

South Carolina Injury Profile

SC DHEC - Division of Injury and Violence
Prevention

Patsy Myers, Injury Epidemiologist

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Data Years
2003-2014

Acknowledgments

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Table of Contents

Acknowledgements	i
Table of Contents	ii
List of Tables	iv
List of Figures	iv
Introduction	1
Sources of information	1
How to use this report	2
Chapter 1. Overall Injury	3
Injury Deaths	4
Overall Injury Hospitalizations and ED Visits	12
Key Findings Overall Injury	13
Chapter 2. Unintentional Injury	14
Key Findings. Unintentional Injury	17
Chapter 3. Drowning or Submersion	19
Key Findings. Drowning or Submersion	21
Chapter 4. Falls	22
Key Findings Falls	24
Chapter 5. Fire-Related Injuries	26
Key Findings Fire-Related Injuries	28
Chapter 6. Firearms	29
Key Findings Firearms	31
Chapter 7. Motor Vehicles	32
Seatbelt Use	34
Texting and Driving	34
Drinking and Driving	35
Alcohol-Related Crash Deaths	35
Key Findings Motor Vehicles	35
Chapter 8. Poisoning	37
Key Findings Poisoning	41
Chapter 9. Homicide/Assault	42
Key Findings Homicide/Assault	45
Chapter 10. Suicide/Self-Inflicted Injuries	46
Key Findings Suicide/Self-Inflicted Injuries	49

Chapter 11. Traumatic Brain Injury	50
Key Findings Traumatic Brain Injury	54
Recommendations: What Can Be Done?	55
Appendices	58
Appendix 1. Technical Notes	58
<i>Sources of Data</i>	58
<i>Fatal Accident Reporting System (FARS)</i>	60
<i>Web-based Injury Statistics Query and Reporting System (WISQARS)</i>	60
<i>Definitions of Causes of Injury</i>	61
<i>Data Analysis</i>	65
Appendix 2 - Injury Morbidity and Mortality ICD Codes	67
References	68

List of Tables

Table 1.1. Causes of Injury Deaths, SC 2014.....	4
Table 1.2. Top 5 Causes of Injury Deaths by Race and Sex, SC 2014.....	5
Table 1.3. Top 3 Causes of Injury Deaths by Age Groups, SC 2014	6
Table 1.4. Top Causes of Death Due to Intentional Injuries, SC 2014.....	9
Table 1.5. 10 Leading Causes of Death by Age Group, SC, 2014.....	10
Table 1.6. Leading Causes of Injury Death by Age Group, SC, 2009-2014.....	11

List of Figures

Figure 1.1. Injury in SC, 2014	3
Figure 1.2. Top 5 Demographic Groups at Highest Risk For Injury.....	3
Figure 1.3. Injury Deaths by Intent, 2014.....	7
Figure 1.4. Age-Adjusted Injury Mortality Rates by Race and Sex	7
Figure 1.5. Injury Mortality, SC vs. Southeast and US	8
Figure 1.6. Injury Mortality, SC vs. Neighboring States	8
Figure 1.7. Injury Hospitalizations and ED Visits by Intent	12
Figure 1.8. Age-Adjusted Injury Inpatient Hospitalization Rates.....	12
Figure 1.9. Age-Adjusted Injury ED Visit Rates	12
Figure 2.1. Unintentional Injury in SC, 2014	14
Figure 2.2. Top 5 Demographic Groups at Highest Risk for Unintentional Injury.....	14
Figure 2.3. Unintentional Injury Deaths by Type.....	15
Figure 2.4. Deaths Attributable to Unintentional Injury by Age Group.....	15
Figure 2.5. Age-Adjusted Unintentional Injury Mortality Rates	16
Figure 2.6. Unintentional Injury Hospitalizations and ED Visits by Type	16
Figure 2.7. Age-Adjusted Unintentional Injury Inpatient Hospitalization Rate	17
Figure 2.8. Age-Adjusted Unintentional Injury ED Visit Rates	17
Figure 3.1. Drowning or Submersion in SC, 2014	19
Figure 3.2. Top 5 Demographic Groups at Highest Risk for Drowning or Submersion	19
Figure 3.3. Mortality from Accidental Drowning	20
Figure 3.4. Age-Adjusted Submersion Inpatient Hospitalization Rates	20
Figure 3.5. Age-Adjusted Submersion ED Visit Rates.....	20
Figure 4.1. Fall-Related Injuries in SC, 2014.....	22
Figure 4.2. Top 5 Demographic Groups at Highest Risk for Falls	23
Figure 4.3. Mortality from Falls by Race	23

Figure 4.4. Age-Adjusted Fall Inpatient Hospitalization Rate	24
Figure 4.5. Age-Adjusted Fall ED Visit Rate	24
Figure 5.1. Fire-Related or Burn Injuries in SC, 2014.....	26
Figure 5.2. Top 5 Demographic Groups at Highest Risk for Injuries from Fire.....	26
Figure 5.3. Mortality from Fire	27
Figure 5.4. Age-Adjusted Fire-Related Injury Inpatient Hospitalization Rate	27
Figure 5.5. Age-Adjusted Fire-Related Injury ED Visit Rate	27
Figure 6.1. Accidental Firearm-Related Injuries in SC, 2014.....	29
Figure 6.2. Top 5 Demographic Groups at Highest Risk for Injuries from Firearms.....	29
Figure 6.3. Mortality from Accidental Discharge of Firearms.....	30
Figure 6.4. Age-Adjusted Firearm-Related Injury Inpatient Hospitalization Rate	30
Figure 6.5. Age-Adjusted Firearm-Related Injury ED Visit Rate.....	30
Figure 7.1. Motor Vehicle Crashes in SC, 2014.....	32
Figure 7.2. Top 5 Demographic Groups at Highest Risk for Injuries from Motor Vehicle Crashes	32
Figure 7.3. Motor Vehicle Occupants Killed in Crashes, 2014.	32
Figure 7.4. Motor Vehicle Crash Mortality.....	33
Figure 7.5. Age-Adjusted Motor Vehicle Crash Injury Inpatient Hospitalization Rate	33
Figure 7.6. Age-Adjusted Motor Vehicle Crash Injury ED Visit Rates	33
Figure 7.7. Seatbelt Use	34
Figure 7.8. Never or Rarely Use Seatbelts	34
Figure 7.9. Texted or Emailed while Driving	35
Figure 7.10. Drove When Had Too Much to Drink.....	35
Figure 7.11. Alcohol-Related Crash Deaths	35
Figure 8.1. Poisoning Injuries in SC, 2014.....	37
Figure 8.2. Top 5 Demographic Groups at Highest Risk for Injuries from Accidental Poisoning	37
Figure 8.3. Mortality from Accidental Poisoning	38
Figure 8.4. Unintentional Poisoning Deaths Age 0-17 and 18-24.....	38
Figure 8.5. Age-Adjusted Poisoning Injury Inpatient Hospitalization Rate	38
Figure 8.6. Poisoning Hospitalizations Age 0-17 and 18-24.....	39
Figure 8.7. Poisoning Hospitalizations by Intent, 2009-2014.....	40
Figure 8.8. Age-Adjusted Poisoning ED Visit Rate.....	40
Figure 8.9. Poisoning Hospitalizations Age 0-17 and 18-24.....	40
Figure 8.10. Poisoning ED Visits by Intent, 2009-2014	41
Figure 9.1. Homicide/Assault in SC, 2014	42
Figure 9.2. Top 5 Demographic Groups at Highest Risk for Homicide/Assault.....	42
Figure 9.3. Mortality from Homicide	43

Figure 9.4. Age-Adjusted Assault Injury Inpatient Hospitalization Rates	43
Figure 9.5. Age-Adjusted Assault Injury ED Visit Rates	44
Figure 9.6. Carried a Weapon on School Property.....	44
Figure 10.1. Suicide/Self-Inflicted Injuries in SC, 2014.....	46
Figure 10.2. Top 5 Demographic Groups at Highest Risk for Suicide/Self-Inflicted Injuries	46
Figure 10.3. Mortality from Suicide	47
Figure 10.4. Age-Adjusted Self-Inflicted Injury Inpatient Hospitalization Rate	47
Figure 10.5. Age-Adjusted Self-Inflicted ED Visit Rate.....	48
Figure 10.6. Seriously Considered Attempting Suicide	48
Figure 11.1. Traumatic Brain Injuries in SC, 2014.....	50
Figure 11.2. Top 5 Demographic Groups at Highest Risk for Suicide/Self-Inflicted Injuries	51
Figure 11.3. Traumatic Brain Injury Mortality.....	51
Figure 11.4. Age-Adjusted Traumatic Brain Injury Inpatient Hospitalization Rate.....	52
Figure 11.5. Age-Adjusted Traumatic Brain Injury ED Visit Rate	52

Introduction

In the United States, unintentional injury is the fifth cause of all deaths-and it is the leading cause of death for people 1-44 years old (Centers for Disease Control and Prevention, 2014b), which is the most productive period in people's lives. In the United States during 2014 there were 199,7569 persons who died from injury (rate 59.9/100,000), and 30,888,063 people who had non-fatal injuries (rate 9876.3/100,000) (Centers for Disease Control and Prevention,

**SC Injury Cost
\$3.9 Billion
Annually**
Medical care and lost productivity
cost due to injuries

2014b). Injuries cost more than \$586 billion in medical case and

lost productivity (Centers for Disease Control and Prevention, 2014b), which does not take into account the cases which have been seen in doctors' offices. The burden of intentional and unintentional injuries among children and adults in South Carolina

**More Than
\$586 Billion
Annually**
National medical care and lost
productivity cost due to injuries.

cannot be ignored since injuries are the leading cause of death in South Carolina residents ages 1-4 and those between 10 and 34 years, and a significant cause of morbidity and mortality in all ages. In the State of South Carolina during 2014 there were 3,581 persons who died from injury (rate 71.7.2/100,000), and 553,774 people who had non-fatal injuries (rate 11,459.5/100,000). Injuries result in over 1 billion dollars in preventable medical costs each year in South Carolina. The loss of life, lifelong disability, and the emotional and financial stress take a tremendous toll on individuals, families, and communities. In addition to economic loss, injuries result in loss of productivity of almost \$3 billion annually and causes stress to the victim, their family, and other caregivers. Even injuries that do not result in loss of life may have significant physical, emotional, and financial effects since injury survivors may have their regular activities of daily living disrupted temporarily or they may be permanently disabled.

This report begins with an overview of the burden of injury in South Carolina, including a comparison of injury to other public health concerns, yearly injury trends, demographics of those injured, and intent of injuries. Information on injury-related deaths, hospitalizations, and emergency department (ED) visits are then presented. Key data are presented in graphical form, with key points and comparisons also noted. Detailed information on the methods used to calculate the data, including the data sources, analysis methods, and variables used for the data are presented in Appendix 1.

Sources of information

This report combines data from South Carolina Department of Health and Environmental Control (SCDHEC) Death Certificates, South Carolina Revenue and Fiscal Affairs Office hospital

inpatient/outpatient discharge data, and the US Centers for Disease Control and Prevention (CDC) Fatal Accident Reporting System (FARS) (Centers for Disease Control and Prevention, 2015). The leading causes of injury deaths, hospitalizations, and ED visits by age, sex, race, are described. There are two dimensions of the external causes of injury: intent (manner) and the mechanism (cause) by which the injury occurred. These data are categorized by manner, intent, and other indicators, including demographics -- age, sex, and race -- which can provide information to improve injury care and stimulate and strengthen injury prevention efforts.

Information on potential injury-causing behaviors is available from the Behavioral Risk Factor Surveillance System (BRFSS) and the Youth Risk Behavior Survey (YRBS). More information on 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. More detailed statistics on injuries not included in this document are available from the SCDHEC Division of Injury and Violence Prevention.

How to Use This Report

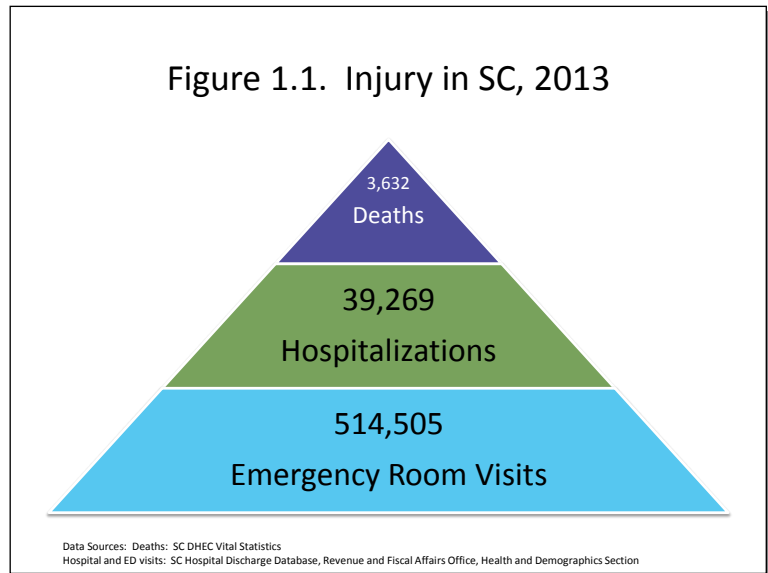
This report is intended to provide information on the burden of injury in South Carolina to assist communities, health practitioners and state and local policymakers in developing strategies and policies to reduce injuries in the state. To accomplish this goal, potential uses of this report include the following:

- Providing information to the media in an effort to raise awareness among them and to educate the general public about the burden of injuries in South Carolina. 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. Informed legislators (at local, state, and national levels) can help advocate for injury prevention efforts. Diverse groups working together can identify priorities and maximize prevention strategies and resources to prevent injuries.
- 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.

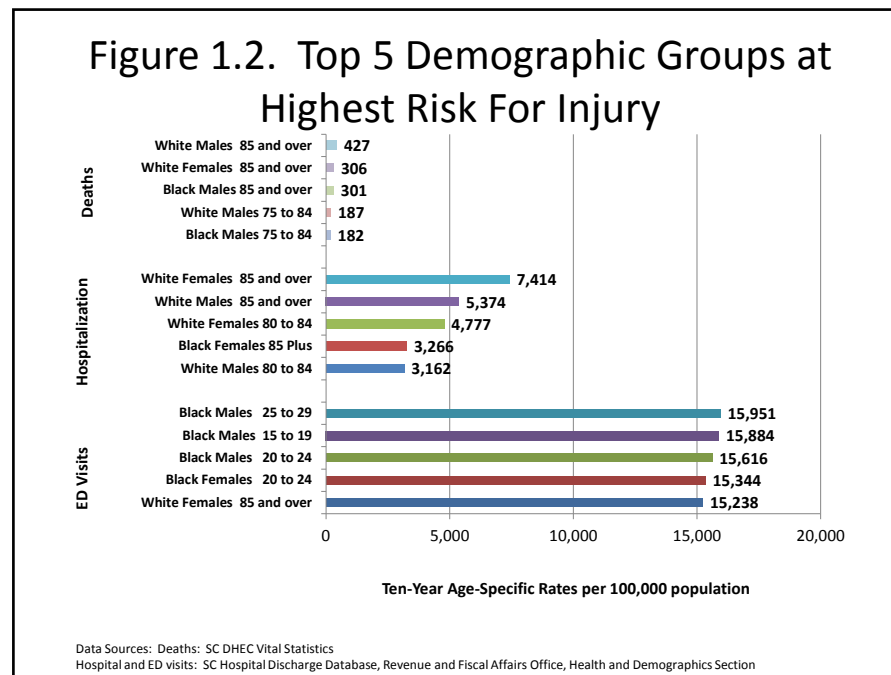
Chapter 1. Overall Injury

Violence and injuries affect everyone regardless of age, race, or economic status. In the first half of life, more Americans die from violence and injuries — such as motor vehicle crashes, falls, or homicides — than from any other cause, including cancer, HIV, or the flu (Centers for Disease Control and Prevention, 2014a). Each year, millions of people are injured and survive, facing life-long mental, physical, and financial problems.

South Carolina ranked 17th in the nation for injury deaths in 2014 (Centers for Disease Control and Prevention, 2014b). Injury was responsible for 3,632 deaths, 39,269 hospitalizations, and 514,505 visits to the emergency room (Fig. 1.1).



Eleven-year rates (2003-2014) indicate that the highest rate of mortality from all injuries occurs in white males age 85 and over, followed closely by white females, black females and black males age 85 and



over. Other demographic groups at high risk of death from injuries include white males ages 20 to 24, white males ages 45 to 54, white males ages 70 to 74, black males ages 20 to 34 and black males ages 75 to 84. White females ages 85 and over are most likely to be hospitalized due to injuries. This is followed closely by white males age 85 and over. Other groups at high risk for hospitalization from

injuries include white males and females ages 75 to 84, and black males and females age 80 and over (Fig. 1.2).

Injury Deaths

Unintentional injuries comprise almost 70% of all injury deaths (Table 1.1). Motor vehicle accidents are the most common cause of injury-related death, comprising 24% of all fatal injuries in SC. The second most common cause of injury-related death is suicide, followed by falls, and poisoning. Accidents due to fire, flame, smoke or hot objects, drowning, water, air and other transport accidents, and accidental discharge of firearms contribute to deaths from unintentional injuries. Suicide, homicide, and legal intervention comprise all deaths by intentional injuries.

Cause of Injury	Number	Percent¹	Rate²	National Rate³
Motor Vehicle Accidents	803	22.1%	16.6	10.2
Poisoning	673	18.5%	13.9	13.1
Falls	417	11.5%	8.6	8.7
Unspecified Causes	353	9.7%	7.3	
Fire/Flame	85	2.3%	1.8	0.8
Drowning	63	1.7%	1.3	1.05
Water, Air and Other Transport Accidents	24	0.7%	0.5	0.25
Other Land Transport Accidents	20	0.6%	0.4	0.39
Accidental Discharge of Firearms	13	0.4%	0.3	0.18
Total Unintentional Injuries	2,451	67.5%	50.7	40.3
Suicide (Intentional Self-Harm)	760	20.9%	15.7	12.9
Homicide (Assault)	364	10.0%	7.5	5.03
Legal Intervention⁴	6	0.2%	0.1	0.17
Total Intentional Injuries	1130	31.1%	23.4	17.89
All Injuries	3,287	100.0%	67.2	59.9

¹Percent of All Injury Deaths, Data Source: SC DHEC Vital Statistics

²Age-Adjusted Rate per 100,000 population

³2014 Age-Adjusted Rate per 100,000 population, source: WISQARS

⁴"Legal Intervention" are injuries inflicted by the police or other law-enforcing agents, including military on duty, in the course of arresting or attempting to arrest lawbreakers. It also includes legal execution.

Table 1.2 shows the top five causes of injury death by race and sex for 2014. Suicide is the leading cause of injury-related death for white males, with motor vehicle accidents, poisoning, and falls ranked the second, third and fourth leading causes of death. In black males, homicides are the most common cause of injury-related death. Motor vehicle accidents, suicide, and other non-transport accidents rank second, third, and fourth. In white females, poisoning was the most common cause of injury-related death, followed by falls, suicide and motor vehicle accidents. In black females, motor vehicle accidents are the most common cause of injury-related deaths, followed by other non-transport¹ accidents, exposure to smoke, fire, or flames, and homicide.

Table 1.2 Top 5 Causes of Injury Deaths ¹ by Race and Sex, SC 2014							
Race and Sex	Cause of Death	Number	Rate ²	Race and Sex	Cause of Death	Number	Rate
White Male	Suicide	510	30.9	Black Male	Homicide	192	29.7
	Motor vehicle accidents	380	23.1		Motor vehicle accidents	182	28.2
	Poisoning	335	20.3		Suicide	67	10.4
	Falls	184	11.2		Other Non-transport accidents ³	63	9.8
	Other Non-transport accidents ³	151	9.2		Poisoning	39	6.0
White Female	Poisoning	270	15.9	Black Female	Motor vehicle accidents	56	7.7
	Falls	181	10.7		Homicide	36	4.9
	Motor vehicle accidents ³	178	10.5		Other Non-transport accidents ³	30	4.1
	Suicide	169	10.0		Accidental exposure to smoke, fire and flames	14	1.9
	Other Non-transport accidents	106	6.3		Falls	16	2.2

¹Data Source: SC DHEC Vital Statistics

²Age-Adjusted Rate per 100,000 population

³Non-transport accidents are defined as "Other and unspecified non-transport accidents and their effects (W20-W31, W35-W64, W75-W99, X10-X39, X50-X59, Y86)" i.e. any accidents not including transportation, falls, discharge of firearms, fire and poisoning.

Injury causes of death vary widely by age group. Table 1.3 shows the top causes of injury death by age for 2014. In children ages 0-14, Sudden Infant Death Syndrome is the most common cause of injury-related deaths, followed by motor vehicle accidents and homicide. In teens and young adults ages 15 to 24, motor vehicle accidents are the most common cause of injury-related deaths, followed by homicide and suicide. In adults ages 25 to 34, motor vehicle accidents are the most common cause of injury-related deaths, followed by suicide and poisoning. In adults ages 35 to 54, poisoning is the most common cause of injury-related deaths, followed by suicide and motor vehicle accidents. In older adults age 65 and older, falls are the most common cause of injury-related deaths followed by suicide and motor vehicle accidents.

Age Group	Cause of Death	Number	Rate²	Age Group	Cause of Death	Number	Rate
0 to 14	Sudden Infant Death Syndrome	31	3.4	35 to 54	Poisoning	327	26.3
	Motor Vehicle Accidents	27	3		Suicide	284	22.8
	Homicide	20	2.2		Motor Vehicle Accidents	223	17.9
15 to 24	Motor vehicle accidents	165	24.9	55 to 64	Suicide	130	17.1
	Homicide	102	15.4		Motor Vehicle Accidents	116	18.4
	Suicide	85	12.8		Poisoning	140	22.2
25 to 34	Motor Vehicle Accidents	146	23.2	65 plus	Falls	345	45.3
	Suicide	109	17.4		Suicide	132	18.1
	Poisoning	115	18.3		Motor Vehicle Accidents	126	16.5

¹Data Source: SC DHEC Vital Statistics

²Age-Adjusted Rate per 100,000 population

More than two out of three deaths (68%) from injuries in SC in 2014 were unintentional injuries. More than one in five (21%) injury deaths were due to suicide, and almost one in ten (9.5%) were due to homicide (Fig.1.3).

Overall injury mortality rates have not changed significantly over the past decade. Injury mortality in the black population has decreased significantly since 2003, at an average annual rate of 2.5%. Very little difference was observed in mortality rates by race, but mortality rates by sex vary widely. Overall injury

mortality rates are more than 2.5 times higher in males than in females. Overall injury rates in males have decreased slightly (1.2% per year) since 2003. Overall injury mortality rates have remained stable in white males and have increased by an average of 1.3% annually in white females. Overall injury rates have decreased by an annual average of 1.6% in black males and 2.8% in black females since 2003, which was statistically significant.

Mortality rates vary greatly by sex in both races. For whites, mortality rates are 2 to 2.5 times higher in males than in females. In blacks mortality rates are more than 3 times higher in males than in females (Fig. 1.4).

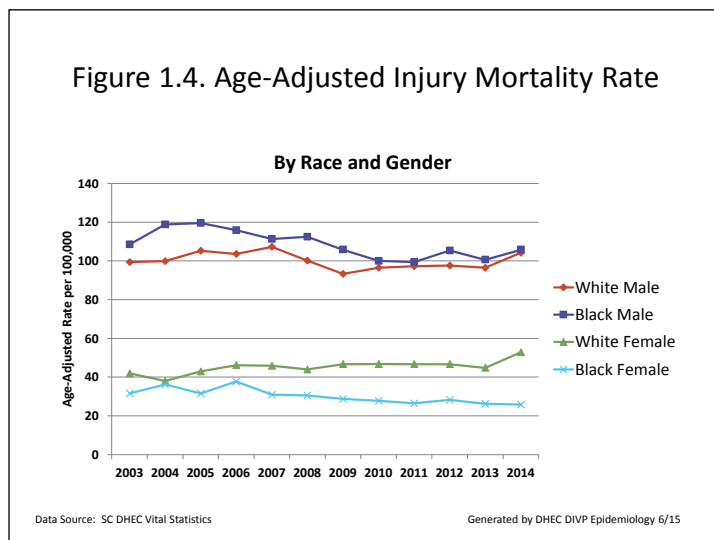
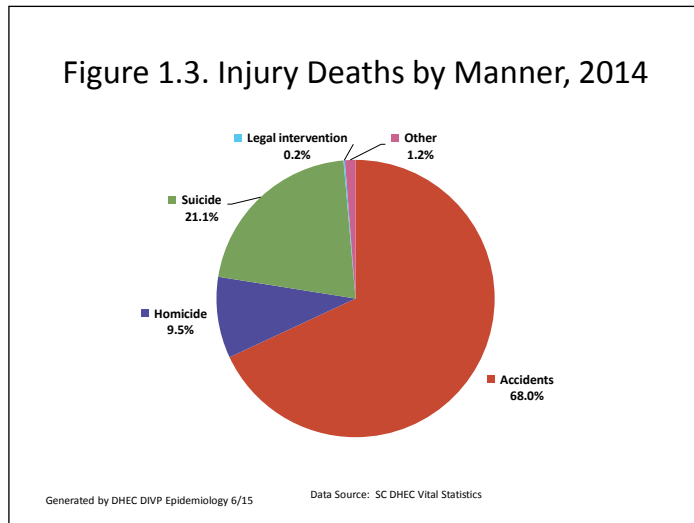
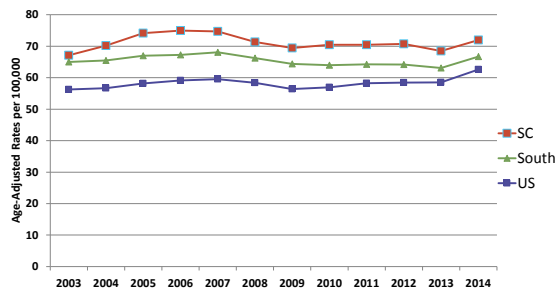


Figure 1.5. Injury Mortality, SC vs Southeast and US



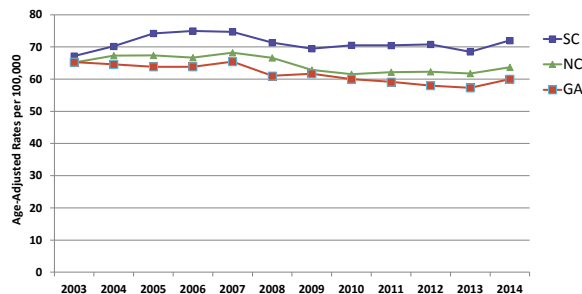
Generated by DHEC DVP Epidemiology 6/15 Data Source: CDC WISQARS http://www.cdc.gov/injury/wisqars/fatal_injury_reports.html

Both South Carolina and US injury mortality rates have remained virtually unchanged since 2003. Rates for the South have decreased slightly by an average of 0.3% per year. In 2003, injury mortality rates in SC were 20% higher than national rates and about the same as mortality rates for the southeast. In 2014 SC injury mortality rates were only 16% higher than national rates and 1% higher than the South. Rates for the South include combined rates for South Carolina, North Carolina, Virginia, West

Virginia, Georgia, Florida, Alabama, Mississippi, Tennessee, Kentucky, Louisiana, Arkansas, Texas, and Oklahoma (Fig. 1.5).

South Carolina overall injury mortality rates have consistently been higher than those in the neighboring states of North Carolina and Georgia since 2003, both of which have had significant decreases in injury mortality rates. In 2014, SC injury mortality rates were 11% higher than North Carolina and 19% higher than Georgia rates (Fig. 1.6).

Figure 1.6. Injury Mortality, SC vs Neighboring States



Generated by DHEC DVP Epidemiology 6/15 Data Source: CDC WISQARS http://www.cdc.gov/injury/wisqars/fatal_injury_reports.html

Intentional injuries include those self-inflicted (suicide) and inflicted by another (homicide).

The most common manner of death in suicides and homicides is firearms. Firearms were used in 77% of homicides and 67% of suicides (Table 1.3). The second most common manner of homicide deaths is cut/pierce, although guns are ten times more likely to be used in a homicide than any other method. Suffocation is the second most likely manner of suicide, followed by drug-related poisoning.

Table 1.4 shows leading causes of death by age group for 2014. Injuries, either intentional or unintentional, comprise the top 3 causes of death for all ages up to age 34 except ages 5-9.

Transportation-related accidents are one of the 10 leading causes of death in all age groups except in infants and persons 65 and over.

Table 1.4 Top Causes of Death Due to Intentional Injuries, SC 2014					
Homicide	No.	Percent	Suicide	No.	Percent
Firearm	266	73.28%	Firearm	479	63.61%
Cut/pierce	35	9.64%	Suffocation	144	19.12%
Unspecified	24	6.61%	Poisoning	88	11.69%
Other	38	10.47%	Cut/Pierce	14	1.86%
			Other	28	3.72%
Total	363	100.00%	Total	753	100.00%
Source: Web-based Injury Statistics Query and Reporting System (WISQARS)					

Table 1.5 shows leading causes of death by age group for 2014. Injury-related deaths are color-coded to be more visible in the table. The same type of injury-related death is coded the same color in each column regardless of where it falls, e.g. homicide is red, transport accidents are blue, suicide is green, falls are yellow, and miscellaneous accidents, which include includes accidental discharge of firearms, accidental drowning and submersion, accidental exposure to smoke, fire and flames, accidental poisoning and exposure to noxious substances, other and unspecified non-transport accidents, are coded purple.

Table 1.6, also color-coded, shows leading cases of injury death by age group for the past 5 years. For ages 5-44, motor vehicle accidents are the most common cause of injury deaths. Homicide is the most common cause of injury death in children and 0-4, followed by motor vehicle accidents. Homicide is the second leading cause of death in children ages 1-9.

Table 1.5. 10 Leading Causes of Death by Age Group, South Carolina, 2014

<1	1 to 4	5 to 9	10 to 14	15 to 24	25 to 34	35 to 44	45 to 54	55 to 64	65+	Total
Short Gestation and Low Birth Weight 71	Misc. Accidents* 17	Transport Accidents 11	Transport Accidents 8	Transport Accidents 168	Transport Accidents 154	Diseases of heart 256	Cancer 828	Cancer 2,129	Diseases of heart 7278	Diseases of heart 9924
Congenital anomalies 56	Transport Accidents 11	Cancer 9	Cancer 5	Homicide 102	Misc. Accidents* 144	Cancer 181	Diseases of heart 774	Diseases of heart 1,493	Cancer 6,686	Cancer 9912
Misc. Accidents* 37	Homicide 10	Misc. Accidents* 7	Diseases of heart 5	Suicide 85	Suicide 109	Misc. Accidents* 175	Misc. Accidents* 226	Chronic lower respiratory disease 340	Chronic lower respiratory disease 2,219	Chronic lower respiratory disease 2,710
Pregnancy and Placenta Complications 34	Diseases of heart 2	Homicide 5	Suicide 5	Misc. Accidents 73	Homicide 97	Suicide 128	Liver disease 165	Stroke 262	Stroke 1,918	Stroke 2385
SIDS 31	Stroke 2	Misc. Accidents* 4	Misc. Accidents* 4	Diseases of heart 17	Disease of heart 84	Transport Accidents 107	Suicide 156	Diabetes 240	Alzheimer's disease 1,915	Alzheimer's disease 1935
Sepsis and Infections 17	Complications of Surgery 2	Congenital Malformations 2	Congenital anomalies 3	Cancer 15	Cancer 48	Stroke 48	Stroke 134	Liver disease 235	Diabetes 839	Diabetes 1,234
Circulatory Diseases 6		Disease of the Heart 2	Homicide 2	Congenital anomalies 6	AIDS (HIV disease) 18	Liver disease 36	Transport Accidents 132	Misc. Accidents* 214	Kidney Disease 639	Misc. Accidents* 1187
Neonatal Hemorrhage 6		Benign neoplasms 1	Influenza and pneumonia 2	Perinatal Issues 4	Stroke 15	Diabetes 33	Chronic lower respiratory disease 123	Septicemia 158	Influenza and pneumonia 569	Transport Accidents 847
Homicide 3			Chronic lower respiratory disease 1	Stroke 6	Diabetes 14	AIDS (HIV disease) 31	Diabetes 105	Suicide 143	Septicemia 562	Kidney Disease 840
			Anemias 1	Falls 4	Perinatal Issues 10	Influenza and Pneumonia 23	Septicemia 59	Kidney Disease 129	Parkinson's Disease 388	Septicemia 811

*Misc. Accidents includes accidental discharge of firearms, accidental drowning and submersion, accidental exposure to smoke, fire and flames, accidental poisoning and exposure to noxious substances, Other and unspecified non-transport accidents

Table 1.6. Leading Causes of Injury Death by Age Group, South Carolina, 2009-2014

<1	1 to 4	5 to 9	10 to 14	15 to 24	25 to 34	35 to 44	45 to 54	55 to 64	65+	Total
Homicide 32	Homicide 37	Motor vehicle Accidents 37	Motor vehicle Accidents 45	Motor vehicle Accidents 142	Motor vehicle Accidents 737	Motor vehicle Accidents 625	Poisoning 893	Suicide 591	Falls 1239	Motor vehicle Accidents 4,143
Motor vehicle Accidents 10	Motor vehicle Accidents 37	Homicide 16	Suicide 24	Poisoning 32	Suicide 499	Poisoning 615	Suicide 712	Motor vehicle Accidents 525	Motor vehicle Accidents 607	Suicide 3,255
Falls 2	Drowning 37	Drowning 9	Drowning 14	Drowning 11	Poisoning 492	Suicide 512	Motor vehicle Accidents 660	Poisoning 408	Suicide 552	Poisoning 2,791
Poisoning 2	Fire 20	Fire 7	Homicide 12	Other non-transport 7	Homicide 445	Homicide 285	Homicide 227	Falls 136	Poisoning 169	Homicide 1,714
Drowning 1	Firearms 7	Firearms 3	Firearms 5	Other Transport Accidents 6	Drowning 44	Drowning 44	Falls 117	Homicide 134	Fire 115	Falls 1,562
Fire 1		Falls 3	Other Transport Accidents 4	Firearms 3	Other Transport Accidents 32	Other Transport Accidents 33	Other Transport Accidents 66	Fire 79	Homicide 111	Drowning 359
		Other Transport Accidents 1	Poisoning 3	Falls 1	Fire 19	Falls 33	Fire 59	Drowning 44	Drowning 39	Fire 347
			Fire 3	Fire 1	Falls 18	Fire 27	Drowning 56	Other Transport Accidents 29	Other Transport Accidents 29	Other Transport Accidents 214
			Falls 1		Firearms 14	Firearms 13	Firearms 9	Firearms 14	Firearms 14	Firearms 104

Overall Injury Hospitalizations and ED Visits

More than nine out of 10 hospital and ED visits for injuries (90.0% and 95.4%, respectively, Fig.1.7) are unintentional. One out of 20 (5.2%) injury hospitalization is from a self-inflicted wound.

Overall injury hospitalization rates have remained virtually unchanged since 2003. Rates tend to be higher in the white population and higher for males than females. Black females have the lowest

hospitalization rates for injury, almost one-half that of the black male population (Fig. 1.8). Black males

Figure 1.7. Injury Hospitalizations and ED Visits by Intent

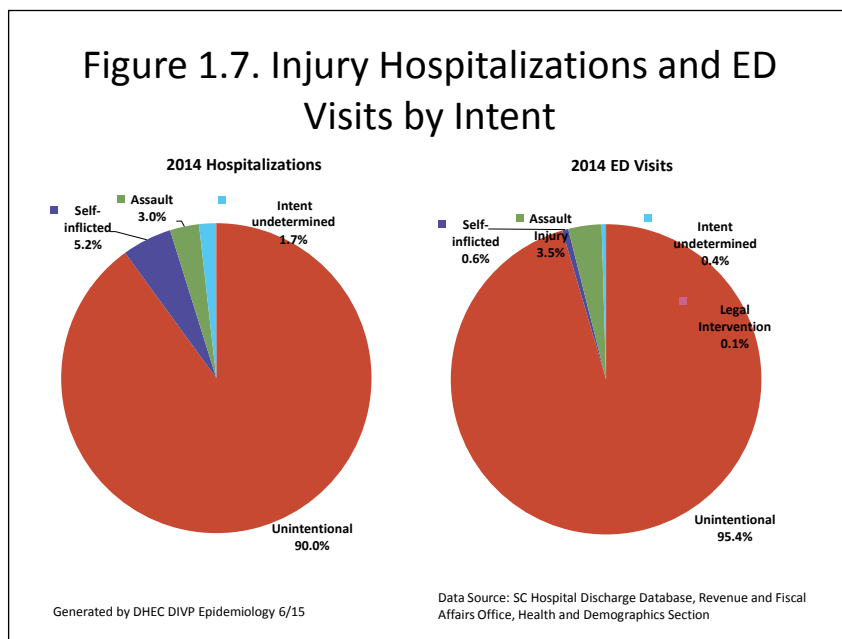
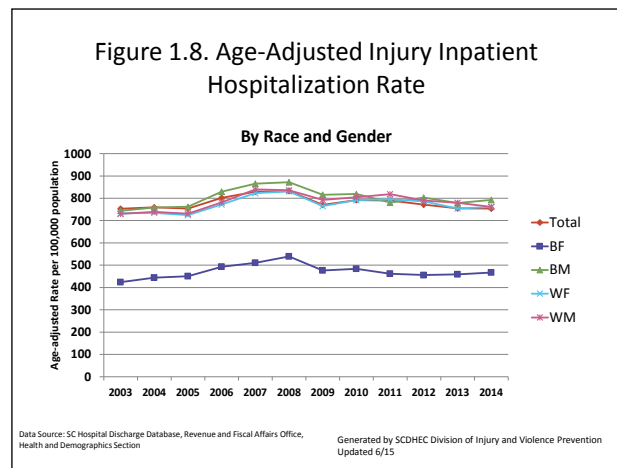


Figure 1.8. Age-Adjusted Injury Inpatient Hospitalization Rate

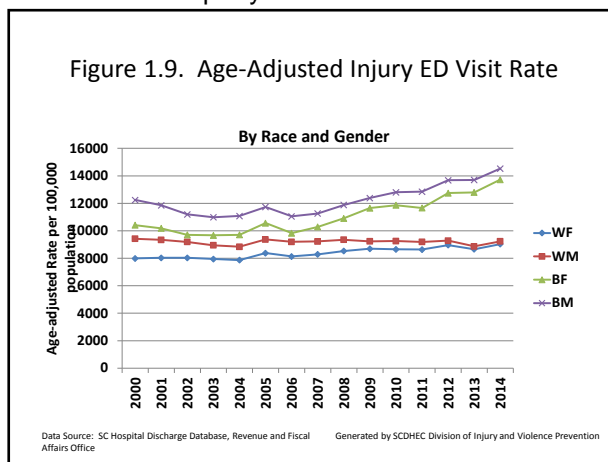


had the only statistically significant change, with an average annual increase of 1% per year since 2003.

Overall injury ED rates have changed very little in the past decade. Black males have consistently had the highest ED visit rates due to injury. Rates for black females have increased by a statistically significant rate of 1.1% per year since 2003.

ED rates for injuries in white males have not changed since 2003. There has been virtually no difference in injury ED visit rates by race. However, males are twice as likely females to have injury-related ED visits (Fig. 1.9).

Figure 1.9. Age-Adjusted Injury ED Visit Rate



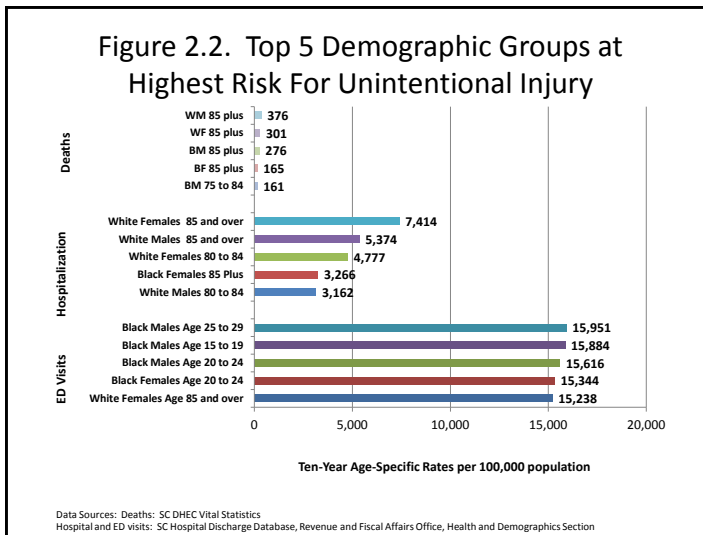
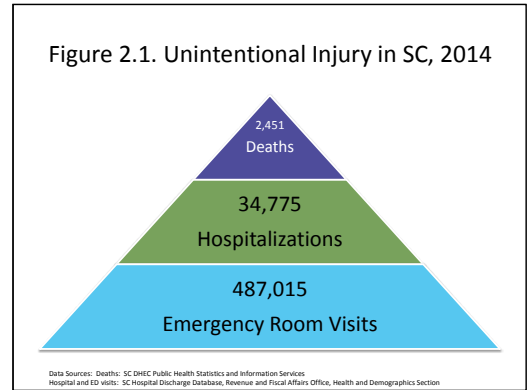
Key Findings--Overall Injury

- South Carolina was ranked 14th highest in the nation in overall injury deaths during the 2003-2013 time-period.
- Intentional and unintentional injuries in 2013 were responsible for 3,287 deaths (highest contributor, motor vehicle crashes), 38,341 hospitalizations (highest contributor, falls), and 483,146 emergency room visits (highest contributor, falls).
- The highest rate of mortality from all injuries occurs in white males age 85 and over, followed closely by 85 years and older white females, black females and black males. The highest rate of hospitalization from all injuries occurs in white females age 85 and over, followed by 80 and older white males and black females.
- The highest rate of emergency department (ED) visits occurs in black males ages 25 to 29, followed by black males ages 15 to 24.
- Motor vehicle accidents are the most common cause of injury-related death, comprising 24% of all fatal injuries in SC.
- Falls are the most common cause of non-fatal injury. In 2013, 142,480 hospital inpatient and ED visits resulted from falls.
- Black males consistently have the highest ED visit rates due to unintentional injury, a statistic resulting from falls, assaults, and fire-related injuries.
- Fatal injuries cost South Carolina \$3.6 billion in medical costs and lost productivity each year, and non-fatal injuries cost another \$3.5 billion in hospital and ED visit charges.

Chapter 2. Unintentional Injury

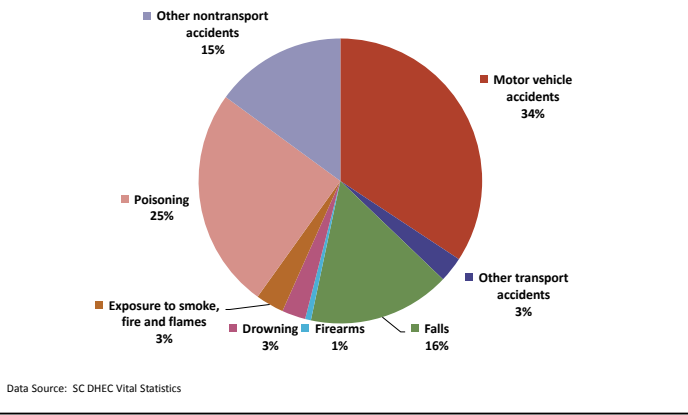
South Carolina ranked 17th in the nation for unintentional injury deaths in 2014 (Centers for Disease Control and Prevention, 2014b). In 2014 South Carolina had 2,451 deaths, 34,775 hospitalizations and 487,015 ED visits attributable to unintentional injury (Fig. 2.1).

Eleven-year rates (2003-2014) indicate that the highest rate of mortality from unintentional injuries occurs in white males age 85 and over, followed closely by white females, black males and black females age 85 and over. Other groups with high mortality rates from injury



include white males and females ages 75 to 84, and black males ages 45 to 84. White males and females age 75 and over and black males and females age 80 and over are most likely to be hospitalized due to unintentional injuries. White females over age 85 are most likely to seek treatment in the ED for unintentional injuries. Other groups most likely to present in the ED for unintentional injuries are black females ages 20 to 34, black males ages 1 to 4, 10 to 19, and 20 to 34 (Fig. 2.2).

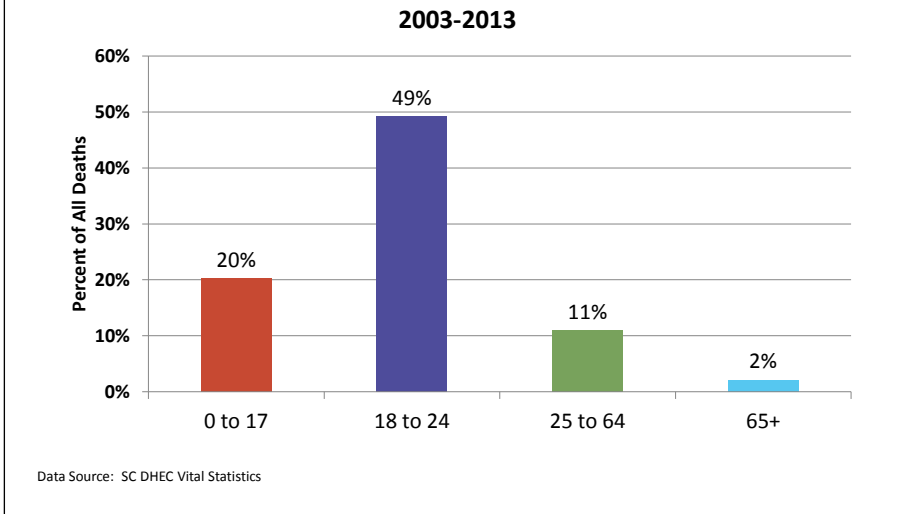
Figure 2.3. Unintentional Injury Deaths by Type



Motor vehicle accidents comprise the most common type of unintentional injury death, followed by poisoning, and then falls (Fig. 2.3).

Deaths from unintentional injury are most likely to occur in children, teens, and young adults. Almost half (49%) of deaths that have occurred in those ages 18-24 have been from unintentional injuries. In children and teens, one in five died from an unintentional injury.

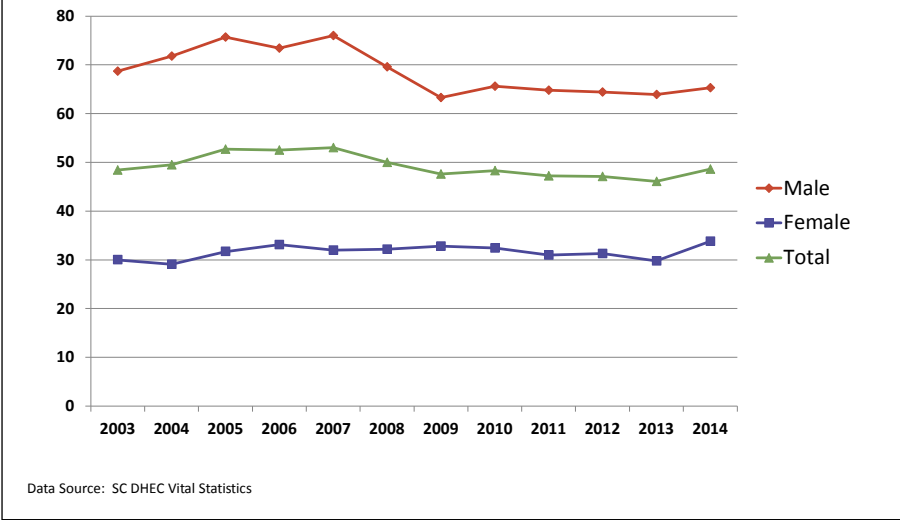
Figure 2.4. Deaths Attributable to Unintentional Injury By Age Group



Adults are less likely to die from unintentional injuries and more likely to die from chronic disease conditions, such as cancer, heart disease, kidney disease, or diabetes (Fig. 2.4).

Mortality rates due to unintentional injury have decreased slightly by an average of 0.6% per year since 2003. In males, mortality rates have decreased by an average

Figure 2.5. Age-Adjusted Unintentional Injury Mortality Rate



of 1.2% annually and rates in blacks have decreased by 2.5% per year in the past decade, both of which were statistically significant. Males are two to three times more likely to die from unintentional injuries than females (Fig. 2.5).

The vast majority of unintentional injury-related hospitalizations

and ED visits are due to falls. The second most likely cause of unintentional injury-related hospitalizations is poisoning, followed by motor vehicle accidents. The second most likely cause of unintentional injury-related ED visits is struck by/caught in, followed by cut/pierce. Struck by/caught in refers to injury caused by being struck accidentally by falling object, striking against or struck accidentally by objects or persons, caught accidentally in or between objects, or accidents caused by machinery.

Another frequent cause of unintentional injury-related hospitalization and ED visit is natural/environmental injuries, which includes animal bites or stings, heat exhaustion, overexertion, or frostbite (Fig. 2.6).

Figure 2.6. Unintentional Injury Hospitalizations and ED Visits by Type

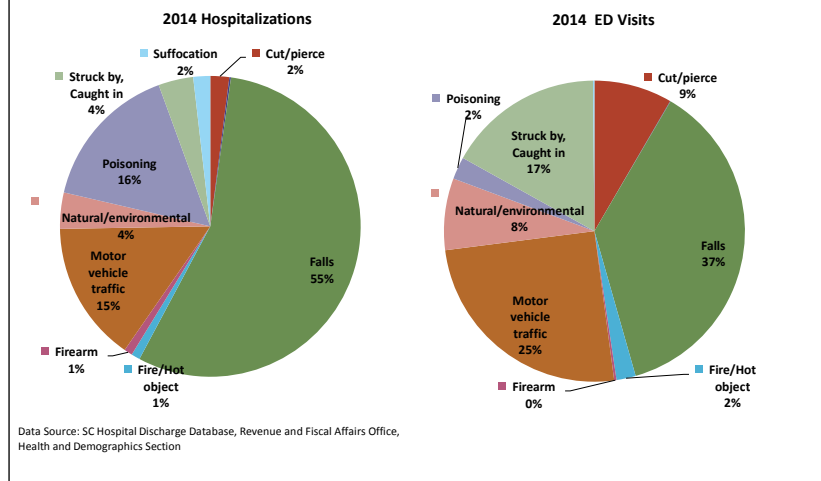
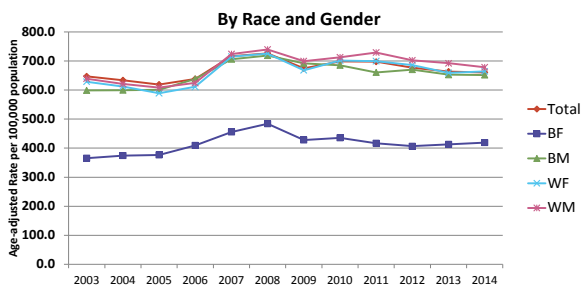


Figure 2.7. Age-Adjusted Unintentional Injury Inpatient Hospitalization Rate



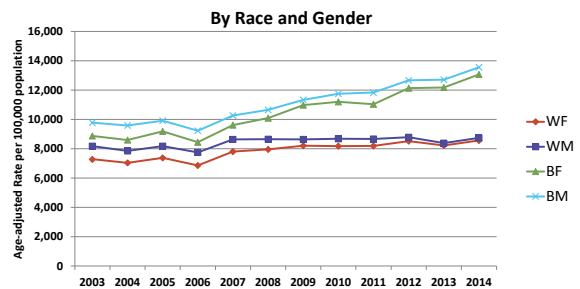
Data Source: SC Hospital Discharge Database, Revenue and Fiscal Affairs Office. Generated by SCDHEC Division of Injury and Violence Prevention.

Overall ED rates have changed very little since 2003. Unintentional injury ED visit rates have increased significantly in both sexes and by race. ED visit rates for unintentional injury have increased 33% at an annual increase of 3.6% per year in the black population since 2003. ED rates for white males have increased significantly by an annual rate 3% 2003. In black females, ED visit rates have increased by 2% annually and rates have increased by 4% annually in white males. ED visit rates are consistently almost twice as high in males as in females (Fig 2.8).

Overall, hospitalization rates for unintentional injury have not changed significantly since 2003. Black females have the lowest unintentional injury hospitalization rates, about 60% less than other race/sex groups, (Fig 2.7). Black males had the only statistically significant increase, at an average increase of 1.5% per year.

ED visit rates for unintentional injuries showed very few differences by sex but did vary by

Figure 2.8. Age-Adjusted Unintentional Injury ED Visit Rate



Data Source: SC Hospital Discharge Database, Revenue and Fiscal Affairs Office, Health and Demographics Section. Generated by SCDHEC Division of Injury and Violence Prevention.

Key Findings--Unintentional Injury

- South Carolina was ranked 12th highest in the nation in fatalities due to unintentional injury during the 2004-2014 time period.
- In 2014 South Carolina had 2,451 deaths, 34,775 hospitalizations and 487,015 ED visits attributable to unintentional injury. Motor vehicle crashes were responsible for the majority of injury-related deaths. Falls were the most common cause of injury related hospital and ED visits.
- The highest rate of mortality from unintentional injuries occurs in white males age 85 and over, closely followed by 85-year and older white females, black females and black males.
- Almost half (49%) of deaths that have occurred in those ages 18-24 have been from unintentional injuries.
- In deaths occurring in children and teens, one in five deaths occurred from an unintentional injury.

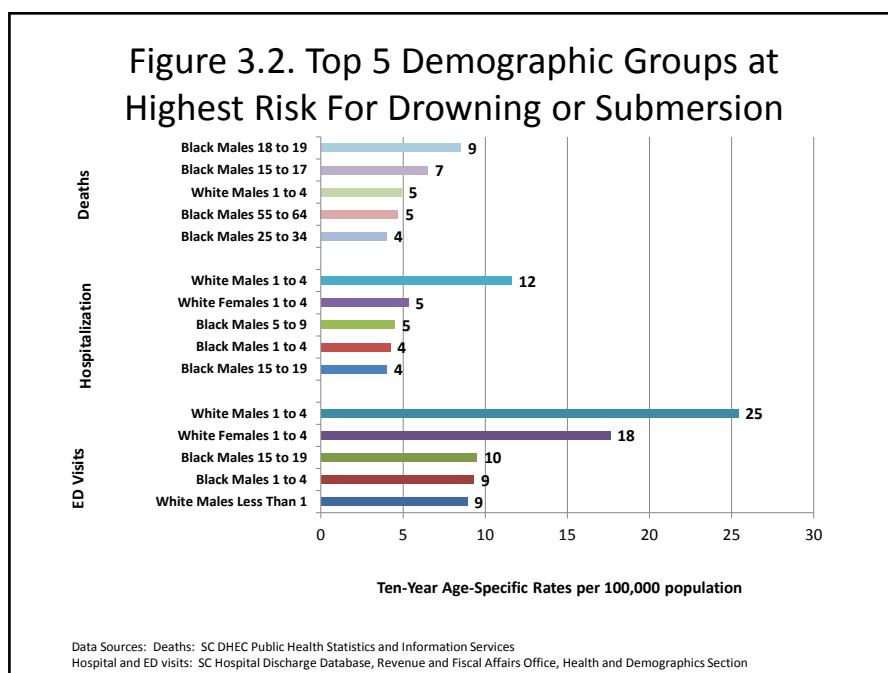
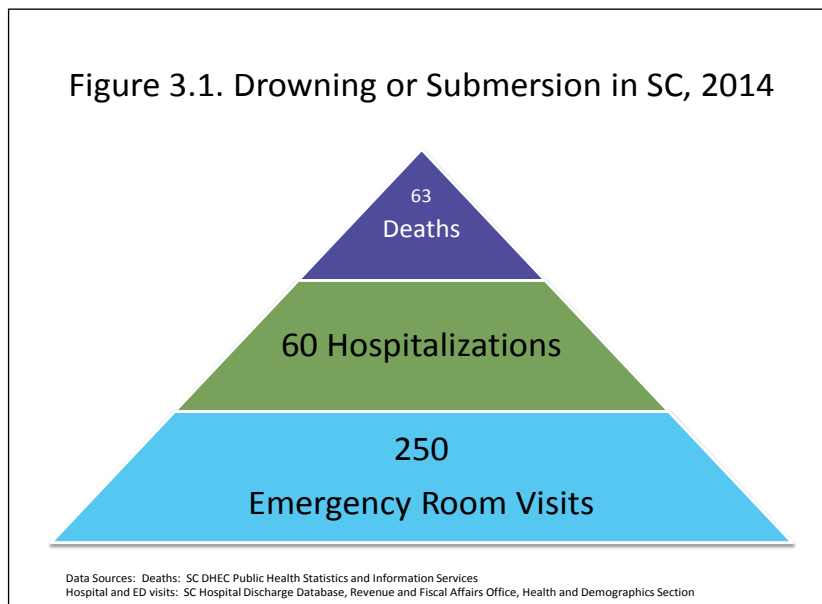
- Motor vehicle accidents comprise the most common type of unintentional injury death.
- Deaths from unintentional injuries cost the state of South Carolina more than \$2.3 billion in medical costs and lost productivity each year. Non-fatal unintentional injuries cost an additional \$3.5 billion in hospital inpatient and ED visit charges.

Chapter 3. Drowning or Submersion

Every day in America about 10 people die from unintentional drowning. Two out of these 10 are children age 14 or younger. Drowning ranks fifth among the leading causes of unintentional injury death in the United States (Centers for Disease Control and Prevention, 2014b). South Carolina ranked 40th in the nation for drowning deaths in 2004-2014 (Centers for Disease Control and Prevention, 2014b). In 2014, SC had 63 deaths from drowning, 60 hospitalizations, and 250 ED visits due to submersion accidents (Fig. 3.1).

The portions of the population at highest risk for death from drowning are black males ages 15 to 18, white males ages 1 to 4, black males ages 25 to 64, and white males ages 18 to 19 and 85 and over. The highest risk group for submersion or near drowning hospitalizations

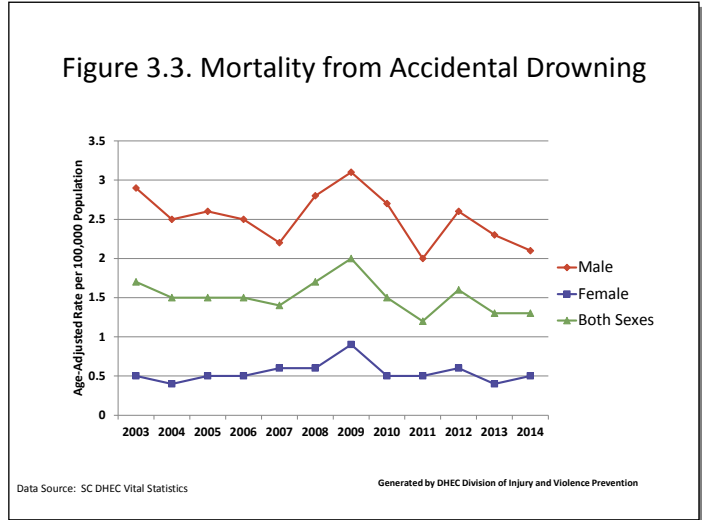
is white males ages 1 to 4. Inpatient hospitalizations for submersion are likely to occur in white males ages 1 to 9, white females ages 0 to 4, black females ages 1 to 9, and black males ages 1 to 19. White



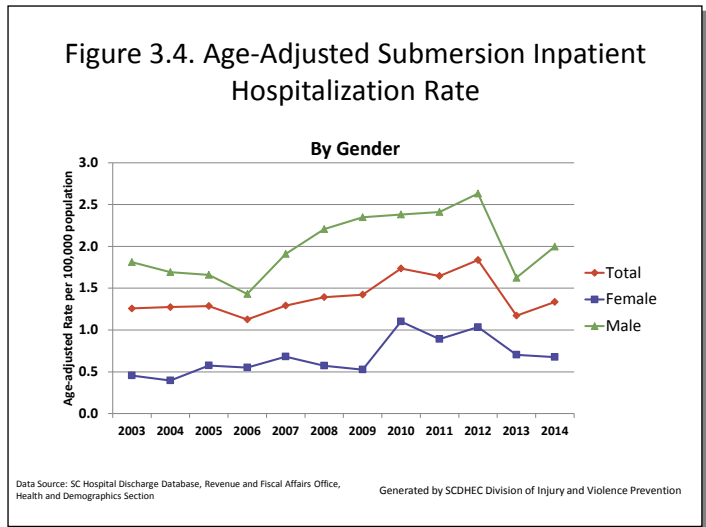
males and white females ages 1 to 4 are most likely to have ED visits due to submersion. White male and female infants ages 0-1, white males ages 15 to 19, and black males ages 1 to 19 are also at high risk for ED visits due to submersion (Fig. 3.2).

Mortality from drowning has decreased in most demographic groups since 2003, after an increase that

peaked in 2009. Since that time, overall mortality rates from drowning have decreased by an average of 1% per year. Mortality in males has decreased by 1% annually, and in females drowning mortality has increased by 1% annually. None of these changes were statistically significant. There is virtually no difference in drowning rates by race, but males are five to six times more likely to die from drowning than females (Fig. 3.3).



Inpatient hospitalization rates due to submersion are significantly higher in males than females. Hospitalization rates have gradually increased through the decade, with a peak in 2012, and a significant decrease since then. Rates have increased by an average rate of 5.8% per year in whites and remained virtually unchanged in blacks. Hospitalization rates for submersion accidents have increased significantly by an average of 7% in females and by an average of 3.2% annually in males.

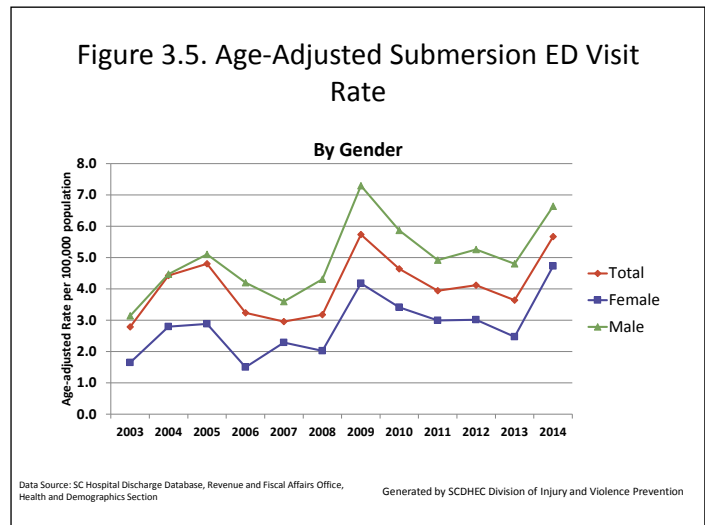


Males are three to four times more likely to be hospitalized due to submersion accidents than females (Fig. 3.4).

ED visits due to submersion, or near drowning, have increased by 31% since 2003. Submersion accidents are more likely to happen in males than females. ED visit rates have risen about 4% annually in both sexes, although neither of the increases is statistically significant. Rates have also risen 4% annually in whites and 2% annually in blacks. ED visit rates peaked in 2009 and have been decreasing each year since then. Males are twice as likely as females to present in the ED due to a submersion accident (Fig. 3.5).

Key Findings--Drowning or Submersion

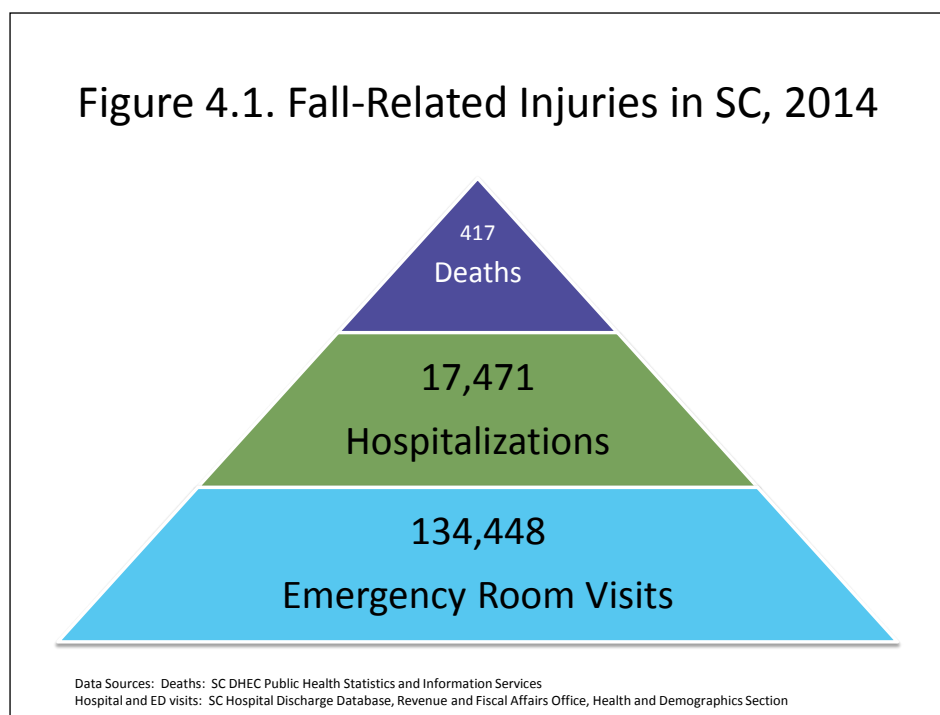
- South Carolina was ranked 40th in the nation for drowning deaths in 2004-2014 (Centers for Disease Control and Prevention, 2014b).
- In 2014, SC had 63 deaths from drowning, 60 hospitalizations, and 250 ED visits due to submersion accidents
- Mortality rates from drowning have decreased by an average of 1% per year.
- Males are five to six times more likely to die from drowning than females.
- Hospitalization rates for submersion accidents have increased significantly by an average of 7% in females and by an average of 3.2% annually in males.
- Hospitalization rates have also risen 4% annually in whites and 2% annually in blacks.
- Males are three to four times more likely to be hospitalized due to submersion accidents than females.
- Deaths due to drowning annually cost the state \$98 million in lost productivity and medical costs, and submersion accidents another \$2.6 million in hospital and ED visit charges.



Chapter 4. Falls

Falls are a threat to the health of older adults and can significantly limit their ability to remain self-sufficient. Each year, millions of adults age 65 and older fall (Tromp, Pluijm, & Smit, 2001). Falls can cause moderate to severe injuries, such as hip fractures and head traumas, and can increase the risk of early death. Fortunately, falls are a public health problem that is largely preventable. Among older adults, falls are the leading cause of both fatal and nonfatal injuries (Centers for Disease Control and Prevention, 2014b). In 2013, 2.5 million nonfatal falls among older adults were treated in emergency departments and more than 734,000 of these patients were hospitalized (Centers for Disease Control and Prevention, 2014b).

Each year in the United States, emergency departments treat more than 200,000 children age 14 and younger for playground-related injuries (Tinsworth & McDonald, 2001). About 45% of playground-related injuries are severe—fractures, internal injuries, concussions, dislocations, and amputations (Tinsworth & McDonald, 2001). About 75% of nonfatal injuries related to playground equipment occur on public

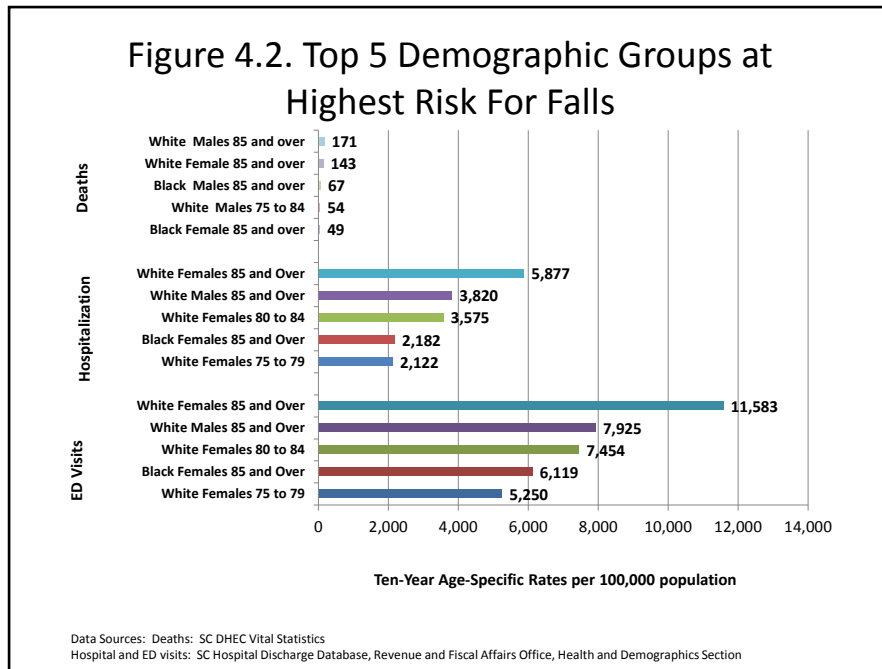


playgrounds (Tinsworth & McDonald, 2001) and most occur at schools and daycare centers (Phelan, Khoury, Kalkwarf, & Lanphear, 2001). Between 1990 and 2000, 147 children age 14 and younger died from playground-related injuries. Of them, 82 (56%) died from strangulation and 31 (20%) died from falls to the playground surface. Most of these

deaths (70%) occurred on home playgrounds (Tinsworth & McDonald, 2001). South Carolina was ranked 39th in the nation in deaths due to falls in 2013.

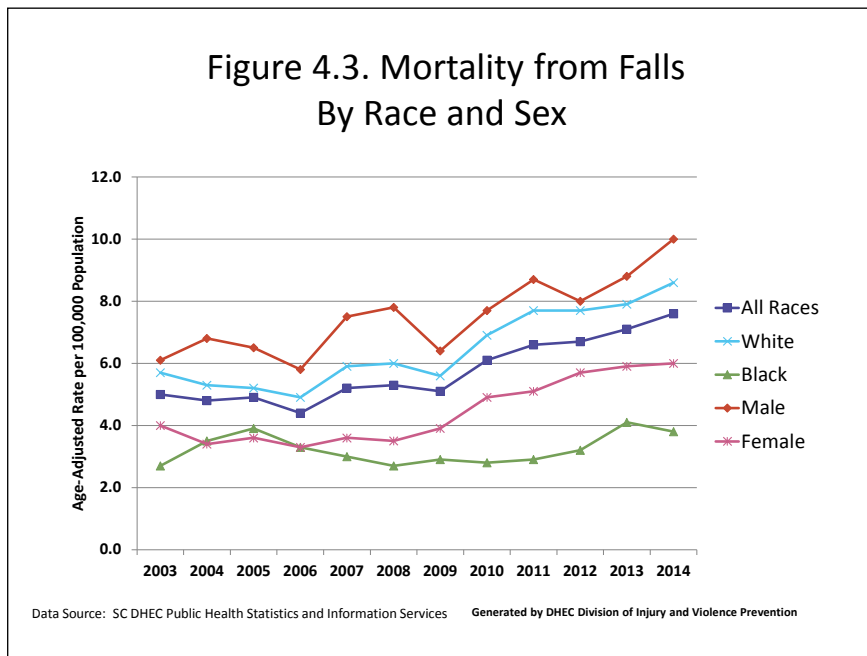
Nationally, there were 31,959 unintentional fall deaths in 2014, producing a mortality rate of 8.7 deaths per 100,000 population.

In South Carolina in 2014 there were 417 deaths, 17,471 hospitalizations, and 134,448 ED visits from falls (Fig. 4.1).



Adults age 70 and over are at risk of death and injury from falls. The population at the highest risk for mortality from falls is white males and white females age 85 and over. Adults age 70 and over, both males and females, are at the highest risk for hospitalization and ED visits due to falls. The highest risk groups are white males and white females age 85 and over (Fig. 4.2).

Mortality due to falls has increased significantly since 2003 at an average rate of 2.7% per year. Death rates from falls have increased significantly at an annual rate of 3.4% in females and 2.6% in males.



Death rates due to falls have increased significantly by 2.7% in whites, which was statistically significant, and by 3% in blacks. Males are twice as likely to die from falls as females, and whites are more than twice as likely to die from falls as blacks (Fig. 4.3).

Hospitalizations from falls have increased significantly by an average rate of 1.6% per year since 2003. This

includes a statistically significant 1.7% annual increase in both whites and blacks. Hospitalizations have

increased by 20% in males at an average annual rate of 2.6% per year, the highest rates of any demographic group. White females have the highest rate of any race/sex group but they have only increased by 1.6% annually in the past decade (Fig. 4.4).

Overall ED visit rates for falls have increased significantly by 11.3% since 2003 at an average annual rate of 1.7%. This includes a 3.6% average annual increase in males and a 3% average annual increase in females, both of which were statistically significant. ED visit rates due to falls have increased by 21% at an annual rate of 2.8% in whites and 36% in blacks, at an average annual rate of 3.8%. White females have the highest ED rates due to falls, and have shown the highest average annual increase, by 4% each year, which is statistically significant (Fig. 4.5).

Figure 4.4. Age-Adjusted Fall Inpatient Hospitalization Rate

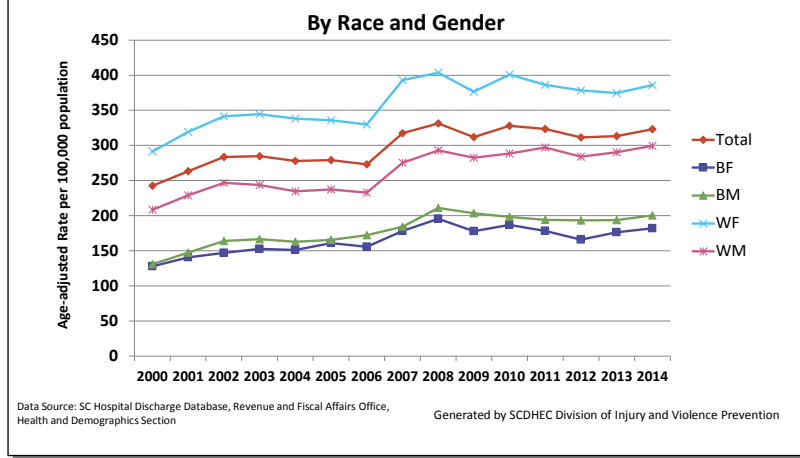
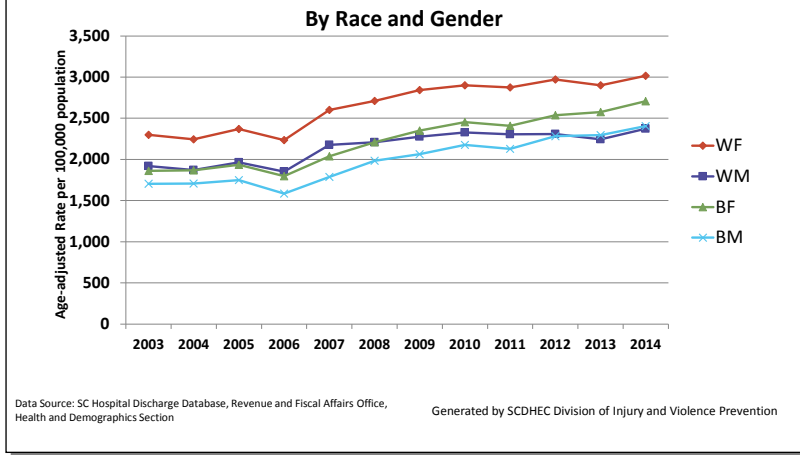


Figure 4.5. Age-Adjusted Fall ED Visit Rate



Key Findings--Falls

- South Carolina was ranked 41st in the nation in fall-related deaths during the 2004-2014 time-period.
- In South Carolina in 2014 there were 417 deaths, 17,471 hospitalizations, and 134,448 ED visits from falls.
- The population at the highest risk for mortality from falls is white males and white females age 85 and over.

- Adults age 85 and over, both males and females, are at the highest risk for hospitalization and ED visits due to falls. Since 2003, hospitalizations due to falls have increased by 20% in males, the highest rate increase of any demographic group.
- White females have the highest hospitalization rate due to falls of any race/sex group.
- Non-fatal injuries due to falls result in over \$1.2 billion in hospital and ED charges annually, and fatalities from falls result in another \$103 million in medical costs and lost productivity.

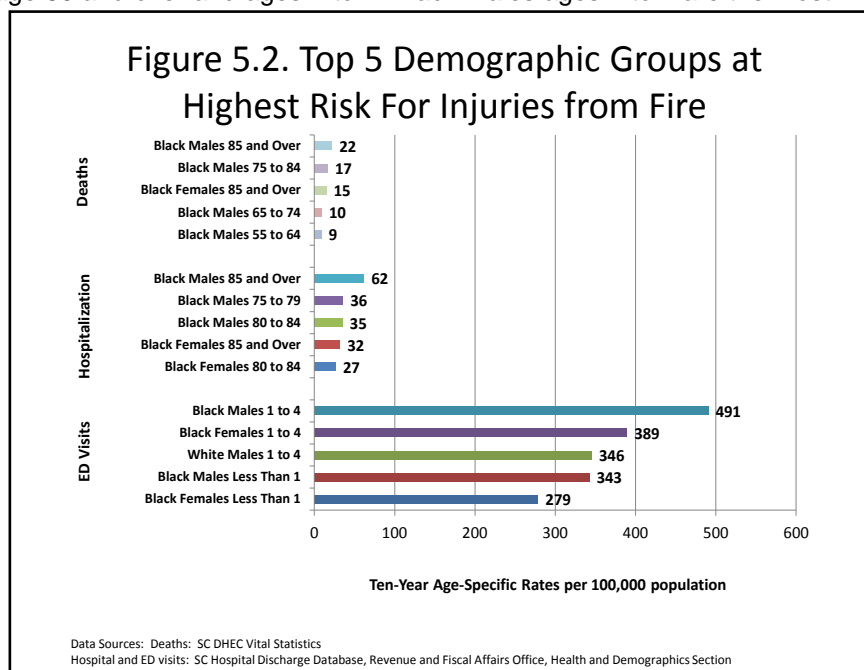
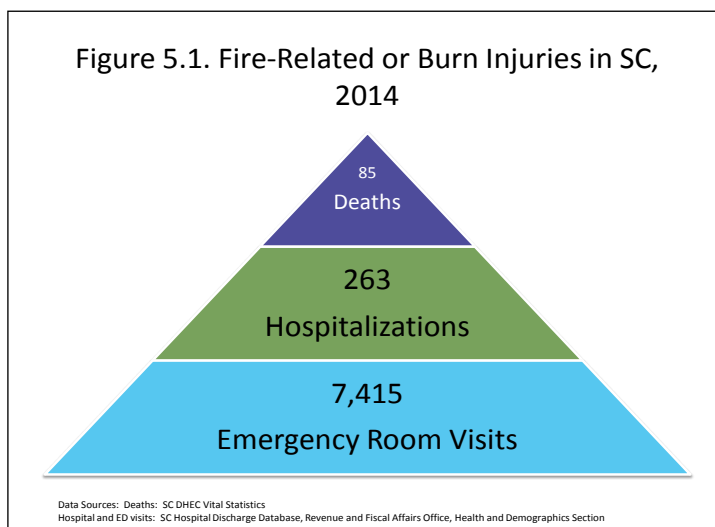
Chapter 5. Fire-Related Injuries

Fire kills over 3,000 and injures more than 17,000 people in America each year. Firefighters pay a high price for this terrible fire record as well; about 100 firefighters die on duty each year. Direct property losses due to fire reach almost \$12 billion a year. Most of these deaths and losses can be prevented (USFA, 2015). South Carolina was ranked 5th in the U.S. in deaths from fire or burns in 2014. In 2014, SC had 85 deaths, 263

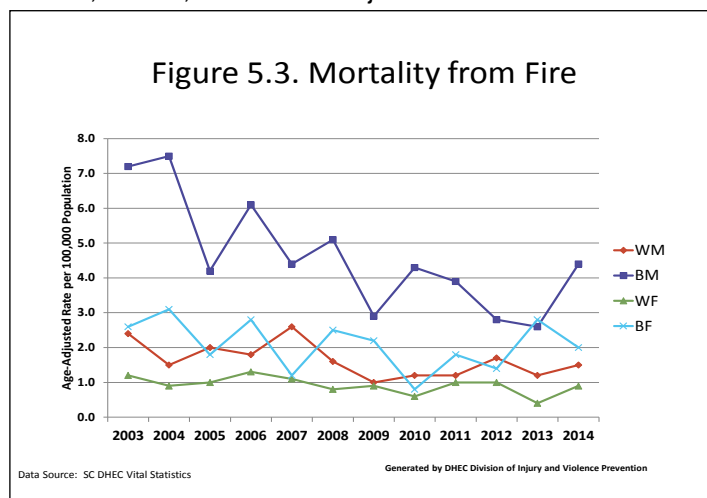
hospitalizations, and 7,415 ED visits due to fire, smoke inhalation, or burns (Fig. 5.1).

Black males age 85 and over are the group most likely to die from fire or burn-related injuries. Black males ages 45 to 84, white males age 75 and over, and, black females age 65 and over, are also at high risk for dying from fire or burn-related injuries. Black males age 85 and over are also the group most likely to be hospitalized due to fire or burn-related injuries. Other groups at high risk for hospitalization due to fire or burn-related injuries are black males ages 75 to 84, black females age 75 and over and black males age 60 and over and ages 1 to 4. Black males ages 1 to 4 are the most likely to have an ED visit due to fire or burn-related injuries.

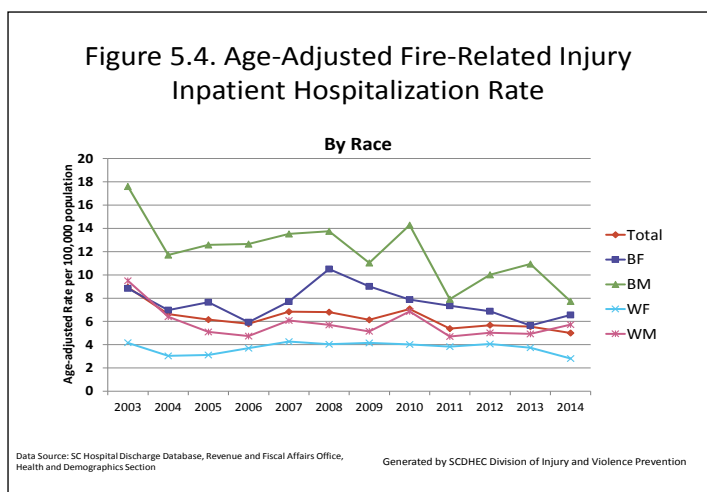
Other groups at high risk for burn-related injuries are white males and white females ages 1 to 4, black males and females ages 0 to 4, white males ages 20 to 24, and black males ages 25 to 44 (Fig. 5.2).



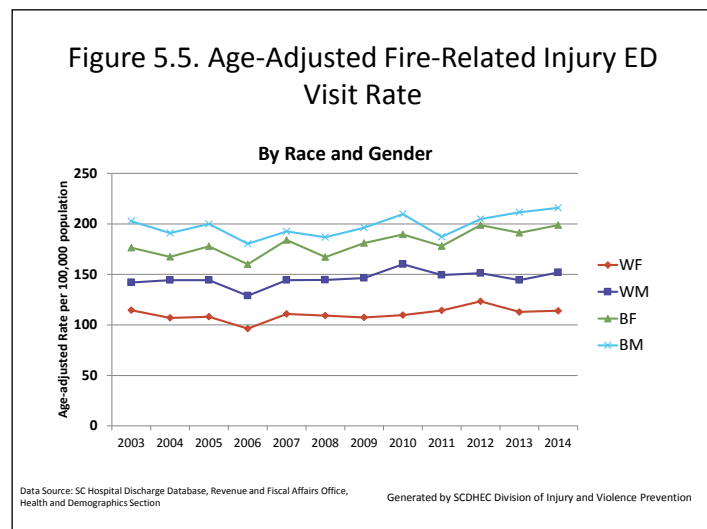
Mortality due to fire is relatively rare, compared to other injury-related deaths. Overall mortality due to smoke, flames, fire and hot objects has decreased 38% at a statistically significant rate of 4.6% per year



since 2003. Black males are the most likely to die from fire-related injuries than other race/sex groups. However, fire-related deaths in black males have decreased by 4% per year, since 2003, until 2013. In 2014 there was a twofold increase in deaths from fire. Rates for other race-sex groups have remained fairly stable (Fig. 5.3).



Fire-related hospitalization rates have decreased significantly by an average of 2.7% per year since 2003. Hospitalizations due to fires have decreased significantly in males at an average of 3.7% per year. Hospitalization rates in whites, blacks, and females did not see a significant change over the past decade. Black males have the highest hospitalization rates due to burns, but white males have shown the greatest improvement in rates with a 48% decrease in fire-related hospitalization since 2003. Blacks are twice as likely as whites to be hospitalized due to fire-related injuries (Fig. 5.4).



Fire-related ED visit rates have remained stable over the past decade, with an overall five percent decrease in ED visit rates since 2003. Males are twice as likely to present in the ED with fire-related injuries as females, although white females were the only race/sex group to show a statistically significant increase, with an

average annual increase of 1.3% per year (Fig. 5.5).

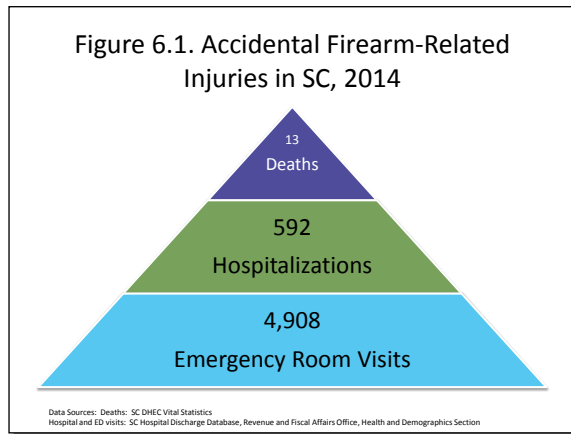
Key Findings--Fire-Related Injuries

- South Carolina was ranked 8th in the U.S. in deaths from fire or burns in 2013.
- In 2014, SC had 85 deaths, 263 hospitalizations, and 7,415 ED visits due to fire, smoke inhalation, or burns.
- Black males age 85 and over are the group most likely to die from fire or burn-related injuries.
- Black males are the most likely to die from fire-related injuries than other race/sex groups.
- Fire-related deaths in black males have decreased by 4% per year, since 2003, while rates for other race-sex groups have remained fairly stable.
- Black males have the highest hospitalization rates due to burns, but white males have shown the greatest improvement in rates with a 48% decrease in fire-related hospitalization since 2003.
- Blacks are twice as likely as whites to be hospitalized due to fire-related injuries.
- Non-fatal fire-related injuries result in \$22 million in hospital and ED visit charges annually, and fire fatalities cost an additional \$57 million in medical costs and lost productivity.

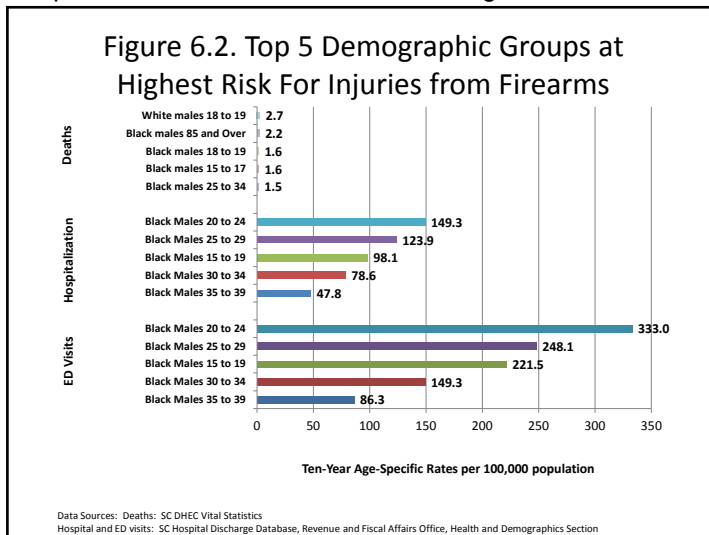
Chapter 6. Firearms

In 2014, firearms took the lives of 33,599 Americans in homicides, suicides, and unintentional shootings. This is the equivalent of more than 92 deaths each day and almost four deaths each hour. In 2013, 84,258 Americans were treated in hospital emergency departments for non-fatal gunshot wounds. Firearms were the third-leading cause of injury-related deaths nationwide in 2014, following poisoning and motor vehicle accidents (Centers for Disease Control and Prevention, 2014b). Firearms are defined as the use of handguns, automatic weapons, hunting rifles, military firearms, and air guns. In this chapter, firearm-related injuries involve the accidental discharge of a firearm. This chapter does not include homicide, suicide, assaults, and self-inflicted injuries by firearm. Those are discussed in following chapters.

South Carolina was ranked 10th in the U.S. in deaths from accidental firearm discharge in 2004-2014 (Centers for Disease Control and Prevention, 2014b). In 2014, 13 deaths, 592 hospitalizations, and 4,908 ED visits were attributable to accidental firearm discharges (Fig. 6.1).



White males ages 15 to 24 are at highest risk of death due to accidental discharge of firearms. Other groups at risk for dying due to firearm accidents are white males and black males age 85 and over, black males ages 15 to 34, and black males ages 1 to 4. Black males ages 20 to 29 are at highest risk for hospitalization due to accidental discharge of firearms. Other groups likely to be hospitalized due to

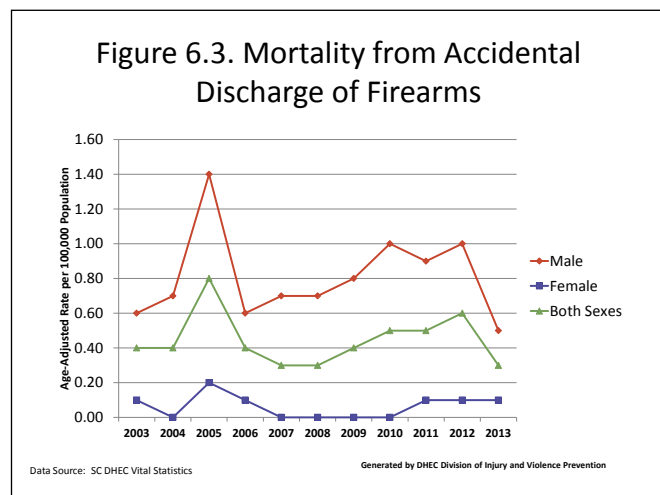


firearm accidents include black males ages 15 to 19 and 30 to 54, and white males ages 20 to 24. Black males ages 20 to 24 are the most likely to be admitted to the ED for injuries related to firearms. Other groups at risk for ED visits due to firearms are black males ages 15 to 19 and 25 to 49, and white males ages 20 to 29, and black males age 85 and over (Fig. 6.2).

Mortality from accidental discharge of firearms is more likely to occur in males

than in females. In fact, deaths from firearm discharge accidents are almost non-existent in females.

Death rates due to firearm accidents have fluctuated widely since 2003, with an average annual decrease

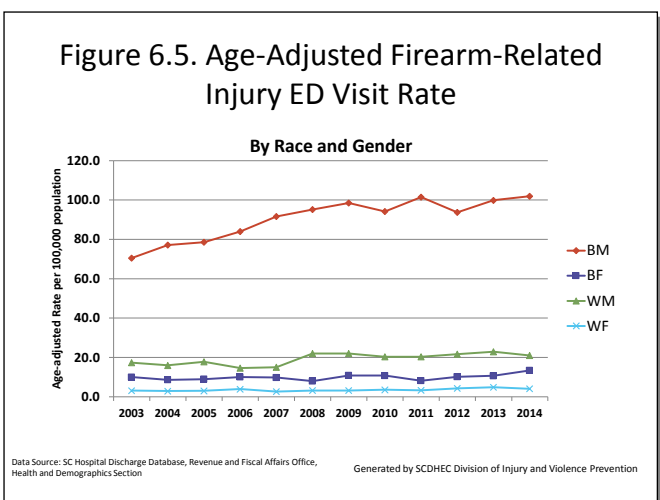
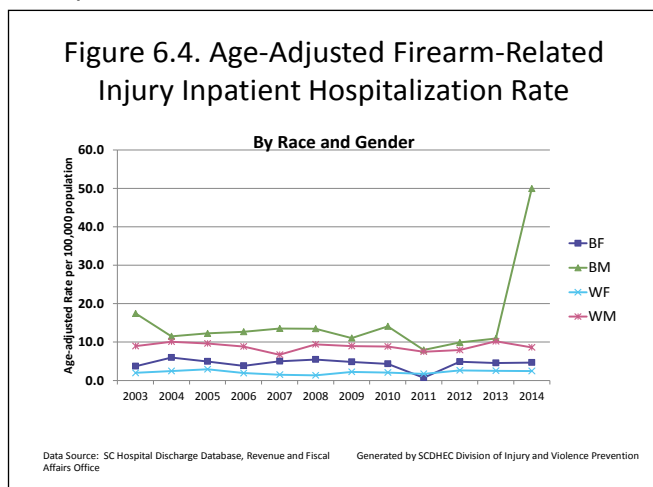


of 0.2%, while mortality due to firearms has shown an overall increase in males of 0.3% per year and by 2.5% in whites. Deaths due to firearms decreased by about 20% in males in 2014.

Deaths from firearm accidents are seven times more likely to occur in men than women and twice as likely to occur in whites as in blacks (Fig. 6.3).

Overall hospitalization rates due to firearm accidents have remained fairly stable during the past decade, with a slight decrease of 2.8% per year since 2003. Firearm-related hospitalization rates have not changed significantly in any race/sex group since 2003. Hospitalizations from firearm accidents are six to eight times more likely to happen in males than females, and twice as likely to happen in blacks as in whites. Black males have the highest hospitalization rates due to firearm accidents, and white females have the lowest (Fig. 6.4).

ED visits from the accidental discharge of firearms have increased significantly, by 26%, at an average annual rate of 2.4% per year, since 2003. ED visits due to firearm accidents are most likely to occur in males. They are six to eight times more likely to



present in the ED due to a firearm accident than females. ED visit rates due to firearms have increased in all race and sex groups, including an increase of 23% in females, 24% in males, 35% in whites, and 35% increase in blacks. ED visit rates due to firearms have increased significantly in black males (3.8% annually), black females (3.8% annually), and white males (3.3% annually). Black males are most likely to visit the ED for firearm-related injuries. They are four to five times more likely than white

males and seven to ten times more likely than black females to have an ED visit due to accidental gunshots (Fig. 6.5).

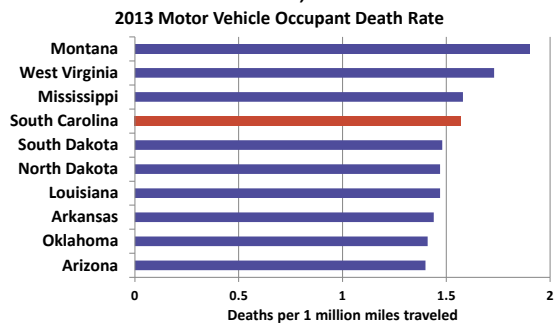
Key Findings--Firearms

- South Carolina was ranked 10th in the U.S. in deaths from accidental firearm discharge in 2004-2014.
- White males ages 15 to 24 are at highest risk of death due to accidental discharge of firearms.
- Mortality from accidental discharge of firearms is more likely to occur in males than in females. In fact, deaths from firearm discharge accidents are almost non-existent in females.
- Hospitalizations from firearm accidents are six to eight times more likely to happen in males than females, and twice as likely to happen in blacks as in whites.
- Black males have the highest hospitalization rates due to firearm accidents, and white females have the lowest.
- ED visits from the accidental discharge of firearms have increased by 26% since 2003.
- Non-fatal firearm-related injuries cost \$70.9 million in hospital and ED charges. Firearm-related fatalities cost more than \$30.4 million in medical costs and lost productivity.

Chapter 7. Motor Vehicles

In 2013, 32,719 people died in motor vehicle traffic crashes in the United States, a 3.1% decrease from 33,782 fatalities in 2012. This decline shows a continuation in the general decline in fatalities that started in 2006, except for the increase in 2012, according to the National Highway Traffic Safety Administration's (NHTSA) Fatality Analysis Reporting System (FARS). In 2013, an estimated 2.31 million people were injured in motor vehicle traffic crashes, compared to 2.36 million in 2012 according to NHTSA's National Automotive

Figure 7.2. Motor Vehicle Occupants Killed in Crashes, 2013.

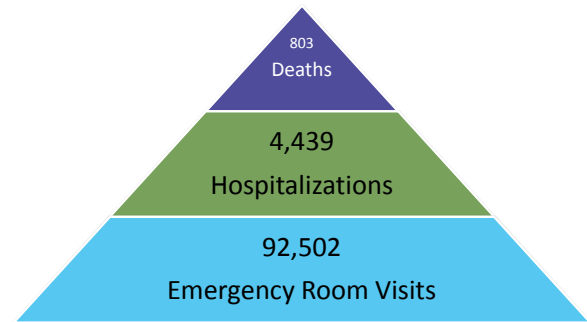


http://www.cdc.gov/motorvehiclesafety/states/occupant_death_rate.html
Source: Fatality Analysis Reporting System (FARS).

occupants killed in motor vehicle crashes (FARS). States that are predominantly rural seem to have a much higher risk for motor vehicle crashes with fatalities than states that are more urban (Fig. 7.2).

Black males age 85 and over had the highest death rates of any demographic group from motor vehicle crashes. Other demographic groups at high risk for death from motor vehicle crashes are 18 to 24 year-old white males, white males age 85 and over, black males ages 18 to 54, and black males ages 75 and over (Fig. 7.3).

Figure 7.1. Motor Vehicle Crashes in SC, 2014



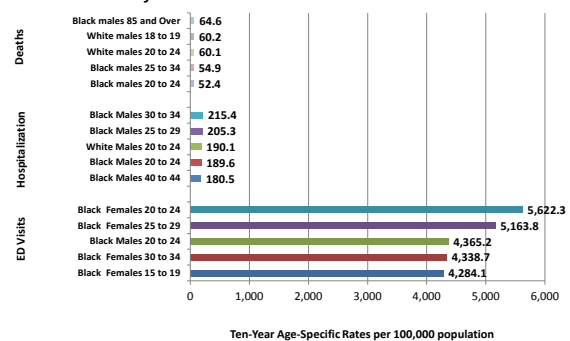
Data Sources: Deaths: SC DHEC Public Health Statistics and Information Services
Hospital and ED visits: SC Hospital Discharge Database, Revenue and Fiscal Affairs Office, Health and Demographics Section

Sampling System (NASS) General Estimates System (GES), a decrease of 2.1% (NHTSA, 2014).

In 2014 South Carolina was ranked 6th in the U.S. in deaths from motor vehicle crashes (Centers for Disease Control and Prevention, 2014b). In 2014 there were 803 deaths, 4,439 hospitalizations, and 92,502 ED visits due to motor vehicle-related accidents (Fig. 7.1).

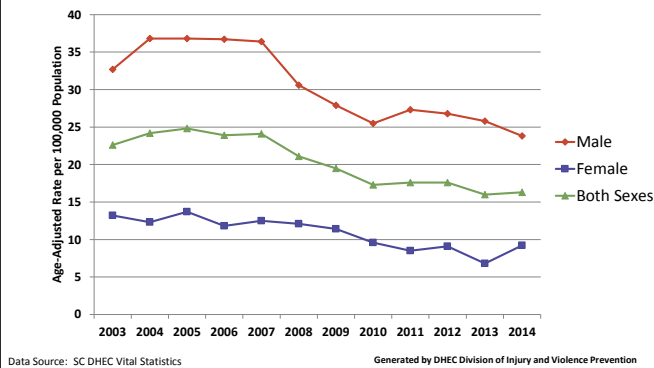
South Carolina is fourth in the nation for

Figure 7.3. Top 5 Demographic Groups at Highest Risk For Injuries from Motor Vehicle Crashes



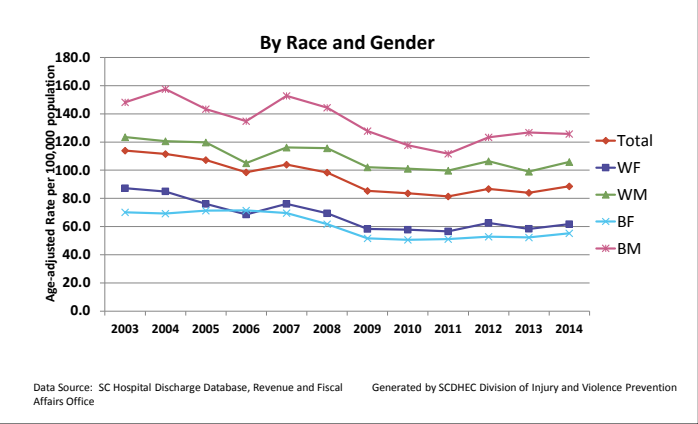
Data Sources: Deaths: SC DHEC Vital Statistics
Hospital and ED visits: SC Hospital Discharge Database, Revenue and Fiscal Affairs Office, Health and Demographics Section

Figure 7.4. Motor Vehicle Crash Mortality



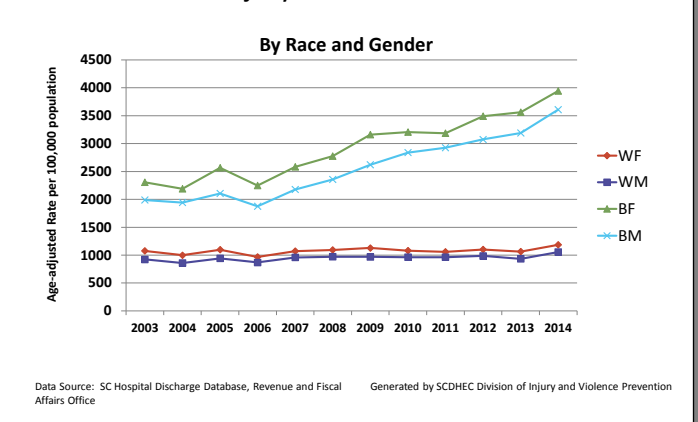
Deaths due to motor vehicle crashes have decreased significantly by 29%, at an average of 2.6% per year since 2003. Fatalities due to crashes are about three times more common in males than in females, but there is virtually no difference in crash mortality rates by race. Deaths in females have shown the greatest improvement with a statistically significant 48% decrease in mortality since 2003 at an average decrease of 4.4% per year (Fig. 7.4).

Figure 7.5. Age-Adjusted Motor Vehicle Crash Injury Inpatient Hospitalization Rate



Hospitalizations due to motor vehicle crashes have decreased significantly by 3.5% since 2003. Black males have the highest motor vehicle crash hospitalization rates, and black females have the lowest. White females have shown the most improvement with a statistically significant 4% annual reduction in hospitalization rates due to motor vehicle crashes (Fig. 7.5).

Figure 7.6. Age-Adjusted Motor Vehicle Crash Injury ED Visit Rates



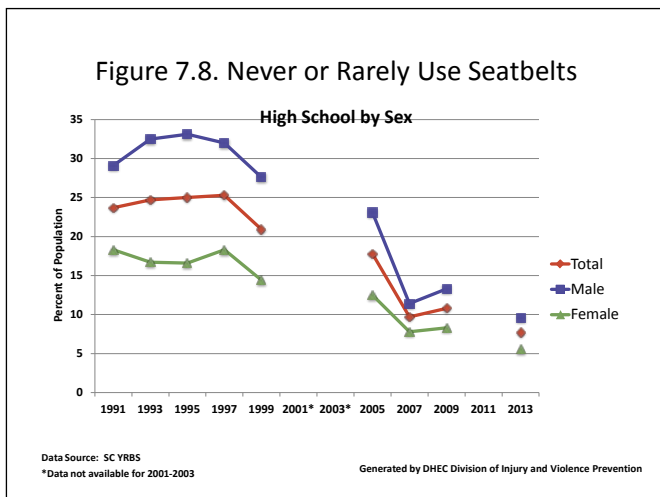
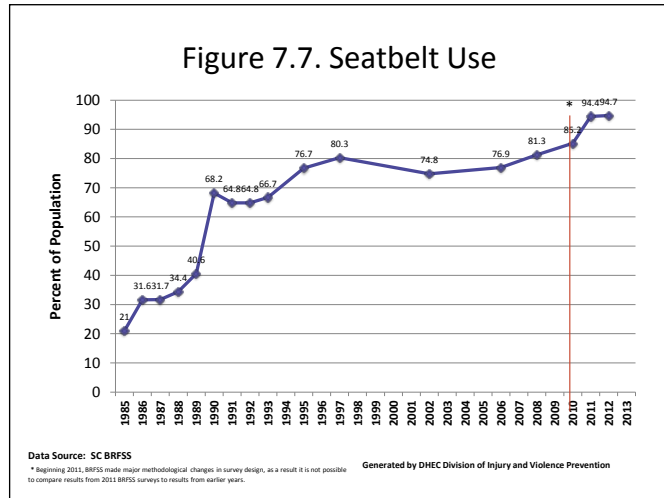
ED visits due to motor vehicle crashes have significantly increased by 17% in the past 10 years at an average annual rate of 2.3%. This increase is seen and has been statistically significant in almost all demographic groups. Males have shown a 28% increase and rates in females have increased by 25%. ED visit rates for motor vehicle accidents have increased by 57% in blacks and have remained stable in whites. ED visit are most likely to occur in black females and least likely to occur in white males. ED visit rates have increased

significantly by 55%, at an average rate of 5.2% in black females and 60%, at an average rate of 5.8% in

black males. Rates in white males and white females have stayed stable. Females are 20% more likely to have ED visits than males and rates are two to three times higher in blacks than in whites (Fig. 7.6).

Seatbelt Use

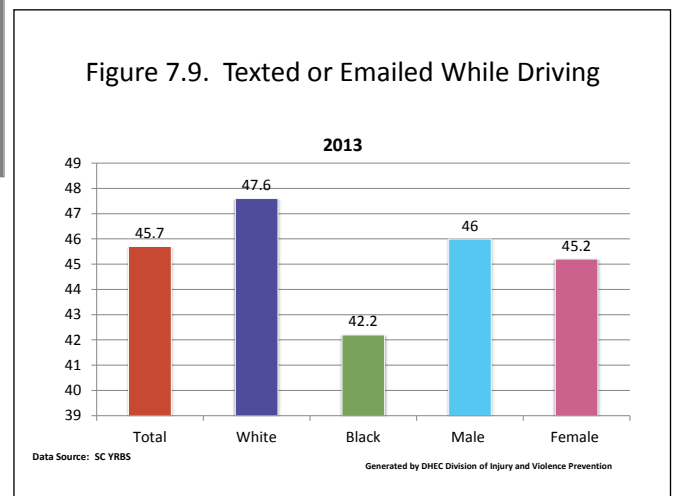
Self-reported seatbelt use by adults has increased dramatically in two decades, from 21% in 1985 to 95% in 2013. This is a five-fold increase in the percent of the population reporting use of seatbelts. The most dramatic increase in seatbelt use occurred in the late 1980s and 1990s. Reported seatbelt use doubled from 1985-1990 and doubled again during the 1990s (Fig. 7.7).



In high-school age-adolescents, boys are 50% to 70% more likely than girls to forego seatbelt use. However, in both sexes, non-use of seatbelts has dropped by about 70% since 1999 (Fig. 7.8).

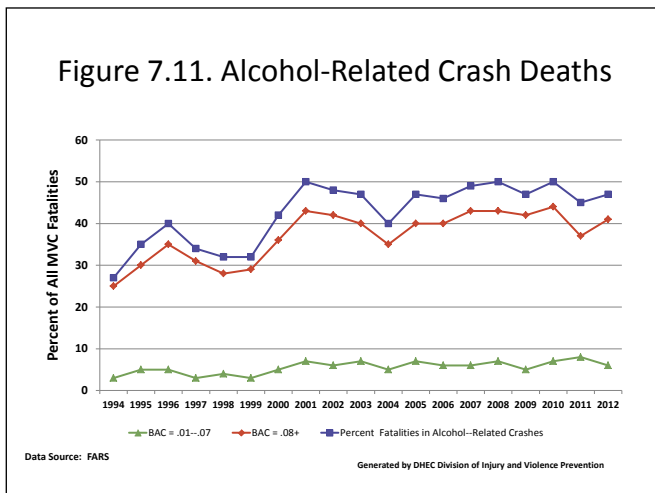
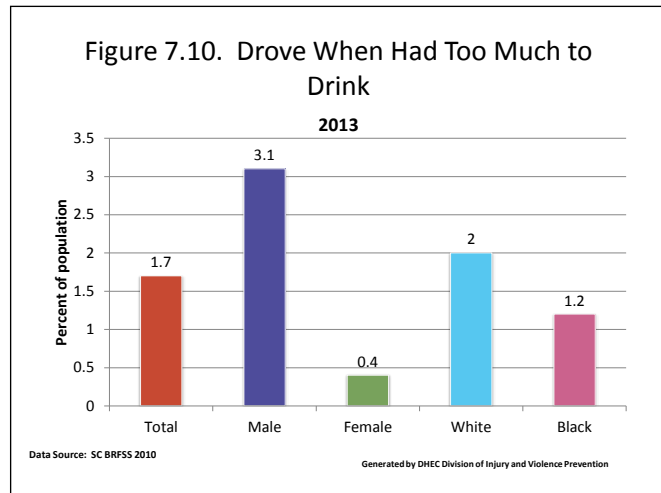
Texting and Driving

When asked about texting and driving, almost one-half (46%) of teens reported texting while they drive. This is slightly more common in whites and males than in females and blacks (Fig. 7.9).



Drinking and Driving

Drinking and driving is a serious problem nationwide and particularly in South Carolina. However, according to the BRFSS, self-reports of driving under the influence is rare among adults. Less than 2% of adults reported driving after having too much to drink. This is 66% more likely to occur in whites than in blacks, and eight times more likely to occur in males than in females (Fig. 7.10).



Alcohol-Related Crash Deaths

Alcohol-related motor vehicle crashes are becoming more deadly. Fatalities in alcohol-related motor vehicle crashes have been increasing steadily for the past two decades. The fatality rate due to alcohol-related motor vehicle crashes has increased 74% since 1994, the first year for which data are available. In 1994, 27% of all alcohol-related motor vehicle crashes involved a fatality, and that rate has increased to 45% of alcohol-

related motor vehicle crashes in 2012. As would be expected, the higher the blood alcohol concentration, the more likely the driver is to be involved in a motor vehicle crash with a fatality. Drivers with a blood alcohol level of 0.08 or higher are six to eight times more likely to be involved in a crash with a fatality than those with a blood alcohol of 0.01-0.07 (Fig. 7.11).

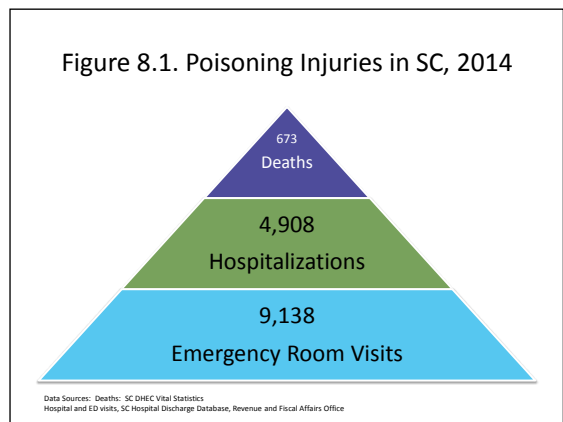
Key Findings--Motor Vehicles

- South Carolina was ranked 10th in the U.S. in deaths from motor vehicle crashes.
- In 2014 there were 803 deaths, 4,439 hospitalizations, and 92,502 ED visits due to motor vehicle-related accidents.
- Deaths due to motor vehicle crashes have decreased by 29% since 2003.

- Fatalities due to crashes are about three times more common in males than in females, but there is virtually no difference in crash mortality rates by race.
- Hospitalizations due to motor vehicle crashes have decreased by 26% since 2003.
- Black males have the highest motor vehicle crash hospitalization rates, and black females have the lowest.
- ED visits due to motor vehicle crashes have increased by 17% in the past ten years.
- ED visit rates for motor vehicle crashes have increased by 57% in blacks and have remained stable in whites.
- Self-reported seatbelt use by adults has increased dramatically in the last two decades, from 21% in 1985 to 95% in 2013.
- Almost one-half (46%) of teens reported texting while they drive.
- The fatality rate due to alcohol-related motor vehicle crashes has increased 74% since 1994, the first year for which data are available.
- Non-fatal motor vehicle crashes cost \$740 million in hospital and ED charges. Fatal motor vehicle crash-related fatalities cost more than \$1.01 billion in medical costs and lost productivity.

Chapter 8. Poisoning

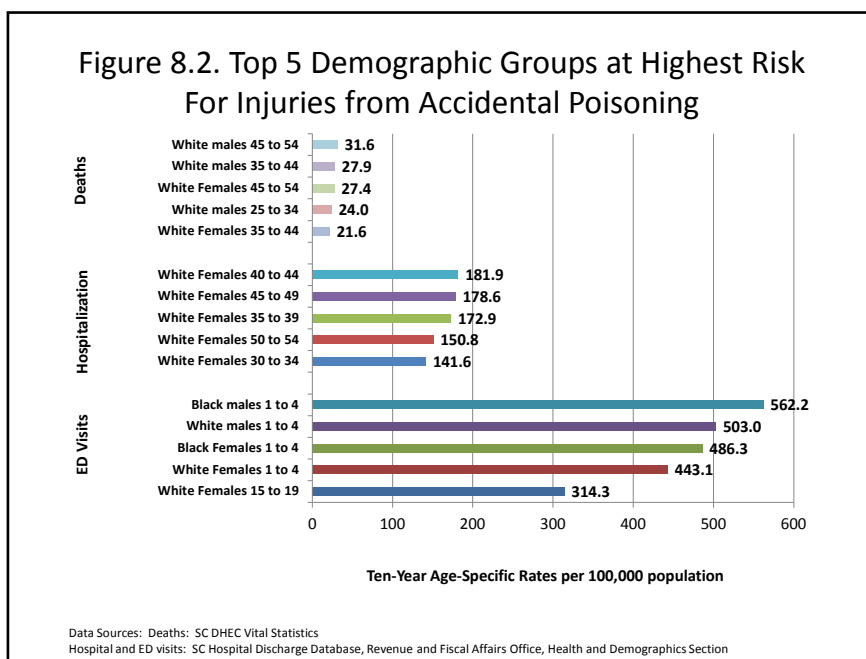
In 2013, 57 poison control centers across the nation confirmed 2,188,013 cases of exposure to poison by humans, and another 59,496 animal exposures (Mowrey, Spyker, Louis R. Cantilena Jr, McMillan, & Ford, 2014). Of these, more than half, 61%, were in children and teens, and one in three was in a child age two or under. The CDC reported 355,381 deaths from unintentional poisoning in 2014. Poisoning



can occur by drugs (painkillers, tranquilizers, antibiotics, antipyretics, and antirheumatics), alcohols, food, cleansing agents, agricultural chemicals, corrosives, gases, and other toxic substances.

South Carolina was ranked 21st in the nation in deaths from poisoning in 2014. There were 673 deaths, 4,908 hospitalizations, and 9,138 ED visits due to unintentional poisoning in 2014 (Fig. 8.1).

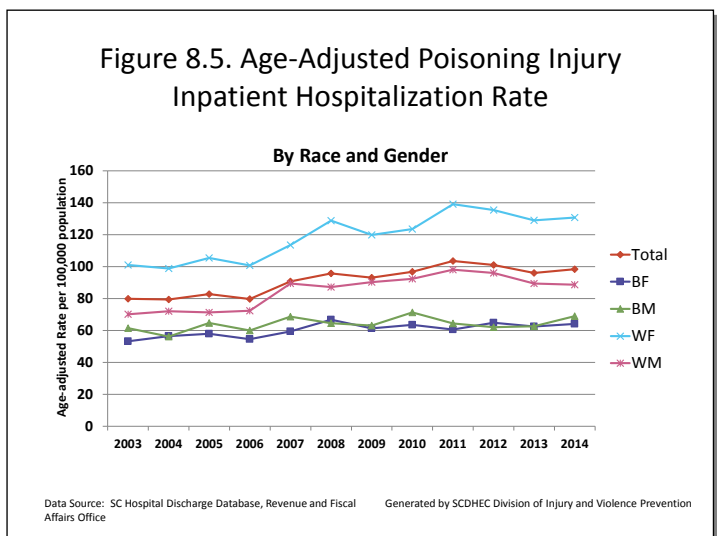
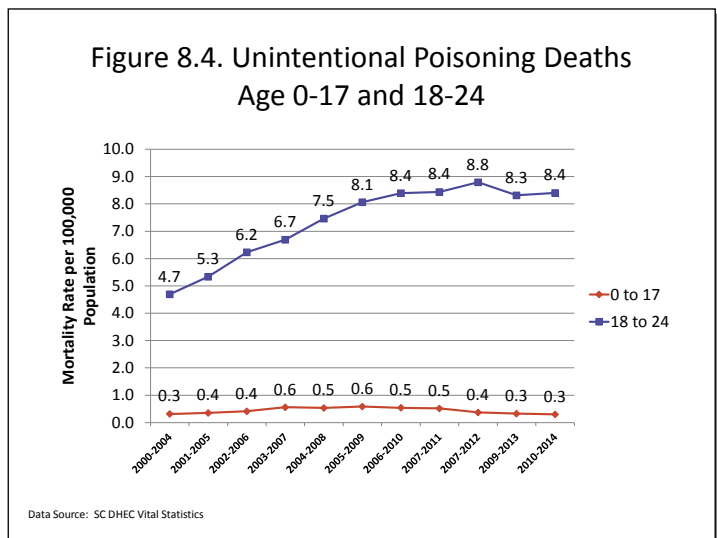
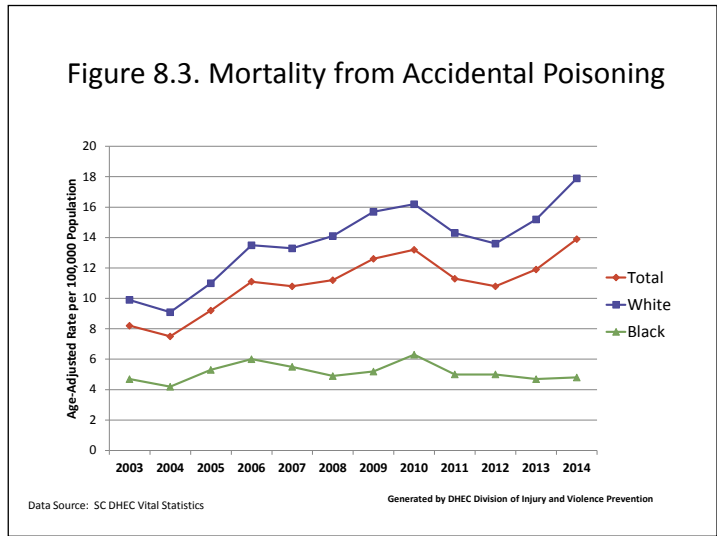
The group most likely to die from unintentional poisoning, including drug overdoses, is white males ages 45 to 54. Groups at high risk of dying from poisoning include white males ages 20 to 64, black males ages 45 to 64, and white females ages 45 to 64. White females ages 40 to 44 are most likely to be hospitalized due to poisoning. Other groups at high risk for hospitalization due to poisoning include white females ages 25 to 39, white females ages 45 to 59, white females ages 80 to 84, and white males ages 40 to 49. Black males ages 1 to 4 have the highest ED visit rates due to poisoning, followed closely by white males, black females ages 1 to 4, and white females ages 1 to 4. Other groups at risk for ED visits due to poisoning include white females ages 15 to 24, and white males and black females ages 15 to 19 (Fig. 8.2).



Mortality from accidental poisoning has increased dramatically in some population groups. Deaths from accidental poisoning have increased by 45% at an average rate of 5.4% per year since 2003. Males are twice as likely as females to die by accidental poisoning and whites are twice as likely as blacks to die from poisoning. Poisoning deaths have increased significantly by an average rate of 6.6% in whites, while remaining virtually unchanged in the black population (Fig. 8.3). White mortality rates due to poisoning are higher in males than in females. Mortality rates are rising three times faster in females, at a significant rate of 9.4% per year, than in males whose rates are increasing by 4.5% annually.

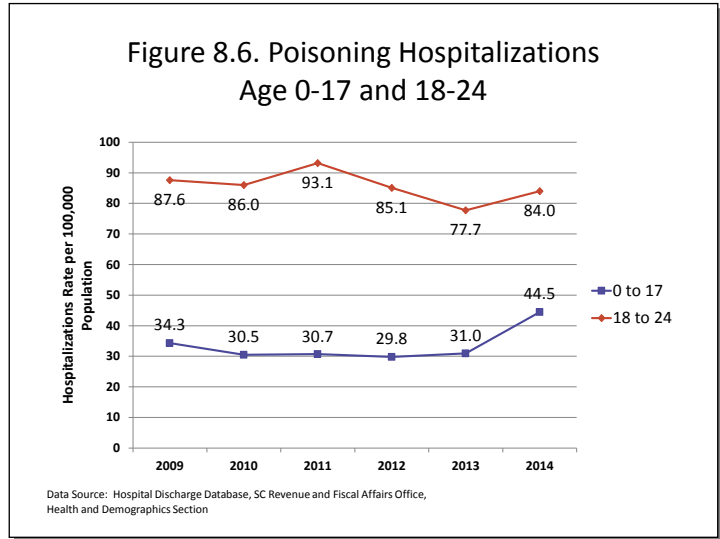
Death from unintentional poisoning in children 17 and under is relatively rare. In children age 17 and under, mortality rates remained virtually unchanged since 2003, but deaths from poisoning in teens and young adults ages 18-24 has risen 76% in the past decade. Young adults ages 18-24 are 16 to 27 times more likely to die from poisoning than teens and young children age 17 and under (Fig. 8.4).

Inpatient hospitalizations due to poisoning have been rising steadily. Hospitalizations due to poisoning have increased by 20% since 2003, at a statistically significant rate of 2.7% per year. Rates have increased in all



race/sex groups. The greatest increases have been shown in whites and females, both of whom have shown a 27% increase in hospitalization rates at an annual increase of 3.3% and 3.5%, respectively, since 2003. Rates in black males are virtually unchanged in the past decade (Fig. 8.5).

Young adults and older teens ages 18-24 are much more likely to be hospitalized for poisoning than younger teens and children age 17 and younger.



Hospitalization rates for older teens and young adults are consistently two to three times higher than for young teens and children (Fig. 8.6).

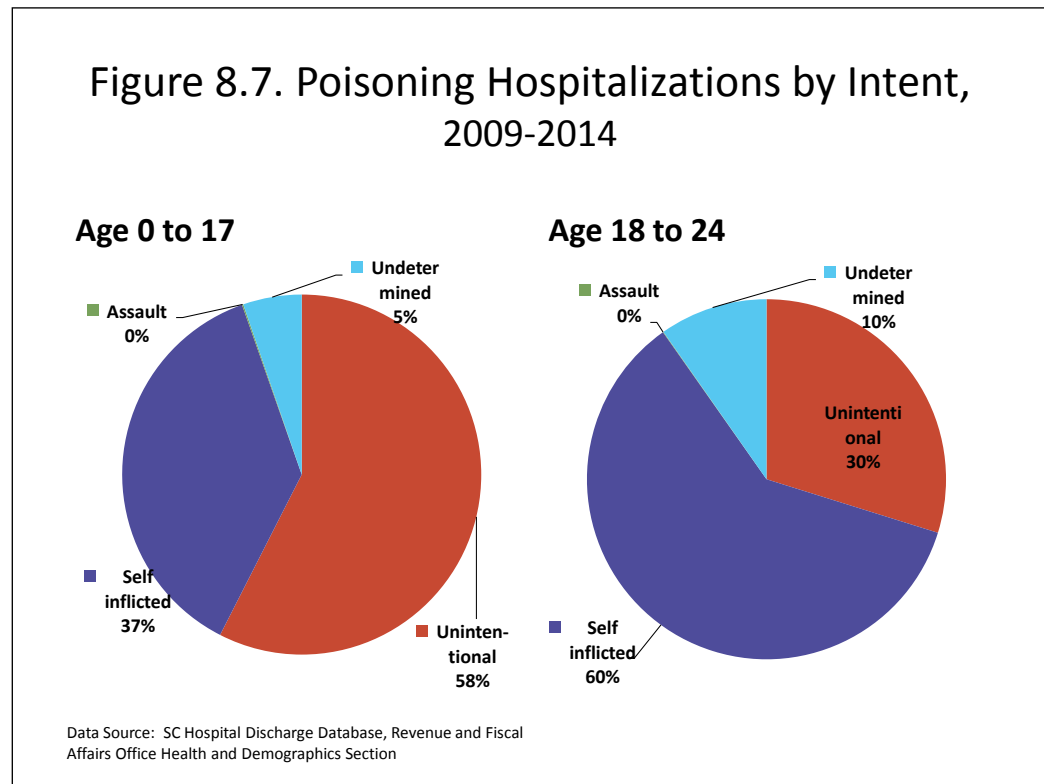
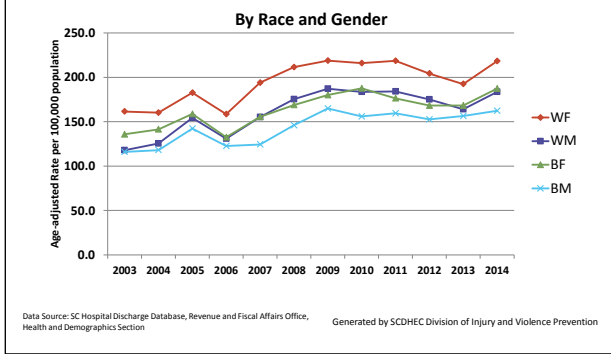
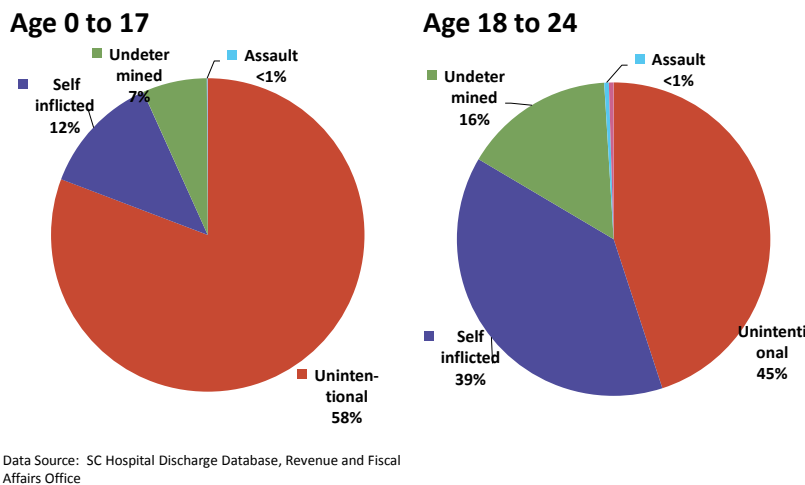


Figure 8.8. Age-Adjusted Poisoning ED Visit Rate



Poisoning hospitalizations in young teens age 17 and under tend to be unintentional, whereas those in 18-24 year-olds are more likely to be self-inflicted. Hospitalizations due to self-inflicted poisonings are twice as likely in the 18-24 year-olds as in children age 17 and under (Fig. 8.7).

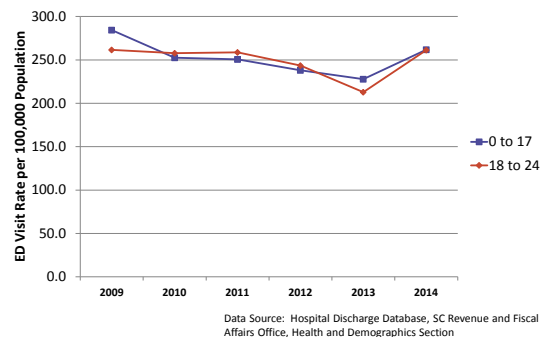
Figure 8.10. Poisoning ED Visits by Intent, 2009-2013



Overall ED visit rates for poisoning have increased by 21% in the past ten years. ED visit rates due to poisoning are most common in white females. The highest increase in ED visit rates has been seen in white males, where ED rates have increased by 3.4% annually in ten years (Fig. 8.8). Poisoning ED visit rates have increased significantly in white females and black males as well.

ED visit rates for unintentional poisoning have decreased by about 20% in the past five years in children, teens, and young adults until 2014, and there is virtually no difference between the 0-17 and 18-24 age groups (Fig. 8.9). In ages 0-17, the vast majority of poisonings, 68%, are unintentional, with only 12% being self-inflicted and 7% undetermined. However in the 18-24 age group 45% are unintentional but 39% of ED visits

Figure 8.9. Poisoning ED Visits Age 0-17 and 18-24



due to poisonings are self-inflicted, as opposed to only 12% self-inflicted in the 0-17 age group (Fig. 8.10).

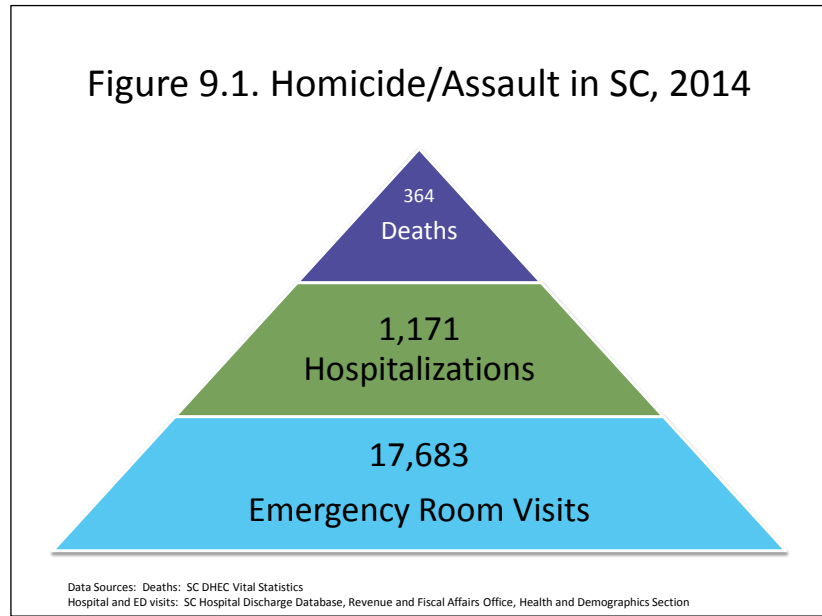
Key Findings--Poisoning

- South Carolina was ranked 21st in the nation in deaths from poisoning in 2014.
- There were 673 deaths, 4,908 hospitalizations, and 9,138 ED visits due to unintentional poisoning in 2014.
- The group most likely to die from unintentional poisoning, including drug overdoses, is white males ages 45 to 54.
- Deaths from accidental poisoning have increased by 45% since 2003.
- Males are twice as likely as females to die by accidental poisoning and whites are twice as likely as blacks to die from poisoning. The major contributing factor is poisoning from drug overdoses.
- Deaths from poisoning in teens and young adults age 18-24 have risen 76% in the past decade.
- Young adults ages 18-24 are 16 to 27 times more likely to die from poisoning than teens and young children age 17 and under.
- Non-fatal poisonings cost \$167 million in hospital and ED charges. Fatal poisonings cost more than \$763 million in medical costs and lost productivity.

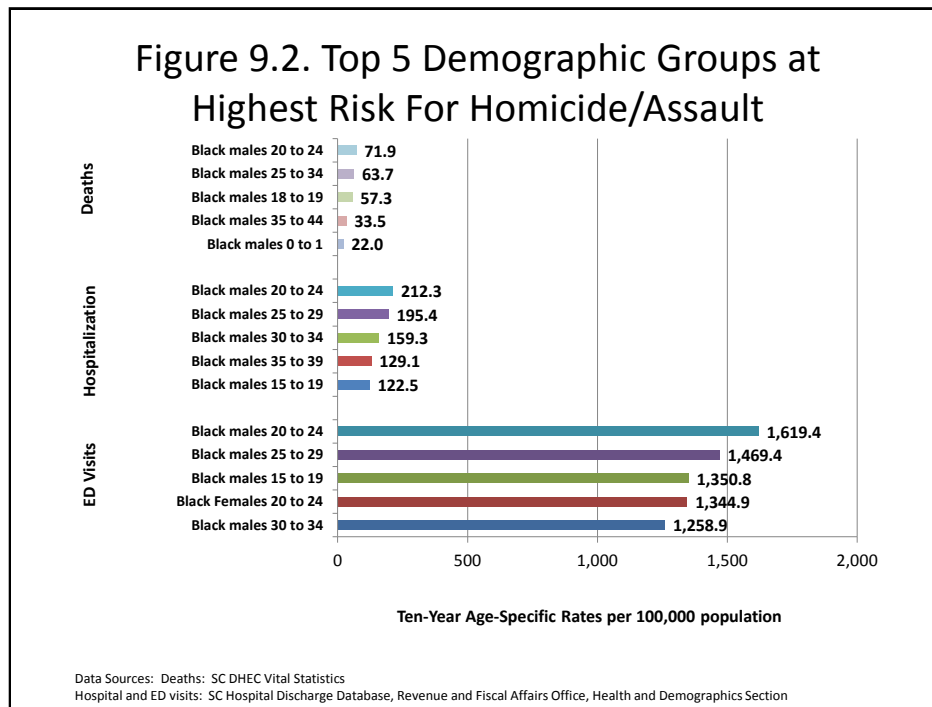
Chapter 9. Homicide/Assault

In the U.S. in 2014, the CDC reported 15,809 deaths occurred due to homicide. This includes 10,945 homicides using firearms. Firearms were used in 70% of all homicides in 2014 (Centers for Disease Control and Prevention, 2014b). There were 2.1 million ED visits for assault (Centers for Disease Control and Prevention, 2014b). The FBI reported 724,149 aggravated

assaults in 2012, at a rate of 229.1 per 100,000 (FBI, 2013). South Carolina was ranked 7th in the U.S. in homicides in 2014 and had 364 homicides, 1,171 hospitalizations and 17,683 ED visits due to assault (Fig. 9.1).



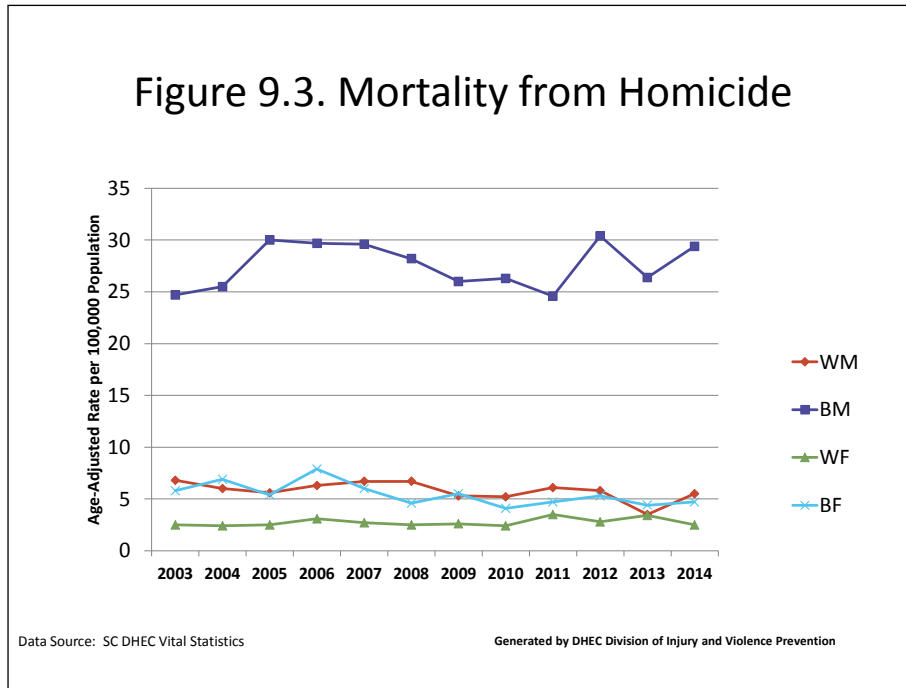
The highest rates of homicide occur in black males ages 20 to 24. Other groups at high risk for homicide



include black males ages 15 to 19, and 25 to 64. Also at risk are black male and female infants. The highest hospitalization rates for assault occur in black males ages 20 to 24, followed closely by black males ages 25 to 39, 14 to 19, and 44 to 59. ED visit rates for assaults are also highest in black males ages 20 to 24, followed

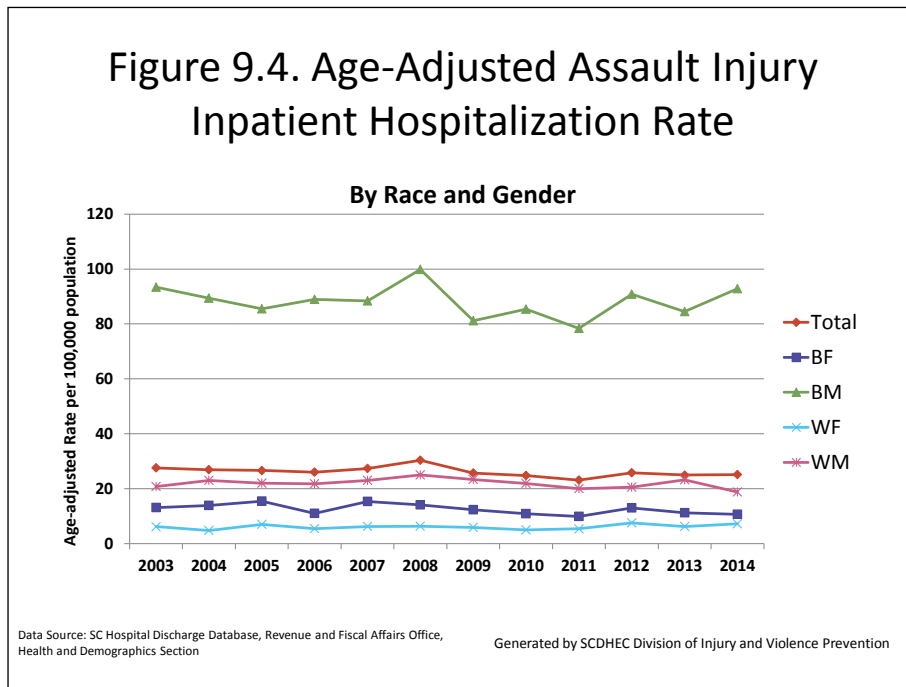
closely by rates for black males ages 15 to 19 and 25 to 29. Also at high risk are black females ages 15 to 29 and black males ages 40 to 45 (Fig. 9.2).

Mortality due to homicide has not changed significantly overall in the past ten years. Homicide rates have significantly decreased in whites at an average rate of 2.1% per year and remained stable in blacks and



both males and females. Blacks are four times more likely to die from a homicide than whites. Males are three times more likely to die from a homicide than females. Black males are five times more likely to die from a homicide than white males or black females (Fig. 9.3).

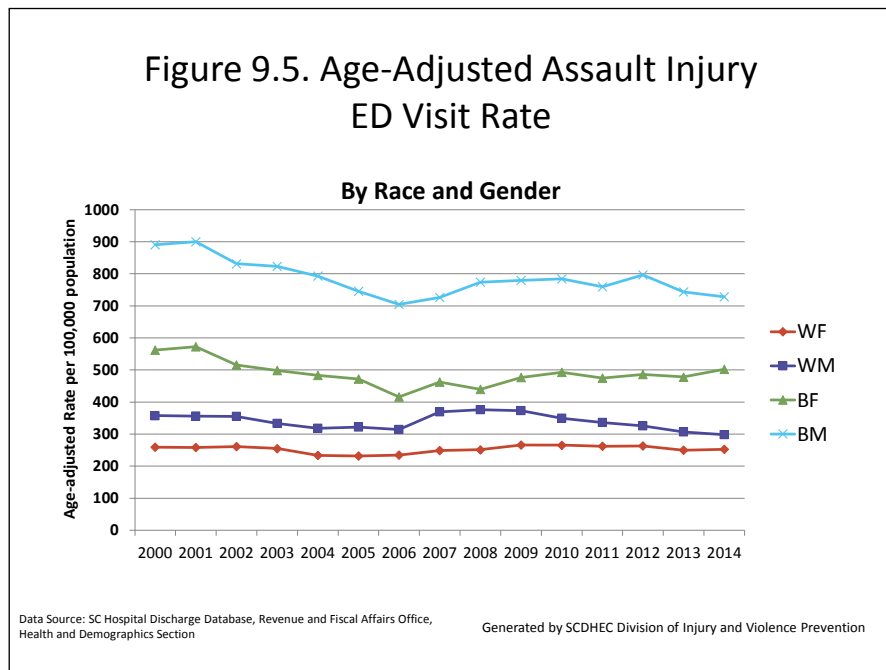
Overall hospitalization rates for assault have not changed significantly since 2003.



Hospitalization rates in some groups have shown improvements and others have increased. Rates in black males have decreased by 10% in the past decade, although the change was not statistically significant. Hospitalization rates for assault in white females and white males have remained unchanged for the past decade (Fig. 9.4).

ED visit rates due to assault have decreased overall by 16%, at an average annual rate of 1% since 2003. This decrease is shown in all race/sex groups, but is statistically significant only in black females. Black males have the highest ED rates for injuries due to assault. While their rates have decreased by 10% in the past decade, they still have ED visit rates that are 70-80% higher than those in black females

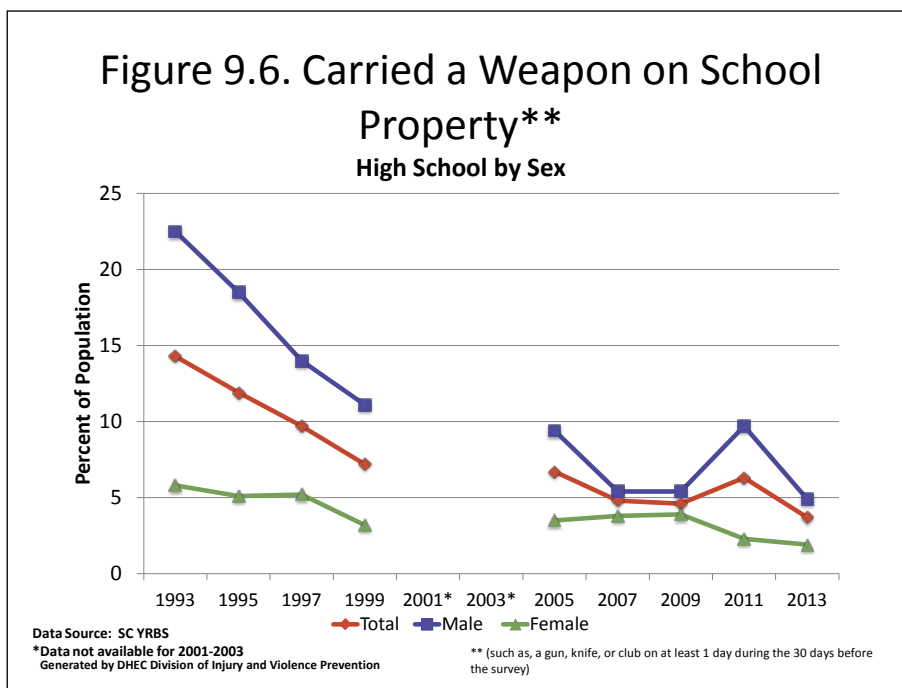
and twice as high as those in white males (Fig. 9.5).



According to the Youth Risk Behavior Survey (YRBS), 8 to 10% of students have carried a gun on at least one day in the past 30 days. These are almost exclusively male. Male teenagers are almost ten times more likely to carry guns than female teens. Carrying a weapon on school property has

decreased by almost 200% in the past two decades.

Again, carrying weapons is almost exclusively a male phenomenon, and has decreased by 35% in two decades, from 19.9% in 1993 to 12.8% in 2013 (Fig. 9.6).

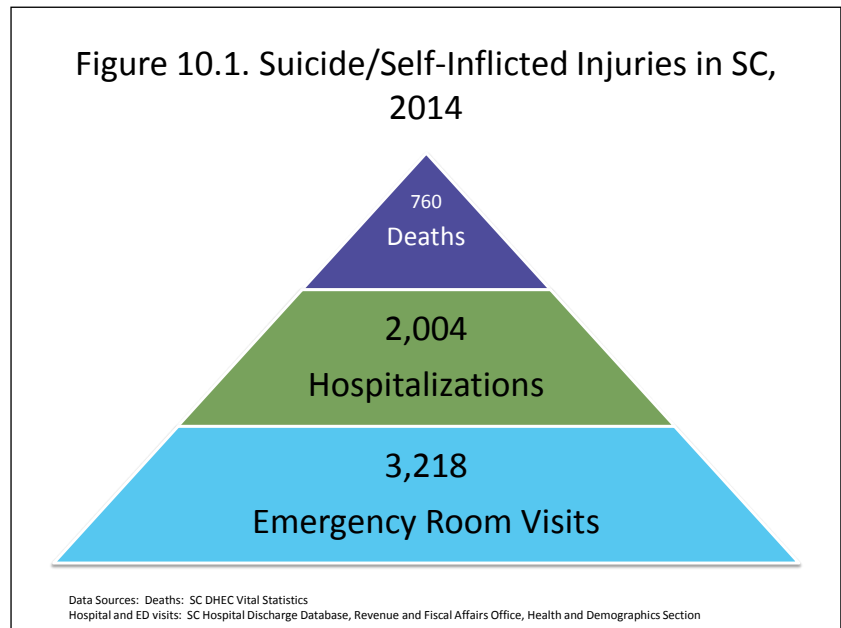


Key Findings--Homicide/Assault

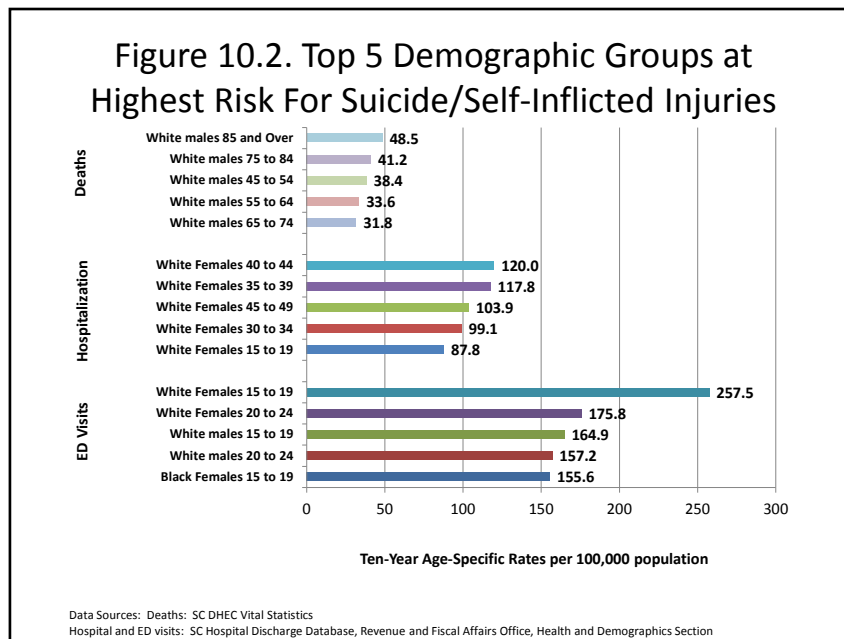
- South Carolina was ranked 7th in the U.S. in homicides in 2014.
- Homicide/Assault-related incidents were responsible for 364 homicides, 1,171 hospitalizations and 17,683 ED visits due to assault in 2014.
- The highest rates of homicide occur in black males age 20 to 24.
- Blacks are four times more likely to die from a homicide than whites.
- Males are three times more likely to die from a homicide than females.
- Black males are five times more likely to die from a homicide than white males or black females.
- In South Carolina, homicides are responsible for more than \$483 million in medical costs and lost productivity, and non-fatal assaults are responsible for \$152 million in hospital and ED charges. .
- Overall, hospitalization rates for assault have decreased by 10% since 2003. Rates in black females have dropped 14% and rates in black males have decreased by 10% since 2003.
- Black males have the highest ED visit rates for injuries due to assault.
- Black males have ED visit rates that are 70-80% higher than those in black females and twice as high as those in white males.

Chapter 10. Suicide/Self-Inflicted Injuries

Nationally, suicide ranks as the tenth leading cause of death. South Carolina was ranked 23rd in the nation in deaths from suicide in 2014. There were 42,773 suicides in the U.S. in 2014, of which 50% were firearm-related, 25% were from suffocation, and 16% were due to poisoning (Centers for Disease Control and Prevention, 2014b). In South Carolina in 2014, there were 760 suicides, 2004 hospitalizations and 3,218 ED visits due to self-inflicted injuries (Fig. 10.1).

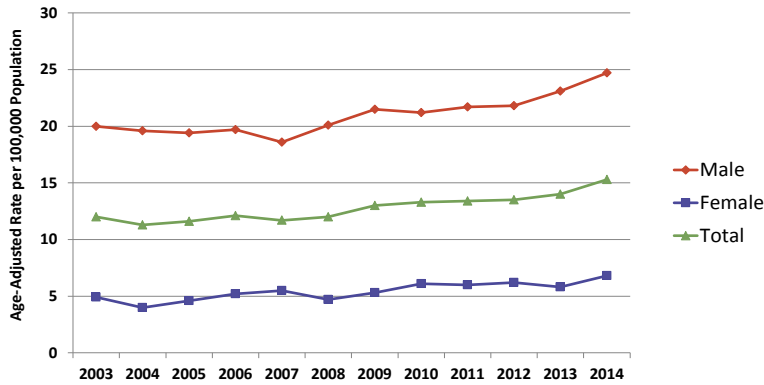


Suicide is most common among white males age 85 and over, followed closely by white males ages 75 to 84 and 45 to 54. Also at risk for suicides are white males ages 18 to 44 and 55 to 64. The group most likely to be hospitalized for self-inflicted injuries is white females ages 40 to 44. Other groups most likely



to be hospitalized for self-inflicted injuries include white females ages 15 to 19, 25 to 39, and 45 to 54, and white males ages 30 to 44. ED visits for self-inflicted injuries are most common among white females ages 15 to 24. High ED visit rates for self-inflicted injuries also occurred among white females ages 30 to 44, white males ages 15 to 29, and black females ages 15 to 19 (Fig. 10.2).

Figure 10.3. Mortality from Suicide



Data Source: SC DHEC Vital Statistics

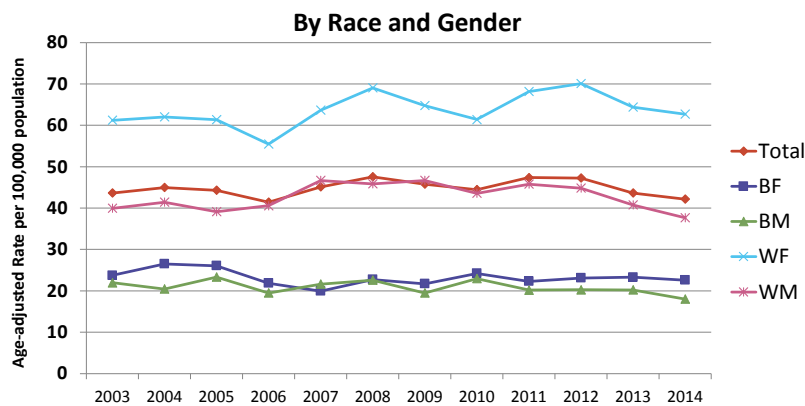
Generated by DHEC Division of Injury and Violence Prevention

Death rates due to suicide have increased significantly in South Carolina by 17% over the past decade, at an average rate of 1.7% per year. Suicide rates have increased significantly in all race/sex groups except in blacks, which showed decrease of 0.5% per year in suicides. Suicide rates have increased in females by 18%, in males by 15%, and in whites by 21% since 2003, all statistically significant

increases. Suicide rates have increased by 10% in 2014. Males are four times more likely to die by suicide than females, and whites are three times more likely than blacks to commit suicide (Fig. 10.3).

Overall inpatient hospitalization rates for self-inflicted injury have stayed stable for the past decade.

Figure 10.4. Age-Adjusted Self-Inflicted Injury Inpatient Hospitalization Rate



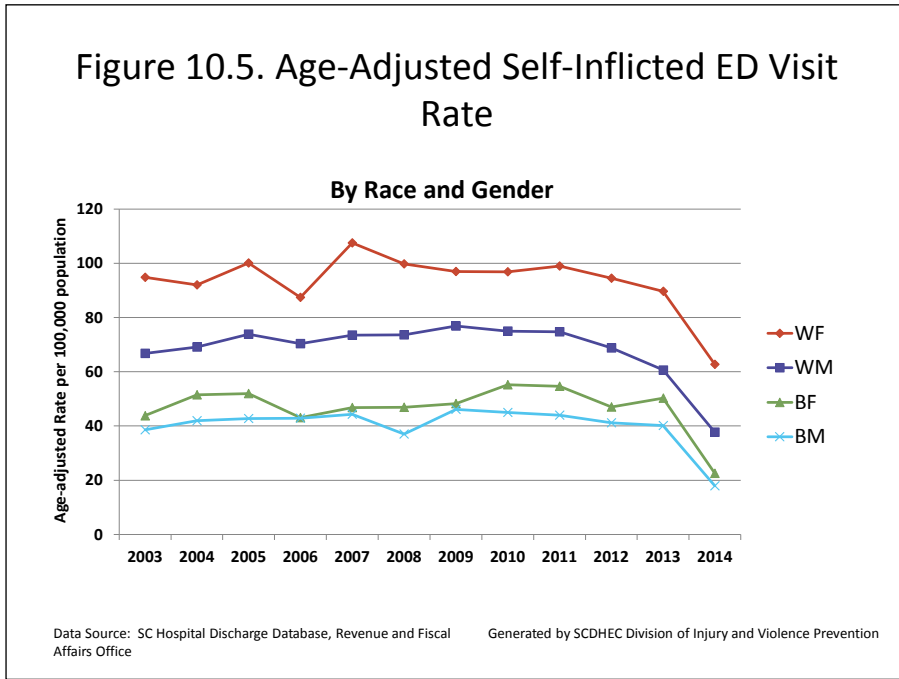
Data Source: SC Hospital Discharge Database, Revenue and Fiscal Affairs Office, Health and Demographics Section

Generated by SCDHEC Division of Injury and Violence Prevention

These rates have increased slightly in white males and in white females (2.1% and 5.2%, respectively), and decreased in black males and in black females (by 8% and 2% respectively). None of these changes were statistically significant. Hospitalization rates from self-inflicted injury are twice as high in whites as in blacks and about 40%

higher in females than in males. White females have the highest hospitalization rates due to self-inflicted injuries (Fig. 10.4).

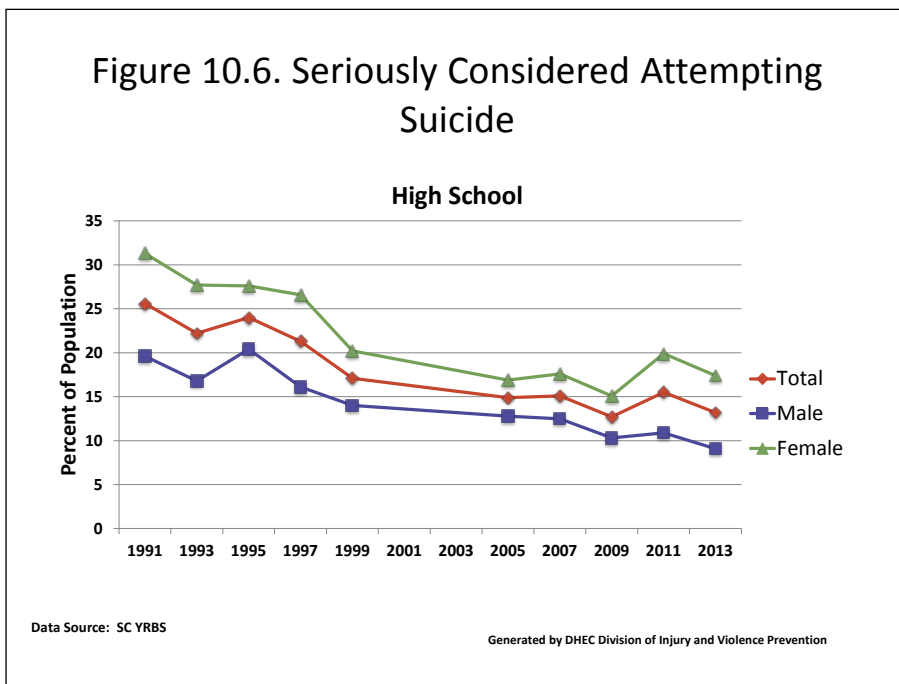
The same pattern is true for ED visits due to self-inflicted injuries. The rates have been fairly stable, and the highest rates are found in white females and lowest in black males (Fig. 10.5).



None of the trends for ED visits due to self-inflicted injuries are statistically significant. The hospitalization and ED rates are somewhat contradictory to suicide rates which are higher in males.

According to the YRBS, high school age females are twice as likely to seriously consider attempting suicide as high school age males.

Fortunately, the prevalence of considering suicide has decreased by 48% in the past two decades, including a 44% decrease in females and a 54% decrease in males (Fig. 10.6).



Key Findings--Suicide/Self-Inflicted Injuries

- South Carolina ranks 23rd in the nation in suicides during the 2003-2013 time-period.
- In South Carolina in 2014, there were 760 suicides, 2,004 hospitalizations and 3,218 ED visits due to self-inflicted injuries.
- Suicide is most common among white males age 85 and over, followed closely by white males ages 75 to 84 and 45 to 54.
- Death rates due to suicide in South Carolina have increased by 17% over the past decade.
- Males are four times more likely to die by suicide than females.
- Hospitalization and ED visit rates due to self-inflicted injuries are about 40% higher in females than in males.
- White females have the highest hospitalization rates due to self-inflicted injuries.
- Females are more likely to contemplate suicide or to attempt suicide but males are more likely to actually commit suicide.
- Whites are three times more likely than blacks to commit suicide.
- Hospitalization rates due to self-inflicted injuries are twice as high in whites as in blacks.
- Suicides are responsible for more than \$748 million in medical costs and lost productivity, and non-fatal self-inflicted injuries are responsible for \$86.7 million in hospital and ED charges.

Chapter 11. Traumatic Brain Injury

A traumatic brain injury (TBI) is caused by a bump, blow, or jolt to the head or a penetrating head injury that disrupts the normal function of the brain. Not all blows or jolts to the head result in a TBI. The severity of a TBI may range from “mild” (i.e., a brief change in mental status or consciousness) to “severe” (i.e., an extended period of unconsciousness or memory loss after the injury) (Centers for Disease Control and Prevention, 2015). Most TBIs that occur each year are mild, commonly called concussions.

TBI is a diagnosis as opposed to a way of classifying injury by intent and manner. There are various causes for TBI. They include: falls, motor vehicle crashes, homicides/assaults, suicides, or being hit by an object.

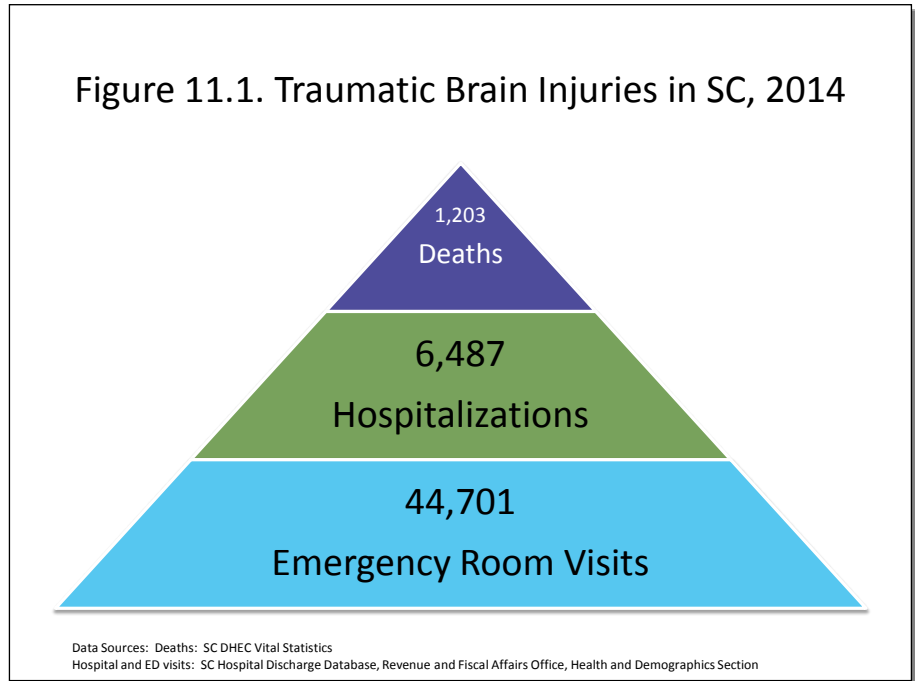
According to TraumaticBrainInjury.com (David Lenrow, 2015), TBI is a complex injury with many symptoms and disabilities. The impact on a person and the family can be devastating. Traumatic brain injury, often referred to as TBI, is most often an acute event similar to other injuries. That is where the similarity between TBI and other injuries ends. One moment the person is normal and the next moment life has abruptly changed.

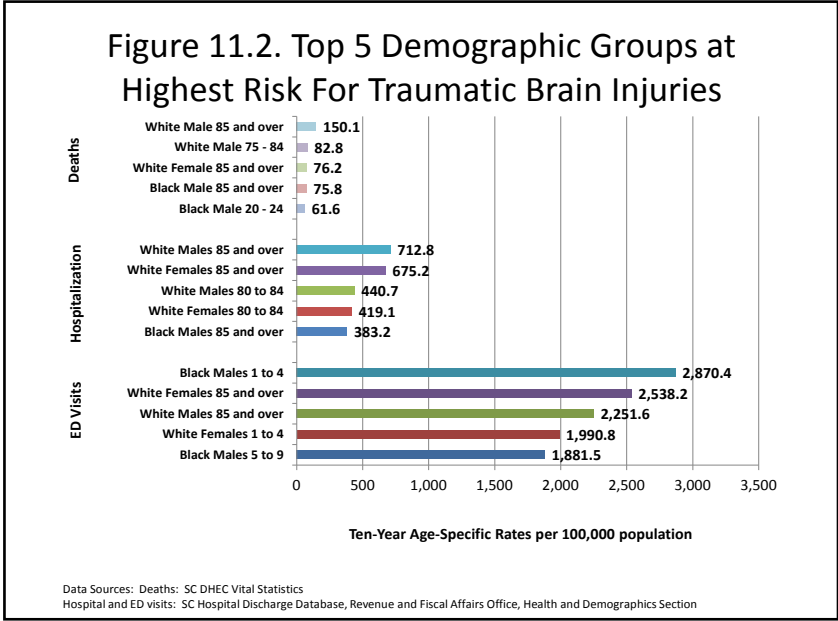
In most other aspects, a TBI is very different. Since our brain defines who we are, the consequences of a brain injury can affect all aspects of our lives, including our personality. A brain injury is different from a broken limb or punctured lung. An injury in these areas limits the use of a specific part of your body, but your personality and mental abilities remain unchanged. Most often, these body structures heal and regain their previous function.

Brain injuries do not heal like other injuries. Recovery is a functional recovery, based on mechanisms that remain uncertain. No two brain injuries are alike and the consequence of two similar injuries may be very different. Symptoms may appear right away or may not be present for days or weeks after the injury. One of the consequences of brain injury is that the person often does not realize that a brain injury has occurred.

According to the CDC, there are approximately 1.5 million people in the U.S. who suffer from a TBI each year, with 50,000 people who die from TBI each year and 85,000 people who suffer long term disabilities. In the U.S., more than 5.3 million people live with disabilities caused by TBI.

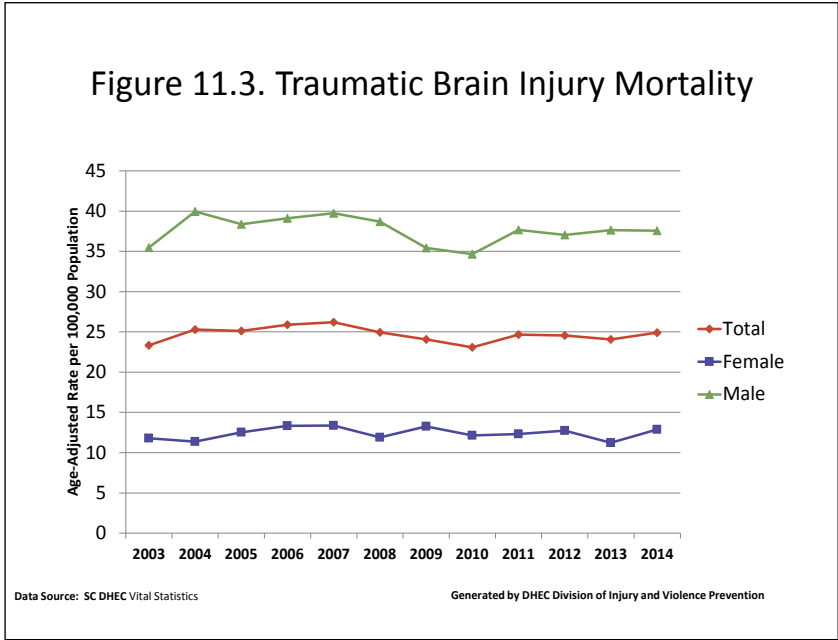
In SC in 2014, there were 1,203 deaths, 6,487 hospitalizations, and 44,701 ED visits attributable to TBI (Fig. 11.1).





White males age 85 and over are at highest risk from dying due to head trauma. Other demographic groups at high risk for death due to head trauma include white males ages 75 to 84, white females age 85 and over, black males age 85 and over, and black males ages 20 to 24. White males age 85 and over also have the highest hospitalization rates due to traumatic brain injuries. Other groups at high risk for

hospitalization due to head injuries include white females age 85 and over, white males and white females ages 80 to 84, and black males age 85 and over.



ED visits due to head trauma present a slightly different pattern. While white males and females age 85 and over are among the top five demographic groups at high risk for ED visits due to head trauma, black males ages 1-4 are the group with the highest ED visit rates. Also within the top five are white females ages 1-4 and black males ages 5-9 (Fig. 11.2).

Mortality rates due to TBI have remained stable over the past ten years. Rates by sex have changed little, with a 5% decrease in deaths in females and a 6% increase in deaths in males. The one group showing a significant change has been black females, who have had a 30% drop in TBI deaths. Males are three times more likely than females to die by TBI, and whites are about 20% more likely than blacks to die from a head injury (Fig. 11.3).

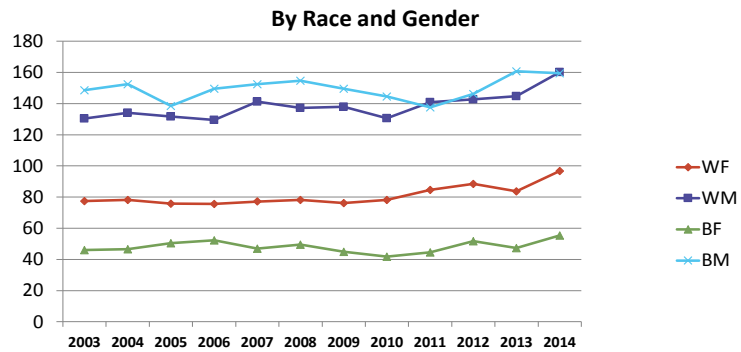
Overall inpatient hospitalization rates due to TBI have remained stable over the past ten years, showing only a 5% increase. Black females are the least likely to be hospitalized due to head trauma, but have shown statistically significant increases in hospitalization rates over the past decade. Males are twice as likely to be hospitalized as females due to TBI. Black males are three times more likely to be hospitalized for head trauma than black females (Fig. 11.4).

Overall ED visit rates due to TBI have significantly decreased by 10%, at an average of 1% per year since 2003. ED visit rates

due to TBI have decreased in males and increased in females in the past 10 years, both of which were statistically significant. Rates in white males have decreased by 10%, but rates in black males have not changed in 10 years.

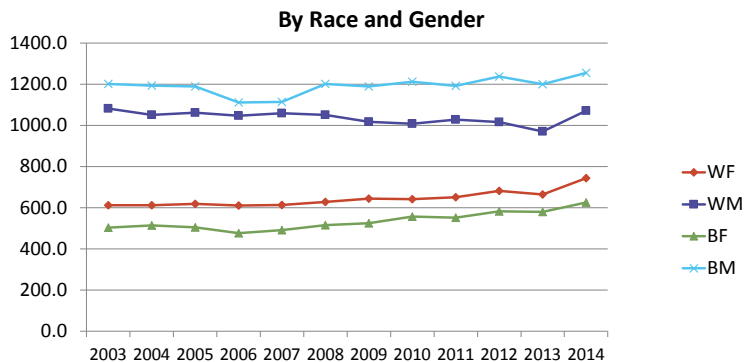
Alarming, ED visit rates due to TBI in both black and white females have risen by an average rate of 1% and 1.4%, respectively, in the past decade, which was statistically significant. Males are almost twice as likely as females to visit the ED for a head injury, but there was virtually no difference in ED visit rates by race (Fig. 11.5).

Figure 11.4. Age-Adjusted Traumatic Brain Injury Inpatient Hospitalization Rate



Data Source: SC Hospital Discharge Database, Revenue and Fiscal Affairs Office. Generated by DHEC Division of Injury and Violence Prevention.

Figure 11.5. Age-Adjusted Traumatic Brain Injury ED Visit Rate



Data Source: SC Hospital Discharge Database, Revenue and Fiscal Affairs Office. Generated by DHEC Division of Injury and Violence Prevention.

Key Findings--Traumatic Brain Injury

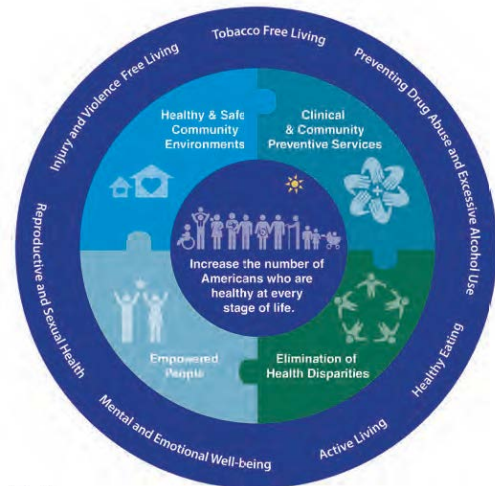
- In 2006, South Carolina ranked 4th in the nation in fatal traumatic brain injuries and 16th in the nation in non-fatal traumatic brain injuries.
- In SC in 2014, there were 1,203 deaths, 6,487 hospitalizations, and 44,701 ED visits attributable to TBI.
- White males age 85 and over are at highest risk for death and hospitalization due to TBI, mainly resulting from falls. Black females have had a 30% drop in TBI deaths since 2003.
- Males are almost three times more likely than females to die by TBI (883 deaths in males vs. 320 deaths in females in 2014).
- Males are twice as likely to be hospitalized as females due to TBI (3595 hospitalizations in males vs. 2101 hospitalizations in females).
- Black males are three times more likely to be hospitalized for head trauma than black females.
- Traumatic brain injuries are responsible for at least \$637 million in hospital and ED charges each year.

Recommendations: What Can Be Done?



The National Prevention Strategy: America's Plan for Better Health and Wellness, June 2011 Report released by the National Prevention Council shares that many of the strongest predictors of health and well-being fall outside of the health care setting (Office of the Surgeon General, 2011). The report builds on the premise that lifelong health starts at birth and continues throughout all stages of life. The

report centers around four strategic areas; healthy and safe community environments, clinical and community preventive services, empowered people, and the elimination of health disparities. Seven priority areas: tobacco free living, preventing drug abuse and excessive alcohol use, healthy eating, active living, injury and violence free living, reproductive and sexual health, and mental and emotional well-being, are detailed under the strategic areas that provide evidence-based recommendations that are most likely to reduce the burden of the leading causes of preventable deaths and major illnesses.



Injury and violence free living: Reducing injury and violence improves physical and emotional health. The leading causes of death from unintentional injury include motor vehicle-related injuries, unintended poisoning and falls. Witnessing or being a victim of violence is linked to lifelong negative physical, emotional, and social consequences.

What can be done? Injury and violence can be prevented by making homes, communities, schools, and work sites safer; strengthening and implementing community-based prevention policies and programs; and focusing efforts among groups at highest risk for injuries and violence, including youth and older adults. The recommendations from the report related to the creation of injury and violence free living environments include:

1. *Implement and strengthen policies and programs to enhance transportation safety* since effective traffic safety policies and programs prevent motor vehicle-related injuries and death. Examples include primary seat belt laws; child safety and booster seat laws; graduated driver licensing systems for young drivers; policies that reduce driving while under the

KEY DOCUMENTS:

- National Highway Traffic Administration: Traffic Safety Fact Sheets
- Best Practices for a Safe Community
- Essential Elements of Effective Workplace Programs and Policies for Improving Worker Health and Well-Being
- Youth Violence: A Report of the Surgeon General
- Preventing Falls: What Works

influence of alcohol or drugs or while drowsy or distracted; motorcycle and bicycle helmet laws; pedestrian safety education; enhanced enforcement of speeding; and other safety regulations.

2. *Support community and streetscape design that promotes safety and prevents injuries* since communities and streets can be designed to reduce pedestrian, bicyclist, and vehicle occupant injuries. Road modifications can reduce the number of deaths and injuries. Many of these modifications, which are included in the Complete Streets and Safe Routes to School models, can also increase levels of physical activity.
3. *Promote and strengthen policies and programs to prevent falls, especially among older adults* since exercise programs to increase strength and balance, medication review and modification to eliminate all but essential drug treatments, home modifications, and vision screening can prevent falls among older adults. Enhancing linkages between clinical- and community-based prevention efforts increases the availability and use of these programs. Properly designed and maintained playgrounds, home safety devices, and the use of protective gear when playing active sports can help prevent children from sustaining injuries related to falls.
4. *Promote and enhance policies and programs to increase safety and prevent injury in the workplace* since comprehensive workplace prevention programs that include management commitment, employee participation, hazard identification and remediation, worker training, and program evaluation can successfully reduce workplace injuries and illnesses. Effective prevention strategies for workplace deaths and injuries include developing and implementing engineering controls and protective technologies; comprehensive, written programs that are part of formal work site safety training initiatives; and training on work practices that promote a culture of safety within the workplace.
5. *Strengthen policies and programs to prevent violence* since modifications to the physical environment, (e.g. windows that overlook sidewalks and parking lots, landscape design that facilitates lines of sight) can deter criminal behavior and enhance community safety. Decreasing the number of businesses selling alcohol has also been shown to reduce violent crime. In addition, housing and economic development and education initiatives show promise in reducing rates of crime and violence.
6. *Provide individuals and families with the knowledge, skills, and tools to make safe choices that prevent violence and injuries* since education and skills-building programs can provide individuals and families with knowledge, skills, and tools to help them prevent violence and injuries. Strategies include school-based programs to prevent violence and reduce unintentional injury risks; intimate partner violence prevention efforts; social development strategies that teach children how to handle difficult social and peer situations without violence; parent and family skill-based programs that support positive family interactions and prevent infant and early childhood exposure to trauma and

violence; and youth development programs. In addition, workplace interventions can reduce violence, bullying, and other negative behaviors.

For additional details and action steps for partner groups, to include: (a) state, tribal. Local and territorial governments, (b) business and employers, (c) health care systems, insurers and clinicians, (d) early learning centers, schools colleges and universities; (e) community, non-profit and faith-based organizations, and (f) individuals and families, please visit:

<http://www.surgeongeneral.gov/priorities/prevention/strategy/report.pdf>.

Appendices

Appendix 1. Technical Notes

This section contains information on data sources, methods, and specific analysis techniques used in this report. A more detailed discussion of data sources, analysis methods, and case definitions used by the SC DHEC Division of Chronic Disease Epidemiology and the SC DHEC Injury Epidemiologist can be found in the Epi Technical Notes on the SC DHEC website

<http://www.scdhec.gov/Health/docs/EpiTechNotes.pdf>

Sources of Data

The data presented in this report were compiled from a variety of sources, including census data, vital records, hospital discharge data, and emergency room records, the Behavioral Risk Factor Surveillance System (BRFSS), Youth Risk Behavior Survey (YRBS), and Fatal Accident Reporting System (FARS). The data on hospitalizations and emergency department visits comes from the inpatient and emergency department discharge datasets collected and maintained by the SC Revenue and Fiscal Affairs Office Division of Health Statistics. These datasets are compiled from billing data supplied by all civilian in-state hospitals. These datasets contain information on admissions to hospitals and emergency departments, including diagnoses, procedures performed, length of stay, and charges. These datasets, while extremely valuable in chronic disease and injury surveillance, have their limitations. Because the hospital discharge data includes only hospital discharges from all in-state civilian hospitals, patients seeking health care in the hospitals outside the state or in the Veterans Administration system are not included in the data.

SC Population Data

The population data are obtained from South Carolina Revenue and Fiscal Affairs Office Division of Health Statistics prior to 2004 and since 2004 from National Center for Health Statistics. Annual population estimates by age group, race, and sex can be accessed at the state and county level through the South Carolina Community Assessment Network (SCAN) (<http://scangis.dhec.sc.gov/scan>). SCAN is an interactive web-based data retrieval system for community assessment, planning, and health practices.

BRFSS

The BRFSS has been collected in SC since 1984, and currently has a sample size of more than 10,000. For analysis of BRFSS data, special procedures in SAS software are used to take into account sampling method and weighting of data. Percentages are obtained by frequency distributions of selected variables and standard errors are calculated. Percentages are not calculated for any indicator with any cell size of less than 50 responses. There are limitations to the BRFSS data in terms of the representation of all regions of the state and all population groups. Rural and black residents are under-represented by the telephone interview system. The frequency of responses by a particular population group (e.g., 65 years and older black women) may be rather small, so in several instances multiple years of data were pooled, or regions of the state were combined to achieve reliable frequencies for this report.

YRBS

The YRBS was developed in 1990 to monitor priority health risk behaviors that markedly contribute to the leading causes of death, disability, and social problems among youth and adults in the United States. The YRBS includes national, state, territorial, tribal government, and local school-based surveys of representative samples of high school and middle school students. These surveys are conducted every two years, usually during the spring semester. The national survey, conducted by the CDC, provides data representative of 6th through 8th grade and 9th through 12th grade students in public and private schools in the United States. The state, territorial, tribal government, and local surveys, conducted by departments of health and education, provide data representative of mostly public high school students in each jurisdiction. The behaviors examined, often established during childhood and early adolescence, include behaviors that contribute to unintentional injuries and violence, sexual behaviors that contribute to unintended pregnancy and sexually transmitted infections, including HIV infection, alcohol and other drug use, tobacco use, unhealthy dietary behaviors, and inadequate physical activity.

Hospital Discharges, ED Discharges, and Outpatient Surgery Data

The data on hospitalizations and Emergency Department (ED) visits comes from the Inpatient and Emergency Room Discharge datasets collected and maintained by the SC Office of Revenue and Fiscal Affairs Division of Health and Demographics. These datasets are compiled from billing data supplied by all civilian in-state hospitals. The hospital discharge dataset contains an average of 550,000-560,000 records annually, and total ER visits range from 1.2 million to 1.5 million annually. This dataset covers every inpatient, outpatient, and ER visit made in SC in a given year. Data includes patient demographics, dates of admission and discharge, ICD 9 codes for primary and secondary diagnoses, primary and

secondary procedures done, charges and source of payment, and patient dispensation, i.e. discharge to home, skilled care facility, transfer to another hospital, or death.

Death Certificate Data

Mortality data are provided by the SC Department of Health and Environmental Control (SC DHEC) Office of Public Health Statistics and Information Services. The Division of Vital Records is responsible for registering all vital events that occur in South Carolina, which include births, deaths, fetal deaths, induced terminations of pregnancy, marriages, and divorces.

SC DHEC mortality data is accessible mainly through the South Carolina Community Assessment Network (SCAN) (<http://scangis.dhec.sc.gov/scan>). Users can create tables, charts, and maps according to their interests and specifications at the DHEC Region, County, or Zip-Code level. Birth Certificate Data, Death Certificate Data, and demographics are among the datasets available on the SCAN system. Each dataset can be used to generate tables and/or maps. Age-adjusted mortality rates are produced by underlying cause of death and may be computed by race, sex, ethnicity, and county or DHEC region. If special analysis of the mortality data beyond the capabilities of SCAN is needed, the Division of Biostatistics is asked to assist with data analysis.

Fatal Accident Reporting System (FARS)

For more than 45 years, the National Highway Traffic Safety Administration (NHTSA) has been working to reduce deaths and injuries on our roads. These efforts have led to historically low rates of deaths and injuries. To continue building on this trend, NHTSA is committed to working on innovative new ways to make our roadways safer. Keeping the American public safe on our roadways can only be achieved in partnership with all stakeholders, and public outreach is a vital component to our combined success. The Fatal Accident Reporting System (FARS) (<http://www.nhtsa.gov/FARS>) is a nationwide census providing NHTSA, Congress, and the American public yearly data regarding fatal injuries suffered in motor vehicle traffic crashes.

Web-based Injury Statistics Query and Reporting System (WISQARS)

The CDC's Web-based Injury Statistics Query and Reporting System (WISQARS™) (<http://www.cdc.gov/injury/wisqars/index.html>) is an interactive, online database that provides fatal and nonfatal injury, violent death, and cost of injury data from a variety of trusted sources. Researchers, the media, public health professionals, and the public can use WISQARS™ data to learn more about the public health and economic burden associated with unintentional and violence-related injury in the United States.

Definitions of Causes of Injury

This includes ICD-9 codes E800-E869, E880-E929, E950-E999 and ICD-10 codes V01-Y36, Y85-Y87, Y89, U01-U03. There are two dimensions of the external causes of injury: intent (manner) and the mechanism (cause) by which the injury occurred. Injuries are grouped according to the intent which in turn divided into groups by causes.

- I. Unintentional injury is defined by ICD-9 codes E 800-E869, E880-E969 and ICD-10 codes V01-X59, Y85-Y86.

Unintentional injuries:

1. **Cut/Pierce:** injuries caused by, or falls on, cutting and piercing instruments or objects (powered or non-powered hand tools and household appliances). This includes also injury by nails, needles, broken glasses, splinters, and tin can lids.
2. **Drowning/submersion:** includes death by drowning or injury by submersion in watercraft accidents, while swimming or just wading in water. It also includes drowning/submersion in bathtubs. This includes ICD-9 codes E830, E832, E910, E954, E964, E984, and ICD-10 codes W65–W74. (*Death data do not include watercraft accidents (in order to compare with national death data).*)
3. **Falls:** include falls on same level (slipping, tripping), and falls on different levels (stairs, bed, ladder). Falls are defined by ICD-9 codes E880-E886, E888 and ICD-10 codes W00-W19.
4. **Fire/flame:** injuries due to fire/flame include burning by fire; asphyxia or poisoning due to fire; secondary fires due to explosion; fall or jump from burning structure. This analysis includes burns by hot objects as well as fires and is defined by ICD-9 codes E890-E899 and ICD-10 codes X00-X19.
5. **Firearms:** use of handguns, automatic weapons, hunting rifles, military firearms, and air guns. Accidental discharge of firearms are defined by ICD-9 codes E922 and ICD-10 codes W32-W34.
6. **Foreign body:** includes foreign body accidentally entering eye and adnexa, or entering other orifice.
7. **Hot/object or substance:** the injury is caused by hot liquids and vapor (including steam); hot appliances or objects; caustic/corrosive material.

8. **Machinery:** includes agricultural, mining, lifting, metalworking, woodworking, and earth moving machines.
9. **Motor vehicle crashes (MVC):** includes all motor vehicles, except motorcycles, which are involved in traffic crashes. The injured person in this group is an occupant of a motor vehicle (driver or passenger), or an unspecified individual who is involved in traffic MVC. Motor vehicle accidents are defined by ICD-9 code sE810-E819 and ICD-10 codes [V02–V04](.1,.9), V09.2, [V12–V14](.3–.9), V19(.4–.6), [V20–V28](.3–.9), [V29–V79](.4–.9), V80(.3–.5), V81.1, V82.1, [V83–V86](.0–.3), V87(.0–.8), V89.2.
10. **Motorcyclists:** motorcycle involved in traffic or non-traffic crashes. The injured person is a driver or passenger of a motorcycle.
11. **Pedal cyclists:** pedal cycle involved in traffic or non-traffic motor vehicle crashes, struck by (train, other bicycle, other road vehicle, or animal drawn vehicle). This also involves falling from or turnover of the pedal cycle, or hitting a fixed or moveable object. The injured person is any person riding on a pedal cycle or in a sidecar attached to such a vehicle.
12. **Pedestrians:** the person injured in this group is a pedestrian who is struck by a motor vehicle in traffic or non-traffic crashes, or is struck by other road vehicles or trains.
13. **Other Transport. In Death data:** includes train railway accidents, non-traffic MVC (*is any motor vehicle accident occurring entirely in any place other than a public highway*), other road vehicle crashes, (3 wheeled vehicles, ATV, steer cars, animal drawn vehicles). It also involves water, air and space transport crashes. **In Non-Fatal data:** includes train railway accidents, non-traffic MVC (*is any motor vehicle accident occurring entirely in any place other than a public highway*), animal drawn vehicle accident, water transport accidents, not including those used in the course of recreational activities.
14. **Natural and environmental factors:** excessive heat or cold, change in air pressure, hunger, thirst, neglect, lightning, floods, tornados, and storms, also due to animal bites, poisoning and toxic reactions from venomous animals and plants.
15. **Overexertion:** includes overexertion resulting from lifting, pulling, or pushing. It also includes excessive physical exercises, and strenuous movements in recreational and other activities.

16. **Poisoning:** includes by drugs (painkillers, tranquilizer, antibiotics, antipyretics, and antirheumatics), alcohols, food, cleansing agents, agricultural chemicals, corrosives, and gases. Poisoning diagnoses are defined by ICD-9 codes E850-E869 and ICD-10 codes X40-X49.
17. **Struck By/Against:** includes person or object or caught in between object or crushed by a crowd.
18. **Sports and recreation (only in non-fatal data)** includes **falls in sports; struck by or against in sports** (kicked or stepped on during game, knocked down during boxing, hit by a ball or hockey stick or puck); **pedal cycle in sports** (motor vehicle traffic collision involving a pedal cyclist); **water skiing; drowning in sports** (accident to watercraft causing submersion not including water skiers); **diving** (diving or jumping into water, striking bottom, wall or board of pool, effect of air pressure from diving); **animal riding; off-road vehicle** (non-traffic accident involving motor-driven snow vehicle or other off-road vehicle); **other water-related sports** (swimmer struck by or crushed between watercraft); **Unpowered aircraft** (any accident with balloon, glider, hang glider, kite carrying a person); **Other vehicles** (non-motor, non-road vehicle not otherwise specified).
19. **Suffocation:** includes inhalation and ingestion of food or object, which cause the obstruction of the respiratory tract or suffocation. This group also includes accidental mechanical suffocation (e.g., by plastic bag, closed up in air tight place, accidental hanging).
20. **Other unintentional causes:** includes pressurized and explosive materials, electrical current, effects of radiation, and late effects.

II. Intentional injuries:

1. **Suicide or attempted suicide:** is defined as self-inflicted injuries, which leads to death or harm, by any means. This includes ICD-9 codes E9510-E959 and ICD-10 codes X60-X84, and Y87.0.
2. **Assaults:** are injuries inflicted by another person with intent to injure or kill (homicide), by any means. Assaults are defined as injuries inflicted by another person with intent to injure or kill (homicide), by any means. Medically, assault is defined by ICD-9 codes E960-E969 and ICD-10 codes X55-Y09, and Y87.1
3. **Legal Intervention:** are injuries inflicted by the police or other law-enforcing agents, including military on duty, in the course of arresting or attempting to arrest lawbreakers, suppressing disturbances, maintaining order, and other legal action, including legal execution. Legal

intervention is defined by ICD-9 codes E970–E978, E990–E999 and ICD-10 codes Y35–Y36, Y89(.0,.1).

III. Undetermined intention: The intent of these injuries cannot be determined as to whether they are unintentional or intentional based on available data.

IV. Traumatic brain injury: is caused by a bump, blow or jolt to the head or a penetrating head injury that disrupts the normal function of the brain. This includes ICD-9 codes 800-804, 850-873, 905, 907, and ICD-10 codes S01.0–S01.9, S02.0, S02.1, S02.3, S02.7--S02.9, S04.0, S06.0–S06.9, S07.0, S07.1, S07.8, S07.9, S09.7–S09.9, T01.0, T02.0, T04.0, T06.0, T90.1, T90.2, T90.4, T90.5, T90.8, T90.9.

Data Analysis

Hospital discharge and ED visits are used to calculate age-adjusted hospitalization rates by ICD-9 code or E code, total charges by ICD-9 code or E code, total and average length of stay by ICD-9 code or E code. These indicators can be calculated by race, sex, age group, county, or any combination thereof. Analyses are done using SAS v.9.3. Of particular interest are age-adjusted hospitalization and ED visit rates for injuries, unintentional injuries, assaults, and self-inflicted injuries. However, there are limitations to the dataset. Hospital discharge data include only hospital discharges from civilian hospitals within the state; therefore, patients seeking healthcare in the hospitals outside the state or in the Veterans Administration system are not included in the data.

Age-adjusted rates are computed by the direct method of applying age-specific hospitalization rates to a standardized age distribution, to eliminate differences in observed rates that result from age differences in population composition. Age-adjustment rates are calculated as:

$$R_i = \sum_{i=1}^n (r_i * P_i/P)$$

p_i = standard population in i^{th} age group.

1. Frequencies of injuries by age group are determined.
2. Age-specific rates are calculated using SC population estimates for a given year as the denominator.
3. These age-specific rates are “standardized” using the US Census 2000 population.
4. These proportions are summed to get an age-adjusted rate R_i .

Age-adjusted rates are calculated per 100,000 population at risk for population overall; by race; by sex, and by race and sex.

Highest risk groups for each type of injury were determined by calculating ten-year age-specific mortality, and five-year age-specific ED and hospitalization rates for each race, sex, and five-year age group. Age-specific rates for each race and sex were then sorted in descending order.

Medical costs and loss of productivity data were obtained through WISQARS (Centers for Disease Control and Prevention, 2014b).

Trend analysis for this report was conducted by piecewise regression method utilizing the Joinpoint© software (NCI, 2014). Such formulated trend models examine how several different lines at various points are connected together at the "joinpoints." Time-trend data helped build the case study with the simplest joinpoint frame that the data allow. The synergistic hierarchical model started with the minimum number of joinpoint (e.g., 0 joinpoints, which is a horizontal straight line) and tested whether added joinpoints could improve the model's indication of potential explanatory powers or output variables. This enables the analyst to test whether an apparent change in trend or change in outcome was statistically significant.

Appendix 2. Injury Morbidity and Mortality ICD Codes

Cause of Injury Death	ICD-9*	ICD-10
All Injury	E800-E869, E880-E929, E950-E999	V01-Y36, Y85-Y87, Y89, *U01-*U03
Suicide	E950-E959	X60-X84, Y87.0
Homicide	E960-E969	X85-Y09, Y87.1
Unintentional	E800-E869, E880-E929	V01-X59, Y85-Y86
Cut or pierce	E920	W25-W29, W45, W46
Drowning	E830, E832, E910, E954, E964, E984	W65-W74
Fall	E880-E886, E888	W00-W19
Fire or hot object	E890-E899	X00-X19
Firearm	E922	W32-W34
Machinery	E919	W24, W30-W31
Motor Vehicle Traffic	E810-E819	[V02-V04](.1,.9), V09.2, [V12-V14](.3-.9), V19(.4-.6), [V20-V28](.3-.9), [V29-V79](.4-.9), V80(.3-.5), V81.1, V82.1, [V83-V86](.0-.3), V87(.0-.8), V89.2
Pedal cyclist, other	[E800-E807](.3), [E820-E825](.6), E826(.1,.9)	V10-V11, [V12-V14](.0-.2), V15-V18, V19(.0-.3,.8,.9)
Pedestrian, other	[E800-E807](.2), [E820-E825] (.7), [E826-E829](.0)	V01, [V02-V04](.0), V05, V06, V09(.0-.1,.3,.9)
Natural or environmental	E900.0-E909, E928(.0-.2)	W42-W43, W53-W64, W92-W99, X20-X39, X51-X57
Overexertion	E927	X50
Poisoning	E850-E869	X40-X49
Struck by or against	E916-E917	W20-W22, W50-W52
Suffocation	E911-E913	W75-W84
Other specified, unspecified	E846-E848, E887, E914-E915, E918, E921(.0-.9), E923(.0-.9), E925.0-E926.9, E928(.8,.9), E929(.0-.5,.8,.9)	W23, W35-W41, W44, W49, W85-W91, X58, X59, Y85, Y86
Legal intervention	E970-E978, E990-E999	Y35-Y36, Y89(.0,.1)
Undetermined	E980-E989	Y10-Y34, Y87.2, Y89.9

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