

The Burden of Injury in Iowa

December 2008
Data from 2002-2006



Iowa Department of Public Health
Promoting and Protecting the Health of Iowans



Acknowledgments

This report would not have been possible without the support of Binnie LeHew, Corinne Peek-Asa PhD., and James C. Torner PhD. The workgroup extends its appreciation for their invaluable guidance, support and leadership.

Data workgroup members: The key members of the data workgroup, responsible for the data analysis and drafting of this report, include (in alphabetic order): Suning Cao (IDPH), Ousmane Diallo (IDPH), Kathy Leinenkugel (IDPH), James Torner PhD. (IPRC), Londa Vanderwal (IPRC), and Tracey Young (IPRC).

Program advisory group members: The following individuals assisted with the planning and review of the report. They represent various unintentional and intentional injury programs in public health. They are, in alphabetical order: Katrina Altenhofen (IDPH Bureau of Emergency Medical Services), Sally Clausen (IDPH Bureau of Family Health), Debbi Cooper (IDPH Bureau of Environmental Health Services), Scott Falb (Iowa Dept. of Transportation), John Fiedler (IDPH Bureau of Emergency Medical Services), John Hedgecoth (IDPH Division of Acute Disease Prevention & Emergency Response), Cindy Heick (IDPH Bureau of Emergency Medical Services), Carol Hinton (IDPH Bureau of Family Health), Donna Johnson (IDPH Bureau of Health Statistics), Craig Keough (local public health), Binnie LeHew (IDPH Bureau of Disability & Violence Prevention), Kathy Leinenkugel (IDPH Occupational Safety and Health Surveillance Program), Louise Lex PhD. (IDPH Bureau of Communication and Planning), John Lundell (University of Iowa, Injury Prevention Research Center), Corrie Peek-Asa PhD. (University of Iowa, Injury Prevention Research Center), and Lisa Roth (Blank Children's Hospital - SAFE Kids).

Citation: The Burden of Injury in Iowa, Iowa Department of Public Health Comprehensive Injury Report, 2002-2006. December 2008.

Table of Contents

Acknowledgments.....	1
<i>Acronyms used in this report</i>	4
<i>Authors of this report</i>	4
Executive Summary	6
Introduction	9
<i>Purpose of this report</i>	9
<i>What you will find in this report</i>	10
<i>How to use this report</i>	11
Overview of burden of injury in Iowa	12
Injury is a major cause of death in Iowa	13
Motor vehicle crashes are the leading cause of injury death in Iowa	14
Injury-related death, hospitalization and emergency department visit rate trends, Iowa, 2002-2006.....	15
Injury affects genders, races, and age groups in Iowa differently: 2002-2006 average rates of injury (per 100,000 Iowans) by gender.....	16
Injury rates (per 100,000 Iowans) by race, 2002-2006	17
Injury rates (per 100,000 Iowans) by age group, 2002-2006.....	18
Injury death, hospitalization and emergency department visit rates differ by county size, 2002-2006.....	19
Injuries are a large percentage of all deaths, hospitalizations, and emergency department visits, and varies by age group in Iowa, 2002-2006	20
Most injuries in Iowa are unintentional (2002-2006)	21
Years of potential life lost by causes and intent	21
Specific injury indicators	24
Comparison of all indicators in Iowa.....	24
Indicators for all injuries, Iowa, 2002-2006	25
Indicators for drowning, Iowa, 2002-2006	27
Indicators for unintentional falls, Iowa, 2002-2006.....	29

Indicators for unintentional fire-related injuries, Iowa, 2002-2006	32
Indicators for firearm-related injuries, Iowa, 2002-2006	34
Indicators for homicide/assault, Iowa, 2002-2006	36
Indicators for motor vehicle trauma, Iowa, 2002-2006	38
Indicators for poisoning, Iowa, 2002-2006	40
Indicators for suicide/suicide attempts, Iowa- 2002-2006	42
Indicators for traumatic brain injury (TBI), Iowa, 2002-2006	44
Hospital charges per indicator, Iowa, 2002-2006	46
Iowa Crash Outcome Data Evaluation System	49
<i>Crash data linked to death certificates (2003-2006)</i>	<i>49</i>
Linked MV fatalities by vehicle type or role	Error! Bookmark not defined.
Demographic characteristics, safety device use and alcohol use for MVT-related deaths in Iowa	49
Percentage of fatally injured drivers of passenger vehicles with blood alcohol concentration (BAC) of 0.08 percent or greater, by driver age.....	50
<i>Linkage between crash data and hospitalizations.....</i>	<i>51</i>
Demographic characteristics, safety device use and alcohol use for motor vehicle-related hospitalizations in Iowa, 2002-2006	51
TBI severity level by motorcycle helmet use - hospitalizations.....	52
<i>Linkage between crash data and emergency department (ED) data (2003-2006)</i>	<i>53</i>
Demographic characteristics, safety device use and alcohol use for motor vehicle-related ED visits in Iowa, 2003-2006	53
Discussion and Recommendations	54
<i>Comparisons</i>	<i>54</i>
<i>Healthy Iowans 2010 indicators.....</i>	<i>55</i>
<i>Limitations of the data</i>	<i>55</i>
<i>Recommendations.....</i>	<i>56</i>
ANNEXES	57
Annex 1. Data analysis methods.....	57

Annex 2. Definition of terms.....	59
Annex 3. References.....	60
Annex 4. Data tables produced in this report.	60

List of Tables

Table 1: Five leading causes of ALL deaths in Iowa by age groups and total # of deaths, 2002-2005	13
Table 2: Five leading causes of INJURY deaths in Iowa by age groups and total # of deaths, 2002-2005	14
Table 3: All injury indicators - Total # and rates, 2002-2006	24
Table 4: Demographic characteristics, safety device use and alcohol use for MVT-related deaths in Iowa.....	49
Table 5: Fatal injuries and BAC by driver's age	50
Table 6: Demographic characteristics, device use and alcohol use for MVT-related hospitalizations in Iowa, 2002-2006.	51
Table 7: TBI severity level by motorcycle use - hospitalizations.....	52
Table 8: Demographic characteristics, safety use and alcohol use for MVT-related ED visits, 2003-2006.....	53

For further information or a copy of this report, please contact the Iowa Department of Public Health, Bureau of Disability and Violence Prevention at (515) 281-5032 or the Injury Prevention Research Center at the University of Iowa at (319) 335-4458.

Electronic copies of the report are available at <http://www.idph.state.ia.us/bh/injuryprevention.asp>

Acronyms used in this report

CDC – Centers for Disease Control and Prevention
CODES – Crash Outcome Data Evaluation System
ED visits – Emergency department visits (outpatient)
EMS – Emergency medical services
IDOT – Iowa Department of Transportation
IDPH – Iowa Department of Public Health
IPRC – University of Iowa Injury Prevention Research Center
MVT – Motor Vehicle Traffic
NCIPC – National Center for Injury Prevention and Control
NIOSH – National Institute for Occupational Safety & Health
STIPDA – State and Territorial Injury Prevention Directors' Association
TBI – Traumatic brain injury
TSAC – Trauma System Advisory Council
WISQARS – Web-based Injury Statistics Query and Reporting System
YPLL – Years of potential life lost

Authors of this report

This report was developed through the State of Iowa Injury Prevention and Surveillance Partnership (a sub-committee of TSAC), whose mission is to facilitate statewide injury prevention improvement by leading a systematic process to gather, review, analyze and disseminate information about injuries and injury prevention in Iowa. The following organizations were the key members of the working group that developed this report:

Iowa Department of Public Health (IDPH)

Bureau of Disability and Violence Prevention

This bureau works with communities to reduce the incidence and severity of unintentional and intentional injuries resulting from disability and violence. Through data collection and analysis, strategic planning and the implementation of evidence-based programs, bureau staff works to reduce the burden of these injuries in Iowa. The bureau is organized into two offices. Within the Office of Disability and Health are the Advisory Council on Brain Injuries, Disability Prevention/Reducing Secondary Conditions Program, and the Traumatic Brain Injury Program. Within the Office of Violence Prevention are the Abuse Education Review Panel, Domestic Abuse Death Review Team, Health Care Response to Violence Against Women, Sexual Violence Prevention and Youth Suicide Prevention Program.

Bureau of Health Statistics

The Bureau staff maintains a comprehensive data and surveillance system capable of monitoring progress on health objectives, identifying emerging health issues, and supporting policy development. The bureau regularly analyzes health data residing in the department, conducts research on health issues, provides access to health information for the state and public, and supports other health data activities as appropriate.

Division of Environmental Health (Occupational Health Program and Consumer Product Safety)

The IDPH Occupational Safety and Health Surveillance Program (OSHSP) is part of the Environmental Health Division and funded through NIOSH to provide fundamental and enhanced surveillance and public health activities specific to work-related illness and injury. Networking with state and local programs, data is collected, analyzed, and reported regarding specific OSH indicators, including occupational fatalities, pesticide poisonings, and adult lead exposures. OSHSP is also involved in outbreak investigations regarding infectious disease or environmental exposures that are linked to work situations.

Bureau of Emergency Medical Services (EMS)

Iowa has an all-inclusive trauma care system that has been operational since January 1, 2001. The IDPH Bureau of EMS is designated the lead agency for the state trauma system. From conception, key trauma/EMS stakeholders have convened regularly to advise the department on strategies to achieve optimal trauma care delivery, implement a statewide trauma system, assess, and evaluate system effectiveness. The Trauma System Advisory Council (TSAC), as established by Iowa Code 147A, has been meeting since October of 1995. Representation is multidisciplinary and includes 21 members. The TSAC has subcommittees that include: 1) hospital categorization and verification, 2) triage and transfer protocols, Adult and Pediatric, 3) injury registry, 4) injury prevention/health promotion, 5) education and training, and 6) rehabilitation. TSAC meets semi-annually. The System Evaluation Quality Improvement Committee (SEQIC), also established by code and meeting since October 1996, has established and implemented a statewide system evaluation process. Representation is multidisciplinary and includes 20 members who meet three times per year for ongoing system evaluation. Researchers at The University of Iowa's Injury Prevention Research Center review the Iowa Trauma Patient Data. This group presents its data analysis during SEQIC meetings.

The bureau also houses the unintentional injury prevention and the EMS pediatric programs. These programs promote bicycle, pedestrian and motor vehicle safety, as well as improved responses to children served through Iowa's EMS system.

Bureau of Family Health

The bureau is comprised of many programs related to maternal and child health. The programs that aim to reduce injury to children and adolescents are the Child Death Review Team, the Healthy Child Care Iowa program, and the School/Adolescent Health program.

University of Iowa Injury Prevention Research Center (IPRC)

Founded in 1990, the IPRC is one of 12 injury "Centers of Excellence" funded by the National Center for Injury Prevention and Control, Centers for Disease Control and Prevention. The theme of the Iowa Center is prevention and control of rural injuries, but the Center works with injuries in all of Iowa. The IPRC aims to prevent and control injuries in high-risk populations, including children, the elderly, farmers, and farm families by supporting research and training and by disseminating research results to policy makers. The IPRC has a number of core groups, including administration, evaluation, simulation, training, and research support. The training core prepares graduate students to meet the need for new academic faculty in the field of occupational injury prevention, and the research support core serves as the backbone for the IPRC research program which provides resources to IPRC investigators, university injury control researchers, and injury control collaborators in the community. The IPRC is funded by CDC grant CCR 703640.

The Iowa Department of Transportation (DOT)

The Iowa DOT, Motor Vehicle Division – Office of Driver Services, collects and maintains data on all motor vehicle-related accidents in Iowa. This office, along with the Office of Traffic and Safety, provides crash data analysis to inform driver and highway safety programming. The data are used to develop the Iowa Comprehensive Highway Safety Plan, guiding efforts to achieve a standard of safer travel across the state. These two offices partner with the Iowa Department of Public Safety's Governor's Traffic Safety Bureau, to implement motor vehicle safety programs for the public.

Executive Summary

Injuries are major public health concerns that affect the lives of all Iowans, regardless of age, race, gender, or size of county. Unintentional injuries are the leading cause of death for Iowans between the ages of 1 and 34, while suicides and/or homicides also rank among the top 5 leading causes of death for Iowans between the ages of 1 and 54.

Unintentional injury is the 5th leading cause of death for all Iowans, with over 1,500 injury deaths occurring on average each year (from 2002- 2006) in Iowa. Injuries also lead to more than 17,000 hospitalizations in Iowa each year and more than 250,000 emergency department (ED) visits. Further, untold numbers of Iowans do not seek medical care for many of the injuries they may incur. Because injuries are preventable, they lead to unnecessary medical costs, economic losses, reduced productivity, and immense physical and emotional strain.

Purpose of this report

This report, the first comprehensive one to examine injury in Iowa, is intended to:

- present a clear picture of the burden of injuries in Iowa (from the years 2002 to 2006) in terms of mortality, morbidity, and causes;
- provide information to state and local policymakers, county health departments, health practitioners, hospitals, and civic groups to improve injury care and stimulate and strengthen injury prevention efforts;
- document Iowa's success in meeting the Healthy Iowans 2010 goals related to injury; and
- provide information on the injury indicators specified by the Centers for Disease Control and Prevention's National Center for Injury Prevention and Control (CDC/NCIPC).

To further these ends, a detailed report of injuries in each county of Iowa has also been developed and is referenced in this report.

Sources of information

The data presented in this report are based on death certificates from the Iowa Department of Public Health, the Iowa Hospital Association hospital inpatient (referred to as hospitalizations)/outpatient (referred to as ED visits) discharge data, and the Iowa trauma registry, including agricultural injuries.

Key findings (2002-2006)

- Over 1,500 injury-related deaths occurred on average each year (from 2002- 2006) in Iowa – 6% of all deaths in Iowa. In addition, injuries led to more than 17,000 hospitalizations and more than 250,000 ED visits each year in Iowa.
- Unintentional injuries were the leading cause of death for Iowans between the ages of 1 and 34 and the 5th leading cause of death for all Iowans.

- While motor vehicle traffic deaths were the leading cause of injury death for Iowans aged 1-34 and 55-64, suicide was the leading cause of injury death among Iowans aged 35-54, and falls were the leading cause of injury death for people over 64 years of age.
- Suicides are the third leading cause of injury death after motor vehicle traffic and falls in Iowa; the rate of suicide (11.1/100,000) in Iowa is higher than the national average of 10.9/100,000.
- 73 percent of injury deaths in Iowa (2002-2006) are classified as unintentional, with 21 percent as suicide and four percent as homicide.
- Firearms (50%), suffocation (27%) and poisonings (20%) are the leading causes of suicide death in Iowa; however, the exact percentage of these different causes varies greatly by county size and age of victim.
- Firearms (52%), cut/pierce (15%) and suffocation (7%) are the leading causes of homicide death in Iowa. Firearms (average of 28 cases per year) are three times as likely to be the cause of homicide in Iowa as cut/pierce (average of 8 cases per year).
- Homicide rates in Iowa (1.9/100,000) are lower than the national average (5.9/100,000), but are still the second leading cause of injury death for children under age 5 and in the top four causes of injury death in teens and young adults aged 15-44.
- Injury death rates increase with age, with rates by far the highest in seniors (85+).
- For every female who dies due to injuries in Iowa, two males will die due to injuries, regardless of age group.
- Injuries have the greatest impact in the smallest counties in Iowa (<10,000 population), which had the highest injury death rate (67/100,000 people) vs. the injury death rate (45/100,000) in counties with over 50,000 population.
- On average from 2002 to 2006, Iowans whose deaths were related to injuries lost 22 years of potential life.
- On average, injury hospitalizations represent five percent of all hospitalizations. Injury hospitalization rates increase with age and rates are by far the highest in seniors (85+), particularly women.
- Blacks in Iowa are three times more likely to be hospitalized for injury than whites and two times more likely to go to the ED for an injury than whites.
- Overall injury charges from hospitals, for inpatient and outpatient services, amounted to a 5-year average of \$300 million per year, which still underestimates the real cost of injury to the State of Iowa.
- Firearm-related injuries have the highest medical charges of any monitored indicator followed by motor vehicle traffic. Charges for each are, respectively, \$16,000/visit (hospitalizations) and \$1,850/visit (ED), and \$13,000/visit (hospitalizations) and \$775/visit (ED).
- Rates for ED visits due to injuries are greatest among the youth and the elderly. Overall, one in five ED visits in Iowa is due to injury.
- Injuries from falls have the highest rate of hospitalizations and ED visits of the monitored indicators.

Key conclusions

- Continued and strengthened collection of data is vital to monitor trends in injuries in Iowa and to assess the effectiveness and impact of injury prevention strategies.
 - o Health care providers must be encouraged to completely and accurately code and report all injuries so that a clearer picture of the burden of injury in Iowa is available, which in turn enables improved prevention efforts.
 - o The IDPH needs to create and support both an internal work group and an external advisory committee to support the establishment of an injury and violence prevention program and raise the visibility and importance of injury and violence prevention within state government. The creation of a subcommittee connected to TSAC is a good step in that direction.
 - o In the summer of 2004, the IDPH director recognized the fragmentation and the silos *modus operandi* of the public health system. He commissioned a work group to make recommendations for redesigning public health in the state to limit inconsistent service delivery. As a first step, the workgroup developed standards for local and state officials, including injury prevention as a separate focus area.
- Injury prevention efforts can be targeted to those groups with the greatest risk by using the data presented in this report.
- Iowa has exceeded many of the goals established for injuries by the Healthy Iowans 2010 initiative; however, much work is still needed to continue to reduce the burden of injury in Iowa. These efforts include:
 - o The use of public education, legislative/policy, and technological strategies to reduce the number of injuries and injury deaths in Iowa.
 - o Promoting prevention programs that use a combination of strategies, such as an ecological model targeting individual, relationship, organizational, and community levels of intervention. These are proven to be more effective.

Introduction

Injuries are major public health concerns that affect the lives of all Iowans, regardless of age, race, gender, or size of county. Unintentional injuries are the leading cause of death for Iowans between the ages of 1 and 34, while suicides and/or homicides also rank among the top five leading causes of death for Iowans between the ages of 1 and 54. Unintentional injuries (often called accidents) are the 5th leading cause of death in the United States (2004)¹, as well as in Iowa, with over 1,500 injury deaths occurring on average each year (from 2002- 2006) in Iowa. Further, injuries are the third leading cause of premature death in Iowa, measured in years of potential life lost.

However, deaths are only a portion of the impact of injury on Iowa as indicated in Figure 1 below². Injuries lead to more than 17,000 hospitalizations each year in Iowa with an average cost of care of over \$9,000 per visit and more than 250,000 emergency department (ED) visits (average cost per visit of nearly \$1,000). In addition, some Iowa residents seek medical care outside of the state, leading to an estimated 1,200 additional Iowans who are hospitalized due to injuries *outside* the state each year. As noted in Figure 1, untold numbers of Iowans do not seek medical care for many of the injuries they may incur. Injury survivors may have their regular activities of daily living disrupted temporarily or may be permanently disabled. Because injuries are preventable, they lead to unnecessary medical costs, economic losses, reduced productivity, and immense physical and emotional strain.

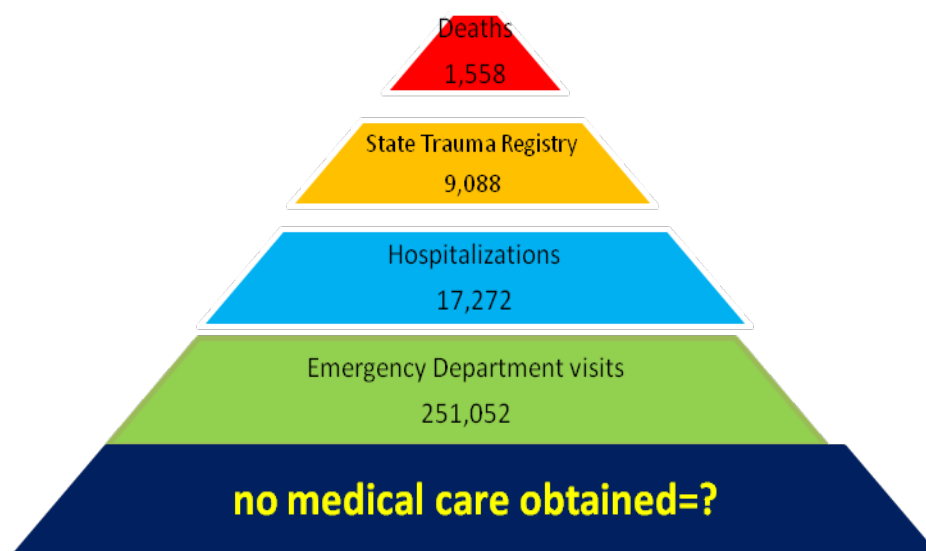


Figure 1. Iowa Injury Pyramid

Purpose of this report

Since injuries are preventable, strategies and policies can be developed to reduce this burden. However, to develop effective strategies, communities and policymakers must understand the extent and nature of injuries incurred in the state. This report, the first of its kind in Iowa, intends to present a clear picture of the burden of injuries in Iowa (from the year 2002 to 2006), in terms of mortality, morbidity, causes, and an indication of the costs of medical care for various injuries.

¹ Source: National Vital Statistics Report, Vol. 55, N 19, Aug. 2007.

² Sources of data for pyramid: Iowa Department of Public Health vital records, State Trauma Registry, Iowa Hospital Association hospital inpatient/ outpatient discharge data. Pyramid includes only Iowa residents seeking medical care within the state.

Because of the detrimental impact of injuries on the state, Iowa has adopted a number of injury-related goals as part of the Healthy Iowans 2010 initiative. This report documents Iowa's success in reducing injuries, particularly in relation to these goals, and points to further efforts that can be made to continue this reduction.

Further, this report is intended to provide information to state and local policymakers, county health departments, health practitioners, hospitals, and civic groups on the injuries to Iowans treated within the state. These data are categorized by cause, type, intent, and other indicators, which can improve injury care and stimulate and strengthen injury prevention efforts.

This report also addresses the recommendations of the 2007 visit of the State and Territorial Injury Prevention Directors' Association (STIPDA) officials to Iowa, including the task of preparing a report to address the ten injury indicators specified by the Centers for Disease Control and Prevention (CDC) National Center for Injury Prevention and Control (NCIPC).

What you will find in this report

This report combines data from Iowa Department of Public Health (IDPH) death certificates, Iowa Hospital Association hospital inpatient/outpatient discharge data, Iowa Crash Outcomes Data Evaluation System (CODES) and the Iowa trauma registry, including agricultural injuries. The main leading causes of injury deaths, hospitalizations, and ED visits by age, gender, race (whenever available) and costs are described.

More information on the authors of the report, the sources of data, and the methods of data analysis used in the report are available in the technical notes section at the end of this document.

The report begins with an overview of the burden of injury in Iowa, including a comparison of injury to other public health concerns, yearly injury trends, demographics of those injured, intent of injuries, and the years of potential life lost due to injury. Information on injury-related deaths, hospitalizations, and ED visits are presented. Key data are presented in graphical form, with key points and comparisons also noted.

Data on each of the CDC-specific injury indicators, by gender and age group, are then presented in a similar format to that of the overview section. Data for deaths, hospitalizations, and ED visits are presented for all indicators. Data on injuries incurred in motor vehicle crashes from the Iowa Crash Outcomes Data Evaluation System (CODES) are then presented in detail.

Further comparisons of the data, including to the Healthy Iowans 2010 indicators, are then presented, along with conclusions and recommendations from the data.

Detailed information on the methods used to calculate the data, including the sources of data, analysis methods, and variables used for the data are presented in Annex 1 of this report.

This report also contains a link to reports from every county of Iowa, detailing the injury death and hospitalization rates for that county by gender, age group, and cause of injury. These reports should be especially helpful to county and local public health officials to develop policies and programs and increase advocacy for injury prevention efforts at a local level. Local agencies interested in injury prevention efforts can also use these data to better inform their efforts at the local level. These reports are available from the following:

The University of Iowa IPRC Website at: <http://www.public-health.uiowa.edu/iprc/> and

IDPH Website at: <http://www.idph.state.ia.us/bh/injuryprevention>

The data tables supporting the data presented in the report are available as a PDF file from the IDPH Website at <http://www.idph.state.ia.us/bh/injuryprevention>.

How to use this report

This report is intended to provide information on the burden of injury in Iowa to assist communities, health practitioners and state and local policymakers to develop strategies and policies to reduce injuries in the state.

To accomplish this goal, potential uses of this report may include the following:

- Providing information to the media to raise awareness among them and the general public about the burden of injuries in Iowa. Media outlets may be particularly receptive to such information after a traumatic injury has occurred that has attracted a great deal of media attention.
- Promoting the need for injury prevention efforts among legislators, community groups, and others through targeted presentations and campaigns.
 - o Informed legislators (at local, state, and national levels) can help advocate for injury prevention efforts.
 - o Diverse groups working together can identify priorities and maximize prevention strategies and resources to prevent injuries.
 - o State and local public health officials can gain Ideas from current and proposed injury prevention efforts indicated in report.
- Encouraging health care practitioners (hospitals, clinics, etc) to strengthen their injury prevention efforts.
- Guiding the allocation of resources to injury prevention and prioritizing/planning injury prevention efforts.
- Providing background information for injury prevention activities and grant applications.

Overview of the burden of injury in Iowa

The following pages present an overview of the burden of injury on all Iowans from 2002- 2006, unless otherwise noted. The data in the first table show that injury is an important public health concern for all age groups in Iowa. The leading causes of injury in Iowa in each age group are then presented to provide insight on prevention efforts that are needed in various portions of the life span of Iowans. Next, the trends of injury over the five-year period are presented to provide information on any major changes in the data over time, which can inform decisions on potential interventions, legislative or reporting method changes, and other similar efforts.

Data are then presented on the differing impact that injuries have on males and females, people of different races, age groups, and rural compared to urban residents. This information can assist with the design of injury prevention and care efforts to target specific segments of the population. Data show the proportion of all deaths, hospitalizations and ED visits that are due to injuries, which underlines the large burden of injuries on health care systems and on all society. Data are then presented on the intent of injuries, which emphasizes the need for continued and specific efforts to prevent both unintentional injuries (often called accidents), as well as homicides and suicides (intentional injuries). This section concludes with data on the years of potential life lost due to injuries and demonstrates the disproportionate impact of injuries on the young people of Iowa who are the future of the state.

When considering the data in the overview section, please note the following:

- The data for deaths and hospitalizations are the yearly averages from 2002-2006, and the data for ED visits is the yearly average from 2003-2006, unless otherwise noted.
- Data for hospitalizations and ED visits include *all* hospitalizations and ED visits, rather than only reporting the first hospitalization or ED visit for each injury.
- Note that the ED visit data are from 2003-2006 as the ED visit data from 2002 were recorded in a different manner than 2003-2006. Also, the data from CDC WISQARS in the first two tables are from 2002-2005 as the CDC data from 2006 were not available at the time this report was drafted.
- Rates are reported as average yearly rates per 100,000 population unless noted otherwise. These rates were determined by calculating the rate for each year per 100,000 people in the state or counties (as appropriate), adding the rates, and dividing by the total number of years of data (5 for deaths and hospitalizations and 4 for ED visits), for a yearly average.
- All rates reported in this section are age-adjusted to the 2000 US population, unless noted otherwise. More information on details of the age adjustment and rate calculation is available in Annex 1 of this report. It is known that the number of hospitalizations and ED visits for various injury causes is underreported, as 22% of hospitalizations and 16% of ED visit records are NOT coded with an electronic cause code.
- Reported values for frequencies of various events may not exactly match the values in other sections of the report due to missing data for the variable analyzed in that particular section.
- All age groupings are presented using CDC life span ages, which is similar to the National Institute for Occupational Safety and Health (NIOSH) occupational age groupings.
- More detailed technical notes and methodology are included in Annex 1 of this report.

Injury is a major cause of death in Iowa

Injuries are a major public health concern in Iowa due to the large number of Iowans affected by them. Like the entire U.S., unintentional injuries are the fifth leading cause of all death for Iowans of all ages and are also the leading cause of death for Iowans from 1 to 34 years of age.

Table 1: Five leading causes of ALL deaths in Iowa by age groups and total # of deaths, 2002-2005

Rank	<1	1 to 4	5 to 14	15 to 24	25 to 34	35 to 44	45 to 54	55 to 64	65 to 74	75 to 84	85 +	All Ages
1	Congenital Anomalies- 210	Unintentional Injury- 55	Unintentional Injury- 133	Unintentional Injury- 545	Unintentional Injury- 353	Malignant Neoplasms- 518	Malignant Neoplasms- 1,913	Malignant Neoplasms- 3,837	Malignant Neoplasms- 6,297	Heart Disease- 8,931	Heart Disease- 13,474	Heart Disease- 30,757
2	Short Gestation- 100	Congenital Anomalies- 15	Malignant Neoplasms- 47	Suicide- 219	Suicide- 214	Heart Disease- 475	Heart Disease- 1,348	Heart Disease- 2,331	Heart Disease- 4,044	Malignant Neoplasms- 8,168	Malignant Neoplasms- 4,728	Malignant Neoplasms- 25,735
3	SIDS- 99	Homicide- 13	Congenital Anomalies- 16	Malignant Neoplasms- 66	Malignant Neoplasms- 143	Unintentional Injury- 439	Unintentional Injury- 532	Chronic Low. Respiratory Disease- 529	Chronic Low. Respiratory Disease- 1,418	Chronic Low. Respiratory Disease- 2,584	Cerebrovascular- 4,191	Cerebrovascular- 8,169
4	Maternal Pregnancy Comp.- 65	Malignant Neoplasms- 12	Heart Disease- 15	Homicide- 46	Heart Disease- 89	Suicide- 269	Suicide- 295	Unintentional Injury- 353	Cerebrovascular- 836	Cerebrovascular- 2,562	Alzheimer's Disease- 2,511	Chronic Low. Respiratory Disease- 6,504
5	Placenta Cord Membranes- 41	Heart Disease- 5	Suicide- 9	Heart Disease- 36	Homicide- 39	Liver Disease- 70	Liver Disease- 195	Diabetes Mellitus- 320	Diabetes Mellitus- 519	Alzheimer's Disease- 1,122	Influenza & Pneumonia- 2,291	Unintentional Injury- 4,567

Source: CDC Web-based Injury Statistics Query and Reporting System (WISQARS- www.cdc.gov/ncipc/wisqars/)

- Unintentional injuries are the 3rd leading cause of death for 35- to 54-year olds in Iowa, after cancer and heart disease.
- Suicide is the 10th leading cause of all deaths in Iowa (2005), while it ranked 11th in all the US (2005).
- Suicide is the 2nd leading cause of all deaths for 15- to 34-year olds in Iowa, the 4th leading cause for Iowans aged 35 to 54, and the 5th leading cause for Iowans aged 5 to 14. Suicide deaths rank slightly higher in Iowa than in the rest of the U.S. in most age categories.
- Homicide ranks lower among causes of death in Iowans, particularly among 5- to 34-year olds, than the US average³.
- Despite the large number of deaths due to injuries, most injuries are not fatal. However, they are still devastating as described later in this report.

³ All comparisons to national data on this page are from CDC WISQARS (2002-2005)

Motor vehicle crashes are the leading cause of injury death in Iowa

Motor vehicle traffic deaths are the leading cause of injury-related deaths for all ages of Iowans, followed by falls. These and other leading causes of injury death vary by age group.

Table 2: Five leading causes of INJURY deaths in Iowa by age groups and total # of deaths, 2002-2005

Rank	<1	1 to 4	5 to 14	15 to 24	25 to 34	35 to 44	45 to 54	55 to 64	65 to 74	75 to 84	>85	All Ages
1	Suffocation - 12	MV Traffic - 20	MV Traffic - 73	MV Traffic - 422	MV Traffic - 203	Suicide - 244	Suicide - 271	MV Traffic - 153	Falls - 122	Falls - 342	Falls - 618	MV Traffic - 1,688
2	Homicide - 7	Homicide - 12	Fire/burn - 10	Suicide - 212	Suicide - 202	MV Traffic - 209	MV Traffic - 246	Suicide - 132	MV Traffic - 169	MV Traffic - 169	Unspecified - 183	Falls - 1,255
3	Drowning - 5	Drowning - 10	Drowning - 9	Homicide - 41	Unintentional Poisoning - 53	Unintentional Poisoning - 53	Unintentional Poisoning - 83	Falls - 63	Suicide - 64	Unspecified - 69	MV Traffic - 85	Suicide - 1,252
4	MV Traffic - 4	Fire/burn - 8	Suicide - 9	Unintentional Poisoning - 36	Homicide - 24	Homicide - 25	Falls - 54	Unintentional Poisoning - 21	Suffocation - 30	Suffocation - 66	Suffocation - 67	Unintentional Poisoning - 322
5	Unspecified - 2	Pedestrian, Non-MVT - 4	Pedestrian, Non-MVT - 7	Drowning - 31	Falls - 14	Falls - 25	Suffocation - 25	Suffocation - 18	Adverse Effects - 26	Suicide - 61	Adverse Effects - 32	Suffocation - 249

Source: CDC Web-based Injury Statistics Query and Reporting System (WISQARS- www.cdc.gov/ncipc/wisqars/)

- Motor vehicle traffic trauma is the leading cause of injury death for Iowans from the age of 1-34 and 55-64, while falls are the leading cause for injury death for Iowans ages 65 and over, the same as in the entire U.S.⁴.
- Suicide is the leading cause of injury death among 35- to 54-year olds, which accounts for 41% of the total suicides in Iowa.
- Homicides are in the top five causes of injury death in Iowa only in children under 5 and in young adults (15-44 years), while homicides are in the top five causes of injury deaths in the entire U.S. for all age groups under the age of 45.

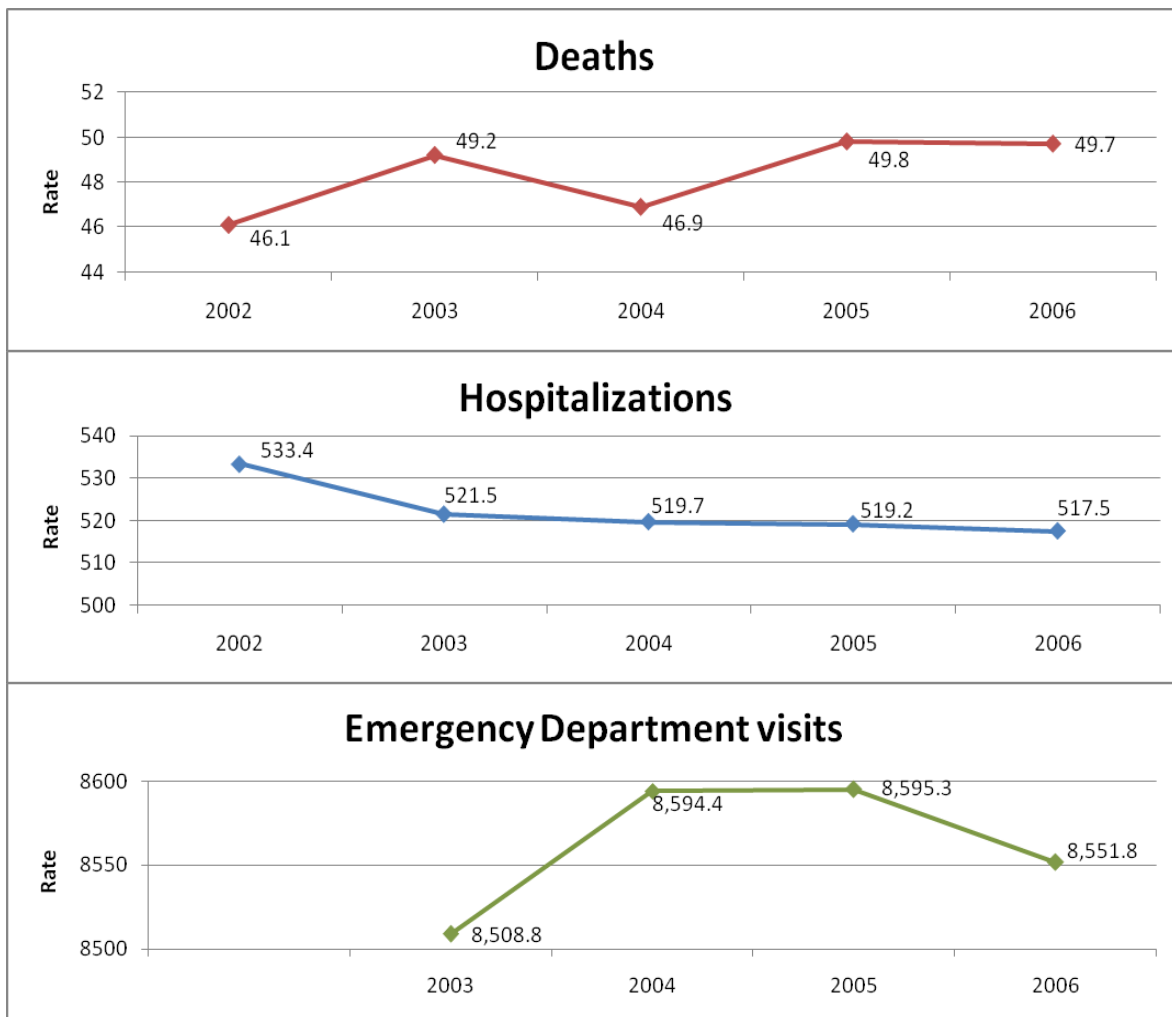
Note that the numbers listed in this table were calculated slightly differently than those in the previous table, so some small differences may exist.

⁴ All comparisons to national data on this page are from CDC WISQARS (2002-2005).

Injury-related death, hospitalization and emergency department visit rate trends, Iowa, 2002-2006

Over the five-year period (2002-2006) of this report, age-adjusted injury death rates (# of events/ 100,000 population) were basically constant with a slight upward trend, ranging from 46.1 to 49.7 deaths/ 100,000 Iowans. In addition:

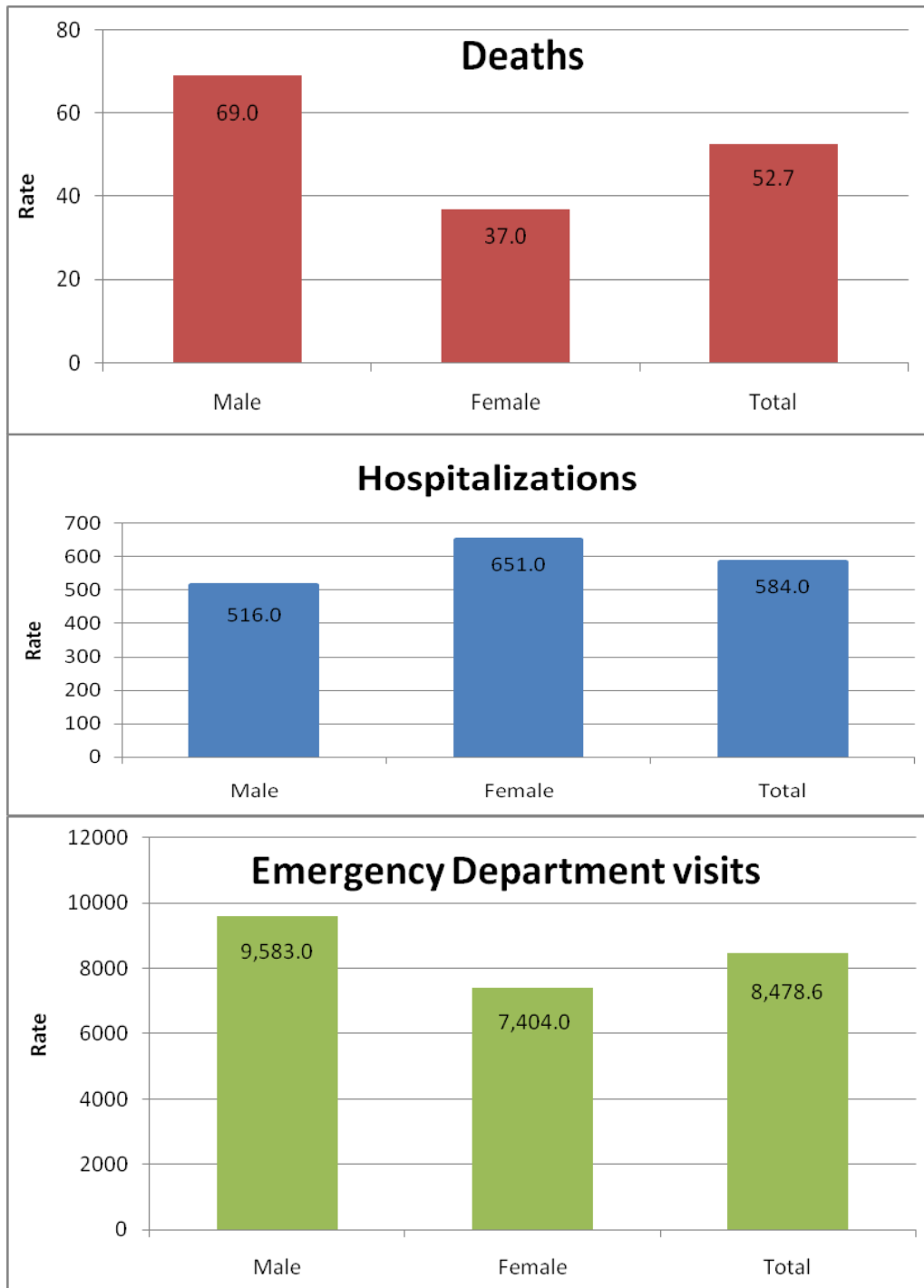
- Injury death rates in Iowa are lower than the national average injury death rate, which increased slightly from 55.7 to 57.6/ 100,000 US population from 2002 to 2005⁵.
- The age-adjusted injury hospitalization rate was also basically constant, with a slight decrease over time (from 533 to 518 injury hospitalizations/ 100,000 Iowans). This is lower than the 2004 national median rate for all injury hospitalizations across the NCIPC reporting states (555/100,000 US population⁶).
- The injury ED visit age-adjusted rates have increased over their four-year reporting period (2003-2006), although declining from 2005 to 2006. The data show that after adjusting for age, for every 100 Iowans, there are, on average, eight injury-related ED visits.



⁵ CDC WISQARS (2002-2005)

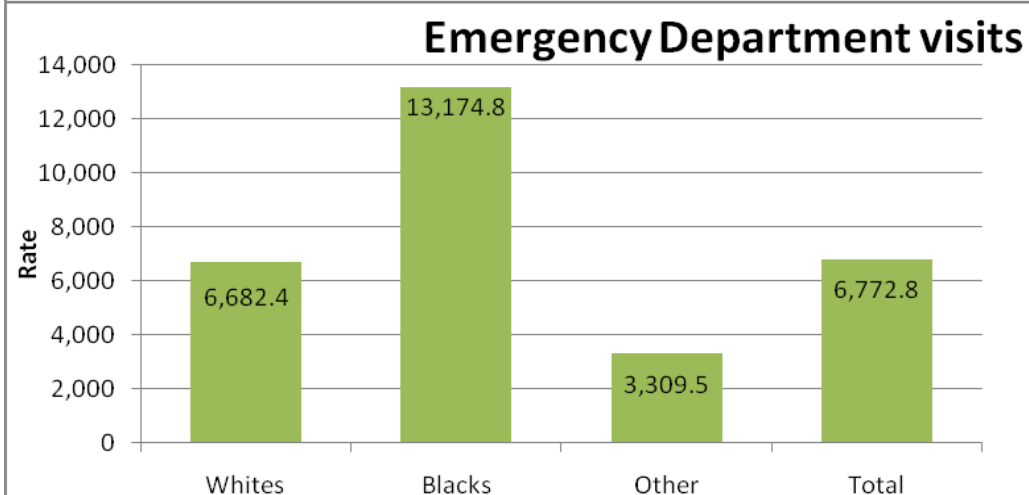
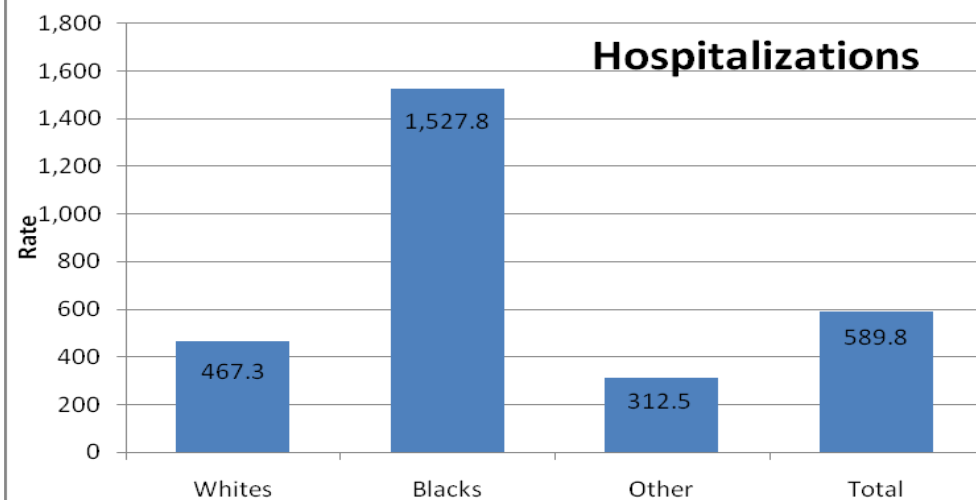
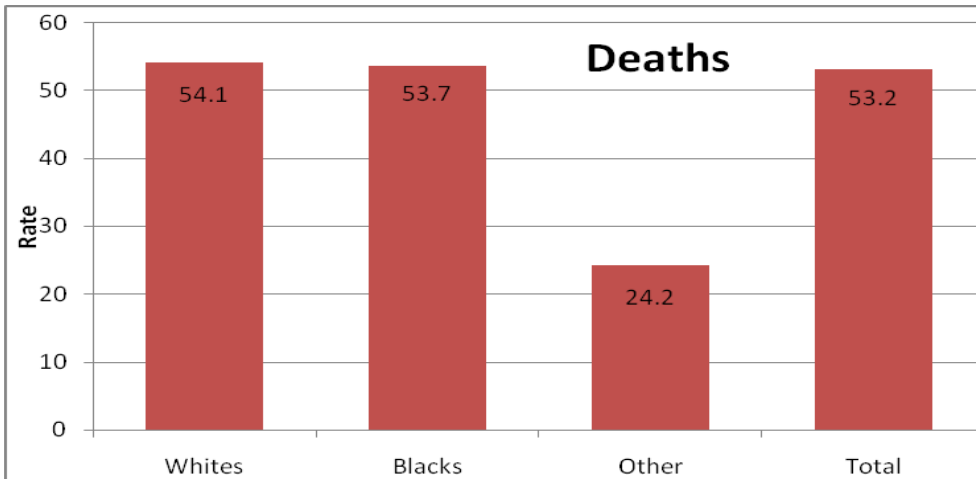
⁶ CDC NCIPC State Indicators Report, 3rd Edition, 2004 data

Injury affects genders, races, and age groups in Iowa differently: 2002-2006 average rates of injury (per 100,000 Iowans) by gender



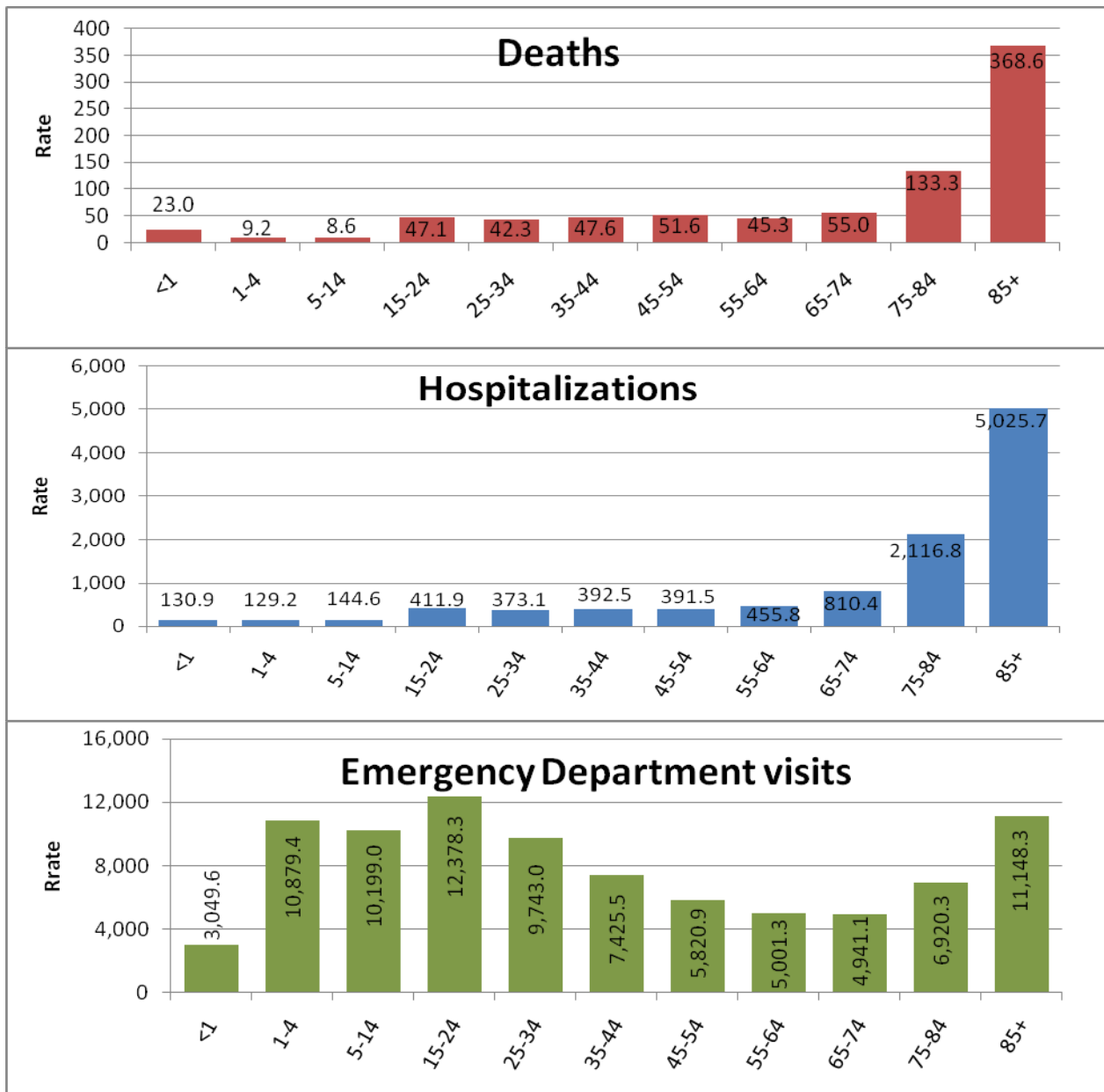
- The rate of males dying in Iowa due to injury (69) is nearly double that of females (37).
- The differences between genders vary greatly, depending on the specific indicator and age of the victim.
- Iowa females have a greater injury hospitalization rate, but a lower ED visit rate than males.
- Caution is needed when interpreting these differences since the rates are not age-adjusted.

Injury rates (per 100,000 lowans) by race, 2002-2006



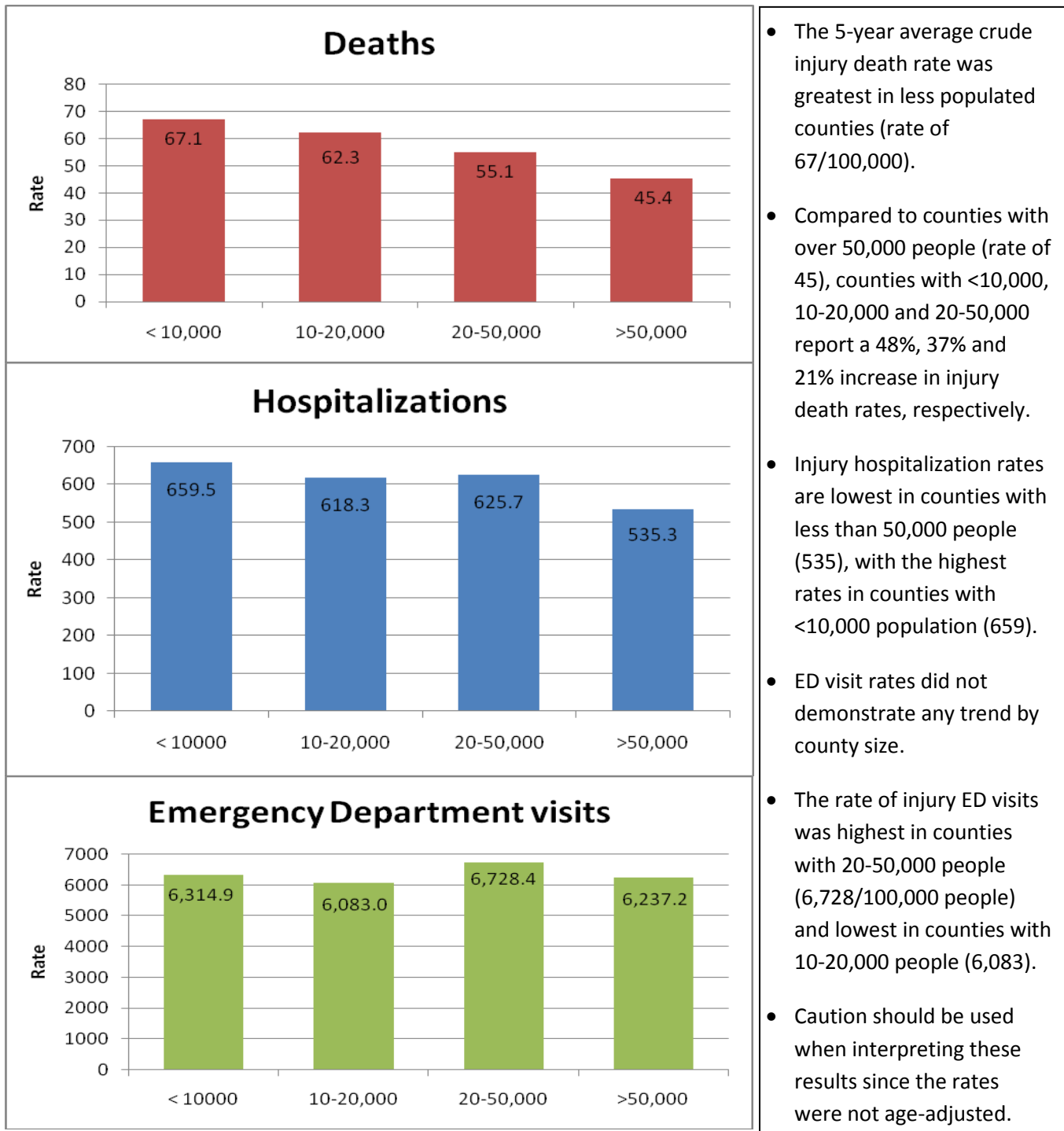
- The crude injury death rate for blacks in Iowa (54) is comparable to that of whites (54).
- Blacks (1,528) in Iowa are 3 times more likely to be hospitalized for an injury than whites (467).
- Blacks are more than 2 times more likely to go to the ED for an injury than whites.
- Other racial groups combined together (Hispanic, Asians, Natives, etc.) have lower crude rates for injury deaths, hospitalizations and ED visits than whites and blacks.
- A large amount of data on race (22% and 21%) is missing for hospitalizations and ED visits, respectively.
- Caution should be used when interpreting these results since the rates were not age-adjusted.

Injury rates (per 100,000 lowans) by age group, 2002-2006



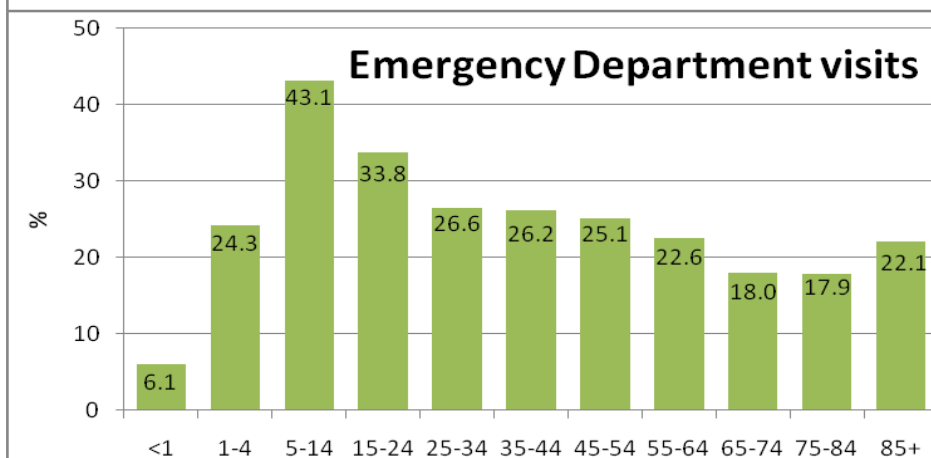
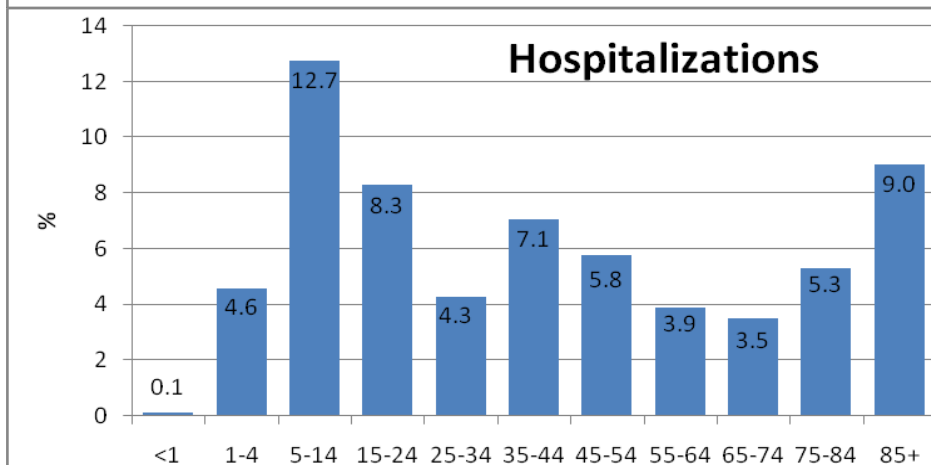
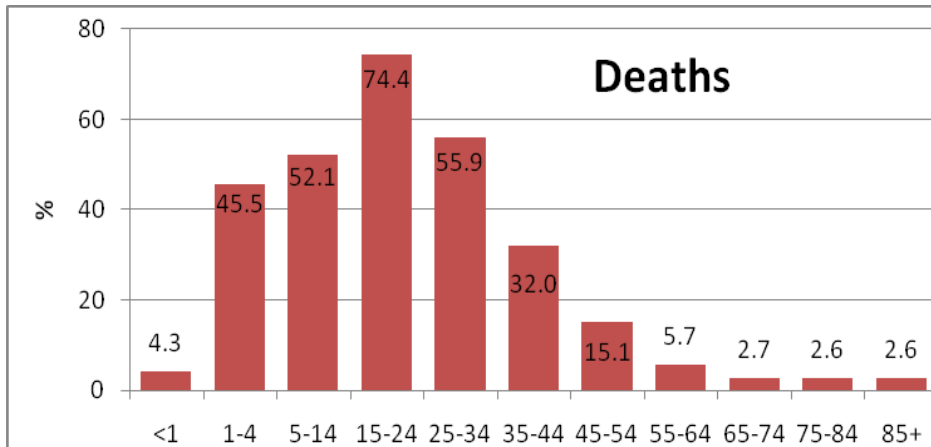
- Injury death and hospitalization rates in Iowa increased with age. Rates of injury deaths (369) and hospitalizations (5,026) are by far the highest in those aged 85 and over.
 - Hospitalization rates for seniors (85+) in other NCIPC reporting states (in 2004) range from 2,600 to 6,800/ 100,000 population; thus, Iowa is also within this range.
- Injury- related ED visit rates were greatest among youth and the elderly. Iowa adults between the ages of 45 and 74 had a low rate of 5 ED visits per 100 people, contrasted with youth aged 15 to 24 that had double the rate, of approximately 12 ED visits per 100 people.
- ED visit rates due to injuries were highest among 15- to 24-year olds, followed by those aged 85+.

Injury death, hospitalization and emergency department visit rates differ by county size, 2002-2006



More detailed information on the burden of injury in each county in Iowa is available as an annex to this report.

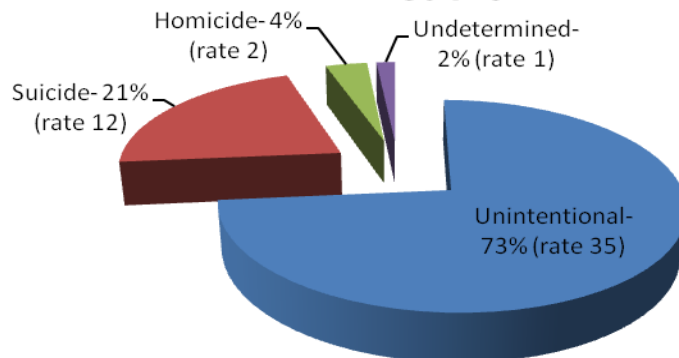
Injuries are a large percentage of all deaths, hospitalizations, and emergency department visits, and varies by age group in Iowa, 2002-2006



- Injuries accounted for 6% of all deaths in Iowa. However, this percentage varies by age group.
- Youths aged 15-24 are the age group with by far the greatest proportion of deaths from injury (74%) compared to all deaths.
- Young adults (aged 25-34) have the second highest proportion (56%) of deaths due to injury.
- Therefore, injury prevention is a very important public health issue for all entities working with children and youth.
- On average, injury hospitalizations represented 5% of all hospitalizations.
- Among children between 5-14 years old, injury hospitalizations corresponded to 13% of all hospitalizations, the highest proportion of all age groups.
- The percent of injury ED visits as a proportion of all ED visits is highest among those age 5 to 14 (43%).
- Overall, one in four (27%) ED visits is due to injury.

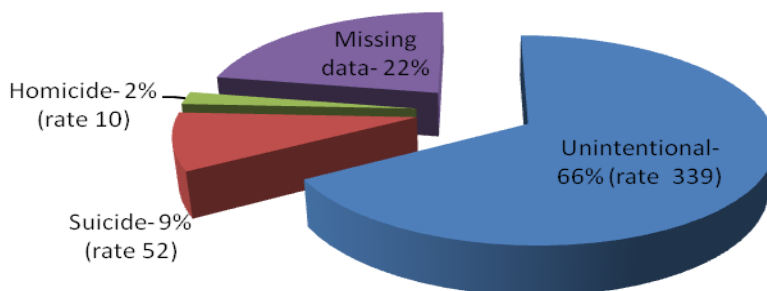
Most injuries in Iowa are unintentional, 2002-2006

Deaths



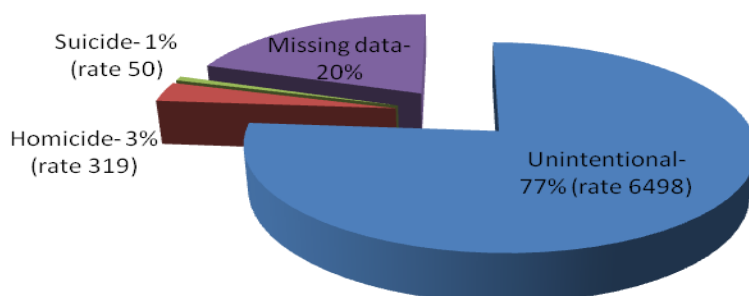
- 73% of injury deaths in Iowa (2002-2006) were classified as unintentional, with 21% as suicide and 4% as homicide.
- Iowa's unintentional injury (Iowa: 35 vs. US: 39) and homicide death rates (Iowa: 2 vs. US: 6) are lower than the national average, while the suicide rate is higher than the national average (Iowa: 12 vs. US: 11).

Hospitalizations



- For every one death due to unintentional injury (rate= 35), there are nearly 10 hospitalizations (rate=339).
- 22% of injury-related hospital visits did not have an intent coded.
- For every 100 Iowans, there were, on average, 6 to 7 ED visits due to unintentional injuries (from 2002-2006).

Emergency Department visits

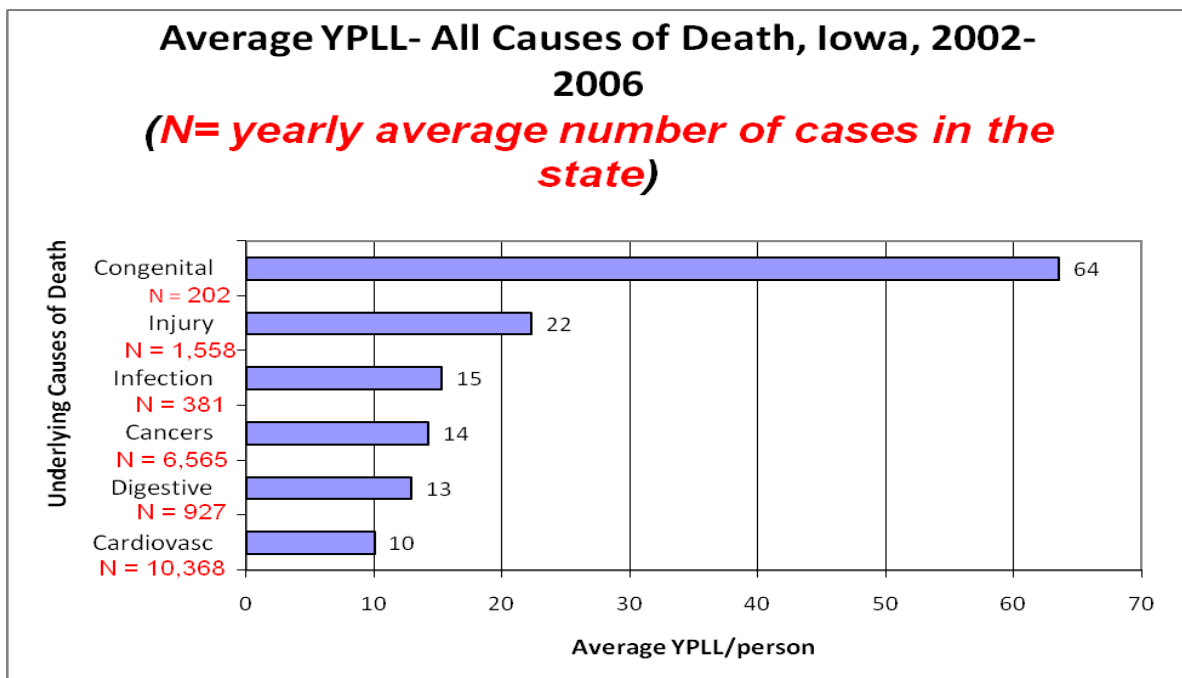
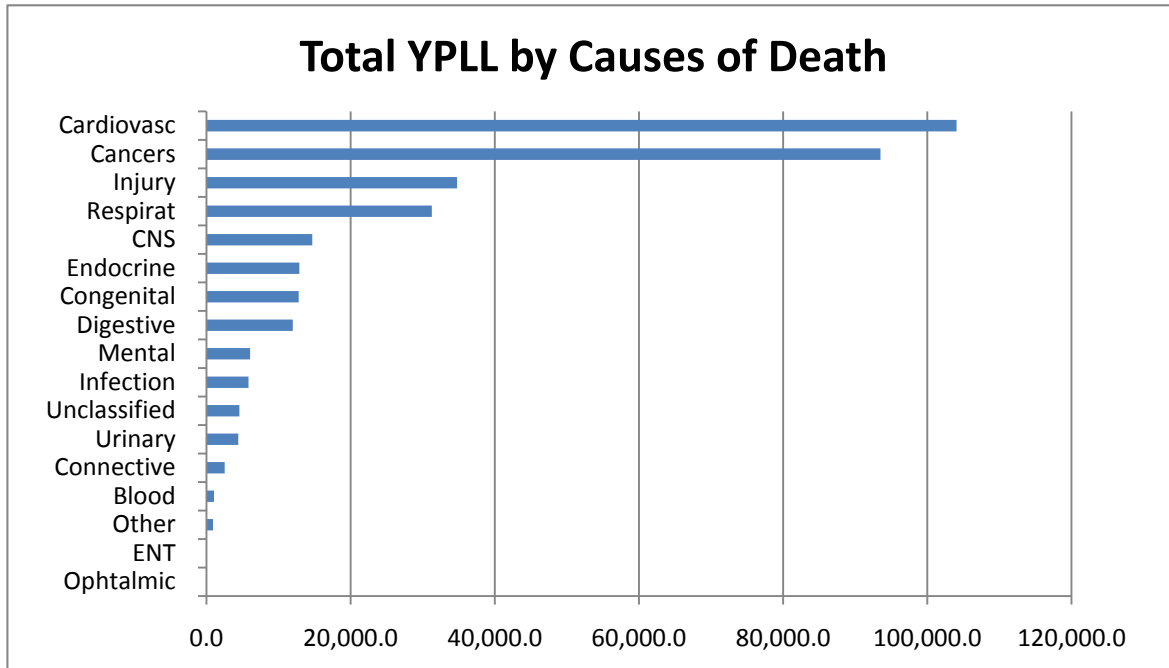


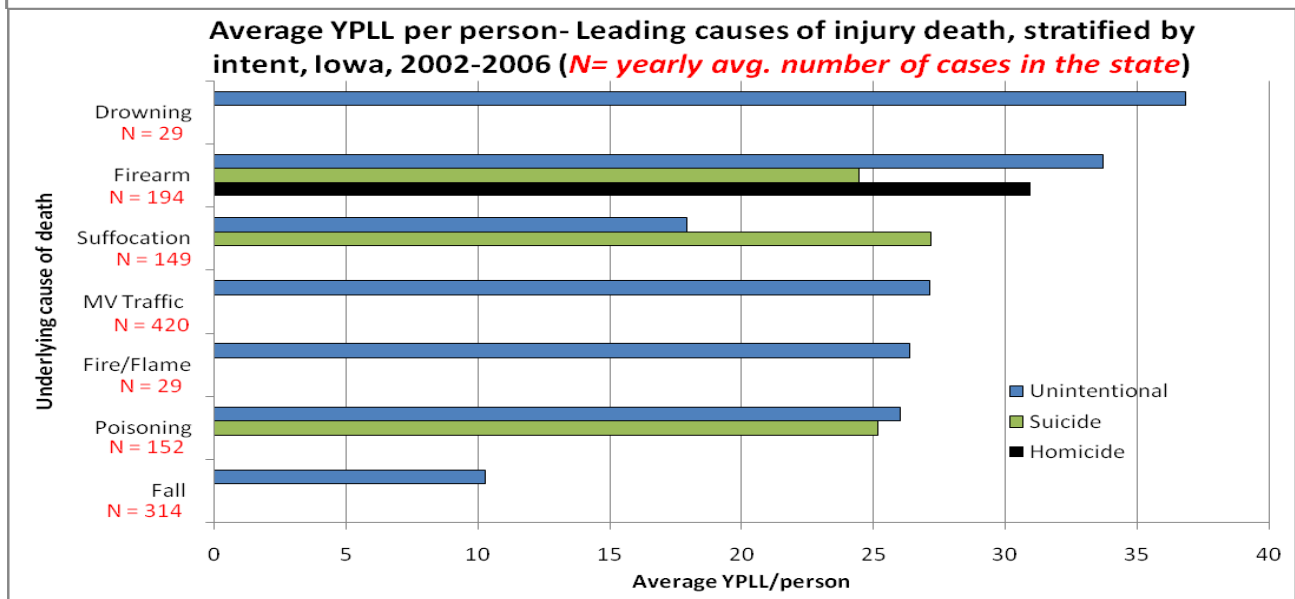
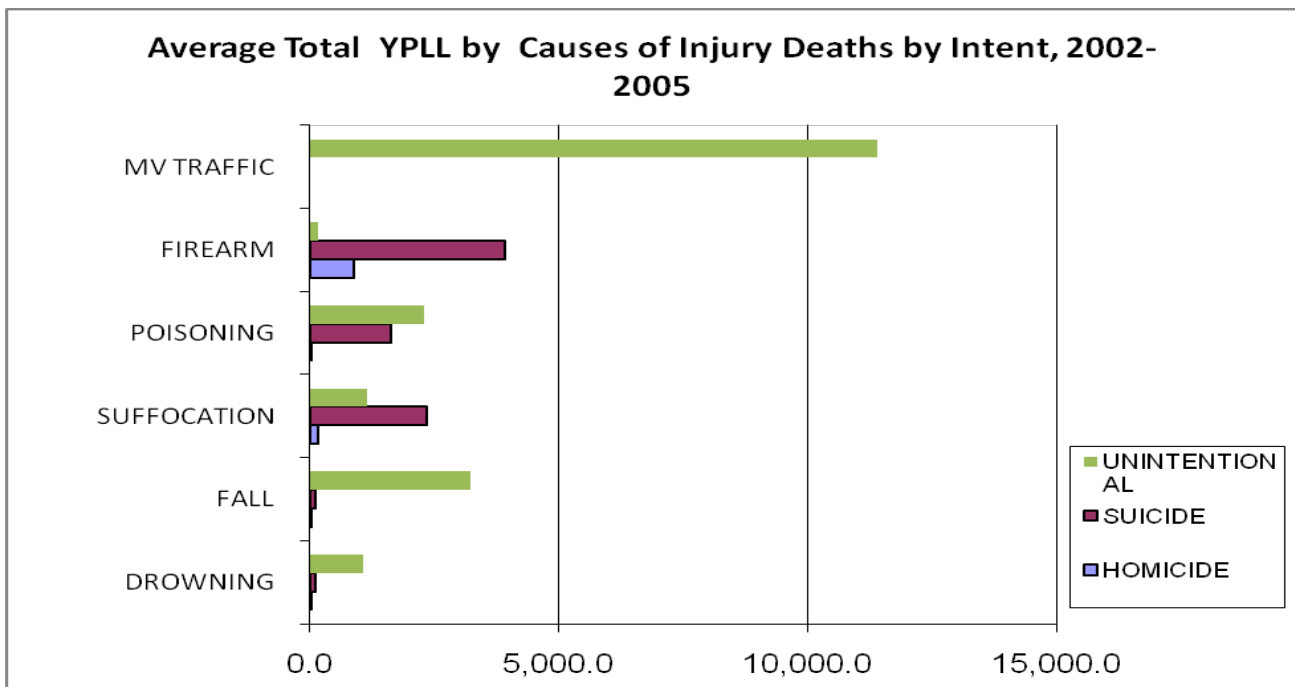
- The age-adjusted rate of homicide/assault-related ED visits (319) was greater than the suicide-related ED visit rates (50).
- The suicide rate is larger than the homicide rate for deaths and hospitalizations.

Mechanisms of intentional injuries (violence) in Iowa

- Firearms (50%), suffocation (27%), and poisonings (20%) are the leading mechanisms of suicide deaths in Iowa.
- Firearms (52%), cut/pierce (15%), and suffocation (7%) are the leading mechanisms of homicide deaths in Iowa.
- Although poisonings are only the 3rd leading mechanism of death by suicide, they are by far the leading mechanism of suicide attempt-related hospitalizations, with an average of 1,400 cases per year.
- Struck by/against (4.6/100,000), followed by cut/pierce (1.9/100,000) are the leading mechanisms of assault-related injury hospitalizations.

Years of potential life lost by causes and intent





- In Iowa, (from 2002-2006), cardiovascular diseases are the leading cause of total YPLL followed by cancers and injury. Injuries contributed to over 34,000 YPLL.
- Looking at the average years of potential life lost, congenital diseases are the greatest contributors (64 YPLL), with all injuries (22 YPLL) being the third largest contributor.
- Unintentional injuries, particularly MVT by far, have the greatest impact on the total YPLL.
- On average, Iowans who died in 2002-2006 by unintentional drowning lost 37 years of potential life.
- Unintentional firearm (34 years) and homicide by firearm (31 years) were the 2nd and 3rd YPLL mechanisms.

Note: In the third and fourth graphs, the intent/cause combinations with an average of < 5 cases per year are not shown.
 Note: The N listed for each cause is the yearly average number of cases for the intents listed for that cause.

Specific injury indicators

The Center for Injury Prevention and Control, Centers for Disease Control and Prevention (CDC), in collaboration with the State and Territorial Injury Prevention Directors Association (STIPDA), have identified 10 areas of primary concern related to tracking the burden of injury in a particular state. Injury indicators associated with each of these areas “describes a health outcome of an injury, such as hospitalization or death, or a factor known to be associated with an injury⁷.” This section provides information on each of these indicators and their relationships to other indicators.

It must be noted that the indicators are NOT mutually exclusive as some of the indicators are causes (fires), others intents (suicide or homicide) and types (traumatic brain injury) of injury. Therefore, the numbers of incidents, rates, and the charges for one injury case may also be included in the number, rates and charges of multiple indicators. Please also note that the values reported in the chart for hospital charges per indicator include only the charges submitted by the hospital to the payer. They are included only as a general means of comparing a portion of the costs of injuries related to each of the various indicators.

Note also that hospitalization or ED data cannot be compared directly to death data, as the populations they are drawn from are different. This data table is presented only to make general comparisons between and among the different indicators. Please also note that unless otherwise stated, all rates are reported as incidents per 100,000 lowans and adjusted to the 2000 US population. **Reported values for frequencies of various events may not exactly match the values in other sections of the report due to missing data for the variable analyzed in that particular section.** More information on the calculation methods and injury coding scheme is available in the methods section in Annex 1.

Comparison of all indicators in Iowa

Table 3: All injury indicators – Total # and rates, 2002-2006

Indicator area	Deaths (2002-2006)		Hospitalizations (2002-2006)		Emergency department visits (2003-2006)	
	Average N [^]	Rate [*]	Average N [^]	Rate [*]	Average N [^]	Rate [*]
All injuries	1,558	48.3	17,272	520.5	267,073	8,953.8
Drowning ⁺	29	1.0	15	0.5	79	2.8
Falls ^u	314	8.5	7,121	197.3	61,891	1,984.0
Fire-related ^u	29	0.9	119	4.0	1,087	37.6
Firearm-related	197	6.5	69	2.4	185	6.4
Homicide/Assault	55	1.9	276	12.0	7,024	242.7
Motor vehicle traffic (MVT) ^u	420	13.2	1,648	54.8	18,911	638.9
Poisoning	165	5.6	2,008	68.9	3,423	113.2
Suicide	332	11.1	1,483	51.7	1,547	53.3
Traumatic brain injury (TBI)	554	17.3	1,821	56.8	15,456	504.9

[^]The Average N is calculated by adding the total number of incidents over the 4 or 5 year period and dividing by the appropriate number of years, for a yearly average.

^{*}All rates are reported per 100,000 population and are age-adjusted to the 2000 US population.

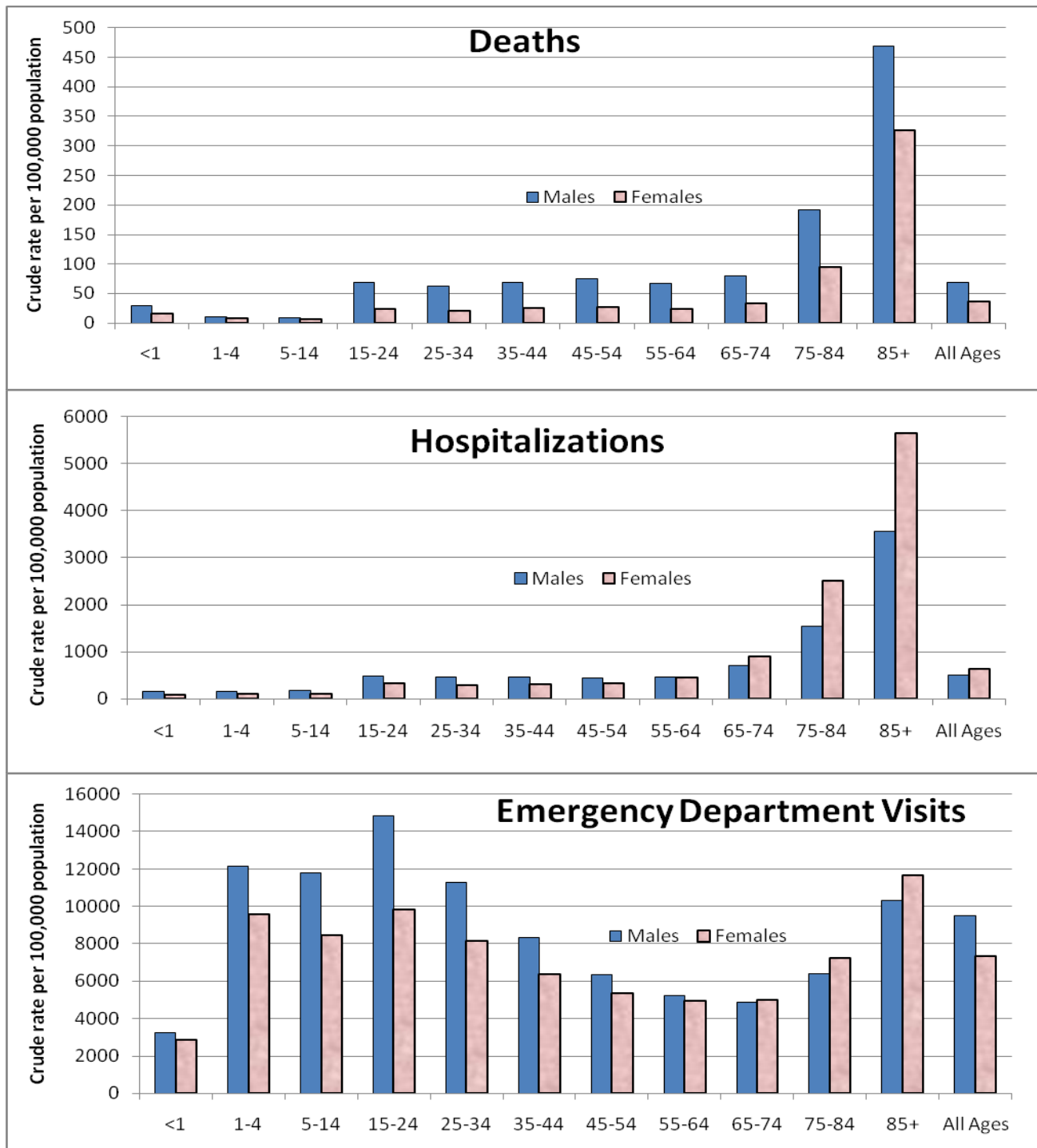
⁺The drowning indicator includes not only unintentional deaths, but all hospitalizations and ED visits.

^u Data for these indicators include only unintentional injuries.

⁷ From CDC NCIPC, available at: <http://www.cdc.gov/ncipc/>

Indicators for all injuries, Iowa, 2002-2006

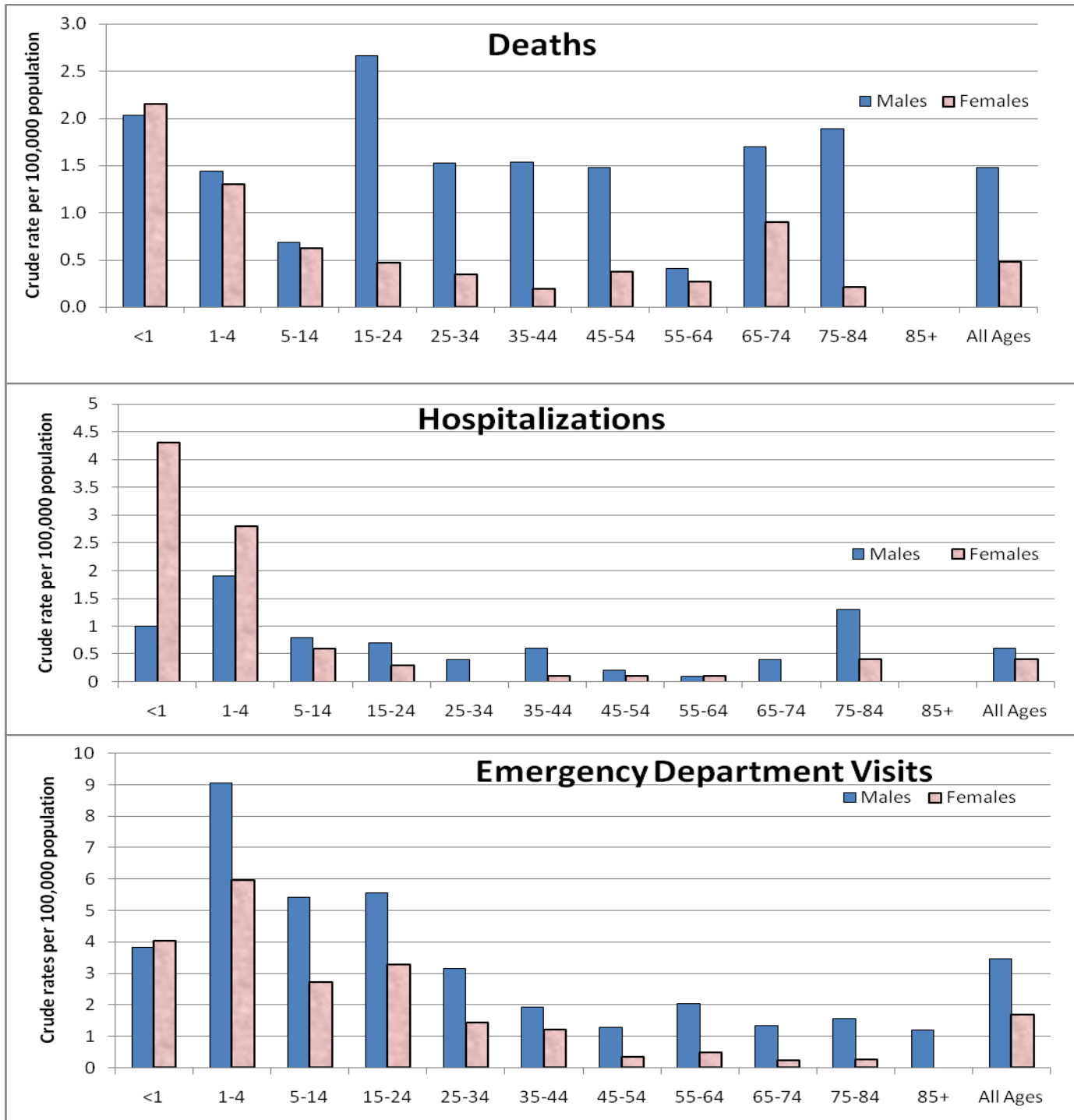
The first of these 10 indicator areas outlines the burden of all injuries in Iowa by age group and gender, including deaths, hospitalizations, and ED visits. More information on the demographic distribution of the overall injury burden in Iowa is available in the previous section of this report, the Overview of Injuries in Iowa. The subsequent specific indicators address specific causes, intents or type of injury, as appropriate. For each indicator, the rates per 100,000 population are charted, followed by a discussion of the issues reflected in the data.



- In Iowa, over the five-year period of this report there were, on average, 1,558 injury deaths; 17,267 injury hospitalizations; and 234,542 ED visits per year.
- Injury death rates vary greatly by age; however, across all ages, crude injury death rates were twice as high in Iowa males (69/100,000) as in Iowa females (36/100,000).
 - The rate of injury deaths is by far the highest in Iowans over 84 years old (males: 468/100,000; females: 327/100,000).
 - The rate of injury deaths was nearly three times higher in infants (males: 30/100,000; females: 16/100,000) than in children aged 1-4 (males: 10/100,000; females: 7/100,000).
 - As shown by the data in the previous point, the injury death rate of male infants is double that of female infants. However, gender differences in injury death rates are small for children between the ages of 1 and 14.
 - Gender differences in death rates were greater after 14 years of age, with the death rate three times higher for males (70/100,000) than females (23/100,000) in the 15-to 24-year-old age group. Iowa males who are 25-64 years old are more than 2.5 times as likely to die from injuries as females in that age group.
 - Female death rates (368/100,000) increased substantially in those over 84 years old, but still did not reach the male death rate (468/100,000).
- The age and gender distribution for injury hospitalizations is similar to that of injury deaths, except that older females are hospitalized for injuries more often than older males.
 - Across all age groups, females had a 26 percent greater injury hospitalization rate than males, with a yearly average hospitalization rate of 643/100,000 vs. 509/100,000, respectively. However, each age group has different characteristics.
 - Among Iowans under the age of 65, males had higher injury hospitalization rates than females. Among Iowans less than one year of age, males are twice as likely as females to be hospitalized due to injuries.
 - The female injury hospitalization rate steadily increased with age to surpass that of males. In Iowans aged 55-64, males and females had nearly the same hospitalization rates of 464/100,000 and 448/100,000, respectively.
 - After the 65-74 age groups, the trend reversed. Hospitalization rates for females increased significantly, exceeding that of males (900/100,000 vs. 706/100,000, respectively), and continued to increase in the older age groups.
- The rate of injury ED visits is greatest in the 15-24 age groups, with another peak in seniors (85+).
 - Even though males of all ages had a higher rate of injury ED visits than females (8,813 vs. 6,881 per 100,000 Iowans, respectively), female ED visit rates were on average 13 percent higher after the age of 65.
 - Iowa males aged 15 to 24 are more likely than females (13,759 vs. 9,180/100,000 Iowans, respectively) to go to the ED for an injury. This gender difference becomes less pronounced after age 34.

Indicators for drowning, Iowa, 2002-2006

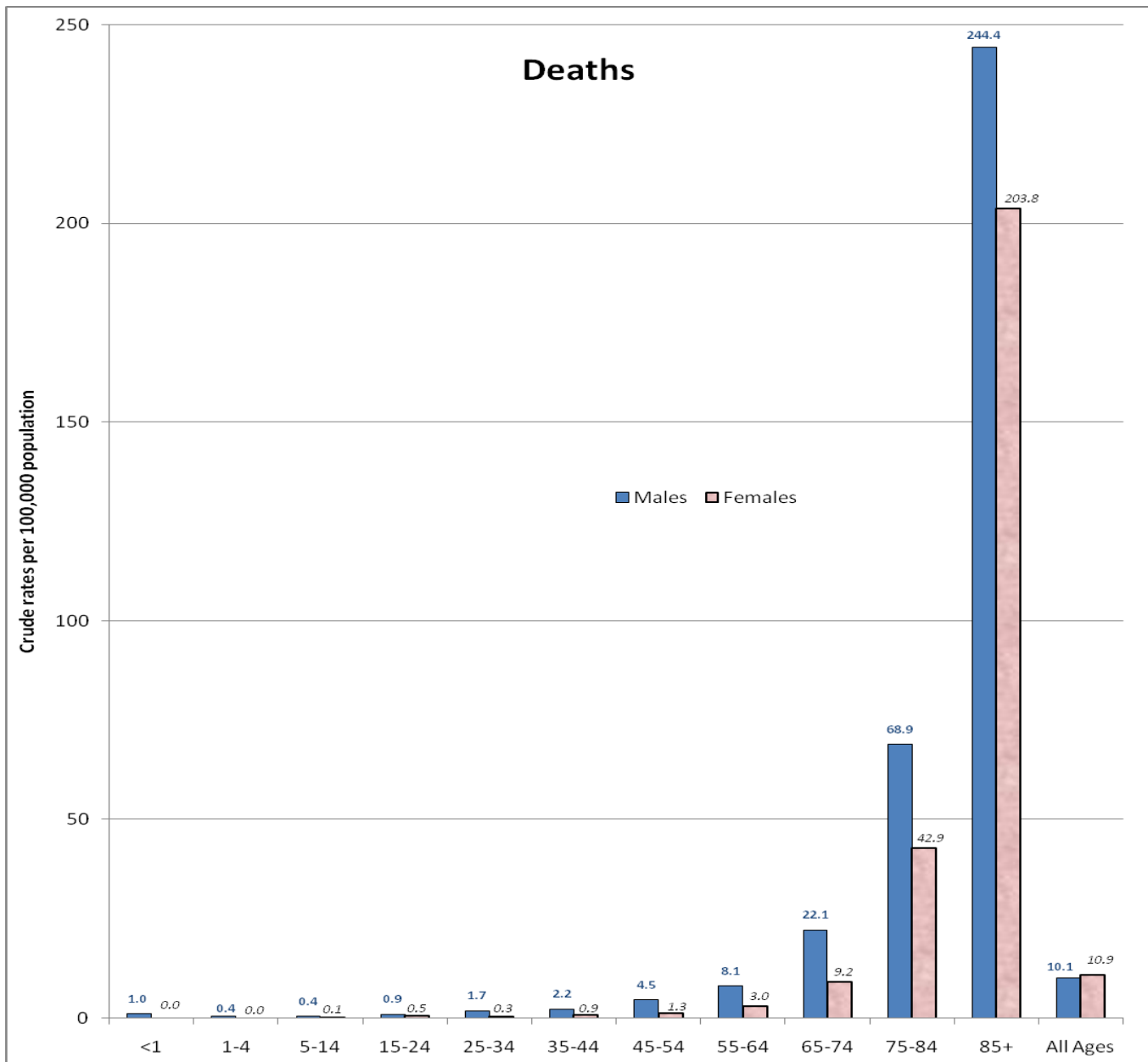
Although drowning death rates are low in Iowa (1.0/100,000), lower than the national NCIPC states' 2004 average (1.3/100,000), it is still the 3rd leading cause of injury death for Iowans under the age of 14. This underlines the importance of prevention for unintentional drowning, particularly in infants and children.



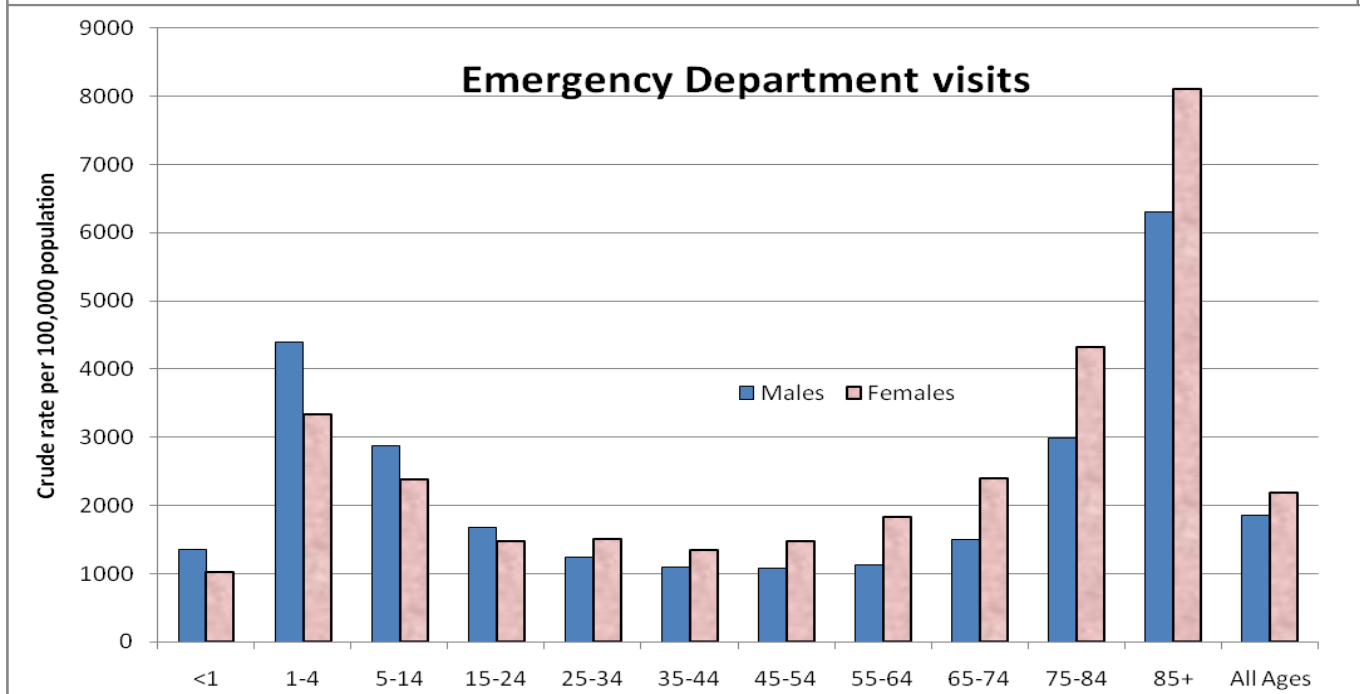
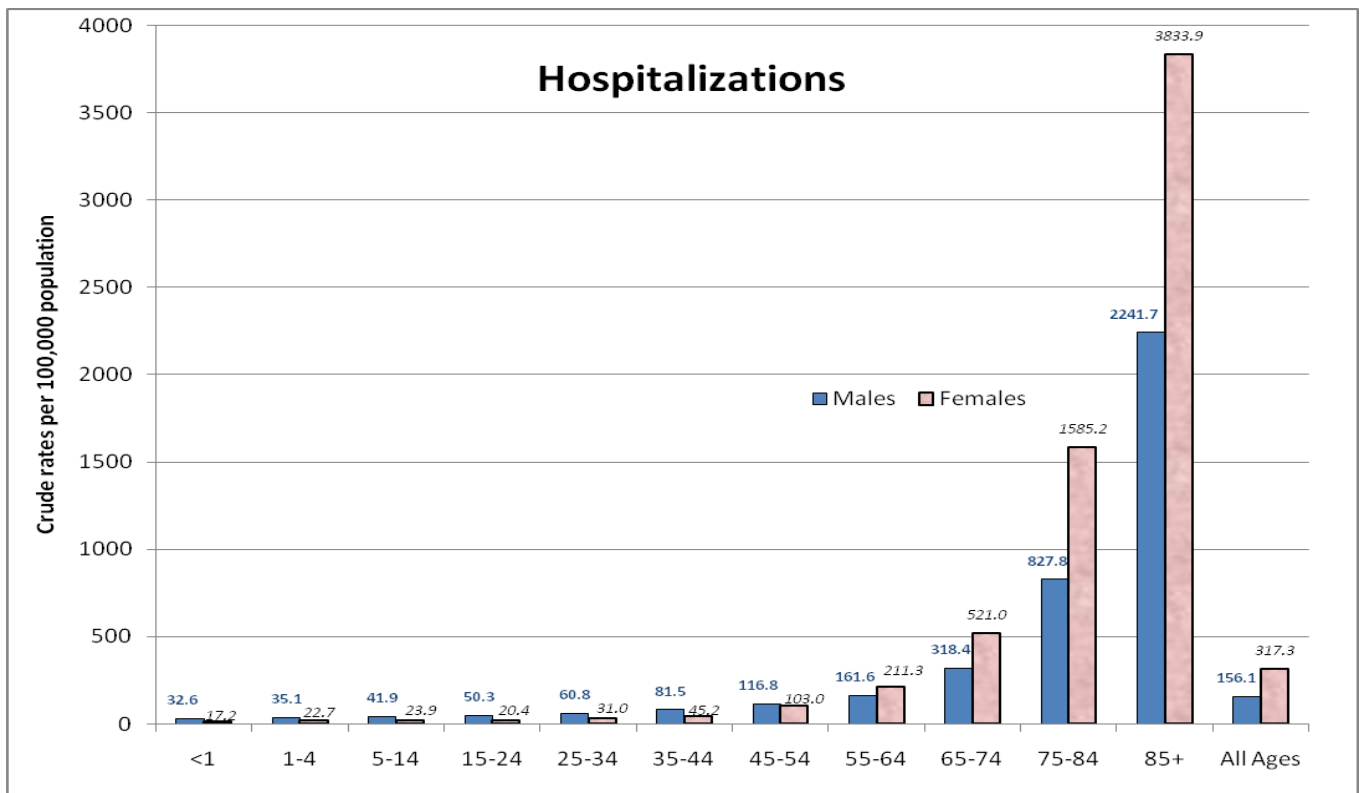
- Over the five-year period of this report, drowning in Iowa resulted in an average of 29 deaths, 15 hospitalizations, and 63 ED visits per year.
- Drowning is the 3rd leading cause of injury death for Iowans under the age of 14, and the 5th leading cause of injury death in those aged 15 to 24.
- While there were few drowning-related hospitalizations in Iowa on average (15 cases/year), there was a larger number of deaths (29 cases/year), which demonstrates the severity of any drowning incidents.
- Although the annual average death rate for drowning in Iowa for 2002-2006 is low (1.0/100,000), lower than the 2004 national average of NCIPC states (1.3/100,000), it is an important cause of injury among certain age groups.
 - Because there are low numbers of drowning deaths in certain age groups (less than 5 in some groups), only general patterns from the resultant rates should be considered.
 - Under the age of 15, drowning death rates are similar between males and females. In Iowans 15 years and older, males were more than twice as likely as females to die from drowning.
 - The highest yearly average number of drowning deaths occurred among 15- to 24-year-old males (6 cases/year), resulting in a rate of 2.7 per 100,000; while only one drowning death was reported among the same age females, with a subsequent rate of 0.5 per 100,000.
- Iowa's drowning hospitalization rate (0.5/100,000) is slightly lower than the NCIPC states' average of 0.7 per 100,000, and varies by age and gender.
 - On average, from 2002-2006, there were nine males of all ages hospitalized for drowning per year and six females.
 - Under the age of five, drowning-related hospitalization rates are higher in girls (<1: 4.3/100,000, 1-4 years: 2.8/100,000) than boys (<1: 1.0/100,000, 1-4 years: 1.9/100,000).
 - In ages five and above, more males than females were hospitalized.
 - In many age/gender groups, there was less than one drowning-related hospitalization on average per year, while there were no drowning-related hospitalizations from 2002-2006 in women aged 25-34 and 65-74.
- Males had twice as many drowning-related ED visits as females (yearly average of 42 vs. 21 ED visits).
 - For every age group, except infants less than one year of age (males: 3.8/100,000, females: 4.0/100,000), males were anywhere from two to four times more likely than females to visit the ED for drowning-related injuries.
 - The majority of ED visits occurred among children and young adults, with the greatest number (average of 10 ED visits per year) in 15- to 24-year-old males. The highest rate of ED visits occurred in 1- to 4-year-old males (7.5/100,000).

Indicators for unintentional falls, Iowa, 2002-2006

The rate of fall-related deaths in Iowa (8.5/100,000) is above the national average (6.2/100,000⁸), partially due to the large proportion of seniors (85+) in Iowa, the age group with by far the highest rate of deaths from falls (males: 244/100,000 and females: 203.8/100,000). Falls are also the leading cause of injury hospitalizations and ED visits in Iowa.



⁸ CDC WISQARS (2002-2005) www.cdc.gov/ncipc/wisgars/

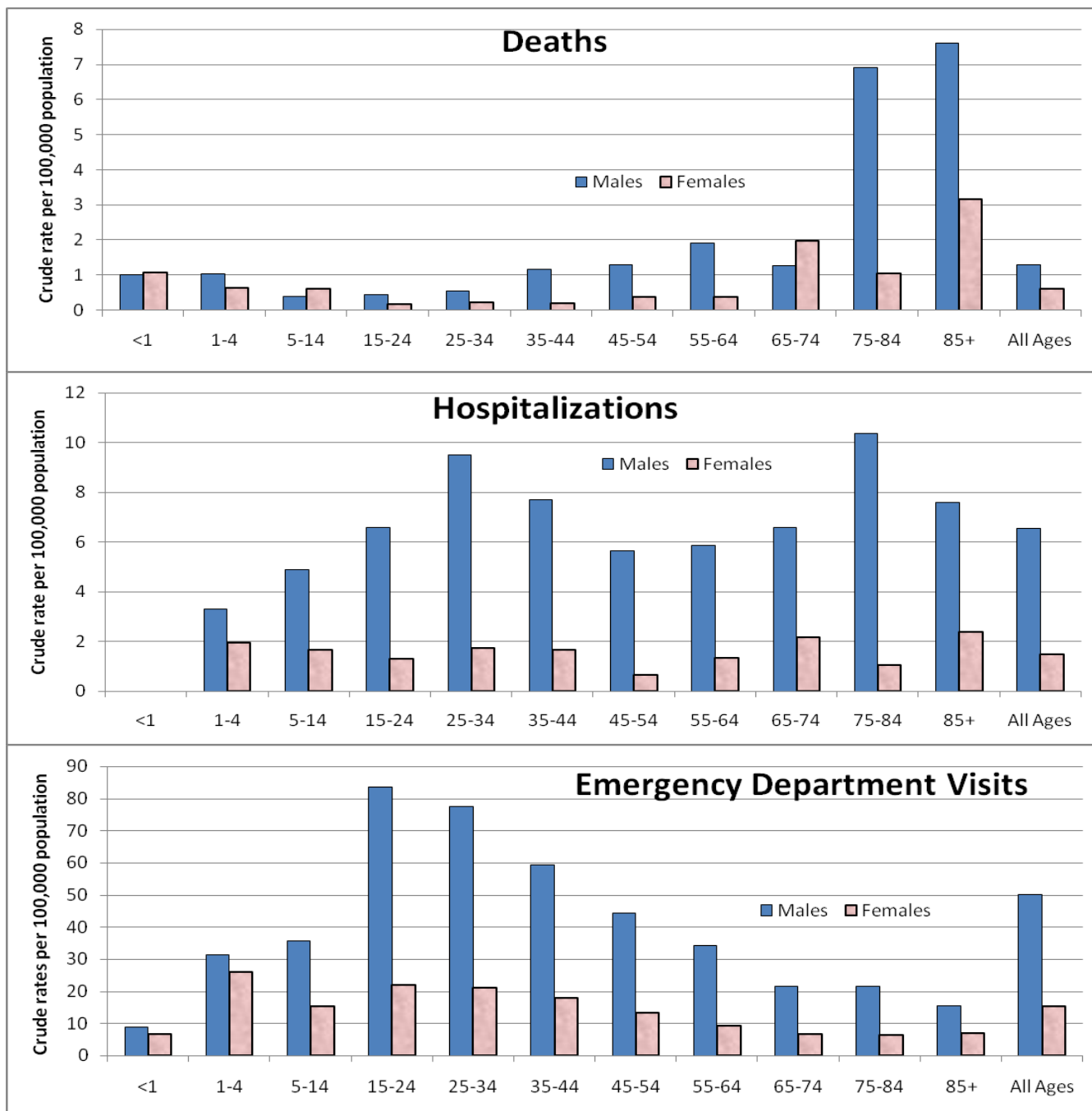


Note: Hospitalization data are for falls in Iowa, 2002-2006; emergency department visits are for falls in Iowa, 2003-2006.

- Although falls are the 2nd leading cause of injury deaths in Iowa (yearly average of 314), falls are the leading cause of injury hospitalizations and ED visits, with respective yearly averages of more than 7,100 and 57,000.
- Falls account for 20 percent of all injury deaths, 41 percent of injury hospitalizations, and 23 percent of all injury ED visits in Iowa.
- The overall fall-related death rate was about the same for males (10/100,000) and females (11/100,000). However, death rates and gender differences varied with each age group.
 - Fall-related deaths mainly occur in people over 74 years old, with by far the highest rate in those over the age of 84 (males: 244/100,000; females: 204/100,000). The average death rate increased as age increased, after the age of 14.
 - Fall-related death rates were higher in males in every age group.
 - In the 15-to 24-year olds, the average death rate for males was 0.9/100,000 vs. 0.5/100,000 for females. By 55 years of age, the rate increased to 8/100,000 (males) vs. 3/100,000 (females).
 - The greatest difference between fall death rates in males and females of the same age occurred in the 25-34 age group where males (1.7/100,000) were five times more likely than females (0.3/100,000) to die from a fall.
 - Among those aged 55 to 64, injury death rates in males (8/100,000) were more than double that of females (3/100,000).
- The demographic pattern of fall-related hospitalizations is very similar to that of deaths from falls, except that many more elderly females than elderly males are hospitalized due to falls.
 - Females of all ages (317/100,000) had twice the hospitalization rate of all males (156/100,000).
 - In the 35- to 44-year-old age group, males (82/100,000) had an 80 percent increased rate of fall-related hospitalizations over females (45/100,000). However, in the 55- to 64-year-old age group, female rates (211/100,000) were 30 percent greater than in males (161/100,000) and continued to increase with age.
 - Rates in women age 85 and over (3,834/100,000) were nearly double that of men age 85+ (2,242/100,000).
- Fall-related ED visit rates were greater in all females (2,079/100,000) than in all males (1,748/100,000) and differed greatly with age.
 - Fall-related ED visit rates peaked in those 85+ (males: 6,114/100,000, females: 7,901/100,000), with a smaller peak in ages 1-4 (males: 4,205/100,000, females: 3,189/100,000).
 - Males had higher rates of fall-related ED visits in all age groups until the age of 25, after which female rates steadily increased compared to males.
 - After the age of four, ED visit rates steadily declined for both genders until ages 45-54 (females) and 55-64 (males), where the rates began to steadily increase for both genders.

Indicators for unintentional fire-related injuries, Iowa, 2002-2006

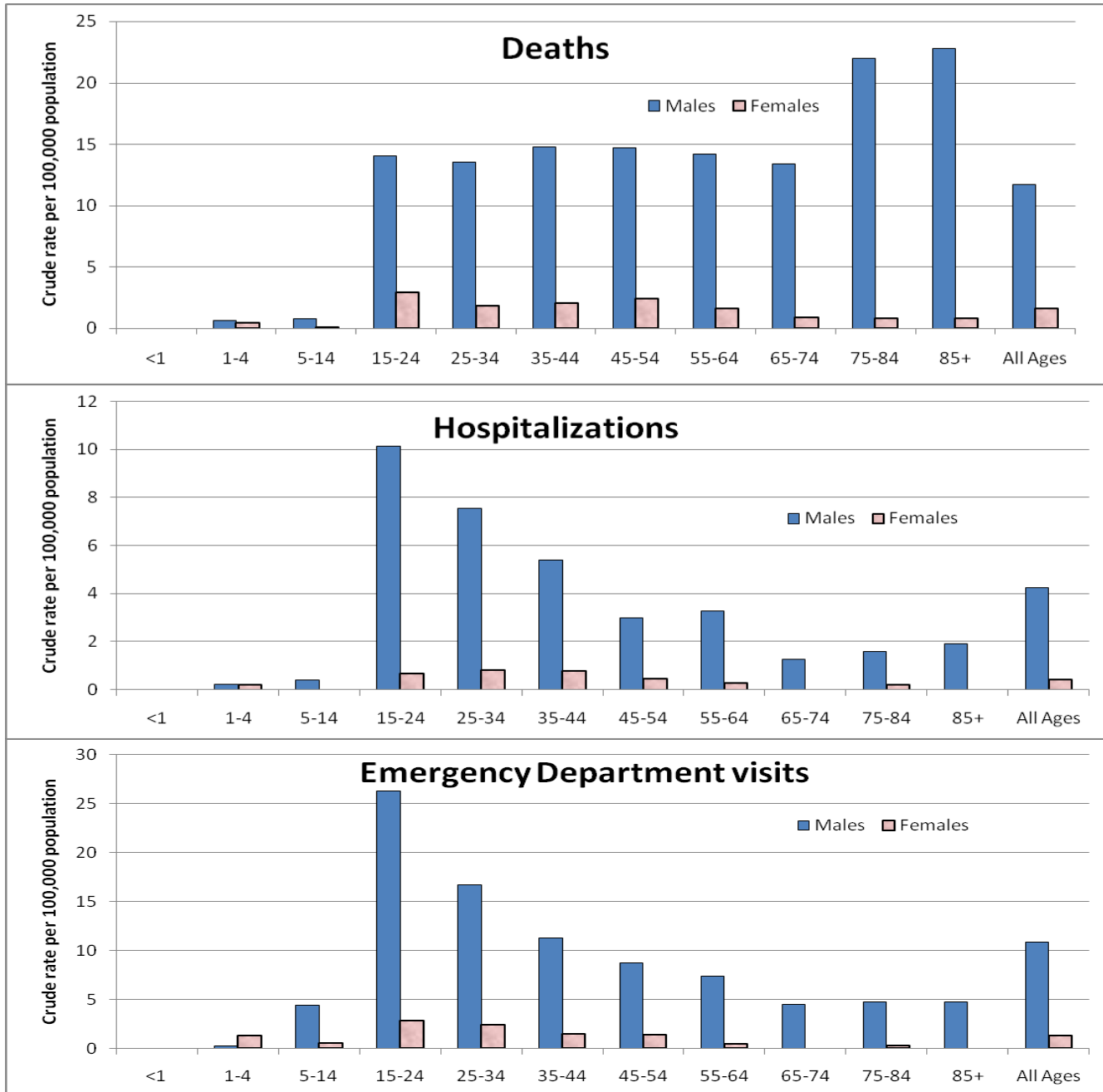
Although the rate of fire-related deaths in Iowa (0.9/100,000) is slightly lower than the national NCIPC states' 2004 average (1.1/100,000), fire injuries are still a major concern in Iowa, particularly in certain age groups. Fires can be particularly deadly for the elderly in Iowa, with males over the age of 74 having by far the highest death rates (75-84: 6.9/100,000; 85+: 7.6/100,000).



- Each year in Iowa, on average, there are 29 fire-related deaths, 119 hospitalizations and 922 ED visits.
- Fire-related deaths are twice as likely to occur in men (1.3/100,000) as in women (0.6/100,000), but these ratios vary with age.
 - Males over age 74 are the most likely group to die from fire-related injuries (ages 75-84, rate of 6.9/100,000; ages 85+, rate of 7.6/100,000). Among females, the 85+ age group is the most likely to die from fire-related injuries (3.2/100,000).
 - There were, however, less than five deaths in every age/gender group, which makes interpretation of any rate calculation difficult.
- Fires are particularly deadly for the elderly, as their ability to escape from a fire is often limited by mobility. In fact, the fire-related death rates for both men and women, in both the 75-84 and 85+ age categories is nearly equal to fire-related hospitalization rate for that same gender/age category.
 - The difference between death and hospitalization rates is the highest for males in the 25- to 34-year-old category (17 hospitalizations for every death) and for females, in the 35- to 44-year-old category (7.5 hospitalizations for every death).
- Fire-related hospitalizations are, on average, four times greater in males (6.5/100,000) than in females (1.5/100,000) and vary with age.
 - The difference between genders is greatest in the 75-84 (males: 10.4/100,000, females: 1.1/100,000) and the 25-34 age groups (males: 9.5/100,000, females: 1.7/100,000). Males aged 75-84 have the highest fire-related hospitalization rate overall, and those 25-34 have the second highest rate.
- Rates of fire-related ED visits were three times higher in all males (47/100,000) than in all females (15/100,000).
 - Rates of fire-related ED visits peaked in men aged 15-24 (78.6/100,000) and gradually decreased with age. Girls aged 1-4 had the highest rate of fire-related ED visits (25.4/100,000), with females aged 15-24 having the second highest rate (21.4/100,000), followed by a gradual decline in subsequent age groups.
 - The gender difference in rates of fire-related ED visits is largest in the 55- to 64-year-old age group where males (32/100,000) are four times more likely than females (8/100,000) to have a fire-related ED visit.

Indicators for firearm-related injuries, Iowa, 2002-2006

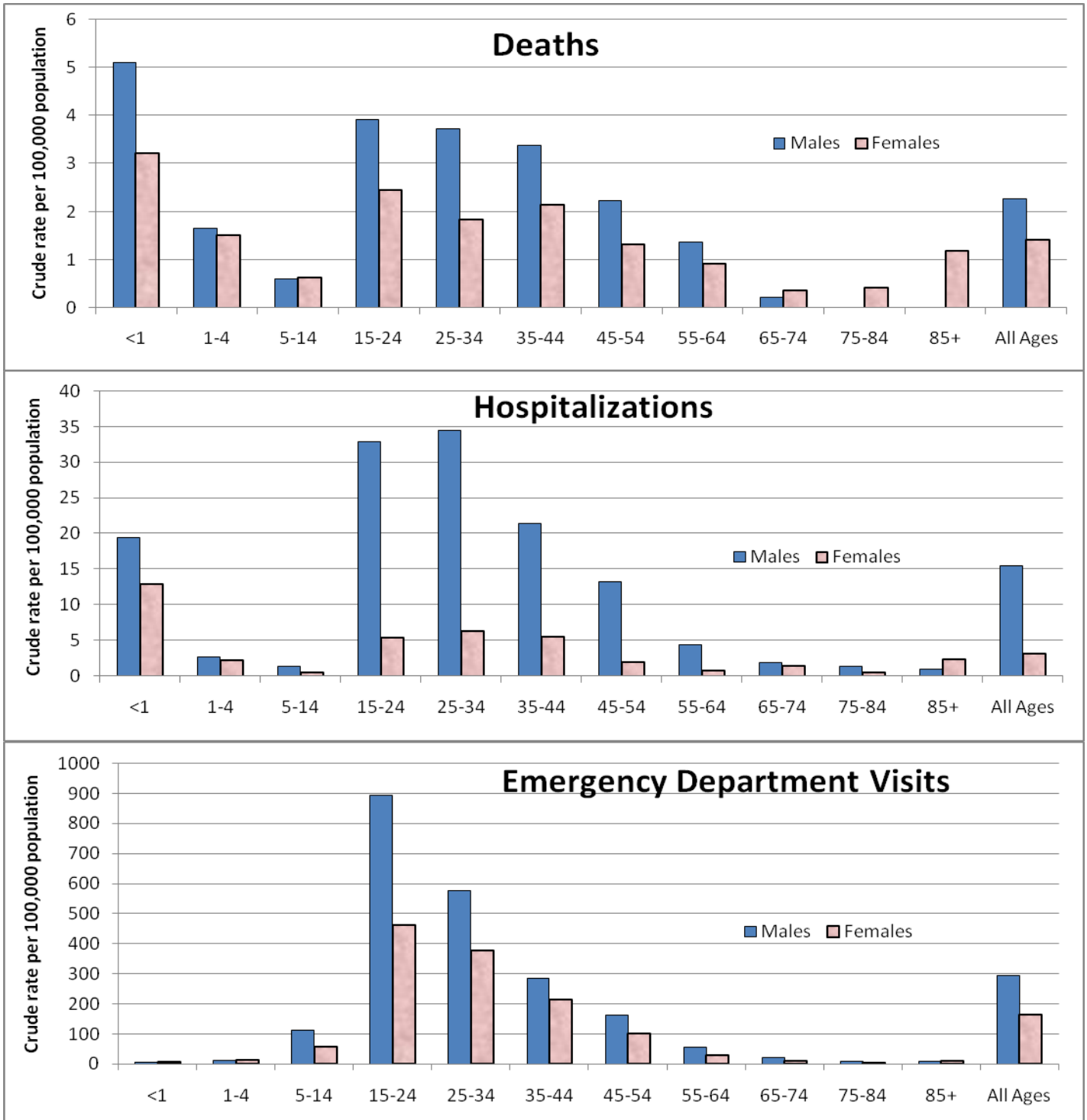
The rate of firearm-related deaths in Iowa (6.5/100,000) is much lower than the national NCIPC states' 2004 average (10/100,000). Firearm-related death rates are the highest among males over the age of 74 (ages 75-84: 22/100,000 and ages 85+: 23/100,000), mainly due to suicides. However, firearm-related hospitalization (10/100,000) and ED visit rates (24/100,000) are highest in 15- to 24-year-old males and gradually decrease with age.



- On average, there were 197 firearm-related deaths per year in Iowa, more than the average yearly number of firearm-related hospitalizations (69) or ED visits (163).
 - 95 percent of all firearm-related deaths in Iowa are intentional (81% suicides and 14% homicides). Five percent of firearm-related deaths in Iowa are unintentional.
 - As age increases, an increasingly larger portion of the firearm-related deaths in Iowa is due to suicide compared with homicide.
 - This is partially due to the low numbers of homicides due to firearms in many age groups. The age group with the largest average number of homicides due to firearms is the 15- to 24-year olds, with nine fatalities each year. On average, each of the age groups under the age of 14 and over the age of 55 have ≤ 1 homicide due to firearms each year.
 - The age group with the largest average number of suicides due to firearms is the 45- to 54-year olds, with 31 fatalities each year. Only the age groups of those less than 14 years old have an average of ≤ 1 suicide due to firearms each year.
 - Firearm-related death rates were relatively constant across all age groups from 15 to 74 and increased significantly in males over the age of 75 (ages 75-84: rate of 22/100,000 and ages 85+: rate of 23/100,000).
 - Overall, Iowa males (11.7/100,000) were seven times more likely to suffer from firearm-related deaths than females (1.6/100,000).
 - Between the ages of 15 to 74 years, death rates ranged from 13-14/100,000 for males and 2/100,000 for females. Over the age of 74, female death rates decreased significantly to 0.8/100,000, while male rates increased to 22/100,000.
 - Since the numbers of firearm-related deaths, hospitalizations, and ED visits were less than five in nearly every age group of females, resultant rates should be interpreted with caution.
- Firearm-related hospitalization (10/100,000) and ED visit rates (24/100,000) were greatest in 15- to 24-year-old males and gradually decreased with age.
 - About 50 percent of firearm-related hospitalizations were due to suicide attempts (31%) and homicide/assaults (19%), with the remaining cases due to unintentional injury (40%), undetermined and other (10%).
 - For Iowa females, firearm-related hospitalization rates remained constant, with a high of 0.8/100,000 in 15- to 44-year olds.
 - Firearm-related ED visits followed the same pattern as hospitalizations.
 - Overall, ED visit rates were eight times higher in males (9.8/100,000) than in females (1.2/100,000).
 - Among both males and females, firearm-related ED visit rates were highest in the 15- to 24-year-old age group (males: 24/100,000, females: 3/100,000).

Indicators for homicide/assault, Iowa, 2002-2006

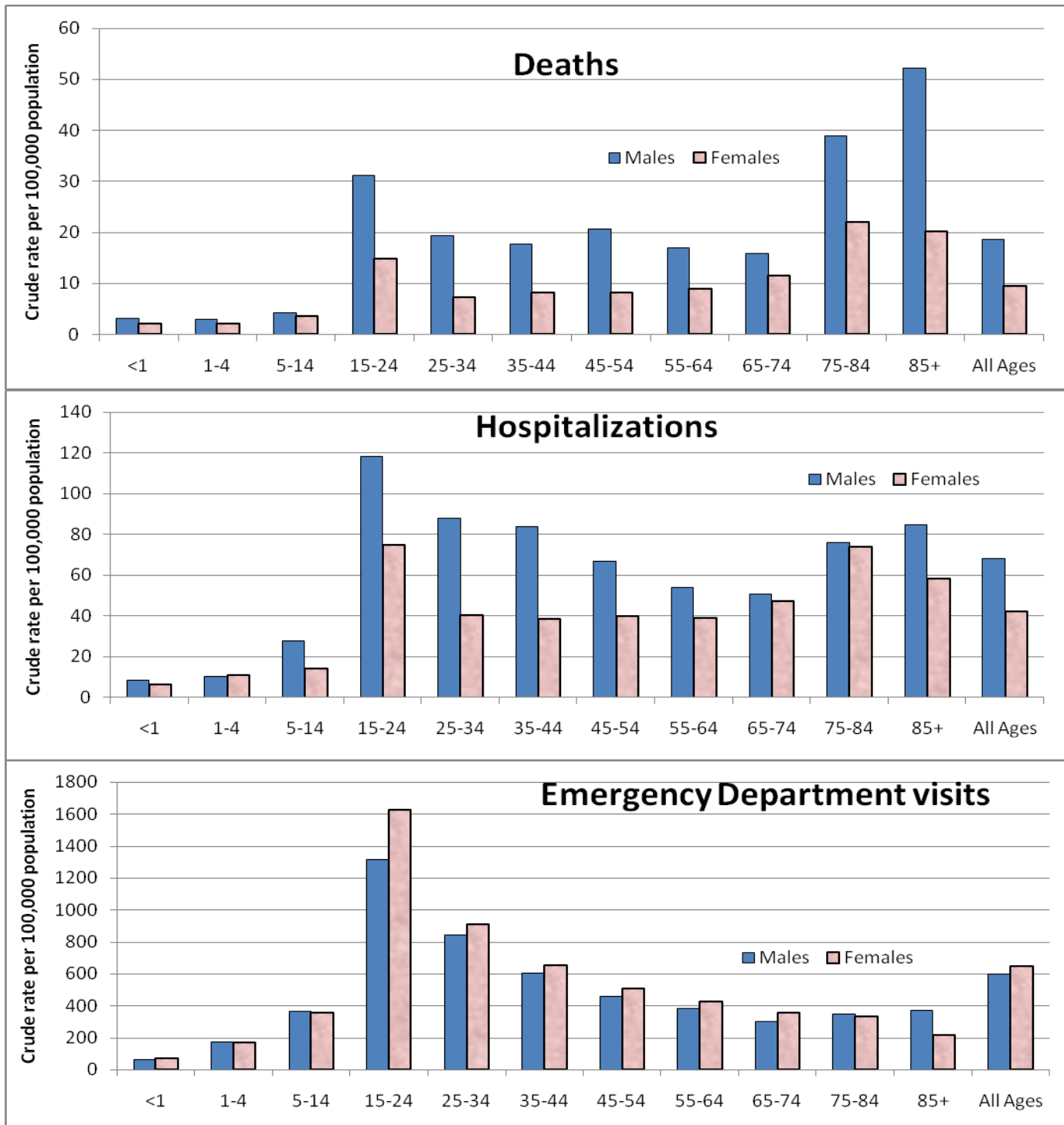
While the homicide death rate (1.9/100,000) in Iowa is considerably lower than the 2004 national average of the NCIPC states (5.9/100,000), the rate of assault-related hospitalizations and particularly ED visits is substantially higher, particularly among youth and young adult males (aged 15-34). Infants also have a high rate of assault-related hospitalizations.



- In Iowa, on average from 2002-2006, there were 55 homicide deaths, 276 assault-related hospitalizations, and 6,473 assault-related ED visits. This translates into an average of more than one homicide per week, nearly one assault-related hospitalization, and nearly 18 assault-related ED visits per day in Iowa.
- Overall, the homicide death rate in Iowa is higher in males (2.3/100,000) than in females (1.4/100,000). The resulting rate ratio shows that, overall, homicide rates in males were 60 percent higher than in females.
 - Males aged 15-24 had the highest average number of homicides (9), followed by those aged 25-34 and 35-44 (each with 7 cases).
 - Over the age of 45, the average number of homicides per year was five or less for both males and females. There was no age group of females in Iowa with an average number of homicides greater than five.
 - On average, there was one homicide per year among both female and male infants (< 1 year-old). Because of the relatively small number of infants (as well as homicides in any age group) in Iowa, the resultant homicide death rates for infants are the highest of any age group for both males and females.
- Over 90 percent of assault-related hospitalizations in Iowa occurred in 15- to 54-year olds.
 - Young males between the ages of 15-24 had the greatest number of hospitalizations (74) followed by the 25-34 age group (63), which had the highest hospitalization rate at 34/100,000.
 - Among females, the 25-34 age group had the highest hospitalization rate of 6.3/100,000, which corresponded to a yearly average of only 11 assault cases.
 - Overall, males (15.5/100,000) were five times more likely to be hospitalized for assaults than females (3.1/100,000). With increasing age, gender differences in assault-related hospitalizations decreased.
- The rate of assault-related ED visits was twice as high in males (278/100,000) as females (157/100,000).
 - Males aged 15-24 had the highest ED visit rate of any age/gender group, with a rate of 838/100,000. The rate for females in the same age group (as well as among all ages) was about half that of males (441/100,000).
 - The rate of assault-related ED visits in children under the age of 5 was nearly the same in males as females.

Indicators for motor vehicle trauma, Iowa, 2002-2006

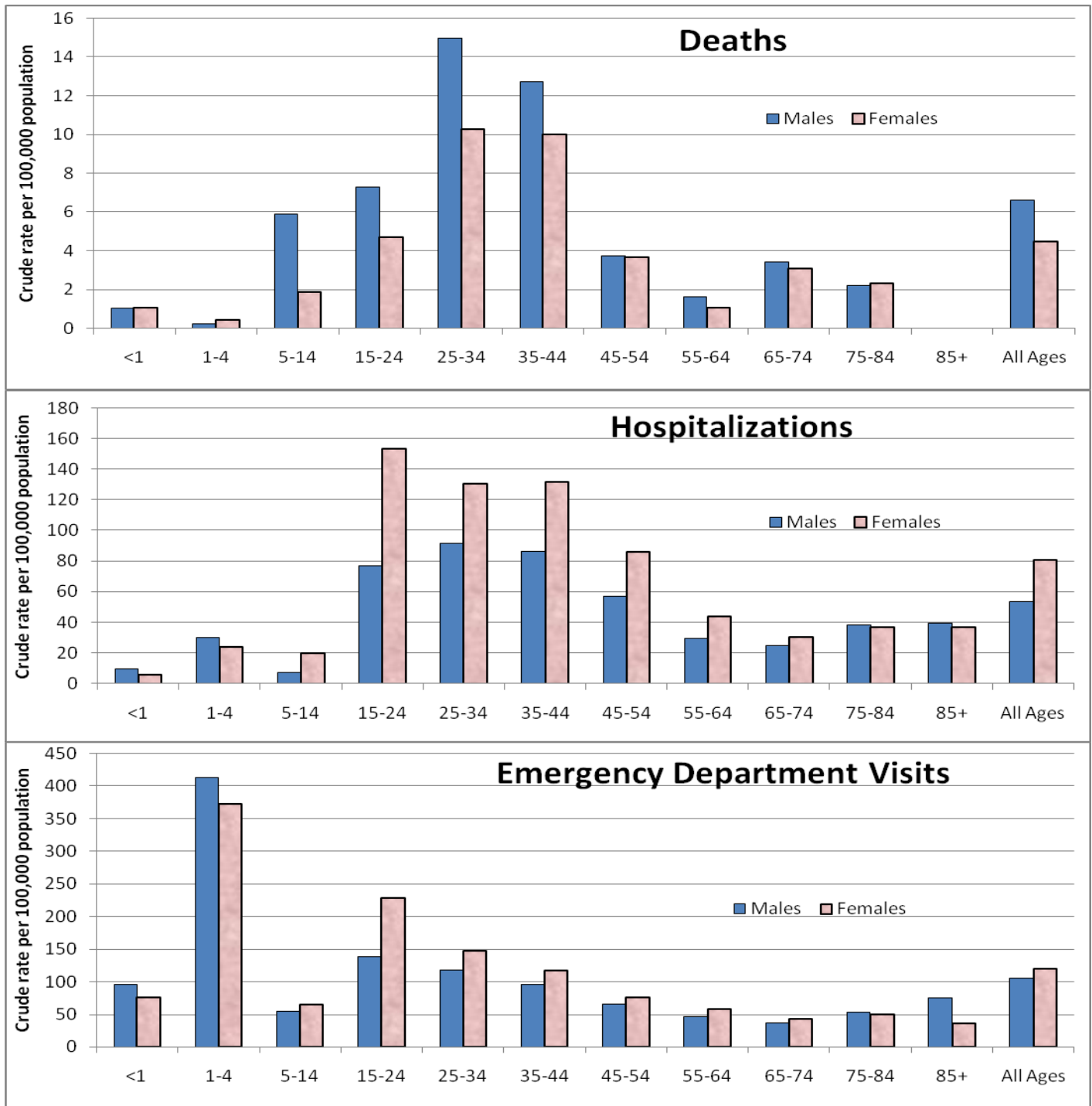
The death rate for motor vehicle traffic-related trauma (MVT) in Iowa (13.2/100,000) is lower than the national NCIPC states' 2004 average (14.7/100,000), but was still the leading cause of injury death in Iowa (420 cases/year), the 3rd leading cause of injury hospitalizations (1,648 cases/year), and the 2nd leading cause of injury ED visits (17,120 cases/year).



- In Iowa, from 2002-2006, there were, on average, 420 deaths, 1,648 hospitalizations, and 17,120 ED visits per year due to motor vehicle traffic-related (MVT) crashes.
- MVT-related trauma was the leading cause of injury death in Iowa. Approximately 1.15 MVT-related deaths occur each day in Iowa.
 - Among Iowans aged 1-34 and 55-64, MVT-related injuries were the leading cause of injury death, and were the 2nd leading cause of injury death for Iowans aged 35-54 and 65-84.
 - In Iowa, MVT-related injury death rates were the highest for males aged 85 and older (52/100,000), followed by 75- to 84-year olds (39/100,000) and 15- to 24-year olds (31/100,000).
 - The rate of MVT-related deaths is two times higher in males (19/100,000) than in females (10/100,000).
- MVT-related injuries were the third leading cause of injury hospitalizations in Iowa (after falls and poisonings), with an average of 1,648 hospitalizations per year in 2002-2006. This is nearly 5 MVT-related hospitalizations per day throughout Iowa.
 - In all age groups, males had higher hospitalization rates than females, except children aged 1-4.
 - Overall, MVT-related hospitalization rates were 1.6 times higher in males (68/100,000) than in females (42/100,000).
 - Hospitalization rates were highest for males aged 15-24 (118/100,000), aged 25-34 (88/100,000), and 85 or older (85/100,000); for females, the highest rates were in persons aged 15-24 (75/100,000) and 75-84 (74/100,000).
- MVT was the 2nd leading cause of injury ED visits after falls, with an average of 17,120 ED visits per year in Iowa from 2002-2006.
 - Overall, the ED visit rate for females (600/100,000) was higher than for males (543/100,000).
 - Among both males and females, ED visit rates were the highest in the 15- to 24-year-old group (1,220/100,000 for males and 1,525/100,000 for females).
- More detailed information on the outcomes and other characteristics of motor vehicle crashes in Iowa is available in a subsequent section of this report on the Crash Outcome Data Evaluation System.

Indicators for poisoning, Iowa, 2002-2006

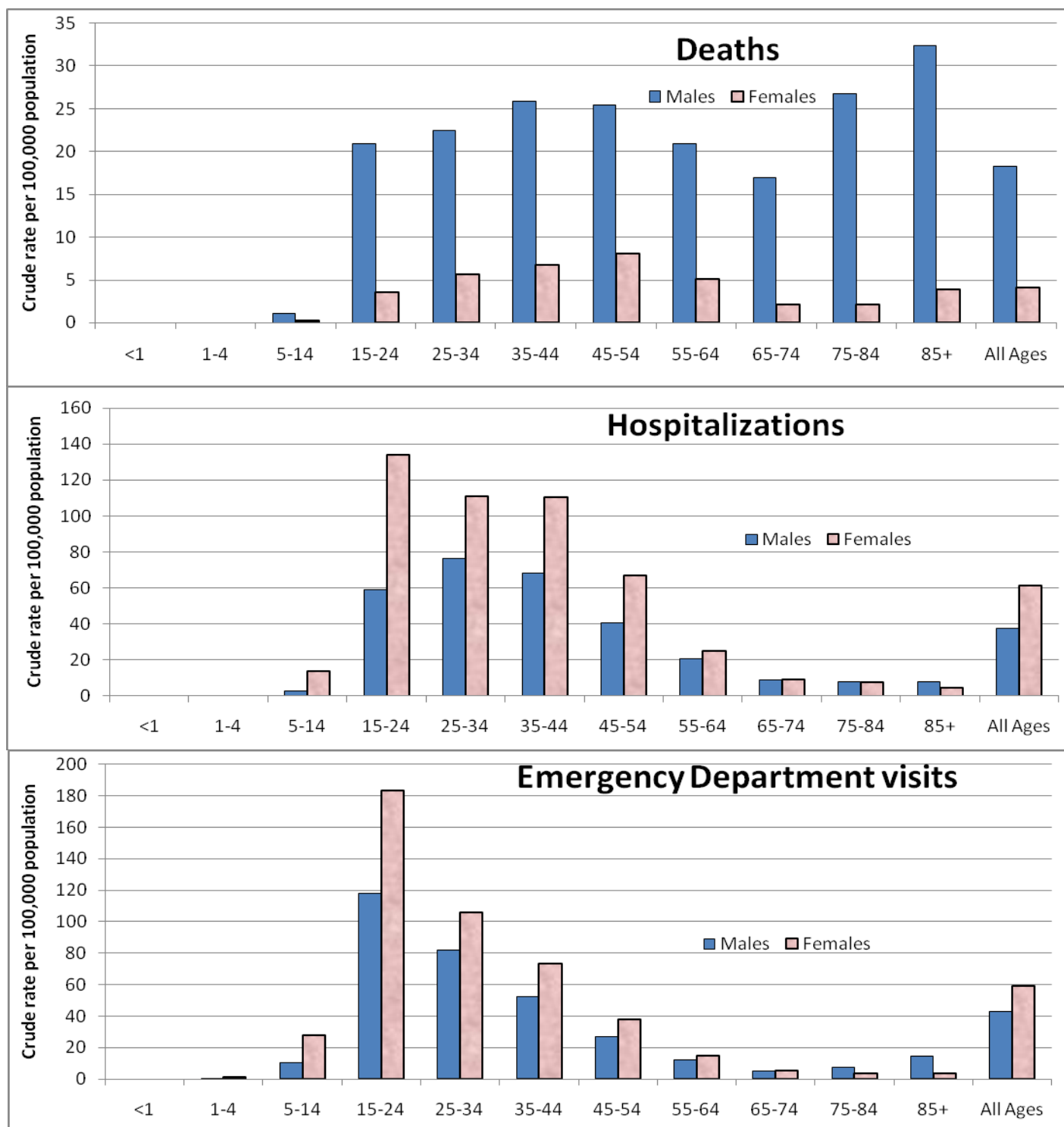
While Iowa's death rate due to poisoning (5.6/100,000) was lower than the 2004 national average of the NCIPC states (10.3/100,000), poisoning injuries are a particular concern in specific age groups. Fifty-three percent of poisoning deaths in Iowa are unintentional, 39 percent are due to suicide, and 8 percent are of undetermined intent. Poisoning rates and intents also vary greatly by county size and gender.



- On average, there were 166 deaths, 2,008 hospitalizations and 3,235 ED visits related to poisoning each year in Iowa from 2002-2006.
- The majority of poisoning deaths – 84 percent for males and 77 percent for females – occurred in Iowans aged 5-44.
 - The death rates for both males (15/100,000) and females (10/100,000) were highest in the 25- to 34-year-old age groups and were followed by the 35- to 44-year olds for both males (13/100,000) and females (10/100,000).
 - Between the ages of 5 and 44, the poisoning death rate for males was 50 percent higher than for females. After the age of 45, the poisoning death rates were very similar for both genders.
 - Fifty-three percent of all poisoning deaths in Iowa from 2002-2006 were unintentional, 39 percent were due to suicide, and 8 percent were of undetermined intent.
- Like the age distribution for poisoning deaths, the rates of poisoning hospitalizations were highest among the 15- to 44-year-old age groups.
 - In contrast to the death rates, females over the age of five had higher poisoning-related hospitalization rates than males.
 - The highest hospitalization rate was in 15- to 24-year-old females (154/100,000), compared to males of the same age (77/100,000).
 - Hospitalization rates consistently decreased until the age of 65, where it stayed relatively constant.
- Poisoning-related ED visit rates were by far the highest among children aged 1 to 4 (males: 396/100,000 and females: 356/100,000), and second highest among 15- to 24-year olds. They steadily declined in subsequent older age groups.
 - Overall, poisoning ED visit rates were nearly 1.2 times higher among females (116/100,000) than males (100/100,000).
 - Other than children under the age of five and seniors over the age of 74, females had a higher rate of poisoning-related ED visits than males. The greatest difference between females and males was in the 15- to 24-year-old age group, as females had a 70 percent higher ED visit rate.

Indicators for suicide/suicide attempts, Iowa- 2002-2006

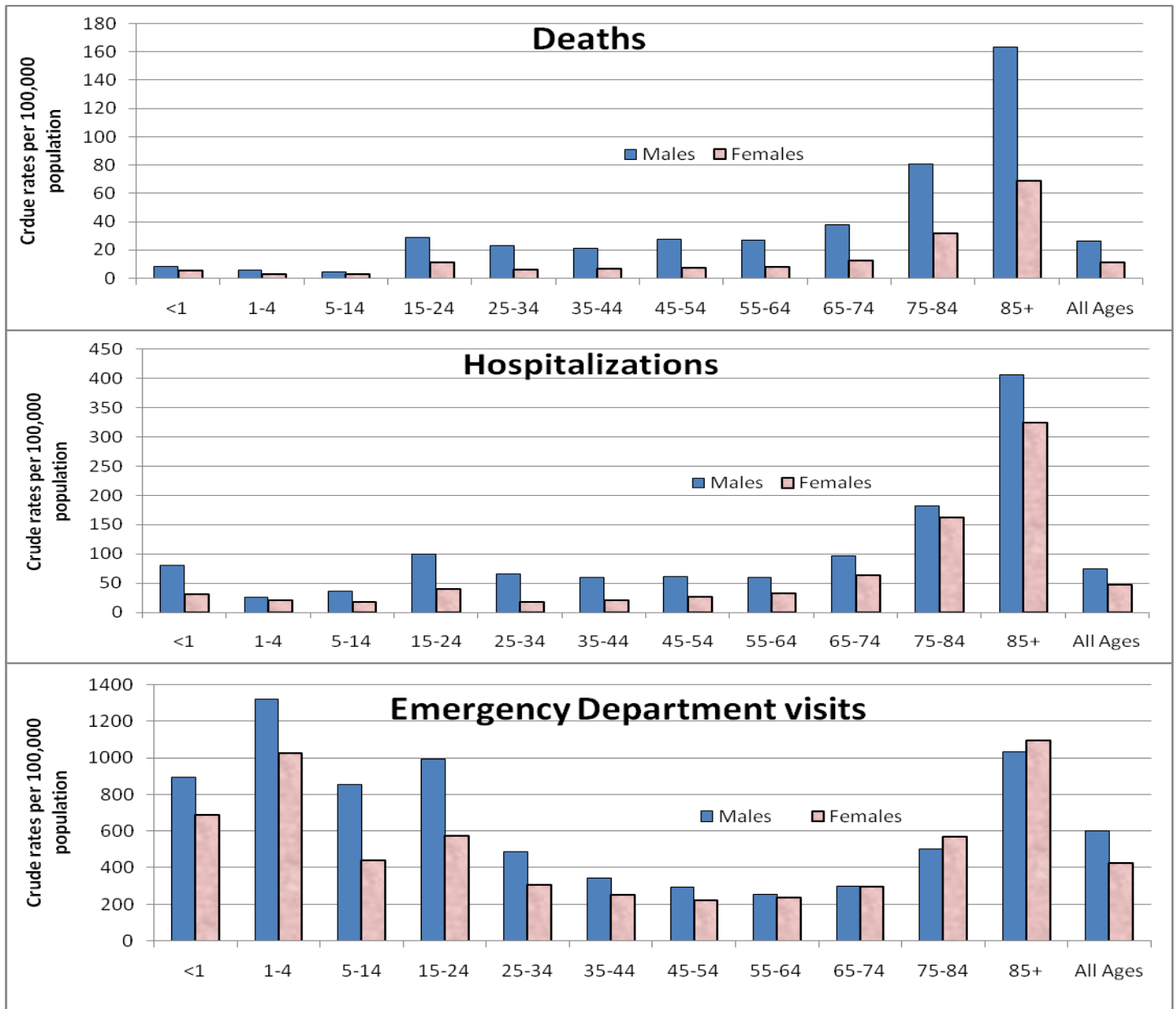
Iowa's suicide rate (11.1/100,000) is higher than the 2004 national average of the NCIPC states (10.9/100,000). Iowa's suicide attempt hospitalization rate (51.7/100,000) is also higher than the 2004 NCIPC national average (47.7/100,000). Males in Iowa are much more likely to actually die from suicide, but Iowa females are more likely to be hospitalized or visit the ED following a suicide attempt.



- In Iowa on average, there were 332 deaths, 1,483 hospitalizations and 1,474 ED visits that occurred yearly from 2002-2006 due to suicides or suicide attempts. Suicide rates are higher among males, but women have higher hospitalization and ED visit rates due to suicide attempts.
- Suicide was the leading cause of injury death in Iowa for individuals aged 35-54, and the second leading cause of injury death for youths aged 15-34 and adults aged 55-64. Suicide was the third leading cause of injury deaths across all ages in Iowa.
- Suicide rates (11/100,000) were almost six times higher than homicide rates (2/100,000) in Iowa.
- From 2002 to 2006, the overall average suicide rate was four times higher in males (18/100,000) than in females (4.2/100,000).
 - Suicide rates were greatest among elderly males. In the 75- to 84-year-old age group, males had a suicide rate of 27/100,000 and males over the age of 85 had a suicide rate of 32/100,000.
 - Beginning with 15- to 24-year-old males, the suicide rate slightly increased from 21/100,000 until it peaked at 26/100,000 for the 35- to 44-year-old age group. After a slight decrease among 65- to 74-year olds, another upward trend occurred, leveling off at 32/100,000 for men over the age of 85.
 - The suicide rate for males between the ages of 5-24 was five times higher than females of the same age. In the 74-85 age groups, the male rate (27/100,000) was 13 times that of females (2.1/100,000).
- The overall rate of hospitalizations for suicide attempts was 65 percent higher in females (62/100,000) compared to males (37/100,000).
 - The rate of hospitalizations for suicide attempts was greatest among 15- to 24-year-old females (135/100,000) compared to males (59/100,000) of the same age group.
 - Among the 5- to 14-year-old age group, the female hospitalization rate for suicide attempts was five times that of males, while among Iowans aged 15-24 years, the female hospitalization rate for suicide attempts was twice that of males.
- The total rate of ED visits for suicide attempts was 40 percent higher among females.
 - Except for those over the age of 74, the female ED visit rates for suicide attempts were greater than males of all ages.
 - ED visit rates were highest among those in the age group of 15- to 24-year olds, reaching 177 (females) and 114 (males) per 100,000.
 - ED visit rates for suicide attempts decreased substantially after age 24.
 - ED visit rates for suicide attempts among seniors (85+) were four times greater in males (14/100,000) than in females (3.4/100,000).

Indicators for traumatic brain injury (TBI), Iowa, 2002-2006

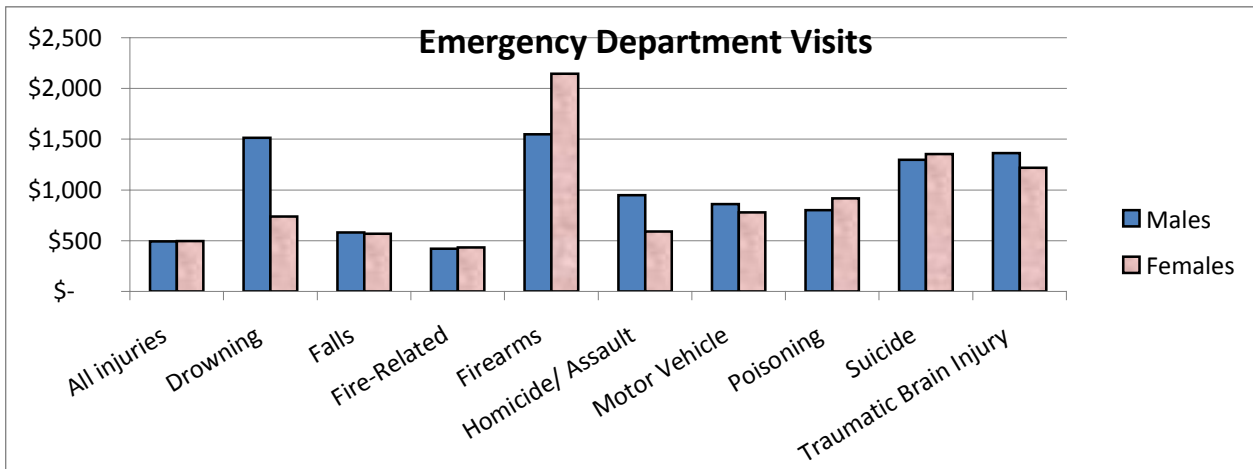
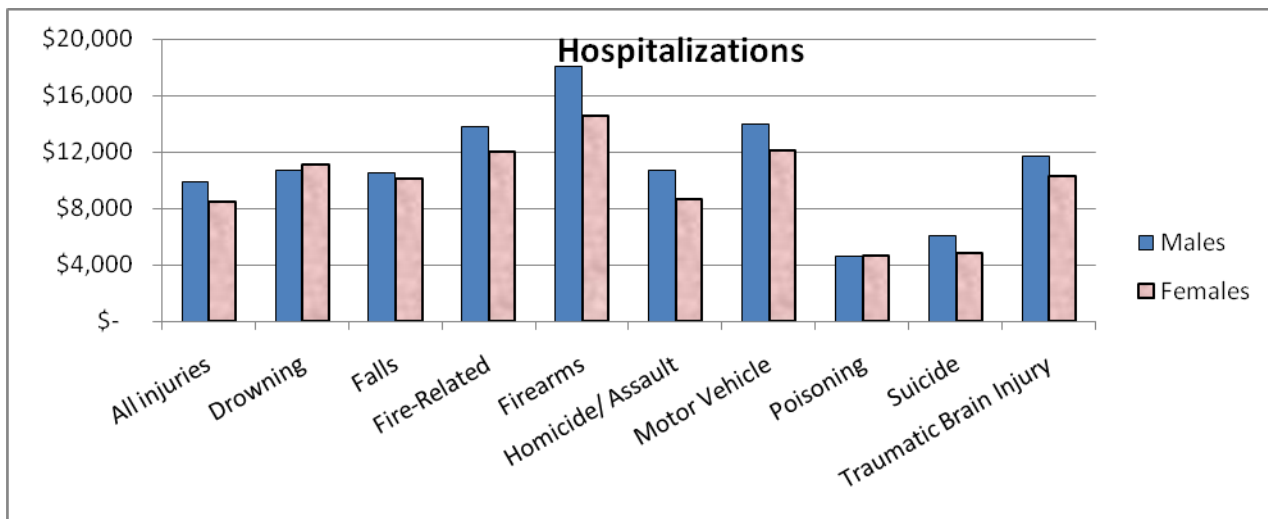
Although it is not a cause or intent of injury, traumatic brain injury (TBI) is included as a specific indicator due to its deadly and debilitating nature. Although the death and hospitalization rates of TBI injuries in Iowa (17.3/100,000 and 56.8/100,000, respectively) is lower than the national NCIPC states' 2004 average (17.9/100,000 and 74.2/100,000, respectively), the TBI death rate is still the highest among all the specific indicators for death in Iowa. On average, there are 1.5 TBI-related deaths/day, 5 hospitalizations, and nearly 40 TBI-related ED visits per day in all of Iowa.



- From 2002 to 2006, there were on average 554 traumatic brain injury (TBI)-related deaths, 1,821 hospitalizations and 14,271 ED visits per year. This translates to 1.5 TBI-related deaths per day, five hospitalizations, and over 40 TBI-related ED visits per day in all of Iowa.
- TBI death rates increased with age. From ages 15-64, the rates of TBI deaths were relatively stable across the age groups, ranging from 21.5 to 28.7 per 100,000 for males and from 6.2 to 11.5 per 100,000 for females.
 - The gender difference consistently increased from males having a death rate double that of females among 15- to 24-year olds, to males having three times the death rate of females after 24 years of age.
 - The largest gender difference occurred among the 45-54 age groups, where male death rates (27.7/100,000) were nearly 4 times greater than females (7.3/100,000).
 - In both males and females, the highest TBI death rates occurred among the elderly. In the 75-84 age groups, the TBI death rate for males (81/100,000) was 2.5 times greater than for females (32/100,000). In Iowans over the age of 84, the TBI death rate for males (164/100,000) was more than two times greater than for females (69/100,000).
 - The TBI-related death rates doubled from the 75-84 and 85+ age groups for both males and females.
- Males had higher TBI hospitalization rates than females. On average, males (75/100,000) had a 60 percent increased rate compared to females (47/100,000).
 - Hospitalization rates increased with age. For both males and females, TBI hospitalization rates were highest among the 75-84 and 85+ age groups. The TBI hospitalization rates doubled from the 75-84 to the 85+ age groups.
- Overall, males (556/100,000) had a higher rate of TBI-related ED visits than females (400/100,000).
 - ED visit rates were highest among children and the elderly.
 - The highest TBI-related ED visit rates occurred among children, particularly those aged 1-4, who had a rate of 1,260/100,000 for males and 975/100,000 for females. Young males had higher TBI-related ED visit rates than females, whereas among the elderly, females had an increased rate (1058/100,000 vs. 983/100,000 for males).

Hospital charges per indicator, Iowa, 2002-2006

Cost is another significant aspect to consider when assessing the burden of a particular type of injury. The graphs below present only the median charges that hospitals submit to their payers. As such, the data include only a fraction of the costs, but they provide information on the general trends of the charges for each of the various indicators.



- The values presented are the average of the median charges over the five-year period (2002-2006).
- On average, all Iowa hospitals charged \$158 million per year for all injury hospitalizations.
- Even though falls have a moderate, average median cost of hospitalization care (\$10,000 charge/visit), the large average number of hospitalizations in Iowa due to falls (8,900) causes the total charges to be \$92 million per year, the largest of any indicator.
- Males (\$9,900 charged) tend to have more costly injury-related hospital stays than women (\$8,500 charged).
- Firearm-related hospital stays tend to be the most expensive of any indicator (\$16,000 charge/visit), followed by MVT (\$13,000 charge/visit) and fire-related injuries (\$13,000 charge/visit).
- On average, the hospital charge for all injury ED visits was \$124 million/year in Iowa.
- Even though falls have a low average median cost of ED visit care (\$576 charge/ visit), the large average number of ED visits in Iowa each year due to falls (61,000) causes the total charges for ED visits due to falls to be \$35 million charged per year, the largest of any ED visit indicator.
- Males and females had nearly identical average hospital charges for an ED visit (average of \$494/visit).
- ED visits due to firearm-related injuries tend to be the most expensive of any indicator (\$1,850/visit), followed by TBI (\$1,330/visit) and suicide (\$1,290/visit).
- See table in appendix for numbers of occurrences and charges for each indicator and information on the calculation of these figures.
- In addition to medical costs, loss of work productivity, decreased ability to perform household tasks, reduced quality of life, and many other factors add to the total burden of injury in Iowa.

Iowa crash outcome data evaluation system

Motor vehicle traffic-related trauma (MVT) is the leading cause of injury death, the third leading cause of injury hospitalizations, and the second leading cause of injury ED visits among Iowans of all ages. Because of the large impact that MVT has on Iowa and the availability of additional sets of data on MVT in Iowa, this section of the report provides information from the Iowa Crash Outcome Data Evaluation System (CODES) to supplement the information already presented in the MVT specific indicator section. This information can be used to better target injury prevention and treatment efforts related to MVT.

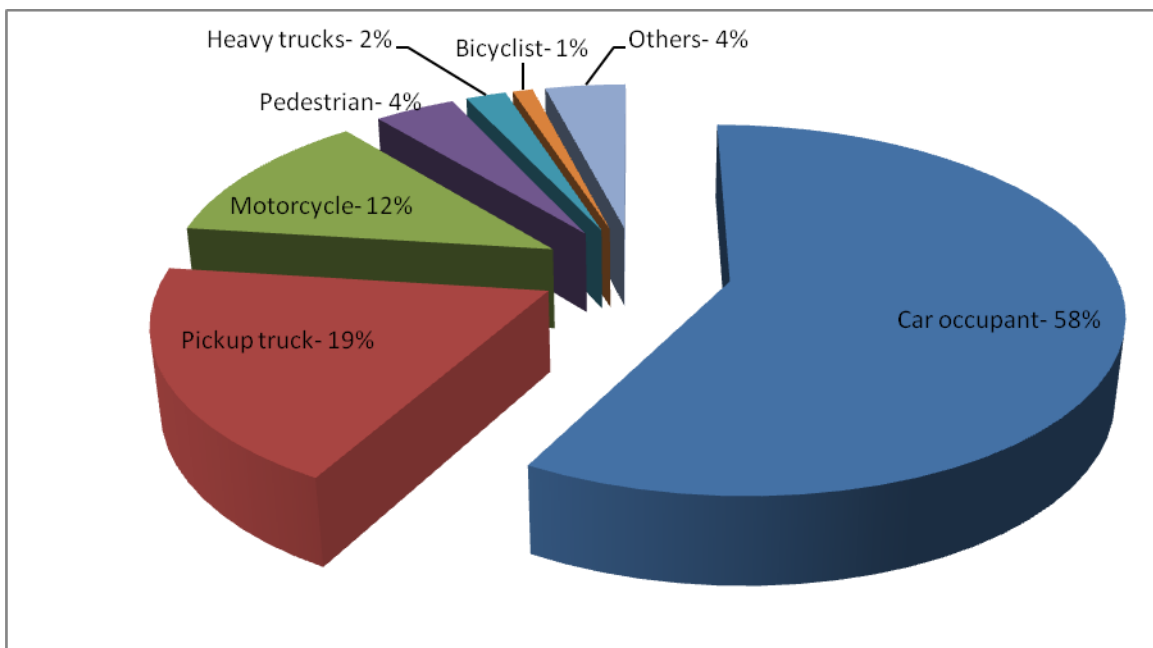
Source of data

CODES data links motor vehicle crash records (from the Iowa Department of Transportation) with injury outcome records collected at the scene and en route to medical care. These data sets include hospitalizations, ED visit data, death certificates, and Iowa Emergency Medical System (EMS) data. These linked crash outcome data are unique resources that relate motor vehicle crash and vehicle characteristics to specific characteristics of the occupants, injured or uninjured. This linked outcomes data is available for the years 2003-2006, while the crash data are available for 2002-2006.

For this particular report, Iowa's motor vehicle crash data are linked to death certificates, inpatient, and outpatient (ED visits) data at the Center for Health Statistics in the Iowa Department of Public Health. EMS data were not included in this analysis, as the EMS database is not considered a complete database in Iowa. No rates are reported because of uncertainty regarding the completeness of the data for the number of the various injuries and not all data are completely matched between the datasets.

Crash data linked to death certificates (2003-2006)

Linked MV fatalities by vehicle type or role



- Most (96%) of total fatal crash cases in Iowa (yearly average of 413 cases) were linked to their corresponding death certificates.
- Of these linked cases, 58 percent of crash victims were car or sport utility vehicle (SUV) occupants, including drivers and passengers; 19 percent were pick-up truck occupants; 12 percent, motorcyclists; 4 percent, pedestrians, 1 percent, pedal cyclists; and 4 percent, others.

Demographic characteristics, safety device use and alcohol use for MVT-related deaths in Iowa

Table 4: Demographic characteristics, safety device use and alcohol use for MVT-related deaths in Iowa

		Car Occupant* (n=965)	Pick-up Truck (n=311)	Motorcycle (n=193)	Pedestrian (n=73)	Pedal cyclist (n=16)
		%	%	%	%	%
Gender	Male	55.4	80.7	82.9	61.6	68.8
	Female	44.5	19.3	17.1	38.4	31.3
Age Groups	<15	4.1	4.5	0.5	9.6	12.5
	15 to 24	28.6	22.8	18.7	15.1	18.8
	25 to 34	10.4	13.5	16.1	5.5	
	35 to 44	9.2	14.5	29.0	16.4	12.5
	45 to 54	11.9	16.4	24.9	19.2	43.8
	55 to 64	8.6	9.3	7.8	13.7	
	65 to 74	7.5	7.7	2.1	5.5	12.5
	75 to 84	13.3	7.1	0.5	11.0	
	>85	5.9	2.6	0.5	4.1	
Median Age in Years		41	41	40	45	45
Seat Belt/Helmet use #	Yes	57.8	37.5	17.1		66.7
Alcohol Present #	Yes	24.8	31.0	31.7		
Died from TBI	Yes	42.4	41.5	53.4	41.0	62.5

* SUVs are included

Unknowns are excluded

- The majority of the fatalities in crashes involving motorcycles (83%) and pick-up trucks (81%) were males.
- The male/female ratio was 5:1 in motorcycle riders and 4:1 in pick-up truck fatalities.
- Young adults aged 15-24 had the highest percentage of car (29%) and pick-up truck occupant casualties (23%) of injury fatalities for all ages.
- More than half of the motorcycle fatalities were 35- to 54-year olds.
- Pedal cyclists aged 44-54 had the highest fatality percentage (44%) of any age group of pedal cyclists.
- According to a 2005 survey, the general driver population in Iowa, as well as passengers in the front seats of cars, vans, SUVs and pick-ups, used their seat-belts 89 percent of the time.⁹
- However, among those killed in crashes, only 38 percent of pick-up truck occupants and 58 percent of car occupants were wearing safety belts at the time of the crash, according to the linked crash data.

⁹ Source: 2005 site surveys conducted by officers of the Iowa State Patrol, Department of Public Safety

- Unbelted occupants were five times more likely to die when involved in a crash than belted occupants. The death rate for unbelted car occupants was 6.1 per 100 injured occupants, while the death rate for belted occupants was 1.2 per 100 injured occupants.
- Compared to other vehicle type users, unbelted pick-up truck occupants had the highest death rate (7.7/per 100 injured).
- As Iowa is one of three states which does not have a law requiring motorcycle helmet use, helmet use is statistically low in Iowa; only 17 percent of riders killed in crashes were wearing helmets.
- Data on cycle helmet use for fatal injuries were not available (10 out of 16 cases); therefore, the percentage of helmet use in cyclists' fatalities included in the table was probably not representative.
- On average, 20 percent of fatal motor vehicle collisions involved alcohol.
- Fatalities where alcohol was present accounted for 25 percent of car occupant fatalities, 31 percent of pick-up truck occupant fatalities, and 32 percent of motorcyclist fatalities in Iowa during 2003-2006.
- Motorcyclists who had alcohol involved had the highest death rate (17 per 100 injured) compared to other vehicle types.

Percentage of fatally injured drivers of passenger vehicles with blood alcohol concentration (BAC) of 0.08 percent or greater, by driver age

Table 5: Fatal injuries and BAC by driver's age

Age Groups	Alcohol BAC >= 0.08		Total (# of fatally injured drivers)	% of total fatalities with BAC>= 0.08
	Yes (# of fatally injured drivers)	No (# of fatally injured drivers)		
16-20	4	20	24	17%
21-30	7	17	24	29%
>30	12	79	91	13%
All Ages	23	116	139	17%

- On average, legally intoxicated drivers (those with a blood alcohol concentration equal to or greater than 0.08) accounted for 17 percent of all fatally-injured drivers.
- Over the five-year period, an average of 29 percent of fatally-injured drivers aged 21-30 were legally intoxicated; 17 percent of fatally-injured drivers aged 16-20 and 13 percent of fatally-injured drivers aged 30 and over were legally intoxicated .

Demographic characteristics, safety device use and alcohol use for motor vehicle-related hospitalizations in Iowa, 2002-2006

Table 6: Demographic characteristics, device use and alcohol use for MVT-related hospitalizations in Iowa, 2002-2006

		All MV* (n=7,512)	Motorcycle (n=1,041)	Pedestrian (n=378)	Pedal cyclist (n=169)
		%	%	%	%
Gender	Male	55.5	86.1	60.0	82.8
	Female	44.5	13.9	40.0	17.2
Age Groups	<1	0.2			
	1 to 4	0.4		4.8	1.2
	5 to 14	2.4	1.6	17.7	43.2
	15 to 24	25.6	18.7	18.3	13.0
	25 to 34	14.2	17.6	9.5	7.7
	35 to 44	13.5	23.1	12.4	16.0
	45 to 54	12.9	25.8	14.3	9.5
	55 to 64	9.8	9.7	7.9	6.5
	65 to 74	7.5	2.4	6.1	1.8
	75 to 84	9.5	1.0	6.1	0.6
	>85	4.1	0.1	2.9	0.6
Median Age in Years		40	40	34	16
Seat Belt/Helmet use #	Yes	71.7	20.6		20.8
Alcohol Present (Driver only) #	Yes	9.8	8.6		
Injury Type: TBI	Yes	24.6	34.2	36.2	46.7

* All Motor Vehicle (MV) includes passenger car, pick-up truck, van, SUV, etc.

Unknowns are excluded.

- In an average year from 2002-2006, 1,822 crash cases were linked to hospitalization data.
- Males made up the majority of hospitalized motorcycle riders (86%) and pedal cyclists (83%) in Iowa.
- Sixty percent of hospitalized pedestrians were males.
- Overall, 56 percent of Iowans hospitalized for MV-related injuries were males.
- Of all age groups, youths aged 15-24 had the highest percentage (26%) of all MV-related hospitalizations, excluding motorcycles.
- Almost half of hospitalized motorcyclists were persons aged 35-54.
- Forty-four percent of hospitalized pedal cyclists and 23 percent of pedestrians were under age 14.
- Hospitalized MV-related injuries, excluding motorcycles, had a higher percent usage of safety devices (72%) compared to MV-related fatalities (58%).
- Helmet use among hospitalized motorcycle riders was still significantly low at 21 percent.
- Hospitalized pedal cyclists reported only 21 percent helmet use.
- Injured bikers were the most likely to sustain traumatic brain injury (TBI).
- Almost half of hospitalized bikers had TBI, compared with 36 percent of pedestrians, 34 percent of motorcycle riders, and 25 percent of other MV occupants who were hospitalized and sustained a TBI.

TBI severity level by motorcycle helmet use - hospitalizations

Table 7: TBI severity level by motorcycle use - hospitalizations

Helmet Use	Severe (n=101)	Moderate (n=83)	Mild (n=8)	Potential (n=39)	Other Injury (n=570)
No (row %)	14%	11%	1%	5%	68%
Yes (row %)	6%	6%	1%	3%	83%
Ratio (No/Yes)	2.3	1.8	0.8	1.8	0.8
No (avg. charges)	\$84,169	\$31,892	\$58,453	\$18,052	\$29,258
Yes (avg. charges)	\$54,924	\$39,125	\$37,785	\$8,965	\$25,732

Note: Excludes mopeds and all-terrain vehicles (ATV).

- The original mandate for gathering the CODES data was to report on the benefits of safety belts and motorcycle helmets to reductions in mortality, morbidity, injury severity, and health care costs. Since then, motorcycle helmet studies have been an important research area.
- From Iowa's latest motorcycle helmet study¹⁰ (2003-2006), a strong link is found between not wearing a helmet and sustaining severe traumatic brain injury (TBI).
 - Fourteen percent of un-helmeted riders who were hospitalized had severe TBI vs. six percent of the helmeted riders. Thus, riders without a helmet were 2.3 times more likely to suffer from severe TBI than riders with a helmet. Average charges for those who were un-helmeted inpatients were 1.5 times higher than those who were helmeted.
 - Eleven percent of un-helmeted riders had moderate TBI compared to only six percent of helmeted riders. Riders without a helmet were 1.8 times more likely to suffer from moderate TBI than riders with a helmet.
 - In total, when motorcycle riders were helmeted, 17 percent of them had some form of TBI following a crash. By contrast, 32 percent of riders who were not helmeted had some form of TBI, which was 1.9 times higher.

¹⁰ The study was based on National Highway Traffic Safety Association (NHTSA) motorcycle model (2007); missing values in helmet use were imputed using SAS Proc MI.

Demographic characteristics, safety device use and alcohol use for motor vehicle-related ED visits in Iowa, 2003-2006

Table 8: Demographic characteristics, safety use and alcohol use for MVT-related ED visits, 2003-2006

		All MV*, excluding Motorcycle (n=51,343)	Motorcycle (n=2,217)	Pedestrian (n=1,091)	Pedal cyclist (n=621)
		%	%	%	%
Gender	Male	44.0	82.5	57.8	75.7
	Female	56.0	17.5	42.3	24.3
Age Groups	<1	0.4	0.1	0.1	
	1 to 4	0.9	0.1	4.4	1.0
	5 to 14	4.1	3.3	28.0	44.6
	15 to 24	34.2	26.2	21.8	20.1
	25 to 34	16.9	16.3	11.0	8.9
	35 to 44	14.3	21.4	10.5	10.3
	45 to 54	11.9	21.8	10.8	8.7
	55 to 64	7.7	8.3	6.0	4.5
	65 to 74	4.6	1.8	3.6	1.8
	75 to 84	3.8	0.7	2.9	0.2
	>85	1.3	0.1	1.0	
	Median Age in Years	30	37	21	16
Seat Belt/Helmet use #	Yes	87.5	25.6		17.1
Alcohol Present (Driver only) #	Yes	4.1	6.0	4.6	
Injury Type: TBI	Yes	10.2	17.2	18.7	20.8
Discharge Status	Discharged from ED	89.5	70.6	79.3	83.4
	Hospital Adm. from ED	10.1	27.7	19.5	15.8
	Died at ED	0.3	1.7	1.2	0.8

* All Motor Vehicle (MV) includes passenger car, pick-up truck, van, SUV, etc.

Unknowns are excluded.

- Since 2003, CODES began linking crash data with the outpatient (ED) dataset, when it became a complete data-set.
- Each year, about 75 percent (14,000) of MV-related ED-visit injury records have been linked with crash records, which was about 55 percent of the injuries reported by police officers.
- Females had a higher proportion in all MV-related ED visits (56%), but males outnumbered females in ED visits due to motorcycle riders, pedestrians and pedal cyclists.
- Of the ED visits in the linked dataset, 89 percent were discharged from EDs, 11 percent were admitted to the hospital, and 0.4 percent died at the ED.
- Of all vehicle types, motorcycle riders had the lowest percentage (71%) of (live) discharges from EDs, but had the highest percentage of any vehicle type in hospital admissions (28%) or death in the ED (1.7%).

Discussion and Recommendations

Throughout this report, the data have been presented from two major Iowa data sources; death certificates and hospital discharge data. The hospital discharge data are further differentiated into inpatient (hospitalizations) and outpatient (ED visits). In this analysis, outpatient procedures and outpatient surgeries were eliminated.

Comparisons

The five leading causes of injury death in Iowa, in order of magnitude, are motor-vehicle trauma-related death, falls, suicide, poisoning, and suffocation.

While national rankings indicate that poisoning is the second leading cause of injury death in the U.S., falls are the second leading cause of injury death in Iowa. Iowa's older population may explain why falls are second to MVT as a cause of death.

Firearm-related suicides are the fourth leading cause of injury death in Iowans aged 25-44, followed by suffocation/hanging, which mirrors the national ranking. In both Iowa and the U.S. overall, suffocation is the fifth leading cause of injury death.

The Iowa age-adjusted rate of drowning (1.0/100,000 people) was lower than the national rate (1.3/100,000). Drowning occurred mostly among males and youth in Iowa. Even though the average number of drowning deaths by specific age groups was less than five, drowning is still an important issue in certain age groups, which emphasizes the necessity of public health interventions in this area. The ratio of the numbers of drowning deaths over hospitalizations demonstrates the lethality of drowning in Iowa. For every two drowning deaths, there was only one case of hospitalization.

The suicide rate in Iowa is greater than the national average (11.1/100,000 in Iowa vs. 10.9/100,000 in the U.S.). In Iowa, suicide was the third leading cause of injury death for all ages, but was the first leading cause of injury death among adults 35-54 years old and the second among youth and young adults (15- to 34-years old). In comparison, suicide was only the second leading cause of death for all Americans aged 10-14 and 55-64.

The five leading causes of injury hospitalization in Iowa were falls, poisonings, MVT, suicide attempts, and homicide/assaults. Comparatively, falls were the leading cause of injury hospitalization, followed by MVT and poisoning for the U.S.

Iowa's age-adjusted injury hospitalization rates are higher for suicide attempts and fire-related injuries than the national average.

The overall age-adjusted hospitalization rate for suicide attempts was 51.7/100,000 in Iowa and 47.7/100,000 in the U.S. In Iowa and the nation, females were more likely to be hospitalized for suicide attempts than males.

Fire-related hospitalization rates were 21 percent higher in Iowa (4.0/100,000) than in the nation (3.3/100,000). The elderly were more likely to be hospitalized for fire-related injuries than younger age groups.

Healthy Iowans 2010 indicators

As an important tool for program planning and evaluation, the Healthy Iowans 2010 initiative included several key indicators for injury prevention, two of which considered hospital data. Most of the Healthy Iowans 2010 injury indicators were for deaths.

Unfortunately, the baseline indicator data used in the Healthy Iowans 2010 initiative were not in total conformity with CDC-recommended comprehensive injury report standards. For those indicators that had a clear baseline rate, all but one objective was reached.

One of the Healthy Iowans 2010 initiative objectives was to moderately reduce total motor vehicle deaths by 10 per year. In the pre-2000 data, there were over 2,200 MVT-related deaths annually. According to data used for this report, there were, on average, 1,688 MVT-related deaths per year from 2002 to 2006. The age-specific death rates showed a significant decrease for all identified age groups other than those over 75 years of age. The MVT-related death rate for the elderly in Iowa is much greater than the set objectives.

The other comparable Healthy Iowans 2010 objectives encompassed the reduction of poisoning, fire- and water-related deaths. For each of these indicators, this report found that the objectives were reached. While the objectives for the number of unintentional poisoning deaths and drowning-related deaths were both set at 30 per year, this report found the average yearly number of poisoning deaths to be 165 and the average yearly number of drowning deaths to be 30. Furthermore, this report data show that unintentional poisoning deaths are still on the rise, and, nationally, the cause of increased unintentional poisoning deaths appears to be primarily due to overdoses of narcotic analgesics. This increasing trend of unintentional narcotic poisonings also appears to be in parallel with the increased writing of narcotic prescriptions that followed the movement of the medical community to improve management of patients' pain. Iowa and the national are facing a major challenge on how to reduce the number of unintentional poisoning deaths.

The Healthy Iowans 2010 objective for the rate of fire-related deaths was set at less than one per 100,000, which was found to be true in Iowa from 2002-2006 (0.9/100,000).

There are no equivalent criteria for suicide rates in the Healthy Iowans 2010 objectives. Nationally, the Healthy People 2010 goal was to reduce the suicide rate to no more than 5.0 per 100,000, which is half the rate of Iowa.

As stated earlier, many Healthy Iowans 2010 objectives were not comparable to this report, which follows the CDC-recommended framework for reporting injury.

Limitations of the data

Even though death certificates are a good source of information for injury deaths, the use of the underlying causes of death field may be a source of error in the coding since the reliability and validity depends upon the coder. Furthermore, using the underlying cause of death field may lead to underreporting since the co-morbid conditions, which could also lead to death, are ignored except for traumatic brain injuries.

The hospital inpatient and outpatient rates provided are specifically event rates and not rates of persons affected. The incompleteness of the external causes of injury codes (E-codes) certainly led to underreporting the mechanism and causes of injury. Therefore, it is likely that hospitalization and ED visit rates for any cause are underreported.

Recommendations

The Iowa Department of Public Health (IDPH) has launched the process of developing the Healthy Iowans 2020 indicators. The use of this report is recommended to set the benchmarks for injury prevention in the state of Iowa. While the use of these data sources for injury surveillance activities are important, the need to systematize the analysis and reporting of injury data are also duly recognized.

The 2007 STIPDA Technical Assistance Team report for Iowa pointed to the need for a systemic approach to injury prevention involving a dedicated leadership and an overall coordination of injury prevention activities. The department has applied to the CDC for core injury prevention program funding twice without success. In light of this report, it is recommended that a statewide injury advisory board or council be created by legislative mandate and funded. This will assist with development of a unified vision for injury prevention in Iowa. The advisory board/council should be charged with the tasks of monitoring injury trends, assessing the societal and economic burden of injury in Iowa, and proposing a strategic plan to prioritize specific goals and objectives of the various entities involved in injury prevention. Currently, the addition of a subcommittee in the Trauma System Advisory Council is a step in the right direction.

Several administrative units at IDPH and the University of Iowa produce reports annually. Since there are no specific guidelines at the state level to collecting, analyzing, and reporting data, it is recommended that any injury data analysis done by the department use the CDC framework.

Access to data is critical to public health surveillance activities. It is important that the Bureau of Disability and Violence Prevention, which is currently taking the lead to coordinate IDPH injury prevention surveillance, receive full access to all data sources, particularly with the future data warehouse.

A similar report will be published in the upcoming years, incorporating recommendations from users of this current report. The next edition of the report will present yearly trends of data and other useful information, which was not included at this time.

ANNEXES

Annex 1. DATA ANALYSIS METHODS

A) Data Sources

Data used in this report were primarily comprised of Death Certificate Data (2002-2006), Hospital Discharge Data (Inpatient-2002-2006, Outpatient/ED visits-2003-2006), and Trauma Registry Data (2002-2006). Other data sources include the Iowa Department of Transportation (DOT)'s traffic crash data, CODES data and agriculture-related injury data.

1. *Death Certificate data:*

The Bureau of Vital Statistics at the Iowa Department of Public Health collects and compiles Iowa residents' death certificates, which are classified by external cause of death. In compliance with the CDC recommendations, this report used the underlying-cause-of-death field to identify the injury deaths (decedents that had an external cause of death code based on ICD-10 (International Classification of Diseases-10th Revision). In addition, the other conditions field was searched only for Traumatic Brain Injury (TBI). The underlying cause of death is defined as "the disease or injury which initiated the train of morbid events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury¹¹".

2. *Hospital Discharge Data (Inpatient and Outpatient/ED visits):*

Iowa's 2002-2006 State Inpatient Database (SID) and Outpatient/Emergency Department (ED) Visits (2003-2006) were used to compute CDC-recommended injury indicators. The CDC recommends using the principal diagnostic field to identify injury hospitalizations and searching all the other diagnostic fields to select the External cause of injury codes (E-codes). The injury and external cause of injury codes were classified according to the 9th Revision of the International Classification of Diseases Clinical Modification (ICD-9-CM). After creating the injury hospitalization and ED visit subsets, we found that 78 percent and 84 percent of E-codes were reported, respectively. It should be noted that hospital discharge data is record-based; thus, a patient may have multiple visits (records) for the same injury. Therefore, the number presented in this report is injury-related *discharges* as opposed to number of *people* injured.

3. *Trauma Registry:*

The state trauma registry provides information about who becomes injured and how, and about the eventual outcome of each patient's care in Iowa, which assists the evaluation of trauma care for the injured persons. Injured patients from Level I – III hospitals (2002-2006) along with a small number of Level IV hospitals were included in report. Please note that in this report, data from the trauma registry is not population based; thus, only percentages were calculated instead of rates.

4. *Crash Outcome Data Evaluation System (CODES):*

The Crash Outcome Data Evaluation System (CODES) uses probabilistic linkage methodology to link state person-level crash data to other datasets such as inpatient, ED visits and Emergency Medical Services (EMS). CODES expands crash data so that components of highway safety can be evaluated in terms of outcomes such as death, injury, injury severity, inpatient charges, Maximum Abbreviated Injury Scale (MAIS), payment, and costs. It should be noted that not all crash-injured persons could be linked to medical records. On the other hand, not all MVT-related medical records could be linked to crash data. Therefore, CODES data sets were presented in percentages instead of rates in this report.

5. *Iowa Farm-Related Injury Registry*

In 1990, the Iowa Department of Public Health established the Iowa Farm-Related Injury Registry also referred to as SPRAINS (Sentinel Project Researching Agricultural Injury Notification Systems), and conducted analysis and reported on

¹¹ Source: http://www.cdc.gov/nchs/about/otheract/injury/injury_mortality.htm

that data in conjunction with the University of Iowa Center for Agricultural Safety and Health (ICASH). While farm injury reporting is mandatory under Iowa Code, the system became a passive surveillance system and an unfunded mandate after 1997 with only minimal resources assigned for oversight of the registry. Data collected through the current farm-related injury registry are known to be incomplete. At this time, little is done to standardize the data for uniformity in coding of the variables or conformity of case definition for inclusion into the data set. However, the data provide some descriptive information on the farm-related injuries that are reported in the state.

B) Analysis

Data were prepared and analyzed based upon the CDC/STIPDA recommendations for state-level comprehensive injury reports.¹²

Injuries described in this report were grouped in compliance with the CDC's ICD Framework: External Cause of Injury Mortality Matrix (available from <http://www.cdc.gov/nchs/about/otheract/ice/matrix10.htm>). Case definitions for each indicator are shown in the STIPDA Instruction manual for preparing data, referenced below. The groups of injury indicators used in this report include: all injuries, drowning, falls, fire-related, firearm-related, homicide/assault, motor vehicle traffic, poisoning, suicide, and TBI.

Only Iowa residents treated within the state are included in the report, which signifies an underestimation of the true rate of injuries in Iowa as some Iowans died outside of Iowa or were treated at hospitals out of the state.

Demographic information provided in this report includes: age, which is in conformity with the CDC life stages age distribution; gender, race; and county size (>50,000; 20,000-50,000; 10,000-20,000; <10,000). The direct age-adjustment method using US 2000 population census data was performed for the overall injury rates, such as death rates, hospitalizations and ED visits. The 5-year (or 4-year for the ED visits data) average was calculated and adjusted to the 2000 census data. We reported only 5-year average data at both the state and county level, rather than reporting any annual data, to have more stable figures from year to year, due to the small number of yearly events. The rate for each year was calculated, and averaged with the other years under study: 2002-2006 (2003-2006 for ED visits). The population data for each age group for that year was used for the denominator, and then the years were averaged together. For the data in the individual county reports, the total number of injuries during the entire five-year period is reported.

The average years of potential life lost (YPLL) is a measure of premature mortality (early death). YPLL provides insight into the impact of injury-related death on society compared to other leading causes of death. This measure is important for injury prevention because injury is the leading cause of death for persons aged 1 through 34 years. For a given cause category, we calculated the average years lost before age 75 through three steps. First, we subtracted each deceased person's age at death from 75. Next, we added the results – the years lost – for all deceased people in that category. Then we divided the sum by the number of deceased persons in that category. (Adapted from <http://www.cdc.gov/ncipc/wisqars/fatal/help/helpfile.htm#yppl>)

¹² State Injury Indicators. Instructions for Preparing 2005 Data. US Department of Health and Human Services, Division of Injury Response, CDC, Atlanta, GA; 2007.

Annex 2. DEFINITION OF TERMS

Age-adjusted rate (Direct Method): A weighted average of the age-specific incidence or mortality rates from the targeted population(s) where the weights are the proportions of persons in the corresponding age groups of a standard population (Year 2000 U.S. population). Age-adjusted rates allow for comparisons of rates over time or between different populations.

Age-specific rate: The number of cases for a given period (e.g., 2002-2006) for a specific age group by the population for that age group for that time period.

Cause of Death: The disease or injury which set in motion the chain of physiological disturbances which produced death.

Crude death rate or crude hospitalization rate: The number of deaths or hospitalizations over a specified time period divided by the total population (per 100,000).

E-Codes: External Cause of Injury codes, developed by the World Health Organization (WHO), are a supplemental code for use with the International Classification of Diseases (ICD).

Hospital discharges: Records from hospital discharges including hospital inpatient and outpatient (ED visits).

ICD-9-CM: The International Classification of Diseases, 9th Revision, Clinical Modification codes will be used in classifying diagnoses from hospital inpatient and ED visits.

ICD-10-CM: The International Classification of Diseases, 10th Revision, Clinical Modification codes will be used in classifying causes of death from death certificates (began in 1999).

Intent of injury: Whether an injury was caused by an act carried out on purpose by oneself or by another person(s), with the goal of injuring or killing (e.g., homicide, suicide, legal intervention), or if there was no intent to harm (i.e., unintentional). Sometimes the manner of intent has not been determined (i.e., undetermined intent). **[See Annex 1]**

Manner of Death: The circumstances surrounding the death. There are generally five categories:

Natural: Deaths resulting solely from disease.

Accident: Death results inadvertently or where no harm was intended (explicit or implicit).

Suicide: Deaths from self-inflicted injury.

Homicide: Death directly caused by the action of another person or a death that occurs during the commission of a felony.

Undetermined: When the manner of death cannot be determined due to insufficient evidence or where there is solid evidence supporting two or more possible manners.

Mechanism of Death: The physiologic derangement or biochemical disturbance incompatible with life which is initiated by the cause of death.

Mechanism of injury (cause of injury): the way in which the person sustained the injury (circumstances or activities that contributed to the injury event; for example, a fall or motor vehicle crash).

MVT: Motor vehicle traffic-related trauma; includes E-Codes: E810 – E819.

Annex 3. REFERENCES

1. State Injury Indicators. Instructions for Preparing 2005 Data. US Department of Health and Human Services, Division of Injury Response, CDC, Atlanta, GA; 2007.
2. National Vital Statistics Reports, Vol. 56, N. 5, Deaths: Leading Causes for 2004, CDC, Nov. 2007
3. Healthy Iowans 2010, Mid-Course Revision, July 2005, Iowa Department of Public Health
4. Iowa Health Fact Book, The University of Iowa College of Public Health, Iowa Department of Public Health, 2007
5. Websites:
<http://www.cdc.gov/ncipc/wisgars/default.htm>
http://www.idph.state.ia.us/apl/vital_stats.asp
<http://www.idph.state.ia.us/ems/common/pdf/tregdict.pdf>
http://www.idph.state.ia.us/ems/common/pdf/farm_injury_report_form.pdf
<http://www.idph.state.ia.us/apl/codes.asp>
6. An Assessment of the Injury and Violence Prevention Activities at the Iowa Department of Public Health, conducted June 18-22, 2007 by the State & Territorial Injury Prevention Directors Association.

Annex 4. DATA TABLES PRODUCED IN THIS REPORT

See: http://www.idph.state.ia.us/bh/injury_prevention