



Native American suicide deaths in Montana : 1989-1992
by Nels Dodge Sanddal

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Applied Psychology
Montana State University
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Abstract:

Statement of the Problem: The incidence and rate of suicide in Montana is higher than national averages. During the period of 1979-1991, Montana ranked fourth overall in the rate of suicide at 18.6 per 100,000 residents. Native Americans have the highest rate of suicide nationally at 15.7 per 100,000. In Montana, during the period of 1979-1991 the rate of suicide was 1.3 times greater for Native American than for Caucasian residents. A number of authors suggest a high degree of variability in rates between various tribes and bands of Native Americans. Little is known about the epidemiology of Native American suicide in Montana.

Method: An archival study of Native American suicide decedents for the period of October 1, 1989-September 30, 1992, was conducted. All deaths occurred in Montana. The certificate of death was used as the primary data source. Statistics applied were predominately descriptive in nature. The Native American data were further compared to a Caucasian sample of suicide decedents from Montana.

Results: The rate of suicide among Native Americans was 24.5 per 100,000 during the study period. There was a significant difference in rate when the data were stratified by on-reservation and off-reservation deaths with the latter cohort being significantly higher. There is also a bimodal distribution of death by age groups with the highest rates occurring 25-29 year old age group and in the elderly beyond 55 years of age. The Native American and Caucasian samples are substantially similar with the exception of age at the time of death. Native Americans die an average of nine years younger than Caucasian suicide decedents.

Conclusions: The rate of suicide across all races in Montana is high. The rates are highest for Native Americans living off a reservation. Reasons for the high rate of occurrence among this population are unknown but might include geographic and temporal distance from immediate and extended family members, inadequate social support networks off the reservation, racial/cultural discrimination, and acculturation demands. Longitudinal examination of suicide etiology in Montana is warranted so that a comprehensive prevention and control strategy can be developed and implemented.

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This thesis has been read by each member of the thesis committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

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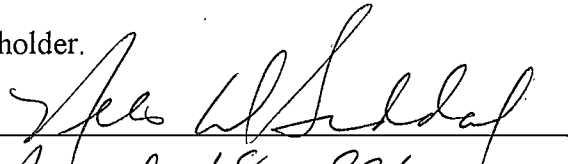
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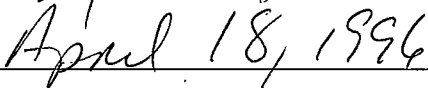


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ABSTRACT

Statement of the Problem: The incidence and rate of suicide in Montana is higher than national averages. During the period of 1979-1991, Montana ranked fourth overall in the rate of suicide at 18.6 per 100,000 residents. Native Americans have the highest rate of suicide nationally at 15.7 per 100,000. In Montana, during the period of 1979-1991 the rate of suicide was 1.3 times greater for Native American than for Caucasian residents. A number of authors suggest a high degree of variability in rates between various tribes and bands of Native Americans. Little is known about the epidemiology of Native American suicide in Montana.

Method: An archival study of Native American suicide decedents for the period of October 1, 1989-September 30, 1992, was conducted. All deaths occurred in Montana. The certificate of death was used as the primary data source. Statistics applied were predominately descriptive in nature. The Native American data were further compared to a Caucasian sample of suicide decedents from Montana.

Results: The rate of suicide among Native Americans was 24.5 per 100,000 during the study period. There was a significant difference in rate when the data were stratified by on-reservation and off-reservation deaths with the latter cohort being significantly higher. There is also a bimodal distribution of death by age groups with the highest rates occurring 25-29 year old age group and in the elderly beyond 55 years of age. The Native American and Caucasian samples are substantially similar with the exception of age at the time of death. Native Americans die an average of nine years younger than Caucasian suicide decedents.

Conclusions: The rate of suicide across all races in Montana is high. The rates are highest for Native Americans living off a reservation. Reasons for the high rate of occurrence among this population are unknown but might include geographic and temporal distance from immediate and extended family members, inadequate social support networks off the reservation, racial/cultural discrimination, and acculturation demands. Longitudinal examination of suicide etiology in Montana is warranted so that a comprehensive prevention and control strategy can be developed and implemented.

CHAPTER 1

INTRODUCTION

Historically, Montana has ranked in the top ten states in population-adjusted rates of suicide. During the period of 1979-1991, Montana ranked fourth in the overall rate of suicide ranging from second in 1990 behind only Nevada to ninth in 1980 (Centers for Disease Control and Prevention [CDC], 1996). When these data are further stratified by race, Native Americans residing in Montana have historically had a population-adjusted rate higher than the Caucasian majority population.

This racial disparity is not unique to Montana. A number of authors have documented higher rates of suicide death among aboriginal populations throughout North America. However, differences exist between tribes, bands, and other sub-classifications of native peoples. Likewise, differences in rates among the Native American population are known to exist among various geographic regions of the continent.

Few published reports describe the magnitude of the problem of suicide among Native Americans residing in Montana. Even less documentation contrasts and compares the incidence, prevalence, and rates of this fatal occurrence among the various tribes represented in the state or between Natives residing on one of Montana's seven federal reservations with those decedents who lived off of the reservation at the time of their death.

A more detailed understanding of the epidemiology of such events may help to design and implement more effective prevention strategies to obviate this pressing problem. This paper will report the findings of an in-depth analysis of death certificates for Native American and Caucasian suicide decedents in Montana from 1989-1992, discuss the findings in light of pertinent literature, and propose a structured longitudinal examination of future decedent records to identify contributing factors and potential intervention strategies.

CHAPTER 2

BACKGROUND

Literature Review

Suicide is defined as a fatal occurrence of intentional injury against oneself. While the rate of such self-destructive behavior has remained relatively constant for the past four decades, the incidence has risen proportionally with the United States population (National Center for Health Statistics, 1996). However, a dramatic increase in rates has been noted in certain age groups. The rate for 15-to-24-year-olds climbed from 4.5 per 100,000 in 1950 to 13.5 per 100,000 in 1990 (O'Carroll, Potter, & Mercy, 1994). An increase has also been noted recently among individuals over the age of 65 with an increase from 17.6 per 100,000 in 1980 to 19.1 per 100,000 in 1992, making suicide the third leading cause of injury-related deaths among older U.S. residents (Division of Violence Prevention, 1996).

Both the suicide incidence and rate have steadily increased in Montana, which has notoriously maintained one of the highest rates of suicide since reporting began (National Center for Health Statistics, 1996). According to the most recent data available from CDC (1996), the Montana rate of suicide per 100,000 (age-adjusted) climbed from 14.8 in 1979 to 19.7 in 1991.

In a recent examination of the etiology of childhood injury death in Montana, Rausch noted that suicide had become the second leading cause of injury death for youths from the ages of 15-19 in the state (Rausch, Esposito, Sanddal, Hansen, & Robertson, in press). This alarming trend in youth suicide in Montana has gone largely unnoticed by public health professionals and the general public alike.

There is a distinct gender bias related to suicide deaths. Males complete the fatal act at a rate 4-5 times their female counterparts in all age groups. Gender differences hold true in Montana with males committing suicide at a rate of 30.9 per 100,000 and females at 6.3 per 100,000 for the period of 1979-1991 (CDC, 1996).

The rates of suicide are likewise higher among certain racial and ethnic groups. When stratified by race, Native Americans have the highest rate in the United States at 15.7 per 100,000 (Indian Health Service, 1994) followed by Caucasians at 13.0 and Blacks at 7.1 per 100,000 (CDC, 1996). Figure 1 illustrates the U.S. racial distribution.

Although variable by year due to small population sizes, Native Americans in Montana committed suicide at a rate 1.3 times that of the Caucasian population for the period of 1979-1991 (CDC, 1996). Contrasts in rates per 100,000 by race are displayed in Figure 2.

FIGURE 1

U.S. SUICIDE RATES BY RACE
1979-1991

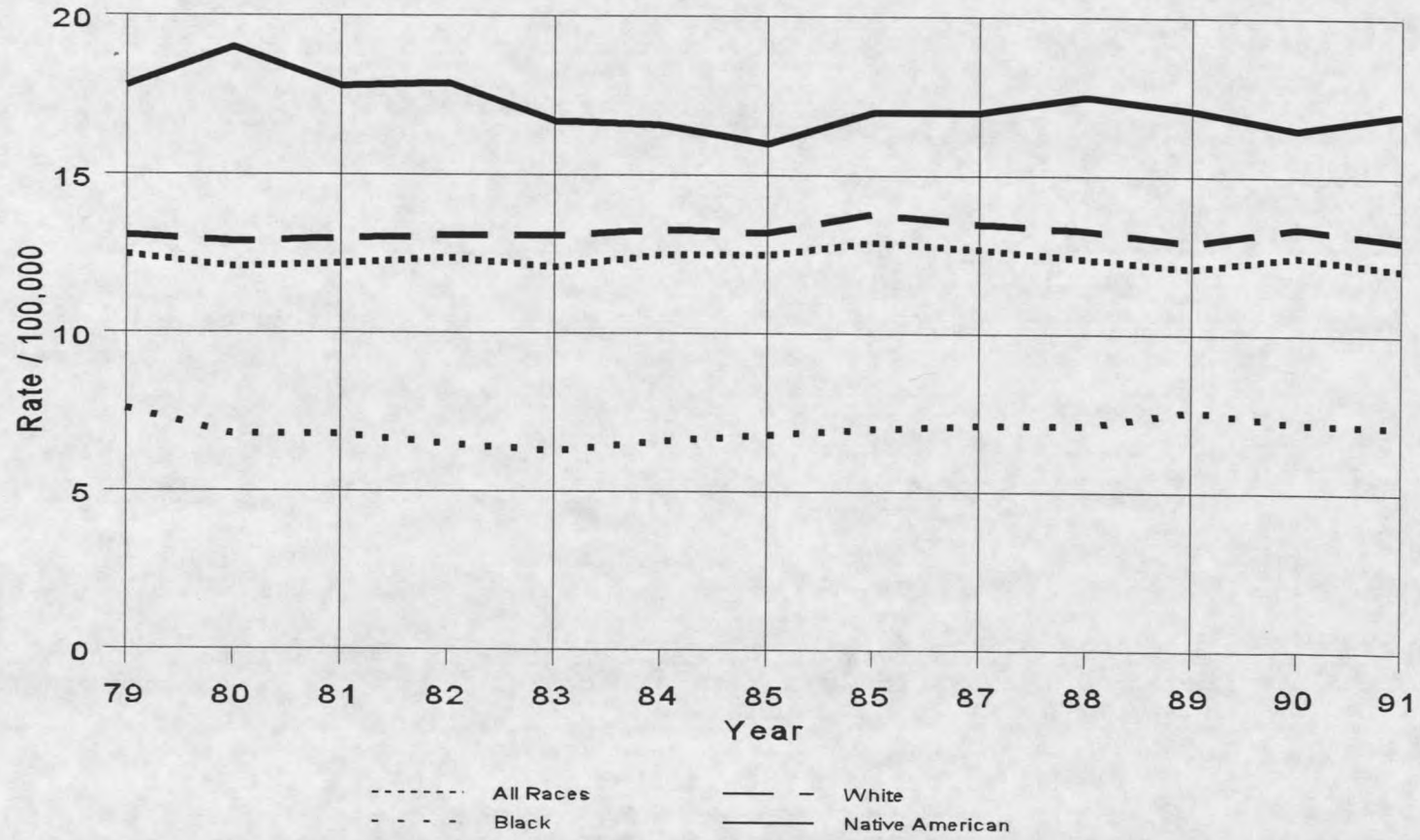
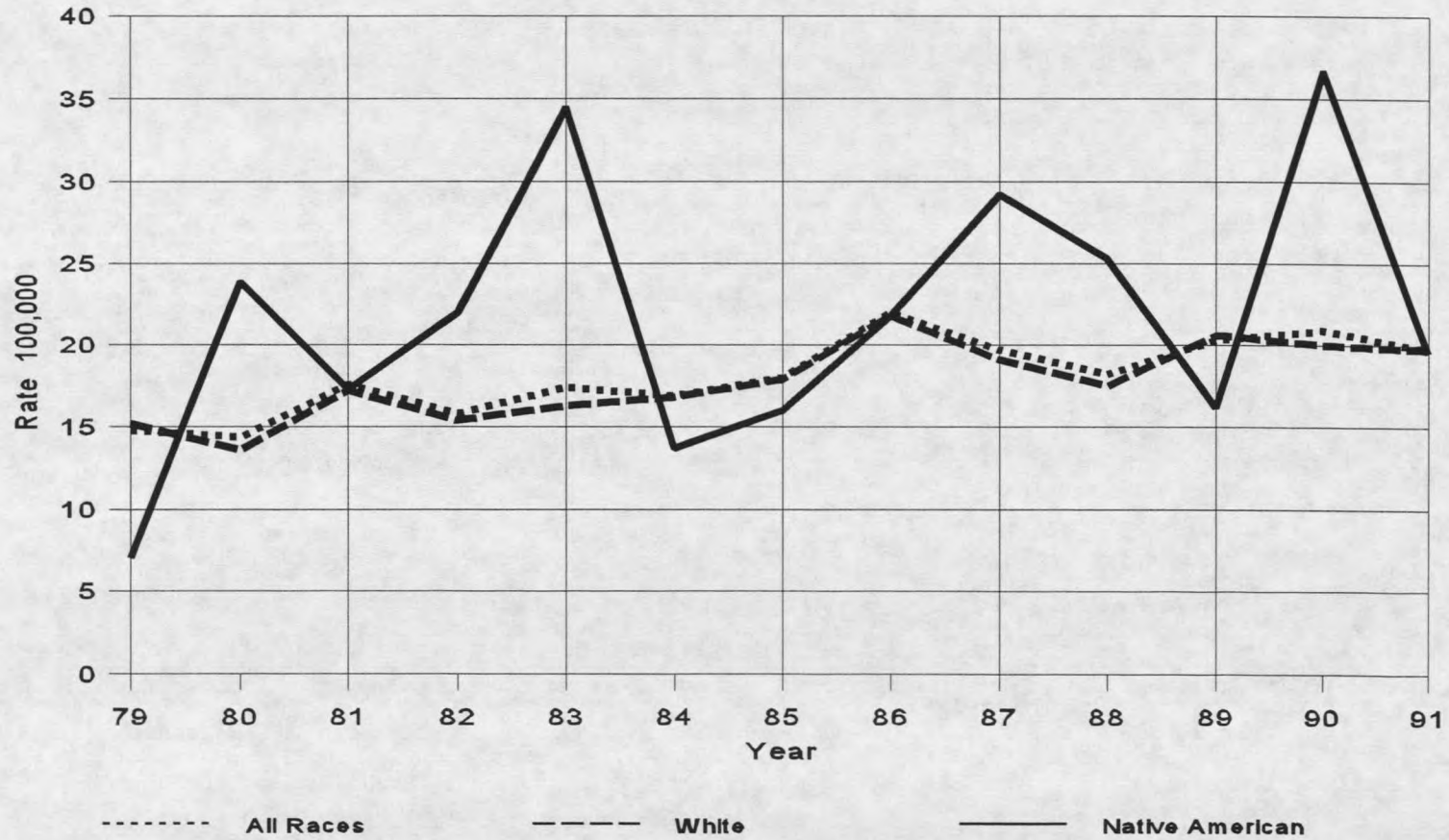


FIGURE 2

MONTANA SUICIDE RATES BY RACE
1979-1991



Suicide among Native Americans has received a great deal of attention in the professional literature across a number of disciplines. This interest could be attributed to factors such as the higher rates of suicide mortality, the research convenience of population clustering by reservation, and the relative ease of access to data on the decedents. Philip May, a noted sociologist with a specific interest in this area, prepared a bibliographic listing in 1990 that noted 160 published works on the issue (May, 1990). The body of knowledge on the subject has grown since that time. Commensurate with the number of published works, there has been a maturation in examination and reporting techniques. Early works were predominately ethnographic reports, followed by psycho-social descriptions and the current discussions of etiology and intervention strategies.

Contained within the higher overall rate of suicide among Native Americans in the United States are extreme tribal, community, geographic, etiological, and temporal variations. Van Winkle and May (1993) and May and Van Winkle (1994) provide a comprehensive description of variants among Native Americans of New Mexico from 1957-1987, documenting differences between and among tribal classifications. Spaulding (1985-86) further describes differences between ten Ojibwa bands in Ontario, again showing marked variation by tribal unit.

A number of attempts have been made to analyze and describe the relationship of various social, economic, and psychological factors to the self-destructive epidemic among Native American peoples. The potential relationship between social status and self-destructive behavior was described by Durkeim (1951). He hypothesized that individuals from higher social categories would be more likely to commit suicide than those of lower

social status. Published works since that time provide compelling evidence to reject Durkeim's hypothesis as it relates to Native Americans in the United States (Davenport & Davenport, 1987; Young & French, 1993). While suicide rates for the culturally dominate gender (male) are higher than those for females — which could be used to support Durkeim's assertions — they are also higher for Native Americans than for the culturally dominant Caucasian race, refuting those same assumptions. Young (1994) reported a positive correlation between poverty status and suicide among Native Americans, further challenging the Durkeim hypothesis. Grossman, Krieger, Sugarman, and Forquera (1994) further describe the higher rates of poverty, unemployment, and failure to obtain a high school diploma as they relate to health care status among Native Americans. In a logistic regression model, risk factors were analyzed for association with suicide attempts among Navaho youth. Factors with the highest odds ratio were a history of mental health problems (O.R.=3.2); alienation from family or community (O.R.=3.2); a family history of suicide or attempted suicide (O.R.=2.7); and weekly consumption of hard liquor (O.R.=2.3) (Grossman, Milligan, & DeGo, 1991).

Several of these conditions are known to exist prominently on reservations. May (1994) confirms the high rates of death among Native Americans associated with both chronic and acute use of alcohol. Grossman (1992) further links the presence of alcohol to both fatal and nonfatal suicide attempts. In one study, more than 85% of Native American adolescent subjects interviewed expressed concern about the use of alcohol by peers, family, and community members (Grossman, Putsch, & Inui, 1993). Recent data gathered by Sanddal, Sanddal, Hansen, Fleming, Upchurch, and Esposito (1996) confirm a high

prevalence and quantity of alcohol present in Native American intentional and unintentional injury fatalities in Montana.

Death is not a stranger to Native American youth. Long (1986) describes the contagion effect of suicide deaths due to the close-knit structure of a reservation community. This perception is further confirmed by Grossman et al. (1993) in which the majority of respondents stated that they had lost either a parent or extended family member prematurely.

Purpose of Current Analysis

Clearly, suicide among Native Americans has been, and continues to be, a topic of considerable investigation and reporting at a national level. Most of the existing research has been conducted in the southwestern region of the United States, in Canada, or in the Pacific Northwest, including Alaska. Little information exists on suicide among tribes of the northern plains, including those represented in Montana. Further, with few exceptions (Grossman et al. 1994), the reported findings most often deal with Native Americans who reside on reservations or with Indian Health Service (IHS) data that is oriented most specifically to reservations in each of the twelve IHS areas. The following section of this paper will provide a descriptive overview of suicide deaths in Montana from 1989-1992 among Native Americans living both on and off a reservation. It will also provide a comparison and contrast to a Caucasian sample of suicide decedents in Montana from 1990-1991.

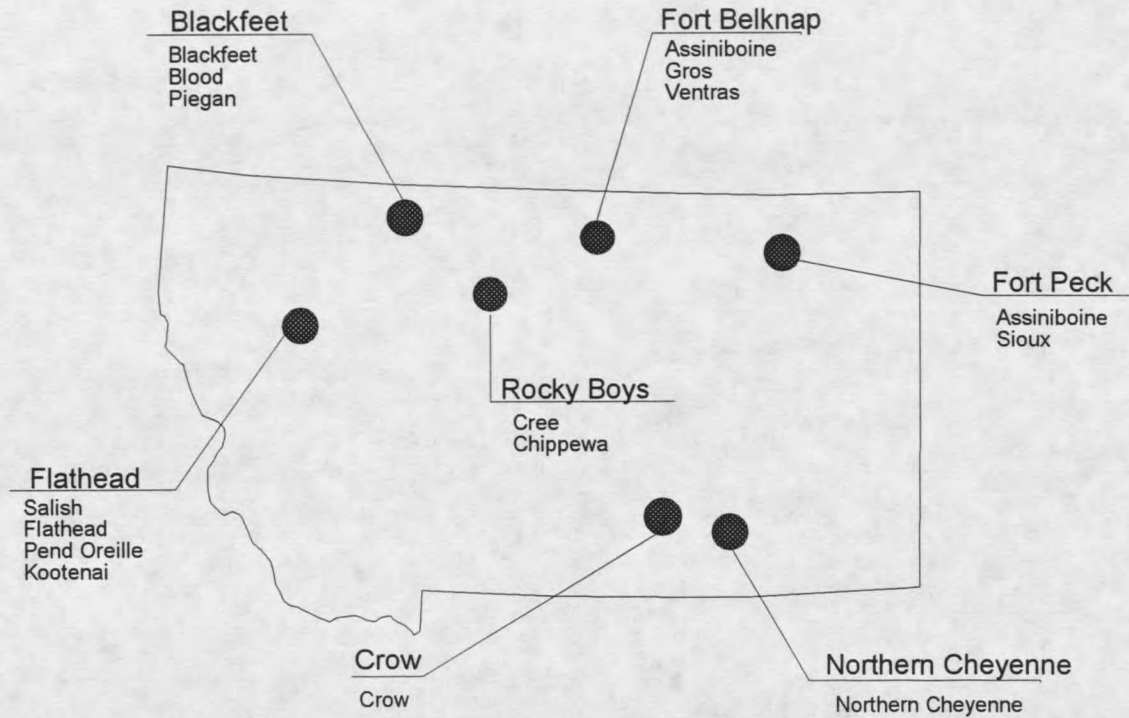
Native Americans are an important feature of Montana's heritage. They represent 6 percent of the state's population and, at nearly 50,000 persons strong, are the largest racial minority in the state. There are thirteen tribes or bands represented in the state with the majority residing on one of the seven federal reservations with the boundaries of Montana. Figure 3 illustrates the distribution of the reservations and major tribes and bands.

Beginning with the arrival of the Europeans, the Native American culture has been devastated by disease and pestilence that has substantially reduced the numbers of these aboriginal people. Historical records indicate that suicide is a relatively new phenomenon among the Native Americans, particularly those nomadic tribes of the northern plains and intermountain region (Pine, 1981).

Even though concerted medical efforts have reduced the health care risks to this population in certain areas, such as infant mortality, suicide rates remain high (Indian Health Service, 1993). The data included in this paper were gathered and analyzed to further define the epidemiology of suicide among Native Americans in Montana to serve as a foundation for the refinement, implementation, and evaluation of prevention and intervention strategies.

FIGURE 3

INDIAN RESERVATIONS AND PRIMARY TRIBES / BANDS IN MONTANA



Does not include a number of "land less" tribes and bands.

CHAPTER 3

METHODS

Participants

This study examined all known Native American suicides occurring between October 1, 1989, and September 30, 1992, within the boundaries of Montana. Death certificates from previous research conducted by the Critical Illness and Trauma Foundation, Inc., of Bozeman, Montana, were used in the analysis. Death certificates were selected based on two criteria. First, they had to meet racial standards imposed. If "Native American," "American Indian," or a specific tribe, such as "Crow," was indicated in either the race or ancestry box of the death certificate, they were included as having met the racial standard. No criteria for percentage of Native American blood or tribal enrollment were imposed. The second criterion was "suicide" marked as the manner of death and confirmed by an International Classification of Disease (Ninth Revision) External Cause of Injury Code falling within the numeric range attributed to suicide, specifically ICD-9:E-950.0-959.9 (World Health Organization, 1987). Although suicide is often thought to be under-reported on death certificates due to the potential loss of insurance benefits and social stigma, no attempts were made to include a broader range of suspicious unintentional or undetermined injuries.

Apparatus

Abstracted data were entered into a computerized database constructed in dBASE V for Windows. Analysis was completed using Statistical Program for Social Sciences (SPSS) versions 6 and 7 for the personal computer. A personal computer running on an Intel 486, 66 MHZ processor with 20 MB of RAM was used to store, retrieve, and analyze the data.

Procedures

This was an archival study using existing data as the primary information source. Death certificates had been previously requested from the Bureau of Vital Records and Statistics (BVRS) of the Montana Department of Public Health and Human Services (DPHHS) for use in a preventable trauma mortality study conducted by the Critical Illness and Trauma Foundation, Inc. (CIT). The initial death certificate request had included all Native American death certificates with injury listed as the cause of death (ICD-9:E 800.0-999.9) occurring within the State of Montana for the period of October 1, 1989, to September 30, 1992. During the initial request, no other restrictions were applied to the death certificates.

Death certificates were reviewed by the investigator and the two previously described criteria were imposed for inclusion in this study. Death certificates meeting the racial and manner-of-death tests were included. Certificates that failed to meet either or both of the two criteria were excluded.

All death certificates were abstracted onto a paper form for data entry and entered into dBASE V by a single research assistant. A written data dictionary was used to ensure consistent coding and interpretation of all fields. Once entered, the investigator ran standard data cleaning procedures within dBASE prior to transferring the file to SPSS for final analysis. Descriptive statistics were initially applied to the Native American (NA) database.

The NA database was then combined with a Caucasian database that had been previously constructed following an identical methodology. The Caucasian database included all suicide deaths (ICD-9:E 950.0-959.9) occurring during the period of October 1, 1990, to September 30, 1991, and in which "white" was indicated as race and "Anglo-European" was listed in the ancestry box. Only one year of Caucasian data was represented because of the construct of previous research from which the records were drawn. However, since the Caucasian sample was sufficiently large and temporally positioned at the mid-point of the Native American study dates, it provided for a set of contrasting data. A comparative analysis was made between the samples for the two races. Again the statistics applied were primarily descriptive in nature although distribution ratios underwent non-parametric chi-square analysis. For t-tests of equal means and chi-square, alpha was established at .05.

The denominators for rate-based descriptions were taken from the 1990 United States census (U.S. Bureau of the Census, 1994). All rates are presented as xx.x per 100,000 population. Age-adjusted rates, which normalizes the populations based upon their age distribution, are used throughout.

CHAPTER 4

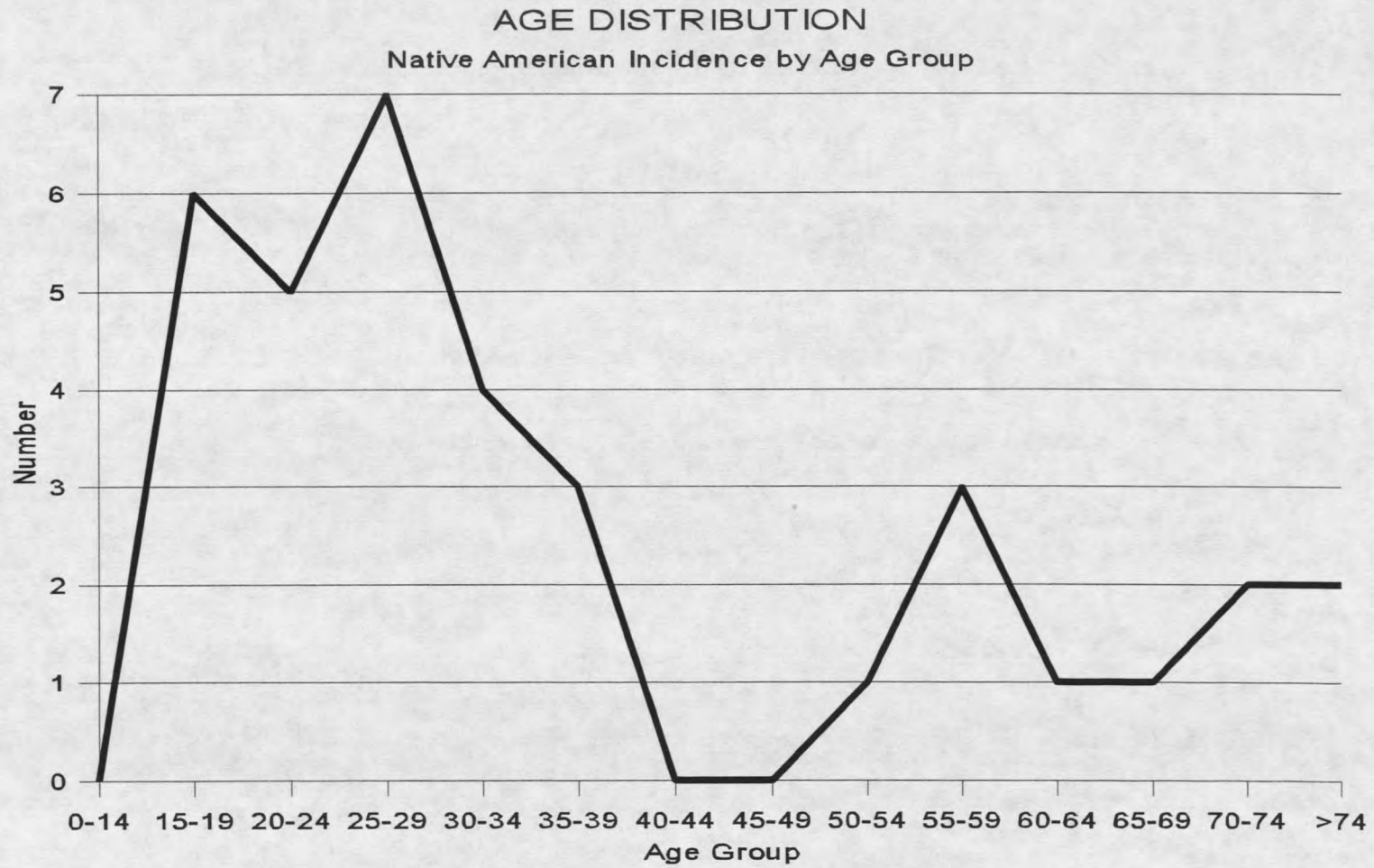
RESULTS

During the period of October 1, 1989, and September 30, 1992, there were 214 deaths among Montana Native Americans attributed to injury. Of these, 142 were reported as unintentional injuries while 56 were listed as intentional. Eight of the deaths were undetermined relative to intent. Of the 56 intentional injuries, 35 (62.5%) were suicide while the remaining 21 (37.5%) were homicide. These 35 suicide cases were included in the analysis for this study.

Demographics

Of the 35 cases, 30 (85.7%) were male and 5 (14.3%) were female. The mean age of the decedents was 37.26, ranging from 15 to 86 years of age. The mean age for males in the sample was 39.57. Females had a mean age at the time of death of 23.40. Differences in mean age, compared by gender, failed to reach statistical significance although the small sample of females does not preclude Type II error. The occurrence of self-destructive events showed a bimodal distribution with a peak at the 25-to-29-year-old group and a steady decline through age 49 followed by a rising trend through the remainder of the age groups. Figure 4 illustrates the distribution pattern in accordance with the standard age groupings associated with these data.

FIGURE 4



When the frequency counts by age group were converted to age-adjusted rates per 100,000, a bimodal distribution remains evident. However, there is a visible shift with the rates of suicide death in the older population, surpassing those of the younger cohort. The overall rate of suicide was 24.5 per 100,000 among Native Americans in Montana during the study period. Figure 5 compares the distribution of age-adjusted rates.

Thirteen (37.1%) of the decedents were married at the time of death and the remaining 22 (62.9%) were listed as single. Comparative data on marital status for the non-suicide Native American population are not readily available from census tapes.

Six (17.1%) of the decedents were students and the residual 29 (82.9%) were not in school at the time of death. The mean level of education, when known (n=34), was 11.26 years, ranging from 8-16 with a standard deviation of 1.78. The educational levels and distribution did not vary from Montana's Native American population at large.

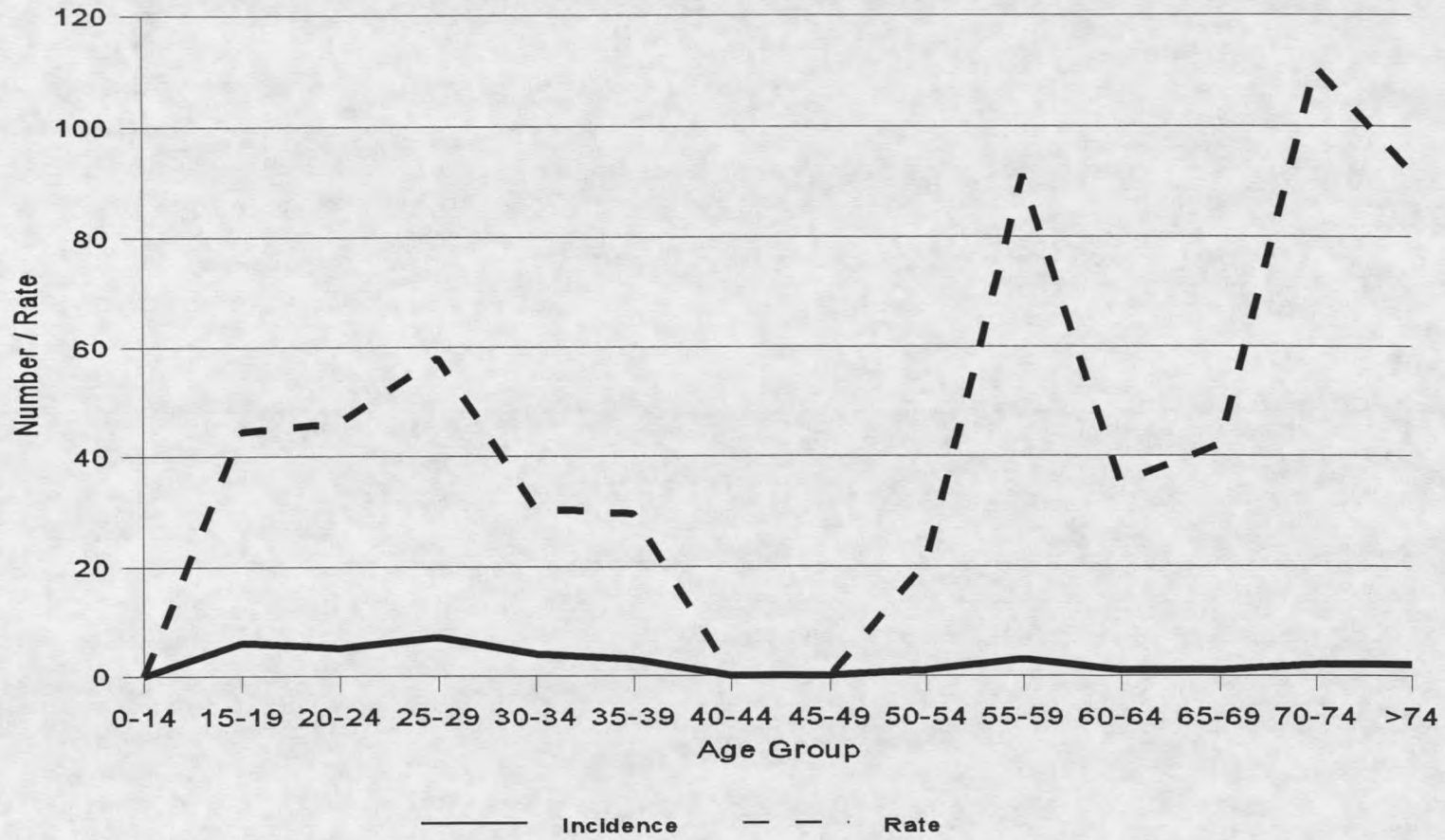
Employment status at the time of death could not be determined in 20 cases due to vagueness in the death certificate information. When employment status could be ascertained (n=15), four (26.7%) of the decedents were employed at the time of death, the remaining 11 (73.3%) were listed as unemployed. Table 1 provides demographic findings.

Table 1. Demographic Characteristics of Native American Suicide Decedents

Gender	Age	Education	Married		Student		Employed		TOTAL	
	Mean	Mean	#	%	#	%	#	%	#	%
Male	39.57	11.30	12	40.0%	4	13.3%	4	40.0%	30	85.7%
Female	23.40	11.00	1	20.0%	2	40.0%	0	0.0%	5	14.3%
Missing Data	-	-	-	-	-	-	20	-	-	-
TOTAL	37.26	11.26	13	37.1%	6	17.1%	4	26.7%	35	100.0%

FIGURE 5

INCIDENCE AND RATE DISTRIBUTION
Montana Native Americans by Age Group



The weapon of choice for self-destruction was a firearm in 25 (74.1%) of the cases. Due to inadequacies in death certificate coding, more specific information concerning the nature of the firearm, e.g. handgun vs. long gun, was not available for analysis. Hanging was the second most frequent mechanism, used in 6 (17.1%) of the cases. Motor vehicle/pedestrian, train/pedestrian, jump from heights, and other accounted for one death each.

Blood alcohol concentrations (BAC) at the time of injury or death, measured in grams of ETOH per deciliter of blood, were known in 22 (60%) of the 35 cases. In 8 (36.4%) cases where alcohol levels were known, no alcohol was present at the time of measurement. The mean BAC was 130 gm/dl at the time of measurement with a range of 0 - 370. Legal intoxication for the purpose of motor vehicle operation in Montana is 100 gm/dl. Twelve (54.5%) of the subjects had BAC exceeding this standard at the time of death. There was no correlation between BAC and age. Stratification by gender was not practical since BAC was known in only two of five female decedents.

On / Off Reservation Residence

Of those decedents (n=16) who had home addresses within the reservation boundaries, all 16 committed the fatal act on the reservation. One decedent was transported off the reservation for additional medical care prior to death. Likewise, the remaining 19 individuals who were living off of a reservation at the time of their death committed the act off of the reservation.

There was no difference in demographic characteristics of age, education, and BAC at the time of death. Table 2 summarizes the demographics between on and off reservation decedents.

Table 2. Demographic Comparisons Between On- and Off-Reservation Residents

Location	Age			Blood Alcohol			Education Level		
	Mean	S.D.	Range	Mean	S.D.	Range	Mean	S.D.	Range
On (n=16) Reservation	40.00	21.06	19-86	133	118	0-290	11.69	1.82	9-16
Off (n=19) Reservation	34.95	19.38	15-72	126	152	0-370	10.89	1.71	8-14
Total	37.26	20.02	15-86	130	132	0-370	11.26	1.78	8-16

Despite the demographic and co-morbid similarities summarized in Table 2, there is a difference in the age-adjusted rate of suicide occurring on and off the reservation. In this limited sample, Native Americans living off the reservation in Montana commit suicide at a rate twice that of reservation residents. The age-adjusted rate for those living off of the reservation is 36.02 compared with 17.77 for those decedents who live on reservations. These differences proved significant in chi-square analysis $\chi^2 (1, N = 35) = 4.519, p = .034$. Table 3 displays age-adjusted rates.

Table 3. Age-Adjusted Rates Per 100,000 by Residence Location

Residence Location	Total Deaths 1989-1992	Annual Average	1990 Population	Adjusted Rate 100,000
On Reservation	16	5.33	30,000	17.77
Off Reservation	19	6.33	17,574	36.02
TOTAL	35	11.66	47,574	24.50

Comparison with Caucasian Sample

The Native American sample was compared with a sample of Montana Caucasian suicide decedents who committed the self-destructive act between October 1, 1990, and September 30, 1991. The total sample size of Caucasian decedents was 153. Materials and methods used in collecting, abstracting, and analyzing the data were the same with the exception of level of detail concerning BAC. Specific toxicology requests had been made by CIT for Native American decedents as part of another study. Toxicology results were not specifically requested on the Caucasian sample in the previous work. Therefore, comparisons concerning BAC levels are limited to those cases (n=21) where BAC was specifically recorded on the death certificate.

The mean age of the Caucasian sample was 46.69 which is 9 years older than the Native American sample. The mean ages of the respective samples were subjected to a one-tailed t-test for equality of means. There was a homogeneity of variance between the samples and the difference in mean ages was significant $t(185) = 2.39, p = .009$.

The frequency distribution for the Caucasian sample is similar to that displayed for the Native American sample. However, the bimodal properties noted in the Native sample are not nearly as pronounced among the white population. There is a marked upward trend beginning at age 60 and continuing. Figure 6 compares the frequency distribution for both populations. Age-adjusted rates are less variable among the Caucasian sample. After a rapid rise in the 15-to-19-year-old group, the rates stabilize until an upward trend begins at 45, peaking in the 60-to-64-year-old group. The overall age adjusted suicide rate per

100,000 for the Caucasian sample was 20.5. Figure 7 illustrates a comparison of rates displayed by race.

Other demographic characteristics such as gender distribution are similar in nature between the races. Table 4 summarizes the demographics of the Caucasian sample.

Table 4. Demographic Characteristics of Caucasian Suicide Decedents

Gender	Age	Education	Married		Student		Employed		TOTAL	
	Mean	Mean	#	%	#	%	#	%	#	%
Male	46.62	11.76	58	46.8%	16	12.9%	53	42.7%	124	81.0%
Female	47.03	12.36	9	31.0%	4	13.8%	6	20.7%	29	18.9%
Missing Data	-	-	-	-	-	-	59	-	-	-
TOTAL	46.69	12.00	13	37.1%	6	17.1%	59	38.6%	153	100.0%

Firearms remained the weapon of choice, being used 68% of the time. Guns were chosen by younger decedents even more frequently. Hanging resulted in 21.6% of the deaths and all other mechanisms were used in 10.5%.

Analysis of the valid cases (n=21) where BAC was known revealed a mean BAC for the Caucasian sample of .096 gm/dl with a range of 0.00-.262. There was no statistical difference in alcohol levels at the time of death between the races, where such data were available.

Analysis of the suicide rate between the Native American population and the Caucasian sample failed to reach significance. Likewise, when the Native American sample was stratified by on and off reservation deaths, comparison of on-reservation deaths and the Caucasian sample was not significant. The Native American off-reservation cohort had a higher rate of suicide by chi-square analysis $\chi^2 (1, N = 172) = 4.519, p = .02$.

FIGURE 6

FREQUENCY DISTRIBUTION
By Age Group and Race

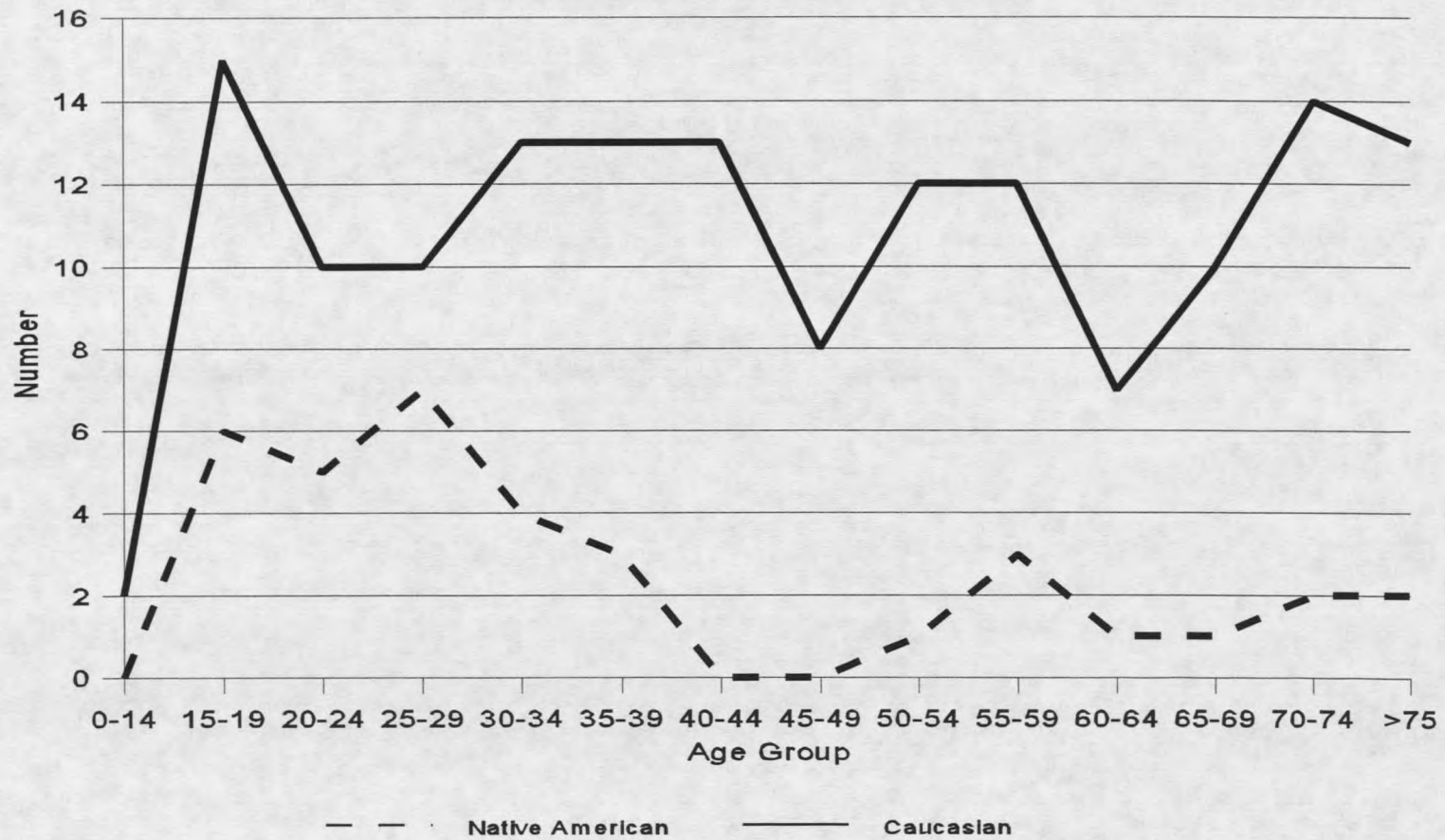
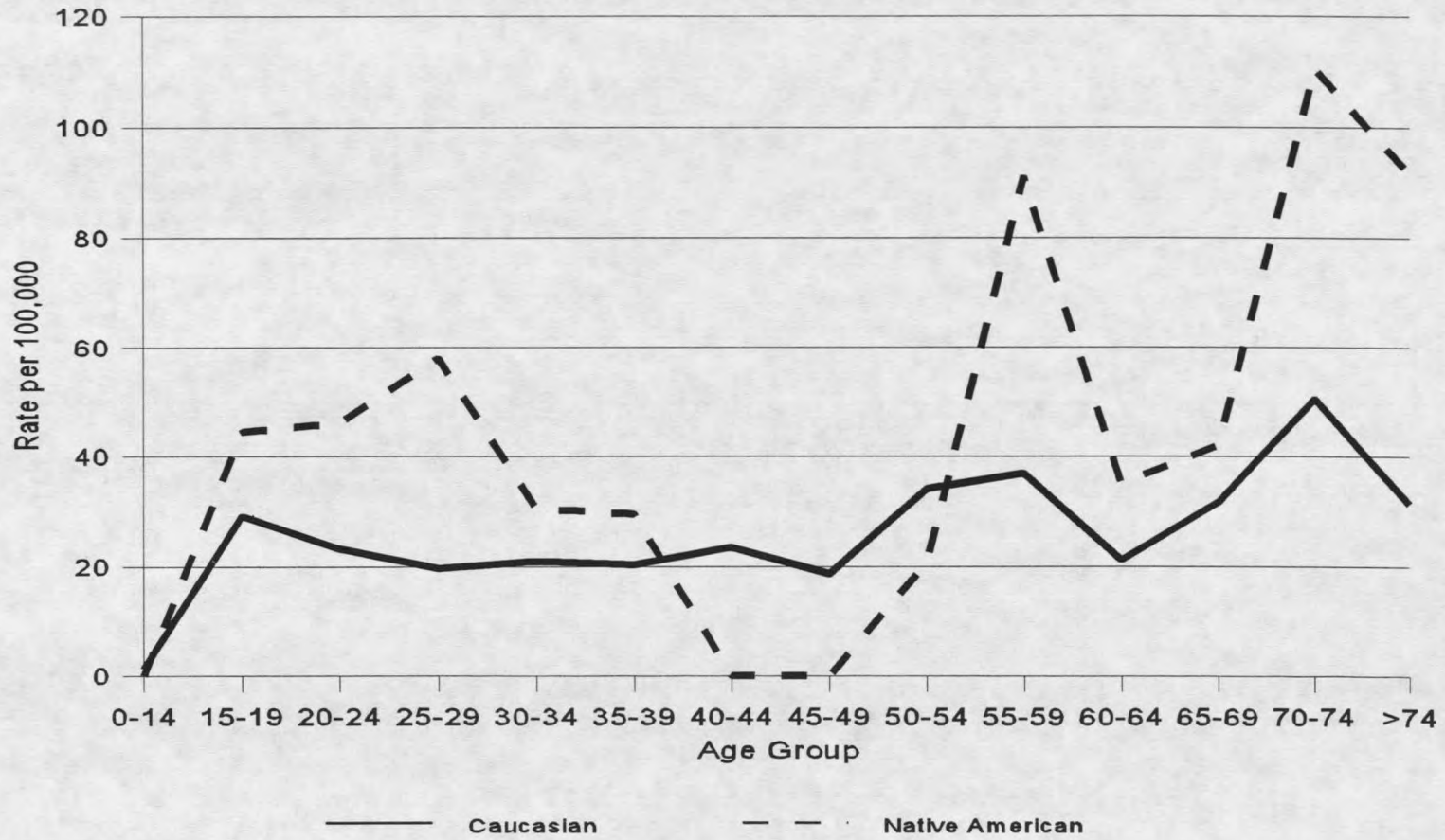


FIGURE 7

RATE DISTRIBUTION COMPARISON
By Age Group and Race



CHAPTER 5

DISCUSSION

General Findings

Suicide rates in Montana remain a concern in regards to frequency of occurrence and population-adjusted rates when compared with national incidence and prevalence. Suicide continues to rank among the leading causes of death in Montana, particularly among the youth and geriatric populations.

Data reported by Indian Health Service (IHS) continues to document a rate of Native American suicide death that is higher than the suicide rate of Native Americans nationwide and the U.S. population in general (Billings Area IHS, 1995). To date, only limited comparisons have been made between the Native American population in Montana and the majority Caucasian race. The results of this study provide some insight into the similarities between the populations in incidence, rate, and demographic characteristics.

Many of the demographic characteristics are unremarkable within and between races. The gender distribution is similar, with males far more prone to commit suicide than females, regardless of race. Education levels are consistent with the general population for each race and between races. It is difficult to draw conclusions from the marital, student, and employment status categories due to lack of a comparative non-suicidal sample and limitations in the death certificate recording.

Native Americans die from the fatal act of self-destruction approximately nine years younger than their Caucasian counterparts. This represents a substantial difference in years of productive life lost. According to 1985 economic estimates, each premature injury fatality results in \$307,636 lost to the local, state and national economy in terms of productivity, wages, taxes, and other indicators (Rice, MacKenzie & Associates, 1989). Obviously, these projected costs would be substantially higher in today's economy.

When the data are plotted by age grouping, there is an apparent difference in the distribution between the races. However, when subjected to chi-square analysis, the ratios in all age groups are similar except that of the 25-to-29-year-old group. In this group the ratio of Native American decedents is greater $\chi^2 (1, N = 17) = 5.354, p = .021$. Two age groupings, specifically those in the 40-to-44-year-old and 45-to-49-year-old groups, could not be subjected to an analysis of ratio since the frequency of occurrence for the Native American sample was zero in those age groups during the study period.

The relationship between alcohol and injury deaths among Native Americans appears to be a strong one (Sanddal & Sanddal, et al., 1996). However, it is also a complex one that goes beyond the identification of the presence, absence, and quantity of alcohol in the bloodstream at the time of the fatal event. For instance, recent literature suggests that it is possible for chronic alcoholics not to have detectable BAC at the time of measurement, suggesting a need for additional screening tests, such as carbohydrate deficient transferrin, which are not in widespread use at this point in time (Smith, Soderstrom, & Dischinger, 1996; Soderstrom et al., 1996; Dischinger, Soderstrom, Smith, Myers, & Shin, 1996). Likewise, it is possible to have an individual, particularly a youth

with little experience with the drug, who succumbs to a violent self-destructive impulse during an episode of acute intoxication. These issues bear additional examination but are beyond the scope and data resources of this study.

Of particular interest may be the difference in suicide rates between Native Americans residing off of the reservation and those residing on the reservation. When the off-reservation cohort is removed from the Native American sample, the age-adjusted rate of 17.77 per 100,000 is lower than that of the Caucasian majority at 20.5. While these differences failed to reach statistical significance, the sample size for the Native Americans in this subset (n=16) may be too small to preclude Type II error.

Without additional data concerning the off-reservation subset, it would be only conjecture as to what factors might be related to the remarkable rate of 36.02 per 100,000. Possibilities worthy of examination might include geographic and temporal distance from immediate and extended family members, inadequate social support networks off of the reservation, racial/cultural discrimination, and acculturation demands. In a comparison of health status between urban Native Americans and their rural counterparts, Grossman et al. (1994) conclude that although the urban Native population had fewer high school graduates and higher rates of unemployment and poverty than the majority urban culture, the more rural representatives of the Native American race suffered even greater disparity in these socio-economic measures. However, he found that the overall health status of urban Native Americans was worse than that of the more rural representatives of the race. Since the majority of the Montana off-reservation decedents lived in the more populous counties it might be conjectured that they would be similarly

situated in a socio-economic posture between the more urban majority and the Native American population residing on the reservation. An interesting hypothesis to explore might be based on a premise that the socio-economic position of an individual is less important than the relative disparity between the individual and his or her immediate neighbors in contributing to the rate of suicide among non-reservation aboriginal people.

Clearly, the issues that may contribute to the ultimate act of self-destruction are complex and variable. Issues such as the relationship between the availability of firearms in the home and rates of suicide are beginning to emerge (Kellermann et al., 1992; Brent et al., 1991). Suicide, as a public health problem, is not one that lends itself to easy solutions. Much more work is necessary to help identify the causes and contributing factors that come together to make Montana such a high risk environment.

Limitations

This examination has two major limitations. First, the sample size for the Native American sample is small. Since there is often a contagion effect associated with suicide (O'Carroll & Potter, 1994) a small clustering outbreak on one or more of the reservations could substantially skew the data for a given year. Such has been the case on the Wind River Reservation in Wyoming (Long, 1986). The small sample size also precluded meaningful comparison between reservations, tribes and bands. Longitudinal surveillance is necessary to overcome this limitation.

The second limitation is the result of the use of death certificates as the primary data source. In Montana death certificates are completed predominately by county coroners — elected officials whose knowledge of forensic investigation varies considerably. Marked differences in the completeness and accuracy of death certificates have been noted (Pollack, O'Neil, Parrish, Combs, & Annest, 1993; Esposito, Sanddal, Hansen, & Reynolds, 1995). Two areas of common error or mis-codification are those pertaining to suicide and race. Suicide is under-reported to an unknown extent due to concerns over insurance claims, social stigma, and poor investigative techniques (Lifeline Institute, 1990). Relative to racial misclassification, Sugarman, Soderberg, Gordon, and Rivara (1993) reported an under-coding of Native American injury by 30% in Oregon. It has often been said, tongue-in-cheek, that “many persons are born Native American but die white.” Such an under-representation could affect adjusted rates substantially in a rural population center such as Montana. Finally, there are a number of boxes on the death certificate that are completed with little consistency between counties. “Usual occupation” may mean one thing to a coroner in one community, e.g. “working as a sawyer at the mill,” and may be interpreted completely differently by another, e.g. “when the decedent worked he usually worked as a farmhand.” This latter limitation is why little emphasis was placed on some of the demographic details of this analysis such as employment status.

Death certificates are also poor resources for information concerning confounding variables, such as alcohol and drug presence at the time of death. Clearly the differences between the ratio of information concerning alcohol use between the Native American (22/35) and Caucasian (21/153) samples demonstrate the benefit of augmenting death

certificate information with specific requests for toxicology information, even though this is more costly and time consuming. Sanddal and Sanddal, et al. (1996) report that the frequency of BAC testing among injury decedents is similar in Montana between the races. However, such data are not routinely recorded on the death certificate. The difference in ratios between known BAC for the Native American population and the Caucasian sample reflects the aggressive work that was done as part of a previous research effort to garner information concerning BAC from other sources rather than a racial bias in actual collection rates. The limitation of fiscal resources associated with this examination precluded the same aggressive pursuit of toxicology information on the Caucasian cohort.

While often used due to the ease of measurement, mortality data also results in under-reporting of the problem. Billings Area IHS reports a rate of approximately 40 ideation, gestures, or attempts for each completion (Billings IHS, 1995). Some references suggest a ratio as high as 250-1 among all races (Lifeline Institute, 1990). While the literature on non-successful suicide is far more limited than that concerning the fatal act, two things are evident in those publications. First, the demographic characteristics of unsuccessful perpetrators is significantly different than those who ultimately complete the act. For instance, even though the mortality data suggest that suicide is more prevalent in males, females are 300% more likely to attempt the act. The second widely-agreed-upon fact is that every attempt, ideation, or gesture should be taken seriously since they are some of the better predictors of eventual fatality. Future studies of the suicide phenomenon in Montana should be designed so as to overcome the limitations imposed by death certificate inadequacies and mortality driven data.

CHAPTER 6

FURTHER RESEARCH

Immediate Opportunities

The Critical Illness and Trauma Foundation, Inc., has recently embarked on a new round of injury research funded by IHS/Office of Program Evaluation to examine the broad spectrum of Native American injuries. That research will use the death certificate as a starting point to identify all injury deaths (both intentional and unintentional) involving this racial classification for a period of five years. Using the death certificate only as an identification point, researchers will link the death records to hospital and clinic records from IHS to ascertain if there is a relationship between previous injury-related visits for medical care in which the decedent had alcohol present in the bloodstream. The objective of the study is to determine whether alcohol-related injuries can be used as an eventual predictor of fatal injury events involving alcohol and subsequently to determine if and when intervention strategies might be effective in preventing the fatal occurrence. This research opportunity will allow for the development of a more complete psycho-social profile of the decedent prior to injury and the examination of potential contributing variables, such as previous or ongoing mental health counseling or treatment for alcohol or drug abuse. While this research examines a broader spectrum of injury deaths, suicide will be included in the study as a prominent mechanism of death among this population.

Longer Range Efforts

Planning is underway for the submission of a grant application to the Centers for Disease Control under the "Grants for Violence-Related Injury Prevention Research" program in 1997. This process will capitalize on an expanding access to data throughout Montana through the emergence of a statewide prehospital data collection network, a trauma registry, and electronic vital records (death certificate) storage and retrieval. This access to key data points will allow for the development of an ongoing suicide surveillance network that will encompass all known suicide attempts and completions, regardless of race. As part of the surveillance network a "psychological autopsy," patterned after pioneering efforts currently underway in Utah by the Childhood Fatality Review Team (B. Rushton, personal communication, February 1, 1996), will be completed on each decedent. This involves linking medical, mental health, and social service records to provide a more complete picture of the general status of the individual prior to the event. This may result in a clearer set of contributing variables over time.

The second aspect of the grant application will be the development of a long-term injury prevention and control strategy that takes advantage of what is known about the translation of such programs into a public health model. The public health model calls for a multi-disciplinary approach and includes a wide range of professions being brought to bear on the issue (Rosenberg & Fenly, 1992). Psychologists, among others, have an opportunity to contribute substantially to injury control efforts (Peterson, Farmer, & Mori, 1987; Sanddal, Mitchell, & Esposito, 1996; Singer & Krantz, 1982; Spielberger & Frank,

1992; Williams & Lund, 1992). This paradigm allows for the development of strategies in the pre-injury, injury, and post-injury stages of the event that are designed to influence the host, agent, and environment. William Haddon, Jr., the inaugural director of the National Highway Traffic Safety Administration, was the first scientist to recognize how injury control fits into this epidemiological model (Haddon, 1972). The Haddon matrix is presented as Table 5.

Table 5. Haddon Matrix for Injury Control With a Suicide by Firearm Example

Phases	Factors		
	Host	Agent	Environment
Pre-Injury	Alcohol intoxication	Weapon access, e.g. locking storage	Pre-crisis counseling
Injury	Resistance to energy insults	Design of projectile, e.g. hollow point	Proximity to supervision and discovery
Post-Injury	Hemorrhage	Rapidity of energy reduction, e.g. caliber	Emergency medical response

Although all cells of the Haddon matrix are not applicable to every situation concerning intentional injury, experience in the application of the paradigm to unintentional injury has shown that to ignore any cell is to decrease the effectiveness of primary, secondary, and tertiary prevention efforts (Robertson, 1992). The suicide prevention plan for the State of Washington is strongly based in this epidemiological model (Potter & Eggert, 1995) and will serve as an excellent resource as a similar strategy is developed for Montana.

The proposal described in this section and the subsequent activities it generates will result in a data-driven epidemiological model that should have an effect on the continuing crisis of suicide in Montana among all of its peoples, regardless of race,

geographic location, socio-economic status, or demographic variables. The work completed as part of this thesis, in spite of acknowledged limitations, will serve as an excellent foundation for the subsequent application development.

Discoveries of differences between the on- and off-reservation population as part of this study should serve as the basis for future research. A host of factors including social isolation; the disparity between neighbors in the "urban" settings; the use of alcohol and drugs; discriminatory and acculturation pressures; and other yet unknown contributors must be identified and overcome to reduce the needless loss of lives among this population.

Likewise, trends towards an increase in suicide rates among the elderly in Montana deserve continued attention. Information is beginning to emerge (Division of Violence Prevention, 1996) that suggests that risk factors for suicide among this population differ from the younger decedent. Often the older decedent has health problems and has recently visited a health care provider. There is a higher prevalence of alcohol abuse coupled with depression among this age group. Differences in rates by marital status also indicate that social isolation contributes to the problem.

Montana's long standing legacy as a state with one of the nation's highest rates of suicide is one that demands a comprehensive prevention and control plan. The changing epidemiology of this health care tragedy has created even more complex issues requiring attention and resources. Current health care, political, academic, and governmental resources should be brought to bear on this challenging and deadly epidemic.

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