COST OF INJURIES INVOLVING NATIVE AMERICANS:

A DISPROPORTIONATE BURDEN AND CRITICAL NEED FOR PREVENTION

By

Neill F. Piland, Dr. P.H.
Research Professor and Director
Institute of Rural Health
Idaho State University

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Introduction

Even a cursory examination of the volume and distribution of injuries accruing annually to Native American (American Indian/Alaska Native or AI/AN) citizens and their communities in the United States generates an immediate understanding of the disparate health burdens incurred by this population. This is especially true in the case of burden of injury. In nearly every category of injury, AI/AN populations exhibit higher incidence and prevalence.[1] This is occurring in communities markedly less economically able to pay the costs of caring for the injured or of incurring the societal costs that accrue to the loss of productive and potentially productive members of the community and the reduction of productivity from disability. However, accurate measures and estimates of the differential economic burden are not available.

Comprehensive data on the cost of injury to AI/AN communities is not available. Local and regional studies of varying quality and external validity have been conducted over the past twenty or more years. Most of these studies are focused on a specific category of injury, such as motor vehicle crash injury; population, such as pediatric or elderly or; cause, such as alcohol related injuries. In many, analysis of cost is secondary to other study objectives. No Meta-analyses or Systematic Reviews of these studies are available. Therefore, no useful road-map or guideline exits for analysis of the complex relationship of injury with either the direct costs of health care, the indirect costs or, of greatest significance, health status of Native Americans and their communities. There is

[1] Paisano, E. and Program Statistics Team, Indian Health Focus: Injures, 1998-1999, USDHHS, 2000, (2, 9-10.)

also no general and accessible source of cost information available. No cost database exists for AI/AN injury. Even assessment of the incidence prevalence of injuries is problematic due to differences in definitions in injury categories used by different organizations collecting injury data. In addition, statistics are not uniformly aggregated into injury, accident, and unintentional injury categories by all public and private agencies and organizations. There is a distinct need to generate and adopt a uniform Taxonomy of injuries that can be used to report and analyze injury data for all populations.

Data on cost and outcomes stemming from Native American injuries is exceptionally difficult to gather and analyze. This makes estimation of the economic costs of injury difficult and subject to many sources of measurement and estimation error. Analysis of health care costs for AI/AN populations is complicated by the complex financing relationships that exist within the Indian Health Service and among the general health care delivery system through contract care facilities and providers of specialty care. The problem is further complicated by regulations and contracting stipulations governing coordination-of-benefits (COB) among payers; determination of responsibility of "payer of last resort" status (subrogation); patient Medicare and Medicaid eligibility; eligibility for VA services the contract relationships existing among private third party payers, the Indian Health Service and fiscal intermediaries and carriers for payment for services covered by both public and private financing and delivery programs. Cost finding is further complicated by the P.L. 93-638, Indian Self-Determination Tribal Health Contract and Compacting system which enable Tribes and Tribal organizations to assume management and delivery of health services to their populations by contracting

with IHS for funding. Tracking of expenditures through direct IHS care, contract care facilities and providers and through Tribal health Contract and Compact programs and their delivery and contracting processes present a very difficult picture for creating valid and reliable cost and utilization information. The existence of additional public and private payers for care for segments of the AI/AN population (e.g. private tribal employee health insurance benefits, Federal Employees Health Benefit Program benefits for BIA and IHS employees for makes the generation of substantial, integrated cost data very difficult. Even basic charge data is not readily available. Charge based investigation of resource use has numerous methodological and analytic properties that make determination of actual costs and interpretation of findings very difficult. Fundamental charge-based data are most frequently unavailable or incomplete for studies of AI/AN injury and its economic burden. Therefore, individual studies have been required to acquire primary data or create databases to address specific questions for carefully delineated populations or population segments. Presently, collection and aggregation of integrated comprehensive data on the cost of health care resources consumed in delivering injury related services does not take place. Excellent data does exist through the Indian Health Service's data reporting systems. But, as a delivery and financing organization, cost data has not been a priority in this or previous IHS data systems. These gaps need to be addressed in the routine health care utilization and disease management reporting systems employed by the Indian Health Service and Tribal Health Authorities, so that analysis of cost-effectiveness of alternative programs, procedures, techniques and delivery systems can be scientifically performed. These data will greatly increase the level of reliability of results and confidence in the accuracy of the estimates that are

made. Health policy can then be based on a more valid and reliable evidence-based foundation.

Economic Costs

For the purpose of this report economic costs should be understood in terms of "opportunity costs" or alternative foregone in the consumption of scarce health resources. This means that there are costs associated with any course of action and for non-action as well. For example, the prevention of injuries frees-up resources that can be employed in other productive uses while failure to avert preventable injuries results in the consumption of resources that can then no longer be used for alternative purposes. It is a simple concept but it is fundamental to understanding the economic valuation of health programs and the resources required to operate them.

To derive accurate estimates of the cost of injury, it is important to include both direct and indirect costs. The investigation of cost variables is complex. Costs represent, most frequently, a flow or series of uneven recurring expenditures of resources. Therefore, measurement of costs entails inclusion of both short and long-run direct and indirect costs. This is particularly true for the measurement of the economic costs of injuries where long-term effects are common and frequently entail very long term economic burden.

Accurate accounting of costs should include the following: Direct Costs should include: 1) Medical care services including emergency and pre-hospital services, ambulance, emergency department, EMT paramedic, Physician services, other personnel costs; 2) Hospital inpatient costs: 3) ambulatory medical care including hospital outpatient services, ambulatory clinic, office bases physician care and cost of

pharmaceuticals; 4) Disability and Rehabilitation services including physical therapy, occupational therapy, speech and hearing therapy; 5) Long-term care including long term rehabilitation and custodial care; 6) home health care services, including home health nursing, aid and homemaker services; 7) Administrative costs; 8) Police, legal and court costs; 9) Welfare and human services costs; 10) Costs accruing to other participants in an accident or injury; 11) morgue, mortuary and medical examiner costs and; 12) funeral costs.

Indirect costs should, at the minimum, include the following: 1) Foregone production (earnings) due to death, injury and disability; 2) Consumption foregone from reduced long and short run income; 3) Value of time, production and consumption foregone by family during care of injury victims; 4) Value of reduced earnings stemming from early termination of education or training to care for the injured family member.

This summary is based upon a Human Capital approach to valuation.[2] This approach does not estimate the value of such intangibles as pain and suffering or stress and depression. These variables are approached with a "Contingent Valuation" or "Willingness to Pay" methodology.[3] A long schedule of potential costs can be involved in any injury. However, data for many of these categories is usually incomplete or unavailable. In the case of AI/AN injuries, the availability of cost data is an especially difficult barrier.

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[2] Drummond, M., B. O'Brien, et al, Methods for the Economic Evaluation of Health Care Programs, Oxford University Press, Oxford, New York, Toronto, 1997.(209-212)

[3] Diener, A., B. O'Brien and A. Gafni, Health Care Contingent Valuation Studies: A Review and Classification of the Literature, Health Econ. 7:313-326, 1998.

Burden of Injury in Native American Communities

Even though precise measurement of total costs accruing to AI/AN communities from injuries is difficult, the impact is obvious and the costs clearly enormous. Accident and injury rates for AI/AN are substantially greater (at least two to five times greater) that those for the general U.S. population. A careful look at incidence data for Native American populations presents truly startling figures. It is important to understand the dimensions of these statistics. The total American Indian/Native Alaskan population, from the 2000 United States Census, was only about 4.1 million or 1.5% of the population. This number included 2.5 million who considered themselves only AI/ AN, and another 1.6 million who reported AI/AN as well as one or more other races.[4] In addition, the Indian Health Service estimates its Fiscal Year 2001 potential service population to be 2,113,739 Registrants and 1,345,242 Active Service Users. Registrants are defined as those listed in the National Patient Information Reporting System (NPIRS) Patient Registration Data Base as of September 30, 2001.Active Indian Registrants are defined as those Indian Registrants in the NPIRS data base that had at least one direct or contract inpatient stay, ambulatory visit or dental visit between October 1, 1998 and September 30, 2001.[5] These relatively small numbers coupled with high mortality and morbidity rates from injuries indicate a disproportionate burden on the Native American population stemming from injuries. In health insurance terms this leaves the population with considerable problems of "adverse selection" or poor risk. This problem is more difficult to manage in small populations because of the relatively fewer numbers

[4] U.S. Census Bureau, DP-1. Profile of General Demographic Characteristics: 2000.
[5] Indian Health Service, Acting Director, Office of Public Health, Final User Estimates-2001, Indian Health Service, USDHHS, March 1, 2002.

available to "spread the risk". Table 1 presents the relatively uneven distribution of injuries in the United States.

The dramatic impact of injury on AI/NA mortality is further illustrated in Table 2. These figures represent the Years of Potential Life Lost (Before Age 70). This gives a graphic picture of the impact of injury related death on the productive capacity of the population. The Years of Potential life Lost (YPLL) provides the foundation for calculating the reduction in productivity and income resulting from premature Native American deaths.[6]

These figures are important but they represent only a portion of the total picture of injuries and their effects. Death is only one variable to be measured in the total cost of injury equation.

Table 1: Injury Deaths and Death Rate Per 100,000 Population
2000

Population	Total Deaths	Crude Death Rate	Age Adjusted Death Rate
Native American	1,903	78.11	82.02
All Races	148,209	53.89	53.69
White	120,711	53.35	52.18
Black	22,886	64.83	67.40
Asian/Pacific Island	2,709	24.03	28.03
All other	4,616	33.64	37.13

i

[6] National Center for Injury Prevention and Control, Years of Potential Life-Lost (YPLL) Reports:1999-2000, Web-Based Injury Statistics Query and Reporting System (WISGARS) http://www.cdc.gov/ncipc/wisqars, 4/12/03.

In 2000 there were a total of 166,103 Years of Potential Life Lost in the Native American population. 27.7% (45,995) of the YPLL were due to Unintentional Injuries.

Table 2: Years of Potential Life Lost (YPLL)
Native American and All Races
Percent by Cause (Before Age 70)
2000

Cause of Death	Native American	Total Population
Unintentional Injury	27.7%	16.0
Heart Disease	9.5	14.2
Cancer	9.1	19.3
Suicide	6.6	5.1
Liver Disease	6.1	2.2
Perinatal	5.2	6.6
Homicide	4.7	4.3
Congenital Anomalies	3.3	3.6

ii

These figures indicate that: 1) injury mortality has a larger impact on AI/AN populations that the overall population and; 2) injury mortality is greater in younger age groups for AI/AN. These factors have a relatively greater impact on both lost productivity and on the distribution of disease in the total AI/AN population. The lower mortality rates for cancer, heart disease and cerebrovascular disease in AI/AN populations are due primarily to a lower life expectancy stemming from increased mortality in younger age groups. Native American life expectancy is nearly 6 years less that that of the general population (70.6 to 76.5 years).[7] People don't live long enough to develop these chronic illnesses at the same rate as the overall population. This negatively

[7] Office of the Director, Facts on Indian Health Disparities. Mortality Rate Disparities: American Indians and Alaska Natives (AI/AN) in the IHS Service Area: 1994-96 to 1997-99 and All Races 1995-1998, Indian Health Service, USDHHS, September, 2002.

affects the "dependency ratio" in these populations. The dependency ratio is ratio of children and elderly in population to those in productive/income producing age categories. This makes it more difficult to stimulate economic development and improvement because there are relatively fewer people in the most productive, wage earning age intervals to support the elderly and young and generate savings and other capital. These Years of Potential Life Lost estimates provide the basic foundation for the analysis of indirect costs accruing to AI/AN injuries.

Age-adjusted death rates for accidents are also revealing. In 1995 the age-adjusted death rate for all unintentional injuries was 92.6 per 100,000 population; 54.0 for motor vehicle accidents and 38.6 for all other accidents. The comparable figures for the general population were 30.5, 16.3 and 14.2 respectively. The differences are dramatic. Overall, deaths from accidents were 280% higher for AI/AN than for the general population.[8] While this accounts for a substantial portion of AI/AN health disparities, it should be noted that considerable variation in injury related mortality exists within and among areas. In the period 1994-1996 the overall age-adjusted injury related death rate for all Indian Health Service Areas was 80.6 per 100,000. But rates among Areas varied from 44.1 in California and 61.6 in Oklahoma to 127.4 and 134.6 in Alaska and Navajo respectively.[9] During the same period the rate for all races in the U.S. was 30.5 per 100,000.

Motor vehicle accidents are clearly major determinants of mortality, non-fatal injury and costs of injury. They are major drivers of health care and total injury costs.

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[8] Paisano, E. and Program Statistics Team, Indian Health Focus: Injuries, 1998-1999, USDHHS, 2000.(Chart15,16: 27 and Table 15: 28)

[9] Paisano, E. and Program Statistics Team, Indian Health Focus: Injuries, 1998-1999, USDHHS, 2000. (Table 16: 29)

Motor vehicle related death rates are also significantly higher that those in the general population. The 1994-1996 Motor Vehicle related unintentional injury age-adjusted death rate for all IHS Areas was 54.0 per 100,000 and 16.3 for the general population. Here again considerable variation exists among IHS Areas with rates ranging from 85.8 and 83.1 for Navajo and Bemidji to 23.7 and 27.7 per 100,000 for California and Alaska respectively. All areas remain significantly higher than the general population's rates.[10]

The elevated incidence and prevalence of accident and injury rates for Native Americans greatly affect and help determine the health service utilization patterns and costs of care for Native American. The importance of injury to AI/AN health and health care delivery should not be underestimated. The use of scarce health resources for the care of injuries that could have been prevented points to many potentially productive opportunities to design and implement highly cost-effective prevention programs and measures. However, in order to determine cost-effectiveness reasonably accurate and stable estimates of costs and effectiveness must be made. As noted above, the structure of the health service delivery system operated by the Indian Health Service and Tribal Health authorities is not set up to capture the cost of care. As noted above, no longitudinal and very few cross-sectional studies of AI/AN injury costs have been performed. Therefore, this report uses available data gathered from both national sources and regional studies to synthesize estimates of the cost burden of injury and the effects on the AI/AN population.

[10] Paisano, E. and Program Statistics Team, Indian Health Focus: Injuries, 1998-1999, USDHHS, 2000. (Table 16: 29)

Estimating the Cost of Injury

The cost estimates presented here must be viewed in the context of the limited resources available for health care delivery to Native Americans. Health service funding is very limited for AI/AN.. The Federal Employee Health Benefit (FEHBP) Disparity Index developed under the auspices of the Indian Health Service and Tribal health authorities estimates that Indian Health Service funding for AI/AN health care in 2001 was only 52% of that needed to reach parity with per capita expenditures under the Federal Employees Health Benefit Program ($1,384 perAN/AI user vs. $2,687 per FEHBP user. These figures reflect the actuarially estimated costs of coverage of AI/AN patients under a typical FEHBP structure.[11] The benefits funded by appropriations to the Indian Health Service are very low relative to those offered to Federal employees through the FEHBP and clearly under-fund the care of the health care needs of the AI/AN population.

As this discussion indicates, in many health care areas, and most certainly in the area of injury control and care, the needs are far greater than in the general population and the demand for care and resulting costs are higher. In 2001 the per capita expenditure for health care for the United States was $5,035.[12] IHS personal health care expenditure for the same year was only about 27.5% of that of the general population. With a fixed budget for health care from the Indian Health Services Direct and Contract Care services and services provided under contract and contract by Tribal Health Authorities, greater demand for injury related care means that other areas of health care delivery must be

[11] Indian Health Service, FEHBP Disparity Index: Key Findings for FY 2001, Indian Health Service, USDHHS, 2001. www.ihs.gov/nonmedicalprograms/lnf/arc2002.htm, March 28, 2003.
[12] Heffler, S., S. Smith, et al, Health Spending Projects for 2001-2011: The Latest Outlook, Health Affairs, 21(2): 207-218, 2002.

affected. As noted above the opportunity costs are very high in treating preventable injuries in AN/AI communities. The constraints on health care resources provided to Native Americans clearly indicate the need for programs and services aimed at preventing the occurrence of illness. Injury prevention is a well defined area that has shown great improvement and holds great promise for modifying the incidence and prevalence of injuries and actual reduction in the cost of care for these conditions.

The Indian Health Service collects injury cost data only for Contract Care Services. These seriously underestimate the cost of care. First, both utilization and cost data are incomplete. Many contract care facilities and providers do not capture and report injury data through the use of Trauma Registry E codes. Second, estimates are based upon charge data reported through fiscal intermediaries. Charges are based upon negotiated rates and do not accurately capture either the cost of care or the cost of injury related services relative to other services. Although these reported contract care costs are underestimates, they help present a lower boundary or floor for injury cost estimates.

Table 3 shows the IHS Contract Health Services Expenses for injuries and poisonings for the period 1994-1997, the average annual cost, cost per inpatient case, outpatient costs and estimated costs for 2001 and 2002. The 2001 and 2002 estimates were made by applying the Medical Care Component of the Consumer Price Index Price changes from 1997 through 2002 to the IHS cost estimates for 1994-1997.[13] IHS reports that 17% of all contract care expenses for inpatient care and 16% for outpatient care were for care of injuries and poisonings over this period. Even if substantially understated, these statistics illustrate the very large burden injuries place on scarce health care

[13] Centers for Medicare and Medicaid Services, Health Indicators: Medical Care Prices, USDHHS, www.cms.hhs.gov/statistics/health-indicators/analysispart2.asp, March 23, 2003.

resources. The average annual Contract Health Service expenditure for care of injuries and poisonings over this period was $42,608,515. The per case estimates refer to average costs per injured individual.[14]

Table 3: IHS Contract Health Services Average Annual Expenses, Injuries and Poisonings: 1994-1997 and Estimated 2001 and 2002

Category	Average Annual Expense	Average Annual Expense per Case
Inpatient (94-97)	$32,243,508	$11,305
Outpatient (94-97)	10,365,007	570
Total (94-97)	42,608,515	
Inpatient (2001)	38,885,671	13,634
Outpatient (2001)	12,500,198	687
Total (2001)	51,385,869	
Inpatient (2002)	41,063,269	14,378
Outpatient (2002)	13,200,209	752
Total (2002)	54,263,478	

iii

Contract care funds account for about 23% of IHS personal health care benefit expenditures. So these contract care estimates may represent a relatively small proportion of the total costs of injuries, although it is likely that a fairly large proportion of more complex and expensive cases may be treated under contract care at regional referral facilities by trauma care and other specialists. Total costs include expenditure for direct IHS care and care delivered by Tribal Health care systems financed through compacting and contracting instruments.

[14] Paisano, E. and Program Statistics Team, Indian Health Focus: Injuries, 1998-1999, USDHHS, 2000.(Table 46, Chart 47 and Table 47:74-75).

These are very conservative estimates for 2001 and 2002 Contract Care in that they are based only upon changes in the Medical Expense Component of the Consumer Price Index (5.24% per year 1998-2002) and include only price changes and no changes in utilization of services. Over the same period expenditures for health services increased nearly 6.9%. Figures from the Milliman USA Health Cost Index, Kaiser/HRET Survey of Employer-Based Health Plans for 1999-2002 and the KPMG Survey for 1991-1998 shows that increases in per capita health care expenditure over this period to be about 8.46% and health care premium increases were 7.94% and 8.52% for large firms and all firms respectively. In any case, the estimates presented here are quite conservative and underestimate actual expenditures for the care of injuries for AI/AN.

The cost of injury is driven by price and volume. Utilization data for this analysis is derived from IHS work load data and cost estimates are drawn from a number of sources. This highlights a substantial problem in estimating and analyzing costs. There is no single source of good cost of injury data either for the AI/AN population or the general population. Data must be collected or synthesized from a number of different private and public sources. These include: national health expenditure data, third party payers including Medicare, Medicaid, CHAMPUS and private health insurance and managed care companies. This raises difficult problems of data comparability and compatibility; adjustment for different time periods; estimation of costs from charge data and the nearly complete absence of cost data for the care of Native Americans. The problem of making reliable estimates would be even greater if the volume of Indian and Alaska Native injuries were not so large. This volume of injuries gives more confidence

in the estimates of cost but also generates a real understanding of the burden these costs have upon AI/AN communities.

The analysis of total direct and indirect costs is driven by the rates of fatal and non-fatal injury, medical care (inpatient and outpatient) utilization, costs of ambulatory and inpatient care, systems costs in dealing with injuries (insurance, administration etc.), foregone productivity and income of both injury victims and those who care for them (family and community). Table 4 shows the age-adjusted mortality rates for major categories of injuries for Native Americans and for the general population. It is not belaboring the point to observe the disparities in rates for Total Injuries, Unintentional Injuries and Motor Vehicle Injuries. These categories illustrate the differential impact that fatal injuries have on Native American communities.

However, fatalities, although extremely important and because of the impact of premature death on lifetime productivity comprise a huge component of the total economic cost injury, are only one aspect of the injury burden borne by Native Americans. Non-fatal injuries are an additional burden. Tables 5 and 6 illustrate the overall rates of non-fatal injury by categories for the general United States population and the medical care utilization rates for use of Indian Health Service, Tribal and Contract health facilities and services. These serve as baseline figures for further comparisons of injury rate differences and similarities between the AI/AN and general population. The differences in incidence, prevalence and burden is, n many cases dramatic.

Table 4: Native American (N.A.) and U.S. Injury Death Rates
Per 100,000 Population, 2000

Injury	Number (N.A.)	N.A. Rate	U.S. Rate
All Injuries	1903	82.02	53.69
Unintentional	1353	59.74	35.47
Motor Vehicle	779	32.29	15.71
Suicide	297	11.98	10.64
Firearms	240	9.60	10.38
Homicide and Intervention	207	8.31	6.19
Poisonings	192	8.16	7.33
Falls	87	4.99	5.08
Drowning	80	3.13	1.47
Fires	42	1.72	1.42

iv

These statistics may seriously under-report both inpatient and ambulatory health service utilization because of non-uniform e-code reporting of serious injuries across states and incomplete capture of utilization data from non-Indian Health Service facilities. This is especially the case when third party payers (private insurance, Medicare, Medicaid) rather than IHS finance care. For example, it was estimated in 1998 in the State of Washington, that only 24% of AI/AN hospital discharges were captured by the IHS Hospital Discharge System.[15] This situation makes the estimation of utilization alone very difficult and of costs even more difficult since the IHS collects cost data only for Contract Care and even those costs are incomplete. Therefore, injury costs for AI/AN must be estimated from a number of different sources. Good data on motor vehicle accidents is available from studies commissioned by the National Highway Traffic Safety

[15] Quinlan, K., L. Wallace, et al, Motor Vehicle Related Injuries Among American Indian and Alaskan Native Youth, 1981-92: Analysis of a National Hospital Discharge Database, Injury Prevention, 4:276-279, 1998. pg. 278.

Administration. These studies provide a good foundation for the estimation of the economic impact of injury beyond motor vehicle crashes. Data presented on the costs of injury by level of severity, by fatalities and category of expenditure are particularly useful. Estimates of indirect costs and the marginal (incremental) costs of alcohol related accidents and injuries are also highly relevant and valuable to the discussion the burden injuries have on AI/AN communites.[16]

Table 5: Age-Adjusted Non-Fatal Injury Rates, U.S.
Per 100,000 Population, 2000

Category	Rate/100,000
All Injuries	10,728.23
Motor Vehicles	1218.47
Falls	2,712.16
Fires and Burns	201.28
Poisonings	183.99
Gunshot	27.35
Drowning/Near Drowning	2.80

v

Estimates of hospital and ambulatory utilization and costs were also made from the use of data from The National Safety Council, the National Health Care Expenditure Survey, the Centers for Medicare and Medicaid services, and the American Hospital Association's *Hospital Statistics* 2002 survey.

[16] U.S. Census Bureau, GCT-PH1. Population, Housing Units Area and Density:2000. United States-American Indian and Alaska Native Area and Native Regional Corporation and;U.S. Census Bureau, DP-1. Profile of General Demographic Characteristics: 2000.

There is a clear need for a comprehensive study of the economic impact of all categories of injury on Native Americans. Both national and regional estimates of cost are severely compromised by the absence of cost data and by incomplete data on injury.

Table 6: Native American Medical Care Utilization
Hospital and Ambulatory Care, IHS Direct, Tribal and Contract Care
1997

Total Inpatient Injury and Poisoning Related Discharges	7,358
Injury Related Ambulatory "Clinical Impressions"	353,398

vi

A number of studies of individual injury categories have estimated the impact of Traumatic Brain Injury, Gunshot wounds, drowning, homicide, suicide, family violence, assault, residential fires, motor vehicle accidents and alcohol on specific age and sex segments of the AI/AN population. These studies help frame the discussion and specification of the model to estimate the total societal cost of injury. As noted above, the Human Capital model estimates direct and indirect costs and life years foregone. It is an incidence-based model that generates estimates of lifetime costs. Total annual costs are estimated by injury incidence multiplied by per capita injury costs. The estimates are broad and based upon large database national incidence and cost data measured against estimates derived from smaller local, state and regional studies. Again, estimates of the

economic cost of injuries are likely to be serious underestimates partially because the most comprehensive data on AI/NA injury is derived from care provided on Reservations while less than 25% actually live on Reservations at any one time.[17] This, in addition to the factors noted in the discussion above, make accurate estimation of costs difficult. Nonetheless, the numbers generated are impressive and indicate that the cost burden of injuries on AI/AN communities is enormous. The costs estimates presented below, especially the direct medical costs should be compared with the health services resources currently available for the care of AI/AN patients through IHS ($1,384 per Indian Health Service user in 2001 with Medicare, Medicaid and private insurance providing as estimated additional $895 per user). Injury costs loom very large in the health care budget for Native Americans.

Table 7 presents the estimated total direct medical care costs of hospitalizations and ambulatory care provided by IHS, Tribal and Contract care facilities and providers in 2001. These are the cost per case figures reported for Contract Health Services from 1994-1997 adjusted for changes in the Medical Expense Component of the Consumer Price Index to reflect the 2001 price level. They are based on the 1997 Utilization figures reported in Table 6. The total direct Inpatient cost of $102,033,386, $247,025,202 Ambulatory care cost and Total cost of $349,058,588 are about 18.37% of the total $1.9 Billion, IHS personal health care benefit expenditure for 2001. These estimates are very conservative and are comparable to the Contract Health Services percentages reported by IHS for 1994-1997. They also reflect lower hospital utilization rates for Native American

[17] U.S. Census Bureau, GCT-PH1. Population, Housing Units Area and Density:2000. United States-American Indian and Alaska Native Area and Native Regional Corporation and;U.S. Census Bureau, DP-1. Profile of General Demographic Characteristics: 2000.

populations relative to the general population (about 46% lower) and relatively greater emphasis and resultant ambulatory care use. It also reflects the lower supply of hospital and specialist services available to AI/AN populations and the relatively lower levels of health care financing for services.[18]

The $349,058,588 represents a per capita expenditure for 2001 "IHS Indian Registrants" of about $165 and $259 per "Indian User". These aggregate estimates indicate that injuries appear to account for approximately 18-20% of direct medical care costs for Native Americans. Direct medical care costs are only one component of total injury costs.[19]

Table 7: Estimated Total Native American Injury Related Hospital Inpatient and Ambulatory Care Costs, 2001

Category	Discharges/ Visits	Total Cost	Cost per Case
Inpatient	7,358 Discharges	$102,033,386	$13,867
Ambulatory	353,398 Visits	$247,025,202	$699

vii

These aggregate estimates offer a useful foundation for constructing more precise and comprehensive estimates of the total societal costs of AI/NA injuries. Table 8

[18] Paisano, E., and Program Statistics Team, Indian Health Focus: Injuries, 1998-1999, USDHHS, 2000. (Table 46, Chart 47 and Table 47:74-75).
[19] Paisano, E. and Program Statistics Team, Trends in Indian Health, Indian Health Service, USDHHS, 2000.(Table 5.17, pg 198).

presents estimates of the total societal costs accruing to AI/AN injuries. The estimates are partially derived from methodologies used for the National Safety Council's estimates of the costs of unintentional injuries and a major study of the Economic Impact of Motor Vehicle crashes commissioned by the National Highway Traffic Safety Administration. The study of motor crashes estimates that the total annual National per capita societal fatal and non-fatal costs of motor vehicle crashes alone is approximately $519.[20] This would mean that the total societal cost to Native Americans for this source of injury would be in the range of $1.09 billion to $2.13 billion depending on the definition of "Native American".[21] The motor vehicle injury cost estimate calculated in Table 8 of nearly $1 billion ($978,731,779) indicates the estimates are comparable to previous studies of injury costs. Motor vehicle fatalities are the major driver of total lifetime costs of injury. Over forty-one percent (41.5% in 2000) of Years of Potential Life Lost (YPLL) for AI/AN under age 70 are due to premature death due to motor vehicle injuries. This disproportionately impacts foregone wage and productivity categories in the calculation of the lifetime costs of injury.

The estimates in Table 8 illustrate the lifetime impact of fatal and non-fatal injuries in several injury categories for injuries occurring in 2000. They are based on injury incidence rates and reflect both direct and indirect costs. They estimate the total societal cost burden of injuries to AI/AN including annual medical care and rehabilitation costs, lost wages and productivity for victims and care-givers and administrative costs

[20] Blinco, L., Seay, A., et al, The Economic Impact of Motor Vehicle Crashes-2000, NTSA, U.S.DOT, May, 2002. (pg. 1)

[21] $519 multiplied by 2,113,739 FY 2001"Indian Registrants"=$1,097,030,541 and by 4,119,301 who in the 2000 Census identified themselves as "Native American or Alaska Native alone or with one or more other races"= $2,137,917,219.

that include insurance, legal, workplace training and retraining and other costs accruing to worker injuries.

Table 8: Lifetime Costs of Native American Injuries
2000

Injury\Costs	Medical	Prod. Loss	Admin. Cost	Total Costs
All Injuries	$488,740,237	1,476,914,652	211,232,401	2,176,887,290
Motor Vehicles	285,364,738	610,358,223	83,008,718	978,731,779
Firearms	23,449,910	156,616,557	22,239,551	202,306,018
Homicides	16,330,674	94,487,674	18,728,300	129,546,648
Falls	30,151,146	89,310,268	15,864,475	135,325,886
Poisonings	10,574,659	88,015,916	12,816,774	111,407,349
Drowning	11,757,301	67,306,289	10,499,645	89,563,235
Fires	19,390,001	29,770,089	6,980,773	56,140,863
Suicide	18,730,168	155,509,692	20,139,053	194,456,120
Other	95,073,639	243,020,529	34,410,791	372,505,013

viii

These are Incidence Based Human Capital Model estimates of the Lifetime Cost of Injuries. That is for the year 2000 the stream of costs stemming from AI/AN injuries was over $2.176 Billion. These estimates give a depiction of both the immediate impact of injuries (Direct Medical and Administrative Costs) and the long-term continuing effects (Lost Productivity and wages from the victim and care-givers). Note that the figures in Table 8 carry considerable duplication because the categories include both injuries and methods of injury (i.e. Firearms and use of firearms in Homicides and Suicides). The figures have been adjusted to include an “Other” category that reports unduplicated data. This category reports injury costs not otherwise captured. These include unintentional pedestrian, suffocation, natural/environmental/other, land

transportation and unspecified injuries. Therefore, the costs are summed horizontally but not vertically and are accurate for each category.

The impact on the use of scarce health care resources and the long-term economic development of AI/AN communities is enormous. These estimates were derived from earlier studies of injury incidence and costs. Incidence data was updated through use of the CDC's WISGARS (Web-based Injury Statistics Query and Reporting System) system. Costs were updated with data from the Medical Care Component of the Consumer Price Index; American Hospital Association's *Hospital Statistics 2002* and National Health Expenditure Data.

These figures are striking and to a degree difficult to comprehend. The direct medical care costs of $488,740,237 are nearly $140 million more than those derived from Indian Health Service Contract Care data. This reflects under-reporting and the lack of cost or charge data within IHS's reporting systems. It also reflects the costs of injuries to Native Americans that are treated outside of the IHS and paid by other third party payers, directly out-of-pocket or written off as uncompensated or charity care. The data in Table 8 also illustrates the enormous long term effect injuries have on the earning and productivity capacities of AI/AN communities. It is important to understand that these are long-term streams of foregone income and production. Incomes are reduced over a very long period by premature death and disability. They stem directly from annual injury incidence rates. Therefore, each year, we can expect an additional $2 Billion or more to be, effectively, withdrawn from health care and economic development resources that would have been available if the injuries had not occurred. These are very real economic or opportunity costs. The policy implications are clear. A great deal more effort and real

resources should be placed on the prevention of injury in AI/AN Communities. The overall per capita economic burden of injuries on Native Americans (AI/AN) in 2000 was $1,300. Again, this is a recurring annual burden that draws resources away from productive use. In addition, the distribution of costs point to the areas of intervention offering the greatest impact and cost-effectiveness. Motor vehicle related injuries and mortality; firearms, suicide, and homicide (highly related to firearms) are obvious areas of concern and potential intervention.

The involvement of substance abuse, especially alcohol, in the incidence of nearly all categories of injury, on the severity of the injury and on resultant mortality is a great area of concern that needs greater explicit attention. For example, the NHTSA study (noted above) of the costs of motor vehicle crashes estimated that for the general population 40% of all traffic fatalities are alcohol related and 32% were legally intoxicated. The ratio of alcohol related motor vehicle fatalities for AI/AN to those of the general population is nearly three times that of the general U.S. population.[22] Similar patterns exist for nearly all injury categories. This is another clear channel for intervention that has the potential to have a great impact upon injury rates and costs for AI/AN communities. A 1997 University of Washington study found that although the risk for traffic accidents for AI/NA was roughly equal to that of the general population, the risk of having a fatal accident was nearly twice as high. This was due to much lower

[22] Blinco, L., Seay, A., et al, The Economic Impact of Motor Vehicle Crashes-2000, NTSA, U.S.DOT, May, 2002; Elder, R. and R. Shults, Involvement by Young Drivers in Fatal Alcohol-Related Motor-Vehicle Crashes-United States, 1982-2001, MMWR, 51(48):1089-1091, 2002; Grossman, D., J. Sugarman, et al, Motor Vehicle Crash Injury Risk Factors Among American Indians, Accid Ana Prev, 29(3):313-319, 1997; Mayrose, J. and D. Jehle, An Analysis of Race and Demographic Factors Among Motor Vehicle Fatalities, J Trauma, 52(4):752-755, 2002; May, P., The Epidemiology of Alcohol Abuse Among American Indians: The Mythical and Real Properties, American Indian Culture and Research Journal, 18(2):121-143, 1994.

use of seat belts and much higher rates of alcohol involvement and impairment. There is enough data available to design and apply highly effective interventions. However, adequate resources need to be allocated for this purpose and careful, continuous evaluation of effectiveness needs to be built into any intervention or system.

Even though these costs are huge, they do not capture the entire cost picture. As notes above, the cost of pain and suffering and mental health (Post Traumatic Stress Disorder and Depression). These need to be evaluated in Contingent Valuation studies of Quality of Life. In addition, many categories of injury are only now being recognized as major contributors to overall costs. For example a recent study of intimate partner violence against women in the United States estimated total annual costs of $5.8 Billion.[23] Since many AI/AN communities are differentially impacted by injuries from domestic violence, this is another important category of injury related cost that has gone largely unevaluated.[24] An accurate appraisal of all costs needs to be made in order to gain a real understanding of the economic impact of injuries on American Indians and Alaska Natives.

Although these costs may be substantial underestimates, they represent huge losses to AI/AN communities. Their impact on the very limited health resources available to is enormous, especially when compared with the funding that has been provided to IHS for injury prevention and control. Table 9 shows the funding of Indian Health Service's injury prevention programs from 1991 through 2001. Funding patterns over this

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[23] Arias, I., R. Bardwell, E. Finkelstein, J. Golding, S. Leadbetter, W. Max, H. Pinderhughes, D. Rice, L. Saltzman, K. Tate, N. Thoennes and P. Tjaden, Cost of Intimate Partner Violence Against Women in the United States, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, USDHHS, March, 2003.

[24] DeBruyn, L., B. Wilkins, et al., Violence and Violence Prevention, IHS Provider, 22(4):58-60, 1997.

period were both modest and erratic. The table reports all sources of funding for all purposes including infrastructure development and prevention services. Congressional Appropriations were very uneven over the years. This pattern of funding has made planning, implementation; and operation of programs extremely difficult. In many cases continuing the operation of even the most successful programs has been problematic and in some cases impossible.

Table 9: Indian Health Service Injury Prevention Funding

Year	OEHE Funds*	IHS Director's Initiative	Congressional Appropriations	Total
1991	$175,000.	0	0	$175,000.
1992	$350,000.	0	0	$350,000.
1993	$150,000.	0	$1,456,000.	$1,606,000.
1994	$70,000.	0	$500,000.	$570,000.
1995	$115,700.	0	$500,000.	$615,700.
1996	$161,500.	0	$500,000.	$661,500.
1997	$110,500.	0	0	$110.500.
1998	$116,000.	$304,000.	0	$420,000.
1999	$174,100.	$304,000.	0	$478,100.
2000	$175,000.	$304,000.	$1,475,000.	$1,954,000.
2001	$69,000.	$304,000.	0	$373,000.
Total	$1,666,800.	$1,216,000.	$4,431,000.	$6,620,800.

[ix]

These funding levels for injury prevention have been clearly inadequate relative to the problem. The entire $6,620,800 spent on injury prevention over this ten year period is about 1.4% of just the Medical Costs of injuries for only one year (2000). Compared to Total Costs the difference, at 3/10ths of a percent (.00304) is even more dramatic. The annual cost vs. annual prevention funding comparisons are still more dramatic. Using the ten year average funding figure of $662,080, injury prevention spending was about 1/10th of 1% of injury related medical costs and 3/100th of 1% of Total Costs. Prevention

expenditures are clearly miniscule compared with the costs of treatment and with Total Societal Costs. Average Per capita injury prevention expenditures for Indian Health Service Registrants were only about thirty-one cents ($.31), while per capita Medical costs and Total Costs were approximately $231 and $1,030 respectively.

Recommendations

This review and synthesis of data on the economic effects of injury on Native Americans indicates a large excess burden on AI/AN communities resulting from excessively high injury rates. The costs accruing to injury are serious diversions of resources from other more productive uses. The loss of "human capital" as measured in lost income and productivity is staggering. Health care resources that could be devoted to prevention, management, treatment and rehabilitation are disproportionately devoted to care, rehabilitation and maintenance of the injured. This makes management of health care delivery for the entire AI/AN population more difficult and fragmented. The following recommendations are derived from the study findings. They are offered in the hope of broadening the discussion of the problems of injury prevention and reduction and to help provide direction for the generation of highly effective and cost-effective preventive interventions.

1) The cost and incidence data required to calculate stable, reliable estimates of the economic cost of injuries to Native Americans does not currently exist. A long-term (five-year) study of injury costs should be performed. Program planning without good information makes the creation of effective interventions exceedingly difficult.

Precise cost estimates should be made for each injury category for each age and sex group in each community and tribe. This can only be done with a rigorously designed and performed study that accurately presents a representative picture of injuries across the country. The collection of medical care and other direct costs should be supplemented with interview and follow-up studies of injury patients, family members, formal and informal caregivers and health care and social support personnel.

2) The resources (monetary, personnel, equipment, facilities) spent on the treatment of injuries is enormous. Most injuries are preventable. The disparity between the resources devoted to treatment of injuries and their consequences and those resources spent on Prevention of injuries is startling. Much more attention and more resources need to be devoted to injury prevention and the conditions that foster high injury rates in AI/AN communities. Prevention needs to be a much higher priority in the Indian Health Service's planning and budgeting. This must be made explicit by explicitly earmarked funds for injury prevention.

3) It is clearly possible to make substantial improvement in AI/AN injury rates. Injury death rates fell 53% from 1972-74 to 1994-96 and there is evidence that this trend has continued for many age groups. However, the figures cited above show injury rates and particularly fatal injury rates remain dramatically above those of the general population. It appears that many prevention programs can have a significant impact on specific injury categories. Key elements of success are: 1) Direct, active involvement by individual communities in the identification of problems, and in the planning, implementation, operation and evaluation of interventions; 2) Community development of tribal and or/culturally specific and sensitive interventions and 3) allocation of

adequate financial, technical and personnel resources to insure the immediate impact and continuing application and follow-up of each intervention.

Many proven interventions are low-cost, highly cost effective solutions. But enforcement and monitoring are crucial and require funding of personnel for these purposes. They must be applied continuously over an extended period in order to become part of a routine and then regulations and laws must be rigorously applied and enforced. Experience with seat belt use enforcement and child car seat programs indicate the continuing need for monitoring and enforcement after initiation of a program.

Many motor vehicle highway traffic safety programs have been shown to be effective. These include: 1) Seat belt (occupant restraint) campaigns and enforcement of seat belt laws; 2) Child car seat low cost purchase or loan programs reinforced with monitoring, educational campaigns and rigorous enforcement; 3) Community campaigns to reduce the serving of intoxicated and near intoxicated patrons; 4) Community sobriety checkpoint programs that are monitored and evaluated for effectiveness in removing DUIs from the highway; 5) Identification, analysis and engineering modification of problem road areas and proposed road safety measures; 6) greatly improved and expanded jurisdictional data, information and record sharing is needed. The problems are cross jurisdiction and involve many independent sources of data and enforcement; 7) Motorcycle helmets need to be mandatory and enforcement must be rigorous and continuous.

Successful and highly effective traffic safety programs have been demonstrated and are currently in operation. These need to be greatly expanded and extended to additional areas and communities. Community involvement is critical.

Other areas of greatly elevated incidence and mortality (homicide, suicide, firearm violence, drowning and residential fires) also have generated programs shown to be effective. However, these rates are markedly different in different areas of the country and different communities.

Community Suicide Prevention Centers and Networks; Family Violence Prevention Centers and Program Coordinators have been relatively effective and provide immediate and continuing support. Smoke detector and child fire education programs have also been shown to be effective in very limited applications in several areas.

Firearms present a unique and difficult problem because they are so heavily involved in successful suicide completion, homicide and unintentional serious injury. Elevation of firearm injuries and violence as a community issue has been a goal of several communities. The issue does need to be widely discussed and debated in the community with the goal of reduced accessibility to firearms, especially by the young, clearly articulated.

It is clear that highly effective and cost-effective interventions are available. These can greatly reduce injury rates and fatalities from injuries. But, resources for these interventions must be appropriated and allocated for these purposes. This is unlikely to occur without good information on both costs and effectiveness on interventions. Accurate assessment of direct and social costs of intervention and not intervening must be made. In order for this to happen great improvement in injury reporting and costing must be made. Problems with comprehensive, accurate data generation are endemic in the health services system. The problem is by no means unique to Native American data generation and reporting. There need to be uniform utilization and cost reporting systems.

These systems should require uniform hospital, emergency and outpatient department E coding. This data should be required for all IHS Direct, Tribal operated, Contract Care facilities and providers. Payment should be linked to complete reporting and submission of comprehensive data. The Electronic submission requirements for billing and reporting compliance under the Health Insurance Portability and Accountability Act (HIPAA) offer an opportunity to move all facilities and providers to uniform billing and reporting of both charges and procedures, including E coding.

4) It is obvious that the funding of health services for Native Americans is inadequate by any standard. This situation needs to be addressed and disparities closed and eventually eliminated. Since this is unlikely to occur in the near future because of competing demands and a sluggish economy it is crucial that injury prevention programs and services be encouraged and adequately financed. There is simply no other way to make progress on the elimination of injury induced health disparities. This cannot be accomplished with increased medical treatment. The losses of productive members of Native American communities are making it extremely difficult for economic progress to take place and be sustained. As this discussion starkly illustrates, the costs of inaction are extremely high and the results unacceptable.

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[i] **Table 1:** National Center for Injury Prevention and Control, Injury Mortality, 1999-2000, Web-Based Injury Statistics Query and Reporting System (WISGARS) www.cdc.gov/ncipc/wisgars, 4/12/03.

[ii] **Table 2:** National Center for Injury Prevention and Control, Years of Potential Life-Lost (YPLL) Reports:1999-2000, Web-Based Injury Statistics Query and Reporting System (WISGARS) www.cdc.gov/ncipc/wisgars, 4/12/03.

[iii] **Table 3:** Paisano, E. and Program Statistics Team, Indian Health Focus: Injuries, 1998-1999, USDHHS, 2000

[iv] **Table 4:** National Center for Injury Prevention and Control, Injury Mortality, 1999-2000, Web-Based Injury Statistics Query and Reporting System (WISGARS) www.cdc.gov/ncipc/wisgars, 4/12/03.

[v] **Table 5:** National Center for Injury Prevention and Control, Unintentional Injuries: 2000, Web-Based Injury Statistics Query and Reporting System (WISGARS) www.cdc.gov/ncipc/wisgars, 4/12/03.

[vi] **Table 6:** Paisano, E. and Program Statistics Team, Indian Health Focus: Injuries, 1998-1999, USDHHS, 2000.

[vii] **Table 7:** Paisano, E. and Program Statistics Team, Indian Health Focus: Injuries, 1998-1999, USDHHS, 2000; Centers for Medicare and Medicaid Services, Health Indicators: Medical Care Prices, USDHHS, www.cms.hhs.gov/statistics/health-indicators/analysispart2.asp, March 23, 2003.

[viii] **Table 8:** Bishop, C., D. Gilden, J. Blom, et al, Medicare Spending for Injured Elders: Are there Opportunities for Saving? *Health Affairs*, 21(6):215-223, 2002; Blinco, L., Seay, A., et al, The Economic Impact of Motor Vehicle Crashes-2000, NTSA, U.S.DOT, May, 2002; Cook, P., B. Lawrence, et al, The Medical Costs of Gunshot Injuries in the United States, JAMA, 282(5):447-54, 1999; Hall, M. and C. DeFrances, 2001 National Hospital Discharge Survey, Advance Data: No. 332, CDC, April 9, 2003; Malloy, B., Characteristics of Fire Loss in a Group of Native American Homes: Recommendations for Loss Reduction, Indian Health Service, USDHHS, 1989; National Foundation for the Brain, The Cost of Traumatic Brain Injury in the U.S., Therapies Unlimited Foundation Inc., Harrisburg, PA, 2001; National Institute on Drug Abuse, The Economic Cost of Alcohol and Drug Abuse in the United States, 1992, www.nida.nih.gov/EconomicCosts, 4/29/03; Paisano, E. and Program Statistics Team, Indian Health Focus: Injuries, 1998-1999, USDHHS, 2000;

[ix] **Table 9:**Personal communication with Kelly M. Taylor, Director, Division of Environmental Services, Office of Environmental Health and Engineering, Indian Health Service, 6/13/2003
Office of Environmental Health and Engineering (OEHE) funds cover reimbursements for the IHS Fellowship, Injury Prevention personal services contracts, and Injury Prevention course instructor travel for national courses.

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