766
Rate per 10,000	nr	8.6	15.9	15.1	40.4
18-44					
Discharges	288	717	2,633	2,342	5,980
Rate per 10,000	10.4	26.0	95.3	84.8	216.4
45-64					
Discharges	1,405	2,913	10,309	9,301	23,928
Rate per 10,000	72.0	149.3	528.5	476.8	1226.6
65+					
Discharges	2,149	6,175	16,778	16,543	41,645
Rate per 10,000	272.2	782.1	2125.0	2095.2	5274.4

Source: Alaska Division of Public Health, Health Analytics and Vital Records Section, Health Facilities Data Reporting Inpatient and Outpatient Database 2016, v5.
Only hospitalizations for Alaska residents are shown.
Rates are per 10,000 population in the state of Alaska.
"Secondary" are contributing or complicating factors that are not the primary reason for the visit.
nr: not reportable due to small number of cases

Table 3: Number and rate of inpatient and outpatient hospital discharges for heart disease, by race and ethnicity

Alaska, 2016

		Inpatient		Outpatient		Total
		Primary	Secondary	Primary	Secondary	
White						
	Discharges	2,481	6,450	15,043	17,350	41,324
	Rate per 10,000	50.8	132.0	307.7	354.9	845.4
Black/African American						
	Discharges	142	381	548	983	2,054
	Rate per 10,000	51.8	138.9	199.8	358.3	748.8
Alaska Native						
	Discharges	662	1,914	11,935	6,967	21,478
	Rate per 10,000	58.6	169.4	1056.5	616.8	1901.3
Asian						
	Discharges	141	342	444	809	1,736
	Rate per 10,000	30.2	73.2	95.0	173.1	371.5
Pacific Islander						
	Discharges	101	245	207	571	1,124
	Rate per 10,000	102.8	249.3	210.6	580.9	1143.6
Hispanic						
	Discharges	71	176	403	533	1,183
	Rate per 10,000	14.0	34.6	79.3	104.9	232.8

Source: Alaska Division of Public Health, Health Analytics and Vital Records Section, Health Facilities Data Reporting Inpatient and Outpatient Database 2016, v5.
Categories are mutually exclusive: all race groups are non-Hispanic; Hispanic ethnicity includes people of all race groups.
Only hospitalizations for Alaska residents are shown.
Rates are per 10,000 population in the state of Alaska.
"Secondary" are contributing or complicating factors that are not the primary reason for the visit.

Stroke

Prevalence

As of 2016, about 2.2% of adults in Alaska had ever been diagnosed as having had a stroke. This translates to about 15,000 people in Alaska.

Stroke

As of 2016:

- 2.2% of adults in Alaska have ever had a stroke.
- This translates to 15,000 Alaska adults who have suffered from a stroke.

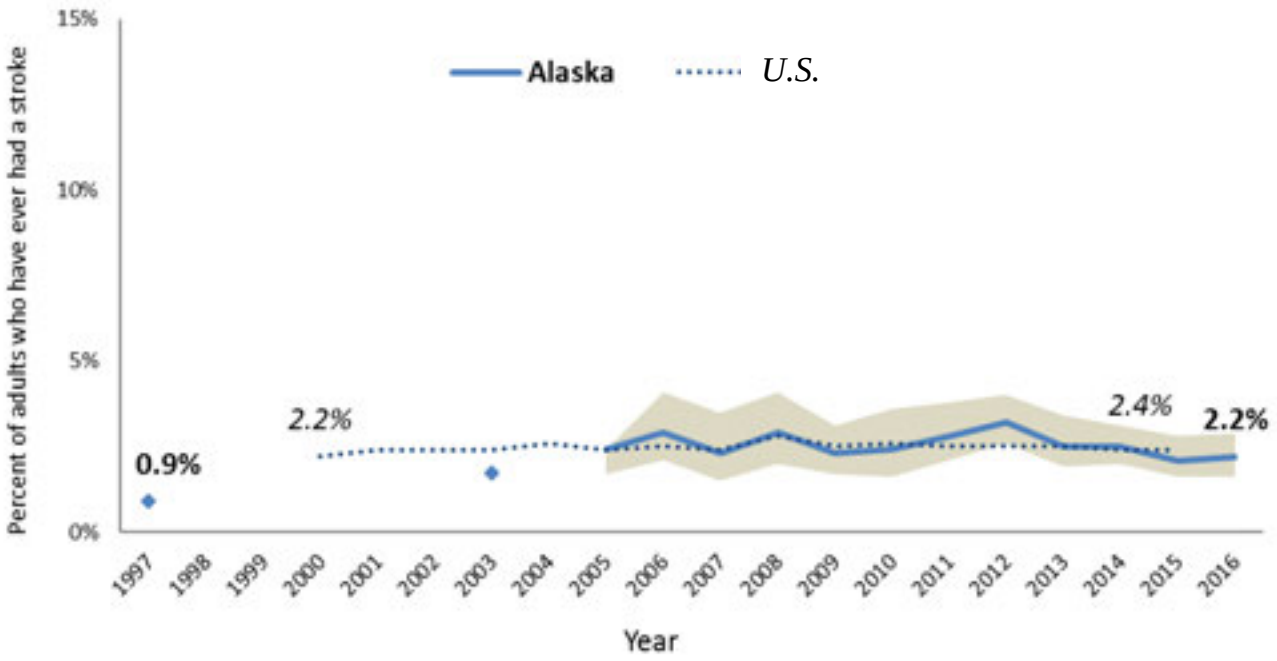
Trends. The prevalence of stroke in Alaska is similar to the U.S., and like the U.S. rates have not changed significantly during recent years (see Figure 12).

Demographic differences. We combined five years of data to describe the prevalence of stroke in Alaska. There were not significant differences in the prevalence of stroke among adults in Alaska by gender, race/ethnicity, socioeconomic status, or rural vs. other areas of the state. There were significant differences by age, with less than 1% of adults ages 18-44 saying they had ever been diagnosed with a stroke, in comparison to 11.7% of adults ages 75 and older (see Figure 13).

Regional differences. The prevalence of having had a stroke was significantly lower in the Juneau region in comparison to the state overall. No other regional differences were significant (see Figure 14).

Figure 12: Prevalence of ever being diagnosed with stroke among adults

Alaska and U.S., 1999-2016, age-adjusted



Prevalence estimates are age-adjusted to the U.S. 2000 population, using 4 groups (18-34, 35-44, 45-64, 65+)
Shading shows 95% confidence interval for Alaska's annual rates. 95% confidence interval for U.S. rates averages to ± 0.3%.
Alaska data source: Alaska BRFSS standard dataset question *Has a doctor, nurse, or other health professional EVER told you that you had any of the following? … a stroke*.
U.S. data source: National Health Interview Survey (NHIS).
Alaska trend was tested using Joinpoint software. Annual Percent Change was -0.83 (non-significant change in prevalence during this period at p=.05).

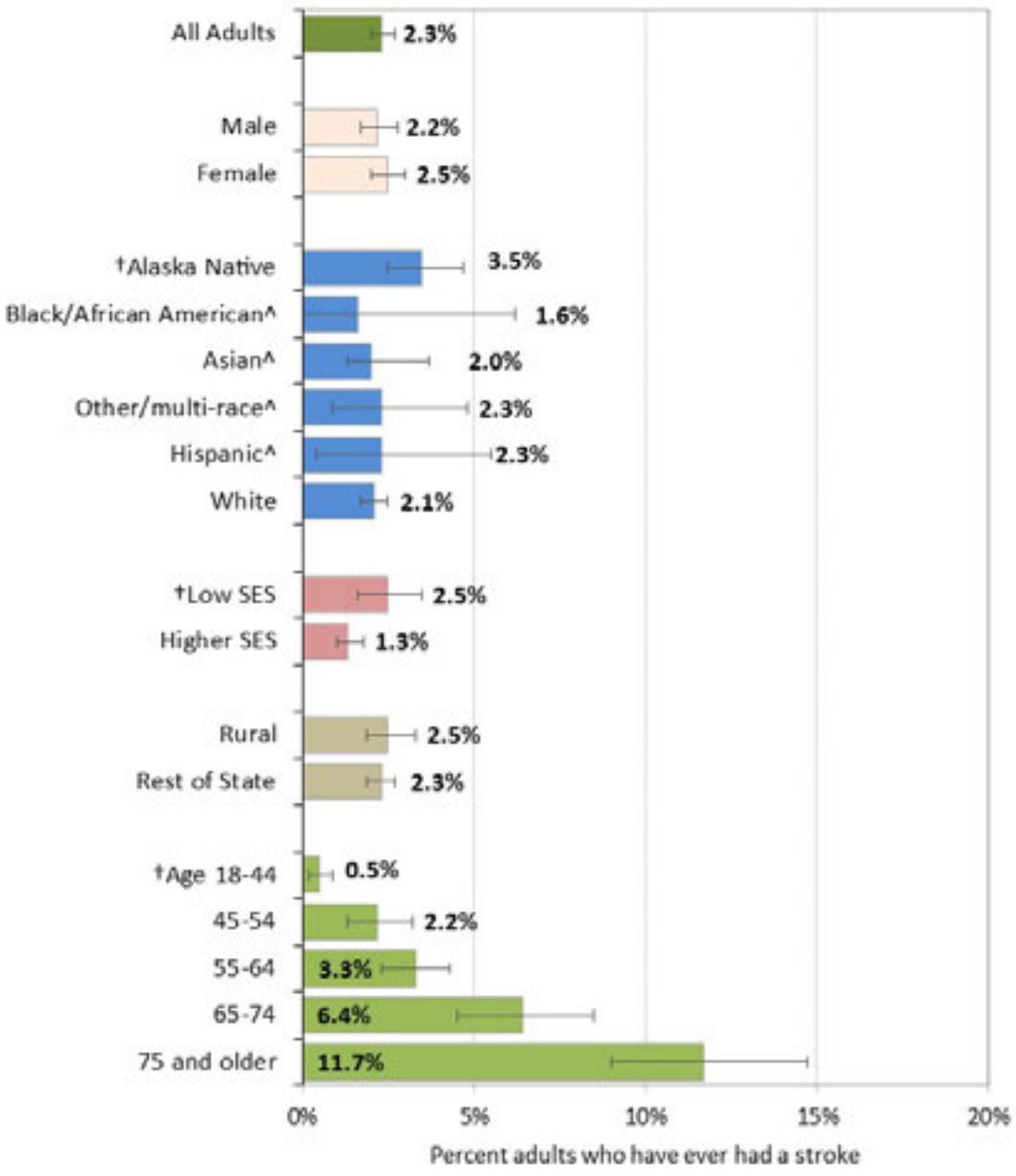
Supporting table for Figure 12:
Prevalence of ever being diagnosed with stroke among adults
Alaska and U.S., 1999-2016, age-adjusted

	Alaska			U.S.		
Year	**Annual Prevalence**	**Lower CI**	**Upper CI**	**Annual Prevalence**	***% Difference (AK from U.S.)***	***+ AK higher than U.S. – AK lower than U.S. Blank: no significant difference****
1997	0.9%	0.4%	2.2%		1%	
1998					0%	
1999					0%	
2000				2.2%	-2%	
2001				2.4%	-2%	
2002				2.4%	-2%	
2003	1.7%	1.1%	2.7%	2.4%	-1%	
2004				2.6%	0%	
2005	2.4%	1.7%	2.4%	2.4%	1%	
2006	2.9%	2.1%	4.1%	2.5%	0%	
2007	2.3%	1.5%	3.5%	2.4%	1%	
2008	2.9%	2.0%	4.1%	2.8%	-1%	
2009	2.3%	1.7%	3.1%	2.5%	0%	
2010	2.4%	1.6%	3.6%	2.6%	0%	
2011	2.8%	2.1%	3.8%	2.5%	1%	
2012	3.2%	2.6%	4.0%	2.5%	0%	
2013	2.5%	1.9%	3.4%	2.5%	0%	
2014	2.5%	2.0%	3.1%	2.4%	0%	
2015	2.1%	1.6%	2.8%	2.4%	0%	
2016	2.2%	1.6%	2.9%			

Prevalence estimates are age-adjusted to the U.S. 2000 population, using 4 groups (18-34, 35-44, 45-64, 65+)
Alaska data source: Alaska BRFSS standard dataset question *Has a doctor, nurse, or other health professional EVER told you that you had any of the following? … a stroke.*
U.S. data source: National Health Interview Survey (NHIS).
Alaska trend was tested using Joinpoint software. Annual Percent Change was -0.83 (non-significant change in prevalence during this period at p=.05).

Figure 13: Prevalence of ever being diagnosed with stroke among adults, by demographic group

Alaska, 2012-2016



Data source: Alaska BRFSS, Standard File. Data are shown in Appendix Table 1.

†indicates intergroup differences from a chi-square test.

Alaska Native group includes all who reported that as one of their race groups; other race groups include those who reported that race as their only race and did not report being Alaska Native or Hispanic. Pacific Islander/Other includes those who reported multiple race groups but not Alaska Native or Hispanic.

Low socio-economic status (SES) includes those who live in a household that is at <185% of the poverty level, or who have completed less than a high school education.

Rural Alaska includes those living in Northern and Southwest Alaska, as defined by the sampling regions for Alaska BRFSS. This includes Northwest, Yukon-Kuskokwim (Y-K) Delta, and Southwest regions, as well as Denali Borough, and the Census Areas Yukon-Koyukuk and SE Fairbanks.

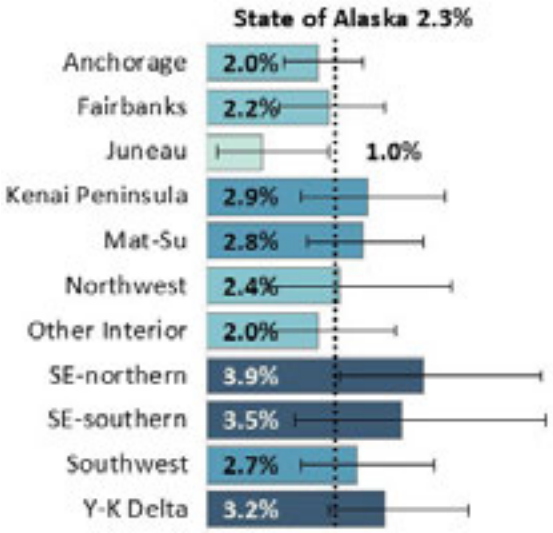
Figure 14: Prevalence of ever being diagnosed with stroke among adults, by Behavioral Health Systems Region

Alaska, 2012-2016

Prevalence of Stroke by Behavioral Health Systems Region

Alaska adults, 2012-2016

	Prevalence	Lower CI	Upper CI
State of Alaska	**2.3%**	**2.0%**	**2.6%**
Anchorage	2.0%	1.5%	2.5%
Fairbanks	2.2%	1.7%	2.9%
Juneau*	1.0%	0.6%	1.7%
Kenai Peninsula	2.9%	2.1%	3.8%
Mat-Su	2.8%	2.0%	4.0%
Northwest	2.4%	1.5%	3.7%
Other Interior	2.0%	1.4%	2.8%
SE-northern	3.9%	2.4%	6.2%
SE-southern	3.5%	2.2%	5.6%
Southwest	2.7%	1.8%	4.1%
Y-K Delta	3.2%	2.2%	4.7%



Data source: Alaska BRFSS Standard File.

*indicates significant difference between region and state overall.

Stroke-related Deaths

Stroke is among Alaska's leading causes of death (mortality).

As noted previously in this report, contribution to death can be indicated on the death certificate in one of two ways:

> **Underlying cause** is the proximal or direct cause of death. This is the disease or injury that initiated the chain of events that led directly and inevitably to death.
>
> **Contributing cause** is any condition or injury that initiated the events leading to death, but which are themselves not the immediate cause of death.

In this section, "Stroke-related deaths" can refer to either deaths where stroke is the underlying cause or a contributing cause. Notes below each table or figure will indicate which classification is used.

In 2016, stroke was listed as the cause of death for 193 people, making it the fifth leading cause of death in the state (see Table 5).

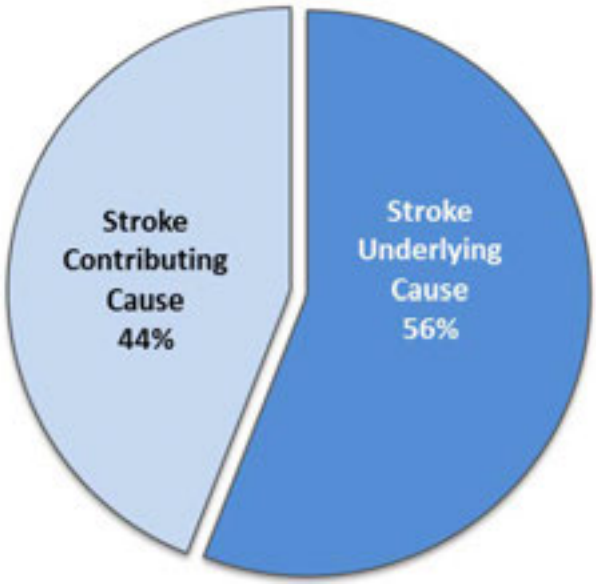
Table 5: Leading causes of death in Alaska and the U.S. (2016)

Cause of Death by Rank in Alaska	Alaska Deaths			U.S. Deaths	
	Number	%	Age-adjusted Rate	Age-adjusted Rate	Rank
1. Cancer	974	22%	152.5	155.8	2
2. Diseases of the Heart	814	18%	136.3	165.5	1
3. Unintentional Injuries	429	9%	61.9	47.4	3
4. Chronic Lower Respiratory Disease	236	5%	40.4	40.6	4
5. Stroke	**193**	**4%**	**38.2**	**37.3**	**5**
6. Suicide	186	4%	25.3	13.5	10
7. Chronic Liver Disease and Cirrhosis	123	3%	15.9	10.7	12
8. Diabetes	122	3%	18.6	21.0	7
9. Alzheimer's Disease	109	2%	25.4	30.3	6
10. Influenza and Pneumonia	60	1%	12.4	13.5	8
Subtotal for top 10 causes	3,246	72%			
Total deaths	4,520	100%			

Alaska Data source: State of Alaska, Department of Health and Social Services. Alaska Vital Statistics 2016 Annual Report. Available at http://dhss.alaska.gov/dph/VitalStats/Documents/PDFs/VitalStatistics_AnnualReport_2016.pdf (last accessed 1-18-2019)
Underlying cause. Only Alaska residents are included in Alaska-specific rates.
U.S. data source: Xu JQ, Murphy SL, Kochanek KD, Bastian B, Arias E. Deaths: Final data for 2016. National Vital Statistics Reports; vol 67 no 5. Hyattsville, MD: National Center for Health Statistics. 2018. Available at https://www.cdc.gov/nchs/data/nvsr/nvsr67/nvsr67_05.pdf (last accessed 1-18-2019)

In the past ten years (2007-2016) there were 4,793 total deaths related to stroke in Alaska – an average of more than 470 per year. More than half of these deaths (56%) were directly caused by stroke as indicated on the death certificate (i.e., "underlying cause of death"), while the remaining 44% indicated that a stroke contributed to the death but was not the direct cause (i.e., "contributing cause of death") (see Figure 15).

Figure 15: Stroke-related death
Alaska, 2007-2016



Data source: Alaska Division of Public Health, Health Analytics and Vital Records Section, Mortality Data.
4,793 total deaths. 1,720 underlying cause; 3,073 contributing cause. Only Alaska residents are included.

Trends. The stroke-related death rate for Alaska has been similar to the U.S. rate since 1999. During those years, the rates declined significantly, at the rate of 1.8% per year on average (see Figure 16). These declines occurred in spite of unchanged prevalence of lifetime stroke (see Figure 12). Improvements in death rates may be related to efforts including greater access to acute stroke care; effective hypertension control efforts; control of diabetes and dyslipidemia; smoking cessation programs; and combinations of these interventions.[8]

Demographic differences. We combined five years of data to examine differences in stroke-related death rates by subgroup. Rates are similar for men and women, and also similar for Alaska and the U.S. (see Figure 17).

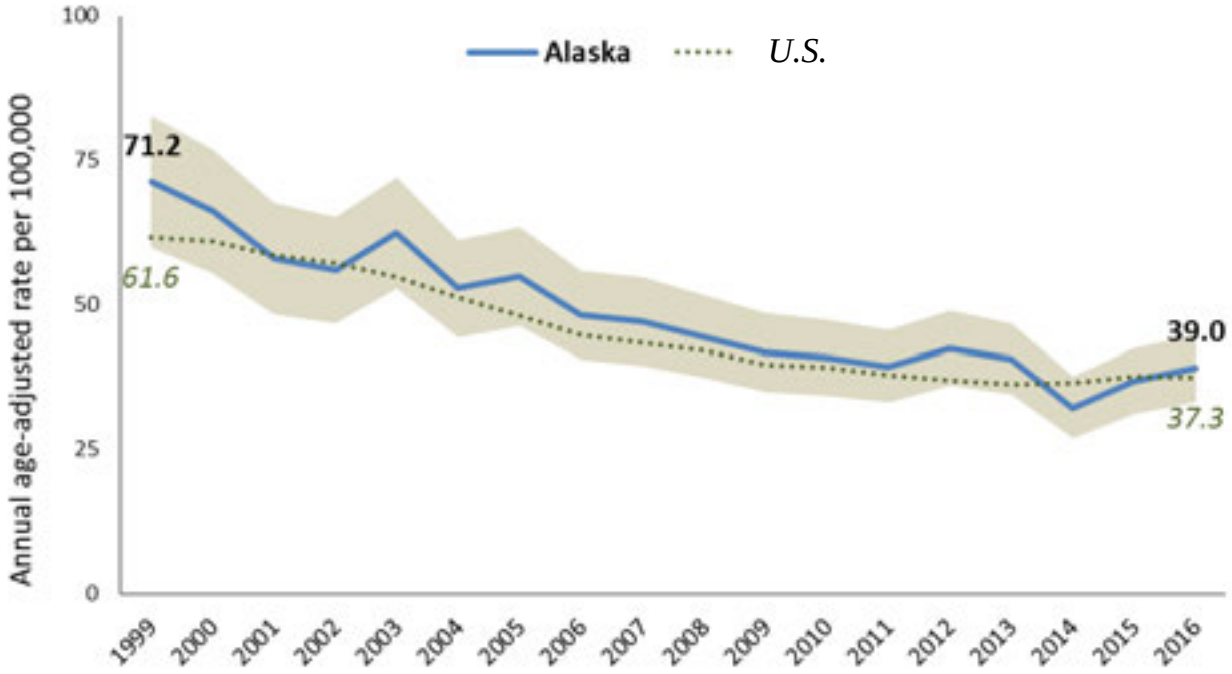
[8] Lackland DT, Roccella EJ, Deutsch A, Fornage M, et. al. Factors influencing the decline in stroke mortality: a statement from the American Heart Association/American Stroke Association. Stroke 2014;45(1):315-53. Available at https://www.ahajournals.org/doi/abs/10.1161/01.str.0000437068.30550.cf?url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org&rfr_dat=cr_pub%3Dpubmed& (last accessed 9-18-18)

Stroke-related death rates were higher for American Indian/Alaska Native people in Alaska compared to American Indian/Alaska Native people in the U.S, and also compared to both Black/African American and White groups in Alaska. Rates for Asian/Pacific Islander (API) people in Alaska were higher than for API people in the U.S. Conversely, stroke-related death rates were lower for Black/African American people in Alaska than the U.S. (see Figure 18).

Geographic differences. Stroke-related death rates were higher in the Northwest and Yukon-Kuskokwim (Y-K) Delta regions than the state overall; the Kenai Peninsula region rate was lower than the state overall (see Figure 19).

Figure 16: Stroke-related death rates

Alaska and U.S., 1999-2016, age-adjusted, underlying cause of death



Data source: Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2016 on CDC WONDER Online Database, released December 2017. Data are from the Multiple Cause of Death Files, 1999-2016, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed at http://wonder.cdc.gov/ucd-icd10.html on Mar 29, 2018.
Rates are per 100,000 and age-adjusted to the 2000 U.S. Standard Population (19 age groups - Census P25-1130). Only Alaska residents are included in Alaska rates.

Alaska trend was tested using Joinpoint software. Annual Percent Change was -1.82 (statistically significant declining trend, $p<.05$).

Supporting table for Figure 16:

Stroke-related death rates

Alaska and U.S., 1999-2016, age-adjusted, underlying cause of death

	Alaska				U.S.		
Year	**Annual Rate**	**Lower CI**	**Upper CI**	**Count**	**Annual Rate**	***% difference (AK from U.S.)***	***+ AK higher than U.S. – AK lower than U.S. Blank: no significant difference****
1999	71.2	59.9	82.6	171	61.6	16%	
2000	66.1	55.4	76.8	170	60.9	9%	
2001	57.9	48.2	67.6	158	58.4	-1%	
2002	56.0	46.7	65.2	158	57.2	-2%	
2003	62.3	52.7	71.9	185	54.6	14%	
2004	52.8	44.3	61.2	172	51.2	3%	
2005	54.9	46.3	63.4	178	48.0	14%	
2006	48.2	40.6	55.8	177	44.8	8%	
2007	47.0	39.3	54.7	157	43.5	8%	
2008	44.5	37.4	51.6	172	42.1	6%	
2009	41.8	35.0	48.6	162	39.6	6%	
2010	40.9	34.3	47.4	167	39.1	5%	
2011	39.4	33.1	45.7	168	37.9	4%	
2012	42.5	36.1	48.9	188	36.9	15%	
2013	40.7	34.6	46.8	189	36.2	12%	
2014	32.3	27.0	37.6	157	36.5	-12%	
2015	36.8	31.2	42.4	182	37.6	-2%	
2016	39.0	33.3	44.7	196	37.3	5%	

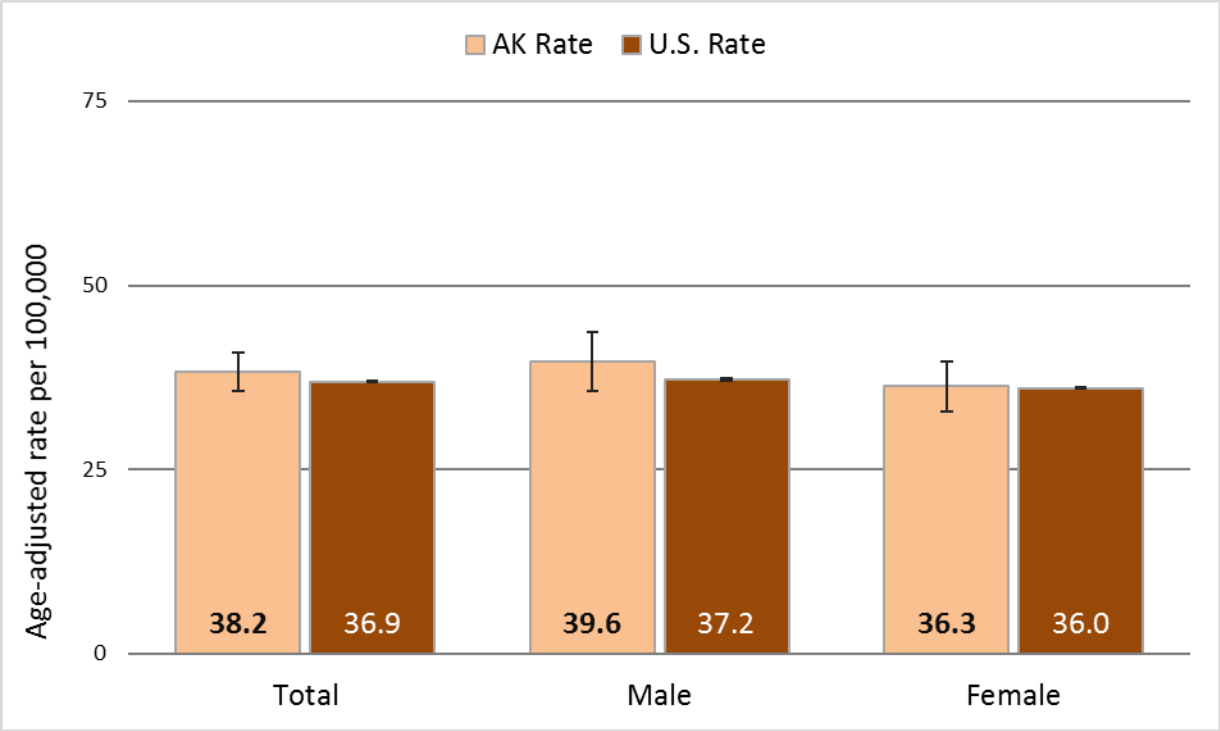
Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2016 on CDC WONDER Online Database, released December 2017. Data are from the Multiple Cause of Death Files, 1999-2016, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed at http://wonder.cdc.gov/ucd-icd10.html on Mar 29, 2018.

Rates are per 100,000 and age-adjusted to the 2000 U.S. Standard Population (19 age groups - Census P25-1130). Only Alaska residents are included in Alaska rates.

Alaska trend was tested using Joinpoint software. Annual Percent Change was -1.82 (statistically significant declining trend, $p<.05$).

Figure 17: Stroke-related death rates, by gender

Alaska and U.S., 2012-2016, age-adjusted, underlying cause of death



	Alaska				U.S.		
	Rate	Lower CI	Upper CI	Count	**Rate**	Lower CI	Upper CI
Total	**38.2**	**35.6**	**40.8**	**912**	**36.9**	**36.8**	**37.0**
Male	39.6	35.6	43.7	447	37.2	37.0	37.3
Female	36.3	32.9	39.7	465	36.0	35.9	36.2

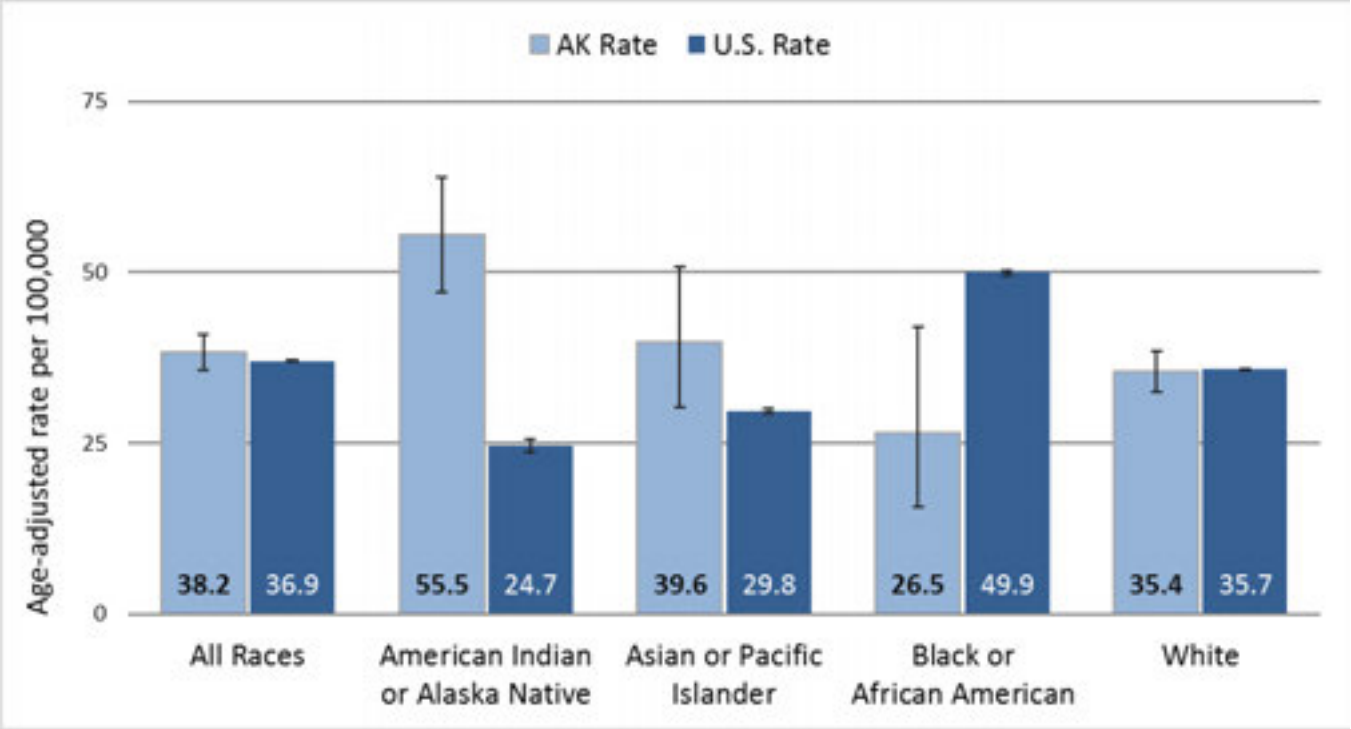
Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2016 on CDC WONDER Online Database, released December, 2017. Data are from the Multiple Cause of Death Files, 1999-2016, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed at http://wonder.cdc.gov/ucd-icd10.html on Apr 3, 2018

Rates are per 100,000 and age-adjusted to the 2000 U.S. Standard Population (19 age groups - Census P25-1130. Only Alaska residents are included in Alaska rates.

There were no statistically significant differences in death between men and women in Alaska, and no significant differences between Alaska and the U.S. within gender or overall.

Figure 18: Stroke-related death rates, by race

Alaska and U.S., 2012-2016, age-adjusted, underlying cause of death



	Alaska				U.S.		
	Rate	Lower CI	Upper CI	Count	**Rate**	Lower CI	Upper CI
All Races	**38.2**	**35.6**	**40.8**	**912**	**36.9**	**36.8**	**37.0**
American Indian or Alaska Native*	55.5	47.0	63.9	185	24.7	23.8	25.6
Asian or Pacific Islander	39.6	30.3	50.8	70	29.8	29.4	30.2
Black or African American	26.5	15.7	41.9	22	49.9	49.5	50.2
White	35.4	32.5	38.3	635	35.7	35.6	35.7

Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2016 on CDC WONDER Online Database, released December, 2017. Data are from the Multiple Cause of Death Files, 1999-2016, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed at http://wonder.cdc.gov/ucd-icd10.html on Apr 3, 2018

Rates are per 100,000 and age-adjusted to the 2000 U.S. Standard Population (19 age groups - Census P25-1130. Only Alaska residents are included in Alaska rates.

* Within Alaska, death rates are higher among American Indian or Alaska Native people in comparison to the state average and to Whites.

+ Death rates are for American Indian/Alaska Native (AIAN) and for Asian or Pacific Islander (API) people in Alaska than for AIAN and API people in the U.S., respectively; death rates are lower for Black or African American people in Alaska in comparison to the U.S.

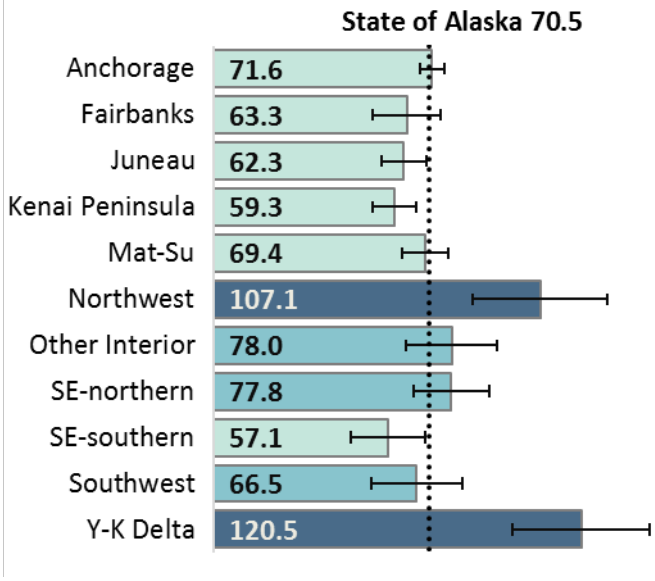
Figure 19: Stroke-related death rates, by Behavioral Health Systems Region

Alaska, 2007-2016, age-adjusted, underlying and contributing causes of death combined

Stroke death rate (underlying and contributing causes) by Behavioral Health Systems Region

Alaska residents, 2007-2016

	Rate	Lower CI	Upper CI	Count
State of Alaska	**70.5**	**67.9**	**73.1**	**3,080**
Anchorage	71.6	67.5	75.7	1,266
Fairbanks	63.3	55.9	70.7	316
Juneau	62.3	51.1	73.6	130
Kenai Peninsula*	59.3	52.1	66.4	288
Mat-Su	69.4	61.9	76.8	374
Northwest*	107.1	85.1	129.1	110
Other Interior	78.0	63.2	92.9	121
SE-northern	77.8	65.4	90.3	155
SE-southern*	57.1	44.9	69.3	91
Southwest	66.5	51.5	81.6	96
Y-K Delta*	120.5	97.9	143.0	126



Rates are per 100,000 and age-adjusted to the 2000 U.S. Standard Population (19 age groups - Census P25-1130).
Source: Alaska Division of Public Health, Health Analytics and Vital Records Section, Mortality Data. Underlying and contributing causes of death combined. Only Alaska residents are included.
*indicates significant difference between region and state overall.

Stroke-related Hospitalizations

We examined stroke-related hospitalization rates for Alaska from 2016, the most recent data available.[9] These datasets include both inpatient (admitted to the hospital) and outpatient (i.e., emergency department, outpatient surgery, outpatient observation, imaging labs, or other services) visits. "Stroke-related" visits could list stroke as the primary reason for the visit, or a contributing or complicating factor that was not the primary reason for the visit (i.e., "secondary").

Although only about 14% of stroke-related hospital visits were inpatient visits where stroke was the primary cause (1,414 total visits), in total stroke contributed to the need for hospital treatment in 10,021 visits during 2016 (see Table 6). Stroke-related inpatient visits made up 27% of total stroke-related visits). For both inpatient and outpatient visits, stroke was listed as the primary diagnosis in 52% of the cases.

Rates of stroke-related hospitalization were higher for males than females and increased with age.

Total stroke-related hospitalization rates were higher among Alaska Native and Pacific Islander people in comparison to White, Black or African Americans, Asians, and Hispanics. Stroke hospitalization among Hispanics was lower than any other group, but numbers are small and should be interpreted with caution (see Table 7).

[9] See description of hospitalization data in Appendix for additional detail.

Table 6: Number and rate of inpatient and outpatient hospital discharges for stroke, by sex and age

Alaska, 2016

		Inpatient		Outpatient		Total
		Primary	Secondary	Primary	Secondary	
Total						
	Discharges	1,414	1,311	3,820	3,476	10,021
	Rate per 10,000	19.1	17.7	51.6	47.0	135.5
Males						
	Discharges	790	671	2,026	1,903	5,390
	Rate per 10,000	20.7	17.6	53.0	49.8	141.1
Females						
	Discharges	624	640	1,794	1,573	4,631
	Rate per 10,000	17.4	17.9	50.2	44.0	129.5
<18						
	Discharges	<6	14	27	36	77
	Rate per 10,000	nr	nr	1.4	1.9	4.1
18-44						
	Discharges	81	48	282	190	601
	Rate per 10,000	2.9	1.7	10.2	6.9	21.8
45-64						
	Discharges	482	342	1,461	1,180	3,465
	Rate per 10,000	24.7	17.5	74.9	60.5	177.6
65+						
	Discharges	849	907	2,050	2,070	5,876
	Rate per 10,000	107.5	114.9	259.6	262.2	744.2

Data source: Alaska Division of Public Health, Health Analytics and Vital Records Section, Health Facilities Data Reporting Inpatient and Outpatient Database 2016, v5
Only hospitalizations for Alaska residents are shown.
nr: not reported due to small number of cases
Rates are per 10,000 population in the state of Alaska.
"Secondary" are contributing or complicating factors that are not the primary reason for the visit.

Table 7: Number and rate of inpatient and outpatient hospital discharges for stroke by race and ethnicity

Alaska, 2016

		Inpatient		Outpatient		Total
		Primary	Secondary	Primary	Secondary	
White						
	Discharges	884	806	2,395	1,972	6,057
	Rate per 10,000	18.1	16.5	49.0	40.3	123.9
Black/African American						
	Discharges	72	39	96	83	290
	Rate per 10,000	26.2	14.2	35.0	30.3	105.7
Alaska Native						
	Discharges	231	287	891	972	2,381
	Rate per 10,000	20.4	25.4	78.9	86.0	210.8
Asian						
	Discharges	98	63	160	193	514
	Rate per 10,000	21.0	13.5	34.2	41.3	110.0
Pacific Islander						
	Discharges	41	42	37	108	228
	Rate per 10,000	41.7	42.7	37.6	109.9	232.0
Hispanic						
	Discharges	24	27	53	52	156
	Rate per 10,000	4.7	5.3	10.4	10.2	30.7

Source: Alaska Division of Public Health, Health Analytics and Vital Records Section, Health Facilities Data Reporting Inpatient and Outpatient Database 2016, v5.
Only hospitalizations for Alaska residents are shown.
Categories are mutually exclusive: all race groups are non-Hispanic; Hispanic ethnicity includes people of all race groups.
Rates are per 10,000 population in the state of Alaska.
"Secondary" are contributing or complicating factors that are not the primary reason for the visit.

Economic Costs

A hospital stay due to a heart attack or other outcome of heart disease or stoke places a burden on individuals, families and society. The CDC reports that heart disease costs the United States about $200 billion each year in terms of health care services, medications and lost productivity.[10] Heart attacks ($11.5 billion) and coronary heart disease ($10.4 billion) are two of the ten most expensive hospital primary discharge diagnoses.[11]

To understand costs of providing healthcare services for people with cardiovascular disease in Alaska, a comprehensive study commissioned by the State of Alaska Division of Public Health assessed the economic costs to Medicaid for treating heart disease, stroke, and other chronic conditions.[12] This study first examined the prevalence of heart disease and stroke among working-age (18-64) and older (65+) adults who were Medicaid-eligible vs not Medicaid-eligible. Self-reported prevalence of stroke was significantly higher among Medicaid-eligible adults in both groups (2.4% vs. 1.2% for working-age adults; 13.2% vs. 8.0% for older adults); the prevalence of self-reported heart disease was also higher among Medicaid-eligible older adults (62.2% vs. 48.2%), but prevalence was not significantly different for working-age adults (14.8% vs. 12.9%).

Medicaid beneficiaries with only heart disease (3,465 people) cost an average of more than $30,000 in healthcare costs and a total of $104 million in FY2016. However, Medicaid beneficiaries with heart disease alone or in combination with other chronic diseases (9,527 people) had an average cost of more than $34,000 and total cost of more than $300 million in FY2016.

Similarly, Medicaid beneficiaries with stroke only (49 people) cost an average of more than $83,000 in healthcare costs and a total of more than $4 million in FY2016; Medicaid beneficiaries with stroke alone or in combination with other chronic diseases (406 people) had an average cost of more than $60,000 and a total of $24 million in FY2016.

For people with heart disease, of the more than $330 million cost of Medicaid services in FY2016, 37.1% was spend by the state of Alaska (more than $72 million), and the remaining 62.9% was paid by federal funds. For people with a stroke, of the more than $24 million cost of Medicaid services in FY2016, 41.7% was spent by the state of Alaska (more than $10 million), and the remaining 58.3% was paid by federal funds.

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[10]Centers for Disease Control and Prevention (CDC), National Center for Health Statistics. *Heart disease fact sheet.* Revised August 23, 2017. https://www.cdc.gov/dhdsp/data_statistics/fact_sheets/fs_heart_disease.htm (last accessed 7/26/18)

[11] American Heart Association. *Heart Disease and Stroke Statistics 2017 At-a-Glance.* Revised January 25, 2017. https://healthmetrics.heart.org/wp-content/uploads/2017/06/Heart-Disease-and-Stroke-Statistics-2017-ucm_491265.pdf (last accessed 7/26/18)

[12] Helvoight TL, Lehndorff H, McMillan N. Evergreen Economics. *The Cost of Eight Chronic Conditions on Alaska's Medicaid Program.* October 18, 2017. http://dhss.alaska.gov/dph/Chronic/Documents/Publications/2017_CostOfChronicConditions_EvergreenEconomics_web.pdf (last accessed 2/4/19)

In summary, heart disease and stroke place a heavy financial burden on the state of Alaska, as well as on individuals and their families.

Screening

Recommended screenings related to heart disease and stroke prevention include the following:

> **Blood Pressure:** Ages 18-39: every 3-5 years with BP <120/80 and no risk factors. Check yearly if BP ≥120/80, overweight/obese, African-American, or have diabetes. Over age 39, check yearly.[13]
>
> **Cholesterol: Men:** Start at age 25 if high risk, repeat every 3 years. If not at high risk, every 5 years, starting at age 35. **Women:** Start at age 35 if high risk, repeat every 3 years. If not at high risk, every 5 years, starting at age 45.[14]
>
> **Diabetes: Blood Sugar/Glucose (diabetes/prediabetes):** Start at age 18 if you are overweight/obese and have additional risk factors (e.g. not white, had a baby weighing more than 9 pounds at birth, family history). If normal, repeat at least every 3 years through age 44. Starting at age 45, every 3 years, but more often if you are overweight or obese, you have high blood pressure or are taking medication for high blood pressure, you exercise fewer than 3 times a week, and/or there are changes in your risk status.[15]

Multiple versions of screening guidelines exist, and can vary based on a person's risk factors. Decisions about how often to screen should be made by individuals with their healthcare provider. The definitions above were used for this report to estimate meeting screening guidelines.

Demographic variation. Appendix Table 2 includes detail about screening prevalence among key Alaska subgroups. Men are significantly less likely than women to have received all three types of screening. Rural Alaska residents are less likely than people in the rest of the state to be up to date with all three types of screenings (see Figure 20). People with fewer economic resources ("low SES") are less likely than those with more resources, and Alaska Native adults are significantly less likely than white non-Hispanic adults in Alaska to be current with recommended screenings.

Regional variations in screening. People living in the Northwest and Yukon-Kuskokwim (Y-K) Delta regions are significantly less likely than people in the state overall to be current for all three screenings (see Figures 21, 22, 23). People in the Other Interior (excluding Fairbanks) region are less likely than those statewide to be current for cholesterol screening (see Figure 22).

---

[13] *Final Recommendation Statement: High Blood Pressure in Adults: Screening*. U.S. Preventive Services Task Force. September 2017. https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/high-blood-pressure-in-adults-screening (last accessed 7/27/18)

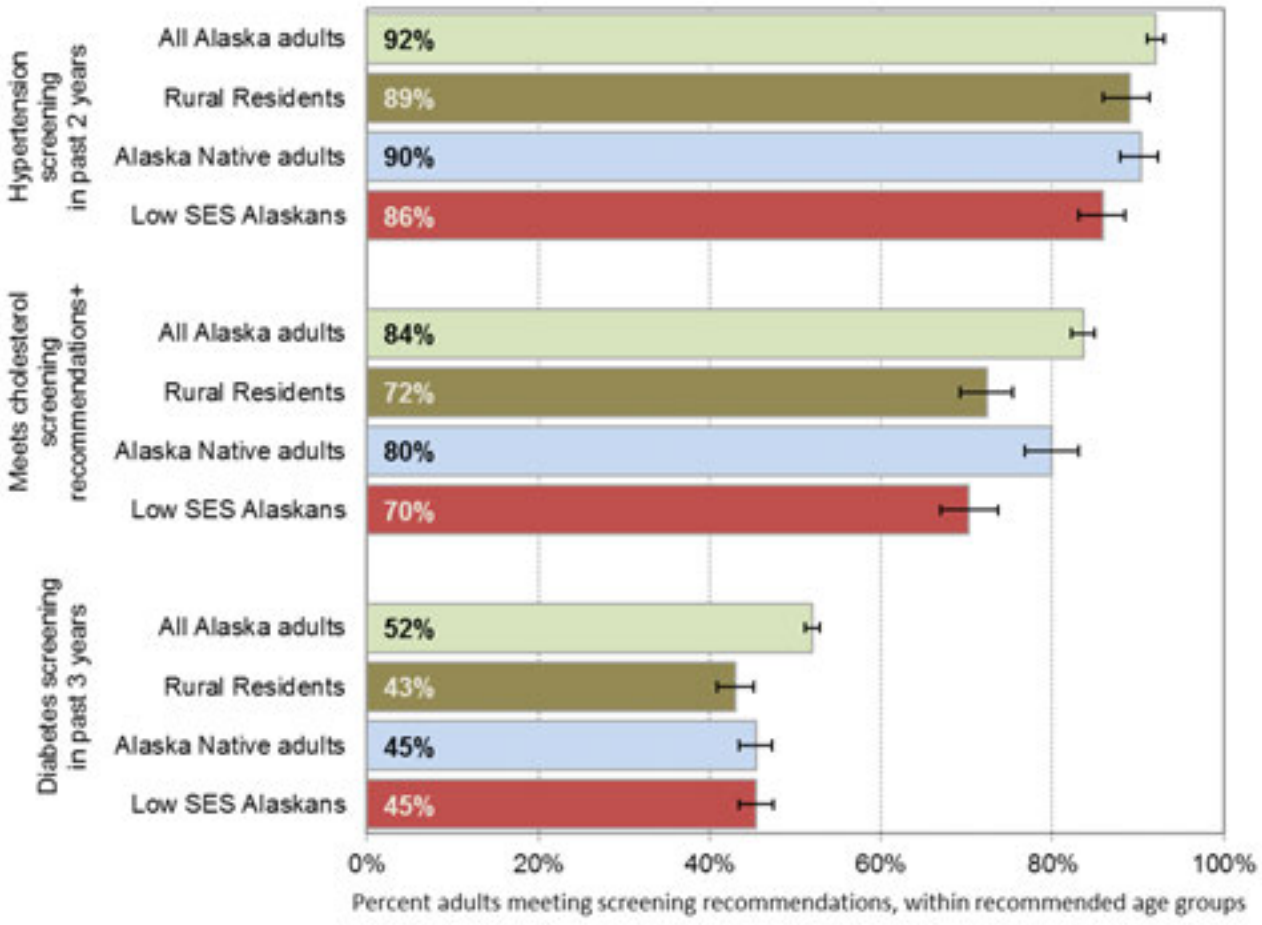
[14] High blood cholesterol levels: Medline Plus Medical Encyclopedia. https://medlineplus.gov/ency/article/000403.htm. Accessed March 7, 2017.

[15] American Diabetes Association. *Classification and Diagnosis of Diabetes: Standards of Medical Care in Diabetes – 2018.*. Diabetes Care. January 2018. Vol 41, Supplement 1: S13-S27. http://care.diabetesjournals.org/content/diacare/suppl/2017/12/08/41.Supplement_1.DC1/DC_41_S1_Combined.pdf (last accessed 7/27/18)

People living in the Southeast (both northern and southern sub-regions) are more likely than the state average to be up to date with diabetes screening (see Figure 23).

Figure 20: Percent of adults meeting current heart disease and stroke-related screening recommendations by priority population groups

Alaska, 2011-2014



+ cholesterol screening is subset to age groups where such screening is recommended: 35+ for men and 45+ for women.

Data source:
Alaska BRFSS Standard file 2014-2016 for hypertension screening and 2011/2013/2015 for cholesterol screening.
Alaska BRFSS Combined file 2013-2016 for diabetes screening. Supporting data for this figure are included in Appendix Table
Data are shown in Appendix Table 2.

BRFSS questions:

- *About how long has it been since you last had your blood pressure taken by a doctor, nurse, or other health professional? (within past 6 months; within the past year; within the past 2 years; within the past 5 years; or more years ago)*
- *Blood cholesterol is a fatty substance found in the blood. Have you EVER had your blood cholesterol checked?* And *About how long has it been since you last had your blood cholesterol checked?*
- *Have you had a test for high blood sugar or diabetes within the past three years?*

Alaska Native group includes all who reported that as one of their race groups; other race groups include those who reported that race as their only race and did not report being Alaska Native or Hispanic. Pacific Islander/Other includes those who reported multiple race groups but not Alaska Native or Hispanic.
Low socio-economic status (SES) includes those who live in a household that is at <185% of the poverty level, or have completed less than a high school education.

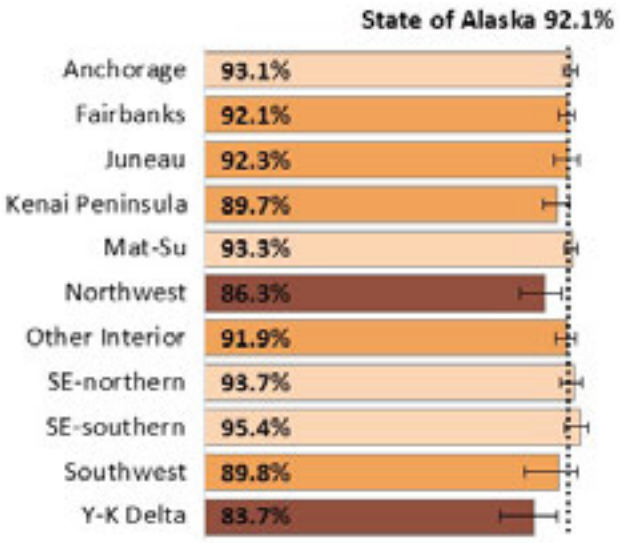
Rural Alaska includes those living in Northern and Southwest Alaska, as defined by the sampling regions for Alaska BRFSS. This includes Northwest, Yukon-Kuskokwim Delta, and Southwest regions, as well as Denali Borough, and the Census Areas Yukon-Koyukuk and SE Fairbanks.

Figure 21: Percent of adults meeting hypertension screening recommendations, by Behavioral Health Systems Region

Alaska adults who have been screened for hypertension in the past 2 years, 2014-2016

Percentage of Alaska adults who have been screened for hypertension in the past 2 years, by Behavioral Health Systems Region, 2014-2016

	Prevalence	Lower CI	Upper CI
State of Alaska	**92.1%**	**91.1%**	**93.0%**
Anchorage	93.1%	91.1%	94.7%
Fairbanks	92.1%	89.8%	94.0%
Juneau	92.3%	88.7%	94.9%
Kenai Peninsula	89.7%	85.9%	92.5%
Mat-Su	93.3%	91.5%	94.8%
Northwest*	86.3%	80.0%	90.8%
Other Interior	91.9%	89.0%	94.1%
SE-northern	93.7%	90.3%	96.0%
SE-southern	95.4%	91.4%	97.5%
Southwest	89.8%	81.1%	94.8%
Y-K Delta*	83.7%	75.1%	89.7%



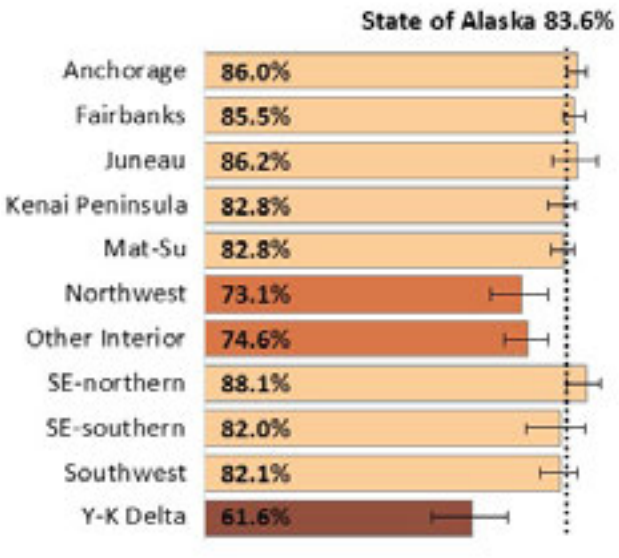
Data source: Alaska BRFSS Standard File.
*indicates significant difference between region and state overall.

Figure 22: Percent of adults meeting cholesterol screening recommendations,[+] by Behavioral Health Systems Region

Alaska adults who have been screened for high cholesterol in the past 5 years, 2011, 2013, 2015

Percentage of Alaska adults who have met the recommendations for high cholesterol screening[+] in the past 5 years, by Behavioral Health Systems Region, 2011, 2013, 2015

	Prevalence	Lower CI	Upper CI
State of Alaska	**83.6%**	**82.3%**	**84.8%**
Anchorage	86.0%	83.4%	88.3%
Fairbanks	85.5%	82.7%	87.9%
Juneau	86.2%	80.3%	90.6%
Kenai Peninsula	82.8%	79.3%	85.8%
Mat-Su	82.8%	79.8%	85.4%
Northwest*	73.1%	66.0%	79.2%
Other Interior*	74.6%	69.2%	79.3%
SE-northern	88.1%	83.6%	91.5%
SE-southern	82.0%	74.4%	87.8%
Southwest	82.1%	77.5%	86.0%
Y-K Delta*	61.6%	52.6%	69.9%



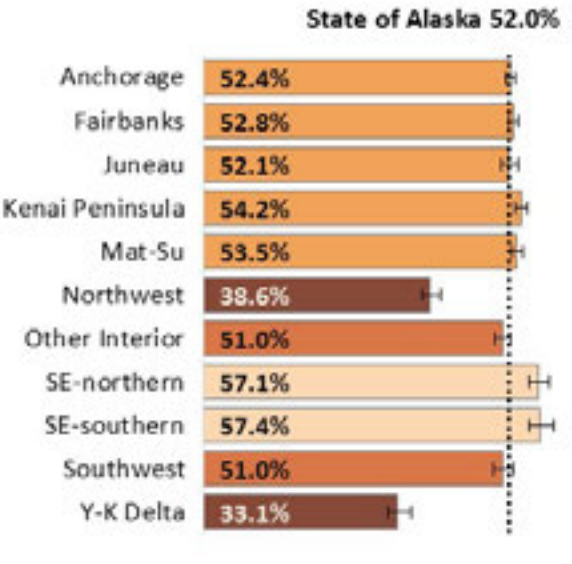
+cholesterol screening in past 5 years among men age 35 and older and women age 45 and older.
Data source: Alaska BRFSS Standard File. Survey questions: *Blood cholesterol is a fatty substance found in the blood. Have you EVER had your blood cholesterol checked?* And *About how long has it been since you last had your blood cholesterol checked?*
*indicates significant difference between region and state overall.

Figure 23: Meeting diabetes screening recommendations among adults, by Behavioral Health Systems Region

Percentage of adults who have been tested for diabetes in the past 3 years, Alaska, 2012-2016

Percentage of adults who have been tested for diabetes in the past 3 years, by Behavioral Health Systems Region, Alaska, 2012-2016

	Prevalence	Lower CI	Upper CI
State of Alaska	**52.0%**	**51.1%**	**52.9%**
Anchorage	52.4%	50.7%	54.2%
Fairbanks	52.8%	50.8%	54.8%
Juneau	52.1%	49.0%	55.2%
Kenai Peninsula	54.2%	51.9%	56.5%
Mat-Su	53.5%	51.5%	55.6%
Northwest*	38.6%	34.8%	42.6%
Other Interior	51.0%	48.1%	53.9%
SE-northern*	57.1%	53.4%	60.7%
SE-southern*	57.4%	53.4%	61.2%
Southwest	51.0%	47.3%	54.7%
Y-K Delta*	33.1%	29.6%	36.9%



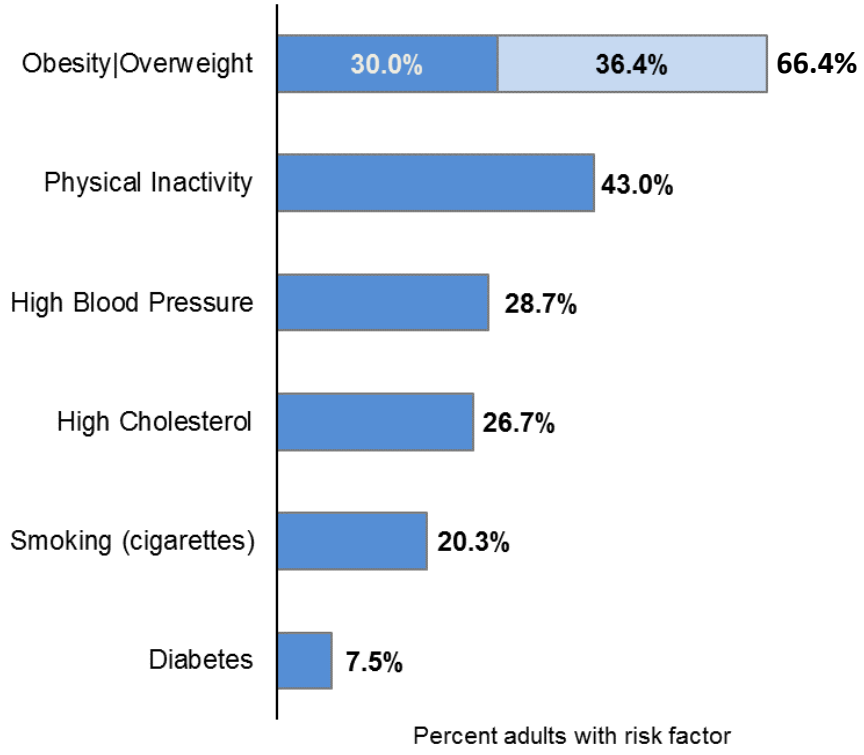
Data source: Alaska BRFSS Combined File. *Have you had a test for high blood sugar or diabetes within the past three years?* Among adults who have not already been diagnosed with diabetes.
*indicates significant difference between region and state overall.

Risk Factors

Key risk factors for developing both heart disease and stroke include being overweight or obese, not getting enough exercise, high blood pressure or cholesterol, smoking cigarettes, and diabetes. Many adults in Alaska have each of these risk factors (see Figure 24), and more than half of adults in any of the key demographic groups examined for this report have two or more risk factors (see Figure 25).

Figure 24: Prevalence of selected risk factors for heart disease and stroke among adults

Alaska, 2011-2016



Data source: Alaska BRFSS. Combined data file 2013-2016 for obesity, overweight, smoking and diabetes; Standard data file 2011, 2013, 2015 for physical inactivity and high cholesterol; Standard data file 2011-2015 for high blood pressure.

Obesity/Overweight: self-reported height and weight are used to calculate body mass index (BMI); BMI >=30 is obese, and BMI between 25.0-29.9 is overweight.

Physical inactivity: percentage of adults not getting the equivalent of moderate-intensity physical activity for >=150 minutes per week.

High blood pressure, High cholesterol: percentage of adults who were ever told by a health care professional that they have this condition (high blood pressure or high cholesterol)

Have you EVER been told by a doctor, nurse, or other health professional that you have high blood pressure? (if female, "was this only when you were pregnant?"

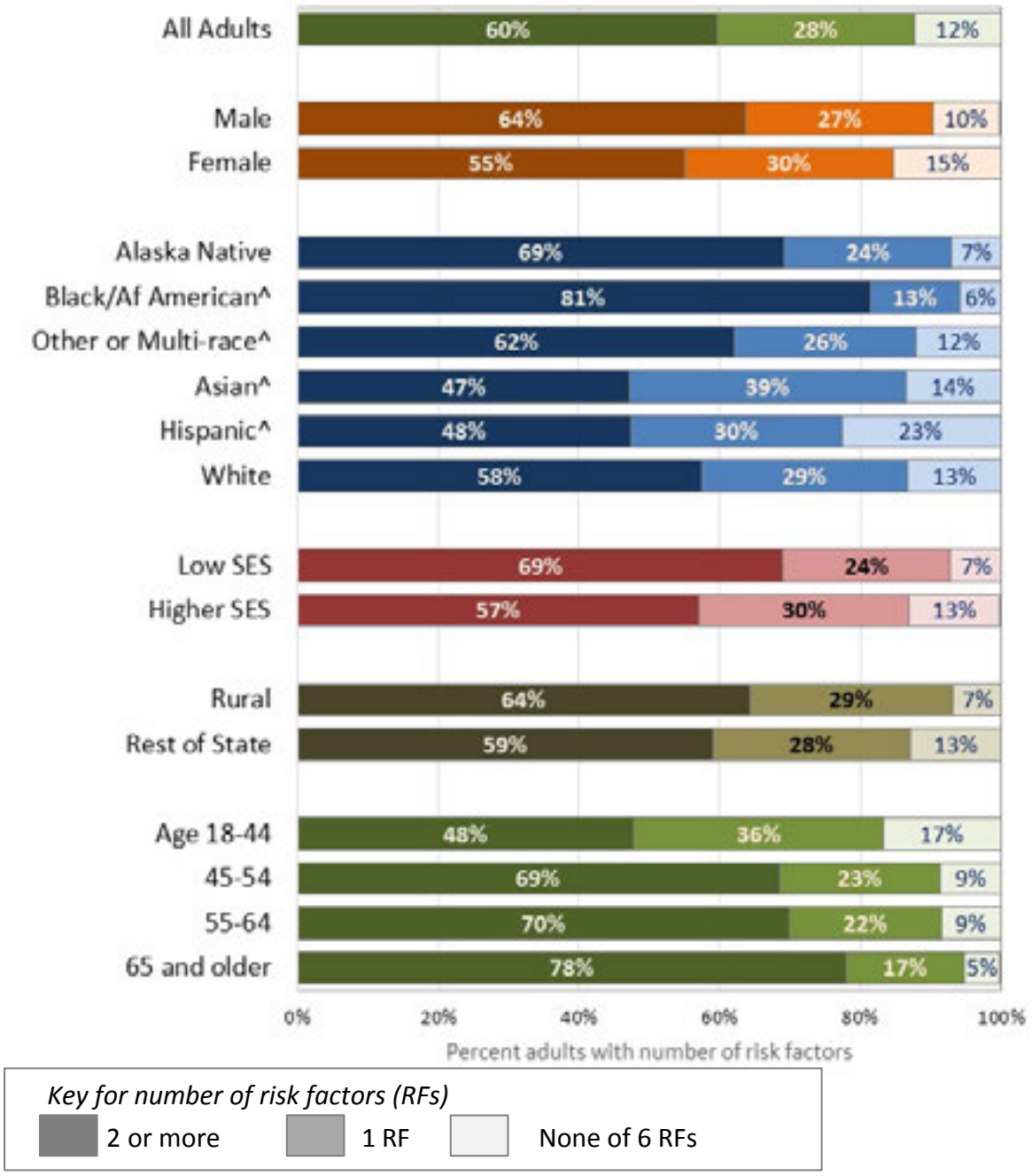
Have you EVER been told by a doctor, nurse or other health professional that your blood cholesterol is high?

Currently smoke cigarettes: percentage of adults who have ever smoked 100 or more cigarettes and who report that they smoke every day or some days.

Diabetes: percentage of adults who were ever told by a health care professional that they have diabetes (excluding gestational diabetes) Has a doctor, nurse, or other health professional EVER told you that you had any of the following? Diabetes (options include "yes, but female told only during pregnancy" and "no, pre-diabetes or borderline diabetes"

Figure 25: Prevalence of multiple risk factors for heart disease and stroke among adults

Alaska, 2011-2015



Data source: Alaska BRFSS, Standard data file, 2011, 2013, 2015. Supporting data for this figure are included in Appendix Table 3.
Risk factors included in the count: Obesity or overweight, physical inactivity, ever told have high blood pressure, ever told have high cholesterol, ever told have diabetes (non-gestational), and/or currently a smoker.
Note: data may not add to 100% due to rounding
^ Indicates that the estimate is flagged for reliability.

(technical notes continue on next page)

Alaska Native group includes all who reported American Indian or Alaska Native as one of their race groups; other race groups include those who reported that race as their only race and did not report being Alaska Native or Hispanic. Pacific Islander/Other includes those who reported multiple race groups but not Alaska Native or Hispanic.
Low socio-economic status (SES) includes those who live in a household that is at <185% of the poverty level, or who have completed less than a high school education.
Rural Alaska includes those living in Northern and Southwest Alaska, as defined by the sampling regions for Alaska BRFSS. This includes Northwest, Y-K Delta, and Southwest regions, as well as Denali Borough, and the Census Areas Yukon-Koyukuk and SE Fairbanks.

Summary of population risk patterns

In summary, we provide a visual display of higher and lower risk factor prevalence by different population groups in Alaska: increasing intensity of red indicates relatively greater prevalence of risk factors, lighter shades indicate closer to "average" prevalence of risk, and increasing intensity of blue spotted patterns indicates relatively lower prevalence of risk factors. These can help to reveal patterns of risk across different population groups.

Figure 26 shows greater risk across multiple risk factors among men, older adults, and low SES populations. Figure 27 shows elevated risk for some factors among Alaska Native and Black/African American adults, and relatively lower risk among Asian, Hispanic and White adults. Finally, Figure 28 shows multiple increased risk factors for Kenai, Northwest, Southeast-southern, and Yukon-Kuskokwim Delta regions, although patterns are generally mixed by region.

Figure 26: Summary of heart disease/stroke risk factor status among adults, by gender, age, and socioeconomic status (SES)

Alaska, 2011-2015

Patterns for	Gender		Age				SES	
Individual Risk Factors	**Male**	**Female**	**18-44**	**45-54**	**55-64**	**65+**	**Low SES**	**Higher**
Obese (BMI 30.0 or higher)								
Overweight (BMI 25.0-29.9)								
Physical Activity <150 Min/Week								
1+ Sugary Beverage/Day								
Current Cigarette Smoker								
Hypertension (Lifetime)								
High Cholesterol (Lifetime)								
Diagnosed with Diabetes								

Key for patterns of risk summary above

Key for Patterns	*Higher Risk*					*Lower Risk*
Individual Risk Factors						
Obese (BMI 30.0 or higher)	>=40%	35.0-39.9	30.7-34.9	28.5-30.6	18.0-28.4	<18.0
Overweight (BMI 25.0-29.9)	>=43.0	40.0-42.9	37.9-39.9	34.0-37.9	20.0-33.9	<20.0
Physical Activity <150 Min/Week	>=53.0	48.0-52.9	45.1-47.9	40.0-45.0	25.0-39.9	<25.0
1+ Sugary Beverage/Day	>=40.0	35.0-39.9	32.1-34.9	27.0-32.0	20.0-26.9	<20.0
Current Cigarette Smoker	>=30.0	25.0-29.9	21.6-24.9	19.0-21.5	12.0-19.0	<12.0
Hypertension (Lifetime)	>=47.0	36.0-46.9	30.1-35.9	27.0-30.0	18.0-26.9	<18.0
High Cholesterol (Lifetime)	>=45.0	34.0-44.9	28.1-33.9	25.0-28.0	18.0-24.9	<18.0
Diagnosed with Diabetes	>=15%	10.0-14.9	7.9-9.9	6.7-7.9	4.0-6.6	<4.0

Data source: 2011-2015 Alaska BRFSS Standard File for physical activity, sugar-sweetened beverage, hypertension, high cholesterol; 2012-2016 Alaska BRFSS Combined File for obesity, overweight, smoking, and diabetes.

Figure 27: Summary of heart disease/stroke risk factor status among adults, by race and ethnicity

Alaska, 2011-2015

Patterns for Individual Risk Factors	Race and Ethnicity					
	Alaska Native	Black or African American	Asian	Other or Multi-race	Hispanic	White
Obese (BMI 30.0 or higher)						
Overweight (BMI 25.0-29.9)						
Physical Activity <150 Min/Week						
1+ Sugary Beverage/Day						
Current Cigarette Smoker						
Hypertension (Lifetime)						
High Cholesterol (Lifetime)						
Diagnosed with Diabetes						

Key for patterns of risk summary above

Key for Patterns	*Higher Risk*					*Lower Risk*
Individual Risk Factors						
Obese (BMI 30.0 or higher)	>=40%	35.0-39.9	30.7-34.9	28.5-30.6	18.0-28.4	<18.0
Overweight (BMI 25.0-29.9)	>=43.0	40.0-42.9	37.9-39.9	34.0-37.9	20.0-33.9	<20.0
Physical Activity <150 Min/Week	>=53.0	48.0-52.9	45.1-47.9	40.0-45.0	25.0-39.9	<25.0
1+ Sugary Beverage/Day	>=40.0	35.0-39.9	32.1-34.9	27.0-32.0	20.0-26.9	<20.0
Current Cigarette Smoker	>=30.0	25.0-29.9	21.6-24.9	19.0-21.5	12.0-19.0	<12.0
Hypertension (Lifetime)	>=47.0	36.0-46.9	30.1-35.9	27.0-30.0	18.0-26.9	<18.0
High Cholesterol (Lifetime)	>=45.0	34.0-44.9	28.1-33.9	25.0-28.0	18.0-24.9	<18.0
Diagnosed with Diabetes	>=15%	10.0-14.9	7.9-9.9	6.7-7.9	4.0-6.6	<4.0

Data source: 2011-2015 Alaska BRFSS Standard File for physical activity, sugar-sweetened beverage, hypertension, high cholesterol; 2012-2016 Alaska BRFSS Combined File for obesity, overweight, smoking, and diabetes.

Figure 28: Summary of heart disease/stroke risk factor status among adults, by Behavioral Health Systems Region

Alaska, 2011-2015

Patterns for Individual Risk Factors	Behavioral Health Systems Region										
	Anchorage	Fairbanks	Juneau	Kenai Peninsula	Mat-Su	Northwest	Other Interior	SE-northern	SE-southern	Southwest	Y-K Delta
Obese (BMI 30.0 or higher)											
Overweight (BMI 25.0-29.9)											
Physical Activity <150 Min/Week											
1+ Sugary Beverage/Day											
Current Cigarette Smoker											
Hypertension (Lifetime)											
High Cholesterol (Lifetime)											
Diagnosed with Diabetes											

Key for patterns of risk summary above

Key for Patterns	*Higher Risk*					*Lower Risk*
Individual Risk Factors						
Obese (BMI 30.0 or higher)	>=40%	35.0-39.9	30.7-34.9	28.5-30.6	18.0-28.4	<18.0
Overweight (BMI 25.0-29.9)	>=43.0	40.0-42.9	37.9-39.9	34.0-37.9	20.0-33.9	<20.0
Physical Activity <150 Min/Week	>=53.0	48.0-52.9	45.1-47.9	40.0-45.0	25.0-39.9	<25.0
1+ Sugary Beverage/Day	>=40.0	35.0-39.9	32.1-34.9	27.0-32.0	20.0-26.9	<20.0
Current Cigarette Smoker	>=30.0	25.0-29.9	21.6-24.9	19.0-21.5	12.0-19.0	<12.0
Hypertension (Lifetime)	>=47.0	36.0-46.9	30.1-35.9	27.0-30.0	18.0-26.9	<18.0
High Cholesterol (Lifetime)	>=45.0	34.0-44.9	28.1-33.9	25.0-28.0	18.0-24.9	<18.0
Diagnosed with Diabetes	>=15%	10.0-14.9	7.9-9.9	6.7-7.9	4.0-6.6	<4.0

Data source: 2011-2015 Alaska BRFSS Standard File for physical activity, sugar-sweetened beverage, hypertension, high cholesterol; 2012-2016 Alaska BRFSS Combined File for obesity, overweight, smoking, and diabetes.

What can be done?

The State of Alaska and other partners are working to prevent and control heart disease and stroke in collaboration with other partners by promoting healthy lifestyles and proven preventive and treatment services.[16] Examples of activities include:

Supporting and promoting the ***Million Hearts Campaign***

- Promote healthy lifestyles, increase awareness about heart disease prevention and empower patients to take control of their own health (including using the *Million Hearts ABCS*—Aspirin when appropriate, Blood pressure under control, Cholesterol management, and Smoking cessation)
- Use health information technology and quality improvement to standardize and improve the delivery of care for high blood pressure and high cholesterol
- Support community efforts to promote smokefree air and reduce sodium in the food supply

Supporting **healthcare providers and systems to adopt evidence-based best practices**

- Improve screening to identify people with high blood pressure who are not yet diagnosed
- Support quality improvement coaching to improve blood pressure control among patients in Alaska
- Ensure optimal treatment and secondary prevention for heart disease and stroke patients with healthcare providers, emergency services, hospitals and clinics

Supporting statewide and community partners to promote healthy lifestyles

- **Change environments.** Increase physical education in schools and physical activity opportunities in communities; increase community opportunities for nutritious diets and use of traditional Alaska Native and local foods; support communities to adopt smokefree air policies
- **Empower Alaskans.** Ensure Alaskans know how to reduce their risk of heart disease and stroke, including through the "know your numbers" tools that empower patients to work with their healthcare provider to know and understand their blood pressure, cholesterol, waist circumference, and glucose

[16] See Alaska Department of Health and Social Services, Division of Public Health, Heart Disease and Stroke Prevention Program http://dhss.alaska.gov/dph/Chronic/Pages/Cardiovascular/default.aspx

Data Gaps and Limitations

This report summarizes key data that are available to describe the burden of heart disease and stroke in Alaska, including among specific populations and communities. Although Alaska has a good amount of information, there are also some important data gaps to acknowledge.

Information on the prevalence of heart disease is currently only available by self-report (from BRFSS) and includes only people who have been diagnosed with a heart attack or coronary heart disease. The true number of people suffering from heart disease in Alaska is likely to be much greater than reported here, because heart disease is often undiagnosed. In the future health information exchanges that include information on presence of clinical conditions may help to fill this gap. Public health stakeholders are advocating to use these sources to develop aggregate information for the state.

Appendix

Resources

The following resources may be useful to people planning strategies or specific interventions to prevent and reduce the burden of heart disease and stroke.

- **Million Hearts® Initiative**
  https://millionhearts.hhs.gov/
  A national initiative to save 1 million lives in 5 years. Website provides information about heart disease and stroke, tools and effective interventions.

- **American Heart/American Stroke Association** Health Topics
  https://www.heart.org/en/health-topics
  Facts about heart conditions and stroke to help individuals with making changes to improve and maintain health.

- **American Heart Association Guidelines and Statements**
  https://professional.heart.org/professional/GuidelinesStatements/UCM_316885_Guidelines-Statements.jsp
  Medical guidelines and scientific statements about cardiovascular disease and stroke topics.

- **CDC Division for Heart Disease and Stroke Prevention**
  https://www.cdc.gov/dhdsp/index.htm
  Multiple resources including educational materials, publications, data, and information about programs.

- **State of Alaska Heart Disease and Stroke Prevention Program**
  http://dhss.alaska.gov/dph/Chronic/Pages/Cardiovascular/default.aspx
  Alaska publications and information about activities within the state to prevent and reduce the burden of heart disease and stroke.

- **Alaska Heart Disease and Stroke Facts: Hypertension, 2018**
  http://dhss.alaska.gov/dph/Chronic/Documents/Cardiovascular/pubs/Factsheet_Hypertension.pdf
  Two-page fact sheet on hypertension from the state of Alaska.

Data Tables

Appendix Table 1: Prevalence of heart disease and stroke among adults

Alaska, 2012-2016

	Heart Disease	Lower CI	Upper CI	Stroke	Lower CI	Upper CI
All Adults	**4.4%**	4.1%	4.8%	**2.3%**	2.0%	2.6%
Male	**5.2%**	4.7%	5.8%	**2.2%**	1.8%	2.5%
Female	**3.6%**	3.1%	4.1%	**2.5%**	2.1%	2.9%
Alaska Native	**4.8%**	3.8%	6.0%	**3.5%**	2.8%	4.4%
Black/African American^	**4.9%**	2.5%	9.5%	**1.6%**	0.7%	3.6%
Other/multi-race^	**3.2%**	1.8%	5.7%	**2.3%**	1.0%	4.9%
Asian^	**1.2%**	0.5%	2.9%	**2.0%**	0.8%	5.1%
Hispanic	**4.5%**	2.6%	7.7%	**2.3%**	1.1%	4.7%
White	**4.6%**	4.2%	5.0%	**2.1%**	1.8%	2.4%
Low SES	**4.8%**	3.9%	5.8%	**2.5%**	2.0%	3.2%
Higher SES	**2.4%**	2.1%	2.9%	**1.3%**	1.0%	1.7%
Rural Alaska	**3.7%**	3.1%	4.5%	**2.5%**	2.1%	3.1%
Rest of state	**4.5%**	4.1%	4.9%	**2.3%**	2.0%	2.6%
Age 18-44	**0.9%**	0.6%	1.3%	**0.5%**	0.3%	0.7%
Age 45-54	**4.0%**	3.1%	5.0%	**2.2%**	1.6%	3.1%
Age 55-64	**6.9%**	5.9%	7.9%	**3.3%**	2.6%	4.3%
Age 65 and older	**15.7%**	14.1%	17.4%	**8.1%**	7.0%	9.4%

Data source: Alaska BRFSS Standard File. Data are shown in Figure 5 (Heart Disease) and Figure 13 (Stroke).
Note: the prevalence of heart disease for 2016 alone is 4.3%.
^ indicates that the estimate is flagged for reliability.

Definitions

Alaska Native group includes all who reported American Indian or Alaska Native as one of their race groups; other race groups include those who reported that race as their only race and did not report being Alaska Native or Hispanic. Other includes those who reported being Pacific Islander, other race, or multiple race groups but not Alaska Native or Hispanic.
Low socio-economic status (SES) includes those who live in a household that is at <185% of the poverty level, or have completed less than a high school education.
Rural Alaska includes those living in Northern and Southwest Alaska, as defined by the sampling regions for Alaska BRFSS. This includes Northwest, Y-K Delta, and Southwest regions, as well as Denali Borough, and the Census Areas Yukon-Koyukuk and SE Fairbanks.

Appendix Table 2: Prevalence of health screenings for specific chronic diseases among adults

Alaska, 2012-2016

	Hypertension screening			Cholesterol screening			Diabetes screening		
	%	Lower CI	Upper CI	%	Lower CI	Upper CI	%	Lower CI	Upper CI
All Adults	**92.1%**	91.1%	93.0%	**83.6%**	82.3%	84.8%	**52.0%**	51.1%	52.9%
Male	**89.6%**	88.0%	91.1%	**79.3%**	77.4%	81.1%	**48.5%**	47.3%	49.7%
Female	**94.7%**	93.5%	95.7%	**89.8%**	88.2%	91.1%	**55.7%**	54.4%	56.9%
Alaska Native	**90.3%**	87.9%	92.3%	**80.0%**	77.1%	82.7%	**45.4%**	43.4%	47.3%
Black/African American	^ **95.0%**	89.1%	97.8%	^ **79.3%**	68.3%	87.2%	^ **57.1%**	50.1%	63.9%
Other/multi-race	^ **88.0%**	80.2%	92.9%	**84.2%**	73.7%	91.0%	**47.4%**	42.9%	51.9%
Asian	^ **84.6%**	74.3%	91.2%	^ **88.5%**	80.1%	93.7%	^ **38.7%**	33.2%	44.4%
Hispanic	^ **95.3%**	80.0%	99.0%	**†**	**†**	**†**	^ **41.3%**	34.9%	47.9%
White	**93.3%**	92.3%	94.2%	**84.1%**	82.7%	85.5%	**54.9%**	53.9%	55.9%
Low SES	**86.0%**	83.1%	88.5%	**70.3%**	66.5%	73.9%	**45.4%**	43.4%	47.4%
Higher SES	**94.6%**	93.4%	95.5%	**85.5%**	83.8%	87.0%	**57.7%**	56.5%	58.9%
Rural Alaska	**89.0%**	86.0%	91.4%	**72.4%**	68.8%	75.7%	**43.0%**	40.9%	45.1%
Rest of state	**92.5%**	91.4%	93.4%	**84.9%**	83.5%	86.2%	**53.1%**	52.1%	54.0%
Age 18-44	**89.8%**	88.0%	91.3%	**67.5%**	62.5%	72.2%	**42.3%**	40.9%	43.6%
Age 45-54	**92.3%**	89.8%	94.2%	**81.0%**	78.6%	83.3%	**57.2%**	55.4%	59.1%
Age 55-64	**94.3%**	92.6%	95.6%	**87.1%**	85.2%	88.7%	**65.6%**	63.8%	67.3%
Age 65 and older	**97.0%**	96.0%	97.7%	**93.8%**	92.5%	94.9%	**68.3%**	66.4%	70.1%

Data sources:
Hypertension screening within the past 2 years, Alaska BRFSS Standard File, 2014-2016
Cholesterol Screening within the past 5 years, among men age 35+ and women age 45+, Alaska BRFSS Standard File, 2011/2013/2015
Diabetes screening within the past 3 years, Alaska BRFSS Combined File, 2012-2016
^ indicates that the estimate is flagged for reliability.
† estimate suppressed because number of respondents <50.

Definitions:
Alaska Native group includes all who reported American Indian or Alaska Native as one of their race groups; other race groups include those who reported that race as their only race and did not report being Alaska Native or Hispanic. Other includes those who reported being Pacific Islander, other race, or multiple race groups but not Alaska Native or Hispanic. Low socio-economic status (SES) includes those who live in a household that is at <185% of the poverty level, or have completed less than a high school education.

(technical notes continue on next page)

Rural Alaska includes those living in Northern and Southwest Alaska, as defined by the sampling regions for Alaska BRFSS. This includes Northwest, Y-K Delta, and Southwest regions, as well as Denali Borough, and the Census Areas Yukon-Koyukuk and SE Fairbanks.

Appendix Table 3: Prevalence of heart disease and stroke-related risk factors among Alaska adults

Alaska, 2011-2015

	None of 6	One	Two or More
All Adults	12.2%	28.1%	59.7%
Male	9.5%	26.7%	63.7%
Female	15.3%	29.7%	55.0%
Alaska Native	7.0%	23.9%	69.1%
Black/African American^	5.9%	12.7%	81.4%
Other/multi-race^	12.0%	25.8%	62.2%
Asian^	13.5%	39.3%	47.2%
Hispanic^	22.6%	29.9%	47.5%
White	13.2%	29.3%	57.5%
Low SES	7.2%	23.8%	69.0%
Higher SES	12.9%	30.0%	57.0%
Rural Alaska	6.9%	28.8%	64.4%
Rest of state	12.8%	28.1%	59.1%
Age 18-44	16.7%	35.5%	47.8%
Age 45-54	8.6%	22.9%	68.5%
Age 55-64	8.5%	21.5%	70.0%
Age 65 and older	5.2%	16.7%	78.0%

Data source: Alaska BRFSS, Standard File, 2011, 2013, 2015. Data shown in Figure 25.
^ indicates that the estimate is flagged for reliability.

Definitions:

Risk factors included in the count: Obesity or overweight, physical inactivity, ever told have high blood pressure, ever told have high cholesterol, ever told have diabetes (non-gestational), and/or currently a smoker.

Alaska Native group includes all who reported American Indian or Alaska Native as one of their race groups; other race groups include those who reported that race as their only race and did not report being Alaska Native or Hispanic. Other includes those who reported being Pacific Islander, other race, or multiple race groups but not Alaska Native or Hispanic.

Low socio-economic status (SES) includes those who live in a household that is at <185% of the poverty level, or have completed less than a high school education.

Rural Alaska includes those living in Northern and Southwest Alaska, as defined by the sampling regions for Alaska BRFSS. This includes Northwest, Y-K Delta, and Southwest regions, as well as Denali Borough, and the Census Areas Yukon-Koyukuk and SE Fairbanks.

Data Sources

Death Data
Information on cause of death is taken from the death certificate. "Cause of death" is reported in two ways:

- Underlying (proximal) cause of death: The disease or injury that initiated the chain of events that led directly and inevitably to death.
- Contributing cause(s) of death: any conditions or injuries that initiated the events leading to death, but which are not themselves the immediate cause of death.

This report primarily uses underlying cause of death alone to describe statewide estimates, but underlying and contributing causes of death were combined and used for reporting regional estimates. This approach was used to provide the most results by region; using underlying cause of death only would have required suppression of many estimates due to small numbers. Including the contributing causes of death also highlights that disease burdens are worsened by additional factors.

Alaska statewide data (e.g., state rates, and rates by gender, age and race/ethnicity) and U.S. data were obtained from the Centers for Disease Control and Prevention (CDC), National Center for Health Statistics, Underlying Cause of Death 1999-2016 on CDC WONDER Online Database, released December, 2017. Data are from the Multiple Cause of Death Files, 1999-2016, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Data were accessed at http://wonder.cdc.gov/ucd-icd10.html .

For regional estimates, information on numbers and causes of death for Alaska residents was obtained directly from the Alaska Health Analytics and Vital Records Section, Division of Public Health. Only Alaska residents are included in these mortality data.

In some cases, there are minor discrepancies between annual statewide rates reported between the two systems; however, these are not meaningful differences in terms of understanding public health burden.

For more information on Alaska's mortality data,
visit: http://dhss.alaska.gov/dph/VitalStats/Pages/data/Deaths.aspx

Behavioral Risk Factor Surveillance System (BRFSS)
The BRFSS is an anonymous telephone survey conducted by the Alaska Division of Public Health in cooperation with the Centers for Disease Control and Prevention (CDC). It aims to estimate the prevalence of behavioral risk factors in the general adult population that are known to be associated with the leading causes of morbidity and mortality. The BRFSS has operated continuously in Alaska since 1991.

BRFSS data are weighted to adjust the distribution of the sample data so that it reflects the total population of the sampled area, and to compensate for the over-representation or under-representation of persons in various subgroups. Changes in both the weighting and sampling methods occurred between 2007 and 2011, including the expansion of the sampling frame to include cell phones in addition to landline phones. More information about the changes in BRFSS methods can be found in the January 2013 issue of
Chronicles: http://dhss.alaska.gov/dph/Chronic/Documents/Publications/assets/ChroniclesV5-1.pdf.

Alaska presently conducts two BRFSS surveys: the standard BRFSS and a separately funded supplemental BRFSS. Data can be reported based on different survey dataset combinations:

- Standard BRFSS
- Supplemental BRFSS
- Combined (standard + supplemental) BRFSS

Datasets are weighted (separately) for analysis of items based on whether they occur only in one or both survey versions. Whenever possible, the combined dataset was used to provide the estimates contained in this report. In cases where questions appeared on only one or another of the BRFSS surveys, that particular dataset was used.

For more information on the Alaska BRFSS,
visit *http://dhss.alaska.gov/dph/Chronic/Pages/brfss/default.aspx*

National Health Interview Survey (NHIS)

The National Health Interview Survey (NHIS) has been given in the U.S. since 1957 and is currently administered by the U.S. Census Bureau. NHIS uses household-based interviews to collect data on a variety of health topics, including healthcare access, health conditions and behaviors, and provides results used for tracking U.S. national health objectives.

For this report, NHIS data were downloaded from the Centers for Disease Control and Prevention (CDC) Division for Heart Disease and Stroke Prevention
at https://www.cdc.gov/dhdsp/maps/dtm/index.html
Similar data are available through the CDC Division of Diabetes Translation
at www.cdc.gov/diabetes/data

NHIS data are age-adjusted. Results are directly standardized to the age distribution of the 2000 US Standard Population using the following age groups: 18-39, 40-59, 60+.

For more information on the NHIS, visit *https://www.cdc.gov/nchs/nhis/index.htm*

Hospitalization data

Inpatient and outpatient discharge data were obtained from the Alaska Health Facilities Data Reporting (HFDR) program. These facilities include private, municipal, state and some federal hospitals, including ambulatory surgical centers, and hospitals operated by Alaska Native organizations; military hospitals are not included.

Reporting of data by Alaska health facilities was mandated effective in December 2014 with reporting beginning in 2015; prior to that year this reporting was voluntary. Only data for 2016 were included in this report due to concerns about the impact of the transition from using International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) for discharge coding to the 10th revision (ICD-10) between quarter 3 and quarter 4 of 2015. Such changes in coding systems could create increases or decreases in estimates that are not related to actual changes in patient presentation or treatment.

Rates are reported per 10,000 population, which is the reporting standard suggested by the HFDR program. These rates were presented without adjustment for factors such as age or gender. Population estimates for 2016 were used as denominators. Population estimates were obtained from the Alaska Department of Labor and Workforce Development, Research and Data Analysis Section (see http://live.laborstats.alaska.gov/pop/index.cfm accessed June 20, 2018).

Data are reported separately by type of encounter, based on the facility where treatment was given:

- Inpatient: acute medical/surgical unit, psychiatric unit, medical rehabilitation, alternate level of care (e.g., long-term care, hospice), alcohol or drug rehabilitation.
- Outpatient: emergency room, outpatient surgery, observation only.

Cases were identified using discharge diagnosis codes, and also reported separately by the position of the disease of interest within the discharge codes – as primary alone, secondary or both primary and secondary combined:

- Primary diagnosis: the specific condition is the first listed discharge code. This is usually the most serious and/or resource-intensive during the hospitalization or patient encounter.
- Secondary diagnoses: the discharge code for a specific condition is identified in any position from up to 19 diagnosis codes (except the first position code). There are up to 29 total discharge codes available, however we limited to 19 so that only conditions most relevant to the visit would be included.

Specific ICD-10 discharge codes used to identify cases for this report were:

- Heart disease was identified based on ICD-10 codes: I0, I11, I13, I2, I3, I4, I5, I20, I21, I22, I23, I24, I25, I50
- Stroke was identified based on ICD-10 code I6

For more information about the Alaska Health Facilities Data Reporting Program, visit http://dhss.alaska.gov/dph/VitalStats/Pages/HFDR/default.aspx

National hospitalization data were not included in this report.

Definitions

Alaska Regions

Data are presented geographically in this report for Behavioral Health Systems Regions (BHSRs). Rates and counts are not shown for specific areas when there were fewer than 6 cases within the combined years. The following table includes a list of Borough/Census Areas included in each of Alaska's Behavioral Health Systems Regions, as well as their total population.

For some BRFSS indicators, results are presented for "rural residents" of Alaska. Rural Alaska includes Northern and Southwest Alaska, as defined by the sampling regions for the Alaska BRFSS. This includes Northwest, Yukon-Kuskokwim (Y-K) Delta, and Southwest regions, as well as Denali Borough, and the Census Areas of Yukon-Koyukuk and Southeast Fairbanks.

The following table provides an example of populations included in each BHSR for one year included in this report. Prior to 2010, the Southeast region was organized as one region; however, our analyses uses the current definitions.

Alaska Behavioral Health Systems Regions with 2014 Alaska Resident Population

Behavioral Health Systems Region	Included 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
	Interior 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
	Northwest Total	**27,294**
Southeast (SE)-northern	Haines Borough	2,566
	Hoonah-Angoon Census Area	2,091
	Petersburg Borough	3,184
	Sitka City and Borough	8,881
	Skagway Municipality	1,038
	Wrangell City and Borough	2,360
	Yakutat City and Borough	634
	SE-northern Total	**20,754**
Southeast (SE)-southern		
	Ketchikan Gateway Borough	13,781
	Prince of Wales-Hyder Census Area	6,384
	SE-southern Total	**20,165**
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
	Southwest Total	**30,644**
Yukon-Kuskokwim (Y-K) Delta	Bethel Census Area	17,923
	Kusilvak Census Area	8,053
	Y-K Delta Total	**25,976**

Sources: Alaska Department of Labor and Workforce Development, Research and Analysis Section; U.S. Census Bureau; and National Center for Health Statistics.

Race

Throughout this report the term "Alaska Native" is used for hospital and BRFSS data to represent people who reported being or were identified as "Alaska Native/American Indian" (AIAN). We used the term AIAN for death data because this is a national standard dataset and comparisons were made to national AIAN groups.

For this report, Asian and Native Hawaiian/Other Pacific Islander groups were combined for the death data because this is how race is reported in this data system. We urge caution in interpreting findings, because Asian and Native Hawaiian/Pacific Islander groups are quite distinct from one another and often show very different risk factors and prevalence of health indicators. Until recent years, they have often been combined in population and other datasets, and some data systems continue to use these prior groupings. For BRFSS data, Native Hawaiian/Other Pacific Islander group are combined with "other" due to small numbers of participants; there were sufficient number of participants for most measures so that results for Asian people were reported alone.

For death data, information included on the death certificate about the race and Hispanic ethnicity of the decedent is reported as provided by an informant, often the surviving next of kin, or, in the absence of an informant, on the basis of observation. Race and ethnicity information from the census (e.g., counts of people in different groups) is by self-report. To the extent that race and Hispanic origin are inconsistent between these two data sources, death rates by race will be biased. Studies have shown that persons self-reported as American Indian, Asian, or Hispanic on census and survey records may sometimes be reported as white or non-Hispanic on the death certificate, resulting in an underestimation of deaths and death rates for the American Indian, Asian, and Hispanic groups. Bias also results from undercounts of some population groups in the census, particularly young black males, young white males, and elderly persons, resulting in an overestimation of death rates.[17] In this report, death data are presented only for race, and not for Hispanic ethnicity.

For hospitalization data, a single race and separate Hispanic ethnicity are included in the record. It is not clear how these are assigned by hospitals. An "other" category may be used to describe people who identify as more than one race, or individuals may select the race with which they most strongly identify. We did not report data for the "other" group, because it was unclear who was included.

For BRFSS, survey participants self-report their race and Hispanic ethnicity in two separate questions, and they can indicate that they identify with multiple race groups. BRFSS respondents were identified as Alaska Native people if they reported this as one of their race groups, regardless of whether they reported being Hispanic. People who said they were Hispanic ethnicity, but not Alaska Native, were classified as Hispanic regardless of their race. Other race groups (Asian, Black, White) include survey respondents who reported that race as their only race group and also said that they were not Hispanic. The "other" group includes people who reported being Pacific Islander/Native Hawaiian, or multiple race groups but not Alaska Native or Hispanic. Numbers of respondents were too small to report Pacific Islander/Native Hawaiian alone.

[17] Centers for Disease Control and Prevention (CDC), Underlying cause of death 1999-2016, dataset documentation. https://wonder.cdc.gov/wonder/help/ucd.html#

"Low SES" Alaskans

Having fewer financial resources, including lower household income and less formal education, is associated with poorer health outcomes. This is sometimes called low socio-economic status (SES). In this report, some BRFSS indicators are shown for "Low SES" populations. This means people who live in a household that is at less than 185% (< 185%) of the federally-determined poverty level (annual thresholds are based on combined household income and number of people living in the household) or who have completed less than a high school education.

Analysis and reporting approaches

Notes on data display

Throughout this report, visual cues are used to help the reader understand what types of data are being presented:

- Data shown on a vertical axis (i.e., column charts) included both Alaska statewide and U.S. data.
- Trend line charts are also used for Alaska statewide data, and include U.S. data when available.
- Data shown on a horizontal axis (i.e., bar charts) are for Alaska alone, including contrasting sub-groups within the state.
- All regional data are presented both with a map to provide geospatial context and a bar chart; colors were assigned by region to provide visual cues about relative rates, but different shades should not be interpreted as statistically significant differences.
- To summarize data across groups and regions, a color block "patchwork" table is included near the end of this report. Different colors were used to provide visual cues about relative rates, and patterns of risks across groups, but should not be interpreted as statistically significant differences.

Small numbers and other limitations

The following are systematic limitations of our datasets, analysis and reporting.

Small numbers and data suppression

The State of Alaska has guidelines for suppressing data based on small numbers, both because rates based on these numbers can be unreliable, and also to prevent the identification of individuals within the data.

In this report, death and hospitalization counts based on fewer than 6 occurrences are not reported. For both of these data sources, rates based on fewer than 20 occurrences are not reported, although the counts (n>5) are reported.

To maximize reportable data for regional comparisons, the rate for both underlying and contributing cause of death are combined, to generate larger and more reportable numbers.

BRFSS information is suppressed or flagged based on statistical guidelines developed by Alaska's Division of Public Health in the Department of Health and Social Services, which are based upon the national Joint Policy of Variance Estimation and Statistical Reporting Standards for the National Health and Nutrition Examination Survey (NHANES-III) and the Continuing Survey of Food Intake by Individuals (CSFII) Reports. An asterisk is used to indicate that the estimate may lack statistical precision. Estimates are suppressed if the unweighted sample size for the denominator (N) is less than 50, or if the numerator (n) is less than 5. In addition, estimates may be reported but flagged with an asterisk if there is inadequate sample size for normal approximation, or for uncommon or very

common event. Finally, if the coefficient of variation is greater than 30%, the estimate is also considered imprecise and is flagged.

Population estimates and effect on rates

Death and hospitalization data are shown as rates, i.e., in terms of cases per population totals. For years when the U.S. census is taken (e.g., 2000, 2010) total population counts are based on what was actually measured during that year. For non-census years (i.e., years other than 2010 and 2000), state and borough/census area population figures are estimates. Because rates are calculated using the population data as a denominator, any errors in the population estimates will impact the rates.

Age-adjusted Rates

A "crude" rate is calculated by taking the number of cases for a given population and dividing it by the total number of people in that population per a specific time period. Since this number would be a very small decimal, it is multiplied by 100,000 and is thus expressed as "per 100,000 persons". However, mortality rates in this report are calculated using the direct method and age-adjusted to the standard 2000 U.S. population; they are expressed as an annual number of cases per 100,000 persons, using the 19-age group Census P25-1130 data file. National prevalence rates from the NHIS, and Alaska prevalence rates used for comparing trends to the U.S., are directly standardized to the age distribution of the 2000 US Standard Population (except where stratified by age) using the following age groups: 18-39, 40-59, 60+.

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 chronic disease (e.g., diabetes, heart disease) 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 rate even if the two communities had the same risk.

Age adjustment is an internationally approved statistical method to remove this effect – sometimes called "confounding" – caused by different age distributions. 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).

Rates shown for combined years of data are average annual age-adjusted rates for the years of data indicated.

Confidence Intervals

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 times) that the confidence interval around an estimate will include the true value.

In many of the tables, we report the 95% confidence intervals as well as the estimates and denominators. In the bar graphs, the error bars (lines with a "T" at either end) reflect the confidence intervals and show the range of where the true population estimate is expected to be, at the 95% confidence level.

Narrower confidence intervals indicate more precision in the presented estimates. The width of the confidence interval is dependent upon the size of the population at risk and the number of reported cases (presence of chronic disease or a risk factor, counts of deaths or hospitalizations). Generally, large populations with large number of cases will result in rates with narrower confidence intervals. Because U.S. rates are based on very large populations and number of cases, their confidence intervals are not stated in this report and are usually about $\pm$ 0.1 of the rate. Rural areas with sparse populations tend to have large confidence intervals.

Statistically Significant Differences

In this report, we indicate "significant" differences between groups when we have used statistically-based approaches and found that the differences measured between groups are unlikely to be due to variability in estimates or chance. Non-significant differences are typically not described in text as being "different" (e.g., higher or lower than other groups).

We used chi-square tests in our comparisons between groups of Alaskans. Chi-square tests are tests of association between group and outcome variables (for example, smoking [yes, no] and gender [male, female]). For trend analyses, we used logistic regression models that tested for a statistically significant linear change over time. P-values less than 0.05 indicate that a difference seen between percentages or across years is statistically significant at the 95% confidence level.

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.

Trend Analysis

Trends for Alaska's age-adjusted mortality and prevalence rates were assessed using the National Cancer Institute's (NCI) Joinpoint Regression Program, Version 4.3.1.0 (April 2016, NCI Statistical Research and Applications Branch; software available at https://surveillance.cancer.gov/joinpoint/). Joinpoint is a national standard for analysis of population-based cancer statistical trends in cancer surveillance, and can also be applied to other health outcomes.

Based on annual prevalence and standard errors, the software identifies "joinpoints" (points of inflection where trends have significantly changed). The program starts with the minimum number of joinpoints (e.g., 0 joinpoints, or a straight line), and tests whether more joinpoints are statistically significant and improve the fit of data (up to the maximum allowed number; 3 for this report).

For each joinpoint time segment, the estimated annual percentage change (APC) was calculated by fitting a least squares regression line to the natural logarithm of the rates. When the APC is statistically significant as different from zero (i.e., significantly different from a flat line), it is listed together with the p-value for that trend. This APC can be interpreted as the average percent increase or decrease incidence during that period.