

# METHODS

## Suicide Prevention Resource Center Suicide Prevention Fact Sheets

- States: Alabama, Arkansas, Delaware, District of Columbia, Georgia, Hawaii, Iowa, Indiana, Kansas, Kentucky, Louisiana, Maryland, Michigan, Minnesota, Mississippi, North Carolina, North Dakota, Nebraska, New Jersey, Ohio, Pennsylvania, Rhode Island, South Carolina, South Dakota, Vermont, Washington, and United States

### Injury Types and Definitions

Suicides and non-fatal self-inflicted injuries were defined by the International Classification of Diseases, 10<sup>th</sup> Revision (ICD-10) and 9<sup>th</sup> Revision, Clinical Modification (ICD-9-CM) classification schemes for self-inflicted injuries. Self-inflicted external cause groupings are based on the CDC recommended framework for presenting mortality and morbidity data. The ICD-9-CM codes used for non-fatal cases are presented in Table 1 and the ICD-10 codes used to define fatal cases are presented in Table 2. Since two different versions of the ICD classification system were used to define the fatal and non-fatal self-inflicted cases presented in each fact sheet's primary data table, **direct comparisons between fatal and nonfatal estimates should not be made.**

**Table 1. International Classification of Diseases, 9<sup>th</sup> Revision, Clinical Modification (ICD-9-CM), External Cause of Injury Codes Used for Categorizing Mechanism or Cause of Non-Fatal Self-Inflicted Injury**

Mechanism/Cause of Self-Inflicted Injury	ICD-9-CM External Cause of Injury Codes
Cut/pierce	E956
Firearm	E955.0-.4,.6
Poisoning	E950.0-E952.9
Suffocation	E953.0-.9
Other (includes drowning, fall, fire/burn, environmental, motor vehicle/transport, other, not elsewhere classified)/ Unspecified	E954 E955.5,.7,.9 E957.0-.9 E958.0-.9 E959
All injury	E950-E959

**Table 2. International Classification of Diseases, 10<sup>th</sup> Revision (ICD-10), Codes Used for Categorizing Mechanism or Cause of Suicide**

<b>Mechanism/Cause of Self-Inflicted Injury</b>	<b>ICD-10 External Cause of Injury Codes</b>
<b>Cut/pierce</b>	X78
<b>Firearm</b>	X72-X74
<b>Poisoning</b>	X60-X69
<b>Suffocation</b>	X70
<b>Other (includes drowning, fall, fire/burn, environmental, motor vehicle/transport, other, not elsewhere classified)/ Unspecified</b>	X71, X75-X77, X79-X84, U03.0, Y87.0, U03.9
<b>All injury</b>	X60-X84, Y87.0, U03.0, U03.9

## **Suicides**

National Center for Health Statistics (NCHS) mortality data for 2000-2004 were used to determine the average annual suicide counts (N in table) and rate by state, gender, age, method, and race/ethnicity. Average annual suicide counts were rounded to the nearest whole number. Percent totals may not add to 100 percent due to rounding. Population estimates from the Web-based Injury Statistics Query and Reporting System (WISQARS™) were used to compute crude death rates per 100,000 population for ages 5 and up for the years 2000-2004. Data presented on the leading cause of death and of injury death were obtained from WISQARS™ Leading Causes of Death Reports (available on the National Center for Injury Prevention and Control's website).

Race and ethnicity data regarding suicide were based on injury death data obtained from WISQARS™. Rate and incidence data for Hispanics, White Non-Hispanics, and Black Non-Hispanics were based on data as described in WISQARS™. Calculations for rates among "Other Non-Hispanics," however, were based on all remaining incidence of suicide and the associated population, including cases where race and Hispanic origin were not coded. These incidence and rates may exceed rates solely based on Asian/Pacific Islander and American Indian/Alaska Native ethnic categories.

## **Non-Fatal Self-Inflicted Hospital-Admitted Injuries / Attempted Suicides**

When available, state hospital discharge data were used to determine the number and the rate of attempted suicides (non-fatal hospital-admitted suicide attempts and other self-inflicted injuries) by state, gender, age, method, and race/ethnicity. When recent state data were not available, we provided estimates for the number of hospital-admitted suicide attempts and self-inflicted injuries. Annual counts and rates for hospitalized attempts are presented on the right side of the primary table in each fact sheet. Population estimates used to compute crude death and hospitalization rates per 100,000 population for ages 5 and up for the years 2003-2004 were obtained from WISQARS™.

## Hospital Discharge Data

### Nationwide Hospital Discharge Data

Data regarding nationwide hospitalization for suicide attempts and self-inflicted injuries were obtained from the 2004 Nationwide Inpatient Sample (NIS) file which is part of the Healthcare Cost and Utilization Project (HCUP; Agency for Healthcare Research and Quality, Rockville, MD, 2006). Counts of hospitalizations for self-inflicted injury were based on the E codes listed in Table 1.

### State Hospital Discharge Data

**Hospitalizations for Arkansas, Kansas, Kentucky, Minnesota, North Carolina, Pennsylvania, and Vermont:** Data regarding hospitalized suicide attempts in 2004 were directly provided by health departments or research centers from these states.

**Hospitalizations for Georgia, Hawaii, Iowa, Indiana, Maryland, Michigan, Nebraska, New Jersey, Ohio, Rhode Island, South Carolina, South Dakota, and Washington:** For these states, data regarding hospitalization for suicide attempts were obtained from the 2003 State Inpatient Database (SID), which is part of the Healthcare Cost and Utilization Project (HCUP; Agency for Healthcare Research and Quality, Rockville, MD, 2006). HCUP is a family of healthcare databases and related software tools and products developed through a Federal-State-Industry partnership and sponsored by the Agency for Healthcare Research and Quality (AHRQ). HCUP includes hospitalization data from 38 states for data year 2003.

Race and ethnicity data regarding suicide attempt hospitalizations were based on State Inpatient Data (SID) files. Race and ethnicity data were not included in the fact sheet when state's SID data either did not code race, or when race data were missing for many cases. We used states where race was coded in greater than 50% of reported hospitalizations; we do not report percentages of cases where race was not coded, therefore the sum of reported percentages across races might not total 100%.

### Estimated State Hospital-Admitted Attempted Suicides

State hospital discharge data were not available for several states at the time the fact sheets were created. Consequently, we used two methods to estimate state counts of hospital-admitted suicides, contingent upon the nature of data available. Hospitalizations for suicide attempts were estimated for the following states: Alabama, Delaware, District of Columbia, Louisiana, Mississippi, and North Dakota.

**Estimated Hospitalizations for District of Columbia:** Data regarding hospitalizations in the District of Columbia in years 2000-2002 were available. We based our estimation of hospitalization in the year 2004 on the ratio of suicide attempt hospitalizations to suicide mortality in years 2000-2002. Ratios across age, gender, and mechanism for years 2000-2002 were applied to mortality incidence across age, gender, and mechanism for year 2004. Hence, the ratios provided a mechanism to estimate hospitalization for suicide attempt in District of Columbia for year 2004.

**Estimated Hospitalizations for Alabama, Delaware, Louisiana, Mississippi, and North Dakota:** Recent hospital discharge data were not available for these states. The

number and rate of attempted suicides were estimated based on the number of completed suicides and the number of hospitalizations in states with similar characteristics. Our selection of similar states was based primarily on overall hospitalization admission and E-coding rates, and secondarily on urbanicity and geographic proximity.

Based on the criteria described above, states with HCUP-SID data were matched with states that did not have available data and, subsequently, used to develop ratios of completed suicides to hospitalizations in 2003. These ratios were then used to estimate the number of hospitalized attempts within each gender for the specific state by age groups and mechanism based on the 2000-2004 average annual incidence of suicide in each respective state.

## Injury Costs

We computed unit costs for medical care and productivity loss. As recommended by the Panel on Cost-Effectiveness in Health and Medicine, we report the present value of lifetime costs, computed at a 3% discount rate, and adopt a societal perspective that includes all costs associated with the injuries - costs to victims, families, employers, government, insurers, and taxpayers. In some instances, no cases were recorded; nevertheless, where possible, we provided estimates of what the average cost would have been had there been cases in the state.

## Medical Costs

For cost calculations for hospitalized injuries we used 2003 HCUP-NIS data and cost-to-charge ratios from the Agency for Healthcare Research and Quality to compute inpatient facility costs. We then used Medstat's Marketscan® data to quantify non-facility costs incurred during an inpatient admission. Most injuries that require a hospitalization will also require additional treatment after discharge. To develop estimates of short- to medium-term medical costs for injuries requiring an inpatient admission, we multiplied total inpatient costs derived from the HCUP-NIS/Marketscan® data by the ratio of all costs during the first 18 months of injury, on average, to the total inpatient costs for that kind of injury. We derived these ratios from 1996 to 1999 MEPS data. We used an identical strategy to Rice et al. (1989) for estimating long-term medical costs (18+ months). We used multipliers derived from longitudinal 1979-1988 Detailed Claim Information (DCI) data on over 450,000 Worker's Compensation claims. The DCI file was unique and nothing similar has subsequently become available.

National per-case costs for the age groups and mechanisms specified in the fact sheet series were calculated based on a weighted average and were adjusted to year 2005 dollars. Subsequently, costs were calculated for each state based on the hospitalizations among state residents and adjusted to state-specific price levels. Medical costs were based on state adjusted national costs. Costs estimates were weighted based on the number of hospitalized self-inflicted injuries within the state.

Medical cost of fatalities was estimated taking into account their probability of occurrence at five places of death identified in the 2000 National Vital Statistics System (NVSS) data: death on scene/at home, dead on arrival at the hospital, death in the ED, death in the hospital after inpatient admission, and death at a nursing home. Depending on place of death, the medical costs incurred might include coroner/medical examiner (C/ME), medical transport, ED, inpatient hospital, or nursing home costs.

## Work Loss Costs (Productivity Costs)

Productivity costs include victims' lost wages and the value of lost household work, fringe benefits, and the administrative costs of processing compensation for lost earnings through litigation, insurance, or public welfare programs like food stamps and Supplemental Security Income. Work losses by family and friends who care for injured children also are included.

We quantify temporary or short-term work loss for nonfatal injuries using the approach presented by Lawrence et al. (2000) where the probability of an injury that resulted in lost workdays was combined with the mean workdays lost (conditional on having missed at least one day) per injury estimated. Averaged across all injuries, estimated temporary work loss was 11.1 days per injury. We computed work loss durations for injuries separately for each age category, sex, and mechanism.

To apply a monetary value to temporary work loss, we multiplied estimated work loss days by the average daily wage and fringe benefit costs stratified by age group and sex from the Current Population Survey. Following other studies (Lawrence et al., 2000; Miller et al., 2000; Zaloshnja et al., 2000), we relied on survey data that showed household work is lost on 90% of days that wage work is lost to injury. Using this ratio and the value of household work (Haddix, Teutsh, & Corso, 2003) we also imputed a value for household work lost.

To compute productivity loss due to permanent or long-term disability, we considered permanent total disability and permanent partial disability separately. For death and other permanent total disability, we multiplied the present value of age- and sex-specific lifetime earnings and household production (Rice et al., 1989), by the probability of permanent disability for each type of injury. For permanent partial disability, we multiplied the earnings estimate by the probability of permanent partial disability and an additional factor that identified the percentage of disability that resulted from that type of injury. We then summed the results to compute the net productivity loss associated with permanent disability, including total and partial disability. The probabilities of permanent and partial disability and the percent disabled (by body part and nature of injury) were computed from DCI data by Lawrence et al. (2000). Application of these estimates to our analysis assumes that these probabilities are the same for injuries that do and do not occur on the job and that they have not changed significantly over time. Averaged across all injuries, our estimated percentage of lifetime productivity potential lost due to injury was 0.26% per injury.

For questions or comments, please call the Pacific Institute for Research and Evaluation, Calverton, Maryland, at 301-755-2728.

## Acknowledgements

### Agency for Healthcare Research

All non-estimated hospitalization counts for year 2003 were obtained from the 2003 State Inpatient Data (SID) file, which is part of the Healthcare Cost and Utilization Project (HCUP; Agency for Healthcare Research and Quality, Rockville, MD, 2006). HCUP is a family of health care databases and related software tools and products developed through a Federal-State-Industry partnership and sponsored by the Agency for Healthcare Research and Quality (AHRQ). HCUP includes hospitalization from 38 states for data year 2003.

Our thanks to the Agency for Healthcare Research and to 37 states that partnered with the Healthcare Cost and Utilization Project for providing State Inpatient Data, and for allowing us to use their de-identified data in these fact sheet. The analysis and opinions reported are those of the authors but not necessarily of the funding agency.

### State Health Departments

Our thanks to the State health departments for providing year 2004 data on hospitalization for self-inflicted injuries.

#### Arkansas

Arkansas Department of Health  
Health Statistics Branch of the Center for Public Health Practice

#### Kansas

Kansas Department of Health and Environment  
Injury Prevention Program

#### Kentucky

University of Kentucky  
Kentucky Injury Prevention and Research Center

#### Minnesota

Minnesota Department of Health  
Center for Health Promotion

#### North Carolina

North Carolina Department of Health and Human Services, Division of Public Health  
Injury and Violence Prevention Branch, Injury Epidemiology Unit

#### Pennsylvania

Pennsylvania Department of Health  
Bureau of Health Statistics & Research

#### Vermont

Vermont Department of Health  
Public Health Specialist-Injury and Violence Prevention Program



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