Reduce Injuries: Eliminate Disparities in Child Mortality Rates among American Indian and Alaska Native Children and Youth

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Introduction

Disparities in health outcomes among populations have many possible causes. They include socio-economic factors, differences in the availability and accessibility of medical services, variations in the quality of medical care, lifestyle differences, and even genetic influences.[1-5] One example of a major health disparity is the difference in child mortality rates among American Indian/Alaska Native (AI/AN) children and White children.[6] The overall child mortality rate for AI/AN children, ages 1 through 19 years, is 44.28 per 100,000 for the years 2000 - 2002. This rate is nearly 40% higher than that of White children in the US (31.94 per 100,000).[7] Because injuries are the leading cause of death for US children ages 1 - 19, and account for 75% of all deaths among AI/AN children in that age group,[8] we investigated the impact of mortality from injuries on the overall child mortality rate in these two populations.

Methods

We determined cause of injury, and calculated all-cause mortality and age-specific mortality rates, for all AI/AN and White children and youth 0 - 19 years of age in the US using CDC's Web-Based Injury Statistics Query and Reporting System (WISQARS).[7] WISQARS contains mortality data compiled by the National Center for Health Statistics (NCHS). For the years 2000 - 2002, WISQARS categorizes external cause of injury death, and all-cause mortality, from the International Classification of Diseases, 10th Revision.[9] Mortality rates per 100,000 population by race, age, and cause are automatically calculated in WISQARS using population statistics from the US Census Bureau.[7] Injury causes described here are grouped into several categories including all injuries, all unintentional causes, unintentional motor vehicle traffic crashes, unintentional pedestrian events, unintentional drowning, unintentional fire/burn, unintentional suffocation, unintentional poisoning, unintentional falls, homicide, and suicide. Because the vast majority of infants die from non-injury causes, we analyze infants separately in Tables 1, 3, and 4.

To determine the contribution of injuries to all-cause mortality, we calculated an "adjusted" all-cause mortality rate for AI/AN. The adjusted rate assumes that the AI/AN injury mortality rate is equal to the White injury mortality rate. The adjusted rate was obtained by 1) calculating the number of excess AI/AN injury deaths by subtracting the White all-injury mortality rate from the AI/AN all-injury mortality rate and then

Table 1. 10 Leading causes of death, American Indians/Alaska Natives and Whites Ages 0-19 years, both sexes, 2000-2002, United States

Rank	AI/AN*	White*	AI/AN*	White*
	Infants	Infants	Ages 1-19	Ages 1-19
	Number (rate)	Number (rate)	Number (rate)	Number (rate)
1	Congenital Anomalies 169 (137.1)	Congenital Anomalies 12,948 (140.4)	Unintentional Injury 746 (22.9)	Unintentional Injury 27,453 (15.3)
2	SIDS 152 (110.2)	Short Gestation 7,404 (80.3)	Suicide 168 (5.0)	Malignant Neoplasms 5,170 (2.9)
3	Short Gestation 113 (82.0)	SIDS 4,508 (48.9)	Homicide 132 (4.0)	Suicide 4,727 (2.6)

Table 1. (continued)

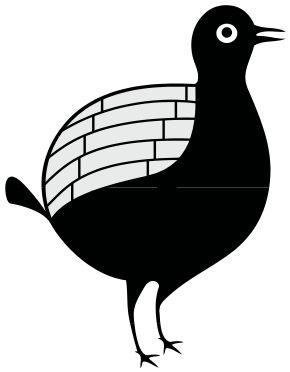
4	**Unintentional Injury** 67 (45.6)	**Maternal** Complications 2,809 (30.5)	**Malignant Neoplasms** 60 (1.8)	**Homicide** 3,781 (2.1)
5	**Maternal** Complications 50 (36.3)	**Placenta, Cord** 2,085 (22.6)	**Congenital anomalies** 38 (1.2)	**Congenital** anomalies 2,561 (1.4)
6	**Placenta, Cord** 33 (23.9)	**Respiratory** Distress 1,839 (19.9)	**Heart Disease** 35 (1.1)	**Heart Disease** 1,692 (0.94)
7	**Influenza and** pneumonia 29 (21.0)	**Unintentional** injury 1,799 (19.5)	**Influenza and pneumonia** 15	**Influenza and** pneumonia 562 (0.31)
8	**Circulatory System** 24 (17.4)	**Bacterial Sepsis** 1,408 (15.2)	**Septicemia** 15	**Septicemia** 475 (0.26)
9	**Homicide** 21 (15.2)	**Circulatory System** 1,295 (14.0)	**Benign Neoplasms** 9	**Benign** Neoplasms 451 (0.25)
10	**Bacterial Sepsis** 20 (14.5)	**Intrauterine Hypoxia** 1,233 (13.4)	**Chronic lower respiratory** disease 9	**Cerebrovascular** 428 (0.24)

* Number of deaths (rate per 100,000). Rates are not calculated for those causes with fewer than 20 deaths because of potential instability.

** Injury-related causes are represented in bold.

Table 2. Leading causes of injury death, American Indians/Alaska Natives, and Whites, Ages 0-19, 2000-2002, United States

	AI/AN		White	AI/AN:White
Cause of Death	**Number**	**Rate***	**Rate***	**Rate Ratio**
Motor Vehicle Traffic	517	15.2	9.8	1.5
Pedestrian**	66	1.9	1.1	1.7
Suicide	163	4.8	2.5	1.9
Homicide	153	4.5	2.3	1.9
Drowning	74	2.2	1.4	1.6
Unintentional Suffocation	46	1.4	1.0	1.4
Fire/Burn	36	1.1	0.6	1.8
Unintentional Poisoning	31	0.9	0.7	1.3
Falls	9		0.3	



* Rate per 100,000 population. Rates are not calculated for those causes with fewer than 20 deaths because of potential instability.

** Pedestrian deaths are included in the motor vehicle traffic category.

multiplying the excess death rate by the AI/AN population; 2) subtracting the AI/AN excess injury deaths from the total number of AI/AN deaths from all causes; and 3) re-calculating the AI/AN all-cause mortality rate using the adjusted numerator. Using data from Tables 3 and 4, the calculation for adjusted AI/AN all-cause mortality rate, age 0 - 19 years would be:

1. Excess Deaths = 33.9/100,000 – 20.6/100,000 X 3,396,861 = **452**
2. Adjusted Deaths = 2,482 – 452 = **2,030**
3. Adjusted AI/AN all-cause mortality rate = 2,030 X 100,000 ÷ 3,396,861 = **59.8 per 100,000.**

Results

In the 1 - 19 year age group, the number of *injury deaths* (unintentional injury, homicide, and suicide) is far greater than the number of deaths from the next *seven* leading causes combined: for AI/AN children, 1,040 injury deaths vs. 182

Table 3. Child mortality by age group and leading cause American Indians/Alaska Natives and Whites, 2000-2002, United States

Age	<1	1-4	5-9	10-14	15-19	0-19 total
	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)
AI/AN:						
All deaths, all causes	1,039 (100)	284 (100)	142 (100)	226 (100)	791(100)	2,482 (100)
All injury deaths*	96 (9.2)	137 (48.2)	91(64.1)	156 (69.0)	672 (85.0)	1,152 (46.4)
Unintentional injury	67 (6.4)	102 (35.9)	83 (58.5)	120 (53.1)	440 (55.6)	812 (32.7)
Homicide	21 (2.0)	32 (11.3)	6 (4.2)	10 (4.4)	84 (10.6)	153 (6.2)
Suicide			1 (0.7)	24 (10.6)	138 (17.4)	163 (6.6)
White:						
All deaths, all causes	54468 (100)	10,570 (100)	6 ,777 (100)	8,981 (100)	31,121 (100)	111917 (100)
All injury deaths*	2,504 (4.6)	4,612 (43.6)	3,043 (44.9)	4,668 (52.0)	24,248 (77.9)	39,075 (34.9)
Unintentional injury	1,799 (3.3)	3,843 (36.4)	2,712 (40.0)	3,532 (39.3)	17,366 (55.8)	27,453 (24.5)
Homicide	563 (1.0)	666 (6.3)	283 (4.2)	370 (4.1)	2,462 (7.9)	3,781 (3.4)
Suicide			14 (0.2)	672 (7.5)	4,041 (13.0)	4,727 (4.2)

* Includes “intent unknown”

deaths from the next seven other causes (ratio of 5.7:1); for White children, 35,961 injury deaths vs. 11,339 deaths from the next seven other causes (ratio of 3.2:1) (Table 1). Among AI/AN ages 1 - 19 years, the four leading causes of death in rank order are unintentional injuries, suicide, homicide, and cancer. Among Whites ages 1 - 19, the four leading causes are (in order) unintentional injuries, cancer, suicide, and homicide.

The situation is different for infants under one year of age, where congenital anomalies, SIDS, and the consequences of short gestation are the leading causes of death in both populations. Among AI/AN infants, unintentional injury ranks fourth as a leading cause of death, and homicide ninth. Among White infants, unintentional injury ranks seventh as a leading cause of death (Table 1) while homicide ranks fourteenth.

Mortality Rates by Cause and Age Group

Motor vehicle traffic crashes were the leading cause of injury death among AI/AN and White children and youth ages 0 - 19 years, with the AI/AN rate 1.5 times greater than the White rate (Table 2). Suicide and homicide were the second and third leading causes of injury death among AI/AN children and youth, with rates 1.9 times greater than rates for White children and youth. The causes of injury with the least disparity for AI/AN children and youth were unintentional poisoning and unintentional falls. Injury death rates from these causes for AI/AN children and youth were only slightly higher or the same as rates for Whites (rate ratio of 1.3 and 1.0, respectively) (Table 2).

As a percentage of all AI/AN deaths to children and youth, injuries ranged from 9% of deaths among infants to 85% of the deaths to teens aged 15 - 19 years (Table 3). The importance of injuries as a leading cause of death among AI/AN children and youth increases dramatically after infancy, and goes up with each age group. For ages 0 - 19 years combined, almost half of all AI/AN deaths were due to injuries, compared to just over a third of the deaths among Whites (Table 3). For the age groups 1 - 4 and 15 - 19 years, the percentage of deaths due to unintentional injuries was similar for both AI/AN and Whites (36% and 56% respectively). Homicide was responsible for a relatively large proportion of the deaths to young AI/AN children (2% of infants, 11.3% of ages 1 - 4) and older teens (10.6% of ages 15 - 19).

Table 4. Child Mortality Rates* by Age Group American Indians/Alaska Natives and Whites 2000-2002, United States

Age	<1	1-4	5-9	10-14	15-19	0-19 total
Injury mortality rates						
AI/AN unadjusted	69.6	21.4	10. 4	16.9	76.5	33.9
AI/AN adjusted	27.1	12.5	6.4	9.4	49.8	20.6
White	27.1	12.5	6.4	9.4	49.8	20.6
All-cause mortality rate						
AI/AN unadjusted	753.6	45.3	16.6	24.8	91.4	**73.1**
AI/AN adjusted	710.8	36.4	12.5	17.3	64.7	**59.8**
White	590.6	29.3	14.4	18.4	65.0	**59.2**
3-year population						
AI/AN	137,878	626,519	857,174	909,675	865,615	3,396,861
White	9,221,896	36,091,523	47,155,295	48,734,576	47,893,599	189,096,889

* Per 100,000 population.

† All-cause mortality rates have been re-calculated based on injury mortality rates equal to US White rates. AI/AN adjusted all-cause mortality rate = (total deaths – excess injury deaths) X 100,000 ÷ AI/AN 3-year population

Injury mortality rates were highest among AI/AN infants (69.6 per 100,000) and older teens 15 - 19 years (76.5 per 100,000) (Table 4). When the AI/AN all-cause mortality rate was adjusted for the excess injury rate, the new adjusted all-cause mortality rate for AI/AN ages 0 - 19 years was essentially the same as the White rate (59.8 per 100,000 vs. 59.2 per 100,000) (Table 4 and Figure 1). Adjusted all-cause mortality rates for AI/AN were *lower* than for White rates in age groups 5 - 9, 10 - 14, and 15 - 19 years, but AI/AN adjusted rates remained higher among infants and 1 - 4 year olds (Table 4).

Discussion

A striking finding is that *the overall child mortality rates for AI/AN and US White populations, ages 0 - 19 years would be essentially equal (59.8 vs. 59.2 per 100,000, respectively) if AI/AN child injury rates were reduced to those of the US White population*. In some age groups (5 - 9, 10 - 14, and 15 - 19 years) the overall child mortality rates would be *lower* among AI/AN children. Only among infants and 1 - 4 year olds would the overall child mortality rate remain higher among AI/AN children (Table 4 and Figure 1).

Targeting injury prevention to AI/AN children and youth is especially warranted in light of the age distribution of the AI/AN population. According to the 2000 Census, 33.3% of individuals who are American Indians or Alaska Natives are under the age of 18. Almost 40% of persons who are Navajo, Sioux, or Alaska Natives are under 18 years of age. This compares to 25.6% of the total US population.[10]

If the injury death rate among AI/AN children and youth (birth to 19 years) had been reduced to the rate of White children and youth the same age, an estimated 452 AI/AN injury-related deaths from 2000 - 2002 would have been prevented. Reducing child injury rates among AI/AN children and youth (birth to 19 years) from 34 to 21 per 100,000 (the current rate for Whites and a 38% reduction) is an ambitious goal, but feasible. From 1982 to 2002, unintentional injury mortality rates among AI/AN children aged 0 - 9 years decreased 39%. During this same time period, rates for White children decreased 51%. Among AI/AN youth aged 10 - 19 years, unintentional injury death rates decreased 28%; the decrease among White youth was 30% (CDC, NCIPC, unpublished study). Although AI/AN unintentional injury death rates have decreased over time, the overall injury disparity compared with rates for Whites persists.[6]

Our findings are subject to at least two limitations. First, AI/AN mortality rates probably underestimate the true rates because of misclassification of race on state death certificates. The extent of racial miscoding in AI/AN children and youth is not well-defined, but our reported AI/AN mortality rates should be considered conservative (under-estimates, rather than over-estimates).[11,12] Second, cause-specific rates of infant deaths are complicated by diagnostic ambiguities.[13] Differentiating among unintentional suffocation, SIDS, and child abuse, for example, often requires a postmortem examination, death scene investigation, and detailed review of case records.[14] Particularly in AI/AN communities, geographic isolation, lack of resources, an absence of tribe-specific child mortality review teams, and cultural practices can be barriers to fulfilling these requirements.

Conclusion

Few health disparities have such potential for elimination as the discrepancy in child mortality rates among American Indian and Alaska Native children. In 2000, The IHS Injury

Prevention Program and the American Academy of Pediatrics hosted a Senate briefing in Washington, DC, including the testimony of AI/AN people about the burden of childhood injuries and the need for additional resources. More recently, the national Tribal Injury Prevention Steering Committee (TSC) has requested of Congress $10 million over five years to expand the capacity-building injury prevention program for tribes. While great strides have been made in establishing child passenger safety programs in AI/AN communities, injury prevention programs that target adolescents,[15,16] and interventions to prevent all forms of child maltreatment,[17-21] deserve more emphasis among native populations. Many injury prevention strategies are effective,[22-34] but too few are fully implemented in AI/AN communities.[35-37]

Reducing childhood injuries requires on-going efforts. For example, every newborn requires a car safety seat before leaving the hospital, and programs to enforce traffic safety laws must be repeated often or they lose their effectiveness. There is a need for expanded collaborations among tribal nations, the IHS, and other national agencies and organizations, such as the Bureau of Indian Affairs Highway Safety Program, Department of Justice, and law enforcement groups.

The Committee on Native American Child Health and the Committee on Injury and Poison Prevention of The American Academy of Pediatrics published a joint statement noting that "strong advocacy is needed to promote childhood injury prevention as an important priority for federal agencies and tribes."[37] By highlighting the dramatic impact of child injury rates on overall child mortality, we hope injury prevention programs will be continued and expanded at the local, state, and national levels.

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