STATE of ALASKA
Department of Health and Social Services

The Burden of Heart Disease and Stroke in Alaska

Mortality, Morbidity, and Risk Factors

The Burden of Heart Disease and Stroke in Alaska: Mortality, Morbidity, and Risk Factors

July 2006 Update

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acknowledgements

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executive summary

Heart disease and stroke are pervasive threats to adults almost everywhere.

t's fair to say that it goes to the heart of health concerns for men and women in 21st Century America. Everyone knows it is a public health problem, but how big a problem is it? Who is most at risk of experiencing heart disease and stroke and dying from it? Where should prevention efforts be focused?

This report gathers existing data on the scope of heart disease and stroke in Alaska into one easy-to-use resource. It examines the state's burden of heart disease and stroke today in terms of mortality and morbidity, and it assesses the prevalence of key risk factors that will determine the likely burden tomorrow.

Some key findings:

- Compared to most other states, Alaska has a relatively low heart disease death rate. Furthermore, rates of death from heart disease—particularly ischemic heart disease—have been falling over the past decade and a half, similar to the pattern seen in the US overall.
- In contrast, the stroke death rate in Alaska is about 10% higher than the national rate. Even more troubling is the fact that, compared to the slowly declining rate of stroke death in the US, Alaska's stroke death rate has not decreased over the past 14 years.
- Although socioeconomic and racial disparities do exist, heart disease and stroke touch Alaskans of every race, ethnic group, occupation and social class.
- Nine percent of hospitalizations in Alaska in 2004 were for a primary diagnosis of either heart disease or stroke. Compared to the pattern seen in the US overall, the Alaskans being hospitalized primarily for heart disease and stroke are disproportionately male and between the ages of 44 and 64.
- There is a gender gap in terms of in-hospital treatment of ischemic heart disease. Women hospitalized for ischemic heart disease are less likely than men to receive angiography or arteriography, cardiac catheterization, percutaneous coronary intervention, bypass surgery, and pacemakers.
- Treatment and care related to heart disease and stroke have a tremendous economic cost in Alaska.
  - Hospitalizations for heart disease in Alaska cost $322 million in 2004—just over one-third of the total for all hospitalization costs in that year; hospitalizations for stroke cost over $30 million.
  - Medicaid payments alone for health care services related to heart disease in SFY 2005 ran $8.6 million. Over $12.6 million was paid by Medicaid for claims related to stroke; given that there were 1,166 individuals with Medicaid claims related to a primary diagnosis of stroke in SFY 2005, that translates to a cost of over $10,000 per stroke sufferer.
  - Eighty-one percent of stroke-related Medicaid claims in SFY 2005 went towards long-term care.

- Less than one-third of the approximately 10,000 Alaskans who reported having had a heart attack say they were referred to cardiac rehabilitation.
- Heart disease and stroke risk factors are generally present in Alaska in levels comparable to what is seen in the US overall, and most have either remained stable or increased over the past decade and a half. For example:
  - Smoking prevalence is flat at around 25 percent, which is higher than in the US overall.
  - Obesity/overweight is increasing, and at 63 percent is slightly higher than in the US overall.
  - Although at 22 percent Alaska's hypertension prevalence is lower than the US overall rate, this key risk factor is on the rise in Alaska.
  - Cholesterol screening is improving, but a full one-third (33 percent) of adult Alaskans did not have their blood cholesterol tested in the previous 5 years. In the US overall only 27 percent are not obtaining these important screenings.
  - The prevalence of high cholesterol has remained flat in Alaska at between 25 and 30 percent.
- One-third of Alaskans have two or more of the above risk factors; an additional one-third has a single risk factor.
- In many cases, Alaska Natives, residents of rural regions, and socioeconomically disadvantaged Alaskans experience higher levels of risk factors related to heart disease and stroke.

Alaska's currently high level of population risk poses a significant challenge for public health to keep ahead of the curve and reduce the state's heart disease and stroke burden into the future. Heart disease and stroke will never be completely eliminated in Alaska. But with our ageing population, even modest percentage gains in preventing premature death and disability from these diseases will pay our state huge dividends in coming years, in terms of medical care savings, economic productivity, and quality of life.

introduction

Alaska is an unusually wild and beautiful state.

Vast open spaces, towering mountains, unbroken wilderness and remote human settlements all provide an untamed natural setting unlike any other in 21st Century America. Although it covers fully one-sixth of the landmass of the United States, Alaska contributes only 0.2 percent to the national population.

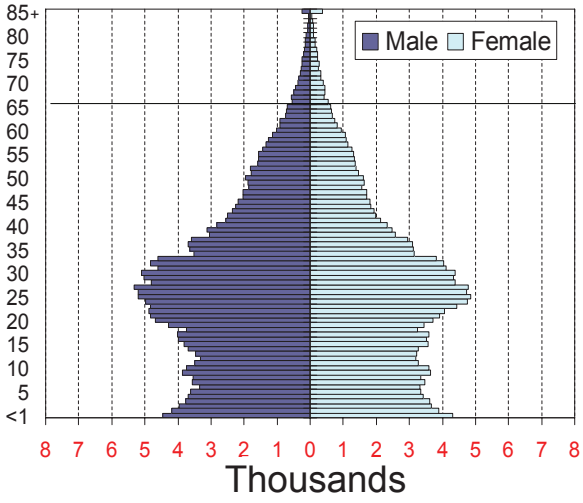
Among all 50 states, Alaska ranks first in mountains higher than 14,000 feet (with 19 in all), first in active volcanoes (10 in all), first in area covered by glaciers (29,000 square miles), and first in length of coastline (6,640 miles). But in spite of its great size, Alaska ranks 48th among the states in population (626,932 in the 2000 census), 47th among the states in total road miles (only 1,089 miles of highway), and dead last in population density (1.1 persons per square mile). It is no wonder that the few hearty souls who make Alaska their home call their state the "last frontier."

In absolute terms, fewer people in Alaska suffer from heart disease and stroke today than in any other state. But even here death and hospitalization due to heart disease and stroke are common. The behavioral and environmental risk factors that lead to these two conditions have found their way even to the most isolated corners of this great land.

There is more that is unusual about Alaska's population than its relatively small size. Alaska has a unique mix of races and ethnicities. It is the only state where men outnumber women. It has an unusually large number of migrants who were born in other states and countries. All of these distinctive characteristics can potentially have profound effects on the risk of chronic illnesses, such as heart disease and stroke.

But the most striking difference about Alaska has always been its relatively youthful population. Traditionally, this has been a state for both the young and the young at heart. To a degree not seen in any other state, the numbers of people whom one might call elderly are relatively small in Alaska.

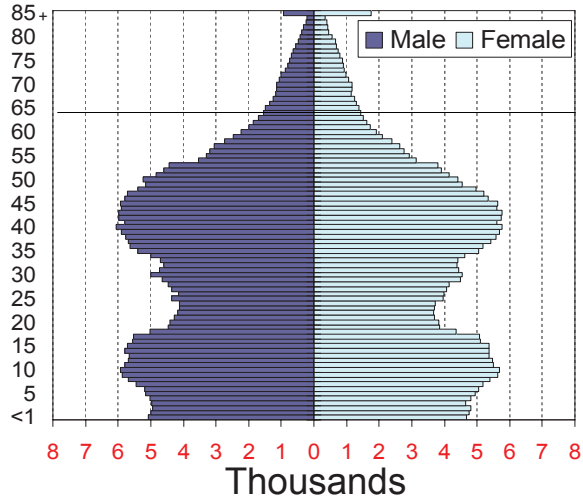
Figure 1. Age, Sex Population Distribution: Alaska, 1980



Source: AK Department of Labor, Research and Analysis Section

This was especially true in past decades. In 1980 the median age of the state's population was just 26 years. The big bubble in the population distribution was between the ages of 20 and 35 years. Very few remained in the state after age 60.

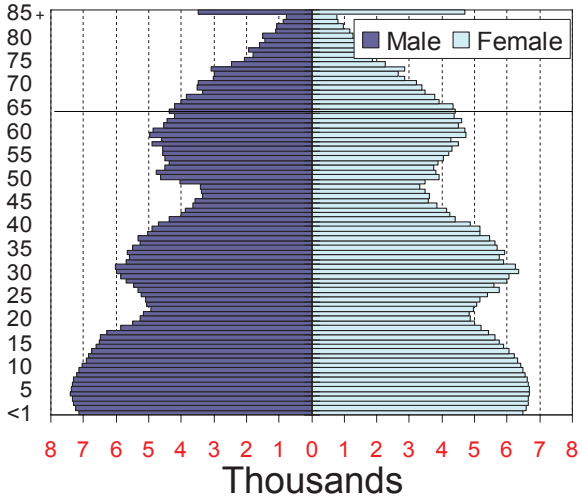
Figure 2. Age, Sex Population Distribution: Alaska, 2000



Source: AK Department of Labor, Research and Analysis Section

But that picture is changing fast. By 2000, the state's median age had risen to 32 years, and in recent years the proportion of the population over age 65 has grown faster in Alaska than in any other state. The elderly still leave the state in droves, and there are fewer senior citizens in Alaska today than in any other state. But now there are proportionately more older Alaskans than ever before, and this shift will only continue in the foreseeable future.

Figure 3. Age, Sex Population Distribution: Alaska, 2020



Source: AK Department of Labor, Research and Analysis Section

As the age-sex pyramid of 2000 shows (Figure 2), the bubble of young adults from 20 years ago is now a bulging waistline that is rapidly entering middle age. Chronic diseases like heart disease and stroke are extremely rare in young adults, but they are common in the age groups to which our population is heading. It is projected that by the year 2020, over 12 percent of Alaskans will be age 65 or older (see Figure 3). The state of Alaska has a unique opportunity to work aggressively on the behavioral and environmental factors that put Alaskans at risk for heart disease and stroke and prevent these chronic diseases so they don't rob Alaskans of vital years and life. The need for public health approaches for prevention of chronic disease has never been greater in Alaska than it is right now.

This report has been prepared to provide Alaskans with the facts they need to understand the burden of heart disease and stroke in their state. It will examine heart disease and stroke in Alaska along three dimensions: mortality, morbidity, and risk factors for heart disease and stroke.

The following terminology will be used throughout this report. Heart disease (diseases of the heart) and stroke are part of the broader category cardiovascular disease (CVD). Cardiovascular disease refers to a variety of heart and blood vessel diseases. Other types of CVD include congenital heart disease, rheumatic heart disease and infections of the heart. This report focuses on heart disease, ischemic heart disease, and stroke, and their risk factors. A secondary focus is congestive heart failure.

heart disease and stroke mortality

More Alaskans die from heart disease and stroke combined than any other cause.

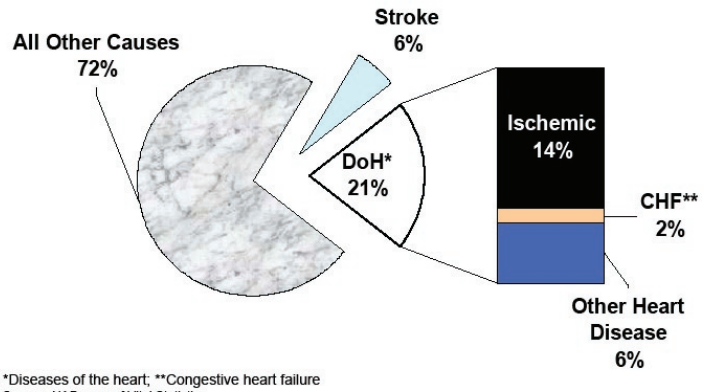
Of the approximately 3,000 Alaskans who died in 2003, 858 died from either heart disease or stroke. That translates to between 3,500 and 4,000 years of productive life lost in a single year due to heart disease and stroke.

In the next 10 years, the number of Alaskans who are expected to die from heart disease and stroke will be roughly equivalent to the population of the North Slope Borough, or the city of Ketchikan, or the entire Aleutian archipelago. Death from heart disease and stroke is a common event in every Alaskan city, town, and village. It touches Alaskans of every race, ethnic group, occupation and social class.

Every person now living in Alaska knows someone well who will die as a result of either heart disease or stroke. Although deaths from these two causes will never be completely eliminated, renewed public health efforts can significantly reduce premature death from heart disease and stroke.

As serious as heart disease is for Alaska's health, our state enjoys one of the lowest heart disease death rates in the United States. Far fewer Alaskans die from heart disease than would be expected in a contemporary American population of Alaska's size. In fact, Alaska is one of only three states where heart disease is not the leading cause of death. This is partly due to the state's robust cancer death rate. But it is mostly because of Alaska's unusually low rate of death from diseases of the heart.

Figure 4. Heart Disease and Stroke as Causes of Death
Alaska, 2003



*Diseases of the heart; **Congestive heart failure
Source: AK Bureau of Vital Statistics

It is possible that out-migration of Alaskans with heart disease and other chronic illnesses artificially reduces the state's observed mortality rates. Little is known about who migrates out of Alaska or why, but a portion of Alaskans with known heart disease may choose to relocate each year to other states, where their deaths no longer contribute to Alaska's mortality rates. Such relocation has not been studied, but it seems plausible given the state's harsh winter climate and the long distances that often separate patients from advanced treatment services.

A more certain explanation of Alaska's comparative advantage in heart disease risk is the younger age structure of the state's population. Alaska's relatively small proportion of residents over age 65 reduces the pool of individuals most at risk of fatal strokes and heart disease events in the population at large. Because Alaska's age structure is so different from that of the United States as a whole, all the mortality rates presented below have been age-adjusted.

Even taking differences in age structure into account, Alaska has a relatively low death rate from heart disease, compared to most other states. The age-adjusted death rate for heart disease in Alaska is more than 16 percent lower than the national rate.

In contrast, the stroke death rate in Alaska, after adjusting for age, is about 10 percent higher than the national rate. As Table 1 shows, the ranking of Alaska's top causes of death is very dissimilar from the United States as a whole.

Table 1. Top 10 causes of death, Alaska and US, 2003

Cause of Death	Deaths	Alaska Age-Adjusted Rate	US Age-Adjusted Rate	US Rank
1. Cancer	726	186.2	189.3	2
2. Diseases of the Heart	**672**	**193.1**	**232.1**	**1**
3. Unintentional Injuries	316	54.7	36.1	5
4. Stroke	**182**	**59.6**	**53.6**	**3**
5. Chronic Lower Respiratory Disease	147	46.1	43.2	4
6. Suicide	124	20.6	10.5	11
7. Diabetes	102	27.5	25.2	6
8. Influenza and Pneumonia	59	20.1	21.9	7
9. Chronic Liver Disease	57	10.4	9.2	12
10. Alzheimer's Disease	56	22.1	21.4	8

Notes: Data sources are Alaska Bureau of Vital Statistics (for Alaska data) and National Center for Health Statistics, CDC (for US data); rates are per 100,000 persons, standardized to the US 2000 standard million.

Since 1980, the number of deaths from heart disease and stroke has increased as the state's population has grown and aged (Table 2). The proportion of all deaths in the state that is due to heart disease and stroke has held fairly constant, between 24 and 29 percent. Nationally, in 2003, the proportion of deaths due to heart disease and stroke accounted for about 35 percent of all deaths.

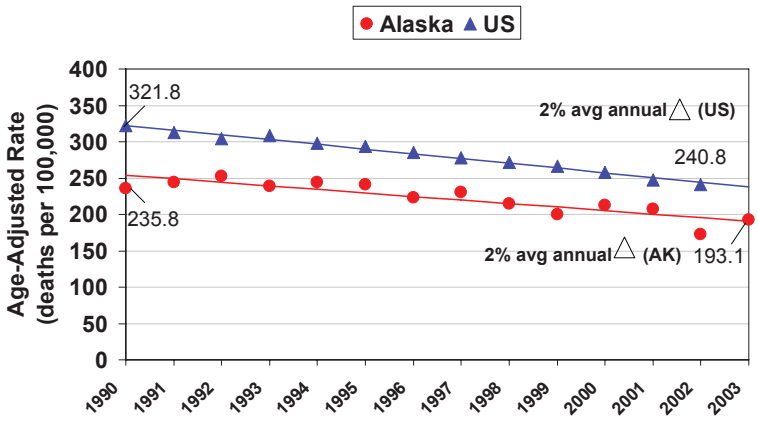
The number of heart disease and stroke deaths in Alaskans under 65 years of age has grown over time, but the proportion of deaths in this age group that is due to heart disease and stroke has held fairly constant between 16 and 20 percent. Nationally, in 2003, the proportion of deaths due to heart disease and stroke among persons under 65 years of age was nearly 22 percent.

Table 2. Number of deaths due to all causes, heart disease, and stroke, for Alaskans of all ages and those under 65 only, Alaska (1980–2003, selected years)

Year	All Causes		Diseases of the Heart						Stroke	
			Ischemic Heart Disease		Congestive Heart Failure		Other Heart Disease			
	All Ages	< 65	All Ages	< 65	All Ages	< 65	All Ages	< 65	All Ages	< 65
1980	1,642	1,102	260	116	17	1	64	39	57	19
1985	2,095	1,359	303	134	31	5	87	39	88	38
1990	2,188	1,243	330	126	13	3	95	43	103	28
1995	2,570	1,311	384	130	36	7	128	43	147	33
1996	2,625	1,300	355	128	34	0	136	51	141	35
1997	2,587	1,250	354	117	44	3	151	54	131	35
1998	2,590	1,245	377	138	45	3	137	53	153	42
1999	2,698	1,251	382	126	44	2	135	49	172	28
2000	2,922	1,351	408	129	50	5	151	55	169	38
2001	2,990	1,430	435	145	33	1	192	86	161	35
2002	3,034	1,519	414	171	36	4	136	51	157	27
2003	3,172	1,451	437	143	49	5	186	83	182	44

Notes: Data source is Alaska Bureau of Vital Statistics; ICD-9 and ICD-10 codes used: Diseases of the Heart: 390-398, 402, 404, 410-429 (ICD-9), I00-I09, I11, I13, I20-I51 (ICD-10); Ischemic Heart Disease: 410-414,429.2 (ICD-9), I20-I25 (ICD-10); Congestive Heart Failure: 428 (ICD-9), I50 (ICD-10); Other Heart Disease: all codes for "Diseases of the Heart" other than those used to identify Ischemic Heart Disease or Congestive Heart Failure; Stroke: 430-434, 436-438 (ICD-9), I60-I69 (ICD-10).

Figure 5. Trends in Age-Adjusted Rates of Deaths Due to Diseases of the Heart, Alaska and US

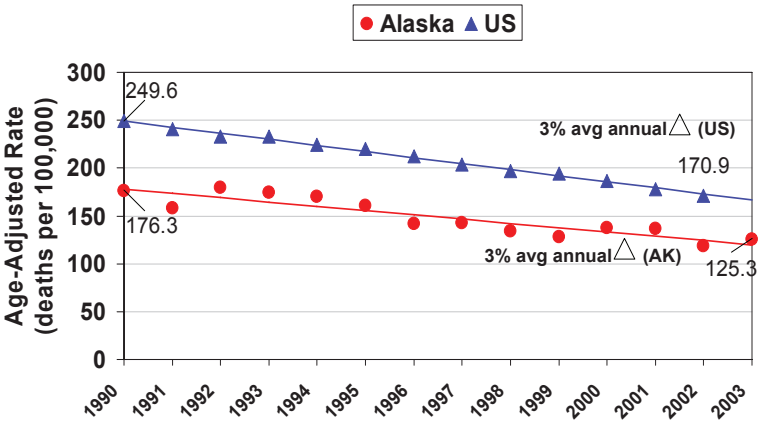


Source: AK Bureau of Vital Statistics

The next three figures illustrate changes in the age-adjusted rates of death from all types of heart disease, ischemic heart disease (which includes heart attacks) and stroke in Alaska and the United States between 1990 and 2003. Regression lines have been fit to the annual age-adjusted rates to test the significance of the trend during the 14-year period. Percentage of change during this time period is reported as an average annual percentage change.

The age-adjusted death rate from diseases of the heart has declined significantly in Alaska since 1990, dropping an average of 2 percent annually through 2003, as indicated by the trend line in Figure 5. This is comparable to a corresponding decline in age-adjusted mortality from diseases of the heart in the United States as a whole during this same time. In Alaska, the rate of death from diseases of the heart has fallen from a high of 254 per 100,000 in 1992 to 173 per 100,000 by 2002. The Alaska rates have remained below the national rates during the entire period.

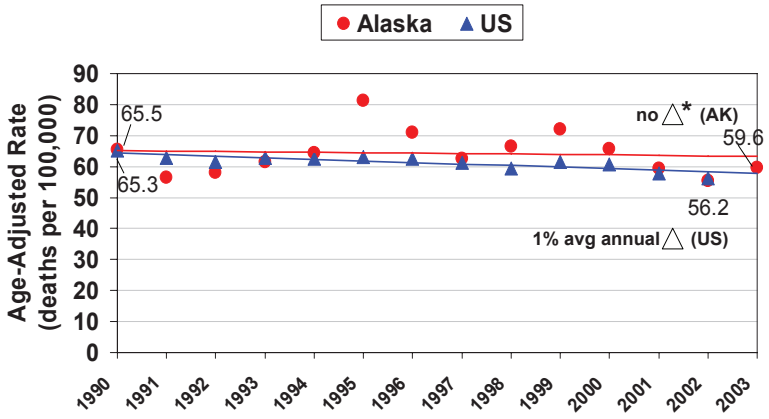
Figure 6. Trends in Age-Adjusted Rates of Deaths Due to Ischemic Heart Disease, Alaska and US



Source: AK Bureau of Vital Statistics

The age-adjusted rate of death from ischemic heart disease alone has also declined significantly since 1990 in both Alaska (3 percent average annual change) and the United States overall (3 percent average annual change). In Alaska, the rate of death from ischemic heart disease has fallen from a high of 180 per 100,000 in 1992 to 118 per 100,000 by 2002. As with diseases of the heart, the Alaska rates for ischemic heart disease have remained below the national rates during the entire period.

Figure 7. Trends in Age-Adjusted Rates of Deaths Due to Stroke, Alaska and US

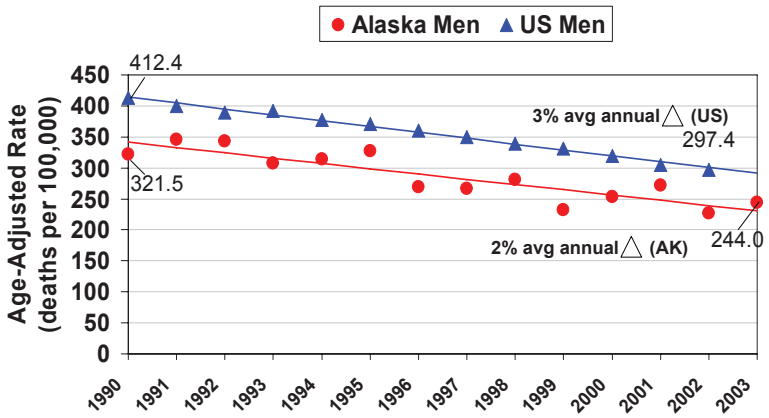


*Regression slope not significantly different from 0.
Source: AK Bureau of Vital Statistics

The age-adjusted death rates from stroke in Alaska have varied considerably from year to year, but there has been no significant linear increase or decrease during the 14-year period. By contrast, the age-adjusted mortality from stroke has declined in the United States during this period by an average of 1 percent annually. In Alaska, the rates of death from stroke ranged between 55 per 100,000 in 2002 and 82 per 100,000 in 1995.

The next six figures (Fig. 8–13) illustrate Alaska's mortality trends for all heart disease, ischemic heart disease, and stroke by sex.

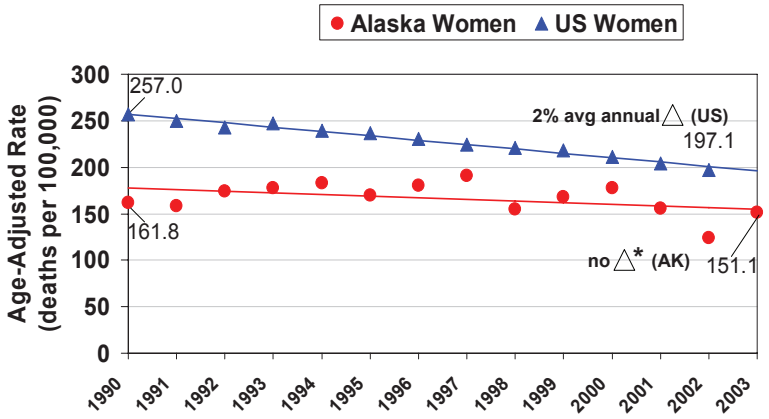
Figure 8. Trends in Age-Adjusted Rates of Deaths Due to Diseases of the Heart, Alaska and US Men



Source: AK Bureau of Vital Statistics

Age-adjusted death rates from diseases of the heart have declined significantly for men in Alaska since 1990. Women experienced lower age-adjusted rates throughout the period, but they have had no decline in rates over time. Among Alaskan men, death rates from diseases of the heart declined an average of 2 percent per year between 1990 and 2003, dropping from a high of 345 per 100,000 in 1991 to a low of 227 per 100,000 by 2002. Among women, the age-adjusted rates fluctuated between 124 per 100,000 and 191 per 100,000 per year.

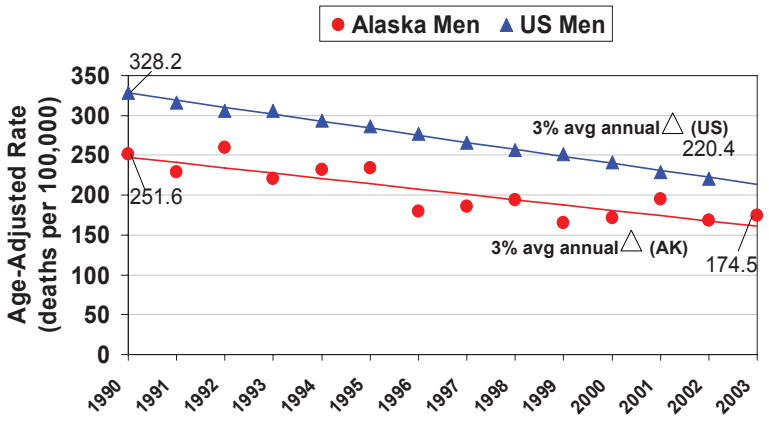
Figure 9. Trends in Age-Adjusted Rates of Deaths Due to Diseases of the Heart, Alaska and US Women



*Regression slope not significantly different from 0.
Source: AK Bureau of Vital Statistics

This picture for females is unusual. In the United States as a whole, age-adjusted death rates for both males and females have been declining since 1990. In absolute terms, Alaskan females have continued to enjoy lower rates of death from heart disease than their counterparts in other states. But their relative advantage is shrinking. In fact, if current trends continue, the trend lines for males and females will intersect in Alaska within approximately 10 years.

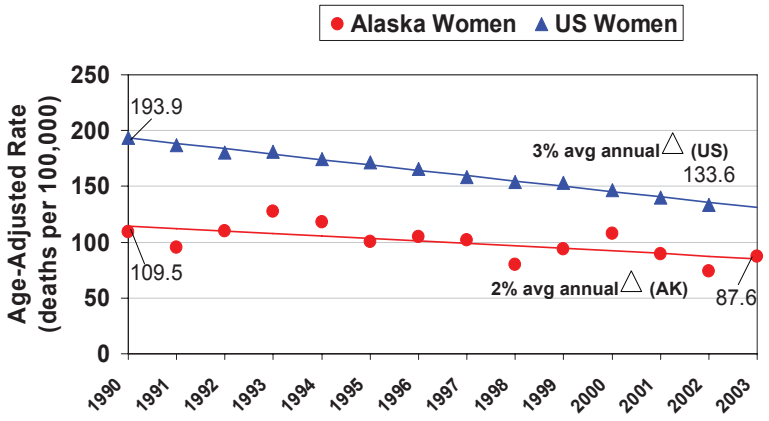
Figure 10. Trends in Age-Adjusted Rates of Deaths Due to Ischemic Heart Disease, Alaska and US Men



Source: AK Bureau of Vital Statistics

Looking at death from ischemic heart disease alone, the age-adjusted rates over time show declines among both Alaskan men and women. Among Alaskan men, death rates from ischemic heart disease declined by an average of 3 percent per year between 1990 and 2003, dropping from a high of 259 per 100,000 in 1992 to a low of 166 per 100,000 by 1999. Alaskan women experienced a 2 percent average annual drop in mortality due to ischemic heart disease between 1990 and 2003, with age-adjusted rates dropping from a high of 127 per 100,000 in 1993 to a low of 74 per 100,000 in 2002.

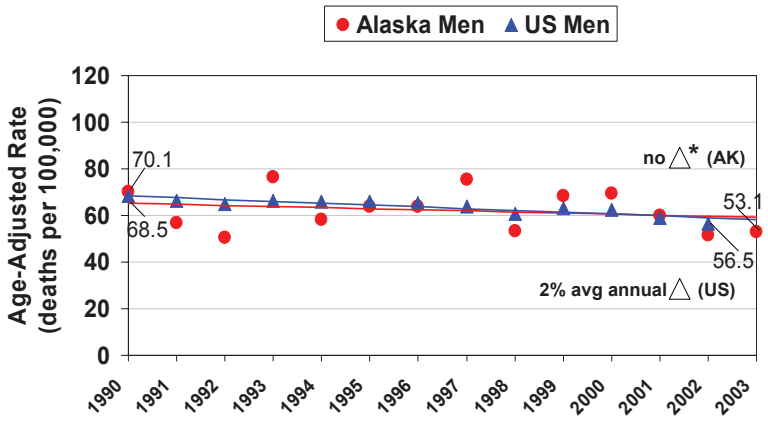
Figure 11. Trends in Age-Adjusted Rates of Deaths Due to Ischemic Heart Disease, Alaska and US Women



Source: AK Bureau of Vital Statistics

Age-adjusted mortality from ischemic heart disease similarly declined among both men and women in the United States during the same period.

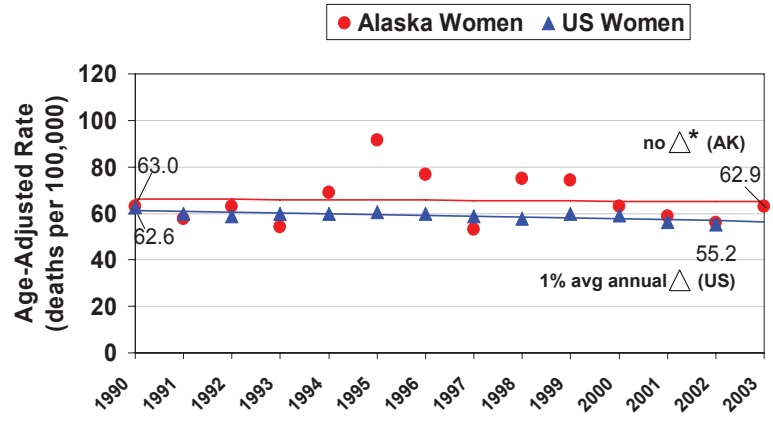
Figure 12. Trends in Age-Adjusted Rates of Deaths Due to Stroke, Alaska and US Men



*Regression slope not significantly different from 0.
Source: AK Bureau of Vital Statistics

Age-adjusted death rates from stroke in Alaska have shown little change among men or women since 1990, but there has been considerable variation from year to year. Rates among women have ranged between 53 per 100,000 and 92 per 100,000 per year; rates among men have ranged between 51 per 100,000 and 76 per 100,000 per year.

Figure 13. Trends in Age-Adjusted Rates of Deaths Due to Stroke, Alaska and US Women

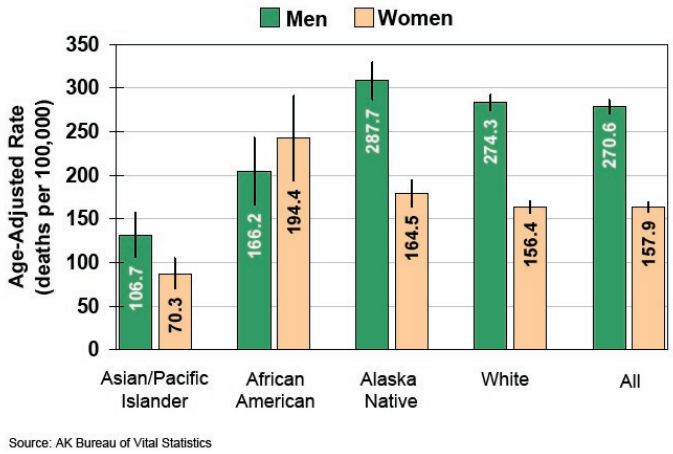


*Regression slope not significantly different from 0.
Source: AK Bureau of Vital Statistics

By contrast, the age-adjusted mortality from stroke has declined among both men and women in the United States during this period. Stroke mortality rates among Alaskan women have exceeded the comparable national rates in every year but one since 1994.

Figures 14 through 16 illustrate differences in age-adjusted rates of death from heart disease and stroke in Alaska according to sex and race. The rates shown are based on total mortality from diseases of the heart, ischemic heart disease, and stroke, during the 14-year period from 1990 to 2003. Because of comparatively small numbers, congestive heart failure mortality rates are shown by race only (Figure 17).

Figure 14. Age-Adjusted Rates of Death Due to Diseases of the Heart, by Race (1990-2003 combined)

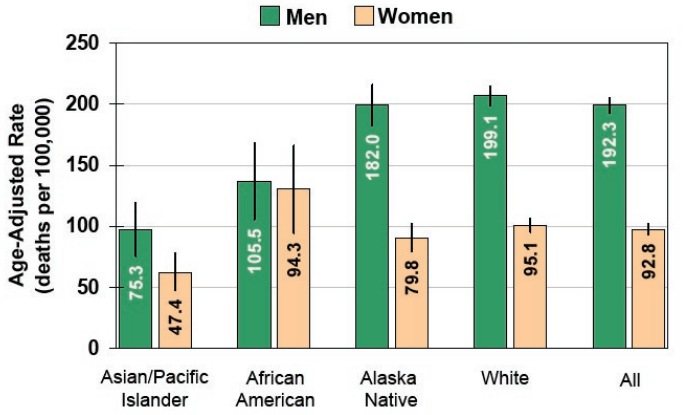


Source: AK Bureau of Vital Statistics

Age-adjusted death rates from diseases of the heart were higher among men compared to women in all racial groups, except among African Americans, where there was no significant sex difference in mortality rates (Figure 14). Among women, African Americans had the highest age-adjusted mortality rate at 243 per 100,000 per year, and Asian/Pacific Islanders had the lowest rate at only 88 per 100,000. Diseases of the heart mortality rates among Alaska Native and White women did not differ significantly.

A slightly different pattern was seen in men's mortality rates for diseases of the heart. Among men, the highest age-adjusted rates were seen in Alaska Natives and Whites, whose rates did not differ significantly from one another. The rate observed among Alaska Native men was 309 per 100,000 per year, more than twice the rate observed in Asian/Pacific Island men, the race group with the lowest age-adjusted death rate from diseases of the heart. African American men had a mortality rate higher than that of Asian/Pacific Island men, but lower than either Alaska Native or White men.

Figure 15. Age-Adjusted Rates of Death Due to Ischemic Heart Disease, by Race (1990-2003 combined)

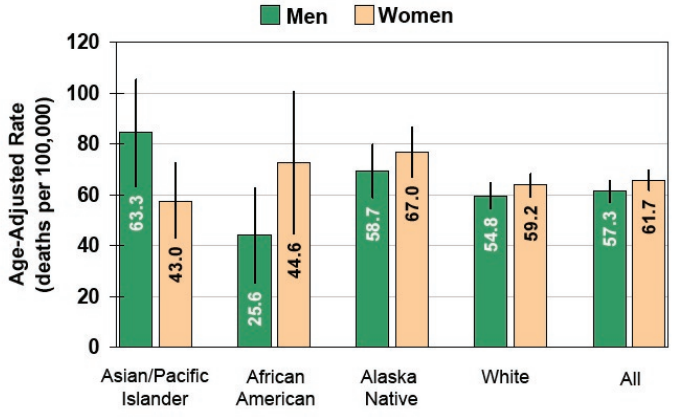


Source: AK Bureau of Vital Statistics

Looking only at death from ischemic heart disease, age-adjusted rates were significantly higher in men compared to women among both Alaska Natives and Whites. In fact, in both race groups men's mortality rates were more than double that of women. There were no significant sex differences in age-adjusted ischemic heart disease death rates among Asian/Pacific Islanders or African Americans. Age-adjusted rates for White (207 per 100,000) and Alaska Native men (199 per 100,000) did not differ significantly from one another, and both were higher than the mortality rates among either Asian/Pacific Islander (97 per 100,000) or African American men (137 per 100,000).

Among women, ischemic heart disease mortality rates were lowest among Asian/Pacific Islanders; there were no other significant racial disparities among women's age-adjusted ischemic heart disease mortality rates.

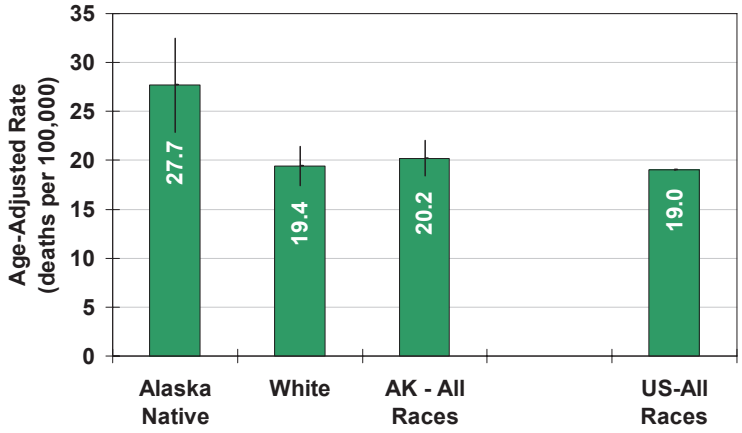
Figure 16. Age-Adjusted Rates of Death Due to Stroke, by Race (1990-2003 combined)



Source: AK Bureau of Vital Statistics

The relatively small numbers of deaths from stroke in some of the racial groups limited the ability to detect significant racial or sex differences in stroke mortality rates. No significant sex differences were observed, either among all race groups combined or within any single race group. The only significant racial disparity in stroke mortality rates was observed between Asian/Pacific Islander men (84 per 100,000) and African American men (44 per 100,000); there were no significant racial differences among women.

Figure 17. Age-Adjusted Rates of Death Due to Congestive Heart Failure, by Race*, Alaska (1990-2003 combined) and US (1990-2002, all race groups combined)



*Only race groups with >50 deaths displayed
Source: AK Bureau of Vital Statistics

Only two racial groups—Alaska Natives and Whites—had more than 50 deaths due to congestive heart failure during the entire 14-year period, so analysis of disparities is restricted to these two groups. As seen in Figure 17, the Alaska Native age-adjusted rate of death from congestive heart failure (28 per 100,000) was higher than the rate observed in either Alaskan Whites (19 per 100,000) or the US overall (19 per 100,000) during this time.

Table 3. Number of deaths due to selected causes, by region, Alaska (1994-2003 combined)

Region of Alaska	Diseases of the Heart (Rank)		Ischemic Heart Disease* (Rank)		Stroke (Rank)	
Municipality of Anchorage	2878	(1)	2016	(1)	841	(1)
Fairbanks North Star Borough	940	(2)	647	(2)	221	(2)
Matanuska-Susitna Borough	774	(3)	546	(4)	157	(3)
Kenai Peninsula Borough	772	(4)	556	(3)	142	(4)
Juneau Borough	349	(5)	242	(5)	102	(5)
Ketchikan Gateway Borough	278	(6)	190	(6)	58	(6)
Bethel	168	(7)	82	(12)	48	(7)
Sitka Borough	166	(8)	122	(7)	46	(8)
Kodiak Island Borough	154	(9)	101	(9)	42	(9)
Wrangell-Petersburg	154	(9)	102	(8)	34	(10)
Nome	140	(10)	90	(11)	42	(9)
Valdez-Cordova	135	(11)	98	(10)	25	(12)
Yukon-Koyukuk	109	(12)	70	(13)	34	(10)
Southeast Fairbanks	92	(13)	70	(13)	24	(13)
Prince Of Wales-Outer Ketchikan	90	(14)	62	(14)	8	(19)
Northwest Arctic Borough	86	(15)	48	(15)	26	(11)
North Slope Borough	78	(16)	47	(16)	13	(17)
Skagway-Hoonah-Angoon	70	(17)	45	(17)	14	(16)
Wade Hampton	57	(18)	27	(20)	15	(15)
Dillingham	50	(19)	30	(19)	20	(14)
Haines Borough	45	(20)	31	(18)	12	(18)
Aleutians West	37	(21)	27	(20)	5	(20)
Lake And Peninsula	25	(22)	17	(21)	8	(19)
Aleutians East Borough	18	(23)	13	(23)	3	(21)
Denali Borough	18	(23)	13	(23)	1	(23)
Yakutat Borough	18	(23)	15	(22)	2	(22)
Bristol Bay Borough	15	(24)	9	(24)	1	(23)
Total	**7725**		**5321**		**1946**	

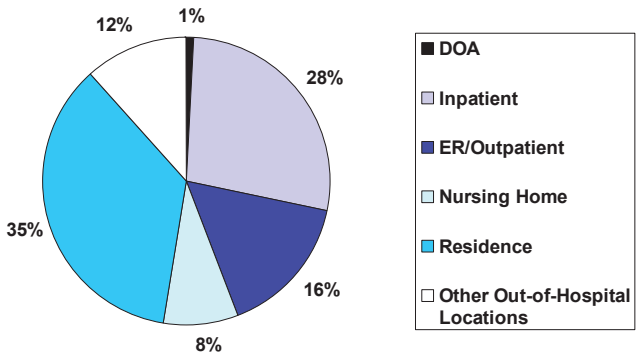
*Ischemic heart disease falls within the broader diagnosis of diseases of the heart.

Notes: Data source is Alaska Bureau of Vital Statistics; ICD-9 and ICD-10 codes used: Diseases of the Heart: 390-398, 402, 404, 410-429 (ICD-9), I00-I09, I11, I13, I20-I51 (ICD-10); Ischemic Heart Disease: 410-414,429.2 (ICD-9), I20-I25 (ICD-10); Stroke: 430-434, 436-438 (ICD-9), I60-I69 (ICD-10).

Table 3 shows the regional distribution of deaths due to diseases of the heart, ischemic heart disease, and stroke for the period 1990 through 2003. The relatively small number of cause-specific deaths observed in Alaska, even during a 14-year period, makes computation of age-adjusted rates for most geographic areas of the state unreliable. Although the absence of rates makes meaningful regional comparisons problematic, it is important to at least understand how the *burden* of heart disease and stroke mortality is experienced across the state.

Over the 14-year period, 7,725 Alaskans died due to diseases of the heart—5,321 specifically from ischemic heart disease. An additional 1,946 Alaskans died due to stroke in this time period. Not surprisingly, the greatest burden of diseases of the heart, ischemic heart disease, and stroke mortality was experienced collectively in the five largest population centers in Alaska: the Municipality of Anchorage, Fairbanks North Star Borough, Matanuska-Susitna Borough, Kenai Peninsula Borough, and Juneau Borough. The boroughs reporting the lowest number of deaths due to these three causes are: Bristol Bay, Yakutat, Denali, and Aleutians East.

Figure 18. Place of Death for Deaths Due to Diseases of the Heart, Alaska 2003



Source: AK Bureau of Vital Statistics

Heart disease and stroke events may occur suddenly and with very little warning. Outcomes are significantly enhanced if those experiencing symptoms of heart attack or stroke are transported quickly to a hospital. This can be problematic in Alaska where traveling to a hospital may involve significant geographic, weather, and transportation barriers. By examining where Alaskans who do not survive heart attack and stroke events die, we learn what percentage of these deaths occurs before people are able to receive care and whether that percentage varies markedly from the United States as a whole.

In Alaska in 2003, only one percent of deaths from diseases of the heart occurred while en route to the hospital (i.e., dead on arrival, or DOA). Forty-four percent of all diseases of the heart deaths occurred in a hospital (i.e., inpatient, emergency room, or outpatient). Nursing homes were the recorded place of death for only eight percent of heart disease deaths. The remaining 47 percent of deaths from heart disease took place either in a residence or some other non-hospital setting (e.g., in a grocery store).

Comparable US data for place of death for diseases of the heart reveal a similar pattern. Two notable discrepancies are deaths occurring in nursing homes (23 percent in the US) and residence or other non-hospital setting (28 percent in the US). These differences may be an indication of Alaska's unique challenges in transporting heart attack victims quickly to appropriate health care facilities. They may also simply reflect that fact that a state with a relatively young population has fewer individuals living in nursing homes.

There is value in understanding when individuals die from heart disease. However, a more complete picture of the quality of care around heart disease and stroke could be gained from examining survival rates across locations. For example, for every 100 9-1-1 calls from Alaskans having heart attacks, how many survive until the paramedics arrive? How many survive the emergency medical services (EMS) transport? How many are successfully treated and released from the hospital? Unfortunately—and not uniquely to Alaska, the data system needed to allow such an analysis does not currently exist.

One factor linked with positive outcomes for heart attack and stroke sufferers on which we *do* have data is awareness of signs and symptoms. Lack of awareness of stroke and heart attack symptoms is an important contributor to mortality from heart attack and stroke. Nationally, nearly half of all stroke and cardiac disease deaths occur before the patient can be transported to hospital.[1,2] Timely access to emergency care, receipt of appropriate treatment, and survival all depend on the early recognition of stroke and heart attack symptoms—by bystanders as well as those experiencing the heart attack or stroke.

Major Heart Attack Signs and Symptoms[3]

- Chest discomfort
- Pain or discomfort in other areas of the upper body including one or both arms, the back, neck, jaw, or stomach
- Shortness of breath
- Breaking out in a cold sweat, nausea, or light-headedness

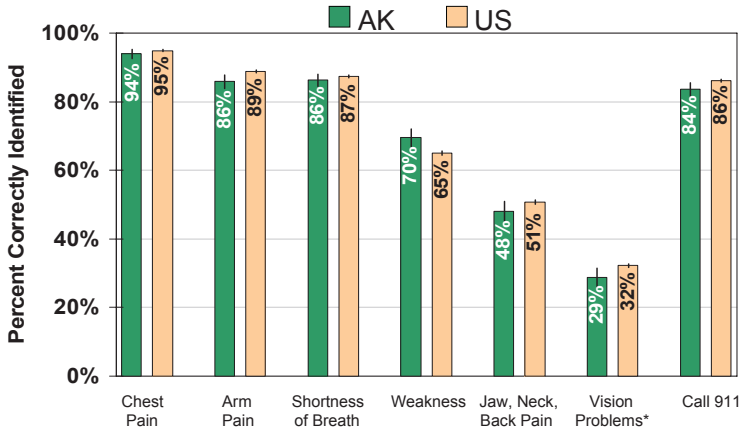
Major Stroke Signs and Symptoms[2]

- Sudden confusion, trouble speaking or understanding
- Sudden numbness or weakness of the face, arm, or leg, especially on one side of the body
- Sudden trouble seeing in one or both eyes
- Sudden trouble walking, dizziness, or loss of balance or coordination
- Sudden headache with no known cause

In the 2002 Alaska BRFSS, participants were asked the following questions to assess awareness of heart attack symptoms: "Which of the following do you think is a symptom of a heart attack? For each, tell me yes, no, or you're not sure". Participants were then given a list of symptoms—five that are true heart attack symptoms (pain or discomfort in the jaw, neck, or back; feeling weak, lightheaded, or faint; chest pain or discomfort; pain or discomfort in the arms or shoulder; and shortness of breath) and one that is not a true symptom (sudden trouble seeing in one or both eyes), used as a decoy. In the same year, participants were asked about awareness of stroke symptoms: "Which of the following do you think is a symptom of a stroke? For each, tell me yes, no, or you're not sure". Symptoms included sudden confusion or trouble speaking; sudden numbness or weakness of the face, arm, or leg, especially on one side; sudden trouble seeing in one or both eyes; sudden chest pain (as a decoy symptom); sudden trouble walking, dizziness, or loss of balance; severe headache with no known cause.

Additionally, participants were asked, "If you thought someone was having a heart attack or stroke, what is the first thing you would do?" Respondents chose from a list of actions that included take them to a hospital, tell them to call their doctor, call 9-1-1, call their spouse or a family member, or do something else.

Figure 19. Awareness of Heart Attack Signs and Symptoms, Alaska (2002) and US (2001)

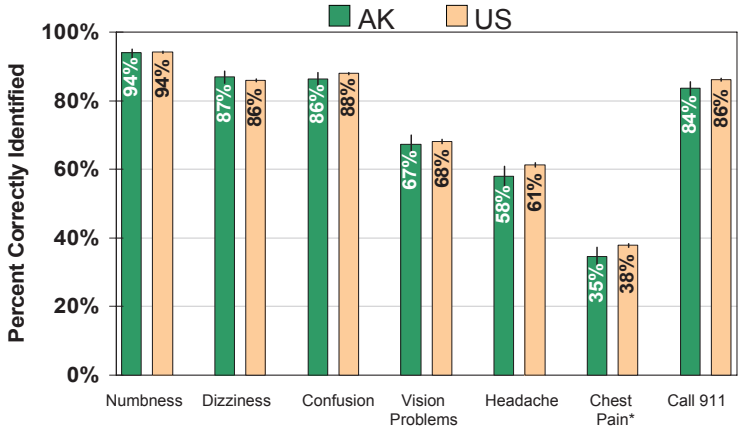


*Correct response was that vision problems is **not** a symptom.

Sources: BRFSS (AK) and Greenlund KJ, Keenan NL, Giles WH, Zheng ZJ, Neff LJ, Croft JB, Mensah GA. Public recognition Of major signs and symptoms of heart attack: 17 states and the US Virgin Islands, 2001. *Am heart J.* 2004;147:1010-1016.

The vast majority of Alaskan adults reported awareness of the following three heart attack signs: chest pain (94 percent), arm or shoulder pain (86 percent), and shortness of breath (86 percent). Seventy percent of Alaskan adults recognized lightheadedness or weakness as a sign of heart attack, and only 48 percent were aware that pain in the jaw, neck or back can also be a symptom of a heart attack. Less than one-third of adults correctly reported that vision problems were not a heart attack symptom. This pattern of awareness of signs and symptoms corresponds closely with that seen in the US overall.

Figure 20. Awareness of Stroke Signs and Symptoms, Alaska (2002) and US (2001)



*Correct response was that chest pain is **not** a symptom.

Sources: BRFSS (AK) and CDC. Awareness of stroke warning signs—17 states and the U.S. Virgin Islands, 2001. MMWR 2004;53(17);359-362.(U.S.)

Awareness of stroke signs and symptoms in Alaska is similarly variable. Although most Alaskan adults (94 percent) recognize sudden numbness or weakness of certain areas of the body as stroke signs, relatively few (35 percent) correctly identified chest pain as not being a stroke symptom. Again, a very similar pattern of symptom awareness was found in the US.

Eighty-four percent of Alaskan adults reported that they would respond to a heart attack or stroke emergency by calling 9-1-1. Only 8 percent correctly identified the five true heart attack signs, correctly noted that the decoy (vision problems) was not a sign, and reported they would call 9-1-1 as a first response to a heart attack or stroke emergency. This figure was 11 percent in the US overall. Sixteen percent of Alaskans correctly identified the stroke signs and reported they would call 9-1-1 as a first response. The comparable US number is 17 percent.

heart disease and stroke morbidity

In addition to death, heart disease and stroke contribute significantly to serious morbidity in the population.

A substantial portion of outpatient medical visits, pharmacy dispensing, and rehabilitation services in the state are a direct result of heart disease and stroke experienced by Alaskans.

A. History of Heart Attack and Stroke

Unfortunately, it is difficult to measure the full impact of non-fatal heart disease and stroke in Alaska, as few population-based morbidity data sources are currently available for analysis. In 2003, several questions related to heart disease and stroke were included on the Behavioral Risk Factor Surveillance System (BRFSS). Specifically, these questions assessed whether an individual had ever been told by a doctor, nurse or other health professional that they had had either a heart attack or a stroke. A follow-up question asked whether the individual had gone to outpatient rehabilitation following a hospital stay for either a heart attack or stroke.

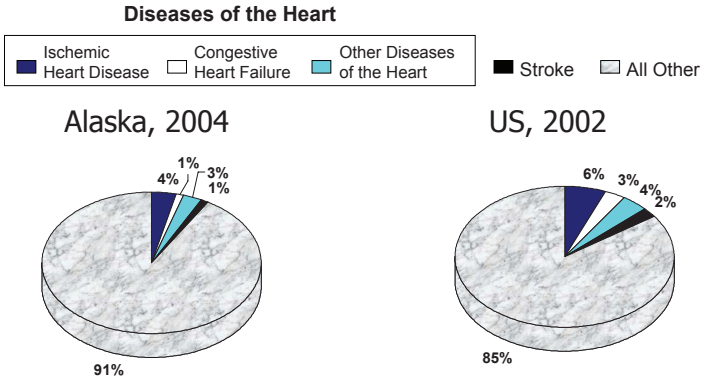
According to these self-reported data, 2.4 percent of adult Alaskans have been told they had a heart attack, and 1.3 percent that they had a stroke. While these percentages may seem low, they represent over 15,000 Alaskan lives touched by heart attack or stroke.

For individuals who have suffered a heart attack in particular, completing a secondary prevention program comprised of supervised exercise and risk factor education and counseling offered singly or together will significantly reduce their risk of having a subsequent heart attack.[4] Unfortunately, less than one-third of adult Alaskans who report having had a heart attack say they went to rehabilitation following release from the hospital. Statewide representative data on referral rates for heart attack and stroke rehabilitation services are currently unavailable; however, national data suggest that providers refer only 10 percent to 47 percent of eligible patients to rehabilitation services.[5] Assuming similar referral rates in Alaska, it is not too surprising that the majority of heart attack patients do not attend—and thus miss out on the benefits of—rehabilitation services.

B. Hospitalization for Heart Disease and Stroke

The most useful data source for assessing morbidity associated with heart disease and stroke is Alaska's hospital discharge database. This database includes all discharges from the state's larger hospitals, as well as most smaller hospitals, occurring during 2004.

Figure 21. Heart Disease and Stroke as Primary Hospital Discharge Diagnosis, Alaska 2004, US 2002



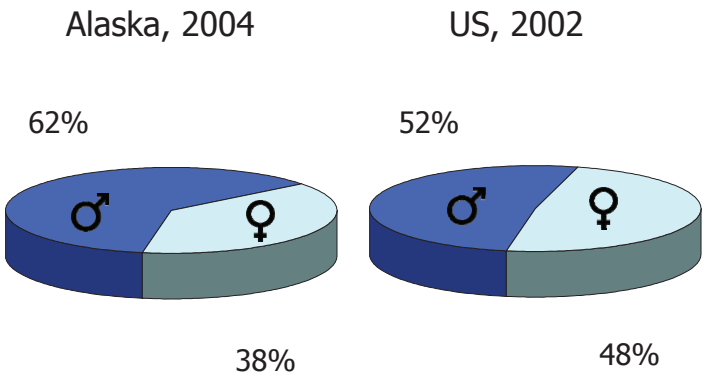
N = 49,383 Discharges

N = 33,726,611 Discharges

Sources: AK State Hospital and Nursing Home Association; CDC, NCHS, National Hospital Discharge Survey, 2002

Of the nearly 50,000 hospitalizations reported in the hospital discharge database in Alaska during 2004, about 9 percent were primarily for heart disease and stroke. In the United States during 2002 there were nearly 34 million discharges meeting the same criteria. Of those, about 15 percent were primarily for heart disease and stroke.

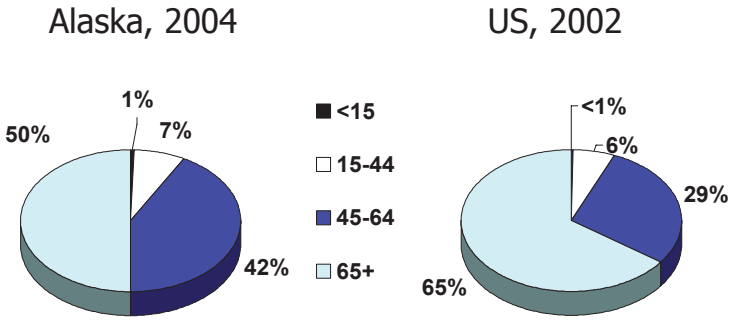
Figure 22. Primary Hospital Discharge Diagnosis for Heart Disease and Stroke, by Sex, Alaska 2004, US 2002



Sources: AK State Hospital and Nursing Home Association; CDC, NCHS, National Hospital Discharge Survey, 2002

In the United States, discharges for heart disease and stroke are nearly equally divided between the sexes. But in Alaska there is a significant gender gap, with males outnumbering females at a level far in excess of their over-representation in the population at large.

Figure 23. Primary Hospital Discharge Diagnosis for Heart Disease and Stroke, by Age, Alaska 2004, US 2002



Sources: AK State Hospital and Nursing Home Association; CDC, NCHS, National Hospital Discharge Survey, 2002

Nationwide, only about one-third of hospital discharges for heart disease and stroke involve persons under 65 years of age. In Alaska, half of the discharges for these conditions involve persons under age 65. The proportion of discharges among the 45- to 64-year-old age group in Alaska is nearly 50 percent greater than in the United States as a whole.

Hospitalization rates for diseases of the heart, ischemic heart disease, and stroke are consistently lower in Alaska than in the United States as a whole, even after adjusting the state rates for hospitalizations missing from the Alaska hospital discharge database (Table 4). Hospitalization rates are lower in Alaska in both sexes and all age groups. For example, Alaskans aged 45- to 64-years are only 55 percent as likely as other Americans their age to be hospitalized for heart disease, and only 52 percent as likely to be hospitalized for stroke. Alaskans over 64 years of age are only 60 percent as likely as other Americans their age to be hospitalized for heart disease, and only 65 percent as likely to be hospitalized for stroke.

Reasons for lower age-specific hospitalization rates in Alaska are not clear. They may reflect differences in rates of underlying disease or differences in the likelihood of hospital admission for the same level of disease. Clearly the austere environment and physically demanding occupations that attract many people to Alaska may serve to select for a higher overall level of cardiovascular fitness than would be expected in other states. Alternatively, the long distances to definitive hospital care—sometimes available only by fixed-wing air transport, and the predominance of a private, fee-for-service medical care system in this state may mediate against hospital admission for less urgent cases that could be hospitalized elsewhere. Both factors, or others, may be involved.

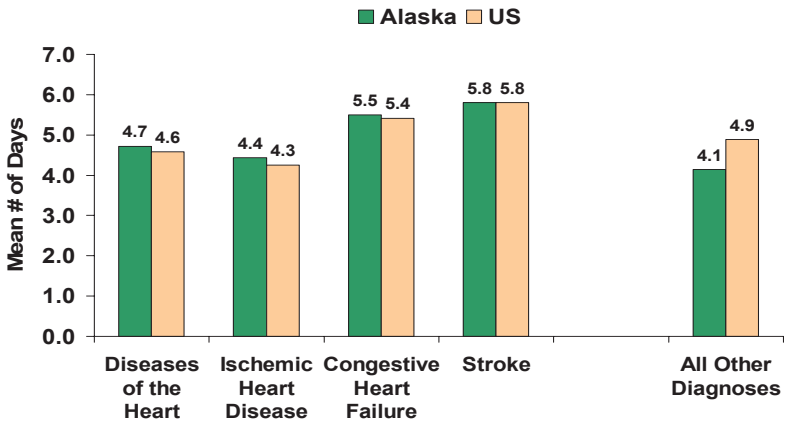
Table 4. Number and rate of discharges for selected primary and secondary diagnoses, by sex and age, Alaska (2004) and US (2002)

	Diseases of the Heart		Ischemic Heart Disease*		Congestive Heart Failure*		Stroke	
	AK	US	AK	US	AK	US	AK	US
Total								
Discharges	8,232	10,190,247	3,763	5,480,104	2,574	3,400,228	1,059	1,458,956
Rate	142.7	354.9	65.2	190.9	44.6	118.4	18.4	50.8
Males								
Discharges	4,560	4,882,390	2,409	2,968,458	1,315	1,484,830	556	677,900
% within Disease	55%	48%	64%	54%	51%	44%	53%	46%
Rate	153.8	347.3	81.3	211.1	44.4	105.6	18.8	48.2
Females								
Discharges	3,672	5,307,857	1,354	2,511,646	1,259	1,915,398	503	781,056
% within Disease	45%	52%	36%	46%	49%	56%	47%	54%
Rate	131.0	362.3	48.3	171.4	44.9	130.7	17.9	53.3
<15								
Discharges	105	59,347	1	2,739	28	13,778	13	9,695
% within Disease	1%	1%	<1%	<1%	1%	<1%	1%	1%
Rate	7.5	9.8	0.1	0.5	2.0	2.3	0.9	1.6
15-44								
Discharges	635	567,258	130	200,644	110	92,921	80	50,423
% within Disease	8%	6%	3%	4%	4%	3%	8%	3%
Rate	25.0	45.7	5.1	16.2	4.3	7.5	3.1	4.1
45-64								
Discharges	2,945	2,432,709	1,583	1,493,888	683	643,437	324	315,662
% within Disease	36%	24%	42%	27%	27%	19%	31%	22%
Rate	203.2	365.0	109.2	224.2	47.1	96.5	22.4	47.4
65+								
Discharges	4,549	7,130,933	2,051	3,782,833	1,753	2,650,092	642	1,083,176
% within Disease	55%	70%	55%	69%	68%	78%	61%	74%
Rate	1243.2	2003.0	560.5	1062.5	479.1	744.4	175.4	304.2

*Ischemic heart disease and congestive heart failure fall within the broader diagnosis of diseases of the heart.

Notes: Alaska data source is the Alaska State Hospital and Nursing Home Association's hospital discharge data set, 2004; US data source is the National Hospital Discharge Survey, 2002, CDC, National Center for Health Statistics; Alaska population data are from the Alaska Department of Labor and Workforce Development, Research & Analyses Section, 2004; Alaska population denominators are reduced (to .88) to account for hospitals not contributing to the data set; secondary discharge diagnoses are those up to and including the 7th-listed diagnosis; rates are discharges per 10,000 population; ICD-9 codes used: Diseases of the Heart: 390-398, 402,404, 410-429, Ischemic Heart Disease: 410-414, 429.2, Congestive Heart Failure: 428, Stroke: 430-434, 436-438

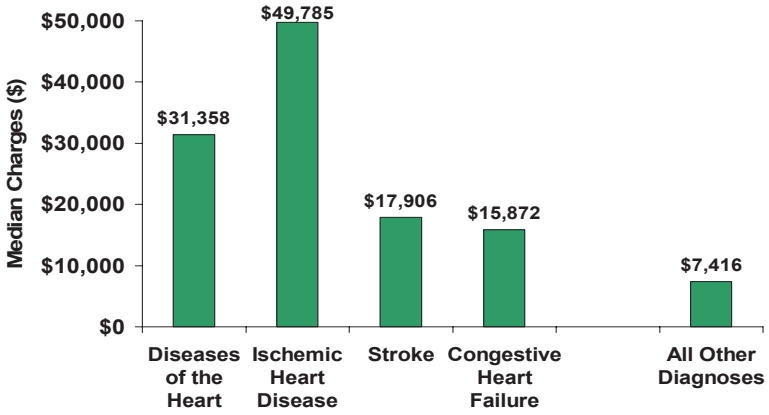
Figure 24. Mean Length-of-Stay by Primary Hospital Discharge Diagnosis, Alaska 2004, US 2002



Sources: AK State Hospital and Nursing Home Association; CDC, NCHS, National Hospital Discharge Survey, 2002

Comparing the mean length of hospital stay across disease types, there are relatively few differences between heart disease and all other diagnoses, either in Alaska or the United States. In Alaska, hospital stays where stroke was the primary discharge diagnosis were, on average, about a day and a half longer than stays for all other diagnoses combined.

Figure 25. Median Charges by Primary Hospital Discharge Diagnosis, Alaska 2004

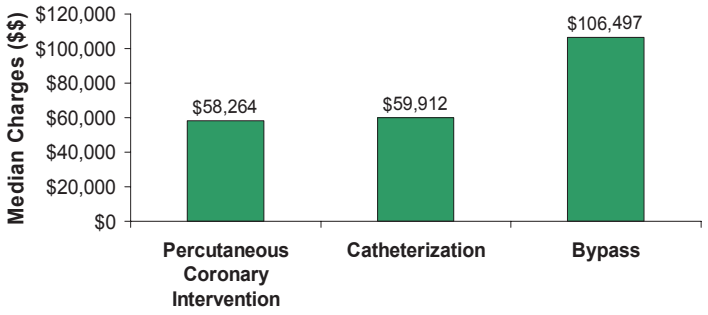


Source: AK State Hospital and Nursing Home Association

Alaska data for median charges per hospital stay show substantially higher costs associated with heart disease and stroke admissions than most other diagnoses. This is especially true when the primary diagnosis is ischemic heart disease, where median charges are more than six times that of all other diagnoses combined. Stroke and congestive heart failure are also expensive diagnoses. With heart failure these costs may be compounded over time since multiple admissions are often necessary.

Considering the cost of hospital stays that list heart disease as a primary or a secondary diagnosis, a total of $322 million was spent on those hospitalizations in just 2004 in Alaska. This represents just over one-third of the total of all hospitalizations costs for one year. The comparable figure for stroke-related hospitalizations in 2004 was over $30 million. This analysis excludes those cases treated in military hospitals where charge data were not recorded.

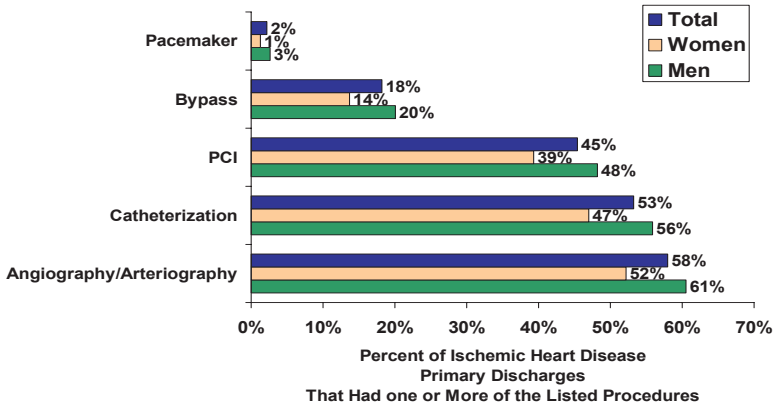
Figure 26. Median Charges for Three Selected Procedures Among Hospital Discharges with a Primary Diagnosis of Ischemic Heart Disease, Alaska 2004



Source: AK State Hospital and Nursing Home Association

Given the costs associated with ischemic heart disease hospitalizations in particular, we examined the types of procedures conducted during ischemic heart disease hospital stays. The procedures driving the costs for ischemic heart disease hospital stays are cardiac catheterization, percutaneous coronary intervention (PCI)—commonly angioplasty and stent insertion—and bypass surgery, the latter being by far the most costly.

Figure 27. Procedures Associated with a Primary Hospital Discharge Diagnosis of Ischemic Heart Disease, Alaska 2004

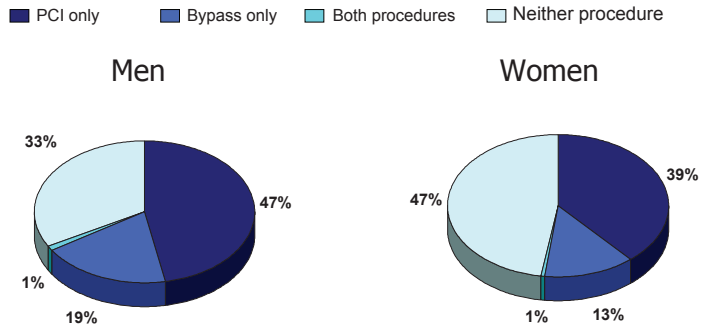


Source: AK State Hospital and Nursing Home Association

Although an expensive procedure, bypass surgery is only conducted on one in five individuals with a primary discharge diagnosis of ischemic heart disease. In comparison, approximately half of ischemic heart disease patients are receiving PCI. This corresponds to national data indicating decreasing use of coronary artery bypass surgery in favor of the less invasive angioplasty and stent insertion for heart attack patients.[6,7]

The Alaska data also reveal a gender disparity. Female hospital patients with ischemic heart disease are consistently less likely than males to receive angiography or arteriography, cardiac catheterization, PCI, bypass surgery, or pacemakers. This is a reflection of a pattern seen nationally: compared to their male counterparts, women with heart disease are less likely to be referred for diagnostic procedures, experience greater delays to intervention, and are less likely to receive effective treatments such as PCI.[8]

Figure 28. Procedures Associated with a Primary Hospital Discharge Diagnosis of Ischemic Heart Disease, By Sex, Alaska 2004



Source: AK State Hospital and Nursing Home Association

In fact, whereas two-thirds of men hospitalized for ischemic heart disease receive either PCI or have bypass surgery, only 50 percent of women with this discharge diagnosis receive the same treatments.

C. Heart Disease and Stroke among the Medicaid Population

Another important indicator of the heart disease and stroke burden in Alaska is the extent to which the state's Medicaid population experiences diagnosis and treatment of heart disease and stroke. Medicaid is the primary public program for covering basic health and long-term care services of low-income Alaskans—many of whom are children. Medicaid also provides coverage for those who are permanently disabled, as well as those Alaskans over the age of 65 whose Medicare costs have exceeded the maximum allowable amount. For many Alaskans over the age of 65, consequences of chronic diseases—including heart disease and stroke—may be the very reason that their Medicare benefits need to be supplemented with Medicaid. For this reason and due to the fact that not all Alaskans are eligible for Medicaid, Medicaid claims data cannot be used to estimate the statewide prevalence or costs associated with heart disease and stroke. The data can, however, provide an estimate of the burden of heart disease and stroke among a segment of the Alaska population that includes some of the state's most vulnerable groups. Furthermore, this estimate of burden is almost certainly a conservative one given the reliance upon claims that list a primary diagnosis of these specific diseases.

In state fiscal year (SFY) 2005, over 120,000 Alaskans were provided health care services for which some portion was paid by Medicaid. This represents approximately 97% of those considered to be eligible for Medicaid in that year. Three-fourths of the Alaskans with Medicaid charges were those under the age of 15 or women age 15 to 44; approximately 8,000 (6 percent) were men or women 65 or older.

Table 5. Number of individuals with and total costs for Medicaid payments related to selected primary diagnoses, by sex and age, Alaska (SFY 2005)

	Diseases of the Heart		Ischemic Heart Disease*		Congestive Heart Failure*		Stroke	
	Individuals	Payments	Individuals	Payments	Individuals	Payments	Individuals	Payments
Total	3,867	$8,632,407	1,220	$1,904,206	979	$2,433,268	1,166	$12,671,737
Males	1,634	$4,002,734	583	$934,498	398	$1,229,782	507	$4,612,677
% within Disease	42%	46%	48%	49%	41%	51%	43%	36%
Females	2,233	$4,629,674	637	$969,707	581	$1,203,486	659	$8,059,060
% within Disease	58%	54%	52%	51%	59%	49%	57%	64%
<15	337	$478,340	3	$4,295	16	$42,120	34	$37,852
% within Disease	9%	6%	<1%	<1%	2%	2%	3%	<1%
15-44	577	$1,704,311	70	$135,653	68	$533,068	111	$651,479
% within Disease	15%	20%	6%	7%	7%	22%	10%	5%
45-64	1,141	$2,841,276	487	$972,837	282	$579,557	348	$2,839,884
% within Disease	30%	33%	40%	51%	29%	24%	30%	22%
65+	1,812	$3,608,481	660	$791,420	613	$1,278,523	673	$9,142,522
% within Disease	47%	42%	54%	42%	63%	53%	58%	72%

*Ischemic heart disease and congestive heart failure fall within the broader diagnosis of diseases of the heart.

Notes: Data source is the Alaska Medicaid claims data set, SFY 2005; ICD-9 codes used: Diseases of the Heart: 390-398, 402, 404, 410-429, Ischemic Heart Disease: 410-414, 429.2, Congestive Heart Failure: 428, Stroke: 430-434, 436-438

Overall, 3,867 individuals (unduplicated) had Medicaid charges that were related to a primary diagnosis of diseases of the heart in SFY 2005. Of those, 1,220 were specifically diagnosed with ischemic heart disease and 979 with congestive heart failure. Women were about equally likely as men to have Medicaid claims for these three diagnoses. Approximately half of the diseases of the heart and ischemic heart disease claims were for Alaskans over the age of 64. Nearly two-thirds of the individuals with Medicaid claims associated with congestive heart failure were 65 or older. There were 1,166 Alaskans in SFY 2005 who had Medicaid claims related to a primary diagnosis of stroke. These were more likely to be women than men, and over half were over the age of 64.

A total of nearly $8.6 million was paid by Medicaid to cover health care services related to a primary diagnosis of diseases of the heart in SFY 2005. Specifically, $1.9 million was spent on claims for individuals with a primary diagnosis of ischemic heart disease, and $2.4 million on claims for individuals with a primary diagnosis of congestive heart failure. These costs were distributed across gender and age groups proportionate to the number of individuals with claims related to diseases of the heart, ischemic heart disease, and congestive heart failure.

Over $12.6 million was paid by Medicaid for claims with a primary diagnosis of stroke. Approximately two-thirds ($8.0 million) of these costs were for women, and three-fourths ($9.1 million) were for the 673 Alaskans age 65 or older with stroke-related Medicaid claims. Over $10 million (81%) of the total stroke-related Medicaid payments that were made in SFY 2005 were associated with long-term care services (data not shown).

heart disease and stroke risk factors

There is a growing understanding of the factors that determine the risk of heart disease and stroke

Some of these factors, such as family history, advancing age, and male sex, cannot be modified. But most of the major determinants of heart disease and stroke risk are, to various degrees, amenable to change. While heart disease and stroke will likely never be completely eliminated, public health interventions aimed at specific risk factors can substantially lessen the burden of heart disease and stroke in the population, now and in the future.

Considerable research has shown that each of the following factors contributes directly or indirectly to heart disease or stroke risk:

- Cigarette smoking
- Diabetes
- Overweight and Obesity
- Physical Inactivity
- Hypertension
- High blood cholesterol

In general, as exposure to each factor increases, so does the risk of disease. When multiple factors are present, risk increases progressively.

This chapter will examine the prevalence of these risk factors in Alaska, together with a measure of poor nutrition, using data from the Alaska BRFSS. Background information about the BRFSS can be found in the Methodology section at the end of this report.

The study of risk factors is a fast-growing area of research. In addition to the well-established risk factors that will be examined in the following pages, there is considerable interest today in other markers of risk, including various fractions of blood cholesterol, triglycerides, lipoprotein (a), C-reactive protein, homocysteine, and abnormalities in coagulation factors. As yet, no population-based data are available to assess the extent of these potential risk factors in Alaska. Today there is also growing interest in the so-called "metabolic syndrome," in which there is a clustering of metabolic abnormalities, including insulin resistance, abnormal blood lipids, hypertension and abdominal obesity, predisposing individuals to premature heart disease and stroke. Again, no Alaska-specific data are available on this currently.

A. Smoking

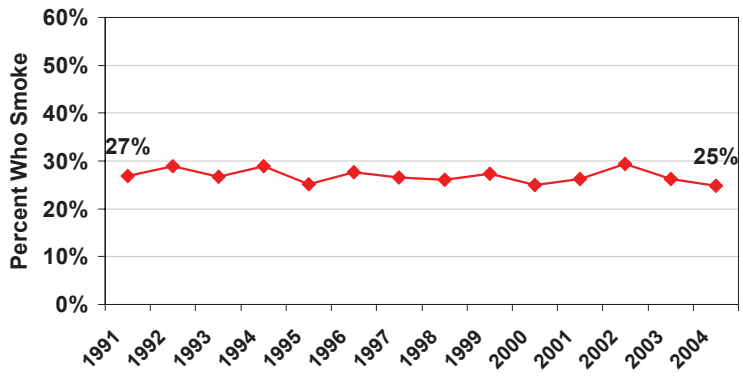
Cigarette smoking is the foremost preventable cause of death in the United States, worsening the risk of heart disease, stroke and peripheral vascular disease, as well as a range of cancers and other disorders. Tobacco exerts a powerful influence on a person's risk of heart disease and stroke in many ways, including acceleration of arterial plaque formation and promotion of plaque rupture and thrombosis.

Some facts about smoking related to heart disease and stroke:

- Smoking accounts for as many as 30 percent of deaths from ischemic heart disease each year[9,10] and 18 percent of strokes.[11]
- The association between smoking and heart disease is strongly dose-dependent. Smoking even a few cigarettes per day increases the risk of heart disease by about 50 percent for women, and about 70 percent for men.[12]
- Smoking increases the risk of stroke by 80 percent. [13]
- Environmental tobacco smoke is a serious public health problem, accounting for the deaths of about 46,000 nonsmokers from heart disease each year. [14]
- One year after quitting, a smoker's risk of ischemic heart disease is cut in half. Within 15 years, the risk approaches that of someone who never smoked.[15]

In the Alaska BRFSS, participants were asked, "Have you smoked at least 100 cigarettes in your entire life?" Those who answered "no" were considered never to have been smokers. Those who answered "yes" were then asked, "Do you now smoke cigarettes everyday, some days or not at all?" Those who answered "not at all" to the second question were considered former smokers. Those who answered "everyday" and "some days" were considered current smokers.

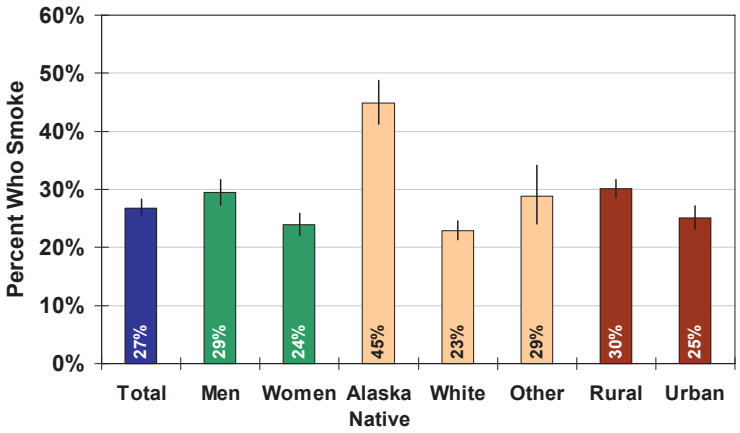
Figure 29. Prevalence of Smoking, Alaska 1991-2004



Source: AK BRFSS

The percentage of Alaskan adults who report that they currently smoke cigarettes has held fairly constant since 1991, between 25 and 30 percent. Nationally, the percentage of adults reporting smoking was 21 percent in 2004. The percentage of Alaskan adults who report that they are former smokers has also held constant since 1991, between 25 and 30 percent.

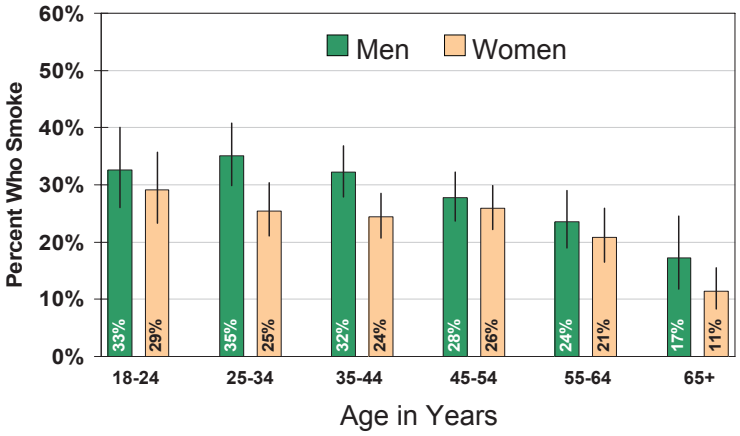
Figure 30. Prevalence of Smoking by Sex, Race, and Region, Alaska 2002-2004 (combined)



Source: AK BRFSS

There are gender, racial, and regional differences in rates of smoking. Similar to the pattern found nationally, Alaskan men are more likely than Alaskan women to smoke (29 percent versus 24 percent, respectively). Alaska Native adults are about twice as likely as Whites to report being a smoker; Alaskans of other racial backgrounds are also less likely than Alaska Natives to smoke. Rural Alaskan adults report smoking at a higher level than their urban counterparts.

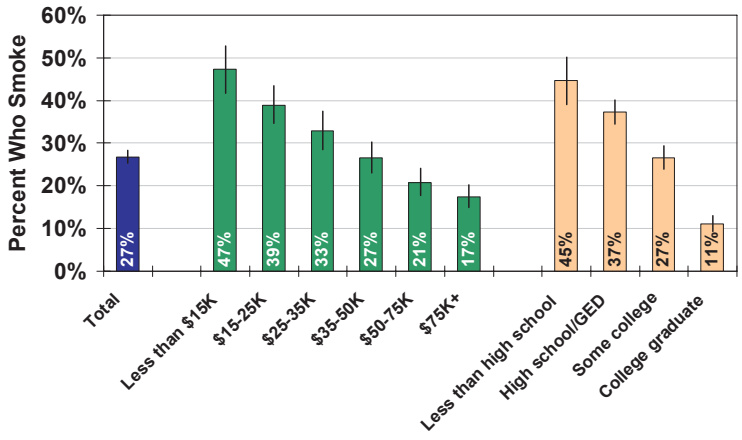
Figure 31. Prevalence of Smoking by Age and Sex, Alaska 2002-2004 (combined)



Source: AK BRFSS

Among both men and women, the prevalence of smoking in Alaska is highest among young adults and decreases with age.

Figure 32. Prevalence of Smoking by Income and Education, Alaska 2002-2004 (combined)



Source: AK BRFSS

In Alaska, smoking is most prevalent among those with low incomes and those who did not complete high school. Prevalence decreases steadily as income and education increase. The inverse association with education is particularly striking. Compared to those who graduated from college, those who did not graduate from high school are about four times as likely to report being a smoker.

B. Diabetes

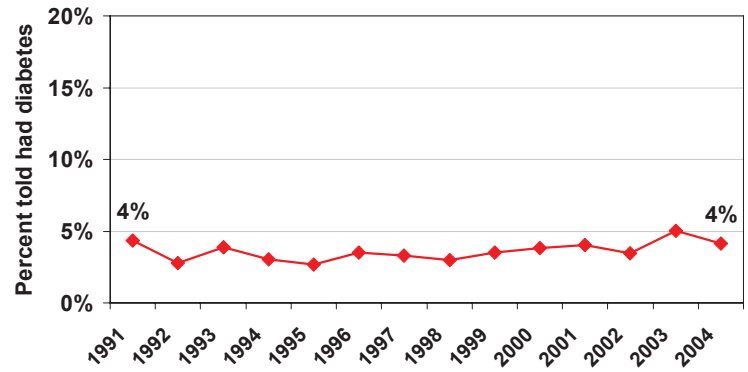
Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. It is strongly associated with ischemic heart disease, stroke, and peripheral vascular disease, although the exact mechanism for the progression of atherosclerosis in persons with diabetes is not certain. While there is good evidence that improved control of hyperglycemia reduces the incidence of microvascular complications of diabetes, it is not clear to what extent such control reduces the risk of ischemic heart disease and stroke.

Some facts about diabetes related to heart disease and stroke:

- More than 65 percent of people with diabetes die from heart disease or stroke.[16]
- Diabetes increases the risk of ischemic heart disease in men by a factor of two to three. In women it increases the risk three to seven times.[17]
- Diabetes increases the risk of stroke by a factor of two to nearly six.[11]
- Patients with diabetes who develop ischemic heart disease experience more morbidity and mortality than patients with ischemic heart disease who don't have diabetes.[18]
- Excess body fat and physical inactivity predispose people to develop type 2 diabetes, the most common form of the disease.[19]
- People with diabetes commonly have other risk factors, including high blood pressure and lipid disorders. Tight control of these other risk factors is essential to reduce their increased risk of heart disease.[20]
- One-third or more of diabetes in the United States is undiagnosed.[19]

In the Alaska BRFSS, participants were asked, "Have you ever been told by a doctor that you have diabetes?" Respondents had the option to choose "no", "yes", or "yes, gestational diabetes". In 2004, respondents also had the option to respond "pre-diabetes or borderline diabetes". Only those who answered "yes" (and not those with either pre-diabetes, borderline diabetes, or gestational diabetes) were considered to have diabetes for this analysis. As with all health status indicators that rely upon a self-report of a diagnosis, this method for assessing morbidity produces an underestimate to the extent that the disease is undiagnosed.

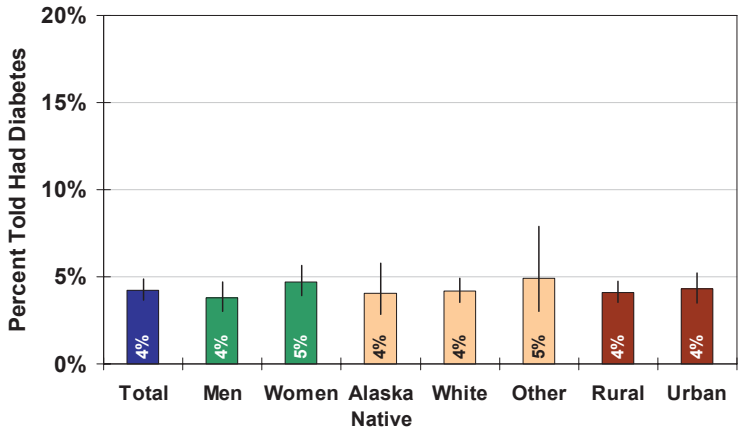
Figure 33. Prevalence of Diabetes, Alaska 1991-2004



Source: AK BRFSS

The percentage of Alaskan adults who report that they have been diagnosed with diabetes has held fairly constant since 1991, between about 3 to 5 percent. The percentage of US adults reporting a diagnosis of diabetes was 7 percent in 2004.

Figure 34. Prevalence of Diabetes by Sex, Race, and Region, Alaska 2002-2004 (combined)

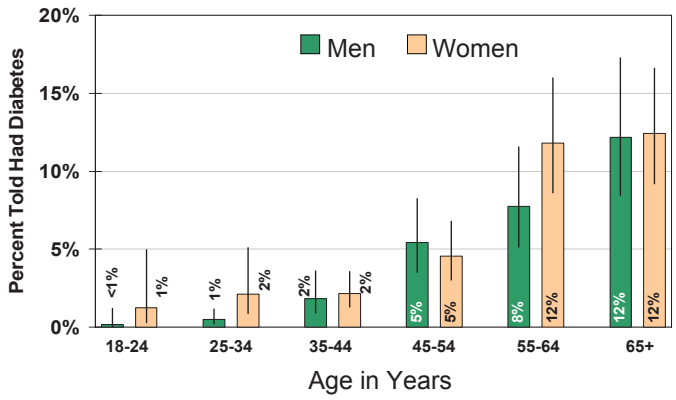


Source: AK BRFSS

Diabetes prevalence does not differ by gender, race group, or region of residence. This snapshot of current diabetes prevalence in Alaska obscures the dramatic increase in diabetes prevalence seen among Alaska Natives in the past two decades. This change comes in the wake of significant lifestyle changes that augment disease incidence while improvements in health care are extending the life expectancy of people with diabetes. According to Alaska Area Diabetes Team of the Alaska Native Tribal Health

Consortium, diabetes prevalence among Alaska Natives has risen by more than 90 percent statewide between 1990 and 2003; several regions of the state have seen even larger increases in diabetes prevalence among their Alaska Native populations.[21]

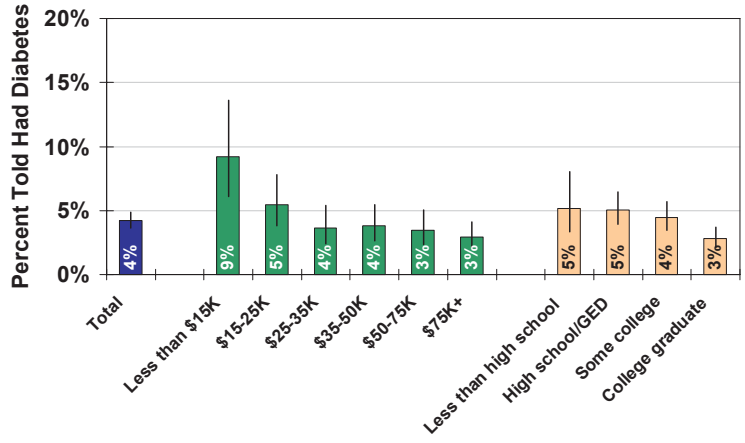
Figure 35. Prevalence of Diabetes by Age and Sex, Alaska 2002-2004 (combined)



Source: AK BRFSS

Diagnosed diabetes prevalence increases sharply with age, and is highest among Alaskan men and women over 65 years of age. Approximately one in eight Alaskans over the age of 64 is diagnosed with diabetes.

Figure 36. Prevalence of Diabetes by Income and Education, Alaska 2002-2004 (combined)



Source: AK BRFSS

The prevalence of diagnosed diabetes in Alaska is highest among those with low incomes and those who did not complete high school. Diabetes prevalence decreases with increasing levels of income and education.

C. Overweight and Obesity

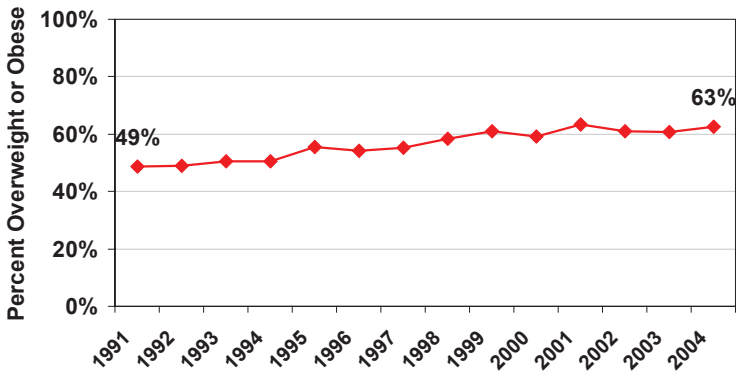
Overweight and obesity are reaching epidemic proportions in the United States, with adverse consequences for health. Obesity in adults is generally defined as a body mass index (BMI) greater than or equal to 30 kg/m^2. Overweight in adults is defined as a BMI of 25.0 to 29.9 kg/m^2. Excess body weight is strongly associated with high blood pressure, defective metabolism of cholesterol, and other serum lipids, insulin resistance and diabetes. Most of the effect of overweight and obesity on the risk of heart disease and stroke is probably mediated through these factors, although other mechanisms that are less well understood may play a role.

Some facts about overweight/obesity related to heart disease and stroke:

- Body weight in excess of 130 percent of ideal weight is associated with a doubling of risk for ischemic heart disease in men and women under age 50.[22] For example, a 45 year-old man with an ideal weight of 175 but an actual weight of 230 is twice as likely to develop ischemic heart disease as he would be if he actually weighed 175.
- More than three-quarters of high blood pressure can be directly attributed to obesity.[23]
- Abdominal obesity, independent of BMI, has been found to be a significant predictor of heart disease and stroke in women.[24-26]
- Men with a markedly elevated waist-hip ratio are 2.3 times as likely to have a stroke as men without abdominal obesity.[27]

In the Alaska BRFSS, participants were asked to report their height and weight. From these values individual BMI were calculated.

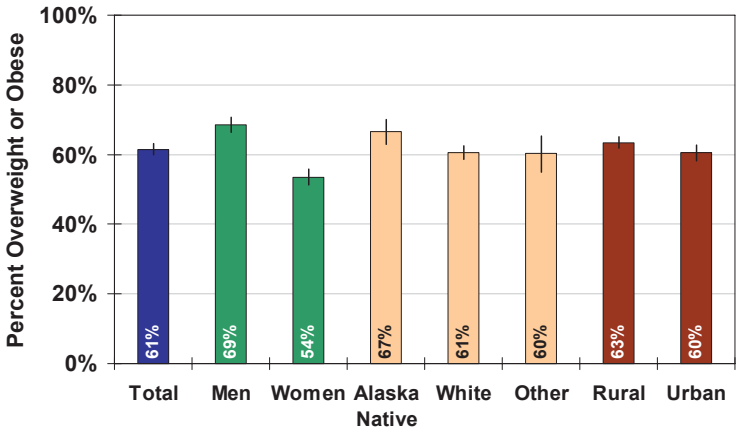
Figure 37. Prevalence of Overweight/Obesity (BMI ≥ 25.0), Alaska 1991-2004



Source: AK BRFSS

The percentage of Alaskan adults whose reported weight and height meet the definition of overweight or obese (BMI > 25.0) has risen significantly from 49 percent in the early 1990s to 63 percent in 2004. Nationally, the percentage of adults whose reported weight and height meet the overweight or obese definition was 60 percent in 2004.

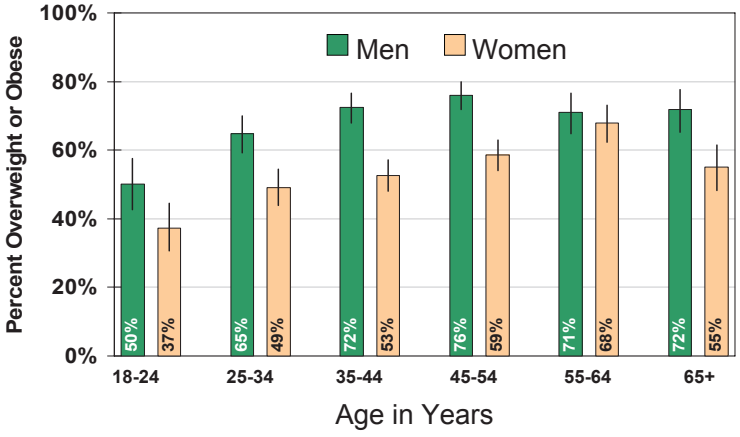
Figure 38. Prevalence of Overweight/Obesity (BMI ≥ 25.0) by Sex, Race, and Region, Alaska 2002-2004 (combined)



Source: AK BRFSS

Men are more likely to be above normal weight than are women. In addition, Alaska Native adults are more likely than Whites to report weights and heights indicative of overweight or obesity. Alaskans living in rural parts of the state are no more likely than their urban counterparts be above normal weight.

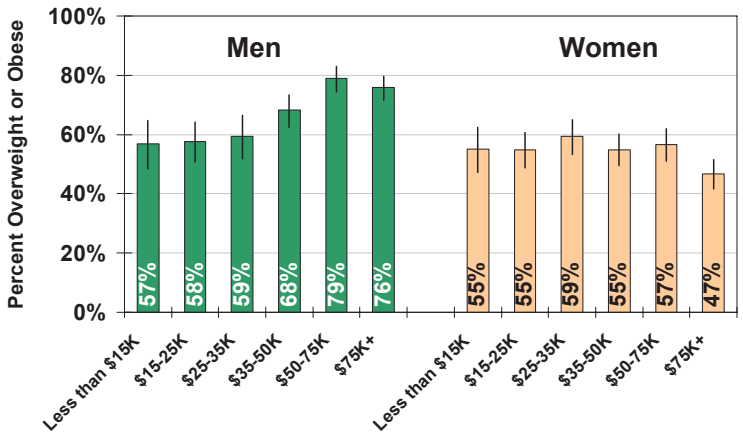
Figure 39. Prevalence of Overweight/Obesity (BMI ≥ 25.0) by Age and Sex, Alaska 2002-2004 (combined)



Source: AK BRFSS

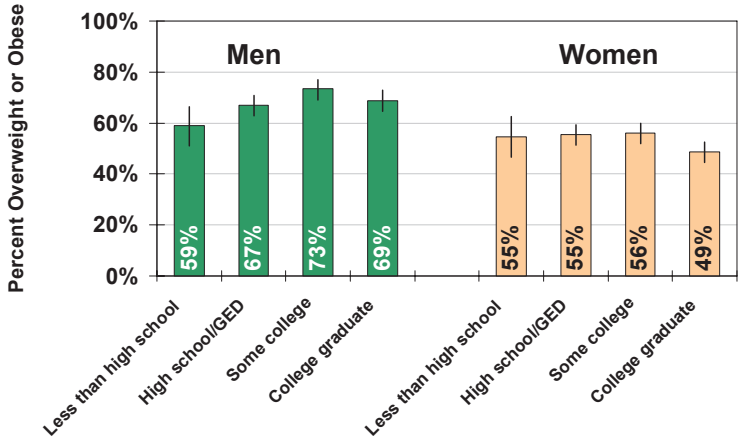
In general, overweight and obesity increase with age in both men and women. For example, two out of every four Alaskan men aged 18 to 24 are either overweight or obese; by the late forties/early fifties, this proportion jumps to three of every four Alaskan men. In the majority of age groups, men were significantly more likely than women to be above a normal weight.

Figure 40a. Prevalence of Overweight/Obesity (BMI ≥ 25.0) by Income and Sex, Alaska 2002-2004 (combined)



Source: AK BRFSS

Figure 40b. Prevalence of Overweight/Obesity (BMI ≥ 25.0) by Education and Sex, Alaska 2002-2004 (combined)



Source: AK BRFSS

Overweight and obesity are associated with income and education in Alaskan men only. Among men, the prevalence of having an above normal weight increases as both income and education level rise. Among Alaskan women, neither income nor education is associated with being above normal weight. This may reflect differences in the types of occupations men and women tend to have. It may be that the high earning jobs for men tend to be more sedentary, while the lower earning "blue collar" jobs for men tend to involve more manual labor, thus more physical activity. There may be a less clear link between earning power and "sedentariness" of occupations women are more likely to have[28], which might explain the lack of association between overweight and either income or education level among women.

D. Physical Inactivity

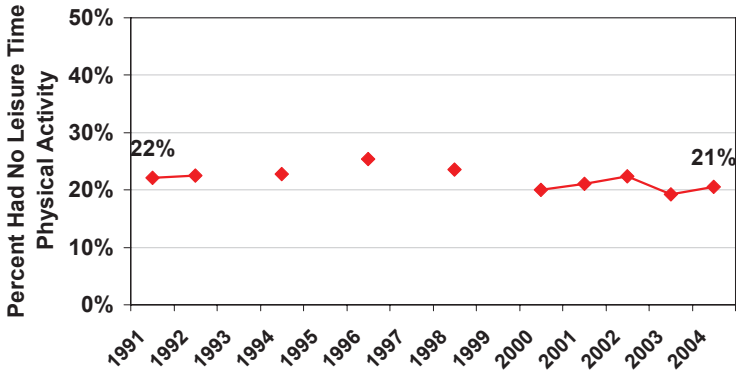
Physical inactivity is strongly linked to heart disease, stroke, and many other adverse health outcomes. Optimal cardiovascular benefits from physical activity are achieved when the large muscle groups of the arms, legs and back are used steadily and rhythmically so that one's heart rate and breathing are significantly increased. But even less intense activity is beneficial, compared to a sedentary lifestyle. Much of the protective effect of physical activity is probably mediated through improvements in blood pressure and body weight, as well as alterations in lipid and carbohydrate metabolism. But routine physical activity also has direct effects on risk of heart disease and stroke, by improving arterial elasticity and helping the cells that line the inside of arteries reduce the progression of atherosclerosis.

Some facts about physical inactivity related to heart disease and stroke:

- Compared to those who are vigorously active, those with a sedentary lifestyle have nearly twice the risk of developing ischemic heart disease.[29]
- Inactive middle-aged men have three times the risk of stroke of those engaging in vigorous physical activity.[30]
- Women who walk briskly for half an hour each day reduce their coronary heart disease risk by approximately 35 percent.[31]
- Aerobic exercise can cause a decrease of 8 to 10 mm Hg in both systolic and diastolic blood pressure measurements.[32]
- In persons at high risk of developing type 2 diabetes, routine physical activity coupled with weight loss reduce the incidence of diabetes by 58 percent.[33]

In the Alaska BRFSS, participants were asked, "During the past 30 days, other than your regular job, did you participate in any physical activities or exercise, such as running, calisthenics, golf, gardening or walking for exercise?" Those who answered "no" were considered physically inactive. The question was asked in 1991, 1992, 1994, 1996, 1998, and annually from 2000 through 2004.

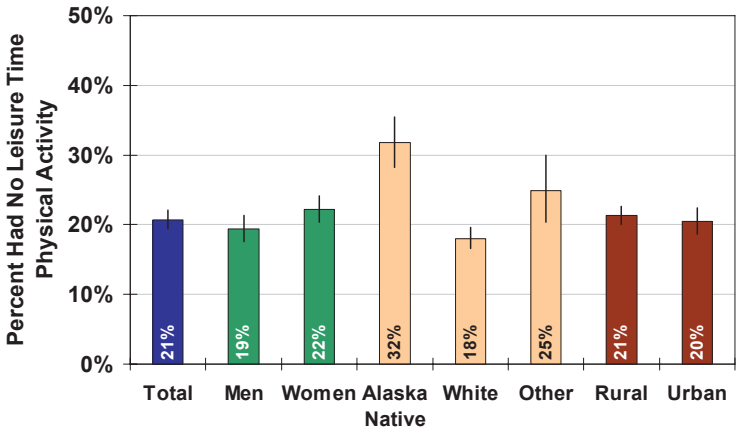
Figure 41. Prevalence of Physical Inactivity, Alaska 1991-2004



Source: AK BRFSS

There has been a slight but statistically significant decline in the percentage of Alaskan adults who report having no leisure time physical activity between 1991 and 2004—a trend mirrored nationally. According to the most recent data, one in five Alaskan adults gets no leisure time physical activity. Nationally, the percentage of adults reporting no such physical activity was 23 percent in 2004.

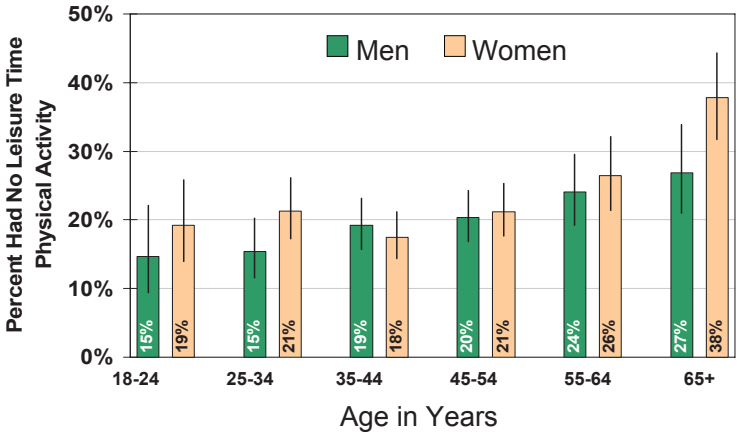
Figure 42. Prevalence of Physical Inactivity by Sex, Race, and Region, Alaska 2002-2004 (combined)



Source: AK BRFSS

Alaska Native adults report having no leisure time physical activity at higher levels than Whites. There is no significant difference between rural and urban populations, or between men and women.

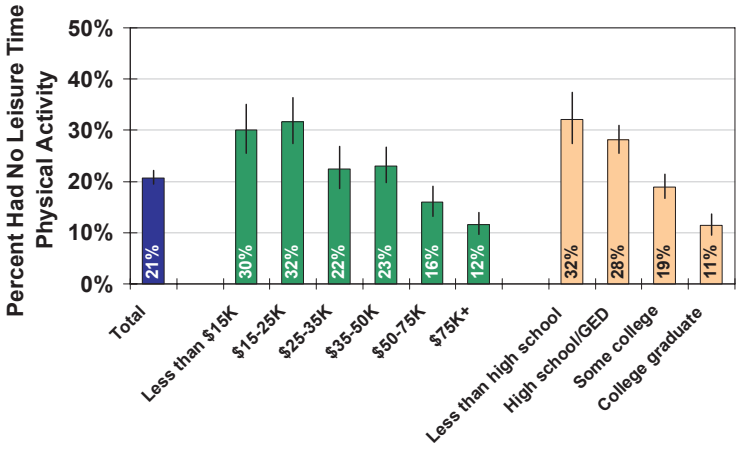
Figure 43. Prevalence of Physical Inactivity by Age and Sex, Alaska 2002-2004 (combined)



Source: AK BRFSS

Physical inactivity generally increases with age, and is highest in Alaska among those over 64 years of age. Among those 65 and over, more than one-quarter of men and more than one-third of women report no leisure time physical activity. There is no significant sex difference in physical inactivity within any age group.

Figure 44. Prevalence of Physical Inactivity by Income and Education, Alaska 2002-2004 (combined)



Source: AK BRFSS

Physical inactivity shows sharp inverse associations with both income and education in Alaska. Those with household earnings of less than $15,000 per year are 2.5 times as likely to have no leisure time physical activity as those with earnings of $75,000 or more. Alaskans not completing high school are almost three times as likely to report no leisure time physical activity as those who graduate from college.

E. Inadequate Nutrition

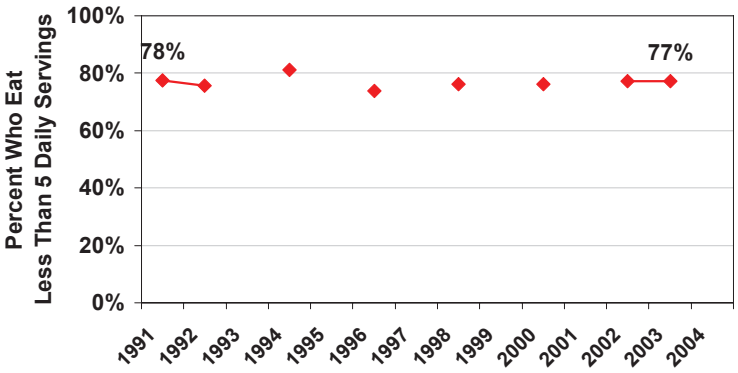
Inadequate nutrition contributes significantly to heart disease and stroke. Diet exerts complex effects on health, and is closely associated with other risk factors, such as high blood pressure, elevated blood cholesterol and obesity. An overall healthy eating pattern includes a variety of fruits, vegetables, grains, low-fat or nonfat dairy products, fish, legumes, poultry and lean meats. Total energy intake should match energy needs. Foods high in saturated and trans-fatty acids should be avoided, as should excess salt and high alcohol intake (in excess of one drink per day on average for women or two drinks per day on average for men). Fish and other foods rich in omega-3 fatty acids should be encouraged, as should fruits and vegetables, especially cruciferous and green leafy vegetables. Measuring nutrition in surveys is often difficult. We are using consumption of fewer than five servings of fruits and vegetables in a day as an overall marker of an unhealthy diet.

Some facts about inadequate nutrition related to heart disease and stroke:

- Up to 30 percent of deaths from ischemic heart disease are due to unhealthy diets.[34]
- Although the recommended intake of soluble fiber is at least 25 grams per day, Americans consume a daily average of just 15.6 grams per day.[35]
- Every gram of increase in soluble fiber intake will decrease LDL-cholesterol by an average of 2.2 mg/dl.[36]
- An adequate intake of fruits and vegetables has been shown to reduce the risk of stroke by 31 percent. One additional serving per day is associated with a 6 percent lower risk of stroke.[37]

In the Alaska BRFSS, participants were asked how many daily servings they usually consumed of fruit, fruit juices, green salads, potatoes, carrots and other servings of vegetables. Those whose servings did not total five or more were considered to have inadequate nutrition. This set of questions was asked in Alaska in 1991, 1992, 1994, 1996, 1998, 2000, 2002, and 2003.

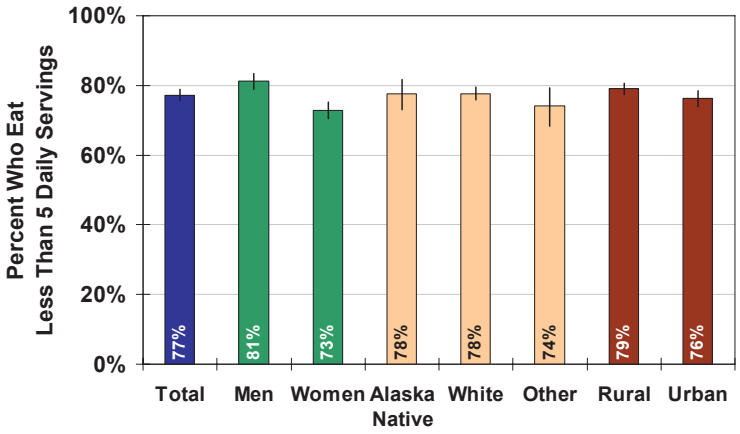
Figure 45. Prevalence of Inadequate Fruit & Vegetable Consumption, Alaska 1991-2004



Source: AK BRFSS

The percentage of Alaskan adults who report that they do not eat five or more servings of fruits and vegetables per day has held fairly constant since 1991, at nearly 80 percent. Nationally, the percentage of adults reporting that they do not eat five or more servings of fruits and vegetables was 77 percent in 2003.

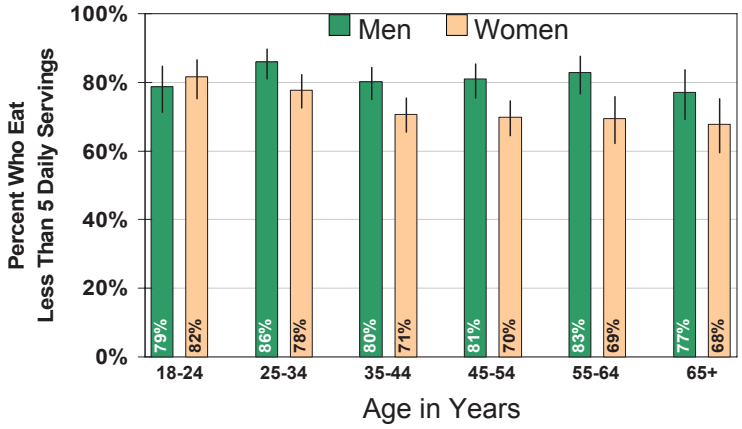
Figure 46. Prevalence of Inadequate Fruit & Vegetable Consumption by Sex, Race, and Region, Alaska 2002-2003 (combined)



Source: AK BRFSS

Men are slightly more likely than women to consume less than the recommended amounts of fruits and vegetables. There is no difference among Alaskan racial groups, or between rural and urban populations, in terms of reported fruit and vegetable consumption.

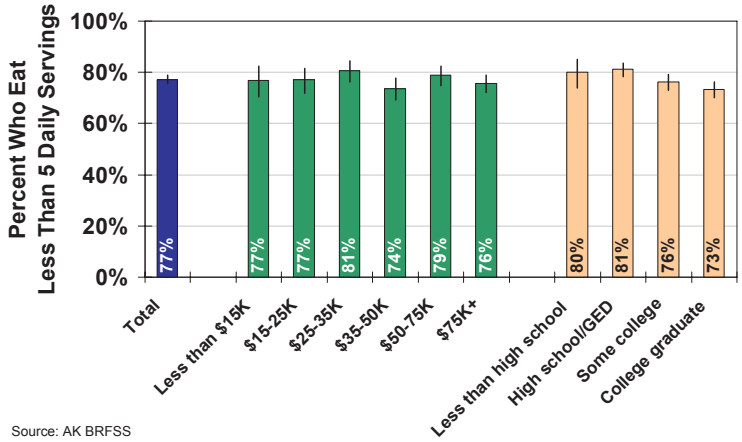
Figure 47. Prevalence of Inadequate Fruit & Vegetable Consumption by Age and Sex, Alaska 2002-2003 (combined)



Source: AK BRFSS

Inadequate consumption of fruits and vegetables is common in both sexes and among all age groups of Alaskan adults. Among men, there is no change in fruit and vegetable consumption with increasing age. Among women, however, there is a significant decline in inadequate fruit and vegetable consumption with age. In other words, as they age, women are increasingly likely to eat the recommended amounts of fruits and vegetables.

Figure 48. Prevalence of Inadequate Fruit & Vegetable Consumption by Income and Education, Alaska 2002-2003 (combined)



Source: AK BRFSS

At lower levels of education, Alaskans are more likely to be consuming inadequate amounts of fruits and vegetables. That said, a full two-thirds of college-educated Alaskans do not meet these dietary recommendations. There is no association between fruit and vegetable consumption and income.

F. Hypertension

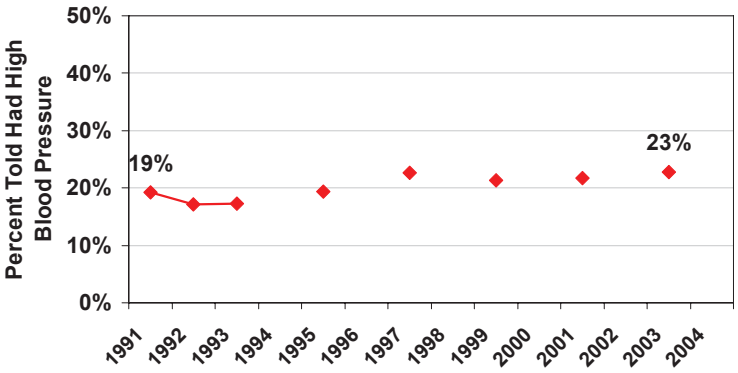
Hypertension is a potent risk factor for heart disease and stroke. Although high blood pressure is defined at a particular threshold (usually a systolic pressure greater than 140 mm Hg or a diastolic pressure greater than 90 mm Hg), the risk of heart disease and stroke increases in step with the level of blood pressure from low to very high. Hypertension is known to accelerate the progression of arterial plaques. It also triggers the enlargement of heart muscles, increasing demand on the coronary arteries. In most people hypertension is a silent disease and the cause is unknown. Treatment reduces risk, but many people with hypertension are unable, for a variety of reasons, to keep their blood pressure under control.

Some facts about hypertension related to heart disease and stroke:

- Approximately 28 percent of new cases of ischemic heart disease among men and 29 percent of such cases among women are attributable to high blood pressure.[12]
- Hypertension precedes more than 90 percent of new cases of congestive heart failure. The risk of heart failure is increased two to three times in those with hypertension.[38]
- The incidence of stroke increases in proportion to both systolic and diastolic blood pressures, and the control of high blood pressure reduces stroke risk.[12]
- Nearly one in three adult Americans has high blood pressure.[39] Of those, about 30 percent are unaware they have it. Most of the others do not have it under control, including nearly half of those taking blood pressure medications.[40]

In the Alaska BRFSS, participants were asked, "Have you ever been told by a doctor, nurse or other health professional that you have high blood pressure?" Those who answered "yes" were considered to have hypertension. This question was asked in Alaska in 1991, 1992, 1993, and in all odd years since 1995.

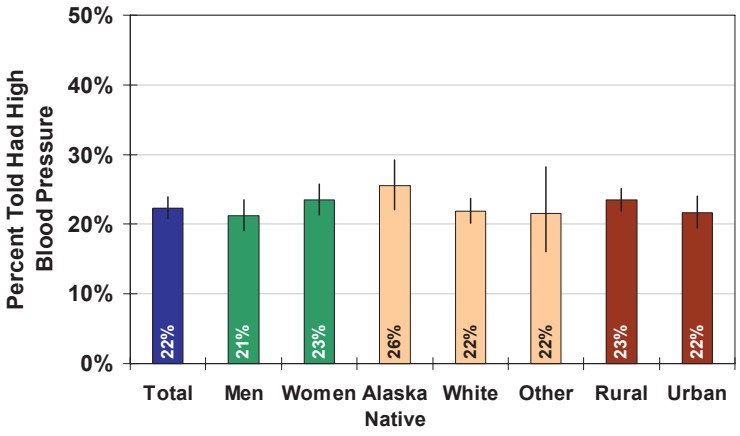
Figure 49. Prevalence of Hypertension, Alaska 1991-2004



Source: AK BRFSS

The percentage of Alaskan adults who report having been told that they have high blood pressure has gradually increased since 1991. In 2003, 23 percent of Alaskan adults reported being told they had high blood pressure. Nationally, the percentage of adults reporting high blood pressure was 25 percent in 2003.

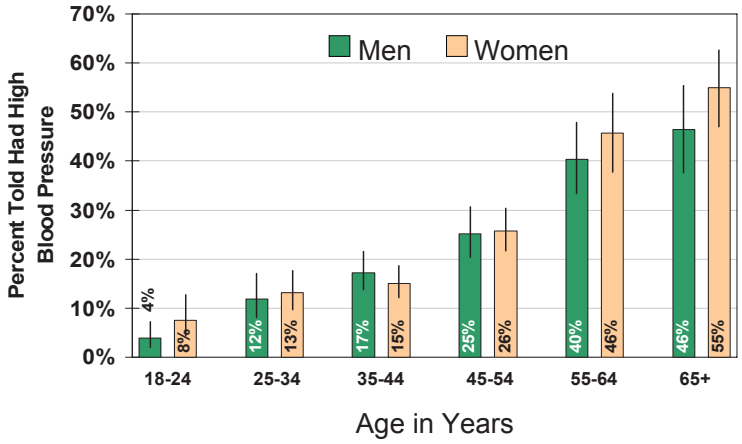
Figure 50. Prevalence of Hypertension by Sex, Race, and Region, Alaska 2001 & 2003 (combined)



Source: AK BRFSS

There are no gender, racial, or regional differences in reported doctor-diagnosed hypertension.

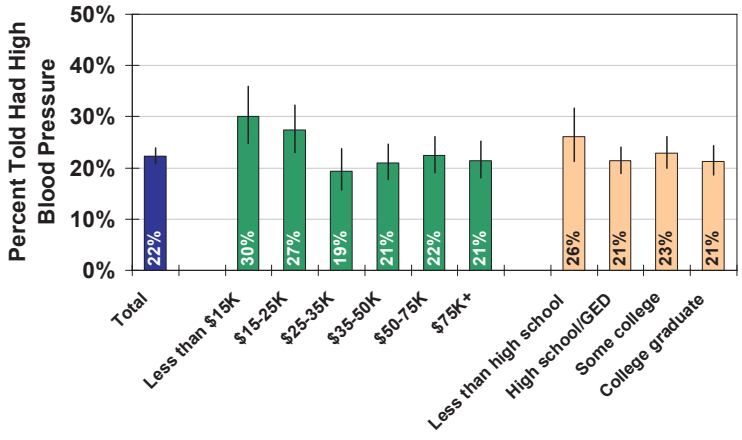
Figure 51. Prevalence of Hypertension by Age and Sex, Alaska 2001 & 2003 (combined)



Source: AK BRFSS

Among both men and women, reported hypertension prevalence increases dramatically with age. Among those 65 and over, nearly half of Alaskan men and over half Alaskan women report high blood pressure. There are no significant gender differences in prevalence within any of the age groups.

Figure 52. Prevalence of Hypertension by Income and Education, Alaska 2001 & 2003 (combined)



Source: AK BRFSS

The prevalence of reported hypertension in Alaska is highest among those with the lowest incomes, and generally decreases with increasing income level. There is no significant association between education and this measure of hypertension. Under-diagnosis of hypertension, particularly in persons with lower income and education, may be masking a stronger inverse association between socioeconomic variables and prevalence of reported hypertension.

G. High Blood Cholesterol

High blood cholesterol is directly related to heart disease risk. Most cholesterol in the blood is transported either in high-density lipoproteins (HDL) or low-density lipoproteins (LDL). HDLs transmit cholesterol to the liver for recycling or secretion out of the body. LDLs carry cholesterol from the liver and intestines throughout the body. When levels of LDL particles are high, they can accumulate within the walls of critical arteries, stimulating an inflammatory process that leads to the growth of atherosclerotic plaques. Over time these plaques can rupture, triggering a blood clot that obstructs the flow of blood to tissues downstream. In healthy adults, blood cholesterol levels should be checked at least every five years, and elevated levels of non-HDL cholesterol should be treated with lifestyle modifications, and, in some cases, medication.

Some facts about high blood cholesterol related to heart disease:

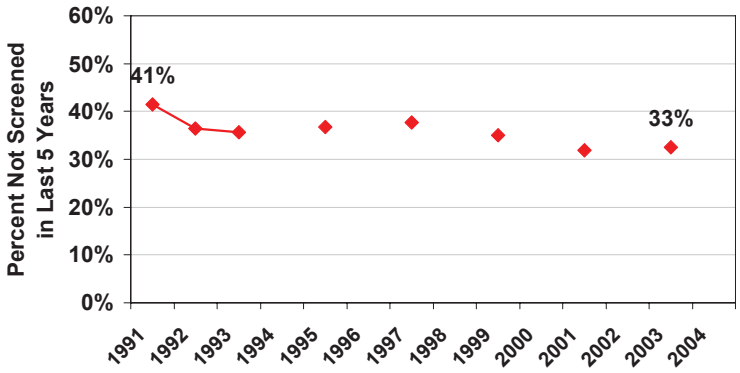
- Elevated total cholesterol (> 200 mg/dl) accounts for 27 percent of new cases of ischemic heart disease in men and 34 percent of new cases in women.[12]

- There are no "normal" levels for lipids in the blood. Cholesterol levels in the United States are, on average, 20 percent higher than in Asian countries.[41]

- A 10 percent decrease in total cholesterol levels is associated with a reduction of approximately 30 percent in risk of ischemic heart disease.[42]

In the Alaska BRFSS, participants were asked, "Blood cholesterol is a fatty substance found in the blood. Have you ever had your blood cholesterol checked?" Those who answered "yes" were asked, "How long has it been since you last had your blood cholesterol checked?" Those who answered "no" to the first question or "five or more years ago" to the second question were considered not to have been tested in the last five years. Participants who had been tested within the past five years were also asked, 'Have you ever been told by a doctor, nurse or other health professional that your blood cholesterol is high?" Those who answered "yes" were considered to have high blood cholesterol. This set of questions was asked in Alaska from 1991 through 1993, and in all odd years between 1995 and 2003.

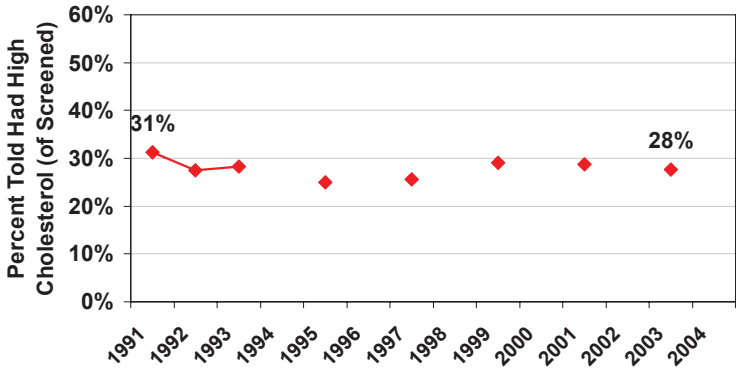
Figure 53. Prevalence of No Cholesterol Screening in Last 5 Years, Alaska 1991-2004



Source: AK BRFSS

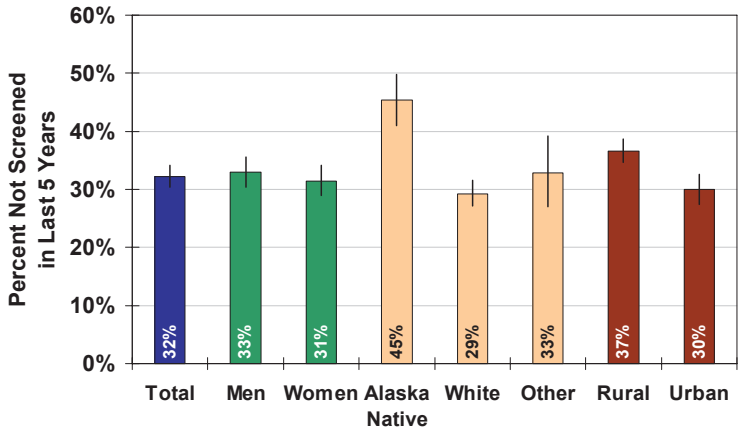
The percentage of Alaskan adults who report they have not had their blood cholesterol level checked in the last five years has decreased significantly since 1991, to approximately 33 percent in 2003. The percentage of those tested who report being told their blood cholesterol was high has remained fairly constant during this period, between 25 and 30 percent. Nationally, the percentage of adults who report not being tested in the last five years was 27 percent in 2003, and the percentage of those tested who report having high blood cholesterol was 33 percent.

Figure 54. Prevalence of High Cholesterol, Alaska 1991-2004



Source: AK BRFSS

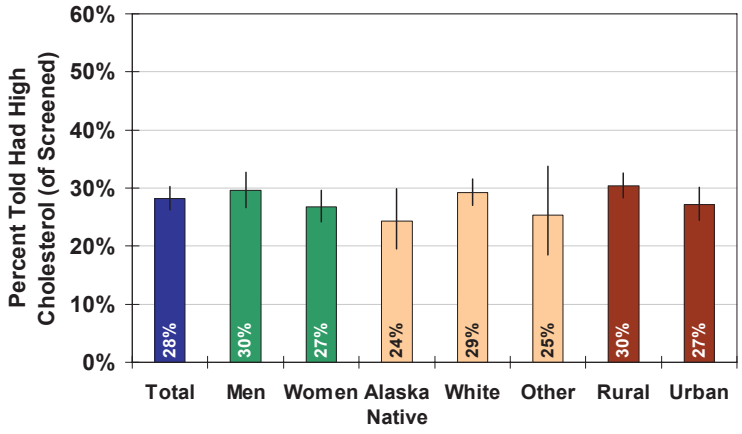
Figure 55. Prevalence of No Cholesterol Screening in Last 5 Years by Sex, Race, and Region, Alaska 2001 & 2003 (combined)



Source: AK BRFSS

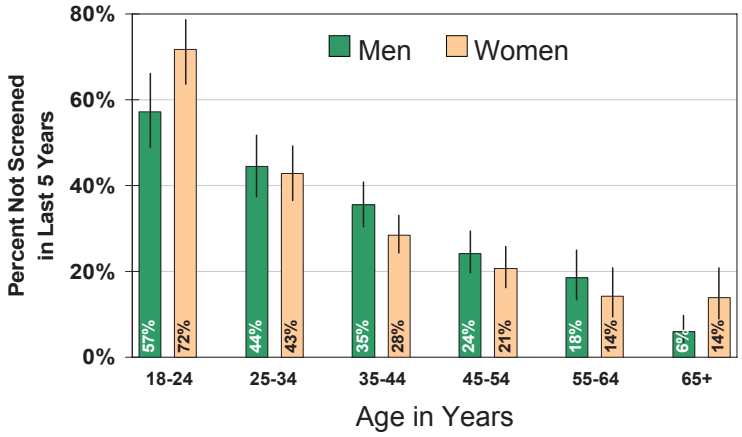
Alaska Native adults are less likely than Alaskans of other race groups to report having their blood cholesterol tested in the last five years. There are, however, no significant racial differences in prevalence of reported doctor-diagnosed high cholesterol among those screened. Similarly, rural Alaskan adults are slightly less likely than Alaskans living in urban regions to report having their blood cholesterol tested in the last five years, but there is no reported difference in the prevalence of high blood cholesterol between rural and urban populations. There is no gender difference in either blood cholesterol screening or high blood cholesterol.

Figure 56. Prevalence of High Cholesterol by Sex, Race, and Region, Alaska 2001 & 2003 (combined)



Source: AK BRFSS

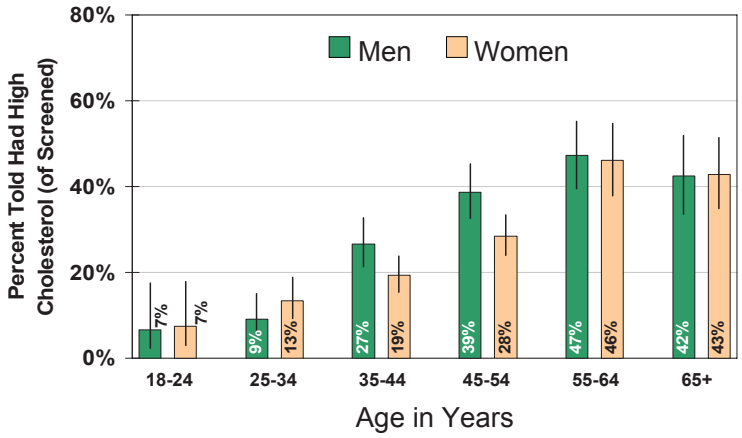
Figure 57. Prevalence of No Cholesterol Screening in Last 5 Years by Age and Sex, Alaska 2001 & 2003 (combined)



Source: AK BRFSS

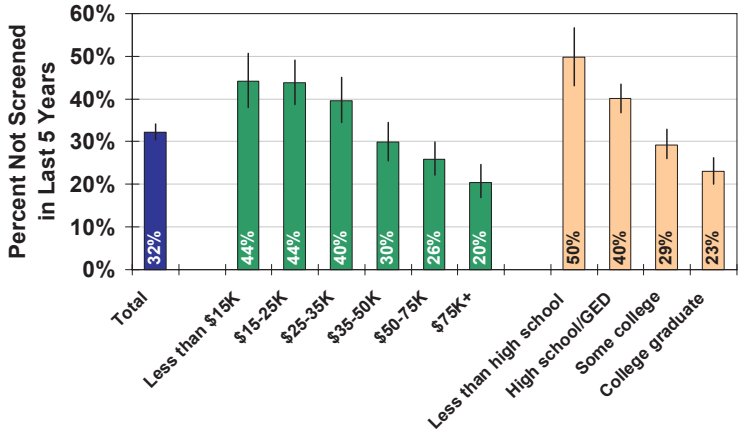
The likelihood of not having had one's blood cholesterol level checked in the last five years generally decreases with increasing age in Alaska. There is no significant difference in cholesterol testing between men and women in any of the age groups. The prevalence of reported high blood cholesterol increases with age, up to the age group of 55-64 years. In that age group approximately half of Alaskan adults report having an elevated blood cholesterol level.

Figure 58. Prevalence of High Cholesterol by Age and Sex, Alaska 2001 & 2003 (combined)



Source: AK BRFSS

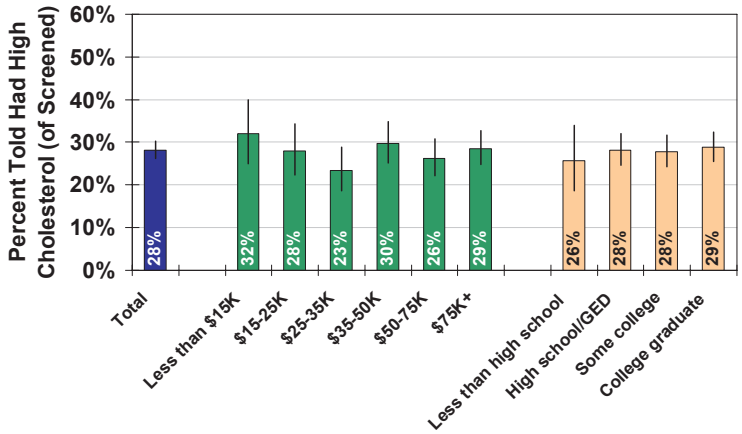
Figure 59. Prevalence of No Cholesterol Screening in Last 5 Years by Income and Education, Alaska 2001 & 2003 (combined)



Source: AK BRFSS

The likelihood of not having had a blood cholesterol screening in the last five years decreases steadily with higher income and education in Alaska; in other words, Alaskans with more resources are more likely to have their cholesterol tested. Alaskans with annual incomes below $15,000 are more than twice as likely as those with incomes over $75,000 to report not having had their cholesterol tested in the past five years. Alaskans with less than a high school education are more than twice as likely as those who graduated from college to have gone without cholesterol screening. There is no significant trend in the reported prevalence of high blood cholesterol by income or education.

Figure 60. Prevalence of High Cholesterol by Income and Education, Alaska 2001 & 2003 (combined)



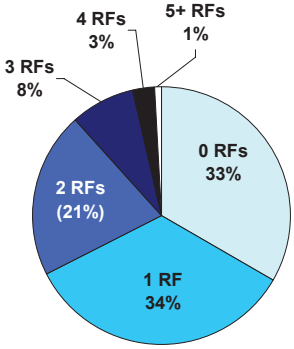
Source: AK BRFSS

H. Multiple Risk Factors

It is an unfortunate fact that many adults possess not one, but many of the heart disease and stroke risk factors described in the previous sections. Compared to those with no risk factors or those with only one, individuals with multiple risk factors have the greatest risk for heart disease and stroke. Results from a recent study showed that men who reach 50 years of age without any of the following risk factors—high total cholesterol, high blood pressure, diabetes, and smoking—have a lifetime risk of cardiovascular disease of only 5 percent. In contrast, those who have two or more of those risk factors by age 50 have a lifetime risk of nearly 70 percent.[43] Individuals with multiple risk factors require the most urgent clinical and public health interventions to prevent morbidity and premature mortality related to heart disease and stroke.

Participants in the Alaska BRFSS do not answer questions about all leading heart disease and stroke risk factors each year. When data for the years 2001 and 2003 are combined it is possible to measure the overlapping prevalence of six key risk factors: smoking, physical inactivity, diabetes, obesity, hypertension, and high blood cholesterol.

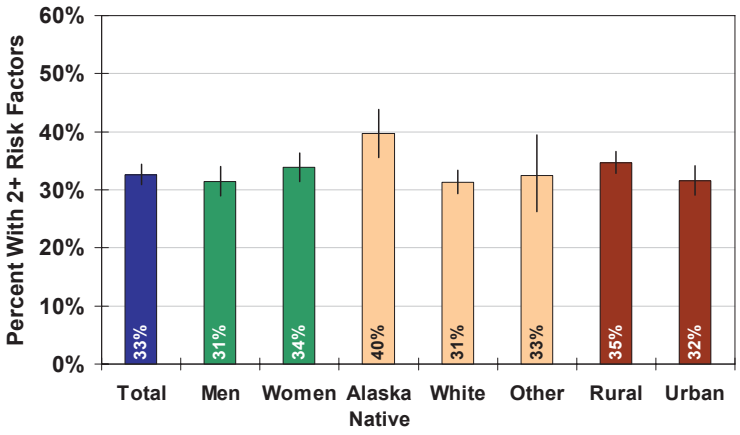
Figure 61. Prevalence of Multiple Risk Factors (RFs): Smoking, Hypertension, High Cholesterol, Obesity, Diabetes, & Physical Inactivity, Alaska 2001 and 2003 (combined)



Source: AK BRFSS

It is striking that only one-third of those surveyed report having none of the six risk factors. Another one-third of Alaskan adults have one risk factor, and the remaining one-third have two or more risk factors for heart disease and stroke. Other than smoking and physical inactivity, these risk factors usually take many years to develop. For this reason, the relatively low prevalence of multiple risk factors shown in this pie chart may be misleading.

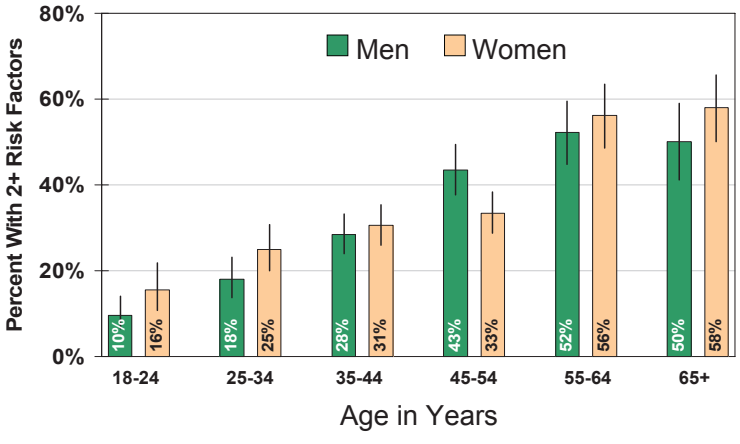
Figure 62. Prevalence of 2+ Risk Factors by Sex, Race, and Region, Alaska 2001 & 2003 (combined)



Source: AK BRFSS

Alaskan men and women are equally likely to have multiple risk factors for heart disease and stroke. Alaska Natives are significantly more likely than Whites to have two or more of the selected risk factors. There is no significant difference between rural and urban populations on this indicator of risk.

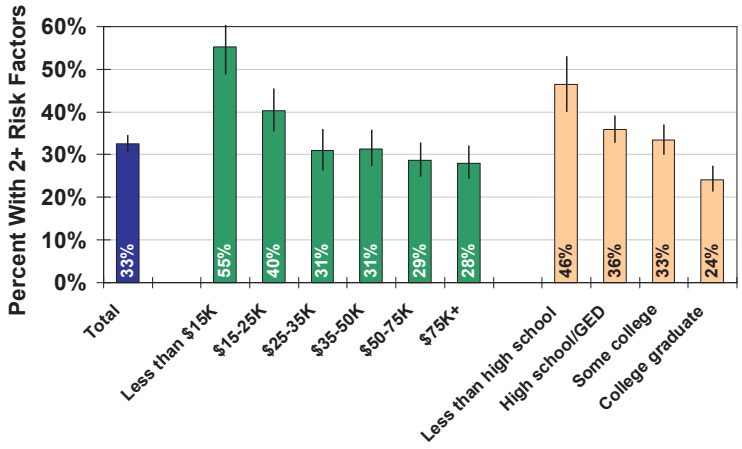
Figure 63. Prevalence of 2+ Risk Factors by Age and Sex, Alaska 2001 & 2003 (combined)



Source: AK BRFSS

As expected, the prevalence of two or more risk factors increases sharply with advancing age. This is largely the result of the relatively late onset of such conditions as hypertension, obesity, diabetes and high blood cholesterol, despite unhealthy behaviors that start much earlier.

Figure 64. Prevalence of 2+ Risk Factors by Income and Education, Alaska 2001 & 2003 (combined)



Source: AK BRFSS

The prevalence of two or more risk factors decreases with both higher income and more education. For example, only approximately one-quarter of college graduates but nearly half of those without a high school education possess multiple risk factors.

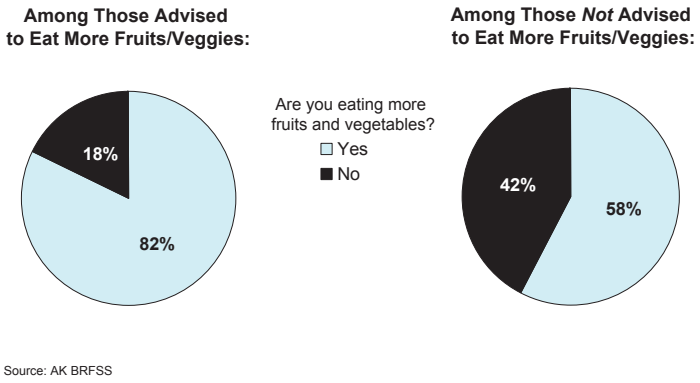
I. Health Behavior Change and Health Provider Advice

There are many real and perceived barriers to making the kinds of lifestyle changes that could reduce one's risk of heart disease and stroke. Health risk behaviors, such as smoking, eating too much fat and sugar, eating too few vegetables and fruits, and avoiding exercise, are often formed over one's lifetime and such behavioral patterns can be difficult to alter. Quitting smoking is a difficult process and can take numerous attempts before one is successful. Changes to one's diet or exercise routine often impact not just that person but also their family members, who may or may not be supportive. Our cities and towns have been designed to provide us with limitless access to food, while at the same time discouraging us from walking or biking to and from work and school.

It is within this context that our public health messages encouraging behavior change exist. To increase the likelihood that such messages are heard and adopted, it is important that they are delivered by sources seen as credible and trustworthy. Healthcare providers can be an ideal source. Providers' advice and encouragement to lose weight, quit smoking, become more physically active, etc., can have a priming effect on subsequent public health messages that those patients will encounter, increasing the chances that lifestyle changes are made.[44]

In 2003 in Alaska, the BRFSS included several questions that assessed: (a) whether Alaskans had been advised by their health care providers to engage in specific health behavior changes, such as increasing the amount of physical activity they engaged in; and (b) what specific changes Alaskans were making to reduce their risk of heart disease or stroke. Specifically, participants were asked, "Within the past 12 months, has a doctor, nurse, or other health professional told you to…Eat fewer high fat or high cholesterol foods? Eat more fruits and vegetables? Be more physically active?" (as three separate questions). A second set of questions assessed whether, "To lower your risk of developing heart disease or stroke, are you…Eating fewer high fat or high cholesterol foods? Eating more fruits and vegetables? More physically active?" (as three separate questions).

Figure 65. Percentage of Adults Increasing Fruit and Vegetable Consumption to Reduce Heart Disease or Stroke Risk, by Health Professional Advice, Alaska 2003



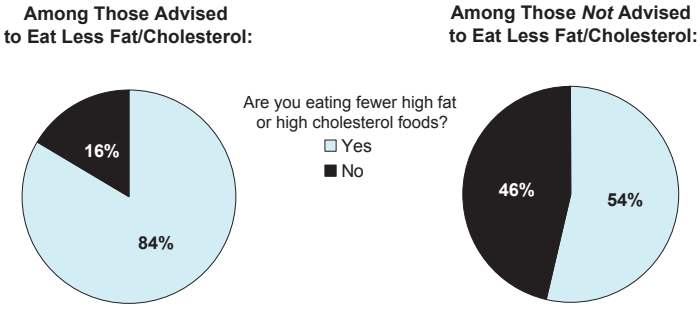
Source: AK BRFSS

Over half of Alaskan adults indicate that they are trying to improve their diet or increase levels of physical activity in order to reduce their heart disease or stroke risk. Specifically, 58 percent are reducing the amount of high fat or high cholesterol foods they eat, 63 percent are increasing fruit and vegetable intake, and 61 percent are getting more physical activity.

Regardless of the specific type of lifestyle change you consider, Alaskan adults are more likely to report they are making those positive changes if they have been given advice from their health provider to do so. For example, whereas only 58 percent of adults who have not been advised to eat more fruits and vegetables are actually increasing their fruit and vegetable consumption to reduce their heart disease and stroke risk, 82 percent of adults who have been so advised report making those lifestyle changes. A similar pattern is seen for both decreasing high fat and cholesterol food consumption and increasing physical activity.

Of course, these findings do not necessarily mean that health provider advice causes these positive lifestyle changes. It is possible that, having indicated that one's doctor has advised increased exercise, for example, a participant would be especially likely to respond that they were indeed making those lifestyle changes. This is because people are motivated to give a socially desirable image of themselves—in this case, someone who not only is making healthy lifestyle choices, but also follows their doctor's advice. While this cannot be ruled out, the fact that respondents answer questions about lifestyle changes they are making before they indicate what their healthcare provider has advised limits somewhat the likelihood of this alternative explanation.

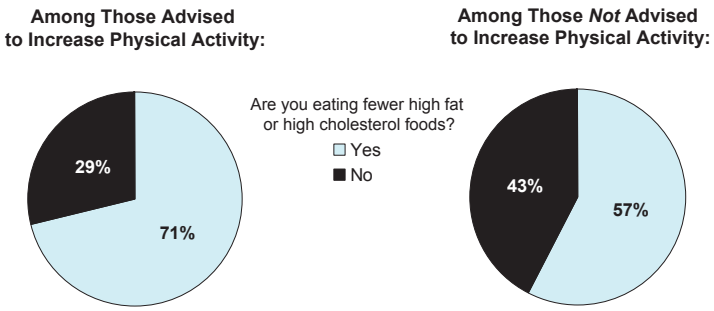
Figure 66. Percentage of Adults Lowering Fat and Cholesterol Consumption to Reduce Heart Disease or Stroke Risk, by Health Professional Advice, Alaska 2003



Source: AK BRFSS

Even though we may not know the exact reason for the association between doctor's advice and lifestyle changes, it is still encouraging that people advised to take these steps towards reducing their risk of heart disease and stroke appear to be doing so. The bad news is that so few are given this advice. In 2003, only 13 percent of Alaskan adults reported that in the past 12 months their healthcare provider recommended that they limit high fat and high cholesterol foods in their diet. Comparable percentages for advice on increasing fruits and vegetables consumption and increasing physical activity were 22 percent and 25 percent, respectively. Given the high levels of risk factors such as poor nutrition, inactivity, and obesity/ overweight outlined in earlier sections of this report, this represents a lost opportunity in terms of supporting Alaskans in making healthy lifestyle choices.

Figure 67. Percentage of Adults Increasing Physical Activity to Reduce Heart Disease or Stroke Risk, by Health Professional Advice, Alaska 2003



Source: AK BRFSS

conclusions and recommendations

The routinely collected surveillance data presented in this report only begin to provide the information needed to develop an effective public health response to heart disease and stroke in Alaska.

At best, the mortality, hospitalization, and Medicaid data reported here offer an incomplete picture of the burden of heart disease and stroke borne by Alaskans today. Little is known about the ongoing prevalence of heart disease and cerebrovascular disease in our communities, outside of hospitals and mortuaries. And even less is known about the quality of care being provided to Alaskans who suffer from heart disease and stroke—throughout the entire continuum of care. We cannot improve the quality of secondary and tertiary prevention of heart disease and stroke in Alaska without access to high quality data on pre-hospital transport, outpatient care, and long-term care.

Information on risk factors, which is required for the development and maintenance of population-based primary prevention efforts, is also limited. We currently have an incomplete picture of the steps Alaskans are taking or are willing to take to reduce their risk of heart disease and stroke. Thanks to a recent expansion of our surveillance of key risk factors and preventive strategies, such data should be available in the near future. However, we have no objective measure of the prevalence of hypertension, lipid disorders, obesity, or diabetes in the population. There is also little available information on the economic burden of heart disease and stroke in Alaska.

The gaps in our knowledge of heart disease and stroke in Alaska are unsettling. Despite these gaps, the following recommendations for action seem clear:

1. Given Alaska's low rates of heart disease mortality and morbidity and moderate to high levels of key risk factors, we have an enormous opportunity and public health responsibility to keep those disease rates low by tackling risk factors head on. We need to turn our obesity and hypertension rates around, make an impact on our stagnant rates of smoking, diabetes, high cholesterol, and poor nutrition, and continue to gain ground with physical activity and cholesterol screening.

2. Hospital discharge and Medicaid claims data indicate that treatment and long-term care for Alaskans who have had a stroke create a tremendous economic burden. Given that stroke does not appear to be on the decline in Alaska as it is in the US overall, it is imperative that we take an evidence-based, comprehensive approach to stroke treatment and care in order to reduce the health and economic costs related to stroke. Toward this end we recommend the development of stroke diagnostic guidelines for pre-hospital transport and a comprehensive stroke treatment plan that addresses acute and subacute care.

3. The data indicate a significant gender gap in the treatment of female hospital patients with ischemic heart disease. They are consistently less likely to receive angiography or arteriography, cardiac catheterization, PCI, bypass surgery, or pacemakers. More data are needed to understand the reasons for the disparities, and to develop strategies to correct them.

4. One half of hospital discharges for heart disease and stroke are for Alaskans between the ages of 44 and 64. As a large proportion of the individuals in this age group are still working, worksite-based prevention strategies may be an effective way to reach this population. More work needs to be done establishing best practices for primary and secondary prevention of heart disease and stroke within Alaskan worksites, the majority of which are small businesses.

5. Phase II cardiac rehabilitation (CR)—that is, 12-week, outpatient CR—is an effective but highly underutilized method of reducing morbidity and mortality from heart disease. Alaska's unique size, population density, and limited road system create a challenge to achieving higher levels of CR participation—particularly in more rural parts of the state. Over 40 percent of Alaskans live in communities with less than 10,000 residents—61 communities have populations under 1,000. Traditional hospital-based CR facilities are not sustainable in such communities. More work needs to be done to develop safe and reimbursable delivery models of CR in rural Alaska.

6. The prevalence of several key heart disease and stroke risk factors is high in Alaska, particularly in subgroups with relatively low income and education. Clinicians and public health professionals need to pay close attention to these social class-based disparities. Addressing disparities in health often equates to reducing gaps in health outcomes between racial or ethnic groups. While such gaps exist in Alaska, there are even stronger disparities for heart disease and stroke along lines of income and education. These disparities are especially challenging to address, as they require interventions aimed at marginalized and poorly organized populations. Clearly, renewed efforts targeting poor and undereducated Alaskans are required, including those aimed at tobacco prevention and cessation, better availability of low-cost healthy foods, increased opportunities for physical activity, and improved access to clinical preventive services.

Other recommendations for further public health activity to reduce the burden of heart disease and stroke can be found in Take Heart Alaska: A Cardiovascular Disease Prevention Plan for Alaska (2003). The plan is available on line at:
http://partners.hss.state.ak.us/takeheart/pdf_files/THA%20CVD%20Prevention%20Plan.pdf.

methodology

This report was assembled entirely from existing data sources. Population data were provided by the Research and Analysis Section of the Department of Labor and Workforce Development and the US Census Bureau.

Mortality

Data on deaths from heart disease and stroke in Alaska were provided by the Alaska Bureau of Vital Statistics, Division of Public Health, Department of Health and Social Services. Alaska deaths included deaths of Alaska residents who died in other states. Comparable data for the United States were provided by CDC Wonder, an on-line resource of the Centers for Disease Control and Prevention (CDC). Data on place of death for US heart disease deaths came from the National Center for Health Statistics, CDC.

The cause of death used in our analysis was the underlying cause, based on the Ninth Revision of the International Classification of Diseases (ICD-9) for the years 1980 to 1998. In subsequent years ICD-10 was used to classify causes of death. Rates were not adjusted to account for discontinuities in transitioning between the two classification systems, but for categories of heart disease and stroke the comparability ratios between the systems are close to 1, according to a recent report of the CDC's National Vital Statistics System.[45] The following table describes the codes used to define the disease categories in this report:

Category	ICD-9 Codes	ICD-10 Codes
Diseases of the Heart	390 – 398; 402; 404; 410 – 429	I00-09; I11; I13; I20 – I51
Ischemic Heart Disease	410 – 414; 429.2	I20 – I25
Congestive Heart Failure	428	I50
Stroke	430 – 434; 436 – 438	I60 – I69

Unless stated otherwise, all mortality rates were age-adjusted by the direct method, using the US 2000 standard population. Trend lines were drawn when rates were compared over time using a linear regression model. This model smoothed out year-to-year variations in rates to provide an estimate of the average rate of change during the period.

Four categories were used to define race/ethnicity. These are white, African-American or black, Alaska Native and Asian/Pacific Islander. Persons of unknown or other race/ethnicity were excluded from race/ethnic-specific analyses, but were included in data for all racial/ethnic groups combined. For the purposes of this report individuals were not identified as Hispanic or non-Hispanic.

Counts of place-specific deaths were calculated for the 14-year period of 1990 to 2003. Age-adjustment was not possible for the geographical analysis of heart disease and stroke mortality because of the small numbers of deaths reported from many of the state's rural areas.

Place of residence at time of death may be different from where the deceased had lived when the disease developed. Migration related to medical care for heart disease- or stroke-related illness shortly before death may distort the death rates obtained in the both the location the patient departed and the location where care was sought.

Lines on columns within certain bar charts displaying mortality data indicate the 95 percent confidence intervals (CI) around each estimate. This interval denotes the range of values within which we are 95% confident the true estimate falls. Populations or subgroups whose 95% CIs do not overlap are said to be statistically significantly different from one another at the $p < .05$ level.

Hospitalization

Hospital discharge data for 2004 were provided through an agreement between the Department of Health and Social Services and the Alaska State Hospital and Nursing Home Association (ASHNHA). The discharge database does not include information from some of the state's smaller hospitals, which accounted for an estimated 12 percent of discharges during 2004. Hospitalization rates for Alaska were adjusted by reducing population denominators by 12 percent to account for cases from hospitals not participating in the discharge database. Comparable national data on hospitalizations were obtained from National Hospital Discharge Survey of 2002.[46]

For most analyses within this report, the primary diagnosis listed in the patient's medical record was used. Because the primary diagnosis describes only one immediate reason for each admission, this method may underestimate the burden due to hospitalizations for heart disease and stroke—especially the impact of ischemic heart disease on hospitalization. A majority of admissions for diseases of the heart that are not primarily for ischemic heart disease are for congestive heart failure and cardiac dysrhythmias, which are frequently sequelae of previously diagnosed ischemic heart disease. To deal with this problem of underestimation and to give a broader sense of the true burden of heart disease and stroke, both primary and secondary diagnoses were considered to produce the overall cost estimate for heart disease and stroke (see page 20) and the counts and rates of heart disease and stroke shown in Table 4. So that the latter analysis would be comparable to data provided through the National Hospital Discharge Survey, the first 7 listed diagnoses were examined.

Data on discharges for healthy newborn infants were excluded from these analyses. Primary and secondary discharge diagnoses for each hospitalization were defined by codes in the ICD-9 Clinical Modification (CM) corresponding to the ICD-9 codes used to define cause of death (see above). Analysis was based on each unique discharge, not on individuals, who may have had multiple hospitalizations during 2004.

The following procedure codes were used to define selected procedures related to ischemic heart disease:

Procedure	ICD-9 CM Procedure Codes
Angiocardiography/Arteriography	88.4 – 88.58
Cardiac catheterization ("Catheterization")	37.21 – 37.23
Coronary artery bypass graft ("Bypass")	36.1
Removal of coronary artery obstruction and insertion of stent(s) (or percutaneous coronary intervention "PCI")	36.0
Insertion, replacement, removal, and revision of pacemaker leads or device ("Pacemaker")	37.7 – 37.8

Medicaid Data

Medicaid claims data from SFY 2005 were provided by the Division of Health Care Services, Alaska Department of Health and Social Services. All claims for a single individual occurring between July 1, 2004 and June 30, 2005 were aggregated, yielding unduplicated individual records, potentially with multiple payments for health care services. The same set of ICD-9 codes that were used to categorize diagnoses in the mortality and hospital discharge data were applied to the Medicaid data. A primary diagnosis of diseases of the heart, ischemic heart disease, congestive heart failure, or stroke was coded if that was the primary diagnosis associated with any of the Medicaid claims for an individual within the specified year period. Data on payments were aggregated across multiple claims for each unique individual based upon the diagnosis.

Alaska Medicaid claims data contain both a primary and (if applicable) a secondary diagnosis for each health service interaction. The reliance on the primary diagnosis for this report almost certainly underestimates the prevalence of heart disease and stroke within this population, as these two conditions contribute to many other conditions for which a person might receive a primary diagnosis other than heart disease or stroke.

Risk Factors

Data were taken from the Alaska Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is a random, anonymous telephone survey of Alaskan adults conducted monthly by the Section of Chronic Disease Prevention and Health Promotion, Division of Public Health in cooperation with the CDC. The survey uses a sample stratified into five regions, with roughly equal numbers of interviews conducted in each region. This method deliberately over-samples rural areas of the state. Approximately 2,500 Alaskans currently participate in the survey each year. All data in the BRFSS are obtained by self-report only.

Our analysis reports the weighted percentages of responses to questions related to key heart disease and stroke risk factors, and compares the responses of subgroups of the survey population. Confidence intervals around prevalence estimates were obtained using SUDAAN software. Lines on columns within risk factor bar charts indicate the 95 percent confidence intervals (CI) around each estimate. This interval denotes the range of values within which we are 95% confident the true estimate falls. Populations or subgroups whose 95% CIs do not overlap are said to be statistically significantly different from one

another at the $p < .05$ level. SUDAAN was also used to test the significance of linear trends across time, as well as income and education levels. Only those trends or subgroup differences statistically significant at the $p<.05$ level are reported as showing a "significant change" or "being significantly different", respectively.

For the purposes of this burden document, risk factor prevalence estimates were not age-adjusted to the US 2000 standard population. Given Alaska's relatively young population, the prevalence of many risk factors indicative of heart disease, stroke, and many other chronic diseases are expected to be lower in Alaska in comparison with national estimates.

For the risk factor data presented in this report, three categories were used to define race/ethnicity. These are Alaska Native, White, and other. Persons of unknown race/ethnicity were excluded from race/ethnic-specific analyses, but were included in data for all racial/ethnic groups combined. For the purposes of this report individuals were not identified as Hispanic or non-Hispanic.

Urban respondents were deemed to be those who resided in the Municipality of Anchorage, the Matanuska-Susitna Borough, the Fairbanks North Star Borough and Southeast Fairbanks census area. Rural respondents were those living elsewhere in the state.

Respondents were classified into six categories of annual income and four categories of educational attainment. Roughly equal numbers of respondents fell into each category, except those for lowest income and education groups, which were smaller.

Prevalence data are reported, when available, for each year since the BRFSS was introduced in Alaska in 1991. It should be noted that all heart disease and stroke risk factor questions are not surveyed each year. Comparisons of responses according to age, sex, race, place of residence, income and education were made by combining data for the same questions from the two or three most recent years they were asked.

Analysis of multiple risk factors was limited to six factors: current smoking, physical inactivity, diabetes, obesity, hypertension, and high blood cholesterol, as these were the only factors examined consistently during the period 2001 to 2003.

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