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Recent Trends in Alaska Native Death Rates

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Prepared by Larry Blackwood

RECENT TRENDS IN ALASKA NATIVE DEATH RATES

This report presents a summary of current trends in the health status of Alaska Natives as reflected by their death rates. Population statistics for Alaska Natives from the 1980 census along with vital statistics information tabulated through 1980 make it possible to establish accurately patterns of change in death rates during the decade of the seventies. These data are used to examine the trend in the annual death rate for Alaska Natives from 1970 to 1980 and to compare three-year average cause specific death rates for the two time periods 1968-1970 and 1978-1980. Current death rates by census area are also presented.

Methods

The data on Alaska Native deaths used in this report were provided by the State of Alaska's Office of Information Systems and are based on officially recorded death certificates. Table 1 contains the categories used in reporting deaths by cause. The ninth revision of the ICDA codes was used in defining the categories (deaths for 1968-1970, originally coded using the ICDA eight revision codes, were recoded using the ninth revision codes). Over 80 percent of the total Alaska Native deaths in both reporting periods (1968-70 and 1978-80) are accounted for in the 13 specific categories listed in the table. The "other" category, containing the remaining deaths, is comprised of all other specific causes, none of which account for more than one percent of the total deaths, as well as general or residual categories not useful in considering causes by rank (e.g. "ill-defined", "other infectious" and "other respiratory" diseases).

The grouping of deaths by cause categories used in any analysis are a matter of disgression and will vary from one report to the next. Because of this variation, rankings of leading causes such as presented in this report should always be taken in context of the breakdown used.

The population figures used in calculating the death rates are based on the U.S. census figures for Alaska Natives in the state of Alaska. The official population counts were used for 1970 and 1980. For the intercensual years, interpolation of the two census figures was done using an exponential population growth model as described in Shryock and Siegel (1975). (The same interpolation procedure but using the 1960 and 1970 census figures was used to

estimate the 1969 population for calculating three-year average rates for 1969-1970.)

Comparison data for the U.S. total population came from data published by the National Center for Health Statistics (1981). As described within this report, it is often desirable to calculate standardized death rates, adjusting for differences in the age structures of the Alaska Native and U.S. total populations. For the present analysis, the indirect method of adjustment was used (World Health Organization, 1980). The first step in this method is to apply U.S. age-specific death rates to the Alaska Native population distribution to produce an expected rate--that which would occur if Alaska Natives experienced the same mortality rates by age as the U.S. total population. The ratio of the actual U.S. crude death rate to the expected Alaska rate, an indicator of the effect of the difference in age structures of the two populations, is then used as an adjustment factor and multiplied by the actual Alaska Native crude rate to produce the final adjusted rate.

The adjusted rate among Alaska Natives can be interpreted as the rate Alaska Natives would be experiencing given their current health risks but with the same population distribution as the total United States. A further refinement of the calculations produces the Standardized Mortality Ratio, the actual deaths experienced divided by the number expected if the mortality experience where the same as for the total U.S., which is a concise estimate of the actual relative health status or risks of the two populations.

Various statistical tests were performed on the data throughout the analysis. In all cases where tests of significance were used, the .05 level of probability was used for determining significance.

Results

The crude death rate (total deaths per 100,000 population) for Alaska Natives for the years 1970 to 1980 are presented in Figure 1. During the seventies there was less change in the death rate than in either of the two previous decades. The death rate of 748.2 in 1970, down from rates of over 1,000 in the sixties, is the lowest single year rate on record. Although the single year rate for 1980 of 754 was slightly higher than that for 1970, the three year average rate for 1978-1980 was lower than that for 1968-1970 (742 vs. 769).

A regression analysis applied to the data in Figure 1 indicated no significant linear trend in the death rate from 1970 to 1980. The fitted regression line showed a slightly declining but not statistically significant slope ($.05 < p < .10$). Thus the line can be considered essentially flat with no appreciable change

over the ten year period. A comparison of the three-year average rates for 1968-1970 and 1978-1980 also indicated no statistically significant change ($p > .10$), supporting the conclusion derived from the regression analysis of the single year data.

The crude death rate for Alaska Natives in 1980 was sixteen percent lower than the rate of 893 for the U.S. total population. However, the direction of this difference is due entirely to differences in the age structures of the two populations. A greater predominance of Alaska Natives in younger age groups, where risks of death are generally lower, causes the crude death rate to be smaller even though age-specific death rates for all age groups of Alaska Natives are greater than those for their counterparts in the U.S. total population. Thus, even though the overall crude death rate indicates correctly that proportionately fewer Alaska Natives are dying at any one time, it does not reflect the fact that Alaska Natives are throughout their lifetimes always at a greater risk of death than are those in the U.S.total population.

A true comparison of actual risks of death can be determined numerically by calculating adjusted death rates for Alaska Natives, as described in the methods section, to compensate for the differences in age structures of the two populations. The indirect adjusted rate for Alaska Natives for 1980 was 1,490, nearly twice the crude rate and 67 percent higher than the U.S. rate. This means that if the Alaska Native population age distribution was the same as that for the U.S. total population, their current death rate would be 67 percent higher than that for the total U.S.

Effect of deaths on population growth. The crude death rate is one of the major components of population growth. Along with the birth rate and migration, it determines the population growth rate of Alaska Natives in the state. The continued low death rate in the seventies along with a continued high birth rate resulted in an average annual growth rate of 2.3 percent throughout the decade. (Calculated as an exponential growth fuction using Census population figures for 1970 and 1980.) This growth rate is over twice the comparable figure of 1.1 percent per year for the U.S. total population.

Crude death rates by census area. The 1978-1980 three-year average Alaska Native death rates for each of the 23 1980 census areas in Alaska are presented in Table 2. The death rates by census area varied from a low of 379 per 100,000 in the Bristol Bay Borough to a high of 1,104 in the Sitka Borough.

There are no readily apparent geographical patterns to the death rates by census area. High rates can be found from one end of the state to another, both in coastal and inland areas, and in areas with more temperate as well as frigid climates. The census

area rates also did not vary consistently along racial and ethnic boundries. One of the largest differences in rates occurred between the Juneau and Sitka areas which are both composed predominately of the same Indian peoples. High rates can be found in areas were the Native people are primarily northern Eskimos (Nome Division) and interior Indians (Yukon-Koyukuk) as well.

A cursory correlation analysis of demographic variables also failed to reveal any significant bivariate correlations between Alaska Native death rates by census area and demographic factors such as population size, population growth (Native and non-Native) percent Native, and in-migration of non-Native persons. Multiple regression analysis involving pairs of these variable also failed to produce significant results. Apparently, the factors determining variations in crude death rates by census area are many and varied and are not determinable by a quick examination of the data.

Deaths by Cause

Although no appreciable changes occurred in the overall Alaska Native death rate in the seventies, some significant changes did occur among rates for specific causes. Cause of death rates for Alaska Natives are presented in Table 3 for the three year periods 1968-1970 and 1978-1980. Figure 2 shows the percentage distribution of deaths by cause for 1978-1980. Accidents, heart disease and hypertension, and malignant neoplasms continue to be the top three leading causes of death among Alaska Natives and deaths are becoming increasingly concentrated in these three categories. In 1978-1980 they accounted for 54 percent of all Alaska Native deaths in the state--up significantly from 46 percent in 1968-1970.

Accidents. As the leading cause of death among Alaska Natives, accidents present a much more serious health problem than in the U.S. total population where it ranks fourth behind heart disease, neoplasms, and cerebrovascular diseases as a major cause of death. Accidents were responsible for an average of 130 Alaska Native deaths annually during the three year period 1978-1980. The three-year average accidental death rate during that time of 207 deaths per 100,000 populations was up only slightly from a rate of 200 in 1968-1970. (The difference between the rates for the two years was not statistically significant, $p > .3$) The three most common specific types of accidents leading to death among Alaska Natives are motor vehicle accidents, water transport accidents, and accidental drownings (based on the years 1976-1978, the most recent three year period for which detailed data were available for this report. They were followed by fire deaths and accidental poisonings.

Heart disease and hypertension. Heart disease and hypertension has been the leading non-accident related cause of

death among Alaska Natives since public health improvements in the fifties and early sixties reduced deaths from such causes as tuberculosis, influenza and pnuemonia, and diseases of early infancy. Currently, Alaska Native deaths from heart disease and hypertension, which totaled just over 200 from 1978 to 1980, are on the increase. Between 1968-1970 and 1978-1980 the three-year average heart disease and hypertension death rate grew significantly from 84 to 108 deaths per 100,000 population ($p \leq .02$). This approximately 30 percent increase in the rate during the seventies is the second largest percentage increase for any of the causes in Table 3.

In spite of the high and increasing risks of heart disease and hypertension deaths among Alaska Natives, these deaths account for a smaller percentage of the total Alaska Native deaths than they do among the total U.S. population where they are the number one cause (15 percent vs. 38 percent).

Malignant neoplasms. The trend in deaths from malignant neoplasms has paralleled that of heart disease and hypertension, becoming a major cause of death in the last two decades. With 165 neoplasm deaths comprising 12 percent of the total Alaska Native deaths in 1978-1980, it follows close behind heart disease in magnitude as well. The three-year average neoplasm death rate of 88 for Alaska Natives in 1978-1980 is up from ten years previously, but the difference was not statistically significant. The most common body sites afflicted by cancer leading to deaths among Alaska Natives are the lung, large intestine (colon), stomach, pharynx, and breast (in descending order based on 1976-1978 data.) Breast cancer is the most common among Native women. Also as with heart disease and hypertension, malignant neoplasm deaths accounted for a smaller proportion of the total Alaska Native deaths than in the U.S. total population where they made up 21 percent of the total in 1979.

Other causes. Statistically significant declines in Alaska Native deaths rates from 1968-1970 to 1978-1980 were observed for deaths due to infectious and parasitic diseases, diseases of early infancy, cerebrovascular diseases and alcoholism. Rates for infectious and parasitic diseases and for cerebrovascular diseases were both down to less than half the rates of ten years earlier and dropped in rank as leading causes from ninth to eleventh place and sixth to ninth place respectively. The rate for diseases of early infancy was down 40 percent, dropping from fifth to seventh leading cause.

The significant decline in the alcoholism death rate which dropped from seventh to tenth leading cause should not necessarily be taken to indicate an actual decline in the number of alcohol related deaths. The difficulty of defining such deaths should be taken into account in the interpretation of the data. This category is only one of several in which such deaths might be

recorded and the decline may simply reflect a trend toward reporting these deaths under other categories.

As an example, the decline in alcoholism deaths is in contrast to a statistically significant increase of almost 100 percent in the death rate for cirrohsis of the liver. Since by far the majority of cirrohsis deaths are alcohol related, these two trends are somewhat contradictory unless interpreted as a change in reporting practices--i.e. some deaths previously reported under the more general title of alcoholism may now be more specifically diagnosed as alcoholic cirrohsis. This might have come about due to the fact that autopsies at death have become more routine in the past decade and cirrohsis deaths are more often diagnosed based on autopsy.

If cirrhosis and alcoholism deaths are considered together as a crude combined measure of deaths due to alcohol, a non-significant decline in rates is observed over the ten year period (from 45 to 36 deaths per 100,000). If other alcohol related deaths, such as those under alcoholic psychosis, even different results might be obtained.

In spite of no significant changes in the death rates for homicide and suicide over the ten year period, homicide moved up from eighth to fifth place and suicide from ninth to sixth place as leading causes. This was due to the significant reductions in the rates for diseases of early infancy, cerebrovascular diseases, and alcoholism, which had previously occupied fifth, sixth, and seventh places as leading causes.

Standardized rates. Comparing the crude death rates by cause for Alaska Natives to those for the U.S. total population as done in the previous sections is instructive as it provides a measure of the actual relative incidence of the problems in the two populations. However, as with the overall crude death rate, differences in the age structures of the two populations can lead to misleading comparisons when crude rates by cause are used to evaluate relative health status or risks. To make such comparisons more accurate, standardized rates must be calculated by cause of death as they were for the overall death rate.

For example, although the crude rates indicate that proportionately fewer Alaska Natives die from heart disease and hypertension than do those in the total U.S. population, it is not known how much of the difference is due to variations in the actual risk to individuals and how much is caused simply by the differences in the age structures of the two populations (since heart disease affects primarily older persons and Alaska Natives are on the average younger than the U.S. total population). The standardized rates control for the differences in age structure to give a more refined indication of actual relative health risks. Table 4 compares adjusted cause-specific rates to the crude rates

for the top six leading causes of death among Alaska Natives in 1978-1980 and presents standardized mortality ratios which relate them directly to cause-specific rates for the U.S. total population.

The standardized mortality ratio of .41 for deaths due to heart disease and hypertension shows that the risk of death from that cause among Alaska Natives is approximately 60 percent lower than that for the U.S. total population. This difference is not as great as suggested by the crude rate for Alaska Natives, but it still represents a real and substantial difference that is not an artifact of the difference in population age structures. The same is not true for malignant neoplasms however. While the crude rate indicates that proportionately fewer Alaska Natives are dying of malignant neoplasms at any one time, the standardized mortality ratio of .99 reveals that, after correcting for differences in age structures, the risk of dying of neoplasms in Alaska Natives are essentially equal to that in the U.S. total population (the rates differ by only one percent).

The adjusted rate for deaths from influenza and pnuemonia is another example where the crude rates do not accurately reflect the true risks relative to the U.S. total population. Although the crude rate indicates that proportionately just under twice as many Alaska Natives are dying from this cause compared to those in the total U.S., the standardized mortality ratio indicates that the adjusted rate is nearly four times that for the U.S. total population. Like cancer, these deaths are more highly concentrated in the older age groups. That is why adjusting for the younger age population of Alaska Natives changes the rates so drastically for these causes. By contrast, rates for accidents, homicide and suicide deaths, which are more evenly distributed among all age groups did not change as much when adjusted for age differences.

Conclusions

Counterbalancing trends in death rates for specific causes have resulted in little overall improvement in the death rate among Alaska Natives in the last decade. In the fifties and sixties, dramatic declines in the death rate among Alaska Natives occurred primarily as a result of new public health programs which began to reduce the extremely high death rates due to specific causes such as tuberculosis, other infectious diseases, and diseases of early infancy. In the seventies however, a slowdown in the decline of rates for these particular causes suggests that a point of diminishing returns from those original efforts has been reached. This and the lack of decline or increase in other rates for more recently emerging problems such as heart disease and neoplasms have combined to produce the current level overall trend.

For the future it seems important steps must be taken to avoid further stagnation or even an increase in the death rate among Alaska Natives. If the rate of change continues to slow for those causes which contributed to past declines, and rates for heart disease and other current major health problems continue to climb, a future deterioration of the health status of Alaska Natives as measured by death rates is inevitable. Redoubled efforts to force continued declines in rates for causes such as influenza and pnuemonia which are still at levels several times those which have been achieved in the U.S. total population, plus successful efforts aimed at stemming the increases in the still relatively low levels of deaths from heart disease and other causes will be needed to prevent this from happening.

References

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1975 The Methods and Materials of Demography. Bureau of the Census, Washington, D.C.: U.S. Government Printing Office.

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1981 "Annual summary of births, deaths, marriages, and divorces: United States, 1980." Monthly Vital Statistics Reports 29:13 (September 17).

Table 1. Cause of death categories by ICDA code

Cause of Death	ICDA Codes (Ninth Revision)
Infectious and parasitic diseases	001-018,137
Malignant Neoplasms	140-208
Alcoholism	303
Heart disease and hypertension	390-429
Cerebrovascular disease	430-438
Arteriosclerosis	440
Influenza and pneumonia	480-487
Cirrhosis of the liver	571
Congenital anomalies	740-759
Diseases of early infancy	760-779
Accidents	E800-E949
Suicide	E950-E959
Homicide	E960-E969
Other	All other codes

Table 2. 1978-1980 three-year average Alaska Native death rates by 1980 Census Areas.

Census Area	Number of deaths 1978-80	Three-year average death rate
North Slope Borough	77	814.8
Kobuk Division	104	862.9
Nome Division	140	923.4
Yukon-Koyukuk Division	121	945.7
Fairbanks North Star Borough	63	719.7
Southeast Fairbanks Division	11	517.8
Wade-Hampton Division	78	612.3
Bethel Division	164	605.2
Dillingham Division	64	620.4
Bristol Bay Borough	4	379.2
Aleutian Islands Division	47	829.3
Matanuska-Susitna Borough	12	598.7
Anchorage Borough	170	651.7
Kenai Penninsula Borough	36	706.8
Kodiak Island Borough	45	815.1
Valdez-Cordova Division	28	901.4
Skagway-Yakutat-Angoon Division	42	980.3
Haines Borough	5	797.3
Juneau Borough	31	483.0
Sitka Borough	54	1104.1
Wrangell-Petersburg Division	27	774.3
Prince of Wales-Outer Ketchikan Division	34	702.7
Ketchikan Borough	34	825.2

Table 3. Deaths by cause, Alaska Natives
1968-1970, 1978-1980

	1968-1970			1978-1980		
	number of deaths	3 year average rate	rank	number of deaths	3 year average rate	rank
Infectious and parasitic diseases	34	22.8	9	20	10.7	11
Malignant neoplasms	112	75.0	3	165	87.9	3
Alcoholism	50	33.5	7	25	13.3	10
Heart disease and hypertension	125	83.7	2	203	108.2	2
Cerebrovascular diseases	61	40.8	6	35	18.7	9
Arteriosclerosis	11	7.4	13	14	7.5	13
Influenza and pnuemonia	69	46.2	4	66	35.2	4
Cirrhosis of the liver	17	11.4		42	22.4	8
Congenital anomalies	17	11.4	11	19	10.1	12
Diseases of early infancy	68	45.5	5	51	27.2	7
Accidents	299	200.1	1	389	207.3	1
Suicide	34	22.8	9	52	27.7	6
Homicide	41	27.4	8	59	31.4	5
Other	211	141.2		252	134.3	
Total al causes	149	769.1		1392	739.9	

Adjusted Three-year Average Death Rates and
Mortality Ratios by Cause, Alaska Natives 1978-1980

Cause	Crude Rate	Indirect Adjusted Rate [1]	Direct Adjusted Rate [2]	U.S. Crude Rate	Ratio Crude Rate [3]	Standardized Mortality Ratio [4]
Accidents	207.3	42.6	233.1	47.9	4.33	4.87
Heart Disease and Hypertension	108.2	136.4	262.9	331.3	.33	.79
Malignant neoplasms	87.9	88.7	181.8	183.5	.48	.99
Influenza and pnuemonia	35.2	8.9	79.1	20.0	1.76	3.96
Homicide	31.4	10.1	32.6	10.5	2.96	3.10
Suicide	27.7	10.2	34.2	12.6	2.20	2.71
Cerebrovascular Disease	20.2	30.6	43.6	77.0	.26	.57

Rates per 100,000 population.

1. Rate if age-specific death rates among Alaska Natives were the same as in the U.S. total population.
2. Rate that would occur given current mortality experience but with a population age structure matching that of the U.S. total population.
3. Alaska Native crude rate/U.S. crude rate.
4. Direct adjusted Alaska Native rate/U.S. total rate (or actual deaths/expected deaths).

Alaska Area Native Health Service

Health Statistics Section

Figure 1. Alaska Native death rate, 1970-1980.

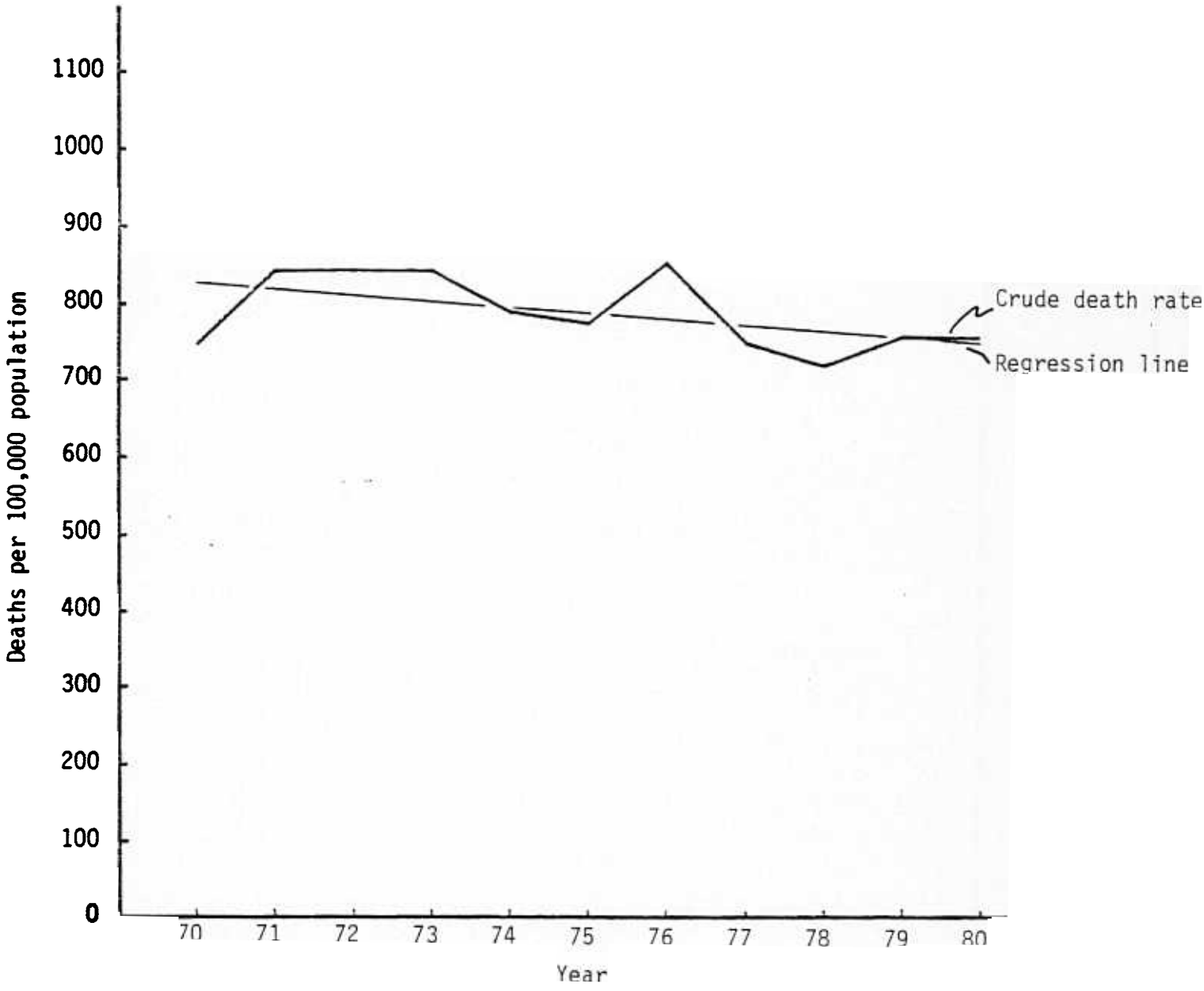

Figure 2. Percent distribution of Alaska Native deaths by cause, 1978-1980