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Recommendations and Reports

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Characteristics of Suicide Among Alaska Native and Alaska non-Native People, 2003–2008

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Executive Summary

This report presents information on the epidemiology of suicide among Alaska Native and Alaska non-Native people from 2003 to 2008 to help inform future suicide prevention efforts.

The key findings are as follows:

- 65% (869/1,347) of all violent deaths in Alaska from 2003 to 2008 were suicides.
- The average annual suicide rate among Alaska Native people during 2003–2008 was 40.4 per 100,000 persons, which was more than two times the rate for Alaska non-Native people at 17.7 per 100,000 persons.
- From 2003 to 2008, there was no statistically significant change in the annual suicide rates among Alaska Native or Alaska non-Native people.
- Alaska Native suicide decedents were younger, on average, than Alaska non-Native suicide decedents. Two-thirds of Alaska Native suicide decedents were younger than 29 years old, while one-third of Alaska non-Native suicide decedents were younger than 29 years old. The highest suicide rate was found among Alaska Native male decedents aged 20–29 years (155.3 per 100,000 persons).
- Firearms remained the major method of self-inflicted injury leading to a suicide (54% for Alaska Native people; 68% for Alaska non-Native people), and a house or apartment was the most common location in which the fatal injury occurred (76% Alaska Native people, 73% Alaska non-Native people).
- Of those tested, a large proportion of Alaska Native and Alaska non-Native suicide decedents were positive for alcohol (54% and 47%, respectively).
- Mental health issues were the most commonly identified precipitating circumstance for Alaska Native suicide decedents and Alaska non-Native suicide decedents, at 38% and 44%, respectively. Forty-two percent of all decedents were described as experiencing a depressed mood near the time of their death.
- Suicide rates were highest among Alaska Native people residing in the Northwest Arctic (93.1 per 100,000 persons), Norton Sound (77.2 per 100,000 persons), and Yukon-Kuskokwim (66.7 per 100,000 persons) regions.
- The suicide rate for Alaska Native people was significantly higher in non-hub communities (60.0 per 100,000 persons) than in hub communities (25.8 per 100,000 persons).

Recommendations are provided for consideration including increasing summary reporting of surveillance data to regional and community-based prevention programs; increasing toxicology testing of decedents; increasing alcohol abuse and depression screening at health care facilities and other locations; increasing the use of gun locks and gun safes in firearm safety programs; investigating ways to expand the delivery of behavioral health care to non-hub communities; investigating ways to reach young adult males under 30; and continuing collaborative suicide prevention efforts at the federal, state, and tribal levels.

Background

Nationally and internationally, suicide is a major public health concern.[1-3] In 2002, the World Health Organization (WHO) estimated that there were more than 1.6 million deaths related to violence worldwide, and half of them were suicides.[1] In 2008, suicide claimed an average of 98.5 lives each day nationally, and ranked 10th among the leading causes of death in the United States (U.S.).[4] There were over 36,000 suicides in the U.S. in 2008; the annual mortality rate attributable to suicide was 11.6 per 100,000 persons.[5] Alaska consistently has one of the highest suicide rates in the nation.[1,5,6] The 2008 suicide rate in Alaska was 24.6 per 100,000 persons, which ranked sixth among the leading causes of death for the state[i].[5,8] In addition, during 2005–2009, suicide attempt was listed in the Alaska Trauma Registry[ii] as being one of the top five leading causes of hospitalized injuries for Alaska residents aged 10–84 years, and as the leading cause of injury hospitalizations for persons aged 15–34 years.[9]

Suicide rates have consistently been higher among Alaska Native people than any other racial/ethnic group in the U.S.; suicide ranked fourth among the leading causes of death among Alaska Native people in 2008.[3,5,8,10-13] A 1983–1984 study noted that although Alaska Native people represented 14% of the population in Alaska, they accounted for 33% of the suicides.[14] During 2003–2006, Alaska Native people comprised 16% of Alaska's total population, and accounted for 38% of the suicides.[3] In 2008, the suicide rate among Alaska Native people (42.9 per 100,000) was 1.9 times higher than the rate for Alaska's total population (24.6 per 100,000) and 3.7 times that for the U.S. total population (11.6 per 100,000).[5]

Suicide rates among Alaska Native people have been consistently highest among adult males aged less than 35 years.[3,10] While the median age for those dying by suicide among Alaska Whites was 32 years, the median age was 23 years for Alaska Native people in 1983–1984.[14] A more recent study by the Alaska Native Tribal Health Consortium showed that during 2004–2008, the median age of suicide among Alaska Whites was 43 years, while the median age among Alaska Native people was 26 years.[15]

The age disparities in suicide rates between racial groups in Alaska and the U.S. are reflected in the years of potential life lost (YPLL[iii]) before 65 years of age. The mean YPLL from suicide among Alaska Native people during 1983–1984 was 1,684 per 100,000 persons; among Alaska Whites and U.S. total population, the YPLL from suicide was 499 and 270 per 100,000 persons, respectively.[14] As expected, the disparity was still considerable in 2007, with YPLL rates of 1,529 per 100,000 Alaska Native persons; 439 per 100,000 Alaska White persons; and 267 per 100,000 persons for U.S. total population.[5]

Suicide rates have consistently been higher among males than females, particularly among Alaska Native people.[10-14] In their 1983–1984 study, Hlady and Middaugh found a male to female suicide ratio of 4.9 to 1 for all Alaskans.[14] This compares to a ratio of 3.8 to 1 during 2003–2008 (33.9 per 100,000 for males compared to 9.0 per 100,000 for females).[12] Suicide ranked fourth among leading causes of death for Alaska Native males and seventh for Alaska Native females.[5]

Historically, the majority of suicides in Alaska have occurred as a result of a gunshot wound, followed by poisoning and suffocation.[3,12,14] Mental health issues were commonly noted for suicide decedents.[13] A personal history of relationship issues, breakups, or previous attempts, and a family history of suicide have been found to be significant risk factors associated with suicidal behavior.[10,13,16] In addition, a history of substance abuse, most commonly alcohol, has been associated with suicidal behavior.[3,10,12,16]

In 2002, the U.S. Centers for Disease Control and Prevention (CDC) established the National Violent Death Reporting System (NVDRS) as an aggregation of data from six state health departments. Today the NVDRS operates in 18 states, including Alaska, with the expectation that all 50 states will be included in the future.[1,12,17,18] The NVDRS aims to collect information on violent deaths (including environmental factors and circumstances preceding them) from key sources to establish a standardized data matrix that can provide a timely, more detailed assessment of these deaths for the prevention of violence and violence-related deaths.[2,13,17,18]

[i] The Bureau of Vital Statistics is the single source of mortality data. Since suicide counts and rates are based on manner of death denoted as "suicide" and do not include certificates denoted as "pending" or "undetermined", mortality rates calculated from death certificates should be considered as an underascertainment of the magnitude of death due to self-harm.[5]

[ii] The Alaska Trauma Registry collects data from all 24 acute care hospitals in Alaska on patients hospitalized for traumatic injuries.

[iii] YPLL is an aggregate measure of premature mortality.

In August 2011, a summary of suicides in Alaska was included in the Alaska Violent Death Reporting System (AKVDRS) report of all violent deaths in 2003–2008. The findings from on-going in-depth analysis of the AKVDRS data will contribute to the understanding of suicide in Alaska and help inform future suicide prevention efforts.

Methods

The source of data for this study was AKVDRS data from 2003–2008, which followed the NVDRS methodology.[19] NVDRS defines suicide as "a death resulting from the use of force against oneself when a preponderance of the evidence indicates that the use of force was intentional."[18] A death is classified as a suicide even if the person was only trying to hurt themselves, or if the death occurred as a result of risky behavior, such as "Russian roulette", where there was not a clear intent to cause death.[18] A death is not classified as suicide if it is the result of chronic or acute substance abuse, or if it is the result of autoerotic behavior.[18] Death certificates usually are the first official documentation of a suicide case; however, information from law enforcement, medical records, and the media are also used to assist with identifying potential cases and to provide details on circumstantial and environmental factors preceding the incident.

The AKVDRS uses an abstractor's assigned "manner of death" based on the working definitions and guidance provided by NVDRS. Abstractors take into account all sources (e.g., a death certificate, a law enforcement report, and an autopsy report) of data on the case prior to assigning a manner of death.[18] Typically, the manner of death denoted on the death certificate agrees with the reports and other documents reviewed. However, when data sources differ as to manner of death, the abstractor assigns a manner of death based on the preponderance of the evidence provided and hierarchy of the data sources.[18]

Tribal Health Regions and Regional Hubs

For the purposes of this study, the state of Alaska was subdivided into nine regions. These regions roughly correspond with the areas served by regional tribal health organizations. Because the populations of the Aleutians and Pribilofs, Copper River/Prince William Sound, Kenai Peninsula, and Kodiak regions are relatively small, these regions were combined into the Rural Anchorage Service Area (Figure 1). Additional information on how the tribal health regions correlate with borough/census areas can be found in Appendix A.

Regional hub communities in this study were defined as cities or villages that serve as transportation and commercial centers that support smaller villages, where a significant proportion of the population for each region resides (Table 1). These hubs tend to have more resources, including behavioral and mental health providers than non-hub communities.

Data Analyses

For the purposes of this study, Alaska Native suicide decedents included American Indian or Alaska Native people residing in Alaska at the time of their death. Alaska non-Native suicide decedents included all racial/ethnic groups residing in Alaska at the time of their death, excluding Alaska Native people. Race was determined from the death certificate. Of the 17 death certificates containing multiple race designations, 14 indicated Alaska Native race. These were categorized as "Two or More Races" and included with the analysis for Alaska non-Native decedents.

Suicides were summarized by counts, percentages, and rates. The rates were presented as deaths per 100,000 persons per year, except as noted otherwise. Counts, percentages, and rates calculated from less than five decedents were suppressed. Chi-squared tests used to test for significance were performed in Microsoft Excel. P-values <0.05 were considered to be significant. In calculating rates for race, sex, marital status, age group, and region, population estimates were based on 2003–2008 Alaska resident estimates produced by the National Center for Health Statistics (NCHS) Bridged-Race Vintage 2009 Postcensal Population Estimates, available at: http://wonder.cdc.gov/population.html.

NCHS population estimates were used to obtain the population estimates by race for the regional hub communities included in this study; however, population data by race for 2003–2008 were not available for the hub communities of Barrow, Kotzebue, and Nome. To calculate rates for Alaska Native people versus Alaska non-Native people in the non-hub communities of the Arctic Slope, Northwest Arctic, and Norton Sound regions, and for Barrow, Kotzebue, and Nome, 2000 and 2010 Census counts for Alaska Native people and 2003–2008 NCHS total population estimates data were used. (See Appendix B for the population estimation formula). Census counts for 2000 and 2010 Alaska Native people were compiled by the Alaska Area Native Health Service Division of Planning, Evaluation, and Health Statistics, and are available at: http://www.ihs.gov/alaska/documents/pop_reports/Census2010publicationInternet.pdf.

Non-marital/interpersonal relationship data are not denoted on the death certificate, and therefore could not be analyzed (See Limitations).

Results

Suicide Rates

Of all violent deaths in Alaska from 2003–2008, 65% (869/1,347) were suicides. The average annual suicide rate among Alaska Native people during 2003–2008 was 40.4 per 100,000 people per year (range: 34.5–49.7), which was more than two times the rate for Alaska non-Native people at 17.7 per 100,000 (range: 16.1–20.6) people per year (Table 2, Figure 2).

Trends by Year and Month

The suicide rate among Alaska Native people varied by year, but did not change significantly for Alaska Native or Alaska non-Native people during 2003–2008. The proportion of suicides that occurred by month ranged from 5% to 12% among Alaska Native people (with the highest percentages occurring in March and April) and from 7% to 11% among Alaska non-Native people (with the highest percentages occurring in June and October; Table 3, Figure 3).

Trends by Sex, Age, and Marital Status

Almost two-thirds of Alaska Native suicide decedents were younger than 29 years, while only about a third of Alaska non-Native decedents were younger than 29 years (Table 4). Suicide rates were significantly higher among Alaska Native people than Alaska non-Native people in all age groups, except for ages greater than 50 years where suicide rates were significantly higher among Alaska non-Native people than Alaska Native people (Table 4).

The suicide rate among Alaska Native males during 2003–2008 was more than three times the rate for Alaska Native females ($p<0.001$; Table 4). Alaska Native males aged 20–29 years had the highest suicide rate of any other group ($p<0.001$; Table 4). The suicide rate for Alaska non-Native males was over four times higher than among Alaska non-Native females ($p<0.001$; Table 4).

Alaska Native suicide decedents that were aged 18 years and older for whom marital status was known were significantly more likely to be "never married" or single than Alaska non-Native suicide decedents ($p<0.001$; Table 5). Alaska non-Native suicide decedents aged 18 and older were significantly more likely than Alaska Native suicide decedents to be married or divorced ($p<0.001$; Table 5).

Method and Location

During 2003–2008, firearms were used in the majority of all suicides. Alaska non-Native people were significantly more likely to use a firearm or poison ($p<0.001$; Table 6). Alaska Native people were significantly more likely to use a method involving hanging, strangulation, or suffocation ($p<0.001$; Table 6).

The most common setting of self-inflicted injury for both Alaska Native people and Alaska non-Native people was a house or apartment, followed by a natural area (Table 6). While no significant difference was detected with either of these locations, Alaska non-Native people were significantly more likely than Alaska Native people to be found in a motor vehicle setting (Table 6).

Autopsy and Toxicology Results

Autopsies were completed on 16% (137/869) of all suicide decedents, of which, 88% (120/137) included toxicology tests (Table 7a). Toxicology specimens were collected and tested on 252 suicide decedents that did not have an autopsy performed.[iv] There was no significant difference between the number of Alaska Native and Alaska non-Native suicide decedents that tested positive for alcohol (Table 7b). Of decedents that were positive for alcohol, 79% (146/184) had a blood alcohol concentration (BAC[v]) of ≥0.08 g/dL (range: 0.08–0.88 g/dL; Table 7b).

Alaska non-Native suicide decedents were significantly more likely to be tested for illicit drugs ($p<0.05$; Tables 7a). The only significant difference

[iv] Under Alaska State law, the State Medical Examiner's Office (SMEO) is responsible for conducting the medical/legal investigative work related to unanticipated, sudden or violent deaths. This includes determining cause and manner of death, providing consultation to law enforcement and the courts, and providing information about non-lethal injuries to children specific to child abuse and neglect. The SMEO has the authority to determine whether or not an autopsy and/or toxicology testing is necessary. Decedents from rural and remote areas must be brought to Anchorage and then returned to the next of kin for services and burial. However, the SMEO may determine that autopsy is not necessary to certify the immediate and contributory causes and manner of death based on information gathered by investigators at the place of death. These determinations are made by the individual forensic pathologist that certifies the death and denotes the manner of death on the death certificate.

[v] Blood alcohol concentration (BAC) is commonly used for legal and medical determination of intoxication, where a BAC ≥ 0.08g/dL is considered legally intoxicated.

found in toxicology results between Alaska Native and Alaska non-Native suicide decedents was that Alaska non-Native decedents were more likely to be positive for opiates (Table 7b).

Precipitating Circumstances

At least one precipitating circumstance was known for 93% of Alaska Native and 96% of Alaska non-Native suicide decedents (precipitating circumstances were not mutually exclusive, and a decedent may have had multiple circumstances identified).

Overall, mental health problems were the most commonly noted precipitating circumstance; 42% of all decedents with a known mental health problem were described as experiencing a depressed mood preceding their deaths (Table 8). Alaska Native suicide decedents were significantly more likely than Alaska non-Native suicide decedents to have had proven or "suspected" intoxication, experienced a suicide of a family member or friend, and/or had a history of previous suicide attempts at the time of their death (Table 8). Alaska non-Native suicide decedents were significantly more likely than Alaska Native suicide decedents to have had a documented current mental health problem, been in treatment for a mental health problem, been treated for a mental health problem, and/or left a suicide note (Table 8).

Alaska Native female suicide decedents were significantly more likely than Alaska Native male suicide decedents to have had a documented current mental health problem ($p<0.001$), been in treatment for a mental health problem ($p<0.001$), been treated for a mental health problem ($p<0.001$), had a non-intimate partner relationship problem ($p<0.01$), and/or left a suicide note ($p<0.05$; Table 8).

Among males, Alaska Native suicide decedents were significantly more likely than Alaska non-Native suicide decedents to have had proven or suspected intoxication at the time of death ($p<0.01$), been a perpetrator of interpersonal violence during the previous month ($p<0.05$), had a friend or family member die by suicide during the previous 5 years ($p<0.001$), and/or had a history of previous suicide attempts ($p<0.001$; Table 8). In contrast, Alaska non-Native suicide decedents were significantly more likely to have had a current mental health problem ($p<0.001$), been in treatment for a mental health problem ($p<0.001$), been treated for a mental health problem ($p<0.001$), had a physical health problem ($p<0.001$), had a financial problem ($p<0.001$), had a job problem ($p<0.001$), and/or left a suicide note ($p<0.001$; Table 8).

Among females, Alaska non-Native suicide decedents were significantly more likely than Alaska Native suicide decedents to have had a current depressed mood ($p<0.05$) and/or a physical health problem ($p<0.01$; Table 8).

Trends by Geographic Region

Suicide rates were highest among Alaska Native people in Northwest Arctic, followed by the Norton Sound, and Yukon-Kuskokwim regions (Table 9). Alaska non-Native suicide rates did not differ significantly by region; however, many areas of the state had too few Alaska non-Native suicide decedents to calculate a stable rate (Table 9).

The suicide rate was significantly higher among Alaska Native people living in the non-hub communities compared to those living in the hub[vi] communities during 2003–2008 ($p<0.001$; Table 10). The suicide rate was also significantly higher among Alaska non-Native people living in non-hub communities compared to those living in the hub communities ($p<0.001$; Table 11).

During 2003–2008, there were 59 suicides among Alaska Native people in the non-hub communities in the Yukon-Kuskokwim region (excluding Bethel), which accounted for 21% of the total statewide Alaska Native suicides; however, the residents in that area only accounted for 6% of the statewide Alaska Native population (Table 10). The suicide rate among Alaska Native people was significantly higher in the non-hub communities than in the hub communities of the Yukon-Kuskokwim ($p<0.001$) and Interior regions ($p<0.01$; Table 10). The suicide rate among Alaska non-Native people was significantly higher in the non-hub communities than in the hub communities of the Anchorage/Matanuska-Susitna and Rural Anchorage Service Area regions ($p<0.001$; Table 11). The small number of Alaska non-Native people living in areas other than Bethel and the Anchorage/Matanuska-Susitna, Rural Anchorage Service Area, Interior, and Southeast tribal health regions precluded calculation of stable rates.

Discussion

Despite annual variation in the number of suicides, AKVDRS data did not show a statistically significant change in suicide rates among Alaska Native people or Alaska non-Native people during 2003–2008. This study as well as other studies show that the Alaska

[vi] Hub communities are cities and towns providing essential medical services from an acute care facility. A list of tribal health regions and associated hub communities is available in Appendix A.

Native suicide rate did not change substantially between 1979 and 2008.[11] While the suicide rates remain unacceptably high in Alaska, the apparent "leveling out" of the Alaska Native suicide rate is an encouraging finding compared with previous studies, which reported a nearly five-fold increase in suicide rates from the early 1960s to the mid-1980s.[20] This recent leveling out may be due, at least in part, to suicide prevention efforts conducted by numerous organizations throughout the state.

As in other studies, the 2003–2008 AKVDRS data showed that the suicide rate was highest among males, and particularly Alaska Native males.[10,11,14,16,18,20,21] Comparing age groups, the suicide rate was highest among Alaska Native people aged 20–29, particularly for males in that age group. These findings were similar to those in other studies, which showed that while the U.S. total and Alaska White suicide rates were highest among those aged >40 years, the highest rates of suicide among Alaska Native people were in persons aged 20–29 years.[3,5,13,14] AKVDRS data show, and other findings support, that unlike the rates of their U.S. White and Alaska non-Native counterparts, the suicide rate among Alaska Native people aged >50 years was relatively low, which may stem in part from their valued and respected roles in the Alaska Native community.[3,10]

AKVDRS data showed that a higher percentage of Alaska Native suicide decedents aged≥18 years were "never married" compared to Alaska non-Native suicide decedents, which has been the case in previous studies.[10,14,16,20]

Based on 2003–2008 AKVDRS data, the highest risk group for suicide by race and age-group was Alaska Native males aged 20–29 years. Profound changes have occurred over the last 75 years among Alaska Native people; in the past, more males aged 20–29 years would have had families of their own and would have been involved in subsistence activities in order to support their families.[21] There are likely a multitude of psychosocial factors that contribute to the extremely high suicide rate in this population. Examples might include reduced social connectedness that some might have previously received while in school or living with their family,[16] confusion around identity and purpose resulting from perceived discordance between traditional and contemporary values, and a low sense of agency to control their own life or to fulfill their ambitions due to lack of jobs and training infrastructure in rural communities. Furthermore, as is discussed below, other factors including alcohol and drug abuse, access to firearms, exposure to domestic/family violence, physical health problems, and less access to suicide prevention and intervention programs are likely contributors as well. In sum, more research is warranted to better characterize suicide risk factors in this vulnerable population, and more targeted community-based suicide prevention efforts are needed.

Firearms were the most common method used by suicide decedents, which is consistent with other study findings.[3,10,14,21,22] Of note, interviews with next-of-kin in a study by Perkins, et al., showed that 78% of suicide decedents that had a firearm readily available used that firearm to end their life.[3] A study during 1976–1980 found that suicide by firearm accounted for approximately 80% of all suicides for Alaska Native and Alaska non-Native people.[22] This is much higher than the 2003–2008 data illustrate, where suicide by firearm accounted for 54% and 68% of deaths among Alaska Native and Alaska non-Native people, respectively. This may be evidence of a significant decrease in suicide by firearm, particularly among Alaska Native people, and could be due to efforts to restrict access to guns among young people and to gun safety campaigns throughout the state of Alaska.[23]

Although alcohol testing data were not available for all suicide decedents, our results showed, similar to previous findings, that alcohol continued to be a risk factor for suicide.[3,10,14,16,22] Also, about one in five of those tested were positive for marijuana among both Alaska Native and Alaska non-Native decedents. An important topic for future studies may be to examine the association between marijuana and suicide, because other studies also found that marijuana was the second most common positive toxicology result (after alcohol) among suicide decedents.[3]

A significant number of Alaska Native and Alaska non-Native suicide decedents had mental health associated circumstances (i.e., were currently depressed, had a mental health problem, were being treated for a mental health problem, or were ever treated for a mental health problem) similar to other study findings.[18] In addition, many had a history of previous suicide attempts or a physical health problem. These circumstances should serve as warning signs that a person may be at risk of suicide. Thus, increasing the number of providers and community members trained in implementing suicide prevention interventions would likely help reduce suicide rates. Health care visits for both mental and physical health problems represent opportunities to recognize suicidal ideation by trained personnel.

Efforts should be made to increase depression screening at intake for mental health or clinical visits to ensure that persons at risk of suicide receive interventions to keep them safe.

The findings of this study indicated that the suicide rate in Alaska varied by geographic tribal health region of the state, which was previously reported in the literature.[3,10,12,14,16] AKVDRS and previous study data support that the non-hub communities of the state had higher rates of suicide among Alaska Native people than the hub communities.[3,14,16] Previous studies have linked low population-density areas with higher suicide rates.[6] Social isolation combined with reduced access to resources such as behavioral health counselors, decreased the likelihood of intervention if a person was experiencing suicidal ideation, and increased the likelihood that they would die by suicide.[6]

Suicide Prevention Efforts

Likely due in part to extensive statewide suicide prevention efforts, the 2003–2008 data showed no increase in the suicide rates in contrast to earlier time periods.[23] Many suicide prevention programs are being implemented throughout the state of Alaska to train a person to recognize and intervene if they encounter someone that is at risk for suicide. These include programs such as Applied Suicide Intervention Skills Training (ASIST), Mental Health First Aid, Alaska Gatekeeper Training, and SafeTALK.[24] In addition, a statewide suicide prevention and crisis intervention hotline called the "Careline" is available in Alaska for those at risk to call 24 hours a day, seven days a week.[24]

Statewide suicide prevention efforts are undertaken and supported by the Alaska Tribal Health System, the State of Alaska, the federal government, and local communities, but little effort was put into linking their efforts before 2009.[25] In Fiscal Year 2010, efforts began to connect and strengthen suicide prevention efforts between organizations in conjunction with the Statewide Suicide Prevention Council. A significant barrier to earlier suicide prevention efforts was a resistance to being candid about suicide.[25] Over the past several years, more people in Alaska have begun to talk openly about suicide. In January 2010, the first Alaska Suicide Prevention Summit, now scheduled to be an annual event, was held to address suicide and facilitate discussion and collaboration between organizations.[25] Since the initial Summit, tribal, state, and other entities have increased their collaborations on suicide prevention efforts.[25]

Limitations

The AKVDRS data are limited by the availability and completeness of surveillance data.[18] Reports may not contain all pertinent information on an incident, or may be delayed when legal proceedings are involved.[18] State-specific surveillance elements, such as interpersonal relationship/family issues (e.g., domestic violence and sexual orientation) and medication compliance were collected in narratives and were not available for analysis at the time of this study. However, the AKVDRS data has provided us with more accurate and more complete data about suicide than was available from death certificates alone. Toxicology data were incomplete because not all suicide decedents in Alaska receive testing. Toxicology testing may be influenced by a limitation of resources at the State Medical Examiner Office.[18]

Recommendations

- Because suicide and suicide attempts are a significant public health concern in Alaska, protocols for reporting surveillance data to regional and community-based prevention programs should be developed and implemented statewide to allow for more timely and focused suicide prevention efforts.
- Similar to recommendations from the Statewide Suicide Prevention Council's 5-year state suicide prevention plan,[24] a more comprehensive public health approach towards suicide prevention is recommended (e.g., a Social Ecological Model)**.**
- The highest rates of suicide are seen for Alaska Native people aged 20–29 years, particularly among males. This may be an age group that has less access to suicide prevention and intervention programs because they are no longer in school. Methods to reach this age group warrant further investigation.
- Firearms remain a frequent suicide method among both Alaska Native and Alaska non-Native people. It has been shown that promoting gun safety reduces the risk for suicide among young people.[10,23] Because guns are a part of life for many Alaskans, important components of a gun safety program include use of gun locks and gun safes.
- A low percentage of suicide decedents are tested for alcohol and drug toxicity, which could lead to a misrepresentation of the magnitude of alcohol and drug issues among all suicide decedents in Alaska. Therefore, where feasible, toxicology tests should be run on all suicide decedents.
- Because a large proportion of suicide decedents were tested positive for alcohol and/or had depression, it would be beneficial to incorporate

alcohol abuse and depression screening and referral to treatment into suicide prevention efforts.

- Due to the disparity between suicide rates in non-hub and hub communities, efforts should be made to provide village-focused suicide prevention interventions and deliver clinical mental health services to non-hub communities.
- Because a substantial portion of people report knowing someone who has died from a suicide, direct mental health efforts/resources should be provided to aid the family/friends of a decedent.
- Federal, state, tribal, and other organizations should continue to collaborate in their suicide prevention efforts. Evaluations on prevention efforts should be conducted to ensure effectiveness.

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Figure 1. Alaska Native Tribal Health Regions

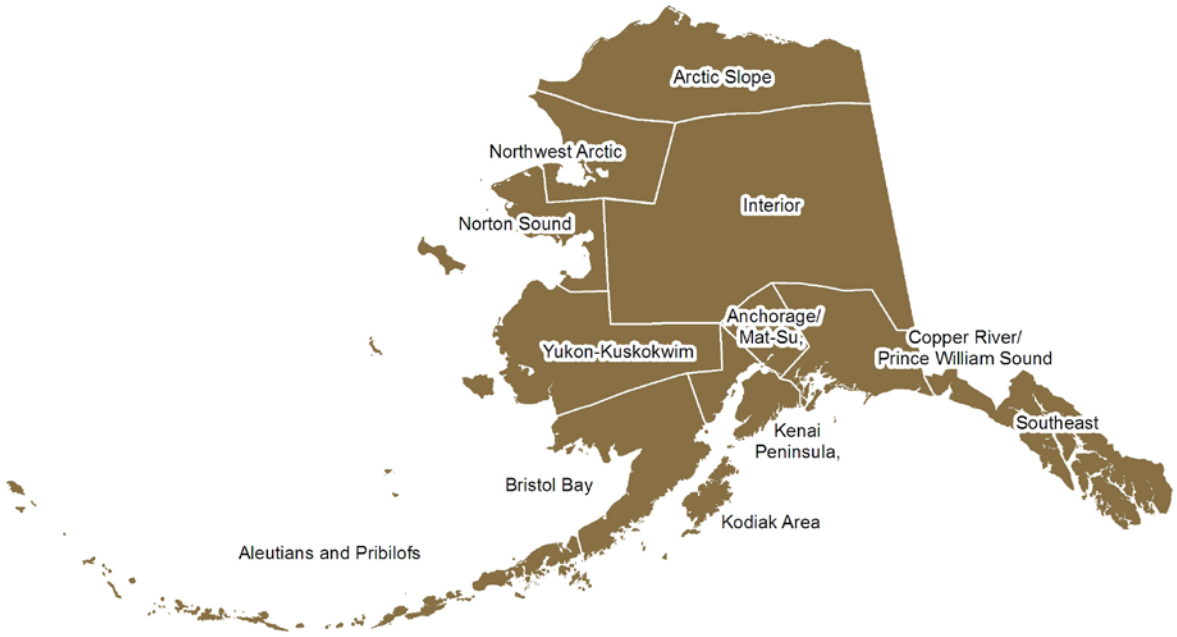

Table 1. Alaska Native Tribal Health Regions and Associated Regional Hub Communities

Region with Hub Community	Population*		Regional Hub Community	Population*	
	Alaska Native	Alaska non-Native		Alaska Native	Alaska non- Native
Anchorage/Mat-Su	35,961	319,259	Anchorage	29,297	250,634
Arctic Slope	4,842	2,074	Barrow	2,792	1,419
Bristol Bay	4,982	2,501	Dillingham	3,425	1,392
Interior	13,954	88,341	Fairbanks	8,845	79,066
Northwest Arctic	5,908	1,436	Kotzebue	2,532	683
Norton Sound	7,122	2,341	Nome	2,220	1,362
Rural Anchorage Service Area†	10,759	72,178	Anchorage	29,297	250,634
Southeast	13,998	56,398	Juneau & Sitka	6,646	33,023
Yukon-Kuskokwim	20,748	3,688	Bethel	13,911	3,005

**Annual Population average, 2003-2008*
†Rural Anchorage Service Area includes Aleutians and Pribilofs, Copper River/Prince William Sound, Kenai Peninsula, and Kodiak

Figure 2. Rate of Suicide by Race Category and Year of Death — Alaska, 2003─2008

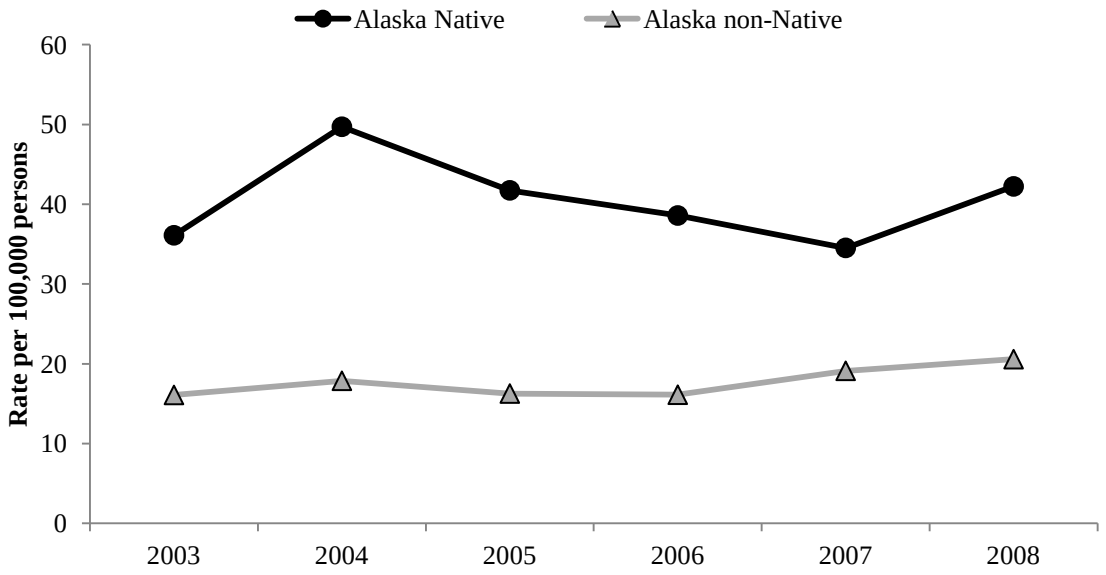

Table 2. Number, Percentage, and Rate* of Suicide by Race Category and Year of Death — Alaska, 2003─2008

	Alaska Native			Alaska non-Native			
Year	**No.**	**%**	**Rate**	**No.**	**%**	**Rate**	**P-value†**
2003	41	14%	36.1	86	15%	16.1	<0.001
2004	57	20%	49.7	97	17%	17.9	<0.001
2005	49	17%	41.7	89	15%	16.3	<0.001
2006	46	16%	38.6	89	15%	16.1	<0.001
2007	42	15%	34.5	106	18%	19.1	<0.01
2008	52	18%	42.2	115	20%	20.6	<0.001
2003-2008	**287**	**100%**	**40.4**	**582**	**100%**	**17.7**	<0.001

**Rate calculated per 100,000 persons; age adjusted rate calculated using 2000 US Census data.*
† P-value calculated for comparison between Alaska Native and Alaska non-Native rates by year.

Figure 3. Percentage of Suicide by Race Category and Month of Death — Alaska, 2003–2008

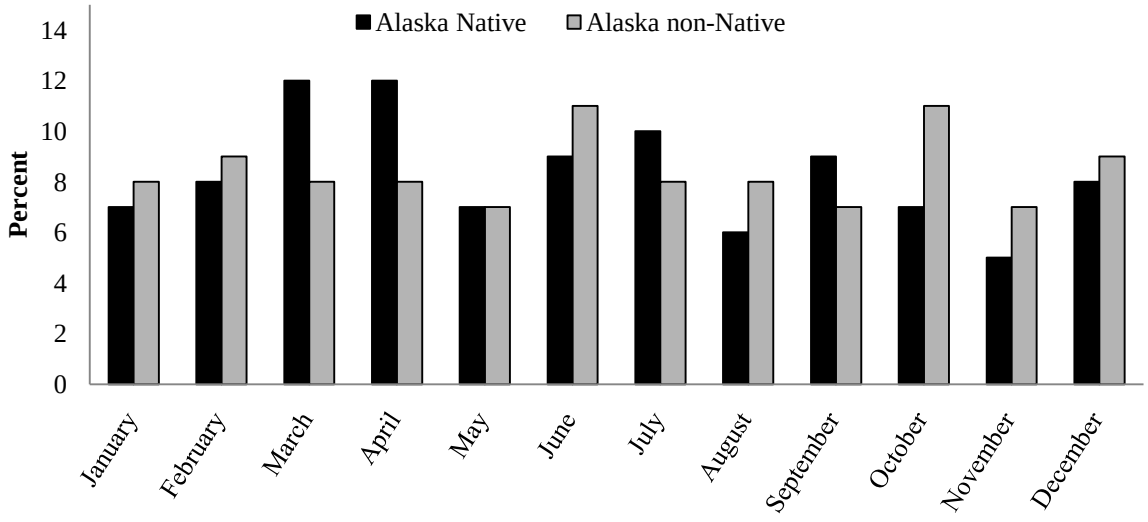

Table 3. Number and Percentage of Suicide by Race Category and Month of Death — Alaska, 2003–2008

	Alaska Native		Alaska non-Native		
Month	**No.**	**%**	**No.**	**%**	**P-value***
January	20	7%	47	8%	NSD
February	23	8%	53	9%	NSD
March	33	12%	46	8%	NSD
April	33	12%	45	8%	NSD
May	21	7%	39	7%	NSD
June	25	9%	65	11%	NSD
July	29	10%	48	8%	NSD
August	18	6%	44	8%	NSD
September	27	9%	41	7%	NSD
October	20	7%	61	11%	NSD
November	15	5%	41	7%	NSD
December	23	8%	49	8%	NSD

** P-value calculated for comparison between Alaska Native and Alaska non-Native percentages by month.*
NSD-No significant difference

Table 4. Number*, Percentage, and Rate† of Suicide by Race Category, Sex, and Age Group — Alaska, 2003─2008

	Alaska Native						Non-Alaska Native					
	Male			Female			Male			Female		
Age Group (yrs)	No.	%	Rate	No.	%	Rate	No.	%	Rate	No.	%	Rate
10-19	49	23%	65.3	24	35%	34.2	33	7%	12.6	6	6%	2.4
20-29	86	39%	155.3	20	29%	38.9	100	21%	47.0	18	17%	8.9
30-39	33	15%	76.6	16	23%	37.2	82	17%	33.3	19	18%	8.2
40-49	32	15%	67.5	7	10%	14.5	91	19%	31.8	35	33%	12.9
≥50	18	8%	29.1	2	3%	-	170	36%	39.4	28	26%	6.9
Total	218	100%	60.7	69	100%	19.7	476	100%	28.1	106	100%	6.6

	Alaska Native			Non-Alaska Native			Total			
Age Group (yrs)	No.	%	Rate	No.	%	Rate	No.	%	Rate	P- value§
10-19	73	25%	50.3	39	7%	7.6	112	13%	17.0	<0.001
20-29	106	37%	99.3	118	20%	28.5	224	26%	43.0	<0.001
30-39	49	17%	56.9	101	17%	21.1	150	17%	26.6	<0.001
40-49	39	14%	40.8	126	22%	22.6	165	19%	25.3	<0.01
≥50	20	7%	15.4	198	34%	23.7	216	25%	22.6	<0.05
Total	287	100%	40.4	582	100%	17.7	869	100%	21.7	<0.001

**Five or fewer observations were suppressed from rate calculations.*
†Rate calculated per 100,000 persons aged 10 – 85+ years; age adjusted rates were calculated using 2000 US Census data.
§P-value calculated for comparison between Alaska Native and Alaska non-Native rates by age group (shaded gray).

Table 5. Number* and Percentage of Suicide by Race Category, Sex, Marital Status of Decedents Aged 18 Years or Older — Alaska, 2003–2008

	Alaska Native		Alaska non-Native		
Marital Status >17 Years of Age	**No.**	**%**	**No.**	**%**	**P-value†**
Married	36	15%	176	32%	<0.001
Never Married	163	68%	212	39%	<0.001
Widowed	<5	-	21	4%	NSD
Divorced	29	12%	139	25%	<0.001
Married, but separated	<5	-	<5	-	NSD
Single, not otherwise specified	9	4%	<5	-	<0.001
Total	**241**	**100%**	**548**	**100%**	

**Fewer than 5 observations were suppressed from percent calculations.*
†P-value calculated for comparison between Alaska Native and Alaska non-Native by marital status.
NSD-No significant difference

Table 6. Number and Percentage of Suicide by Race Category, Method, and Location — Alaska, 2003–2008

	Alaska Native		Alaska non-Native		
Method	**No.**	**%**	**No.**	**%**	**P-value†**
Firearms	155	54%	397	68%	<0.001
H/S/S*	107	37%	93	16%	<0.001
Poisoning	14	5%	70	12%	<0.001
Other/unknown/missing	11	4%	22	4%	NSD
Total	**287**	**100%**	**582**	**100%**	
Location					
House, apartment	218	76%	426	73%	NSD
Natural area	18	6%	42	7%	NSD
Motor vehicle	8	3%	34	6%	<0.05
All others	43	15%	80	14%	NSD
Total	**287**	**100%**	**582**	**100%**	

** Hanging/Strangulation/Suffocation*
† P-value calculated for comparison between Alaska Native and Alaska non-Native by method and location.
NSD-No significant difference

Table 7a. Number and Percentage of Suicide Decedents Tested for Alcohol and Drugs, by Race Category and Substances — Alaska, 2003─2008

	Alaska Native		Alaska non-Native		
	Tested		Tested		P-value[†]
Toxicology Variable	**No.**	**%**	**No.**	**%**	
Suspected Intoxication	139	48%	220	38%	<0.01
BAC*	110	38%	265	46%	<0.05
Amphetamines	85	30%	217	37%	<0.05
Antidepressants	58	20%	164	28%	<0.05
Cocaine	86	30%	222	38%	<0.05
Marijuana	84	29%	216	37%	<0.05
Opiates	85	30%	223	38%	<0.05
Other Drugs	87	30%	219	38%	<0.05

** Blood Alcohol Concentration.*
†P-value calculated for comparison between Alaska Native and Alaska non-Native substance categories.

Table 7b. Number* and Percentage of Suicide Decedents with Positive Alcohol and Drugs Results, by Race Category and Substance — Alaska, 2003─2008

	Alaska Native		Alaska non-Native		
	Positive		Positive		
Toxicology Variable	**No.**	**%**	**No.**	**%**	**P-value[§]**
BAC[†]	59	54%	125	47%	NSD
BAC <0.08 g/dL	8	14%	30	24%	NSD
BAC ≥0.08 g/dL	51	86%	95	76%	NSD
Amphetamines	<5	-	11	5%	NSD
Antidepressants	5	9%	23	14%	NSD
Cocaine	6	7%	20	9%	NSD
Marijuana	17	20%	40	19%	NSD
Opiates	<5	-	33	15%	<0.001
Other Drugs	21	24%	71	32%	NSD

** Fewer than 5 observations were suppressed from percent calculations.*
† Blood alcohol concentration; BAC ≥0.08 g/dL is used as the standard for intoxication.
§ P-value calculated for comparison between Alaska Native and non-Alaska Native groups by substance categories.
NSD-No significant difference

Table 8. Number* and Percentage of Suicides, by Race Category, Sex, Associated Circumstances Category and Characteristics — Alaska, 2003–2008

	Alaska Native						Alaska non-Native						
	Male (N=216)		Female (N=69)		Total§ (N=285)		Male (N=476)		Female (N=106)		Total (N=582)		P-value†
Associated Circumstances	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Mental Health Characteristics													
Current depressed mood	84	39%	23	33%	107	38%	198	42%	56	53%	254	44%	NSD
Current mental health problem	30	14%	25	36%	55	19%	126	27%	46	43%	172	30%	<0.01
Current treatment for mental health problem	27	13%	24	35%	51	18%	116	24%	45	43%	161	28%	<0.01
Ever treated for mental problem	30	14%	23	33%	53	19%	122	26%	46	43%	168	29%	<0.001
Problem with Alcohol or Other Substance													
Alcohol dependence	47	22%	15	22%	62	22%	101	21%	15	14%	116	20%	NSD
Other substance problem	21	10%	<5	-	-	-	62	13%	14	13%	76	13%	NSD
Proven/suspected intoxication	107	50%	34	49%	141	50%	183	38%	37	35%	220	39%	<0.01
Relationship Characteristics													
Intimate partner problem	63	29%	28	41%	91	32%	148	31%	32	30%	180	31%	NSD
Other relationship problem (non-intimate)	15	7%	12	17%	27	10%	46	10%	9	9%	55	10%	NSD
Perpetrator of interpersonal violence, past month	22	10%	6	9%	28	10%	24	5%	<5	-	-	-	<0.01
Victim of interpersonal violence, past month	6	3%	5	7%	11	4%	<5	-	<5	-	-	-	<0.01
Suicide of family or friend, past 5 years	14	7%	7	10%	21	7%	7	2%	<5	-	-	-	<0.001

	Alaska Native						Alaska non-Native						
	Male		Female		Total		Male		Female		Total		P-value
Other death of friend or family	13	6%	5	7%	18	6%	23	5%	10	9%	33	6%	NSD
Life Stressor Characteristics													
Crisis, past 2 weeks	74	34%	29	42%	103	36%	174	37%	30	28%	204	35%	NSD
Physical health problem	14	7%	9	13%	23	8%	117	25%	37	35%	154	27%	<0.001
Financial problem	6	3%	<5	-	-	-	66	14%	7	7%	73	13%	<0.001
Job problem	12	6%	<5	-	-	-	83	17%	8	8%	91	16%	<0.001
Recent criminal legal problem	40	19%	<5	-	-	-	79	17%	<5	-	-	-	NSD
Non-criminal legal problem	5	2%	<5	-	-	-	14	3%	6	6%	20	3%	NSD
School problem	9	4%	<5	-	-	-	<5	-	<5	-	-	-	<0.01
Suicide Event													
Left a suicide note	38	18%	22	32%	60	21%	156	33%	37	35%	193	33%	<0.001
Disclosed intent to commit suicide	75	35%	24	35%	99	35%	134	28%	37	35%	171	29%	NSD
History of previous suicide attempts	42	19%	21	30%	63	22%	47	10%	37	35%	84	14%	<0.01
Other suicide circumstance	6	3%	<5	-	-	-	8	2%	<5	-	-	-	NSD

**Fewer than 5 observations were suppressed from percent calculations. Two cases did not have associated circumstances available and were excluded.*
†P-value calculated for comparison between all Alaska Native and all Alaska non-Native cases by associated circumstances (shaded gray).

Table 9. Number*, Percentage, and Rate† of Suicide by Race Category and Tribal Health Region of Residence — Alaska, 2003─2008

	Alaska Native			Alaska non-Native		
Region	**No.**	**%**	**Rate**	**No.**	**%**	**Rate**
Northwest Arctic	33	12%	93.1	<5	-	-
Norton Sound	33	12%	77.2	<5	-	-
Yukon-Kuskokwim	83	29%	66.7	6	1%	27.1
Arctic Slope	18	6%	62.0	<5	-	-
Interior	32	11%	38.2	94	16%	17.7
Bristol Bay	9	3%	30.1	<5	-	-
Rural Anchorage Service Area	16	6%	24.8	77	13%	17.8
Anchorage/Matanuska-Susitna	45	16%	20.9	343	59%	17.9
Southeast	17	6%	20.4	52	9%	15.4
Unknown	1	-	-	1	-	-
Total	**287**	**100%**	**40.4**	**582**	**100%**	**17.7**

**Fewer than five observations were suppressed from calculations for percent.*
†Crude rate calculated per 100,000 persons.

Table 10. Number*, Percentage, and Rate† of Suicide Among Alaska Native People by Tribal Health Region of Residence — Alaska, 2003─2008

	Region without Hub Community			Regional Hub Community		
Region	**No.**	**%**	**Rate**	**No.**	**%**	**Rate**
Yukon-Kuskokwim	59	21%	143.8	24	8%	28.8
Northwest Arctic	23	8%	113.5	10	4%	65.8
Norton Sound	29	10%	98.6	<5	-	-
Bristol Bay	6	2%	64.2	<5	-	-
Interior	19	7%	62.0	13	5%	24.5
Arctic Slope	7	2%	56.9	11	4%	65.7
Rural Anchorage Service Area	16	6%	24.8			
Anchorage/Matanuska-Susitna	9	3%	22.5	36	13%	20.5
Southeast	7	2%	15.9	10	4%	25.1
Total	**175**	**61%**	**60.0¶**	**111**	**39%**	**25.8**

**Fewer than five observations were suppressed from calculations for percent.*
† Crude rate calculated per 100,000 persons.

Table 11. Number*, Percentage, and Rate† of Suicide Among Alaska non-Native People by Tribal Health Region of Residence — Alaska, 2003–2008

	Region without Hub			Regional Hub		
Region	**No.**	**%**	**Rate**	**No.**	**%**	**Rate**
Anchorage/Matanuska-Susitna	131	23%	31.8	214	37%	14.2
Rural Anchorage Service Area	75	13%	17.3			
Interior	15	3%	27.0	79	14%	16.7
Southeast	20	4%	14.3	27	5%	13.6
Yukon-Kuskokwim	<5	-	-	5	1%	27.7
Arctic Slope	<5	-	-	<5	-	-
Bristol Bay	<5	-	-	<5	-	-
Norton Sound	<5	-	-	<5	-	-
Northwest Arctic	<5	-	-	<5	-	-
Total	**246**	**43%**	**22.6**	**330**	**57%**	**15.1**

**Fewer than five observations were suppressed from calculations for percent.*
†Crude rate calculated per 100,000 persons.

Appendix A

Tribal Health Region	Census Area/Borough	FIP Code	Hub Community
1—Aleutians and Pribilofs	Aleutians East Borough Aleutians West Borough	13 16	Anchorage
2—Anchorage/Matanuska-Susitna	Anchorage Municipality Matanuska-Susitna Borough	20 170	Anchorage
3—Arctic Slope	North Slope Borough	185	Barrow
4—Bristol Bay	Dillingham Lake and Peninsula Borough Bristol Bay Borough	70 164 60	Dillingham
5—Copper River/Prince William Sound	Valdez/Cordova	261	Anchorage
6—Interior	Denali Borough Fairbanks North Star Borough Southeast Fairbanks Yukon-Koyukuk	68 90 240 290	Fairbanks
7—Kenai Peninsula	Kenai Peninsula Borough	122	Anchorage
8—Kodiak Area	Kodiak Island Borough	150	Anchorage
9—Northwest Arctic	Northwest Arctic Borough	188	Kotzebue
10—Norton Sound	Nome	180	Nome
11—Southeast	Yakutat Borough Skagway-Hoonah-Angoon Haines Borough Juneau Borough Sitka Borough Wrangell Petersburg Prince of Wales/Outer Ketchikan Ketchikan-Gateway Borough	282 232 100 110 220 280 201 130	Juneau & Sitka
12—Yukon-Kuskokwim	Bethel Wade Hampton	50 270	Bethel

Appendix B

Population estimate data by race for 2003–2008 were not available for the hub communities of Barrow, Kotzebue and Nome. To calculate estimated population by race, the following was done:

- Percent of Alaska Native populations compared to the total populations living in Barrow, Kotzebue, and Nome during the 2000 and 2010 censuses were calculated.

- 2000 and 2010 data were averaged to provide an estimated percentage of the Alaska Native population that resided in Barrow, Kotzebue, and Nome during 2000–2010.

- Average population estimates for Barrow, Kotzebue, and Nome during 2000–2010 were used to calculate annual 2003–2008 Alaska Native estimated population data from Barrow, Kotzebue, and Nome total population data.

- Alaska Native population estimates for Barrow, Kotzebue, and Nome were subtracted from the corresponding census area Alaska Native populations for 2003–2008 (Barrow from North Slope Borough, Kotzebue from Northwest Arctic Borough, and Nome from the Nome Census Area) to calculate the regional non-hub community populations.