

## **EXECUTIVE SUMMARY**

This report reviews injuries for Ohioans from 2000 to 2010. Data for this report were derived from Ohio Hospital Association hospital inpatient discharge and emergency department (ED) datasets and Ohio death certificate files.

### **Fatalities:**

- 7,156 people died from an injury in Ohio in 2010. On average, 20 people die from an injury every day statewide.
- The death rate for injuries increased 33 percent between 2000 and 2010.
- The leading causes of injury death in 2010 were unintentional poisoning, suicide, motor vehicle traffic crashes, and falls. The risk profile for the leading causes of injury varies by segment of the population. The following groups are disproportionately at risk for the leading causes of injury death.
  1. Unintentional poisoning: Males, ages 25-54, and whites
  2. Suicide: Males, ages 25-54, and whites
  3. Motor vehicle traffic crashes: Males, ages 15-24 and ages 85 or older
  4. Falls: Ages 85 or older
- Death rates increased rapidly for poisoning, suicides, and fall related injuries while rates have decreased for motor vehicle traffic related injuries between 2000 and 2010.

### **Hospitalizations:**

- 72,485 injury related hospitalizations occurred in Ohio in 2010. On average, 199 hospitalizations occur in Ohio every day.
- The injury hospitalization rate changed very little between 2002 and 2010.
- The leading causes of injury hospitalizations were falls, self-harm, motor vehicle traffic crashes, and unintentional poisoning. The risk profile for the leading causes of injury hospitalizations varies by segment of the population. The following groups were identified as at risk.
  1. Falls: Females and ages 85 or older
  2. Self-harm: Females and ages 15-44
  3. Motor vehicle traffic crashes: Males and ages 15-24
  4. Unintentional poisoning: Ages 45 or older
- Hospitalization rates increased for self-harm and unintentional poisoning related injuries while rates associated with motor vehicle traffic related injuries decreased between 2002 and 2010. Rates of fall related hospitalizations increased between 2002 and 2003 then remained the same between 2003 and 2010.

### **Emergency Department Visits (ED):**

- 1.36 million ED visits in Ohio were associated with injuries in 2010. On average, 3,726 visits were made to emergency departments every day in Ohio.
- The injury ED visit rate changed very little between 2002 and 2010.
- The leading causes of injury ED visits were falls, motor vehicle traffic crashes, assaults, and unintentional poisoning. The risk profile for the leading causes of injury ED visits varies by segment of the population. The following groups were identified as at risk.
  1. Falls: Females and ages 85 or older
  2. Motor vehicle traffic crashes: Females and ages 15-34
  3. Assaults: Males and ages 15-34
  4. Unintentional poisoning: Ages 1-4
- ED visit rates increased for injuries associated with falls, motor vehicle traffic, assaults, and unintentional poisoning.

### **Social and Economic Costs:**

- Injury related deaths, hospitalizations, and ED visits cost Ohio an estimated \$13 billion in 2010. The estimate includes costs associated with medical care and worker productivity.
- Costs associated with injuries increased 21 percent between 2002 and 2010.
- The leading cause of injury costs in 2010 were falls (\$2.6 billion), motor vehicle traffic (\$2.3 billion), unintentional poisoning (\$2.0 billion), suicide or self-harm (\$1.7 billion), and homicides or assaults (\$1.3 billion).
- Rapid increases in costs were found among unintentional poisoning (117 percent), falls (40 percent), and suffocation (15 percent) while a significant decrease in costs occurred among injuries associated with motor vehicle traffic crashes (20 percent).
- Injuries were associated with over 109,000 years of potential life lost each year which is the leading cause of potential life loss in Ohio.

### **Violence and Injury Prevention:**

The Ohio Department of Health (ODH) is funded by the Centers for Disease Control and Prevention to build capacity related to the prevention and control of injuries and to develop or strengthen injury surveillance programs. ODH coordinates a statewide group of injury prevention stakeholders, the Ohio Injury Prevention Partnership, to build capacity to address the leading causes of injury in Ohio. The group has identified falls among older adults, drug poisonings, child injury and violence prevention (suicide and firearm related) as priority areas.

**APPENDICES**

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## **APPENDIX 1: DATA SOURCES**

This report uses data from behavioral risk factor surveys, hospital discharge records and death certificates to study patterns and trends in injuries among Ohio residents. The following is brief summary of each data source referenced in this report.

### ***Cost of Injuries***

The medical and work loss cost of injuries was estimated by the Centers for Disease Control and Prevention (CDC). Cost estimates for fatal and non-fatal injuries can be queried on the CDC's Web-based Injury Statistics Query and Reporting System Web (WISQARS).

[http://www.cdc.gov/injury/wisqars/pdf/WISQARS\\_Cost\\_Methods-a.pdf](http://www.cdc.gov/injury/wisqars/pdf/WISQARS_Cost_Methods-a.pdf)

### ***Death Records***

Death records are maintained by ODH's Office of Vital Statistics. Death certificates provide limited information about circumstances of injury circumstances or contributing factors. Both injuries and their external causes were classified according to the 10th Revision of the International Classification of Diseases (ICD-10). See Appendix 3 for a complete list of external cause of injury codes by mechanism and intent.

<http://dwhouse.odh.ohio.gov/datawarehousev2.htm>

### ***Hospital Discharge Records***

Hospital discharge records are collected and maintained by the Ohio Hospital Association (OHA) from information provided by member hospitals. Both injuries and their external causes were classified according to the 9th Revision of the International Classification of Diseases, Clinical Modification (ICD-9-CM). For hospitalizations, a case was defined as an Ohio resident with an injury listed in the primary diagnosis field. For ED visits, a case was defined as an Ohio resident with an injury listed in the primary diagnosis field or a valid external cause of injury code any of the 15 diagnosis fields. Injury mechanisms for both hospitalizations and ED visits were based on the first listed external cause of injury. See Appendix 2 for a complete list external cause of injury codes by mechanism and intent.

<http://www.ohanet.org/>

### ***Leading Causes of Death***

The data source for WISQARS Fatal Injury Data is the National Vital Statistics System (NVSS) operated by the National Center for Health Statistics. WISQARS provides death counts and death rates for the United States and by state, county, age, race, Hispanic ethnicity, sex, and leading cause of death, injury intent, and injury mechanism categories. WISQARS can be used to query death data for the years 1999 - 2009, of which the underlying cause of death is specified using ICD-10 codes.

[http://www.cdc.gov/injury/wisqars/leading\\_causes\\_death.html](http://www.cdc.gov/injury/wisqars/leading_causes_death.html)

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## ***Burden of Injury in Ohio, 2000-2010***

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### ***Ohio Behavioral Risk Factor Surveillance System (BRFSS)***

The Ohio Behavioral Risk Factor Surveillance System (BRFSS) is a random digit dial telephone survey of non-institutionalized adults aged 18 years of older. The BRFSS has been conducted annually by the Ohio Department of Health since 1984. The survey collects information on the prevalence of health behaviors, health care usage, and disease diagnosis associated with the leading cause of disease, injury and death in the United States. Results from the survey are weighted to represent the age, sex, race, and ethnic composition of Ohio.

<http://www.odh.ohio.gov/healthstats/brfss/behrisk1.aspx>

### ***Ohio Population Estimates***

The National Center for Health Statistics releases bridged-race population estimates of the resident population of the United States for use in calculating vital rates. These estimates result from bridging the 31 race categories used in Census 2000 and Census 2010. The bridged-race population estimates are produced under a collaborative arrangement with the U. S. Census Bureau.

[http://www.cdc.gov/nchs/nvss/bridged\\_race.htm](http://www.cdc.gov/nchs/nvss/bridged_race.htm)

### ***Ohio Pregnancy Risk Assessment Monitoring System (PRAMS)***

The Pregnancy Risk Assessment Monitoring System (PRAMS) is a population-based survey designed to examine maternal behaviors and experiences before, during and after a woman's pregnancy, and during the early infancy of her child. The Centers for Disease Control and Prevention initiated PRAMS in 1987 in an effort to reduce infant mortality and the incidence of low birth weight. PRAMS were implemented in Ohio in 1999.

<http://www.odh.ohio.gov/healthstats/pramshs/prams1.aspx>

### ***Ohio Traffic Crash Reports***

The Ohio Department of Public Safety compiles statistical data on crashes that occur on Ohio's roads and highways. Crash data is available in the form of annual reports. Users can also develop customized queries of the data online.

[http://ohiohighwaysafetyoffice.ohio.gov/otso\\_annual\\_crash\\_facts.stm](http://ohiohighwaysafetyoffice.ohio.gov/otso_annual_crash_facts.stm)

### ***Ohio Youth Risk Behavior Survey (YRBS)***

The Ohio Youth Risk Factor Survey (YRBS) is an anonymous paper and pencil survey of high school students enrolled in public and non-public schools. The YRBS has been conducted in Ohio since 1993 and is collaborative project between the Ohio Departments of Education and Health. The survey collects information on the prevalence of health behaviors, health care usage, and disease diagnosis associated with the leading cause of disease, injury and death in the United States. Results from the survey are weighted to represent the age, sex, race, and ethnic composition of Ohio.

[http://www.odh.ohio.gov/odhprograms/chss/ad\\_hlth/youthrsk/youthrsk1.aspx](http://www.odh.ohio.gov/odhprograms/chss/ad_hlth/youthrsk/youthrsk1.aspx)

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## **APPENDIX 2: ANALYTIC METHODS**

This analysis was limited to descriptive statistics, which were generated through the use of Statistical Analysis System (SAS) Version 9.1, Cary, N.C. The data were analyzed using injury surveillance guidelines from the Centers for Disease Control and Prevention (CDC).

### **Deaths:**

- Injury deaths were defined as a death with the underlying cause of death listed as an injury. Traumatic brain injury deaths were defined as deaths with an injury as underlying cause of death and a traumatic brain injury listed in one of the multiple cause of death fields. See Appendix 4 for a list of ICD-10 codes for injury mechanisms and Appendix 6 for a list of mechanism subcategories.
- Deaths included in this report were restricted to Ohio residents.
- Rates were calculated by dividing the number of injuries by the number of Ohio residents. Population estimates were based on estimates from the National Center for Health Statistics. Rates were age adjusted to the 2000 U.S. standard population.

### **Hospitalizations:**

- Discharge dataset includes nonfederal, acute care, or inpatient facilities. The dataset does not include Veterans' Affairs and other federal hospitals, rehabilitation centers, or psychiatric hospitals.
- Injury hospitalizations were defined as an inpatient visit with an injury listed in the primary discharge diagnosis field. See Appendix 5 for a list of ICD-9-CM codes for injury mechanisms and Appendix 7 for a list of mechanism subcategories.
- Datasets include readmissions, transfers, and deaths occurring in the hospital.
- Hospitalizations included in this report were restricted to Ohio residents.
- The external cause of injury code used in the analysis was the first listed cause of the discharge diagnosis fields. If the codes E000-E030, E849, E967, E869.4, E870-E879, or E930-E949 were the first listed codes then the next valid external cause code was used.
- Rates were calculated by dividing the number of injuries by the number of Ohio residents. Population estimates were based on estimates from the National Center for Health Statistics. Rates were age adjusted to the 2000 U.S. standard population.

### **Emergency Department Visits:**

- Discharge dataset includes nonfederal, acute care, or inpatient facilities. The dataset does not include Veterans' Affairs and other federal hospitals, rehabilitation centers, or psychiatric hospitals.
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- Injury ED visits were defined as an ED visit with an injury listed in the primary discharge diagnosis field or a valid external cause of injury code in any of the discharge diagnosis fields. See Appendix 5 for a complete list of ICD-9-CM codes.
- ED visits included in this report were restricted to Ohio residents.
- Persons who are treated at an ED and later admitted to a hospital are removed from the ED dataset, and therefore are not included in any analysis of ED data.
- The external cause of injury code used in the analysis was the first listed cause of the discharge diagnosis fields. If the codes E000-E030, E849, E967, E869.4, E870-E879, or E930-E949 were the first listed codes then the next valid external cause code was used.
- Rates were calculated by dividing the number of injuries by the number of Ohio residents. Population estimates were based on estimates from the National Center for Health Statistics. Rates were age adjusted to the 2000 U.S. standard population.

**Trend Analysis for Deaths, Hospitalizations and Emergency Department Visits:**

- Trend analysis for annual injury death, hospitalization, and ED visit rates was conducted in Microsoft Excel. Annual injury rates were plotted and a linear trend line was drawn to minimize the distance between the trend line and data point. The goodness of fit for the linear trend line was determined by the R-squared value. Linear trends were defined as a trend line with an R-squared value of 0.5 or higher. Non-linear trends were defined as a trend line with an R-squared value of less than 0.5. The slope and goodness of fit of the trend line were reported in the data tables. Non-linear trends were labeled with (NL) next to the slope.

**Poverty Status and County Urbanity Classifications:**

- County urbanity was derived from county of residence reported by Ohio Behavioral Risk Factor Surveillance System respondents. County urbanity classifications were based on a combination of proximity and connectedness to urban core economic development area and definitions of Appalachian counties established by the Appalachian Development Commission. See Appendix 11 for a map with county classifications.
- Poverty status was derived from household income and household composition reported by Ohio Behavioral Risk Factor Surveillance System respondents. Respondents were grouped into categories based on the 2010 Federal Poverty Guidelines. See Appendix 12 for household income and composition thresholds.

**Cost of Injuries:**

- Fatal Injury costs were calculated by multiplying the number of injury deaths in Ohio by the average cost associated the death for Ohio published on the CDC's
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WISQARS website. See Appendix 8 for average cost estimates by mechanism and intent.

- Non-fatal injury costs for hospitalizations were calculated by multiplying the number of hospitalizations by the average cost associated with hospitalizations for the United States published on the CDC's WISQARS website. See Appendix 9 for average cost estimates by mechanism and intent.
  - Non-fatal injury costs for ED visits were calculated by multiplying the number of ED visits by the average cost associated with ED visits for the United States published on the CDC's WISQARS website. See Appendix 10 for average cost estimates by mechanism and intent.
  - Total injury costs were calculated by adding the estimated costs for injury deaths, hospitalizations and ED visits.
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### **APPENDIX 3: LIMITATIONS OF INJURY SURVEILLANCE DATA**

#### **Death Certificate Data:**

- The cause of death reported on the death certificate is based on the underlying cause of death determined by a physician or coroner. While physicians and coroners are well trained to investigate and determine causes of death, a standardized process for investigating and determining causes of death does not exist in Ohio. This lack of uniformity may lead to differences in how underlying causes of death are classified and pose limitations for comparing rates across local jurisdictions.

#### **Hospital Discharge Data:**

- In each year of the study period, approximately 30 percent of injuries treated in the as inpatients and emergency departments were not assigned an external cause code (E-code). This most likely resulted in an underestimate of total costs and incidence rates, because not all mechanism and intents for injuries could be identified and included in the analysis by mechanism.
- Of the non-fatally injured, only those who sought medical care were captured for this analysis.
- Discharges, not individuals, were the unit of measurement, thereby resulting in duplication when readmissions for the same initial event occurred. The inclusion of readmissions would lead to an overestimate of incidence rates.
- Race and ethnicity are largely incomplete in the hospital discharge data and were not included in the analysis.
- Ohio residents treated in out-of-state hospitals are not consistently included, thereby affecting rates, particularly of border counties.
- Severity of injury is assumed based on type of medical treatment received (i.e., inpatient treatment is for more severe injuries than ED visits).

#### **Behavioral Risk Factor Data:**

- Data from the Pregnancy Risk Assessment Monitoring System (PRAMS), Ohio Youth Risk Behavior Survey (YRBS) and Behavioral Risk Factor Surveillance System (BRFSS) are based on self-reported behaviors by respondents. The accuracy of self-reported data depends on the respondents' ability to recall and willing to report the information. Self-reported data can lead to overestimates or underestimates of the true prevalence in the population depending on the topic being asked.
  - Results from Ohio YRBS represent a random sample of students enrolled in high schools in Ohio. The results do not represent high school age youth who have dropped out of school.
  - Results from the Ohio BRFSS represent a random sample of non-institutionalized adults ages 18 or older in Ohio with a landline in their home. The BRFSS excludes institutionalized adults and adults living in cell phone only households.
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