Alaska Native Mortality Rates and Trends

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SYNOPSIS

Objectives. This article compared mortality data (1999–2003) for Alaska Natives (AN), U.S. white residents (USW), and Alaska white residents (AKW), and examined changes in mortality rates from 1979 to 2003.

Methods. We used SEERStat* software from the National Cancer Institute to calculate age-adjusted mortality rates.

Results. The AN all-cause mortality rate was 40% higher (rate ratio [RR]=1.4) than the rate for both the USW and AKW populations. Based on comparisons with USW, the largest disparities in AN mortality were found for unintentional injuries (RR=3.0), suicide (RR=3.1), and homicide (RR=4.4). Disparities were also found for eight of the 10 leading causes of death, including cancer (AN/USW RR=1.3), cerebrovascular disease (RR=1.3), chronic obstructive pulmonary disease (RR=1.4), pneumonia/influenza (RR=1.6), and chronic liver disease (RR=2.0). In contrast, the mortality rate for heart disease among AN was significantly lower (RR=0.9) than for USW, and lower—though not significantly lower—for diabetes. Findings were quite similar when rates for AN were compared with AKW. AKW also had high rates of unintentional injury mortality and suicide compared with USW, but the magnitude of the difference was much less for AKW. From 1979 to 2003, mortality rates among AN declined 16% for all causes, similar to the USW decline of 15%.

Conclusions. Monitoring mortality rates and their trends is essential not only to understand the health status of a population but also to target areas for prevention and evaluate the impact of policy change or the effect of interventions over time.

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Reliable information on cause of death is essential to the development of policies and programs for prevention and control of disease and injury. Alaska mortality statistics have been collected systematically since the mid-1950s. The 1954 Parran Report, one of the first studies to address the health status of Alaska Natives (AN), documented that infectious diseases were responsible for the largest percentage (45.8%) of all AN deaths.[1] In response to this report, the Indian Health Service, part of the U.S. Public Health Service, was assigned the responsibility of health care for AN. Infectious disease and maternal child health programs were instituted, and mortality and morbidity rates began to fall. A study of AN mortality during the 1980s found that the proportion of deaths due to infectious diseases had declined to 1.3%, and injuries had become the leading cause of death, accounting for 30.0% of all deaths.[2] A more recent review of mortality among AN, from 1989 to 1998, documented declines in mortality rates for unintentional injury and homicide, although disparities persisted.[3] These data also indicated that improvements in injury mortality rates may be offset by marked increases in deaths from chronic disease.

Alaska Native is the term used to describe the people whose ancestors occupied the area of what is now the state of Alaska. The U.S. Bureau of the Census estimates that in the year 2000, there were 119,499 AN residing in Alaska, 97,012 of whom selected the American Indian/AN category only for race among multiple options. AN have traditionally been classified by federal reporting systems into three major ethnic groups: Eskimo, Indian, and Aleut. Linguistic and cultural studies have documented many different subgroups within these major groupings, including: Inupiat, Yupik, Cupik, and Sugiaq (Eskimo); Athabascan, Tlingit, Haida, and Tsimpsian (Indian); and Aleut. Among AN enumerated in the 2000 census, they were grouped as 50% Eskimo, 39% Indian, and 11% Aleut. Although the various indigenous groups in the state differ in culture and language, social and economic indicators such as martial status, level of education and income, and access to health care were similar.

The purpose of this study was to update disparities among the AN population using the most current mortality data for the five-year period 1999–2003. Because disparity among minority populations is an important national issue, we compared AN mortality with that of U.S. white residents (USW), including trends over time since 1979. We also compared AN mortality rates with those of the Alaska white population (AKW) for this same time period. Because the rates for AKW were quite similar to those of USW, we focused this article largely on results of comparisons of AN rates with USW.

METHODS

We used the online SEERStat* software, available through the National Cancer Institute's Surveillance Epidemiology and End Results (SEER) program, to calculate mortality rates for AN.[4] All rates were based on deaths for Alaska residents. At the time of this study, information on AN mortality in the SEER database was available through 2003. We compared AN mortality rates by age and gender with rates for USW for all causes combined and leading causes of death for 1999–2003. We focused on the 10 leading causes of death based on number of deaths in rank order in the AN population. Leading causes were derived from the list of 50 leading causes of death as defined by the National Center for Health Statistics.[5] We also calculated rates for categories that ranked among the top 19 in the USW population and/or the AKW population, but were not among the top 10 causes of death for AN. A list of International Classification of Diseases, 10th Revision (ICD-10) code groupings used is included in Table 1. We also examined mortality rates for AKW using SEER data for the comparable time period. Population denominators were from the bridged single-race 2000 census in the SEER database.[4] For examination of changes in rates over time, we used data tabulated for this study as well as for our previous publication covering 1979–1998.[3]

We calculated mean annual age-adjusted mortality rates using aggregated AN deaths for the five-year time period, 1999–2003. We age-adjusted rates for all ages combined as well as for selected age strata to the U.S. 2000 standard million. We calculated rates only for those causes that had at least five deaths during the interval studied. Because some categories include small numbers, we calculated rate ratios (RRs) and 95% confidence intervals (CIs) around the ratios to show which ratios differed significantly.[6] We used StatsDirect software to calculate CIs.[7] Rates were considered significantly different if the 95% CI around the ratio did not contain one.

We calculated percentage change in mortality rates for AN and USW between the two time periods, 1979–1983 and 1999–2003. We used age-stratified Mantel-Haenzsel Chi-square for trend tests to determine significant trends during the period 1979–2003.

RESULTS

Overall mortality

During the period 1999–2003, a total of 3,404 AN deaths were reported. Table 1 shows the leading causes of death for AN for the period 1999–2003 and compares rates and RRs of AN with USW and AKW

Table 1. Mean annual age-adjusted mortality rates for AN compared with USW and AKW, 1999–2003

	Male and female combined						*Males*						*Females*					
	AN deaths N	*AN rate*[a]	*USW rate*[a]	*Rate ratio*[b]	*AKW rate*[a]	*Rate ratio*[c]	*AN deaths* N	*AN rate*[a]	*USW rate*[a]	*Rate ratio*[b]	*AKW rate*[a]	*Rate ratio*[c]	*AN deaths* N	*AN rate*[a]	*USW rate*[a]	*Rate ratio*[b]	*AKW rate*[a]	*Rate ratio*[c]
Total, all causes	3,404	1,131.5	834.6	1.4[d]	800.8	1.4[d]	1,930	1,401.8	1,009.3	1.4[d]	953.7	1.5[d]	1,474	930.0	701.8	1.3[d]	666.7	1.4[d]
Cancer C00-C97[e]	660	242.3	193.5	1.3[d]	191.5	1.3[d]	349	299.1	239.2	1.3[d]	229.6	1.3[d]	311	205.4	163.4	1.3[d]	164.9	1.2[d]
Heart disease I00–I09, I11, I13, I20–I51[e]	504	210.4	243.6	0.9[d]	190.3	1.1	281	270.6	304.6	0.9	244.8	1.1	223	169.5	197.1	0.9[d]	143.0	1.2[d]
Unintentional injuries V01–X59, Y85–Y86[e]	499	108.6	36.4	3.0[d]	51.8	2.1[d]	355	156.2	50.7	3.1[d]	74.4	2.1[d]	144	61.8	23.2	2.7[d]	29.6	2.1[d]
Suicide X60–X84, Y87.0[e]	204	36.1	11.6	3.1[d]	16.7	2.2[d]	159	56.7	19.4	2.9[d]	27.1	2.1[d]	45	15.4	4.5	3.4[d]	6.6	2.4[d]
Cerebrovascular disease I60–I69[e]	165	70.0	55.6	1.3[d]	60.0	1.2	76	77.9	56.6	1.4[d]	59.8	1.3	89	65.2	54.1	1.2	59.4	1.1
COPD J40–J47[e]	153	65.1	45.8	1.4[d]	49.4	1.3[d]	73	78.1	56.3	1.4[d]	61.1	1.3	80	58.4	39.6	1.5[d]	42.2	1.4[d]
Homicide U01–U02, X85–Y09,Y87.1[e]	90	17.7	4.0	4.4[d]	4.3	4.1[d]	55	22.5	5.9	3.8[d]	5.7	4.0[d]	35	13.3	2.2	6.1[d]	2.7	4.9[d]
Pneumonia/influenza J10–J18[e]	85	36.1	22.5	1.6[d]	14.4	2.5[d]	41	43.6	27.0	1.6[d]	15.8	2.8[d]	44	32.5	19.8	1.6[d]	13.7	2.4[d]
Chronic liver disease K70, K73–K74[e]	75	19.4	9.6	2.0[d]	9.2	2.1[d]	24	13.2	13.4	1.0	13.1	1.0	51	25.2	6.2	4.1[d]	5.7	4.4[d]
Diabetes mellitus E10–E14[e]	51	20.9	22.8	0.9	24.9	0.8	25	25.5	26.4	1.0	27.3	0.9	26	19.7	20.1	1.0	22.3	1.0
Nephritis, Nephrotic Syndrome, and Nephrosis N00–N07, N17–N19, N25–N27[e]	35	15.3	12.3	1.2	7.6	2.0[d]	24	26.4	15.9	1.7[d]	9.0	2.9[d]	11	8.5	10.3	0.8	6.5	1.3
Atherosclerosis I70[e]	29	11.1	5.0	2.2[d]	10.2	1.1	17	15.6	5.2	3.0[d]	14.9	1.0	12	8.7	5.1	1.7[d]	6.3	1.4
Alzheimer's disease G30[e]	22	11.6	19.8	0.6[d]	23.2	0.5[d]	5	6.6	16.7	0.4	15.2	0.4	17	14.3	21.2	0.7	27.3	0.5[d]
All other causes	832	266.9	152.1	1.8[d]	147.3	1.8[d]	446	309.8	172.0	1.8[d]	155.9	2.0[d]	386	232.1	135.0	1.7[d]	136.5	1.7[d]

[a]Rate per 100,000 population, age-adjusted to 2000 standard million

[b]AN rate/USW rate

[c]AN rate/AKW rate

[d]95% confidence interval does not contain 1.

[e]National Center for Health Statistics 50 leading causes of death, International Classification of Diseases, 10th Revision codes

AN = Alaska Native

USW = U.S. white

AKW = Alaska white

COPD = chronic obstructive pulmonary disease

during the same period. All categories ranking in the top 10 causes of death in each of the three populations are included. The USW and AKW populations shared eight of the 10 leading causes of death among AN, although in different rank order. Among USW, Alzheimer's disease and nephritis replaced homicide and chronic liver disease (CLD), while among AKW, Alzheimer's disease and atherosclerosis replaced pneumonia/influenza and homicide among the 10 leading causes of death. The three leading causes of AN death—cancer, unintentional injury, and heart disease—were responsible for 1,663 deaths, or nearly half of the total 3,404 deaths.

Mean annual age-adjusted mortality from all causes in both genders among AN was higher (1,131.5 per 100,000) than for USW (834.6 per 100,000) and AKW (800.8 per 100,000). Significantly, the RR was the same (1.4) when rates for AN were compared with either rates for USW or AKW. All-cause mortality RRs by gender were also significantly higher than USW (1.4) for AN men and women.

Mortality rates for AN, both genders combined, were significantly higher than USW and AKW for all 10 leading causes of death except heart disease and diabetes. Heart disease was significantly lower among AN compared with USW (RR=0.9), but not in comparison with AKW. Diabetes among AN appeared lower, but not significantly lower, in comparison with both populations. Cerebrovascular disease was higher among AN but only significantly higher when compared with USW (RR=1.3). Disparities for AN when compared with USW were greatest for homicide (RR=4.4), suicide (RR=3.1), and unintentional injury (RR=3.0), followed by CLD (RR=2.0) and pneumonia/influenza (RR=1.6). RRs were higher when AN rates were compared with USW than with AKW.

Rates by gender are also shown in Table 1. AN men had higher overall mortality rates compared with AN women 1,401.8 vs. 930 per 100,000 and higher rates in all but one of the 10 leading causes of death, CLD. Comparing AN with USW, rates were significantly higher among both AN men and women for death from cancer, unintentional injury, suicide, chronic obstructive pulmonary disease (COPD), homicide, and pneumonia/influenza. Rates were higher for cerebrovascular disease for both AN men (RR=1.4) and women (RR=1.2) but significantly higher only among men. For CLD, disparate rates occurred among AN women (RR=4.1) but not among men (RR=1.0). For the 10 leading causes of death, AN men tended to have higher RRs compared with the USW population than AN women. However, compared with USW, in a few categories AN women experienced even greater disparities than AN men: homicide (RR=6.1 vs. 3.8), suicide (RR=3.4 vs. 2.9), and CLD (RR=4.1 vs. 1.0), respectively.

Age-specific mortality

In Table 2, age-specific death rates for all causes combined showed significantly higher mortality rates among AN than among USW for all age categories except those ≥75 years of age. Age-specific rates were higher among males than females for all ages. Disparities between the two populations were highest for people younger than 45 years of age, and appeared to decline progressively in both genders in people aged ≥45 years.

Changes over time

As shown in Table 3, the all-cause mortality rate for AN declined a significant 16% between 1979 and 2003, similar to the significant 15% decline among USW. Change in rates over time for specific causes of death among AN varied. For example, dramatic increases occurred in COPD (192%) and diabetes mellitus (DM) (194%), while there was decline or no significant change in other categories. The percent increase in DM was nearly five times greater in the AN population than among USW, and at least 3.5 times higher for COPD among AN than USW. The direction of the trends for other leading causes were similar for AN and USW. However, the magnitude of change varied significantly between the two populations.

Death by cause

Cancer. For the time period 1999–2003, cancer was the leading cause of death among AN, both genders combined, and accounted for about 19% (n=660) of all deaths (Table 1). The cancer mortality rate for AN, both genders combined, was 1.3 times that of USW (242.3 vs. 193.5 per 100,000) and higher among both AN men (299.1 vs. 239.2 per 100,000) and AN women (205.4 vs. 163.4 per 100,000). Age-specific cancer mortality RRs for AN, both genders combined, compared with USW ranged from 1.0 to 1.8. Cancer mortality rates were significantly higher among AN men than AN women for all age groups ≥65 years (Table 2). As shown in Table 3, there was little change in AN cancer mortality rates between 1979 and 2003 (246.1 vs. 242.3 per 100,000). In contrast, USW rates significantly declined by 4% during this time period.

Among AN, both genders combined, three types of cancer comprised almost half (47%) of all cancer deaths: lung and bronchus (26%), colon/rectum (14%), and stomach (7%). Among USW, the following cancers comprised 41% of cancer deaths: lung and

Table 2. Age-specific mean annual mortality rates for AN compared with USW, 1999–2003

	Men and women combined					*Men*					*Women*				
	AN rate	*USW rate*	*Rate ratio*	*Lower 95% CI*	*Upper 95% CI*	*AN rate*	*USW rate*	*Rate ratio*	*Lower 95% CI*	*Upper 95% CI*	*AN rate*	*USW rate*	*Rate ratio*	*Lower 95% CI*	*Upper 95% CI*
Age: 0–4 years															
Unintentional injuries	63.8	12.5	5.1[a]	3.69	7.14	62.8	14.7	4.3[a]	2.53	6.77	64.9	10.3	6.3[a]	3.73	10.29
Pneumonia and influenza	13.8	1.7	8.1[a]	4.35	17.02	16.4	1.9	8.6[a]	3.00	21.54	—	1.5	—	—	—
Homicide and legal intervention	12.8	2.7	4.7[a]	2.29	9.80	—	3.0	—	—	—	—	2.4	—	—	—
All causes	297.5	141.8	2.1[a]	1.85	2.50	316.9	156.7	2.0[a]	1.68	2.54	276.1	126.2	2.2[a]	1.79	2.82
Age: 5–14 years															
Unintentional injuries	30.5	6.6	4.6[a]	3.43	6.46	45.8	8.0	5.7[a]	3.85	8.27	14.5	5.0	2.9[a]	1.57	5.66
All causes	45.6	16.5	2.8[a]	2.17	3.64	62.7	18.9	3.3[a]	2.40	4.58	27.8	13.9	2.0[a]	1.27	3.26
Age: 15–24 years															
Suicide	99.5	10.5	9.5[a]	7.77	11.60	142.9	17.4	8.2[a]	6.39	10.34	53.2	3.1	17.2[a]	11.10	25.50
Unintentional injuries	88.3	38.8	2.3[a]	1.77	2.73	137.7	55.7	2.5[a]	1.81	2.99	35.3	20.8	1.7[a]	1.10	2.82
Homicide and legal intervention	21.9	6.8	3.2[a]	1.96	4.67	29.2	10.7	2.7[a]	1.43	4.39	14.1	2.7	5.2[a]	2.16	10.33
Cancer	7.9	4.3	1.8	0.99	3.84	—	4.9	—	—	—	—	3.5	—	—	—
Heart disease	8.1	2.1	3.9[a]	1.64	6.98	—	2.7	—	—	—	—	1.6	—	—	—
All causes	263.3	75.1	3.5[a]	3.03	3.88	373.4	106.3	3.5[a]	2.94	3.95	145.4	41.7	3.5[a]	2.72	4.39
Age: 25–44 years															
Unintentional injuries	117.2	34.0	3.4[a]	2.97	4.00	162.3	50.2	3.2[a]	2.68	3.88	72.8	17.3	4.2[a]	3.21	5.46
Suicide	55.7	15.1	3.7[a]	3.01	4.62	89.4	23.7	3.8[a]	2.95	4.85	22.6	6.3	3.6[a]	2.27	5.83
Cancer	30.7	23.2	1.3	0.99	1.77	27.9	21.0	1.3	0.80	2.03	33.6	25.4	1.3	0.90	1.95
Homicide and legal intervention	24.2	6.0	4.0[a]	2.93	5.62	25.6	8.8	2.9[a]	1.77	4.59	22.7	3.1	7.3[a]	4.60	11.81
Heart disease	24.0	17.3	1.4	0.99	1.91	33.4	24.9	1.3	0.85	1.98	14.9	9.6	1.6	0.85	2.74
Chronic liver disease	15.8	4.4	3.6[a]	2.38	5.36	12.4	6.0	2.1	0.95	3.95	19.0	2.8	6.8[a]	4.05	11.42
Cerebrovascular diseases	15.3	2.9	5.3[a]	3.37	7.73	11.3	3.0	3.8[a]	1.58	7.21	19.2	2.8	6.9[a]	3.93	11.09
All causes	397.4	142.0	2.8[a]	2.58	3.03	495.6	186.6	2.7[a]	2.40	2.95	300.7	96.2	3.1[a]	2.73	3.55
Age: 45–54 years															
Cancer	123.9	119.2	1.0	0.81	1.28	145.9	121.8	1.2	0.84	1.58	102.5	116.5	0.9	0.61	1.24
Unintentional injuries	118.5	34.0	3.5[a]	2.75	4.41	177.8	49.6	3.6[a]	2.66	4.70	60.9	18.5	3.3[a]	2.08	5.20
Heart disease	79.5	84.3	0.9	0.70	1.24	122.6	128.1	1.0	0.66	1.32	37.6	41.2	0.9	0.50	1.61
Chronic liver disease	37.4	17.8	2.1[a]	1.40	3.20	—	27.0	—	—	—	63.7	8.8	7.2[a]	4.69	11.44
Suicide	30.9	16.8	1.8	1.16	2.91	52.6	25.7	2.0[a]	1.14	3.35	—	8.0	—	—	—
Cerebrovascular diseases	29.2	11.7	2.5[a]	1.56	3.99	21.4	12.9	1.7	0.59	3.51	36.9	10.4	3.5[a]	1.99	6.37
Homicide and legal intervention	28.7	3.8	7.6	4.75	12.20	37.1	5.5	6.7[a]	3.46	12.42	20.4	2.2	9.3[a]	4.28	20.44
COPD	13.4	8.2	1.6	0.84	3.26	—	8.5	—	—	—	19.7	8.0	2.5[a]	1.16	5.51
All causes	664.4	389.5	1.7[a]	1.53	1.87	836.4	498.0	1.7[a]	1.46	1.89	497.1	282.7	1.8[a]	1.49	1.92

continued on p. 59

Table 2 (continued). Age-specific mean annual mortality rates for AN compared with USW, 1999–2003

	Men and women combined					*Men*					*Women*				
	AN rate	*USW rate*	*Rate ratio*	*Lower 95% CI*	*Upper 95% CI*	*AN rate*	*USW rate*	*Rate ratio*	*Lower 95% CI*	*Upper 95% CI*	*AN rate*	*USW rate*	*Rate ratio*	*Lower 95% CI*	*Upper 95% CI*
Age: 55–64 years															
Cancer	484.7	351.4	1.4[a]	1.17	1.61	424.4	395.2	1.1	0.83	1.37	545.5	310.4	1.8[a]	1.40	2.13
Heart disease	205.7	233.1	0.9	0.69	1.11	287.6	337.0	0.9	0.62	1.13	123.3	135.6	0.9	0.59	1.41
Unintentional injuries	137.9	30.5	4.5[a]	3.36	6.06	208.6	43.0	4.9[a]	3.34	6.82	69.0	18.7	3.7[a]	2.03	6.51
Chronic liver disease	52.5	23.3	2.3[a]	1.43	3.66	50.5	33.8	1.5	0.65	2.96	54.3	13.4	4.1[a]	2.18	7.89
COPD	54.7	46.2	1.2	0.72	1.85	57.3	48.9	1.2	0.54	2.22	52.9	43.7	1.2	0.57	2.23
Cerebrovascular diseases	38.0	32.3	1.2	0.67	2.03	38.4	36.8	1.0	0.38	2.25	37.4	28.0	1.3	0.61	2.88
DM	25.7	33.0	0.8	0.38	1.50	—	38.9	—	—	—	38.2	27.4	1.4	0.62	2.95
Pneumonia and influenza	15.3	10.3	1.5	0.65	3.55	—	12.1	—	—	—	—	8.7	—	—	—
Suicide	15.1	14.3	1.1	0.47	2.56	30.9	22.9	1.3	0.45	3.23	—	—	—	—	—
All causes	1,342.6	921.2	1.5[a]	1.32	1.59	1,478.5	1,142.6	1.3[a]	1.13	1.47	1,212.2	713.6	1.7[a]	1.45	1.92
Age: 65–74 years															
Cancer	947.5	797.8	1.2	0.99	1.32	1,280.6	970.3	1.3[a]	1.10	1.53	655.4	653.7	1.0	0.76	1.23
Heart disease	614.9	617.9	1.0	0.80	1.15	776.9	844.8	0.9	0.69	1.12	473.3	427.8	1.1	0.81	1.42
COPD	246.7	177.9	1.4[a]	1.03	1.15	220.8	201.4	1.1	0.66	1.67	269.9	158.4	1.7[a]	1.17	2.43
Unintentional injuries	171.1	42.9	4.0[a]	2.88	5.62	298.0	57.4	5.2[a]	3.52	7.65	58.2	30.8	1.9	0.85	4.06
Cerebrovascular diseases	153.6	113.5	1.4	0.87	1.81	247.0	128.7	1.9[a]	1.10	2.71	72.6	100.9	0.7	0.32	1.36
DM	76.9	81.6	0.9	0.57	1.54	98.0	93.9	1.0	0.48	1.97	58.2	71.2	0.8	0.37	1.75
Pneumonia and influenza	63.1	36.2	1.7	0.96	2.94	66.2	44.7	1.5	0.54	3.18	60.1	29.1	2.1	0.90	4.27
Chronic liver disease	35.6	30.9	1.2	0.56	2.38	—	41.0	—	—	—	45.8	22.3	2.1	0.91	5.01
All causes	3,022.0	2,301.9	1.3[a]	1.18	1.38	3,912.0	2,862.7	1.4[a]	1.20	1.48	2,240.8	1,832.8	1.2[a]	1.04	1.35
Age: ≥75 years															
Heart disease	2,193.0	2,739.6	0.8[a]	0.66	0.85	2,755.5	3,214.9	0.9[a]	0.63	0.93	1,926.0	2,453.7	0.8[a]	0.61	0.87
Cancer	1,822.9	1,425.0	1.3[a]	1.09	1.44	2,449.3	1,932.8	1.3[a]	0.97	1.45	1,479.0	1,140.3	1.3[a]	1.05	1.55
Cerebrovascular diseases	793.4	708.0	1.1	0.87	1.32	857.1	697.9	1.2	0.81	1.64	769.8	706.9	1.1	0.78	1.34
COPD	684.6	471.1	1.5[a]	1.14	1.79	936.1	616.1	1.5[a]	1.10	2.03	539.1	393.5	1.4	0.97	1.86
Pneumonia and influenza	453.6	298.3	1.5[a]	1.08	1.90	569.1	358.1	1.6	0.90	2.22	402.9	266.5	1.5	0.97	2.05
Unintentional injuries	219.2	148.5	1.5	0.97	2.15	262.0	192.8	1.4	0.77	2.46	173.8	124.4	1.4	0.79	2.40
DM	199.6	201.5	1.0	0.61	1.43	250.4	230.0	1.1	0.35	1.59	201.5	184.9	1.1	0.60	1.75
Chronic liver disease	41.9	29.8	1.4	0.65	3.56	—	37.5	—	—	—	—	25.2	—	—	—
All causes	8,997.1	8,032.4	1.1	1.00	1.13	1,1120.4	9,436.3	1.2	0.98	1.19	2,354.2	1,908.9	1.2	0.98	1.17

[a]95% CI does not contain 1.

AN = Alaska Native

USW = U.S. white

CI = confidence interval

COPD = chronic obstructive pulmonary disease

DM = Diabetes mellitus

bronchus (29%), colon/rectum (10%), and stomach (2%). Among AN men, the leading cancer deaths were lung and bronchus (30%), colon/rectum (13%), and stomach (7%). For USW men, lung and bronchus comprised 32%, colon and rectum 10%, and stomach 2% of deaths. Among AN women, the leading causes of cancer deaths were lung and bronchus (23%), colon/rectum (14%), and breast (12%). For USW women, lung and bronchus comprised 25%, colon/rectum 11%, and breast 15% of cancer deaths.

Heart disease. Heart disease was the second leading cause of death among AN, both genders combined, third among AN men, and second among AN women. Heart disease accounted for about 15% (n=504) of all deaths among AN. The heart disease mortality rate for AN was lower than USW rates for both genders combined (210.4 vs. 243.6 per 100,000) and for each gender: men (270.6 vs. 304.6 per 100,000) and women (169.5 vs. 197.1 per 100,000), although these differences were only significant among AN women.

When examined by age, there were no significant differences in heart disease death rates between AN and USW, both genders combined, for any age group except those aged 15 to 24 (RR=3.9) and ≥75 (RR=0.8). Compared with USW, age-specific patterns of heart disease mortality for AN men and women separately were similar to those of both genders combined. Within the AN population, heart disease mortality rates for AN men were 1.4 to 3.3 times higher than for AN women (Table 2).

Heart disease mortality rates for AN declined 25% between 1979 and 2003 compared with a 39% decline for USW. Most of the decline (20%) occurred in the most recent five-year period, 1999–2003 (Table 3).

Unintentional injury. Unintentional injury was the third leading cause of death for AN, both genders combined, ranking first among men and third among women. Unintentional injury comprised nearly 15% (n=499) of all AN deaths. The AN unintentional injury mortality rate was 3.0 times higher than the USW rate (108.6 vs. 36.4 per 100,000), 3.1 times higher among men (156.2 vs. 50.7 per 100,000), and 2.7 times higher among women (61.8 vs. 23.2 per 100,000).

Unintentional injury death rates were higher for USW in every age group among AN, both genders combined. RRs ranged from 1.5 among those ≥75 years of age to 5.1 times higher among 0- to 4-year-olds. Patterns by age were similar for men and women; however, women's rates began to decline after age 65, whereas men's rates only began to decline at ≥75 years of age. Comparing AN with USW by gender, RRs were multifold higher for both men and women. Comparing AN men with women, men experienced significantly higher rates than AN women aged 5 to 74 years (RR range=2.2 to 5.1).

Unintentional injury mortality rates declined 43% for AN, both genders combined, between 1979 and 2003. Declines appear to have begun in the mid-1980s and continued through the present time period. USW experienced a 16% decline from 1979 to 2003 (Table 3).

The top five causes of unintentional injury deaths among AN, both genders combined, accounted for 77% of all unintentional injury deaths. Of these top five, drowning and watercraft accidents accounted for 21%, poisoning 19%, motor vehicle traffic injuries 16%, all-terrain vehicle injuries 13%, and exposure to the elements 8%. Firearm injuries declined significantly between the 1989–1998 period and the present and comprised less than 1% of all unintentional injury deaths.

Suicide. Suicide was the fourth leading cause of death among AN, both genders combined, comprising 6% (n=204) of all deaths. Suicide ranked fourth among AN men and seventh among AN women. The suicide rate for AN, both genders combined, was 3.1 times higher than among USW (36.1 vs. 11.6 per 100,000). The RRs were 2.9 and 3.4 for AN men and women, respectively.

AN, both genders combined, experienced suicide rates that were 1.4 to 9.5 times higher than USW among 15- to 64-year-olds. Compared with USW, RRs were higher in both AN men and AN women. Among the AN population, suicide was 2.7 to 4.0 times more common among men than women.

As shown in Table 3, although suicide rates were lower for the most recent time period, change between 1979 and 2003 was not statistically significant. In contrast, USW experienced a significant 12% decline. For AN, both genders combined, suicides were attributed to firearms (61%), hanging (29%), poisoning (8%), and all other means (2%). RRs among men and women were similar except for poisoning, which occurred more frequently among women.

Cerebrovascular disease. Cerebrovascular disease was the fifth leading cause of death among AN, both genders combined. This category ranked fifth among AN men and fourth among AN women. Cerebrovascular disease accounted for nearly 5% (n=165) of all deaths among AN during 1999–2003. AN, both genders combined, experienced a cerebrovascular disease mortality rate that was significantly higher than the USW rate (70.0 vs. 55.6 per 100,000). Compared with USW, death rates for cerebrovascular disease were higher for both AN men

Table 3. Changes in mortality rates between 1979 and 2003 by five-year time period for AN and USW

	Time period	*All cause*	*Cancer*	*Unintentional injuries*	*Heart disease*	*Suicide*	*COPD*	*Cerebro-vascular diseases*	*Homicide and legal intervention*	*Pneumonia/ influenza*	*Chronic liver disease*	*Diabetes mellitus*
AN	1979–1983	1,347.3	246.1	189.5	279.9	39.9	22.3	62.1	35.7	49.4	28.1	7.1
	1984–1988	1,341.0	266.6	188.4	317.0	50.0	49.4	71.1	25.1	63.4	20.4	13.5
	1989–1993	1,242.6	255.9	140.5	277.8	47.7	62.0	67.5	19.7	57.6	26.8	24.2
	1994–1998	1,197.2	268.5	116.3	261.7	42.4	72.6	81.2	15.8	39.4	18.3	21.7
	1999–2003	1,131.5	242.3	108.6	210.4	36.1	65.1	70.0	17.7	36.1	19.4	20.9
	Percent change[a]	-16	NS	-43	-25	NS	192	NS	50	-27	-31	194
USW	1979–1983	984.9	203.4	43.4	396.7	13.1	29.8	87.3	6.2	28.6	13.0	16.3
	1984–1988	955.8	207.6	39.1	362.5	13.5	35.8	72.0	5.3	34.2	11.3	15.9
	1989–1993	898.6	209.9	35.5	310.2	13.0	39.2	61.5	5.6	34.6	10.3	18.9
	1994–1998	867.5	202.9	35.1	280.2	12.4	42.2	59.6	4.7	33.2	9.6	21.1
	1999–2003	834.6	193.5	36.4	243.6	11.6	45.8	55.6	4.0	22.5	9.6	22.8
	Percent change[a]	-15	-4	-16	-39	-12	54	-36	-35	-21	-26	40

[a]Percent change = (rate of 1999–2003 minus rate of 1979–1983)/rate of 1979–1983. Changes are statistically significant unless noted otherwise.

AN = Alaska Native

USW = U.S. white

COPD = chronic obstructive pulmonary disease

NS = not statistically significant

(77.9 vs. 56.6 per 100,000) and women (65.2 vs. 54.1 per 100,000), although the difference was significant only among men.

RRs between the two populations declined with increasing age, becoming nonsignificant for AN men and women ≥55 years of age. Within the AN population, there was little difference between men and women.

Cerebrovascular disease death rates for AN did not change significantly between 1979 and 2003. In contrast, rates declined a significant 36% among USW during this time period (Table 3).

COPD. COPD was the sixth leading cause of death among AN, both genders combined, ranking sixth for men and fifth for women. AN, both genders combined, experienced a COPD mortality rate 1.4 times higher than for USW (65.1 vs. 45.8 per 100,000). RRs were similar for men and women. RRs between AN and USW appeared to increase with increasing age. Within the AN population, rates were higher for men than women only in the oldest age group. As shown in Table 3, AN COPD mortality rates increased a significant 192% between 1979 and 2003. During the same time period, USW experienced a significant 54% increase.

Homicide. Homicide and legal intervention was the seventh leading cause of death among AN, both genders combined. Only three of the 90 deaths in this category were due to legal intervention. Homicide ranked seventh among AN men and ninth among AN women. It accounted for about 3% (n=90) of all AN deaths. Rates for AN, both genders combined, were 4.0 times higher than for USW (17.7 vs. 4.0 per 100,000). Compared with USW, RRs were high for both AN men (RR=3.8) and AN women (RR=6.1).

Age-specific homicide rates were a significant 3.2 to 7.6 times higher among AN, both genders combined, than among USW for people aged 0 to 54 years. RRs were higher for AN women compared with USW women than for AN men compared with USW men. Comparing AN men with women, however, rates did not differ significantly by age group.

AN homicide rates declined a significant 50% between 1979 and 2003, while USW experienced a 35% decline in rates (Table 3). Among AN, both genders combined, homicides were attributed to firearms (53%), stabbing (14%), and all other means (34%). RRs among men and women were similar. The percentage of AN homicides involving firearms increased significantly between 1989–1998 and the present (37% vs. 55%, respectively; $p<0.05$). This overall increase was due to a large increase in the proportion of firearm homicides among AN women.

Pneumonia/influenza. Pneumonia/influenza was the eighth leading cause of death among AN, both genders combined, and for men and women separately. It accounted for nearly 3% (n=85) of all deaths. Pneumonia/influenza mortality rates among AN, both genders combined, were 1.6 times higher than those among USW (36.1 vs. 22.5 per 100,000). This difference in rates was true for both AN men compared with USW men (43.6 vs. 27.0 per 100,000) and AN women compared with USW women (32.5 vs. 19.8 per 100,000).

Age-specific pneumonia/influenza mortality rates were significantly different between AN and USW for both genders combined only in the 0–4 and ≥75 age groups (Table 2). Comparing men with women within the AN population, there were no significant differences in rates by age group.

As shown in Table 3, AN experienced a significant 27% decline in pneumonia/influenza death rates between 1979 and 2003. Most of this decline occurred since the mid-1990s. Among USW, there was a significant 21% decline between 1979 and 2003.

CLD. CLD was the ninth leading cause of death among AN, both genders combined. It ranked 10th among AN men and sixth among AN women. CLD accounted for about 2% (n=75) of all deaths. CLD mortality rates for AN, both genders combined, were 2.0 times higher than among USW (19.4 vs. 9.6 per 100,000). Rates for AN men were not significantly different from those for USW men (13.2 vs. 13.4 per 100,000); however, rates for AN women were 4.1 times higher than those for USW women (25.2 vs. 6.2 per 100,000).

Age-specific CLD mortality rates for AN, both genders combined, were 1.2 to 3.6 times higher for those aged 25 to 64 years compared with USW. There were no significant differences between mortality rates for AN men and USW men for any age groups. Among AN women, CLD mortality rates were 2.1 to 7.2 times higher than for USW women for those aged 25 to 74 years. There were no significant differences between rates for AN men and women by age group.

There was a significant 31% decline in CLD death rates for AN, both genders combined, between 1979 and 2003. USW experienced a significant 26% decline (Table 3). More than three-quarters (77%) of CLD deaths for AN during 1999–2003 were coded as alcohol-related. This proportion has not changed significantly since 1989–1998. Proportions of alcohol-related liver disease deaths were similar for both AN men and women.

DM. DM was the 10th leading cause of death among AN, both genders combined. DM ranked ninth for AN

men and 10th for AN women, and it accounted for almost 2% (n=51) of all deaths among AN, both genders combined. The mortality rate for DM among AN, both genders combined, was lower but not significantly lower than the USW rate (20.9 vs. 22.8 per 100,000). Among AN men and women, rates were similar to those for USW men (25.5 vs. 26.4 per 100,000) and USW women (19.7 vs. 20.1 per 100,000).

There were no significant differences in mortality rates between AN and USW by age group for both genders combined or by gender. There were no significant differences between AN men and women by age group. As shown in Table 3, DM death rates among AN, both genders combined, increased 194% between 1979 and 2003, a much greater increase than that among USW of 40%.

DISCUSSION

This study examined mortality data for AN for the period 1999–2003 and compared current rates with those of USW and AKW. It also examined trends over time in the AN and USW populations. This study found that disparities in death rates for AN persist: all-cause mortality rates for AN are 40% higher than those for USW. In addition, rates for eight of the 10 leading causes of death in AN were significantly higher than in USW, and for several of the causes the ratio was multifold. The greatest disparities were found in unintentional injuries (RR=3.0), suicide (RR=3.1), and homicide (RR=4.4). These categories ranked second, fourth, and seventh, respectively, and as a group comprised 23% of all deaths. AN rates for heart disease mortality were significantly lower than in USW, although not lower when compared with AKW. It is unclear why rates for heart disease for AKW were relatively lower than for USW.

Examination of trends over time showed similar declines among both AN and USW (16% and 15%, respectively). Although overall rates have declined, mortality rates for AN were still 40% higher than for USW and AKW.

It is important to note that the largest disparities between AN and USW were among injury (unintentional and intentional: suicide and homicide). It is also important to note that for all age categories 0–44 years, unintentional injury or suicide was the leading cause of death, thus contributing to the greatest years of potential life lost. This has important implications for service delivery, intervention, and policy. Declines in unintentional injuries related to firearms are promising. However, the lack of change in firearm-related suicides and the increase in use of firearms in homicide is worrisome.

Chronic diseases appear as the leading causes of death after age 45, while cancer is the leading cause of death for those aged 45–74, and heart disease is the leading cause of death for those ≥75 years of age. Although heart disease mortality rates were lower among AN of all ages, RRs were higher in the younger age groups. This figure may have important implications for rates of the disease as the population ages. Between 1979 and 2003, deaths from COPD and DM showed marked increases. In the time period 1979–1983, death rates for diabetes were less than half those of USW, and COPD death rates were approximately three-quarters. Current rates for DM are nearly the same, and COPD mortality rates are 40% higher than for USW.

For all causes and nearly all of the 10 leading causes of death, rates for AN men exceeded those for AN women, similar to USW patterns. An exception was CLD. Rates for AN women exceeded those of AN men and the RRs compared with USW were higher for women than men. Because more than three-quarters of all liver disease deaths were alcohol-related, many of these deaths may be preventable. The more than sevenfold higher homicide rate, the more than threefold higher suicide and injury rates, and the sevenfold higher cerebrovascular disease mortality rate found among AN women aged 25 to 44 years warrant further investigation.

To explore the potential impact of the Alaska environment on death rates, we examined mortality rates for AN compared with AKW. In general, the findings were similar when AN were compared with either the USW or the AKW population. There appeared to be an increased risk associated with living in Alaska for unintentional injury and suicide, as rates for AKW were higher than for USW. AN/AKW RRs were lower than AN/USW for unintentional injury (2.1 vs. 3.0) and suicide (2.2 vs. 3.1) mortality. The difference between AN and AKW may be due to the fact that a much larger percentage of AKW live in an urban center compared with AN. However, the finding that the risk of mortality from these causes was multifold regardless of the population of comparison indicates a need for prevention efforts.

Limitations

This study had limitations, primarily the small numbers of the AN population, especially when trying to calculate rates by gender and age and within specific causes of death. However, we calculated CIs around rates and emphasized those for which the rates were significantly different. There is often concern about underreporting of minority groups. However, a prior study estimated that underreporting of AN on death

certificates in Alaska is relatively low (5%).[8] A check of the state of Alaska vital statistics mortality data file showed that race codes were missing from less than 1% of all death records. As seen in the Tables, the magnitude of the differences is multifold although the magnitude varies among conditions, including some in which no excesses are found. Thus, we believe these rates correctly reflect the mortality status of AN.

CONCLUSION

Disparities persist for overall mortality and eight of the 10 leading causes of AN death. The largest relative differences were in unintentional and intentional injuries. The largest increases in AN mortality rates occurred in COPD and DM. Therefore, monitoring mortality rates and their trends is essential to understand the health status of a population, target areas for prevention, and evaluate the impact of policy change or the effect of interventions over time.

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