

Appendix A – Methods

This appendix provides the methods used in each chapter in order. Mortality reporting is essential to monitoring the health and well-being of a population. This report serves as an update to prior mortality statistics published by the Alaska Native Epidemiology Center, with a new edition published approximately every five-years.

Population Overview

Alaska Native people are the Alutiiq, Athabascan, Cup'ik, Eyak, Haida, Iñupiaq, St. Lawrence Yup'ik, Tlingit, Tsimshian, Unangax̂, and Yup'ik peoples who have lived and thrived in the land now known as Alaska since time immemorial. The U.S. Bureau of the Census estimates that in the year 2010 there were 130,998 Alaska Native people residing in Alaska, 104,871 of whom checked only the American Indian/Alaska Native category for race among multiple options.

For this report, bridged race population estimates were used for statistics calculated prior to 2014. The bridged estimate for the year 2010 Alaska Native population was 120,767, an intermediate value between the single race and multiple race estimates reported by the census.^a For the most recent time period, 2014-2018, the racial classification includes Alaska Native people alone or in combination with other races. Population tables for the 2014-2018 time period are presented in Appendix E.

Mortality Data Overview

Mortality records for the years 1980-2018 were obtained from the State of Alaska's Department of Health and Social Services, Health Analytics and Vital Records Section. The analyses in this report include all Alaska Native people who were a resident in Alaska and died in Alaska. Individuals with no underlying cause of death listed were excluded from the analysis. For most chapters in this report, we calculated mortality rates for Alaska Native people using only the underlying cause of death. For one chapter, *Alcohol-Related Mortality*, all causes of death listed on the certificate were considered for analysis.

Because of small numbers, deaths were aggregated for the five-year time period, 2014-2018. Race, alone or in combination, of the Alaska Native population estimate for this period was used as the population denominator.^b We only reported and calculated rates for those causes that had at least five deaths during the interval studied.

Race is assigned at time of death by either next of kin, or the coroner. There is often concern about under-reporting of minority groups on death certificate data. However, a 2014 study estimated that misclassification of Alaska Native people on death certificates is relatively low (6.5%).^c

Alaska Native rates for 2014-2018 were compared to mortality rates for U.S. all races for the time period, 2014-2018. These large numbers provide accurate estimates by age and sex for comparison. U.S. all races data, numerators and denominators, came from the CDC National Center for Health Statistics.^d Data for U.S. all races are available for the years 1969-2018.

Age-adjusted mortality rates control for the effects of differences in population age distributions. Direct age-adjustment is the same as calculating a weighted average. It weights the age-specific rates observed in a population by the proportion of each age group in a standard population. All mortality rates were age-adjusted to the 2000 standard population by the direct method.

Rate ratios, a calculation of relative difference between two incidence rates, were created to compare Alaska Native to U.S. all races rates. The denominators used in these rate ratio calculations are the U.S. all races rates. Confidence intervals were calculated around these rate ratios.^e Alaska Native rates were considered significantly different if the 95% confidence interval did not contain one. Age-adjusted rates based on fewer than 20 occurrences are statistically unreliable and should be used with caution.

Most chapters focus on the ten leading causes of death among Alaska Native people, both sexes combined. Some chapters include statistics for the top 18 causes of death that have at least 30 deaths occurring statewide among Alaska Native people during the five-year time period 2014-2018.

Leading Causes of Death

This report shows causes of death among Alaska Native people in rank order. Numbers of deaths for each cause and age-adjusted rates are listed for both Alaska Native people and U.S. all races. Rate ratios with 95% confidence intervals are used to compare the two populations. Rates are considered statistically different if the confidence intervals do not contain one.

In order for the data in this report to be comparable to other studies, mortality rates for the 10 leading causes of death for Alaska Native people statewide were calculated from a standardized list of 50 leading causes of death as defined by the National Center for Health Statistics (NCHS) with the exception of alcohol abuse (F10). Deaths due to Alcohol Abuse (F10) do not appear on the NCHS list of leading causes because of its low rate of occurrence nationwide. It does, however, rank in the top 10 leading causes of death among Alaska Native people, and was included in this report. A list of ICD-9 and ICD-10 code groupings used is included in the Appendix C.

Throughout this document, certain conditions originating in the perinatal period are listed as perinatal conditions; chronic liver disease and cirrhosis are referred to as chronic liver disease; chronic obstructive pulmonary disease is listed as COPD; congenital malformations, deformations and chromosomal abnormalities are listed as congenital abnormalities; diseases of heart are listed as heart disease; essential (primary) hypertension and hypertensive renal disease are listed as hypertension; homicide and legal intervention is listed as homicide; nephritis, nephrotic syndrome and nephrosis are listed as nephritis; and mental and behavioral disorders due to alcohol abuse are listed as alcohol abuse; diabetes mellitus are listed as diabetes.

Age-Specific Rates

Age-specific mortality rates are the total number of deaths per year per 100,000 people of a given age and allow an examination of health risks for each age group of the population. For the most recent time period, 2014-2018, age-specific rates for Alaska Native people were compared with age-

specific U.S. all races rates using rate ratios and 95% confidence intervals. Rates are considered statistically different if the confidence intervals of the rate ratios do not contain one. Age-specific rates are not age-adjusted.

Years of Potential Life Lost (YPLL)

Years of potential life lost (YPLL) is a measure of premature mortality. It is an estimate of the years a person would have lived if s/he had lived to age 75. For the purpose of this publication, the number of YPLL is calculated by subtracting the age at death for each individual from 75. Only those people who died before 75 years of age are included in the calculation. YPLL is an alternative death statistic to mortality rates that gives more insight into deaths that occur among younger people. This section lists the fifteen leading causes of YPLL among Alaska Native people.

Trends Over Time

Changes in mortality rates over the period, 1980-1983 to 2014-2018, were analyzed for the leading causes of death among Alaska Native people statewide and in each service region.

Historical data is presented for five-year aggregated time periods with the exception of the first time period, 1980-1983. While the first time period presented here, 1980-1983, is only a four year aggregate (compared to five-years for all other time periods), there is no reason to believe the inclusion of an additional year in the first time period would substantially change the overall trend calculation. We assume the risk of mortality in 1979 is not significantly different than the 1980-1983 time period.

Percentage change between the 1980-1983 time period and the 2014-2018 time period was calculated by subtracting the rate for the first time period from the rate for the most recent time period and dividing by the rate for the first time period. Rates over time were reported for both Alaska Native people and U.S. all races.

Rates were not calculated for a cause that had fewer than five cases. Rates based on fewer than 20 occurrences are statistically unreliable and should be used with caution.

Mantel-Haenszel Chi-square tests for trend stratified by age group were used to test for a significant trend over time for each age-adjusted time period.^f

Service Regions

Alaska is divided into twelve service regions for reporting health data. In general, these regions match the larger Tribal Health Organization (THO) service areas. Smaller service areas required aggregation. There are twelve service regions: Aleutians & Pribilofs; Anchorage-MatSu; Arctic Slope; Bristol Bay; Copper River/Prince William Sound; Interior; Kenai Peninsula; Kodiak Area; Northwest Arctic; Norton Sound; Southeast; Yukon-Kuskokwim. Refer to Appendix D for details on region definitions.

Deaths were assigned to the service region in which the person was resident, regardless of place of death in Alaska. This report does not include deaths of Alaska residents who died outside of Alaska as well as Alaska residents without an underlying cause of death.

Rate ratios were used to compare each region to all regions combined minus the region of interest. Confidence intervals for the rate ratios were calculated around the ratios. Mortality rates for a region were considered to be significantly different from the rest of the state if the rate ratio of the region compared to the rest of the state combined does not include one.

Regional data is presented for the top 18 causes of death, where reportable. Fewer causes were reported in individual regions if causes had fewer than five cases.

Excess Deaths

Excess deaths were calculated by multiplying the age-specific and cause-specific death rates for U.S. all races by the Alaska Native population for each age group to determine the expected number of deaths. The difference between the expected and the observed number of Alaska Native deaths was considered excess.^g If the number is positive, it means there were more deaths among Alaska Native people than expected. If the number is negative, it means there were fewer deaths among Alaska Native people than expected.

Life Expectancy

Life expectancy at birth is the average number of years a person is expected to live from birth, based on the year in which they were born. Life expectancy tables report the number of years a person can expect to live if they have survived to a given age. Reported life expectancy for this report is calculated via a traditional life-table method.^h

Alcohol-Related Mortality

Inclusion of records in this section is defined by any mention of one alcohol-associated code anywhere in the certificates' cause of death, whether underlying or contributing. The codes included for this special analysis are developed from the CDC's Alcohol-Related Disease Impact (ARDI) framework.ⁱ Death certificates were then analyzed according to the underlying cause listed, in accordance with the methodology in the rest of this report.

^a Population bridging is a method used to make multiple-race and single-race data comparable enough for analysis. In population bridging, all single race respondents are counted in the race category (in this case, all 104,871 AN). Persons who reported multiple races (in this case, an additional 26,127 individuals) are assigned to a single race category based upon fairly complex mathematical models.

^b Population estimates for Alaska Native people for the years 1980-1998 are based on the NCHS postcensal series by year, census area, age, sex, single race, and Hispanic origin. Population estimates for Alaska Native people for the years 1999-2013 are based on the NCHS postcensal series by year, census area, age, sex, bridged race, and Hispanic origin. Population estimates for Alaska Native people for the years 2014-2018 are based on the State of Alaska, Department of Labor and Workforce Development by year, census area, age, sex, race (alone or in combination), and Hispanic origin. Census areas were combined to form Service Regions as outlined in Appendix D. Population counts for communities that received health services from regions other than those to which their census areas belonged were added or subtracted

- from the appropriate service region. Counts for Alaska Native people in these villages came from 2010 Census data. Changes in annual community estimates were calculated based on annual changes for the census area of the community. Data for 1990-2013 is available on the Internet at: http://www.cdc.gov/nchs/nvss/bridged_race.htm as of December 1, 2020. Data for 2014-2018 is available on the internet at: <https://live.laborstats.alaska.gov/pop/> as of December 1, 2020.
- ^c Espey, D. K., Jim, M. A., Richards, T. B., Begay, C., Haverkamp, D., & Roberts, D. (2014). Methods for improving the quality and completeness of mortality data for American Indians and Alaska Natives. *American journal of public health*, 104 Suppl 3(Suppl 3), S286–S294. <https://doi.org/10.2105/AJPH.2013.301716>
- ^d Underlying Cause of Death 1999-2018 on CDC WONDER Online Database, accessed 2020. Data are from the Multiple Cause of Death Files, 1999-2018, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed at <http://wonder.cdc.gov/ucd-icd10.html>. Underlying mortality data provided by NCHS (www.cdc.gov/nchs).
- ^e Armitage P, Berry G, Matthews. *JNS. Statistical Methods in Medical Research* (4th edition). Oxford: Blackwell Science 2002.
- ^f Schlesselman. “Case-Control Studies”, New York, Oxford Univ. Press, 1982, pp.203-206.
- ^g Berry G. The Analysis of Mortality by the Subject-Years Method. *Biometrics*. 1983;39(1): 173-184.
- ^h For more information, see “WHO methods for life expectancy and healthy life expectancy,” http://www.who.int/healthinfo/statistics/LT_method.pdf
- ⁱ For more information, see “ARDI methods,” <https://www.cdc.gov/alcohol/ardi/methods.html>