STATE of ALASKA
Department of Health and Social Services

The Burden of Heart Disease and Stroke

Mortality, Morbidity, and Risk Factors

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The Burden of Cardiovascular Disease in Alaska: Mortality, Hospitalization and Risk Factors

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executive summary

Cardiovascular disease is a pervasive threat to adults almost everywhere.

It'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 developing cardiovascular disease and dying from it? Where should prevention efforts be focused?

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

Some key findings:

Mortality and morbidity from cardiovascular disease are common in our state.
Cardiovascular disease may be a little less widespread here than in most other states, but it is a public health problem of the first order – and it will only become more important in the next few years as the state's population continues to age.

An alarming feminization of cardiovascular mortality is emerging in Alaska.
Alaskan women are beginning to lose their historic advantages in cardiovascular mortality over men and over women in other states. This trend deserves greater notice by public health planners and providers of primary care services.

Alaska is a young state, and the burden of cardiovascular disease continues to be borne disproportionately by those under age 65 years.
Because of our state's relatively youthful age structure, death or hospitalization due to cardiovascular disease is more often a younger person's misfortune than in other states. This would suggest that public health interventions developed elsewhere that target senior citizens might not have as much impact in reducing the toll of cardiovascular disease in Alaska.

The prevalence of several key cardiovascular 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 the gulf in social class – not just the gap in race and ethnicity – between themselves and those most in need of risk reduction.

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 cardiovascular disease 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. Today the time is ripe to examine cardiovascular disease closely in Alaska and use our knowledge to help communities bring it under control.

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 cardiovascular disease today than in any other state. But even here on the frontier the public health burden of heart disease and stroke is immense, and it is likely to increase in the years ahead. Death and hospitalization due to cardiovascular disease are common in Alaska, and the behavioral and environmental risk factors that lead to cardiovascular disease have found their way even to the most isolated corners of this great land.

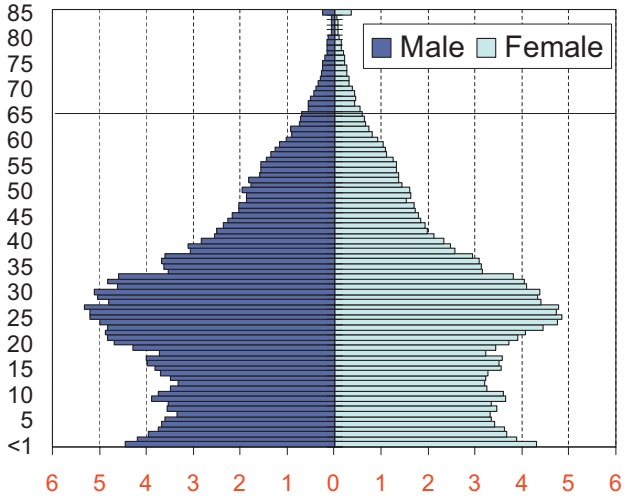
- There is more that is unusual about Alaska's population than its relatively small size. Alaska has a unique mix of races and ethnicities. It is the only state where men outnumber women. It has an unusually large number of migrants who were born in other states and countries. All of these distinctive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

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.

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 1).

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 anywhere else.

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

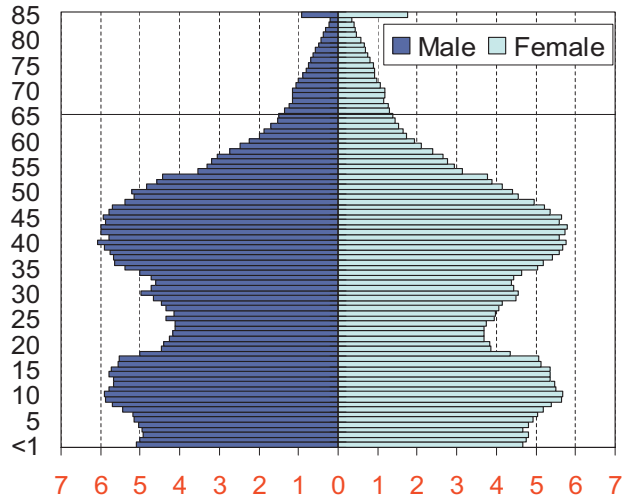


Source: AK Department of Labor, Research and Analysis Section

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 many more are coming in the next few years.

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. The need for public health approaches to stem the incoming tide of chronic disease has never been greater in Alaska than it is right now.

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



Source: AK Department of Labor, Research and Analysis Section

This report has been prepared to provide Alaskans with the facts they need to understand the burden of cardiovascular disease in their state. It will examine cardiovascular disease in Alaska along three dimensions: mortality, incidence of hospitalization, and prevalence of cardiovascular risk factors. Methodology is provided in Appendix A.

mortality from cardiovascular disease

Cardiovascular disease is a leading cause of death in Alaska.

Of the approximately 3000 Alaskans who will die this year, 800 to 900 will die from cardiovascular disease, particularly heart disease and stroke. The impact of cardiovascular disease on mortality is staggering. For every death due to homicide in Alaska there are approximately 20 deaths resulting from cardiovascular disease. For each life cut short by AIDS, there are about 70 other Alaskans who die from cardiovascular disease.

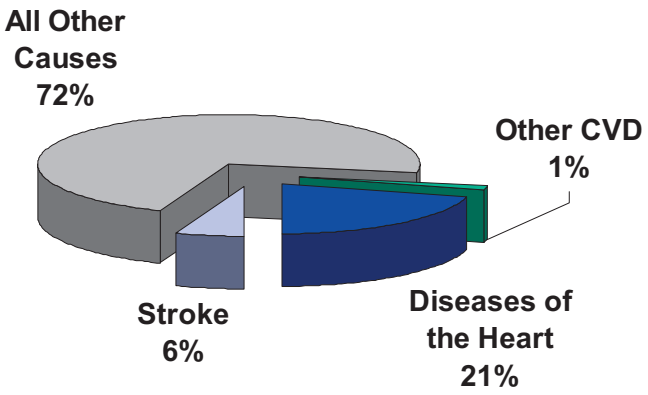
In the next 10 years, the number of Alaskans who are expected to die from cardiovascular disease will be roughly equivalent to the population of the North Slope Borough, or the city of Ketchikan, or the entire Aleutian archipelago. Death from cardiovascular disease is a common event in every Alaskan 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 cardiovascular disease. Heart disease and stroke will never be completely eliminated, but with renewed public health efforts, most premature deaths from cardiovascular causes can be prevented.

As serious as cardiovascular disease is for Alaska's health, our state enjoys one of the lowest cardiovascular death rates in the United States. Far fewer Alaskans die from cardiovascular causes, heart disease in particular, than would be expected in a contemporary American population of Alaska's size.

In fact, Alaska is the only state 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 3. Heart Disease and Stroke as Causes of Death
Alaska, 2000



Source: AK Bureau of Vital Statistics

If the United States as a whole had Alaska's death rate from heart disease, approximately 440,000 fewer Americans would die from heart disease each year. That change alone would reduce the nation's mortality from all causes by nearly 20 percent, assuming none of those who avoided death from heart disease died in the same year from other causes.

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 cardiovascular events in the population at large.

But 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 almost 20 percent lower than the national rate. Curiously, the stroke death rate in Alaska, after adjusting for age, is about 10 percent higher than the national rate. Alaska has one of the 10 worst showings among states for stroke mortality, although stroke is a much less common cause of death than heart disease. 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 15 Causes of Death, Alaska, U.S., 2000

Cause of Death	Deaths	Alaska Age-Adjusted Rate	U.S. Age-Adjusted Rate	U.S. Rank
1. Cancer	705	209.0	200.9	2
2. Diseases of the Heart	**609**	**213.1**	**258.2**	**1**
3. Unintentional Injuries	339	63.4	35.6	5
4. Stroke	**169**	**65.6**	**60.9**	**3**
5. Suicide	135	21.0	10.7	10
6. COPD	132	48.0	44.3	4
7. Diabetes	86	26.7	25.2	6
8. Alzheimer's Disease	47	22.0	18.0	8
8. Influenza, Pneumonia	47	16.5	23.7	7
10. Chronic Liver Disease	45	10.0	9.6	12
11. Homicide	38	6.1	6.1	14
12. Nephritis	30	11.6	13.5	9
13. Perinatal Conditions	23	3.0	5.1	19
14. Congenital Malformations	22	3.5	3.8	19
15. Parkinson's Disease	19	9.0	5.7	16

Notes: Data source is Alaska Bureau of Vital Statistics; Rates are per 100,000 persons, standardized to U.S. 2000 standard million.

Since 1980, the number of deaths from cardiovascular disease has increased as the state's population has grown and aged (Table 2). The proportion of all deaths in the state that are due to cardiovascular causes has held fairly constant, between 24 and 29 percent. Nationally, in 2000, the proportion of deaths due to cardiovascular causes accounted for about 39 percent of all deaths.

The number of cardiovascular 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 cardiovascular disease has held fairly constant between 16 and 20 percent. Nationally, in 2000, the proportion of deaths due to cardiovascular disease among deaths in persons under 65 years of age was nearly 24 percent.

Table 2. Number of deaths from all cardiovascular disease (CVD) and percentage of deaths due to CVD, Alaska, 1980-2001

Year	All Ages					< 65 years	
	Heart Disease		Stroke	Total CVD	% Deaths CVD[a]	Total CVD	% Deaths CVD[a]
	Ischemic	Other					
1980	260	81	57	429	26%	184	17%
1981	268	108	70	481	28%	186	16%
1982	299	92	94	512	28%	226	19%
1983	278	90	72	468	24%	203	16%
1984	282	103	84	511	26%	214	17%
1985	303	118	88	543	26%	229	17%
1986	343	140	90	609	29%	240	18%
1987	328	149	95	596	29%	218	18%
1988	318	155	86	586	28%	208	17%
1989	338	128	98	598	29%	206	17%
1990	330	108	103	582	27%	210	17%
1991	318	153	89	598	27%	205	17%
1992	370	148	105	660	28%	225	18%
1993	374	121	114	650	27%	219	17%
1994	383	151	122	704	29%	223	18%
1995	384	164	147	740	29%	219	17%
1996	335	170	141	711	27%	225	17%
1997	354	195	131	726	28%	220	18%
1998	377	182	153	754	29%	243	20%
1999	382	178	172	771	29%	215	17%
2000	408	201	169	821	28%	237	18%
2001	376	221	158	848	29%	277	20%

Notes: Data source is Alaska Bureau of Vital Statistics; [a]Percentage of all deaths each year due to major cardiovascular disease ([CDV deaths/deaths from all causes] x100).
The following ICD codes were used to define the various forms of CVD:

- heart disease = ICD9: 390-398, 402, 404, 410-429; ICD10: I00-I09, I11, I13, I20-I51
- ischemic heart disease = ICD9: 410-414,429.2; ICD10: I20-I25
- "other" heart disease = all codes for "diseases of the heart" other than ischemic
- stroke = ICD9: 430-434, 436-438; ICD10: I60-I69
- total CVD/major CVD = 390-434, 436-448; ICD10: I00-I78

While the proportion of all deaths due to cardiovascular disease has remained constant among persons under age 65 years, the age distribution of Alaska's cardiovascular deaths has shifted upwards over time. Today a smaller proportion of all cardiovascular deaths is occurring among Alaskans under age 65 than ever before. While 43 percent of cardiovascular deaths in 1980 occurred among those under 65 years of age, that fraction has dropped to between 28 and 33 percent in recent years (Table 3).

Similar declines have been found in the percentage of deaths due to heart disease and stroke occurring before age 65 years, particularly ischemic heart disease. In the early 1980s, nearly half of deaths from ischemic heart disease occurred in Alaskans under 65 years of age. Since then that fraction has shrunk to about one-third. The trends in "other" heart disease and stroke deaths are less stable, but are generally pointed downward since 1980. "Other" heart diseases here include rheumatic heart diseases, hypertensive heart disease, endocarditis, heart failure and an array of less common heart conditions.

Despite these decreases over time, the proportion of cardiovascular deaths that occur in Alaska before age 65 years of age is far in excess of expected levels in the United States. Nationally, in 2000, only about 15 percent of deaths due to cardiovascular causes occurred in persons under 65 years of age. This younger age group accounted for only about 16 percent of deaths due to ischemic heart disease, 18 percent of deaths due to other heart diseases, and 12 percent of deaths due to stroke.

Table 3. Percentage of Cardiovascular Disease (CVD) deaths occurring among those under 65 years of age, Alaska, 1980-2001.

Year	Heart Disease		Stroke	Total CVD
	Ischemic	Other		
1980	45%	49%	33%	43%
1981	43%	34%	36%	39%
1982	45%	58%	34%	44%
1983	49%	48%	26%	43%
1984	44%	48%	35%	42%
1985	44%	37%	43%	42%
1986	47%	36%	23%	39%
1987	38%	36%	33%	37%
1988	37%	34%	33%	35%
1989	38%	33%	31%	34%
1990	38%	43%	27%	36%
1991	40%	29%	29%	34%
1992	36%	36%	28%	34%
1993	36%	33%	26%	34%
1994	34%	35%	25%	32%
1995	34%	30%	22%	30%
1996	36%	30%	25%	32%
1997	33%	29%	27%	30%
1998	37%	31%	27%	32%
1999	33%	28%	16%	28%
2000	32%	30%	22%	29%
2001	34%	39%	22%	33%

Notes: Data source is Alaska Bureau of Vital Statistics. The following ICD codes were used to define the various forms of CVD:

- heart disease = ICD9: 390-398, 402, 404, 410-429; ICD10: I00-I09, I11, I13, I20-I51
- ischemic heart disease = ICD9: 410-414,429.2; ICD10: I20-I25
- "other" heart disease = all codes for "diseases of the heart" other than ischemic
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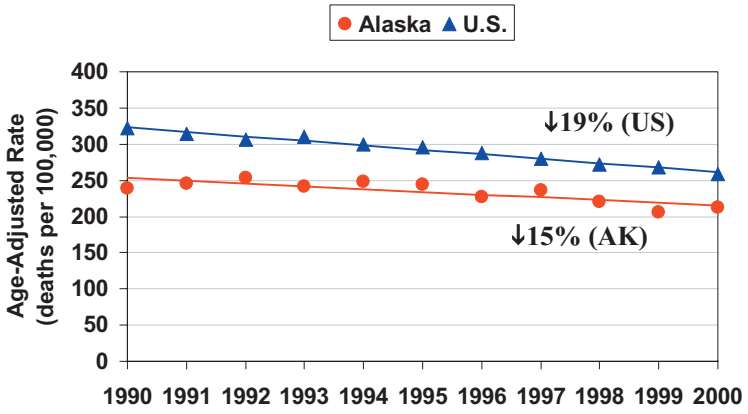
- total CVD/major CVD = 390-434, 436-448; ICD10: I00-I78

Differences between state and nation in the proportions of cardiovascular deaths affecting those under age 65 are best explained by the relatively young age structure of Alaska's population. In fact, Alaskans under age 65 have generally lower age-specific rates of death from cardiovascular diseases than their counterparts nationally.

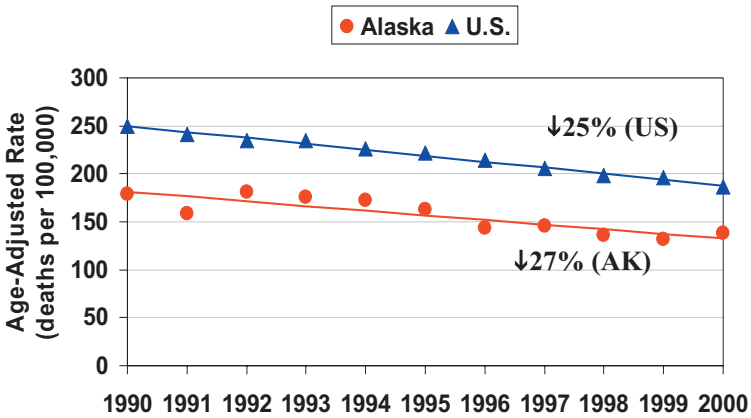
The next three figures illustrate changes in the age-adjusted rates of death from all types of heart disease, ischemic heart disease, and stroke in Alaska and the United States between 1990 and 2000. Regression lines have been fit to the annual age-adjusted rates to reveal the overall direction and degree of change during the 11-year period.

Figure 4. Trends in Age-Adjusted Rates of Deaths Due to Diseases of the Heart, Alaska and U.S.



Source: AK Bureau of Vital Statistics

Figure 5. Trends in Age-Adjusted Rates of Deaths Due to Ischemic Heart Disease, Alaska and U.S.



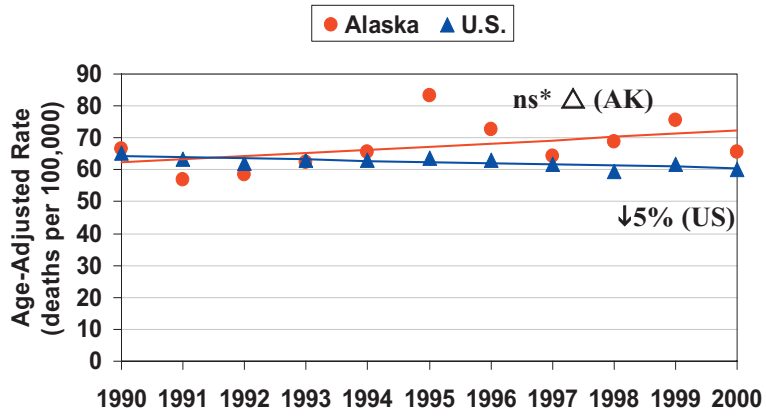
Source: AK Bureau of Vital Statistics

The age-adjusted death rate from diseases of the heart has declined in Alaska since 1990, dropping 15 percent by 2000, as indicated by the trend line in Figure 4. In comparison, age-adjusted mortality from all types of heart disease has declined in the United States as a whole during the same period by 19 percent. In Alaska, the rate of death from diseases of the heart has fallen from a high of 254 per 100,000 in 1992 to 207 per 100,000 by 1999. The Alaska rates have remained below the national rates during the entire period.

The age-adjusted rate of death from ischemic heart disease alone has declined in Alaska by 27 percent since 1990. The age-adjusted mortality from ischemic heart disease has declined in the United States during this period by 25 percent. In Alaska, the rate of death from ischemic heart disease has fallen from a high of 181

per 100,000 in 1992 to 132 per 100,000 by 2000. As with all diseases of the heart, the Alaska rates have remained below the national rates during the entire period.

Figure 6. Trends in Age-Adjusted Rates of Deaths Due to Stroke, Alaska and U.S.



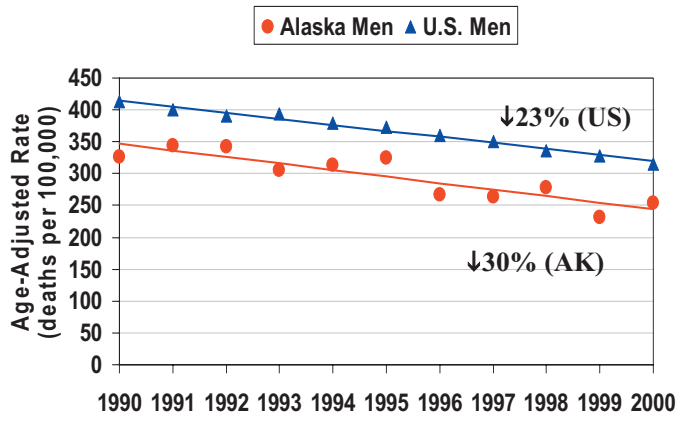
Source: AK Bureau of Vital Statistics

*Regression slope not significantly different from 0.

The age-adjusted death rates from stroke in Alaska have varied considerably from year to year, showing a slight increase during the period that is not statistically significant. By contrast, the age-adjusted mortality from stroke has declined in the United States during this period by 5 percent. In Alaska, the rates of death from stroke ranged between 57 per 100,000 in 1991 and 83 per 100,000 in 1995. Since 1994, the Alaska rates have exceeded the national rates each year.

The next six figures illustrate Alaska's mortality trends for all heart disease, ischemic heart disease, and stroke by sex.

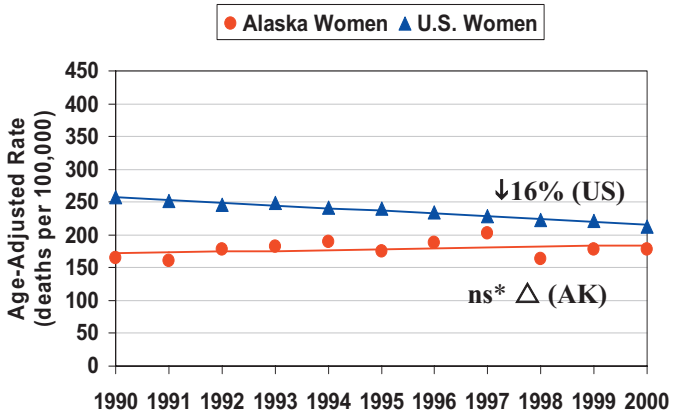
Figure 7. Trends in Age-Adjusted Rates of Deaths Due to Diseases of the Heart, Alaska and U.S. Men



Source: AK Bureau of Vital Statistics

Age-adjusted death rates from diseases of the heart have declined markedly 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 by 30 percent between 1990 and 2000, dropping from a high of 344 per 100,000 in 1991 to a low of 232 per 100,000 by 1999. Among women, the age-adjusted rates fluctuated between 160 per 100,000 and 203 per 100,000 per year.

Figure 8. Trends in Age-Adjusted Rates of Deaths Due to Diseases of the Heart, Alaska and U.S. Women

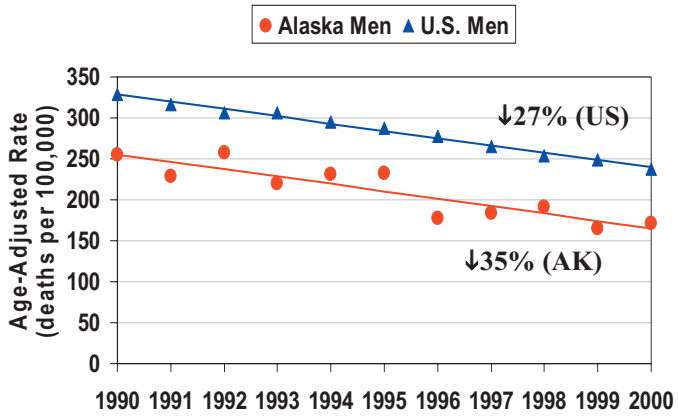


Source: AK Bureau of Vital Statistics

*Regression slope not significantly different from 0.

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 by 2005 or 2006.

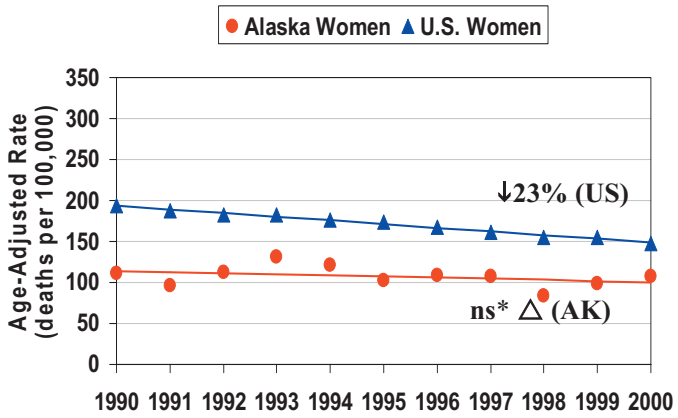
Figure 9. Trends in Age-Adjusted Rates of Deaths Due to Ischemic Heart Disease: Alaska and U.S. Men



Source: AK Bureau of Vital Statistics

Looking at death from ischemic heart disease alone, the age-adjusted rates over time again show a sharp decline for Alaskan men and little change for women, although women had lower rates than men throughout the period. Among Alaskan men, death rates from ischemic heart disease declined by 35 percent between 1990 and 2000, dropping from a high of 258 per 100,000 in 1992 to a low of 165 per 100,000 by 1999. Among women, the age-adjusted rates fluctuated between 84 per 100,000 and 131 per 100,000 per year during the period.

Figure 10. Trends in Age-Adjusted Rates of Deaths Due to Ischemic Heart Disease: Alaska and U.S. Women

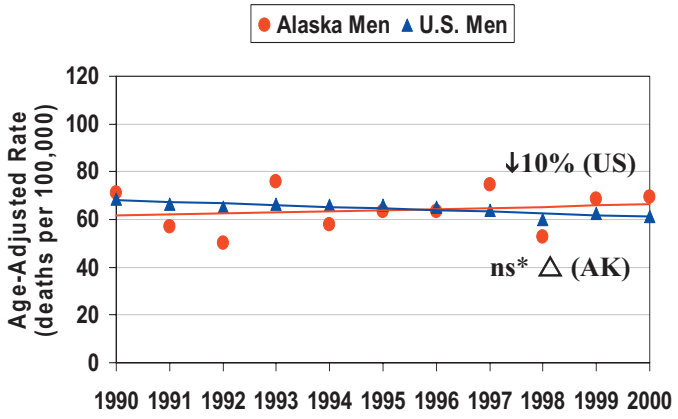


Source: AK Bureau of Vital Statistics

*Regression slope not significantly different from 0.

In comparison, age-adjusted mortality from ischemic heart disease declined among men in the United States during the same period by 27 percent, with a 23 percent decline seen among women.

Figure 11. Trends in Age-Adjusted Rates of Deaths Due to Stroke: Alaska and U.S. Men



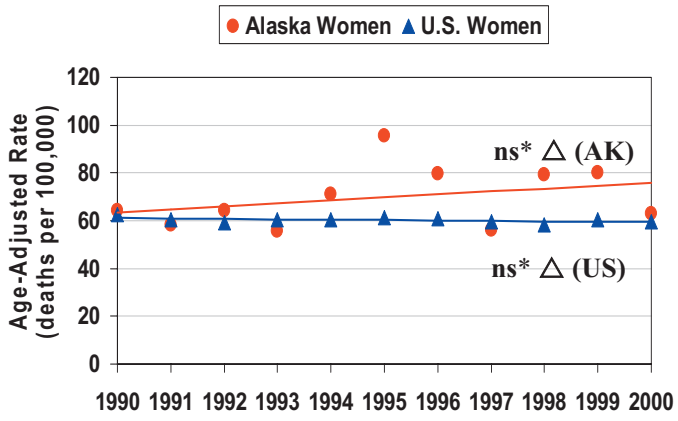
Source: AK Bureau of Vital Statistics

*Regression slope not significantly different from 0.

Age-adjusted death rates from stroke in Alaska have shown little change in either sex since 1990, but there has been considerable variation from year to year. The rates have usually been higher among women in Alaska than among men, with female rates ranging between 56 per 100,000 and 96 per 100,000 per year. Male rates have ranged between 50 per 100,000 and 76 per 100,000 per year.

By contrast, the age-adjusted mortality from stroke has declined among men in the United States during this period by 10 percent, with the national and state trend lines crossing. Among women, neither the trend line for Alaska nor the United States as a whole shows a statistically significant change since 1990. However, the Alaskan rates have exceeded the national rates in every year but one since 1994, suggesting that Alaskan women are starting to fall behind their counterparts in other states in terms of stroke mortality.

Figure 12. Trends in Age-Adjusted Rates of Deaths Due to Stroke: Alaska and U.S. Women

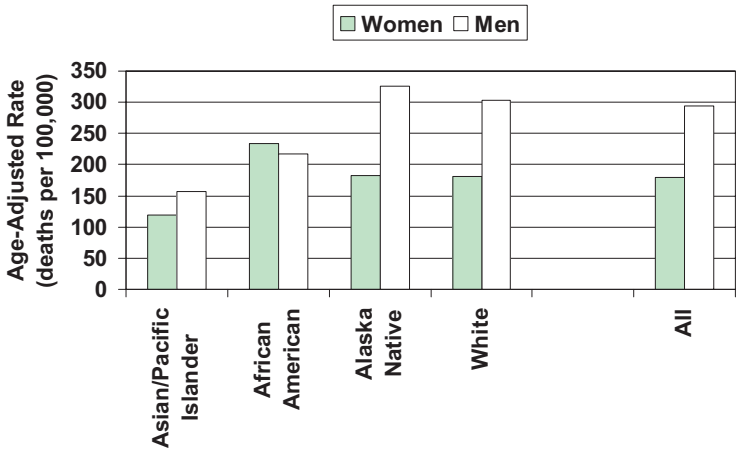


Source: AK Bureau of Vital Statistics

*Regression slope not significantly different from 0.

Figures 13, 14 and 15 illustrate differences in age-adjusted rates of death from cardiovascular disease in Alaska according to sex and race. The rates shown are based on total mortality from cardiovascular disease during the decade 1990 to 1999.

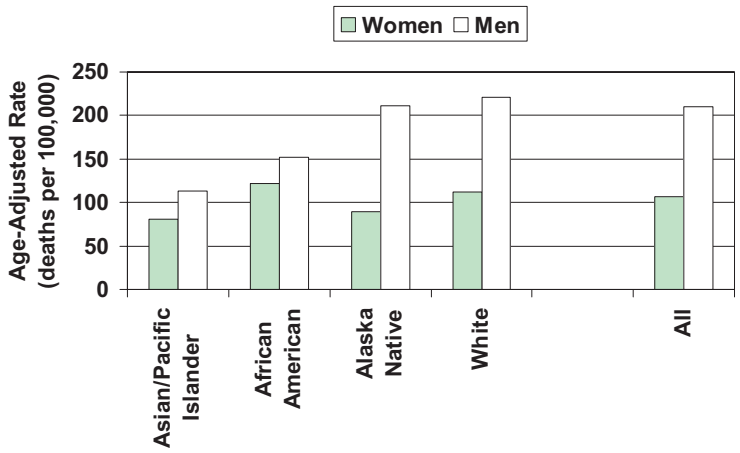
Figure 13. Age-Adjusted Rates of Death Due to Diseases of the Heart, by Race (1990-1999 combined)



Source: AK Bureau of Vital Statistics

Age-adjusted death rates from diseases of the heart were higher among Alaskan men in all racial groups, except among African Americans, where women had a slightly higher mortality rate (Figure 13). Among women, African Americans had the highest age-adjusted mortality rate at 234 per 100,000 per year, while among men the highest age-adjusted rate was seen in Alaska Natives. The rate observed among Alaska Native men was 326 per 100,000 per year, 7 percent higher than the rate in white males and more than twice the rate observed in Asian/Pacific Island men. People included in the Asian/Pacific Islander group had the lowest age-adjusted death rates from diseases of the heart in both sexes. The greatest disparities between sexes were seen among Alaska Natives, where the mortality rate in males was almost 1.8 times the female rate.

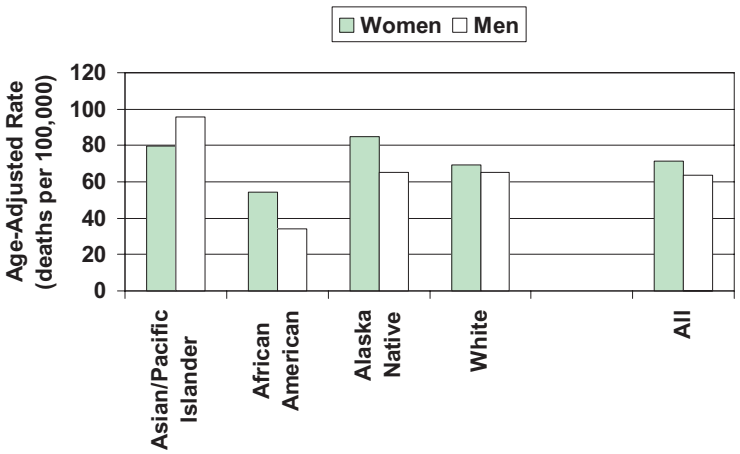
Figure 14. Age-Adjusted Rates of Death Due to Ischemic Heart Disease, by Race (1990-1999 combined)



Source: AK Bureau of Vital Statistics

Looking only at death from ischemic heart disease, age-adjusted rates have been consistently higher in Alaska men than women in all racial groups. White men had the highest rate, at 221 per 100,000 per year, with the rate in Alaska Native men close behind at 212 per 100,000 per year. Among women, the highest rates were in African Americans, at 122 per 100,000 per year. Again, the lowest age-adjusted death rates in both sexes were seen in the Asian/Pacific Islander group. The largest disparity between the sexes was seen in Alaska Natives, where the age-adjusted death rate in males was more than double the rate seen in females.

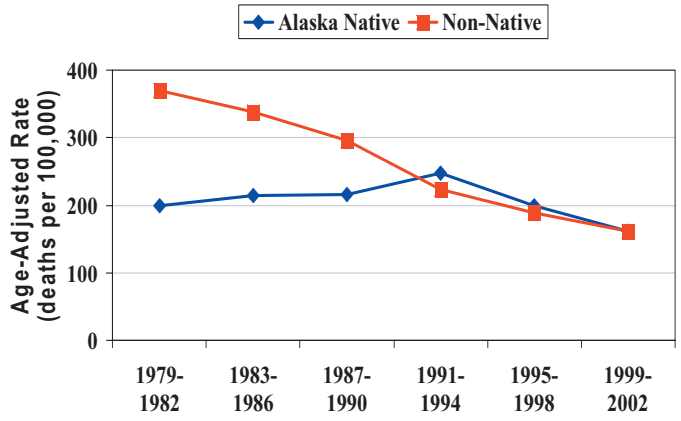
Figure 15. Age-Adjusted Rates of Death Due to Stroke, by Race (1990-1999 combined)



Source: AK Bureau of Vital Statistics

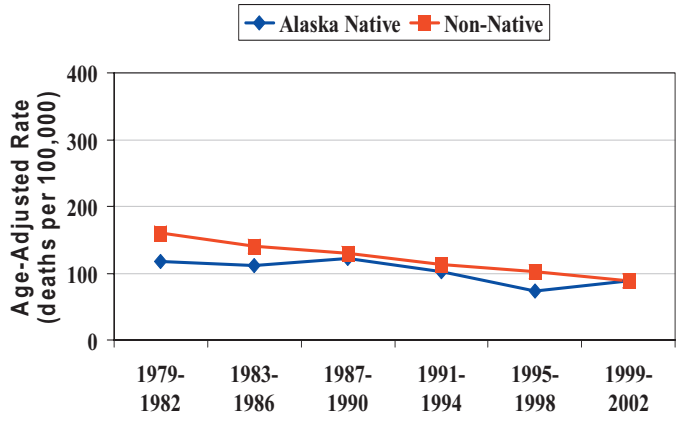
Examining Alaskan stroke mortality, the Asian/Pacific Islander group had the highest age-adjusted death rate in men and the second highest rate among women. Although the numbers of deaths were small among the state's Asian/Pacific Islanders, the group's death rate among men was 1.5 times that seen for men in Alaska at large. Curiously, Alaska's age-adjusted stroke death rate among African American men, a group at high risk for stroke nationally, was only about half the rate seen in the state as a whole. In all race groups except Asian/Pacific Islanders, female death rates from stroke exceeded those of males. The rate in Alaska Native females was 1.3 times that seen in Alaska Native males (85 per 100,000 vs. 65 per 100,000 per year).

Figure 14a. Trends in Age-Adjusted Rates of Deaths Due to Ischemic Heart Disease: Alaska Native vs. Non-Native Men



Source: AK Bureau of Vital Statistics

Figure 14b. Trends in Age-Adjusted Rates of Deaths Due to Ischemic Heart Disease: Alaska Native vs. Non-Native Women

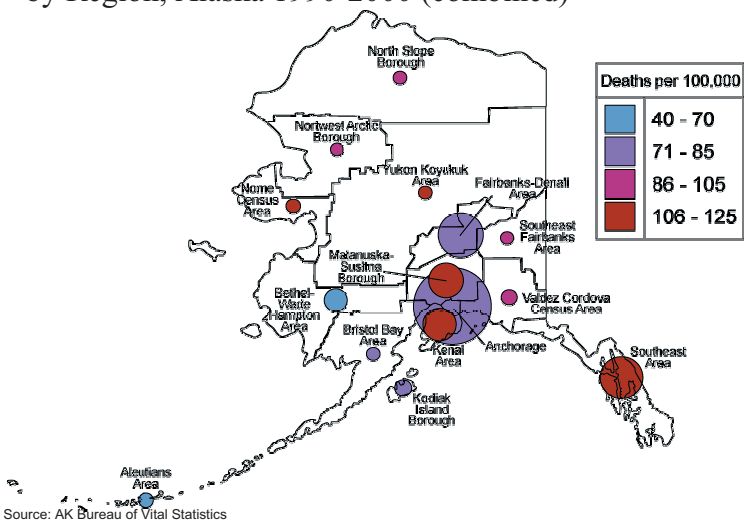


Source: AK Bureau of Vital Statistics

Since 1990, the similarities seen in cardiovascular mortality rates between Alaska Natives and non-Natives, particularly whites, are striking. But these comparable rates actually represent a significant change from previous years, at least among men. Figure 14a shows that the age-adjusted mortality rate for ischemic heart disease among Alaska Native males a quarter-century ago was approximately half that of non-Native males. Since then mortality among non-Native males has fallen sharply, while it has changed little for their Alaska Native counterparts. The convergence of mortality rates between these racial groups since 1990 has occurred at a time when Alaska Natives have been exposed increasingly to such risk factors for cardiovascular disease as smoking, Western diets, diabetes and sedentary lifestyles. Among women there has always been less disparity between the races for ischemic heart disease mortality, and the convergence of rates in recent years is less apparent (Figure 14b).

Figures 16, 17 and 18 show differences in rates of death from cardiovascular disease in boroughs and census areas across the state between 1990 to 2000. The volume of each sphere is proportional to the population of the borough or census area, as reported by the 2000 Census. The reader should be warned that these maps are based on crude death rates, which may be biased by differences in the underlying age distributions of the populations being compared. The relatively small number of cause-specific deaths observed in Alaska, even during an 11-year period, makes computation of age-adjusted rates for most geographic areas of the state unreliable.

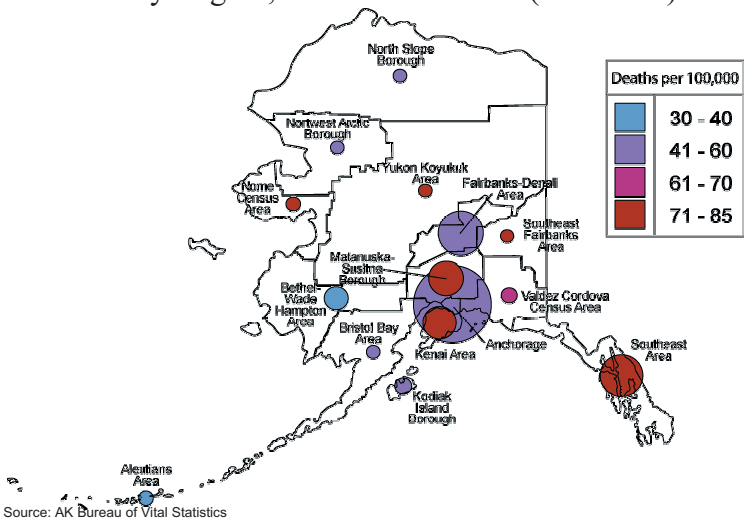
Figure 16. Crude Death Rates of Diseases of the Heart by Region, Alaska 1990-2000 (combined)



Source: AK Bureau of Vital Statistics

Crude death rates from diseases of the heart varied from 45 per 100,000 per year in the Aleutians to 120 per 100,000 in the Yukon-Koyukuk Census Area (Figure 16). Among the five regions having more than 50,000 persons each (Anchorage, Fairbanks-Denali, Southeast, Matanuska-Susitna and Kenai), the highest death rate was seen in the Southeast, at 110 per 100,000 per year. The lowest rate was in Anchorage, at 78 per 100,000 per year.

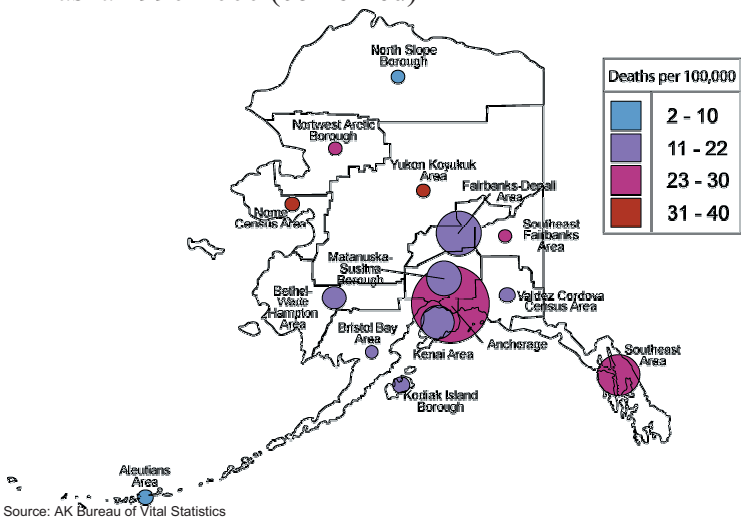
Figure 17. Crude Death Rates of Ischemic Heart Disease by Region, Alaska 1990-2000 (combined)



Source: AK Bureau of Vital Statistics

Crude death rates from ischemic heart disease show a similar pattern to that seen for deaths from all heart disease. Again, the Aleutians had the lowest rate (33 per 100,000 per year) and the Yukon-Koyukuk Census Area had the highest rate (79 per 100,000 per year). Among the five largest regions, the rates in Kenai, Southeast and Matanuska-Susitna were higher (78, 77 and 76 per 100,000 per year, respectively) while the rates in Anchorage and Fairbanks-Denali were lower (55 and 57 per 100,000 per year, respectively.)

Figure 18. Crude Death Rates of Stroke by Region, Alaska 1990-2000 (combined)



Source: AK Bureau of Vital Statistics

The pattern of crude death rates from stroke is similar to that seen for death from heart disease. Again, the Aleutians had the lowest rate (3 per 100,000 per year) and the Yukon-Koyukuk Census area had the highest rate (35 per 100,000 per year.) Stroke death rates were similar in the five largest regions, ranging from 19 per 100,000 per year in Fairbanks-Denali and Kenai to 26 per 100,000 per year in Southeast Alaska.

hospitalization for cardiovascular disease

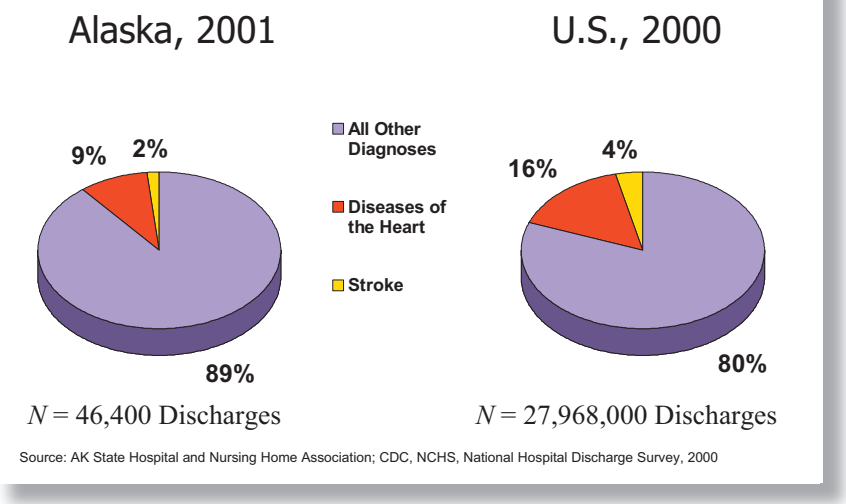
In addition to death, cardiovascular disease contributes significantly to serious morbidity in the population

It is the underlying cause of a substantial portion of outpatient medical visits, pharmacy dispensing and community-based rehabilitation services.

Unfortunately, it is difficult to measure the full impact of non-fatal cardiovascular disease in Alaska, as few population-based morbidity data sources are currently available for analysis. The most useful data source, for the most serious morbidity, is Alaska's new hospital discharge database. At present this database includes all discharges in 2001 from the state's larger hospitals, as well as several smaller hospitals.

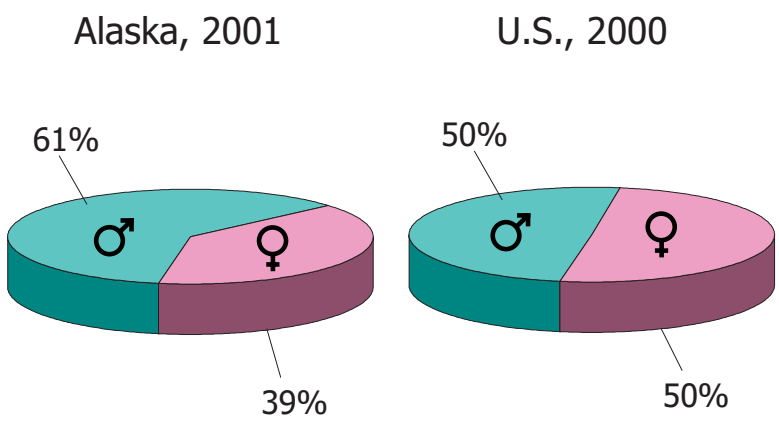
Of more than 46,000 hospitalizations reported in the hospital discharge database in Alaska during 2001, about 11 percent were primarily for heart disease and stroke. In this total, here and elsewhere in this section of the report, all admissions for reasons other than disease, such as normal pregnancy and delivery, have been excluded from analysis. In the United States during 2000 there were nearly 28 million discharges meeting the same criteria. Of those, about 20 percent were primarily for heart disease and stroke.

Figure 19. Heart Disease and Stroke as Primary Hospital Discharge Diagnosis, Alaska 2001, U.S. 2000



Source: AK State Hospital and Nursing Home Association; CDC, NCHS, National Hospital Discharge Survey, 2000

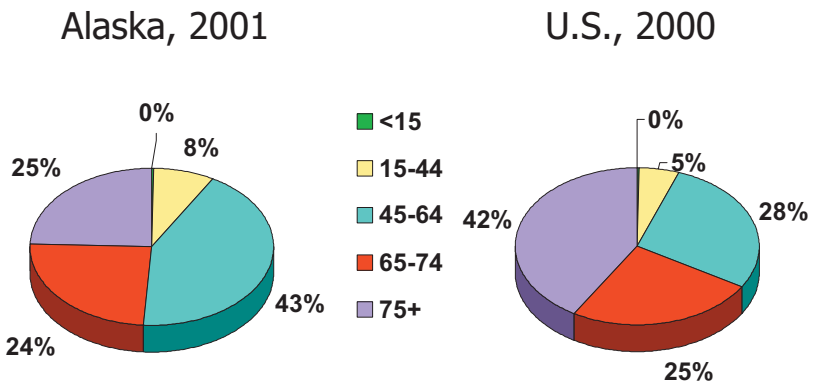
Figure 20. Hospital Discharges for Heart Disease and Stroke, by Sex, Alaska 2001, U.S. 2000



Source: AK State Hospital and Nursing Home Association; CDC, NCHS, National Hospital Discharge Survey, 2000

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 21. Hospital Discharges for Heart Disease and Stroke, by Age, Alaska 2001, U.S. 2000



Source: AK State Hospital and Nursing Home Association; CDC, NCHS, National Hospital Discharge Survey, 2000

In the United States, only about one-third of hospital discharges for heart disease and stroke involve persons under 65 years of age. In Alaska, more than half of the discharges for these conditions involve persons under age 65. The proportion of discharges among the 44- to 64-year-old age group in Alaska is roughly 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 75 percent as likely as other Americans their age to be hospitalized for heart disease, and only 61 percent as likely to be hospitalized for stroke. Alaskans over 65 years of age are only 81 percent as likely as other Americans their age to be hospitalized for heart disease, and only 66 percent as likely to be hospitalized for stroke.

Table 4. Number, percentage within disease, and rate of discharges for selected first-listed diagnoses, by sex and age, Alaska (2001) and U.S. (2000).

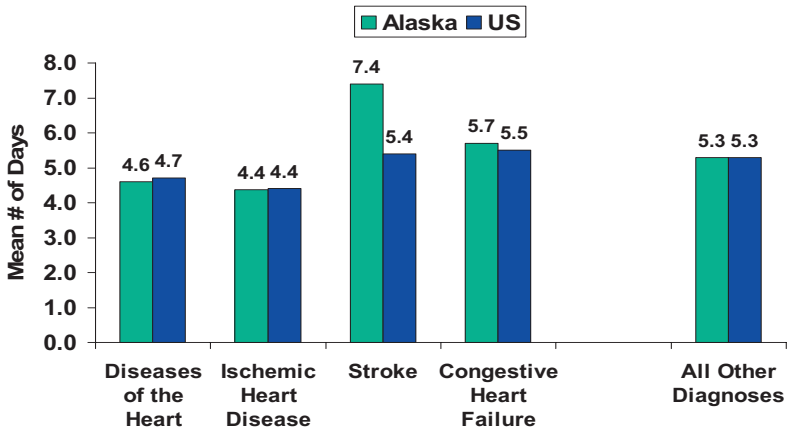
	Diseases of The Heart		Ischemic Heart Disease		Stroke	
	AK	US	AK	US	AK	US
Total						
Discharges	4,277	4,385,000	2,125	2,166,000	745	981,000
Rate[a]	82.3	157.7	40.9	77.9	14.3	35.3
Males						
Discharges	2,664	2,243,000	1,476	1,247,000	390	428,000
% within Disease	62%	51%	69%	59%	52%	44%
Rate	99.4	165.0	55.1	93.7	14.6	31.5
Females						
Discharges	1,613	2,142,000	649	892,000	355	553,000
% within Disease	38%	49%	31%	41%	48%	56%
Rate	64.1	150.7	25.8	62.8	14.1	38.9
<15						
Discharges	17	16,000	0	*	3	*
% within Disease	<1%	<1%	0%	<1%	<1%	<1%
Rate	1.3	2.6	0.0	*	0.2	*
15-44						
Discharges	340	244,000	141	109,000	52	37,000
% within Disease	8%	6%	7%	5%	7%	4%
Rate	14.3	20.0	5.9	8.9	2.2	3.0
45-64						
Discharges	1,883	1,271,000	1,112	789,000	274	229,000
% within Disease	44%	29%	52%	36%	37%	23%
Rate	157.4	208.6	93.0	129.5	22.9	37.6
65+						
Discharges	2,037	2,854,000	872	1,265,000	416	711,000
% within Disease	48%	65%	41%	58%	56%	72%
Rate	669.9	827.8	286.8	366.9	136.8	206.3

Notes: Alaska data source is Alaska State Hospital and Nursing Home Association's hospital discharge data set, 2001; US data source is the National Hospital Discharge Survey, 2000, CDC, National Center for Health Statistics; Alaska population data from Alaska Department of Labor and Workforce Development, Research & Analysis Section, 2000.
[a]Number of discharges per 10,000 population.
*Numbers did not meet the standard of reliability or precision.

Reasons for lower age-specific hospitalization rates in Alaska are not certain. 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 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.

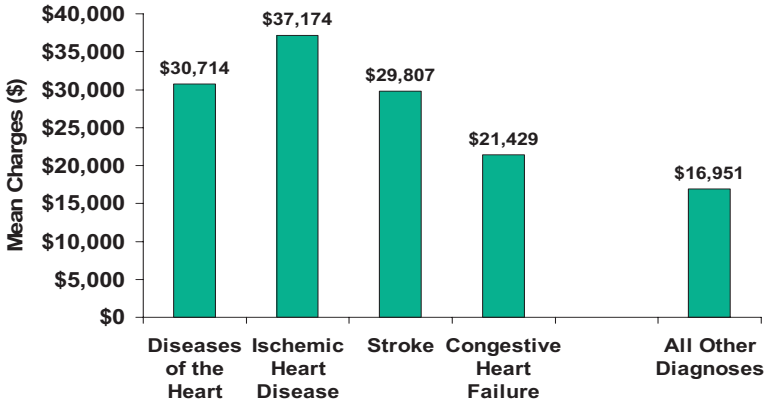
Figure 22. Mean Length-of-Stay by Primary Discharge Diagnosis, Alaska 2001, U.S. 2000



Source: AK State Hospital and Nursing Home Association; CDC, NCHS, National Hospital Discharge Survey, 2000

Comparing the mean length of hospital stay across disease types, there are relatively few differences between cardiovascular diseases and all other diagnoses, either in Alaska or the United States. The mean values for length of stay in Alaska differed little from means in the country at large, except for stroke.

Figure 23. Mean Charges by Primary Discharge Diagnosis, Alaska 2001



Source: AK State Hospital and Nursing Home Association

Alaska data for mean charges per hospital stay show substantially higher costs associated with cardiovascular admissions than most other diagnoses. This is especially true when the primary diagnosis is ischemic heart disease. 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. This analysis excludes those cases treated in military and Native hospitals where charge data were not recorded.

risk factors for cardiovascular disease

There is a growing understanding of the factors that determine the risk of cardiovascular disease

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

Considerable research has shown that each of the following factors contributes directly or indirectly to cardiovascular disease 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 unhealthy nutrition, using data from the Alaska Behavioral Risk Factor Surveillance System (BRFSS). Background information about the BRFSS can be found in Appendix A.

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 cardiovascular disease. Again, no data are available on this in Alaska.

A. Smoking

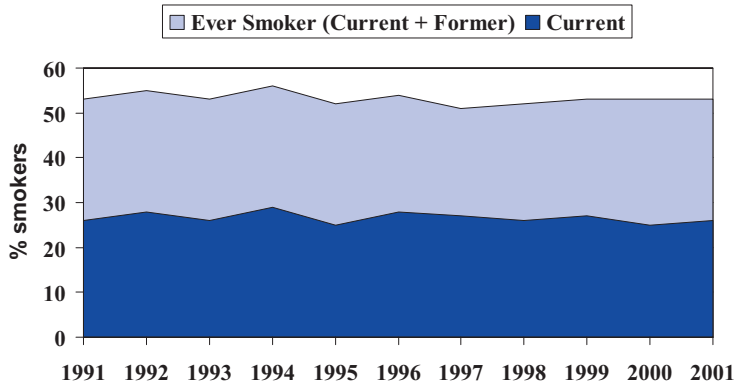
Cigarette smoking is the foremost preventable cause of death in the United States, worsening the risk of heart disease, stroke and peripheral vascular disease, as well as a range of cancers and other disorders. Tobacco exerts a powerful influence on a person's risk of cardiovascular disease in many ways,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

Some facts about smoking and cardiovascular disease:

- Smoking accounts for as many as 30 percent of deaths from ischemic heart disease each year[1] and 18 percent of strokes.[2]
- Smoking even a few cigarettes per day increases a man's risk of heart disease by about 70 percent and a woman's risk by about 50 percent.[3] The association between smoking and heart disease is strongly dose-dependent.
- Smoking increases the risk of stroke by 80 percent.[2]
- Environmental tobacco smoke is a serious public health problem, accounting for the deaths of about 35,000 nonsmokers from heart disease each year.[4]
- 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.[5]
- No single lifestyle change can do as much to reduce the risk of cardiovascular disease as quitting smoking.

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.

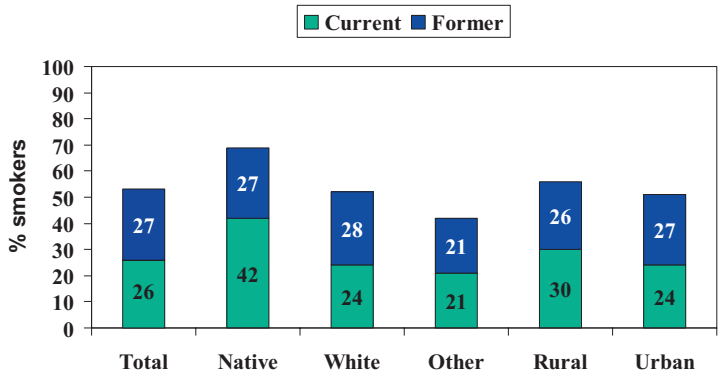
Figure 24. Prevalence of Smoking, Alaska 1991-2001



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 current smoking was 23 percent in 2001. The percentage of Alaskan adults who report that they are former smokers has also held constant since 1991, between 25 and 30 percent.

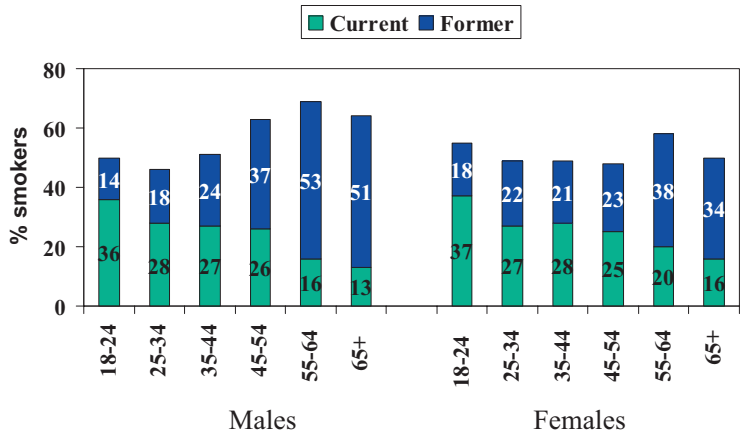
Figure 25. Prevalence of Smoking by Race and Region, Alaska 1999-2001 (combined)



Source: AK BRFSS

Alaska Native adults report smoking at a much higher level than other racial groups. Nearly 70 percent of Native adults are either current or former smokers, compared to 52 percent of whites and 42 percent of others. Rural Alaskan adults report smoking at a higher level than their urban counterparts.

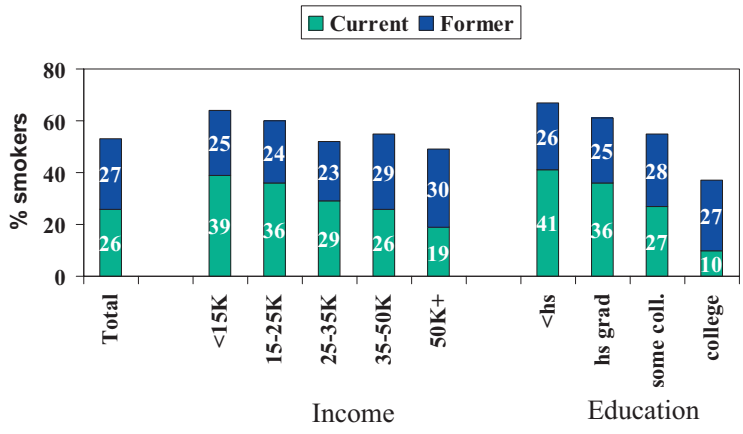
Figure 26. Prevalence of Smoking by Age and Sex, Alaska 1999-2001 (combined)



Source: AK BRFSS

The prevalence of current smoking in Alaska is highest among young adults and decreases with age. There is little difference in current smoking prevalence between the sexes, although a larger proportion of males aged 45 and above are former smokers.

Figure 27. Prevalence of Smoking by Income and Education, Alaska BRFSS: 1999-2001 (combined)



Source: AK BRFSS

The prevalence of current smoking in Alaska is highest among those with low incomes and those who did not complete high school. It 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 current smoking.

B. Diabetes

Diabetes mellitus is a metabolic disorder characterized by excess sugar in the blood. It is due to either a deficiency in insulin secretion, or a reduction in its effectiveness, or both. Diabetes 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

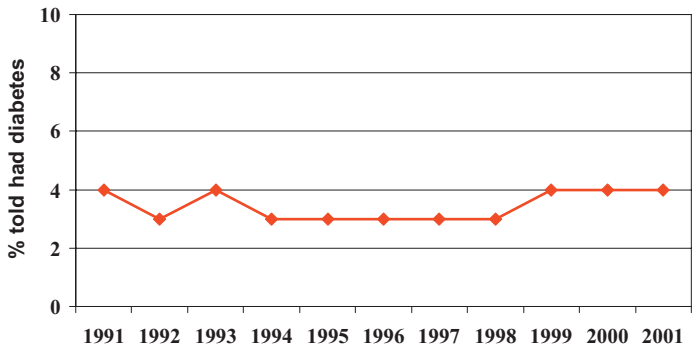
evidence that improved control of hyperglycemia reduces the incidence of microvascular complications of diabetes, it is not clear to what extent such control reduces the risk of ischemic heart disease and stroke.

Some facts about diabetes and cardiovascular disease:

- Cardiovascular disease accounts for about two-thirds of deaths in persons with diabetes.[6]
- 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.[7]
- Diabetes increases the risk of stroke by a factor of two to nearly six.[2]
- Diabetic patients who develop ischemic heart disease experience more morbidity and mortality than non-diabetic patients with ischemic heart disease.[8]
- Excess body fat and physical inactivity predispose people to develop type 2 diabetes, the most common form of the disease.
- 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 incidence of cardiovascular disease.[9]
- One-third or more of diabetes in the United States is undiagnosed.[10]

In the Alaska BRFSS, participants were asked, "Have you ever been told by a doctor that you have diabetes?" Those who answered "yes" were considered to have diabetes.

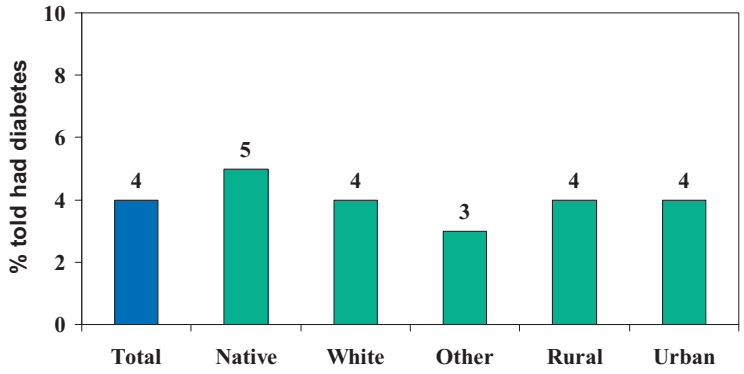
Figure 28. Prevalence of Diabetes, Alaska 1991-2001



Source: AK BRFSS

The percentage of Alaskan adults who report that they have been diagnosed with diabetes has held fairly constant since 1991, at about 3 to 4 percent. Nationally, the percentage of adults reporting a diagnosis of diabetes was 6.5 percent in 2001.

Figure 29. Prevalence of Diabetes by Race and Region, Alaska 1999-2001 (combined)

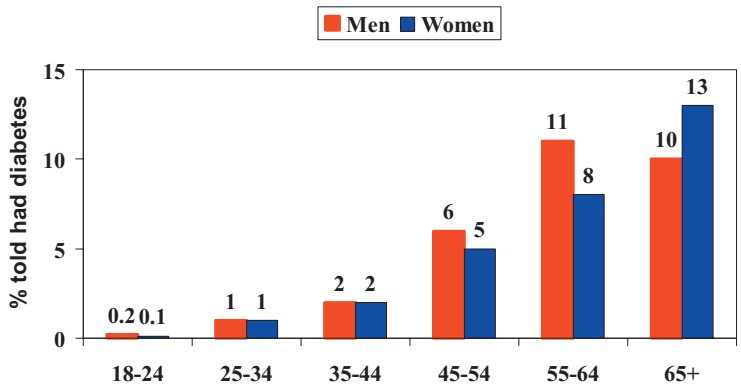


Source: AK BRFSS

Alaska Native adults report being diagnosed with diabetes at a slightly higher level than other racial groups, but the difference is not statistically significant. Likewise, there is no difference in rural and urban populations.

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 the Alaska Area Diabetes Team of the Alaska Native Tribal Health Consortium, diabetes prevalence has risen among Alaska Natives by more than 70 percent since 1990. Increases of 100 percent or more have been observed in the Dillingham, Barrow, Nome and Metlakatla service regions.

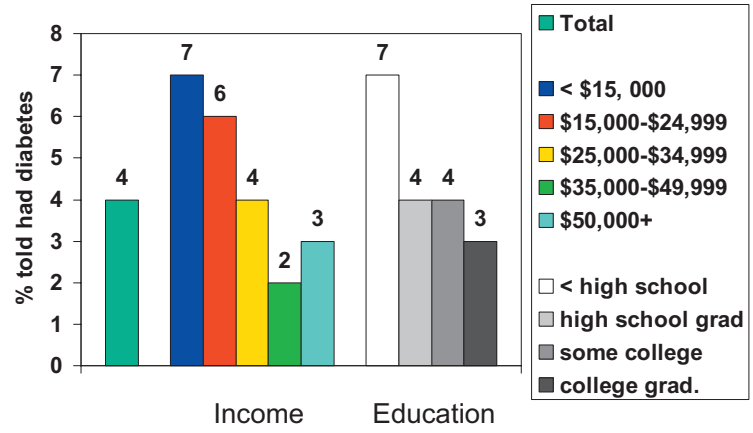
Figure 30. Prevalence of Diabetes by Age and Sex, Alaska 1999-2001 (combined)



Source: AK BRFSS

Diagnosed diabetes prevalence increases sharply with age, and is highest in Alaska among those over 65 years of age. Among those 65 and over, approximately one in ten males and one in eight females is diagnosed with diabetes. Before age 65, prevalence among males slightly exceeds that of females.

Figure 31. Prevalence of Diabetes by Income and Education, Alaska 1999-2001 (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. It tends to decrease with increasing income and education.

C. Overweight and Obesity

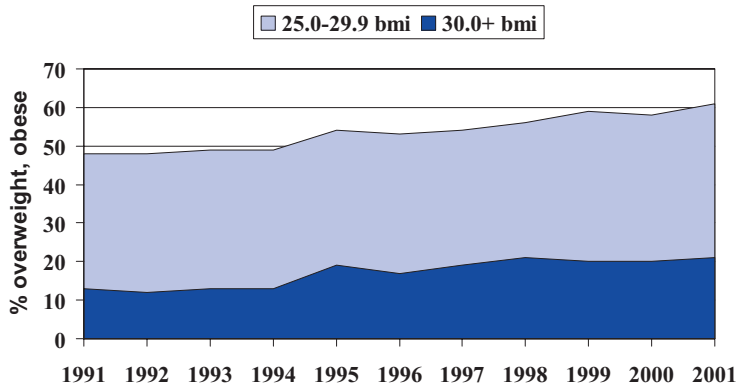
Overweight and obesity are reaching epidemic proportions in the United States, with adverse consequences for health. Obesity in adults is generally defined as a body mass index (BMI) greater than or equal to 30 kg/m^2. Overweight in adults is defined as a BMI of 25.0 to 29.9 kg/m^2. Excess body weight 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 cardiovascular disease is probably mediated through these factors, although other mechanisms that are less well understood may play a role.

Some facts about overweight/obesity and cardiovascular disease:

- 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.[11]
- More than three-quarters of high blood pressure can be directly attributed to obesity.[12]
- Abdominal obesity, rather than BMI, may be a more accurate predictor of risk for cardio vascular disease, especially for men. Weight gain after 18 years of age may also be an independent predictor of risk, especially for women.[2]
- Men with a markedly elevated waist-hip ratio are 2.3 times as likely to have a stroke as men without abdominal obesity.[2]

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

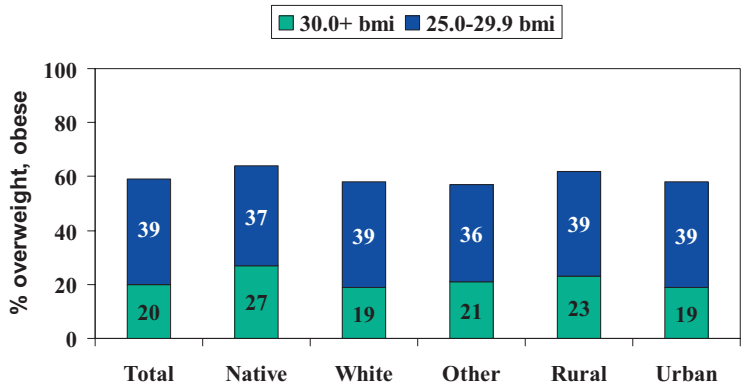
Figure 32. Prevalence of Overweight and Obesity, Alaska 1991-2001



Source: AK BRFSS

The percentage of Alaskan adults whose reported weight and height meet the definition of obese (BMI ≥ 30.0) has risen from less than 15 percent in the early 1990s to 20 percent or more since 1998. Nationally, the percentage of adults whose reported weight and height meet the obesity definition was 21 percent in 2001. The percentage of Alaskan adults reporting weights and heights indicating that they are overweight has tended upward since 1998, averaging 39 percent since 1999. Nationally, 37 percent of adults were classified as overweight in 2001. At present approximately 60 percent of Alaskan adults are either overweight or obese.

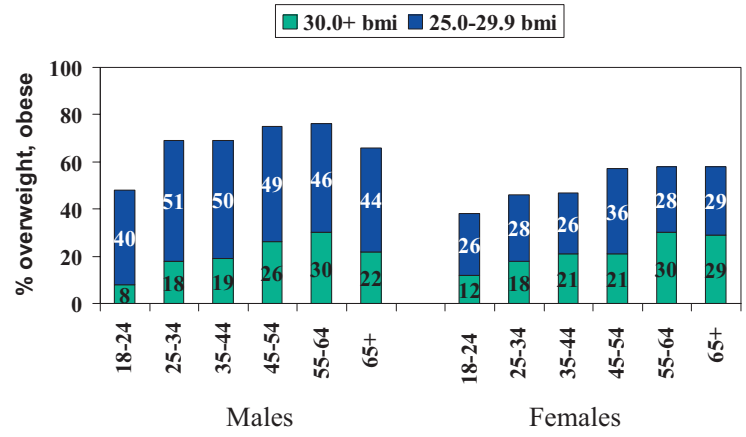
Figure 33. Prevalence of Overweight and Obesity by Race and Region, Alaska 1999-2001 (combined)



Source: AK BRFSS

Alaska Native adults are more likely than other racial groups to report weights and heights indicative of obesity. Overweight percentages do not differ greatly by race. Rural Alaskan adults are somewhat more likely to be obese than their urban counterparts.

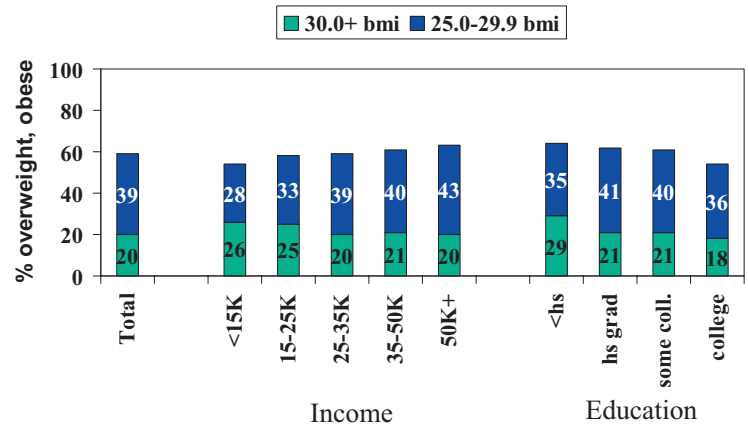
Figure 34. Prevalence of Overweight and Obesity by Age and Sex, Alaska 1999-2001 (combined)



Source: AK BRFSS

Obesity is uncommon among young adult Alaskans, but it increases with age up to 55-64 years, when 30 percent of both sexes indicate that they are obese. The sexes differ little in the likelihood of obesity throughout life, but males are far more likely to be overweight than females in every age group. Three-quarters of Alaska males aged 45 to 64 years are either overweight or obese.

Figure 35. Prevalence of Overweight and Obesity by Income and Education, Alaska 1999-2001 (combined)



Source: AK BRFSS

The prevalence of obesity in Alaskan adults shows an inverse association with income and education. By contrast, being overweight is more likely as income rises. Those with household incomes of more than $50,000 per year were 23 percent less likely to be obese but 53 percent more likely to be overweight than those earning less than $15,000 per year. No clear trend with being overweight was seen by education level.

D. Physical Inactivity

Physical inactivity is strongly linked to cardiovascular disease 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

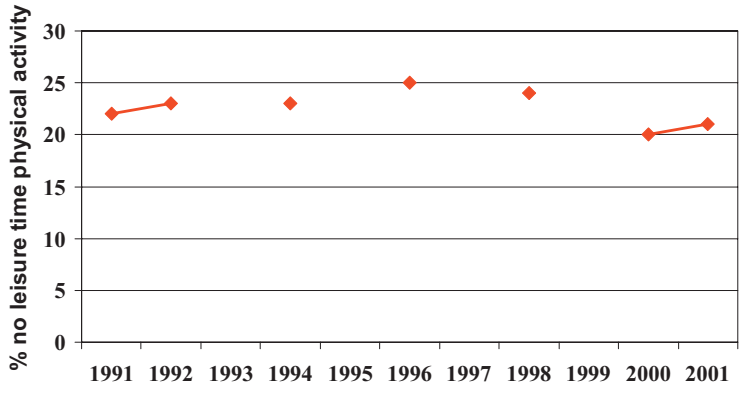
breathing are significantly increased. But even less intense activity is beneficial, compared to a sedentary lifestyle. Much of the protective effect of physical activity is probably mediated through improvements in blood pressure and body weight, as well as alterations in lipid and carbohydrate metabolism. But routine physical activity also has direct effects on cardiovascular health, by improving arterial elasticity and helping the cells that line the inside of arteries reduce the progression of atherosclerosis.

Some facts about physical inactivity and cardiovascular disease:

- Compared to those who are vigorously active, those with a sedentary lifestyle have nearly twice the risk of developing ischemic heart disease.[13]
- Physical inactivity is associated with a three-fold increase in risk of stroke in middle-aged men.[14]
- Women who walk briskly for half an hour each day reduce their cardiovascular risk by approximately 35 percent.[15]
- Aerobic exercise can cause a decrease of 8 to 10 mm Hg in both systolic and diastolic blood pressure measurements.[16]
- In persons at high risk of developing type 2 diabetes, routine physical activity of 150 minutes per week, coupled with at least 7 percent weight loss, reduced the incidence of diabetes by 58 percent.[17]

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, 2000 and 2001.

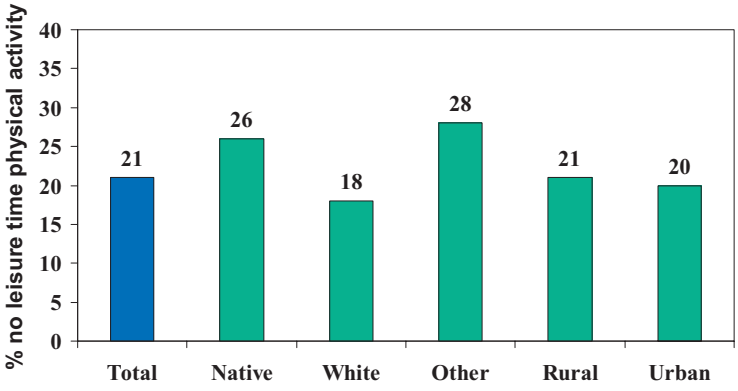
Figure 36. Prevalence of Physical Inactivity, Alaska 1991-2001



Source: AK BRFSS

The percentage of Alaskan adults who report having no leisure time physical activity has held fairly constant since 1991, between 20 and 25 percent. Nationally, the percentage of adults reporting no such physical activity was 26 percent in 2001.

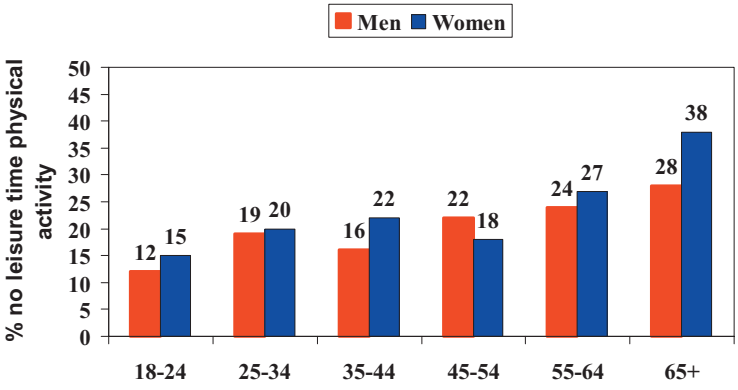
Figure 37. Prevalence of Physical Inactivity by Race and Region, Alaska 2000-2001 (combined)



Source: AK BRFSS

Alaska Native adults and other non-whites report having no leisure time physical activity at higher levels than whites. There is no significant difference between rural and urban populations.

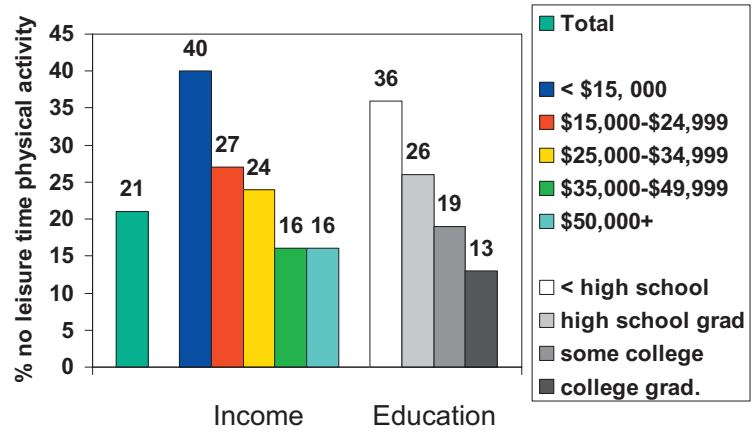
Figure 38. Prevalence of Physical Inactivity by Age and Sex, Alaska 2000-2001 (combined)



Source: AK BRFSS

Physical inactivity generally increases with age, and is highest in Alaska among those over 65 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. Females tend to be less active than males, except in the age group 45-54 years.

Figure 39. Prevalence of Physical Inactivity by Income and Education, Alaska 2000-2001 (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 $35,000 or more. Those 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

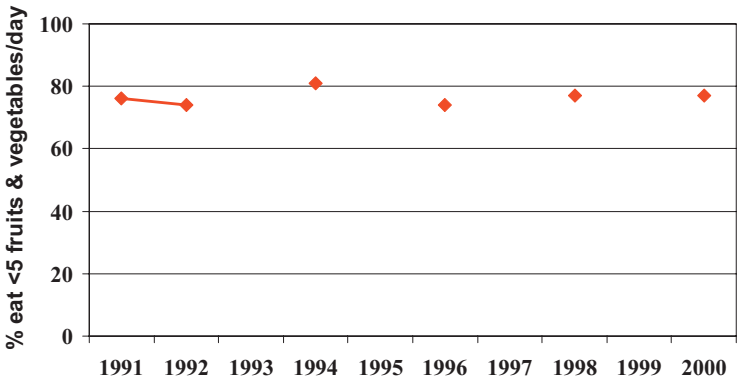
Inadequate nutrition contributes significantly to cardiovascular risk. Diet exerts complex effects on health, and is closely associated with other CVD risk factors, such as high blood pressure, elevated blood cholesterol and obesity. An overall healthy eating pattern includes a variety of fruits, vegetables, 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. Fish and other foods rich in omega-3 fatty acids should be encouraged, as should fruits and vegetables, especially cruciferous and green leafy vegetables and citrus fruit and juice. Measuring nutrition in surveys is often difficult. We are using consumption of five or more servings of fruits and vegetables in a day as an overall marker of a healthy diet.

Some facts about inadequate nutrition and cardiovascular disease:

- Up to 30 percent of deaths from ischemic heart disease are due to unhealthy diets.[18]
- 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.[5]
- Every gram of increase in soluble fiber intake will decrease LDL-cholesterol by an average of 2.2 mg/dl.[19]
- 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.[2]

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.

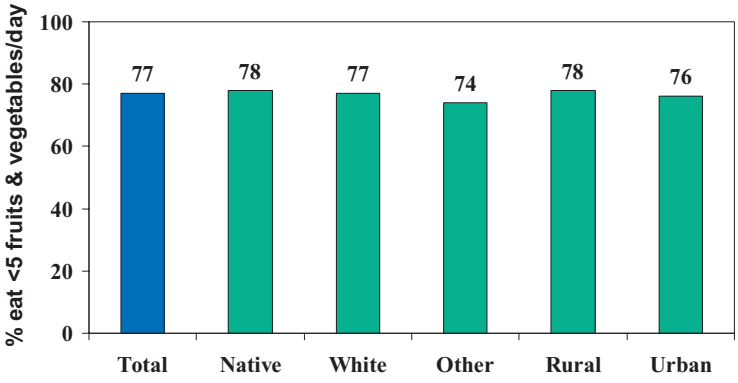
Figure 40. Prevalence of Inadequate Nutrition, Alaska 1991-2000



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 approximately 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 2000.

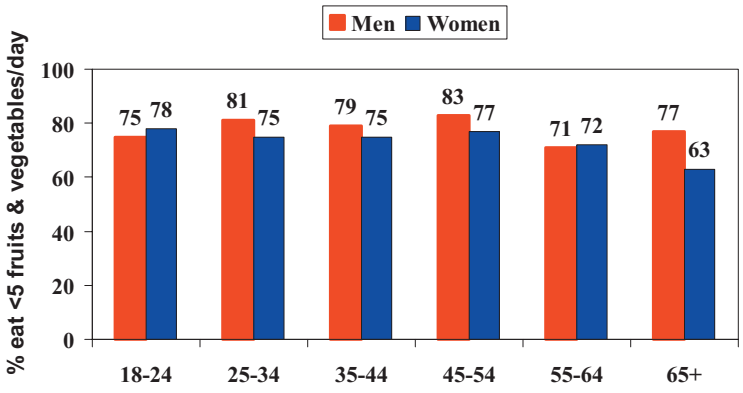
Figure 41. Prevalence of Inadequate Nutrition by Race and Region, Alaska 1998 and 2000 (combined)



Source: AK BRFSS

There is no difference among Alaskan racial groups, or between rural and urban populations, in terms of reported fruit and vegetable consumption.

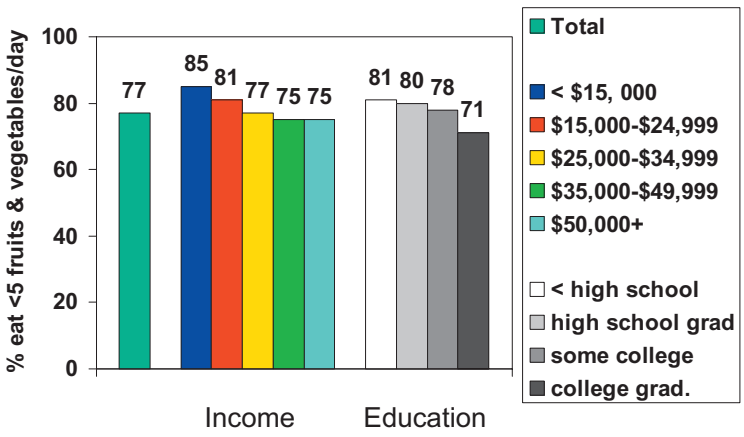
Figure 42. Prevalence of Inadequate Nutrition by Age and Sex, Alaska 1998 and 2000 (combined)



Source: AK BRFSS

Inadequate consumption of fruits and vegetables is common in both sexes and among all age groups of Alaskan adults. Women over 65 years of age were slightly less likely than other age groups of either sex to report inadequate fruit and vegetable consumption.

Figure 43. Prevalence of Inadequate Nutrition by Income and Education, Alaska 1998 and 2000 (combined)



Source: AK BRFSS

Inadequate consumption of fruits and vegetables is slightly more common in Alaska among those in the lowest income and lowest education classes.

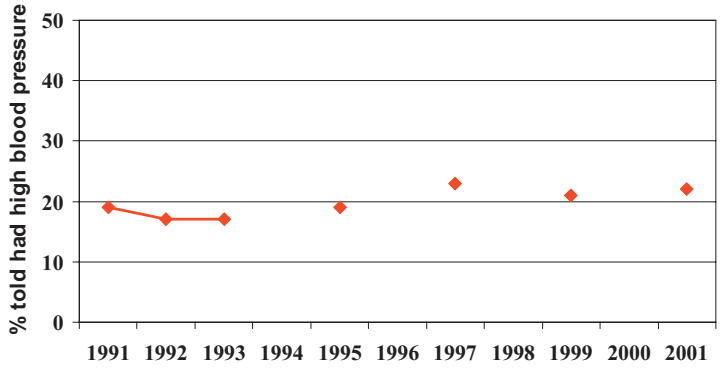
F. Hypertension

Hypertension is a potent risk factor for cardiovascular disease. 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 cardiovascular disease 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 and cardiovascular disease:

- The risk of ischemic heart disease is four times higher in those with a diastolic blood pressure of 105 mm Hg, compared to individuals with a diastolic pressure of 84 mm Hg or less. [20]
- 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.[3]
- A 50-year-old with untreated high blood pressure is four times as likely to suffer a stroke as someone the same age without hypertension. The risk is reduced by 38 percent with treatment.[2]
- 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.[21]
- One in four adult Americans has high blood pressure. Of those, 32 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.[5]

Figure 44. Prevalence of Hypertension, Alaska 1991-2001

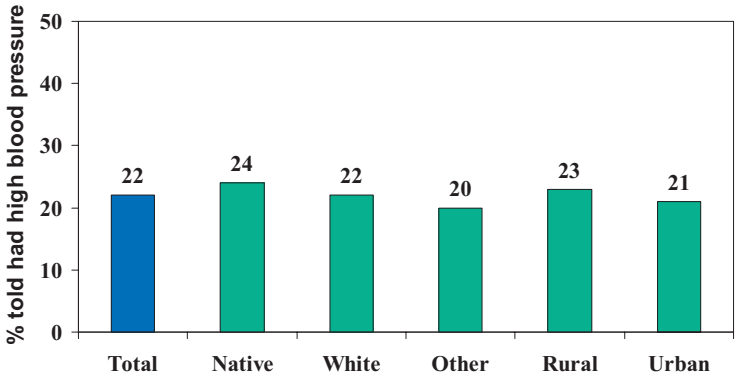


Source: AK BRFSS

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.

The percentage of Alaskan adults who report having been told that they have high blood pressure has held fairly constant since 1991, between 15 and 25 percent. Nationally, the percentage of adults reporting high blood pressure was 24 percent in 1999.

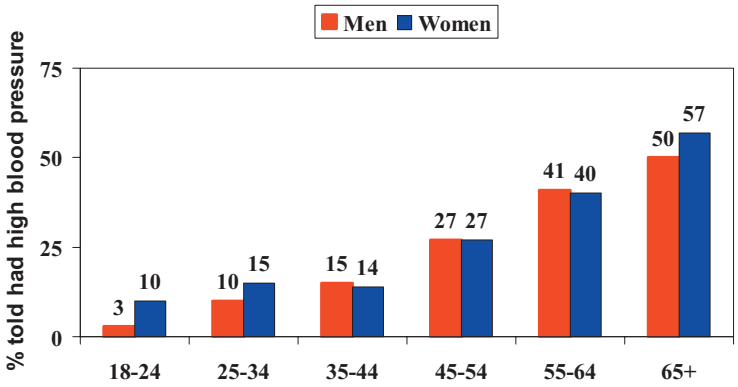
Figure 45. Prevalence of Hypertension by Race and Region, Alaska 1999 and 2001 (combined)



Source: AK BRFSS

Alaska Native adults report having high blood pressure at a slightly higher level than other racial groups. There is also a slightly higher prevalence among rural populations compared to urban populations. Neither difference attains statistical significance, however.

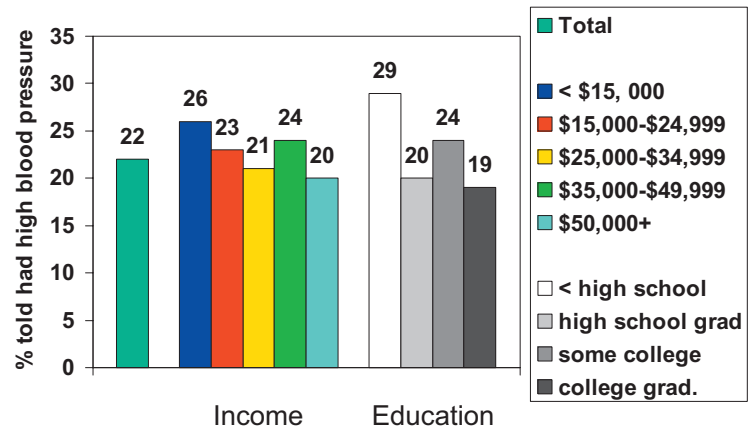
Figure 46. Prevalence of Hypertension by Age and Sex, Alaska 1999 and 2001 (combined)



Source: AK BRFSS

Reported hypertension prevalence increases dramatically with age, and is highest in Alaska among those over 65 years of age. Among those 65 and over, half of males and nearly six in ten females report high blood pressure. Although rare, reported hypertension is more common in females before the age of 35 years than in males, although the difference is not statistically significant. Between ages 35 and 64 there is even less difference between the sexes.

Figure 47. Prevalence of Hypertension by Income and Education, Alaska 1999 and 2001 (combined)



Source: AK BRFSS

The prevalence of reported hypertension in Alaska is highest among those with the lowest incomes and among those who did not complete high school. It tends to decrease with increasing education, but the relationship with income is less clear. Underdiagnosis 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 cardiovascular 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, drugs.

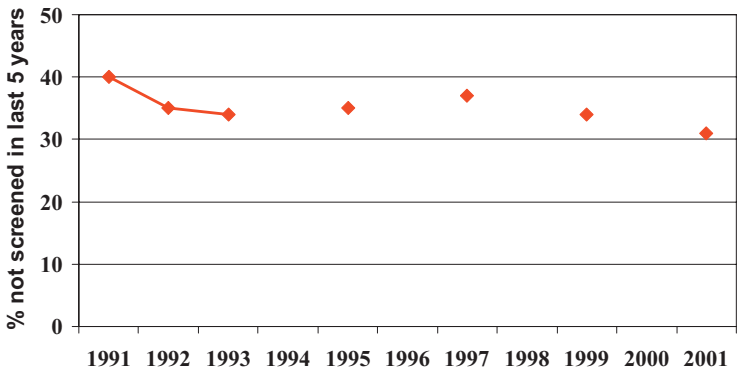
Some facts about high blood cholesterol and cardiovascular disease:

- 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.[3]
- 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.[22]
- A 10 percent decrease in total cholesterol levels is associated with a 30 percent reduction in risk of ischemic heart disease.[23]

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 before 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.

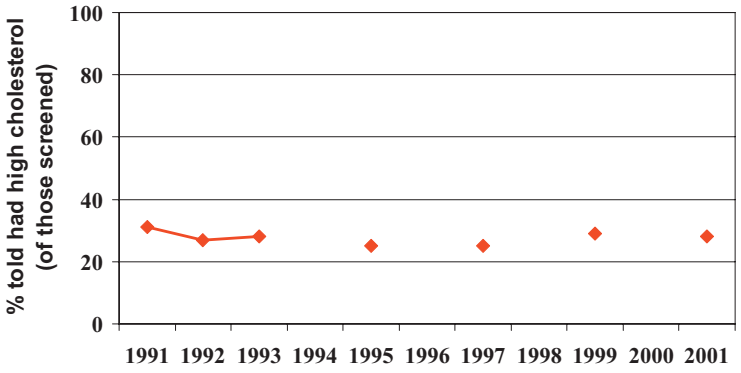
Figure 48. Prevalence of No Cholesterol Screening in Last 5 Years, Alaska 1991-2001



Source: AK BRFSS

The percentage of Alaskan adults who report they have not been tested for blood cholesterol in the last five years has decreased slightly since 1991, to approximately 31 percent in 2001.

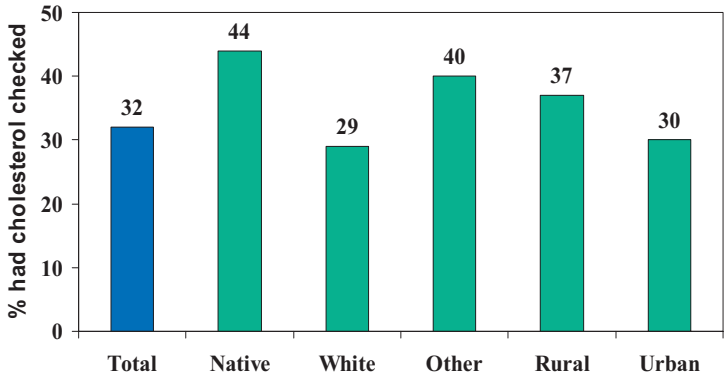
Figure 49. Prevalence of High Cholesterol, Alaska 1991-2001



Source: AK BRFSS

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 31 percent in 1999, and the percentage of those tested who report having high blood cholesterol was 30 percent.

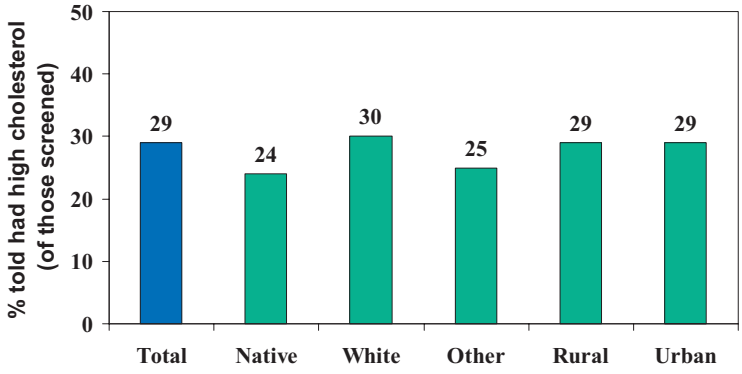
Figure 50. Prevalence of No Cholesterol Screening in Last 5 Years, by Race and Region, Alaska 1999 and 2001 (combined)



Source: AK BRFSS

Alaska Native adults are less likely than whites to report being tested for blood cholesterol in the last five years. Those who are tested are also less likely than whites to report having an elevated blood cholesterol level, although the difference is not statistically significant.

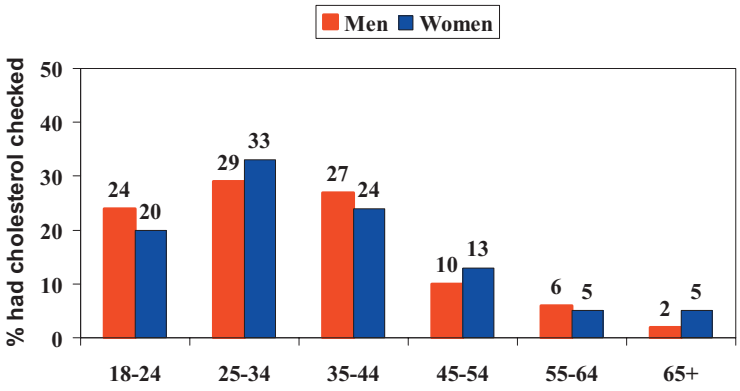
Figure 51. Prevalence of High Cholesterol, by Race and Region, Alaska 1999 and 2001 (combined)



Source: AK BRFSS

Urban Alaskan adults are slightly more likely to report being tested for blood cholesterol in the last five years, but there is no reported difference in the prevalence of high blood cholesterol between rural and urban populations.

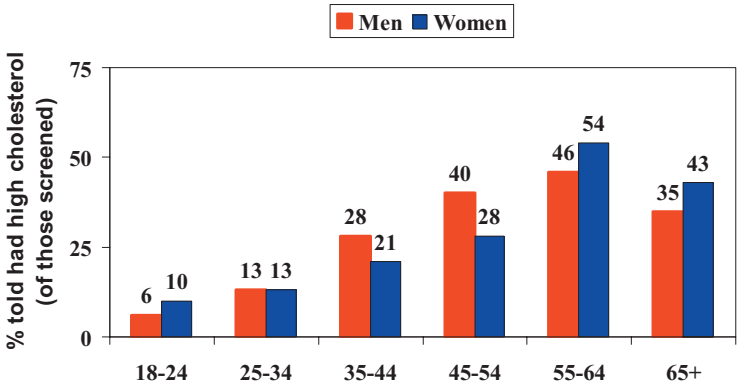
Figure 52. Prevalence of No Cholesterol Screening in Last 5 Years, by Age and Sex, Alaska 1999 and 2001 (combined)



Source: AK BRFSS

The likelihood of being tested for blood cholesterol in the last five years generally decreases with increasing age in Alaska, up to the age group of 55-64 years. There is no significant difference in testing between men and women.

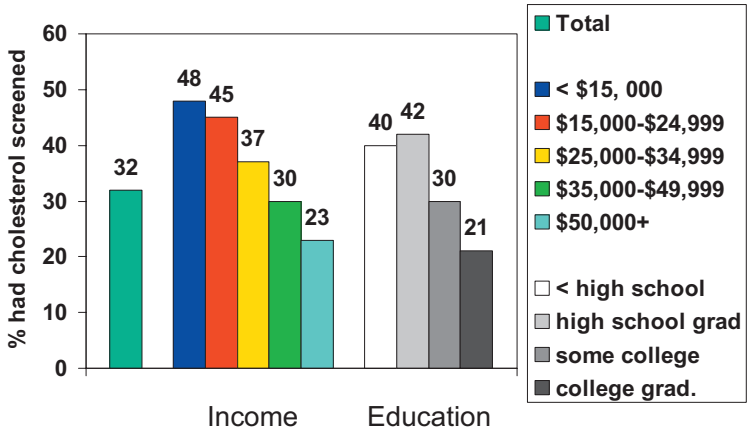
Figure 53. Prevalence of High Cholesterol by Age and Sex, Alaska 1999 and 2001 (combined)



Source: AK BRFSS

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. Between ages 35 and 54, high blood cholesterol is more commonly reported by males, but from age 55 upwards it is more commonly reported by females. None of the sex differences attain statistical significance, however.

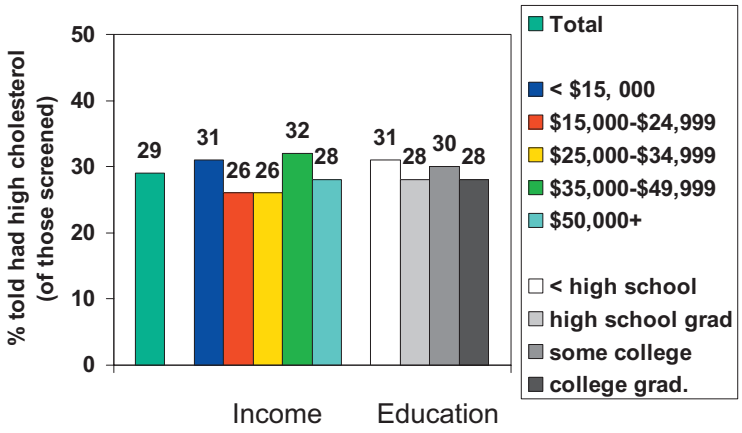
Figure 54. Prevalence of No Cholesterol Screening in Last 5 Years, by Income and Education, Alaska 1999 and 2001 (combined)



Source: AK BRFSS

The likelihood of not being tested for blood cholesterol in the last five years decreases steadily with higher income and tends to decrease with more education in Alaska. There is no significant trend in the reported prevalence of high blood cholesterol by income or education.

Figure 55. Prevalence of High Cholesterol, by Income and Education, Alaska 1999 and 2001 (combined)



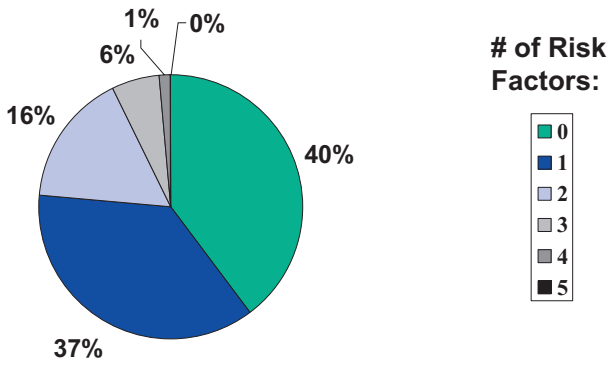
Source: AK BRFSS

H. Multiple Risk Factors

Cardiovascular risk factors can interact with an individual's probability of cardiovascular disease increasing with each factor present. Certain risk factors will work together so that the total risk of disease is even greater than the sum of the individual risks added by each risk factor. Compared to those with no risk factors, or those with only one, Alaskans with multiple risk factors have the greatest risk for cardiovascular disease. They require the most urgent clinical and public health interventions to prevent future cardiovascular disease.

Participants in the Alaska BRFSS do not answer questions about all leading cardiovascular risk factors each year. When data for the years 1999 and 2001 are combined it is possible to measure the overlapping prevalence of five key risk factors: current smoking, diabetes, obesity, hypertension and high blood cholesterol.

Figure 56. Prevalence of Multiple Risk Factors: Smoking, Hypertension, High Cholesterol, Obesity & Diabetes, Alaska 1999 and 2001 (combined)



Source: AK BRFSS

In all, 40 percent of those surveyed are considered to have none of the five risk factors. Another 37 percent have one risk factor, and 23 percent have two or more.

Other than smoking, 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. When only those 45 years of age and older are included, the prevalence of multiple risk factors increases to 37 percent. Prevalence of three or more factors increases to 13 percent.

Of those who report current smoking:

- 16 percent also report high blood cholesterol
- 19 percent also report hypertension
- 18 percent are also obese
- 3 percent also have diabetes

Of those who report having diabetes:

- 23 percent also smoke
- 43 percent also report high blood cholesterol
- 58 percent also report hypertension
- 51 percent are also obese

Of those who are obese:

- 23 percent also smoke
- 32 percent also report high blood cholesterol
- 37 percent also report hypertension
- 9 percent also have diabetes

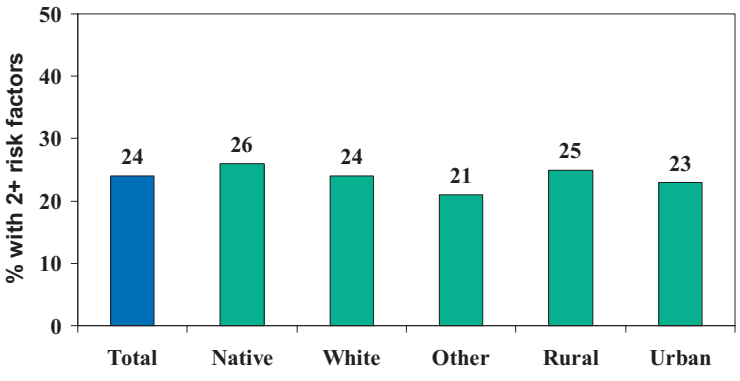
Of those who report hypertension:

- 23 percent also smoke
- 38 percent also report high blood cholesterol
- 35 percent are also obese
- 10 percent also have diabetes

Of those who report high blood cholesterol:

- 21 percent also smoke
- 41 percent also report hypertension
- 32 percent are also obese
- 8 percent also have diabetes

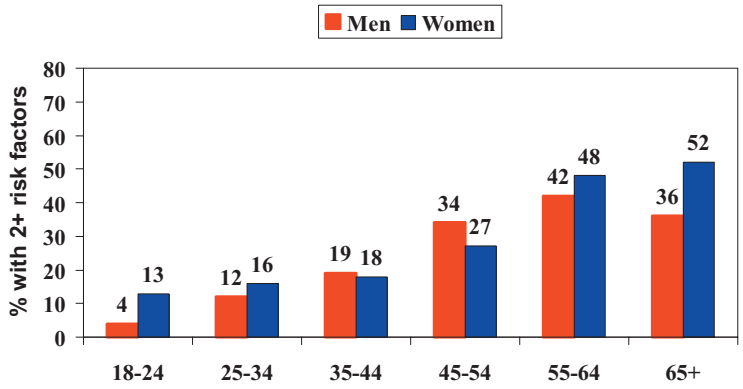
Figure 57. Prevalence of 2+ Risk Factors, by Race, Region, Alaska 1999 and 2001 (combined)



Source: AK BRFSS

When considering the survey population as a whole, there are not large differences in the prevalence of two or more risk factors by race. There are also no significant differences between rural and urban populations.

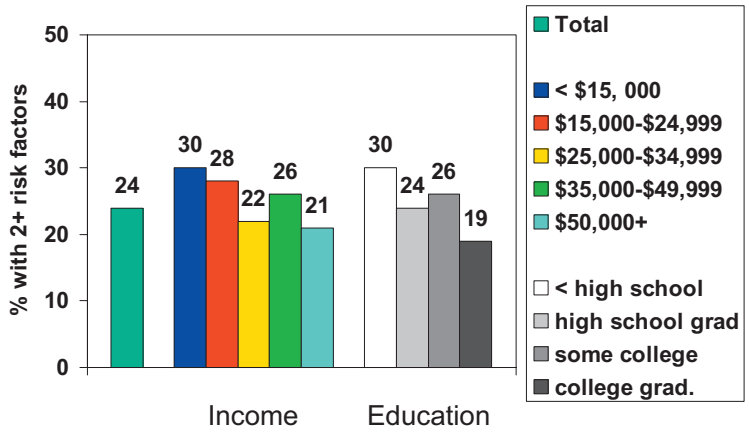
Figure 58. Prevalence of 2+ Risk Factors by Age and Sex, Alaska 1999 and 2001 (combined)



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. Women tend to report multiple risk factors more often than men, except in the age group of 45 to 54 years, when multiple risk factors are more common in men.

Figure 59. Prevalence of 2+ Risk Factors, by Income and Education, Alaska 1999 and 2001 (combined)



Source: AK BRFSS

The prevalence of two or more risk factors tends to decrease with increased income and increased education.

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 cardiovascular disease in Alaska.

At best, the mortality and hospitalization data reported here offer an incomplete picture of the burden of cardiovascular disease borne by Alaskans today. Little is known about the ongoing prevalence of cardiovascular diseases in our communities, outside of hospitals and mortuaries. We don't even know how many Alaskans are survivors of initial cardiovascular events such as heart attacks or strokes. Such information is essential in developing a program of secondary prevention. Information on risk factors, which is required for primary prevention strategies aimed at the population at large, is limited to a handful of questions on a single statewide survey. We know far too little about the diets, the physical activities, or the use of preventive services of Alaskan adults. 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 cardiovascular disease in Alaska.

The gaps in our knowledge of cardiovascular disease in Alaska are unsettling, but even as we gaze through the dim mirror of data reported here, certain trends are clear and are crying out for public health responses:

1. Mortality and morbidity from cardiovascular disease are common in our state. Cardiovascular disease may be a little less widespread here than in most other states, but it is a public health problem of the first order – and it will only become more important in the next few years as the state's population continues to age. As the Take Heart Alaska Coalition has written in its 2003 Cardiovascular Disease Prevention Plan for Alaska, the unavoidable consequences of an ageing population require better leadership, coordination, and collaboration in Alaska around cardiovascular issues. Well-organized advocacy for cardiovascular disease prevention must occur across disciplines, including policy makers, city planners, educators, and the food industry, as well as health professionals. Alaska's economy and future well-being depend on the cardiovascular health of its people, and heart-friendly values must be reflected in all facets of our common life.

2. There is an alarming feminization of cardiovascular mortality emerging in Alaska. In recent years Alaskan women have begun to lose their historic advantages in cardiovascular mortality over men and over women in other states. This trend deserves further study, but available data suggest that there be more targeted efforts to make women and the clinicians who treat them aware of their risk for cardiovascular disease. No one in Alaska can assume any longer that heart disease and stroke are primarily the problems of men. Clinicians caring for women should be just as vigilant to screen for hypertension and elevated cholesterol in women as they are for their male patients. They should be just as aggressive with women in promoting tobacco cessation, increased physical activity and a sensible diet as they are with

men. And women need to know their risk of cardiovascular disease and have the tools to reduce it.

3. Alaska is a young state, and the burden of cardiovascular disease continues to be borne disproportionately by those under age 65 years. Because of our state's relatively youthful age structure, death or hospitalization due to cardiovascular disease is more often a younger person's misfortune than in other states. This would suggest that public health interventions developed elsewhere that target senior citizens might not have as much impact in reducing the toll of cardiovascular disease in Alaska. The marketing of a heart-healthy lifestyle in Alaska will need to reflect our younger population. As adults aged 40 to 65 years contribute a larger share to the burden of cardiovascular disease here, our efforts to reduce that burden need to give more attention to this group. That may include more worksite interventions, more education for the providers of health care who serve this group in order to maximize appropriate screening, and greater emphasis on primary prevention in Alaska compared to other states.

4. The prevalence of several key cardiovascular 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 the gulf in social class – not just the gap in race and ethnicity – between themselves and those most in need of risk reduction. 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 cardiovascular disease along lines of income and education. These disparities are especially challenging to add ress, 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 cardiovascular diseases can be found in ***Take Heart Alaska: A Cardiovascular Disease Prevention Plan for Alaska*** (2003). The plan is available on line at: http://www.epi.hss.state.ak.us/pubs/tha/default.htm

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appendix A: 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.

Mortality

Data on deaths from cardiovascular disease in Alaska were provided by the Alaska Bureau of Vital Statistics, Division of Public Health, Department of Health and Social Services. Comparable data for the United States were provided by CDC Wonder, an on-line resource of the Centers for Disease Control and Prevention (CDC). Alaska deaths included deaths of Alaska residents who died in other states. For Figures 14a and 14b, death data for the period 1980 to 1989 were taken from a database established by the Section of Epidemiology of the Division of Public Health, in collaboration with the Alaska Bureau of Vital Statistics.

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 cardiovascular disease the comparability ratios between the systems are close to 1, according to a recent report of the CDC's National Vital Statistics System.[24] The following table describes the codes used to define the disease categories in this report:

Category	ICD-9 Codes	ICD-10 Codes
All Cardiovascular Disease	390 – 434; 436 – 448	I00 – I78
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
Stroke	430 – 434; 436 – 438	I60 – I69

Unless stated otherwise, all mortality rates were age-adjusted by the direct method, using the 2000 US population as the 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. No attempt was made to identify persons as Hispanic or non-Hispanic.

The geographical analysis used spheres to distinguish population sizes among boroughs and census areas. The volume of each sphere was proportional to the population of the borough or census area, as reported by the 2000 Census. Place-specific death rates were calculated for the 11-year period of 1990 to 2000, and grouped into four categories for display on the maps. Age-adjustment was not possible for the geographical analysis of cardiovascular 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 a cardiovascular 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. Deaths among persons from all communities in Southeast Alaska (Yakutat, Haines, Skagway, Juneau, Sitka, Petersburg, Wrangell, Ketchikan and Prince of Wales Island) were combined for this analysis.

Hospitalization

Hospital discharge data for 2001 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 10 of the state's smaller hospitals, which accounted for 17 percent of discharges during 2001. It does provide limited information on patients normally resident in Alaska who were hospitalized in the state of Washington, and our analysis includes those cases (210 for heart disease, 67 for stroke). Hospitalization rates for Alaska were adjusted by reducing population denominators by 17 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 2000 (National Center for Health Statistics, CDC).

In all cases, the primary diagnosis listed in the patient's medical record was used. Because the primary diagnosis describes only one immediate reason for each admission, our method may underestimate the impact of cardiovascular disease on hospitalization. It is likely that some hospitalizations having a non-cardiovascular primary diagnosis would not have occurred without underlying cardiovascular disease. Our method may especially underestimate the impact of ischemic heart disease on hospi-

talization. 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.

Cases were excluded from this analysis when the primary diagnosis was not for treatment of disease, such as normal pregnancy and delivery. The same ICD-9 codes used to define cause of death were used to classify the primary diagnosis for each hospitalization. Code 428 was used to define heart failure. Analysis was based on each unique discharge, not on individuals, who may have had multiple hospitalizations during 2001.

Cost analyses excluded those cases treated in military and Native hospitals where charge data were not recorded.

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 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 2000 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 cardiovascular risk factors, and compares the responses of subgroups of the survey population. Confidence intervals around prevalence estimates were obtained using SUDAAN software.

In this analysis, 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. No attempt was made to identify persons 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-Northstar Borough and the Southeast Fairbanks census area. Rural respondents were those living elsewhere in the state.

Respondents were classified into five 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 cardiovascular 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 five factors: current smoking, diabetes, obesity, hypertension and high blood cholesterol, as these were the only factors examined consistently during the period 1999 to 2001.

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