N.C. Child Injury Report: 2007-2010

Image Courtesy: CDC/Dawn Arlotta

Injury and Violence Prevention Branch
North Carolina Division of Public Health
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Vani Sistla, M.P.H.
Program Consultant, N.C. Division of Public Health

State of North Carolina
Pat McCrory, Governor

Department of Health and Human Services
Aldona Z. Wos, M.D., Secretary

Division of Public Health
Robin Cummings, M.D., Acting State Health Director

Injury and Violence Prevention Branch
www.injuryfreenc.ncdhhs.gov

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Contributors and Reviewers

Scott K. Proescholdbell, M.P.H.
Head, Epidemiology and Surveillance Unit
Injury and Violence Prevention Branch
North Carolina Division of Public Health

Annie Hirsch, M.P.H.
Chemical Epidemiologist
Occupational and Environmental Epidemiology Branch
North Carolina Division of Public Health

Kathleen Creppage, M.P.H.
CDC/CSTE Applied Epidemiology Fellow
Injury and Violence Prevention Branch
North Carolina Division of Public Health

Anna Austin, M.P.H.
CDC/CSTE Applied Epidemiology Fellow
Injury and Violence Prevention Branch
North Carolina Division of Public Health

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1. Overview of Child Injury in North Carolina: 2007-2010

Introduction

Injury is the number one cause of death among children in the United States [1]. Unintentional Injury has consistently been the leading cause of death among children ages 1-14 for more than a decade [2]. For children ages 1-19 on average 12,175 died each year in the United States just from unintentional injury. In North Carolina alone, 153 deaths due to injury were reported among children ages 0-14 in 2010 and 124 of these were unintentional in nature [2].

The CDC reports that on average one child dies from injury every hour in the United States. Around 20% (one in five) of all deaths among children are due to injury. Every four seconds, a child is treated for an injury in an emergency department in the United States [1]. Annually, an estimated 9.2 million children have emergency department visits for an unintentional injury. The economic burden created by unintentional injuries is around $300 billion each year [3].

Despite these grim statistics, until recently, there were no national guidelines or strategies as part of a national child injury prevention effort. The National Action Plan for Child Injury and Prevention (NAP) was established in 2012. The main goal of the NAP is to reduce the incidence of child injury and the burden associated with it.

This report provides an overview of the public health burden of injury in children ages 0-14 in the state of North Carolina. In an effort to evaluate and understand the scope of the problem of child injury in North Carolina, analyses were performed on injury-related deaths and hospitalizations for the years 2007-2010 and emergency department visits from the years 2009-2010. Each cause of injury was further stratified based on age and gender. Injury deaths, hospitalizations, and emergency department visit rates were calculated for the years 2007 to 2010, per 100,000 children residing in the state of North Carolina. A detailed explanation of the data analysis is provided in Appendix A.

Common causes of both fatal and non-fatal unintentional injuries are motor vehicle crashes, suffocation, poisoning, falls, fire/burn, pedestrian injuries, and drowning. These are distinct from intentional injuries, which are classified as assaults or suicides. Since this data is captured only for the cases registered with hospitals and emergency departments, it underestimates the “true incidence” which could include cases treated at physician’s offices, at urgent care facilities, and at home.

Data for this report has been obtained from three sources: North Carolina Division of Public Health (2010) death certificate data, N.C. Hospital Discharge data, and N.C. Emergency Department Visit data has been analyzed separately for three age groups; 0-4, 5-9, and 10-14. Throughout this report, the term “children” refers to all of these age groups taken together.

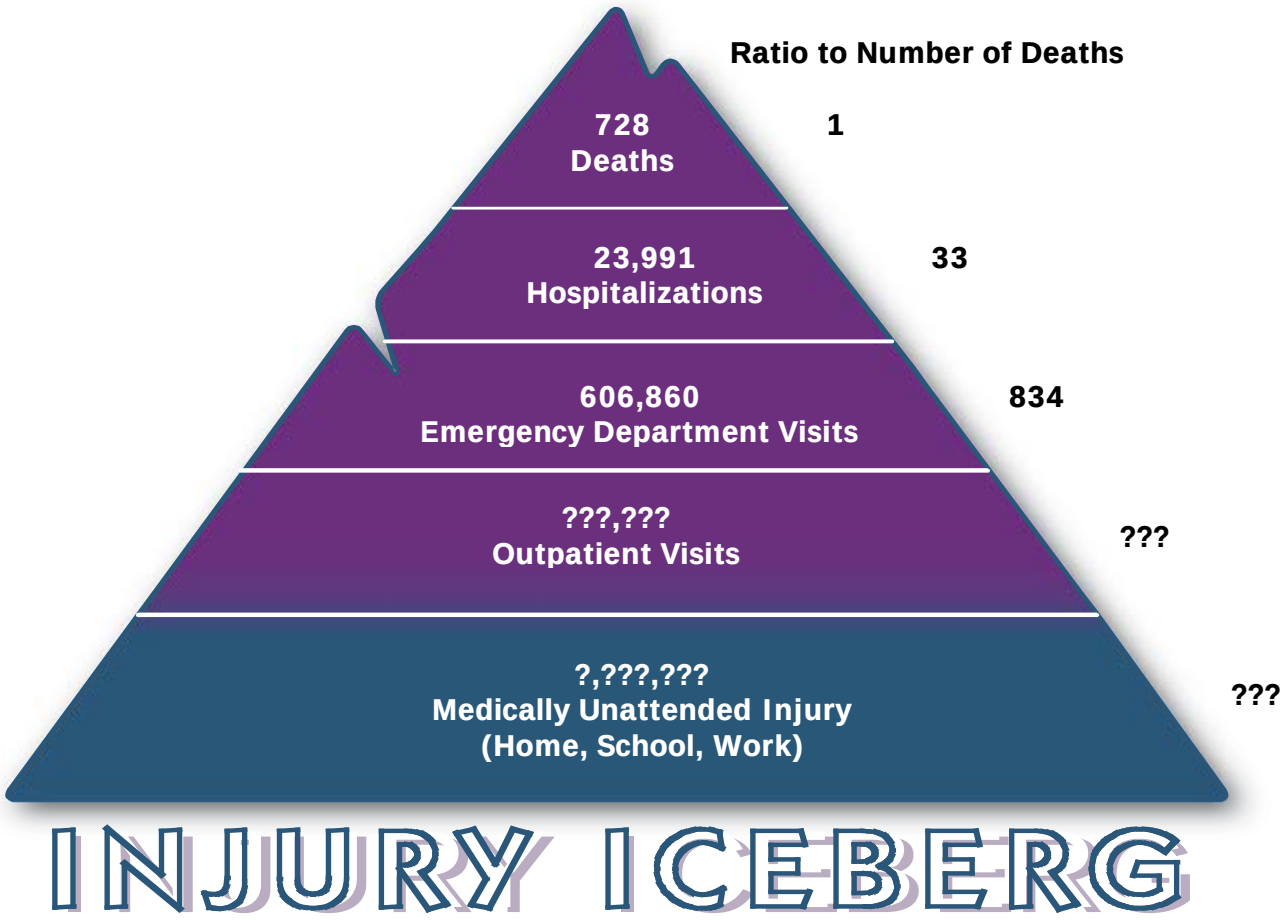
This report is intended for state and local officials to help them understand vulnerable populations as well as the types of injury that dominate different age groups. This will facilitate better allocation of resources for public health programs that help in reducing injury burden. It will also help researchers track injury trends, help physicians educate parents and children about making safer and healthier choices for themselves. It helps policy makers both understand the burden these issues cause, as well as frame policy decisions, and help the public make better and healthier choices for their communities and families.

The format of this report is based on a series of injury reports based on lifespan (i.e. children, adolescents, adults and older adults) and its content is an update to *Injuries to North Carolina Children: 2004-2007*.

The burden caused by childhood injury can be better understood from the "Injury Iceberg", illustrated in Figure 1. Here the "tip of the iceberg" is injury-related deaths, which represents only a small fraction of the total childhood injury events yet is often the most visible. The second level represents hospitalizations, whose number is slightly larger than deaths but still underestimates the "true" number of injury-related events. The third level represents emergency department visits. The lower levels represent the large fraction of childhood injuries that are not recorded as part of routine surveillance efforts, such as injuries seen and treated in outpatient facilities or those where no medical attention is sought.

For every injury-related death, there were 33 hospitalizations and 834 emergency department (ED) visits for children ages 0-14 between 2007-2010. Other data based on ED visits throughout this report is from 2009-2010.

FIGURE 1: Injury Iceberg, North Carolina Childhood Injuries, Age 0-14: Deaths, Hospitalizations, and ED 2007-2010. Injury and Violence Prevention Branch, Chronic Disease and Injury Section, Division of Public Health.



The Problem of Childhood Injury

Among North Carolina children between the ages 0-14, injuries resulted in 728 deaths (9.7 per 100,000) from 2007 to 2010, 23,991 hospitalizations (319 per 100,000) from 2007 to 2010, and 305,632 emergency departments visits (8,030 per 100,000) from 2009 to 2010 in North Carolina.

Seventy-nine percent of deaths were caused by unintentional injuries (Figure 2) as were 47 percent of hospitalizations (Figure 3) and 79 percent of emergency department visits (Figure 4).

Figure 2 shows that three percent of child deaths were the result of a self-inflicted injury, or suicide, and 15 percent were from an assault (homicide). The remaining three percent have undetermined intent or resulted from some other mechanisms.

Figure 3 points out that injuries with unintentional injuries are responsible for a much larger percentage (47%) of hospitalizations among children age 0-14. Assault accounts for only two percent of hospitalization and self-inflicted injuries only three percent. Nearly 18 percent of injury-related hospitalizations were missing intent information.

Eighteen percent of emergency department visits are also missing intent information (Figure 4). The remaining three percent of visits for treatment for child injuries are comprised of assault (1%), and other sources (2%).

Figure 2: N.C. Child Injury Deaths by Intent, Age 0-14: 2007-2010 (N=728)

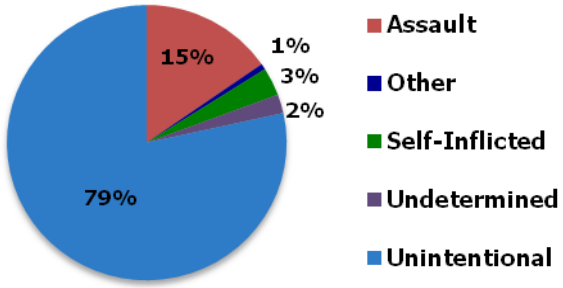


Figure 3: N.C. Child Injury Hospitalization by Intent, Age 0-14: 2007-2010 (N=23,991)

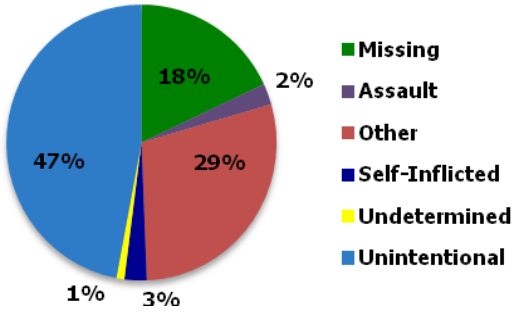
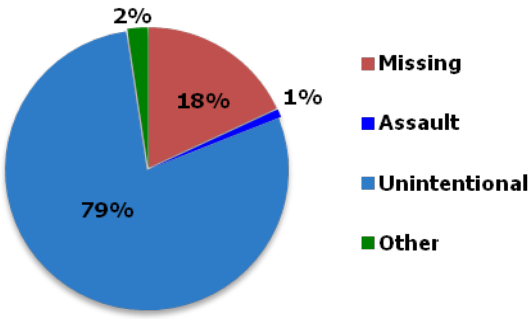


Figure 4: N.C. Child Injury Emergency Department Visit by Intent, Age 0-14: 2007-2010 (N=305,632)



Leading Causes of Child Injury

The leading cause of injury-related death among children in North Carolina from 2007-2010 was motor vehicle accidents. Motor vehicle crashes are also the fourth leading cause of hospitalizations in children between ages 0-14 and the eighth leading cause of emergency department visits during 2009-2010. Motor vehicle-related injuries accounted for 203 (17%) deaths, 1,468 (6%) hospitalizations and 13,275 (4%) emergency department visits, as displayed in Tables 1, 2, and 3. Adverse effects of medications and medical care were the leading cause of hospitalizations and accounted for 6,922 (29%) hospitalizations in children during 2007-2010. It was not a significant cause of death or emergency department visits. The leading cause of emergency department visits for children age 0-14 was falls. Falls resulted in 80,997 (27%) total emergency department visits (Table 3). Falls were also the third leading cause of hospitalizations for children within the same age group and caused 2,846 (12%) hospitalizations (Table 2). A large proportion of injury-related information was missing or unknown among hospitalizations (18%) and emergency departments visits (18%).

TABLE 1: N. C. Leading Types of Child Injury Deaths, Age 0-14: 2007-2010

Injury Type	Number of Deaths
Motor-Vehicle (Unintentional)	203
Suffocation (Unintentional)	120
Assault (Intentional)	112
Drowning – (Unintentional)	95
Fire/Burn - (Unintentional)	52
Suicides (Self-inflicted)	24
Pedestrian, other – (Unintentional)	23
Suffocation (Self-Inflicted)	17
Other land transport – (Unintentional)	16
All other causes	66
Total	**728**

TABLE 2: N. C. Leading Types of Child Injury Hospitalizations, Age 0-14: 2007-2010

Injury Type	Number of Hospitalizations
Adverse Effects (Other)	6,922
Missing Cause/Intent	4,329
Fall (Unintentional)	2,846
Motor-Vehicle (Unintentional)	1,468
Fire/Burn (Unintentional)	976
Otherspec/class (Unintentional)	843
Poisoning (Unintentional)	840
Natural/Environ – (Unintentional)	752
Unspecified (Unintentional)	747
All other causes	4,268
Total	**23,991***

*1 was unknown/missing gender

TABLE 3: N. C. Leading Types of Child Injury Emergency Department Visits, Age 0-14: 2009-2010

Injury Type	Number of Visits
Fall (Unintentional)	80,997
Missing Cause/Intent	55,078
Struck – (Unintentional)	44,015
Natural/Environ (Unintentional)	18,362
Otherspec/class (Unintentional)	16,508
Unspecified (Unintentional)	14,926
Cut/Pierce (Unintentional)	14,594
Motor-Vehicle (Unintentional)	13,275
Overexertion – (Unintentional)	12,309
All other causes	35,568
Total	**305,632***

*13 were unknown/missing gender

Causes of Child Unintentional Injury

Unintentional injuries account for 78 percent of the total child injury deaths, highlighting its significance among this age group. The most significant causes of unintentional injury-related mortality include motor vehicle crashes, suffocation, drowning, and fire/burn-related injuries. A larger fraction of unintentional injury-related morbidity among this age group resulted from falls, though motor-vehicle injuries and fire/burn-related injuries contributed as well.

In particular, motor vehicle crashes (36%) and suffocation (21%) were the leading causes of unintentional child injury-related death for 2007-2010. Motor vehicle injuries were the second leading cause of unintentional injury-related hospitalizations (13%), but resulted in far fewer emergency department visits (5%).

Tables 2 and 3 show that falls is the leading cause of unintentional injury-related hospitalizations and emergency department visits among children aged 0-14. Unintentional falls caused 25 percent of all hospitalizations from 2007 to 2010 and 21 percent of all emergency department visits from 2009 to 2010. Falls were ranked the ninth leading cause of unintentional injury-related death in Table 1 (5%) with nine deaths between 2007 and 2010.

TABLE 4: N.C. Leading Types of Child Unintentional Injury Deaths, Age 0-14: 2007-2010

Unintentional Injury Type	Number of Deaths
Motor Vehicle	203
Suffocation	120
Drowning	95
Fire/Burn	52
Pedestrian, other	23
Otherlandtransport	16
Firearm	12
Poisoning	12
Fall	9
Otherspec/class	7
Natural/Environ	5
All Other Causes	17
Total	**571**

TABLE 5: N.C. Leading Types of Child Unintentional Injury Hospitalizations, Age 0-14: 2007-2010

Unintentional Injury Type	Number of Hospitalizations
Fall	2,846
Motor Vehicle	1468
Fire/Burn	976
Otherspec/class	843
Poisoning	840
Natural/Environ	752
Unspecified	747
Struck	678
Transport, other	578
Pedalcyclist, other	363
Otherspec/NEC*	351
All Other Causes	837
Total	**11,279**

TABLE 6: N.C. Leading Types of Child Unintentional Injury Emergency Department Visits, Age0-14: 2009-2010

Unintentional Injury Type	Number of Visits
Fall	80,997
Struck	44,015
Natural/Environ	18,362
Otherspc/class	16,508
Unspecified	14,926
Cut/Pierce	14,594
Motor Vehicle	13,275
Overexertion	12,309
Pedalcyclist, other	6,626
Poisoning	5,799
Otherspec/NEC*	4,534
All Other Causes	8,513
Total	**240,458**

***NEC** = not elsewhere classified

Deaths, Hospitalizations, and Emergency Department Visits by Age and Gender

Child injury mortality rates are displayed by age and gender in Figure 5 for 2007 to 2010. Both male and female rates are highest for children between the ages 0-4. Children between the ages 5-9 had the lowest mortality rates as compared to the other age groups. Males consistently have higher mortality rates across all age groups than females for injury-related deaths.

Figure 6 shows hospitalization rates. These rates depict similar trends to those of deaths. In every age category, males have higher rates than females. The highest hospitalization rates are seen in the youngest age group of children age 0-4. The rate for males is 536 hospitalizations per 100,000; females had hospitalization rates of 396 per 100,000 for the same age group.

Like Figures 5 and 6, Figure 7 shows a similar trend in emergency department visits among North Carolina children for 2009 to 2010. Rates for males were higher than females for all age groups. Among males, the highest rate for visits was 9,879 per 100,000 for age 0-4. Among females for the same age group, the rate was 7,967 per 100,000. Children age 5-9 had the lowest emergency department visit rates for both males and females in North Carolina.

Figure 5: N.C. Child Injury Deaths by Age and Gender, Age 0-14: 2007-2010 (N=728)

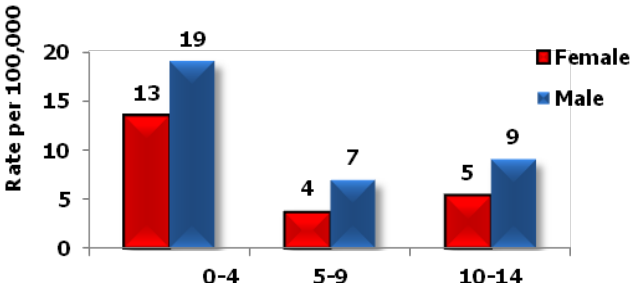


Figure 6: N.C. Child Injury Hosptalizations by Age and Gender, Age 0-14: 2007-2010 (N=23,991)

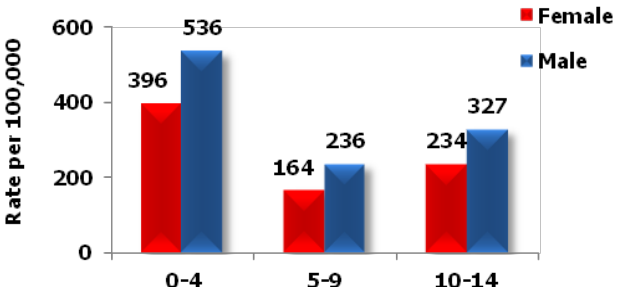
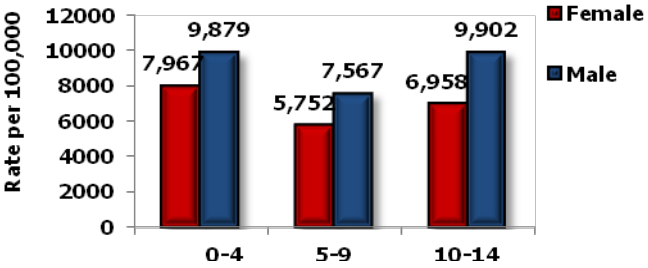


Figure 7: N.C. Child Injury Emergency Department Visits by Age and Gender, Age 0-14:2009-2010 (N=305,632)

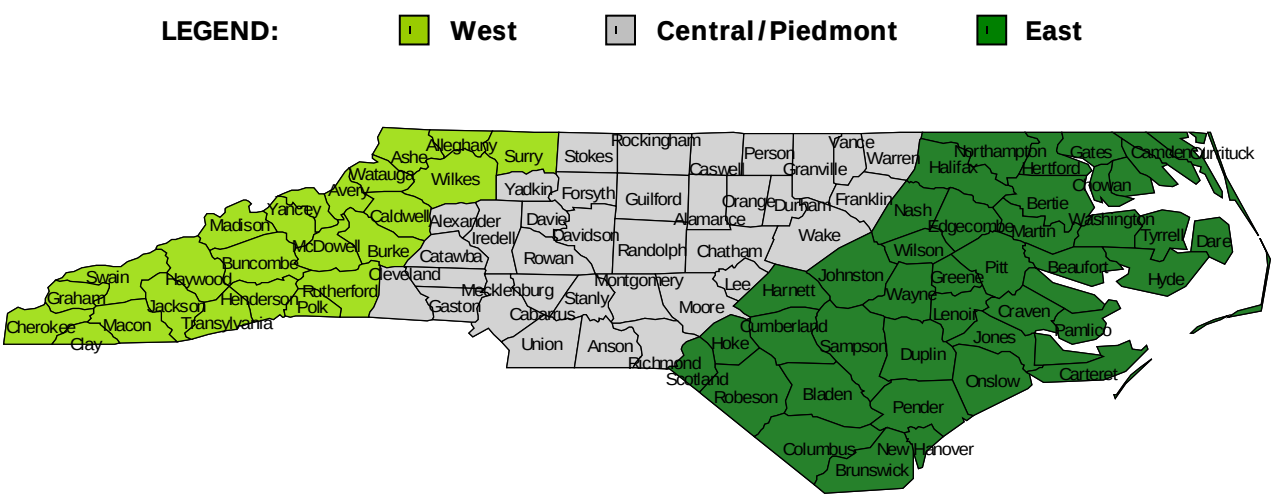


Regional Injury Rates

Figure 8 illustrates the child injury rate for deaths and hospitalizations (2007 to 2010) and emergency department visits (2009 to 2010) in the western, central (Piedmont) and eastern regions of North Carolina. In general, the eastern region appears to have the highest mortality, hospitalization, and ED rates as a result of injury to children, followed by the central region and finally the western region.

The child injury fatality rate was nine per 100,000 in the western region, eight per 100,000 in the central region, and 14 per 100,000 in the eastern region of the state. The western region had the lowest hospitalization rate for child injury (294 per 100,000) followed by the central region (298 per 100,000) and the eastern region (370 per 100,000). The central region had the lowest rates of ED visits (7,690 per 100,000) among children, while the Eastern region had the highest (8,781 per 100,000).

FIGURE 8: North Carolina Adult Injury Rates by Region, Age 0-14 Deaths (n=728): 2007-2010, Hospitalizations (n=23,991): 2007-2010 and Emergency Department Visits (n=305,632): 2009-2010



	West	Central	East
Deaths per 100,000	**9**	**8**	**14**
Hospitalizations per 100,000	**294**	**298**	**370**
Emergency Visits per 100,000	**7,941**	**7,690**	**8,781**

Comparison to United States and Comparison over Time

The child injury death rates in North Carolina and the United States have slightly decreased over the 10 years from 1999 to 2010 (Figure 9). North Carolina has consistently had a higher injury death rate for children age 0-14 as compared to the U.S. across this time period. The most recently available child injury death rate for both state and national levels for the years 2009 and 2010 showed the fatality rate reduced from 9 to 8 per 100,000 in North Carolina and 10 to 9 per 100,000 in the U.S. (CDC WISQARS). Whether this decrease is an aberration or a new tread will have to be explored in coming years.

Motor vehicle crashes and suffocation injuries were the leading causes of injury-related death among this age group for both the U.S. and North Carolina between 2007 and 2010 (Figure 10). The U.S. had slightly higher death rates than North Carolina for suffocation, assault and suicides. The state injury mortality rates on WISQARS are age-adjusted and comparable to national rates.

Figure 9: Child Injury Death Rates in the United States and North Carolina, Age 0-14 : 1999-2010

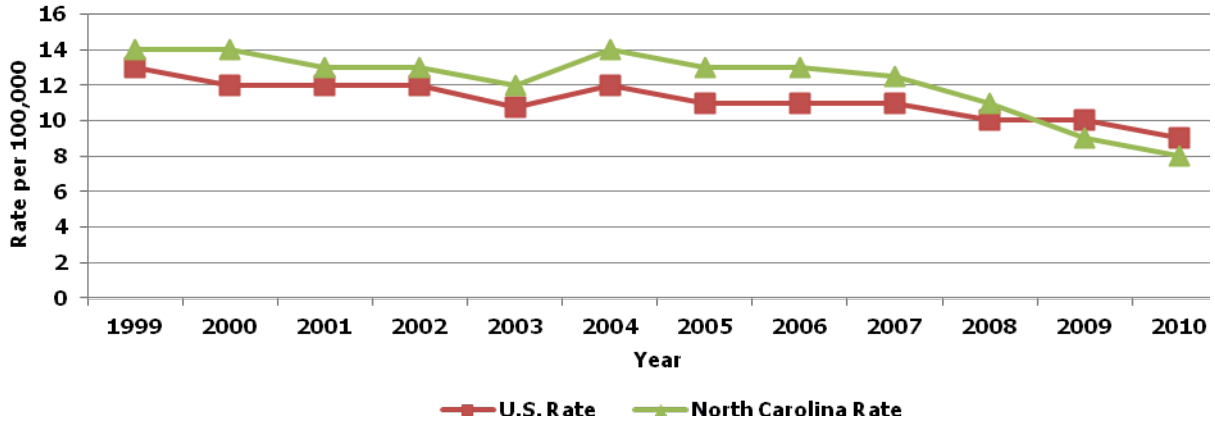
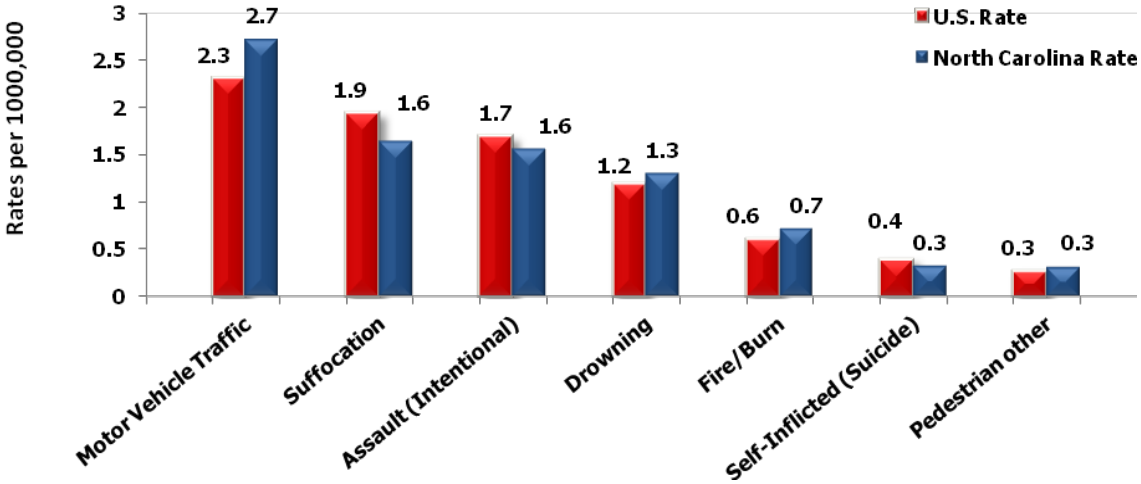


Figure 10: Child Injury Death Rates in North Carolina and the United States by Type of Injury, Age 0-14: 2007-2010

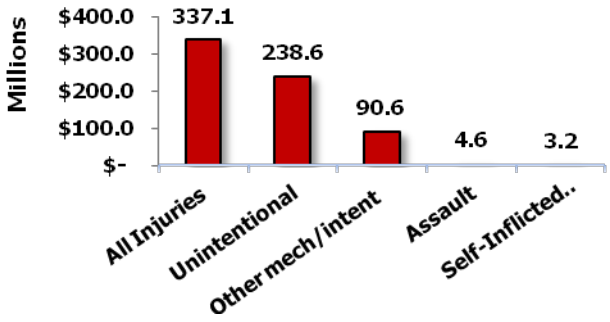


Data Source: CDC WISQARS

Hospitalization Charges for Child Injuries from 2007-2010

Between 2007 and 2010, hospitalizations from child injuries generated more than $337 million in charges in North Carolina. Referring to Figure 11, about $238.6 million in charges were due to unintentional child injuries and account for the majority of all hospitalization charges. Assault ($4.6 million) and self-inflicted injuries ($3.2 million) account for a small percentage. Injuries with other mechanisms and intents account for about $90.6 million in hospitalization charges. These charges provide an estimate of the financial toll of the medical care requiring hospitalization for child injuries, but do not account for the indirect costs of loss in productivity and quality of life that contribute to a greater burden on children and their families.

Figure 11: Total Hospitalization Charges for Child Injuries in North Carolina, Age 0-14: 2007-2010



Total hospitalization charges by injury type for children in North Carolina, 2007 to 2010, are displayed in Figure 12. Injuries with mechanisms and intents that were not listed or included accounted for $90.6 million in charges. Motor vehicle crashes ($57.9 million), and falls ($38.7 million). These figures again reflect the magnitude of the burden of unintentional motor vehicle crashes, falls, fire/burn and assault on this population in particular.

Figure 12: Total Hospitalization Charges for Child Injury in North Carolina by Type of Injury, Age 0-14: 2007-2010

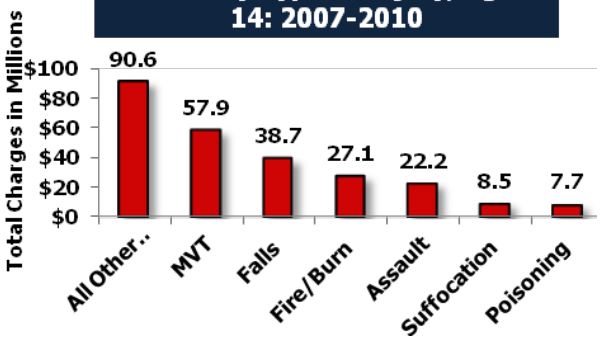
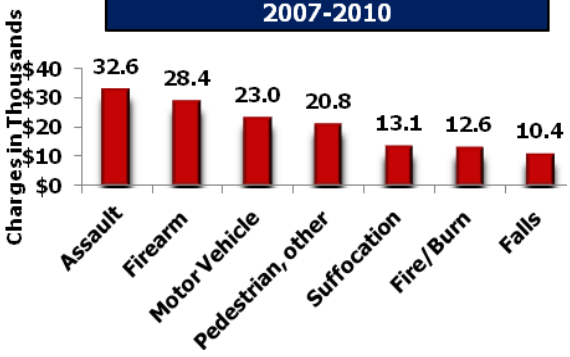


Figure 13 displays the median estimated charges related to specific types of child injury, which estimates charge per injury. Disparities in median charges can be attributed to the differences in each separate injury case such as extent of patient trauma, type of procedure/treatment required, and length of hospital stay. The type of injury for child aged 0-14 with the most expensive median hospitalization charges was assault ($32,600) followed by unintentional firearm ($28,400) and thirdly by motor vehicle crashes ($23,000).

Figure 13: Median Hospitalization Charges for Child Injuries in North Carolina by Type of Injury Age 0-14: 2007-2010



2. Types of Child Injury

2.1 Unintentional Injury

Motor Vehicle Injury (Unintentional)

Motor vehicle crashes were the major cause of injury deaths (3 per 100,000), the fourth leading cause of hospitalizations, and the seventh overall cause of emergency visits for children between ages 0-14 in North Carolina.

Motor vehicle-related injuries in children led to 203 deaths (3 per 100,000) from 2007 to 2010, 1,468 hospitalizations (19 per 100,000) from 2007 to 2010, and 13,275 emergency department visits (349 per 100,000) from 2009 to 2010. The total hospitalization charges resulting from motor vehicle injuries (Table 7) among children in North Carolina were $57.8 million. Motor vehicle injuries were ranked second in total hospitalization charges for child injury and ranked third in the median charges at $22,979, with an average charge of $39,440.

The mortality rates for motor vehicle injuries (Fig. 14) for children between the ages of 0-4 and 10-14 were similar (3 per 100,000). Children ages 5 to 9 had the lowest mortality rates (2 per 100,000). The hospitalization rates for motor vehicle injuries (Fig. 15) increased with age, with children ages 10 to 14 having the highest hospitalizations rates (25 per 100,000). Males had higher rates of hospitalizations than females. The rates for emergency department visits (Figure 16) among North Carolina children tended to increase with age. Children age 10-14 had the highest rates of ED visits. Females had a slightly higher rate (372 per 100,000) of emergency department visits than males (326 per 100,000) in 2009-2010.

TABLE 7: Estimated Hospitalization Charges Resulting from Child Motor Vehicle-Related Unintentional Injuries in North Carolina, Age 0-14: 2007-2010

Total Charges	**$57,898,350**
Median Charges	**$22,979**
Average Charge	**$39,440**

Figure 14: N.C. Child Injury Motor Vehicle-related Injury Deaths by Age and Gender, Age 0-14: 2007-2010 (N=203)

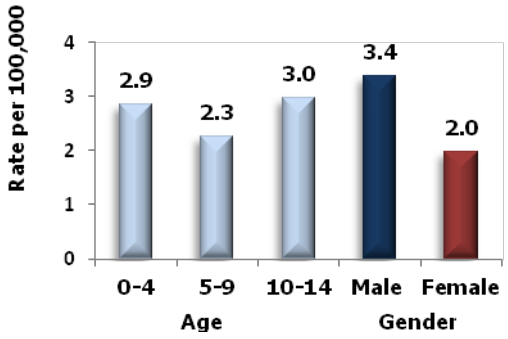


Figure 15: N.C. Child Unintentional Motor Vehicle-Related Injury Hospitalizations by Age and Gender, Age 0-14: 2007-2010 (N=1,468)

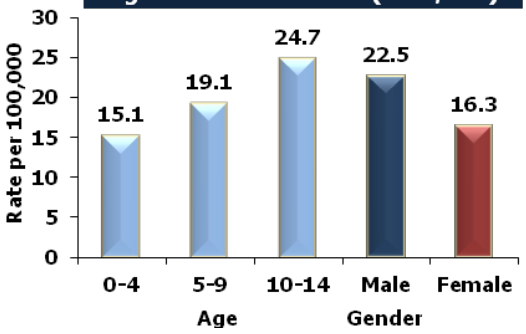
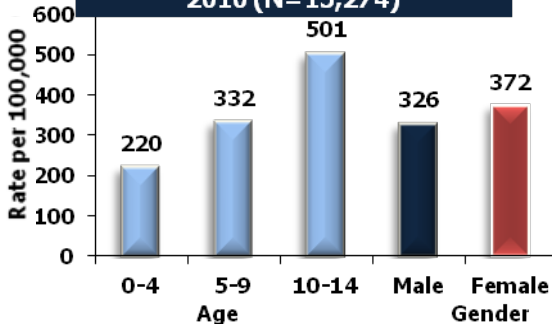


Figure 16: N.C. Child Unintentional Motor Vehicle-Related injury Emergency Department Visits by Age and Gender, Age 0-14: 2009-2010 (N=13,274)



*n=3 undetermined gender

Suffocation (Unintentional)

Unintentional suffocation was the second overall leading cause of child injury deaths in North Carolina and led to a total of 120 deaths (1.6 per 100,000) and 234 hospitalizations (3.1 per 100,000) in children between the ages 0-14 from 2007-2010, and 376 emergency department visits (9.9 per 100,000) from 2009-2010.

The total hospitalization charges attributed to unintentional suffocation injuries among children were $8.4 million in North Carolina from 2007 to 2010. Median hospitalization charges for suffocation injuries were ranked fourth highest at $13,064, with an average charge of $36,239 (Table 8).

Children ages 0-4 were 44 times more likely to unintentionally suffocate (4.4 per 100,000) compared to children ages 5-9 (0.1 per 100,000). Rates for males were slightly higher (1.9 per 100,000) than for female children (1.3 per 100,000). The hospitalization rates for unintentional suffocation injuries (Figure 18) showed similar trends to the mortality rates with the highest hospitalization rates for children ages 0-4 (7 per 100,000) and then reducing substantially for ages 5-9 (1.3 per 100,000) and 10-14 (0.8 per 100,000). The rate for males (3.4 per 100,000) was slightly higher than for females (2.8 per 100,000).

The rates for emergency department visits (Figure 19) among children decreased with age, with the lowest rate of visits for ages 10-14 (1.4 per 100,000). Females had only a slightly higher rate of emergency department visits than males.

Figure 17: N.C. Unintentional Childhood Suffocation Deaths by Age and Gender, Age 0-14: 2007-2010 (N=120)

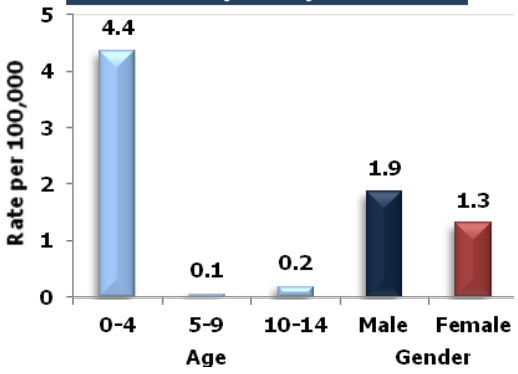
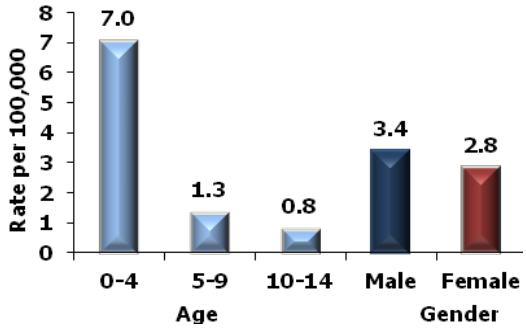


Figure 18: N.C. Unintentional Childhood Suffocation Hospitalizations by Age and Gender, Age 0-14: 2007-2010 (N=237)



*n=1 undetermined gender

Figure 19: N.C. Unintentional Childhood Suffocation Emergency Department Visits by Age and Gender, Age 0-14: 2009-2010 (N=376)

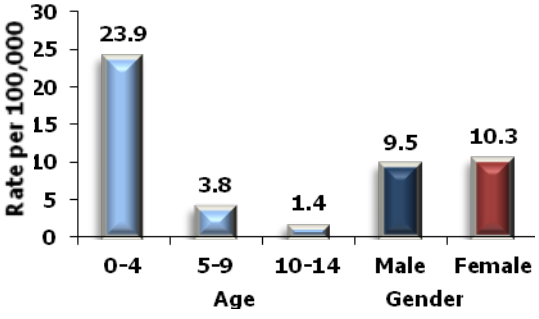


TABLE 8: Estimated Hospitalization Charges Resulting from Child Unintentional Suffocation Injuries in North Carolina, Age 0-14: 2007-2010

Total Charges	**$8,480,011**
Median Charges	**$13,064**
Average Charge	**$36,239**

Drowning (Unintentional)

From 2007-2010, drowning was the fourth leading cause of child injury deaths for ages 0-14 in North Carolina. Among unintentional injuries, drowning is the third leading cause of death among children 0-14. From 2007-2010, a total of 95 children died from unintentional drowning, 118 children were hospitalized for a drowning-related injury and 230 children visited the ED for a drowning-related injury during 2009-2010 in North Carolina.

In terms of economic burden, drowning also had significant impact on total hospitalization charges. For childhood injuries in North Carolina from 2007 to 2010, total hospitalization charges equaled over $4.2 million. Median charges were ranked seventh overall at $8,004 (Table 9) with an average charge of $36,188.

Figure 20 illustrates the trend in unintentional drowning mortality rates: As age increases, the mortality rates decrease. Children ages 0-4 (2.4 per 100,000) have a death rate two times higher than children aged 5-9 (1 per 100,000) and 10-14. Males (1.7 per 100,000) were more likely to die from unintentional drowning than females (0.8 per 100,000).

Hospitalization rates for children ages 0-4 (2.9 per 100,000) were three times higher as compared to children ages 5-9 and 10-14 (0.9 per 100,000). (Figure 21)

The rates for males were slightly higher as compared to females. Emergency department visit rates were higher for children ages 0-4 than for children aged 5-9. Female rates had slight lower emergency visit rates than their male counterparts. (Figure 22)

Figure 20: N.C. Childhood Unintentional Drowning Injury Reated Deaths by Age and Gender, Age 0-14: 2007-2010 (N=95)

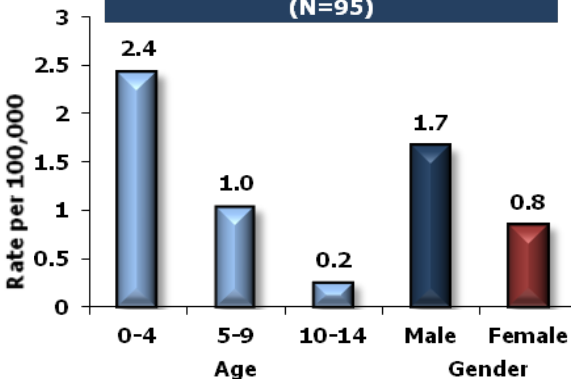


Figure 21: N.C. Unintentinal Childhood Drowning Related Hospitalizations by Age and Gender, Age 0-14: 2007-2010 (N=118)

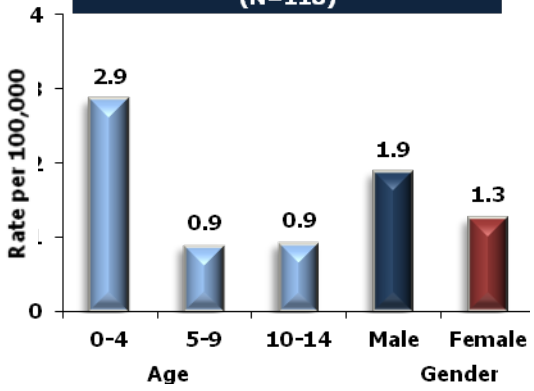


Figure 22: N.C. Childhood Unintentional Drowning Related Emergency Department Visits by Age and Gender, Age 0-14: 2009-2010 (N=230)

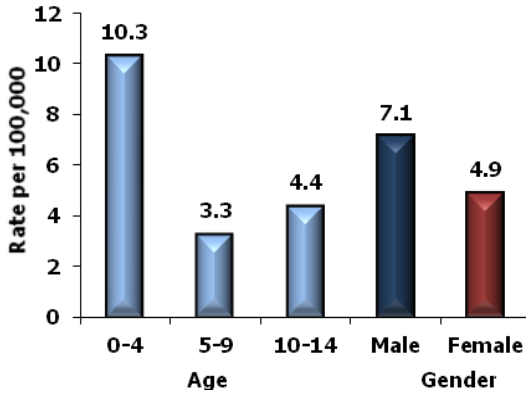


TABLE 9: Estimated Hospitalization Charges Resulting from Unintentional Drowning Injuries for Children in North Carolina, Age 0-14: 2007-20010

Total Charges	**$4,270,229**
Median Charges	**$8,004**
Average Charge	**$36,188**

Fire/Burn (Unintentional)

In North Carolina, 52 children ages 0-14 (0.7 per 100,000) died between 2007 and 2010, 976 (13 per 100,000) were hospitalized between 2007 and 2010, and 4,189 (110 per 100,000) visited an emergency department from 2009 to 2010 because of unintentional fire or burn injuries.

Unintentional fire/burn injury is the fourth leading contributor to the total estimated hospitalization charges of $27.1 million between 2007 and 2010 in North Carolina from child injuries (Table 10). It has estimated median charges of $10,408 and the average charge was $13,616.

The mortality rates for children between 0-4 were almost double those between the ages 5-14. Children between the ages 5-9 and 10-14 had similar mortality rates (0.5 per 100,000). (Figure 23)

Hospitalization rates for fire/burn related injuries (Figure 24) for the years 2007-2010 were 4.4 times higher for children between the ages 0-4 (26 per 100,000) compared to those between the ages of 10-14 (6 per 100,000). The hospitalization rates for males (16 per 100,000) were slightly higher than the rates for females (10 per 100,000).

Emergency department visit rates from 2009-2010 were 3.6 times higher for children ages 0-4 (205 per 100,000) than for children ages 5-9 (68 per 100,000) and 10-14 (55 per 100,000). Male children once again had higher emergency department visit rates than females.

Figure 23: N.C. Childhood Unintentional Fire/Burn Related Deaths by Age and Gender, Age 0-14: 2007-2010 (N=52)

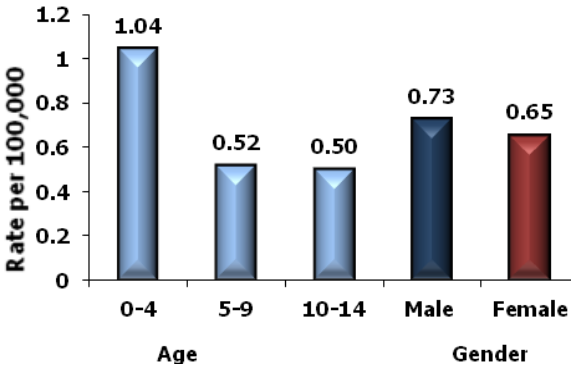


Figure 24: N.C. Childhood Unintentional Fire/Burn Related Injury Hospitalizations by Age and Gender, Age 0-14: 2007-2010 (N=976)

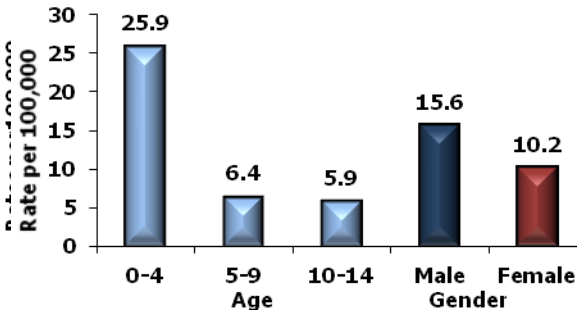


Figure 25: N.C. Childhood Unintentional Fire/Burn Related Emergency Department Visits by Age and Gender, Age 0-14: 2009-2010 (N=4,189)

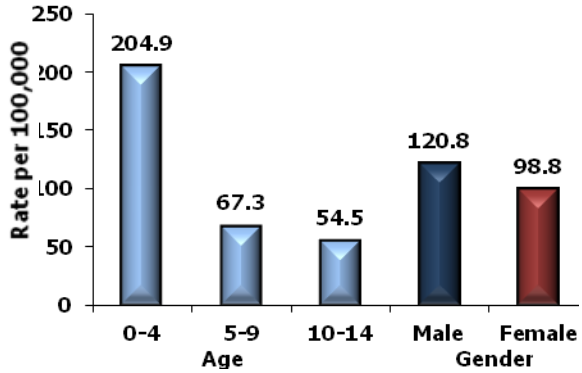


TABLE 10: Estimated Hospitalization Charges Resulting from Child Fire/Burn Related Unintentional Injuries in North Carolina, Age 0-14: 2007-2010

Total Charges	**$27,102,513**
Median Charges	**$12,567**
Average Charge	**$27,769**

Falls (Unintentional)

In North Carolina, nine children age 0-14 (0.1 per 100,000) died in 2007-2010 and 2,846 (37.8 per 100,000) were hospitalized as a result of unintentional fall-related injuries. Furthermore, 80,997 children (2,127 per 100,000) made emergency department visits from 2009-2010. Falls were the leading cause of total emergency department visits for children age 0-14 from 2009-2010 and the third leading cause of hospitalizations from 2007-2010.

Unintentional fall-related injuries ranked third among the top contributors for total estimated hospitalization charges in children at $38.7 million between 2007 and 2010 in North Carolina (Table 11). The median charge was $10,408 and the average charge was $13,616 from 2007-2010.

Figure 26 shows the highest mortality rates for children age 0-4, with a total of seven cases reported (0.3 per 100,000). Children age 5-9 had two deaths with a rate of 0.1 per 100,000 in North Carolina from 2007-2010. No deaths were reported for ages 10 to 14.

As shown in Figure 27, hospitalization rates for children with unintentional falls were slightly higher for ages 0-4, after which the rates fell and plateaued for ages 5-9 and 10-14. Males had twice the rate (47.0 per 100,000) that females had (28.1 per 100,000).

Figure 28 shows that children age 0-4 had the highest emergency department visit rate (2,789 per 100,000). Similar to hospitalizations, the ED rates fell and stabilized for children age 5-9 and 10-14. Males had higher emergency department visit rates than females.

Figure 26: N.C. Childhood Unintentional Fall Injury Deaths by Age and Gender, Age 0-14: 2007-2010 (N=9)

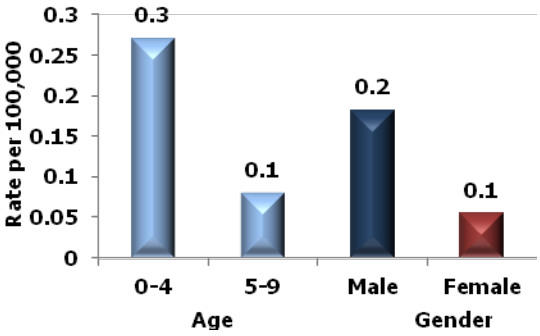


Figure 27: N.C. Childhood Unintentional Falls-Related Injury Hospitalizations by Age and Gender, Age 0-14: 2007-2010 (N=2,846)

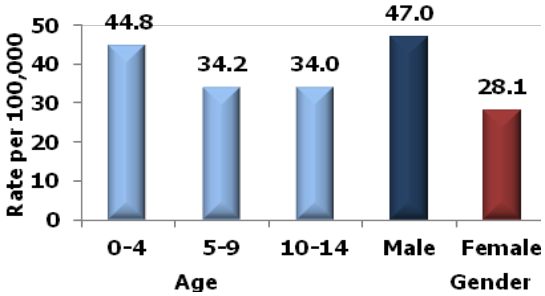
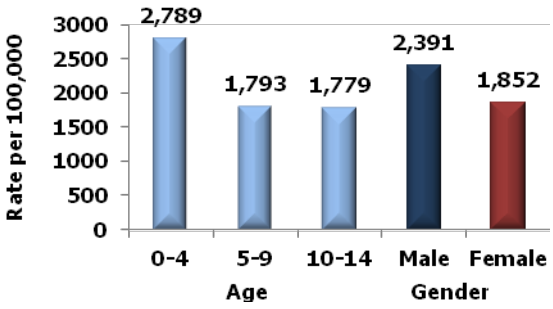


Figure 28: N.C. Childhood Fall-Related Emergency Department Visits by Age and Gender, Age 0-14: 2009-2010 (N=80,997)



* n=2 undetermined gender

TABLE 11: Estimated Hospitalization Charges Resulting from Child Unintentional Fall Related Injuries in North Carolina, Age 0-14: 2007-2010

Total Charges	**$38,710,183**
Median Charges	**$10,408**
Average Charge	**$13,616**

Poisoning (Unintentional)

Unintentional poisoning was the seventh leading cause of hospitalizations for children age 0-14 from 2007-2010. Unintentional poisoning injuries suffered by children age 0-14 from 2007-2010 led to 12 deaths and 840 hospitalizations. A total of 5,799 children required visits to emergency departments due to poisoning related injuries from 2009 to 2010. Hospitalization charges due to unintentional poisoning were $7.6 million with a median charge of $4,872 and average charge of $9,164.

The highest mortality rates 2007-2010 were seen in children age 0-4 and 10-14 (0.2 per 100,000). Male children (0.2 per 100,000) had a slighter higher rate compared with female children (0.1 per 100,000).

Figure 30 shows a downward trend in hospitalization rates, with the highest rates for children age 0-4 and the lowest for children age 10-14. Males once again had slighter higher rates than females.

From 2009-2010, emergency department visits for children age 0-14 showed a negative trend, with the highest rates for children between 0 and 4 (347 per 100,000) and the lowest for those ages 10 to 14 (43 per 100,000). Children age 0-4 years had a rate eight times higher than children age 10-14.

TABLE 12: Estimated Hospitalization Charges Resulting from Child Unintentional Poisoning Injuries in North Carolina, Age 0-14: 2007-2010

Total Charges	**$7,698,154**
Median Charges	**$4,872**
Average Charge	**$9,164**

Figure 29: N.C. Childhood Unintentional Poisoning Related Injury Deaths by Age and Gender, Age 0-14: 2007-2010 (N=12)

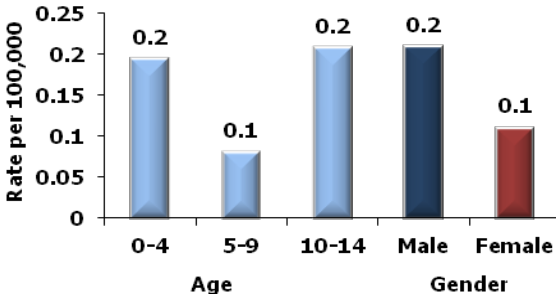


Figure 30: N.C. Childhood Unintentional Poisoning Related Hospitalizations by Age and Gender, Age 0-14: 2007-2010 (N=840)

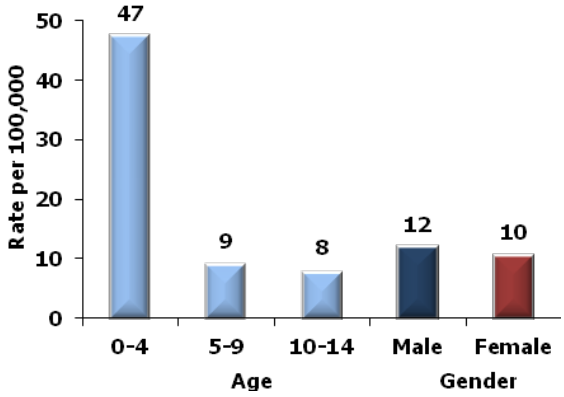
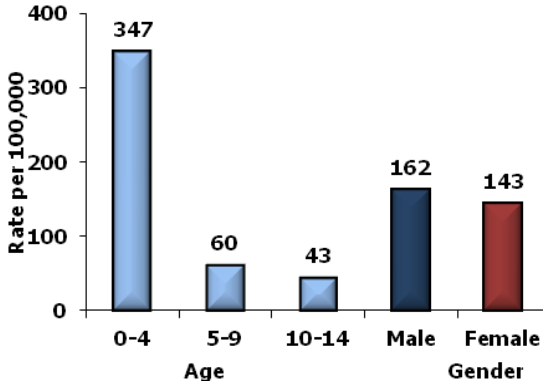


Figure 31: N.C. Childhood Unintentional Poisoning Related Emergency Visits by Age and Gender, Age 0-14: 2009-2010 (N=5,799)



Pedestrian (Unintentional)

In North Carolina from 2007-2010, 23 children age 0-14 (0.3 per 100,000) died due to unintentional pedestrian injury and 55 (0.7 per 100,000) were hospitalized. In addition, 255 (6.7 per 100,000) children visited the emergency department for treatment during 2009-2010.

From 2007-2010, unintentional pedestrian injury is ranked eighth in total hospitalization charges for children at $1.9 million (Table 13). The median hospitalization charge was $20,787, with an average charge of $36,089.

Figure 32 shows that the mortality rates for children due to unintentional pedestrian-related injuries for age 0-4 (0.7 per 100,000) were seven times higher than those for ages 5 to 9 (0.1 per 100,000) and 10 to 14 (0.1 per 100,000). Male and female children had similar rates (0.3 per 100,000).

Between 2007 and 2010, hospitalization for children in all age groups remained fairly similar, although male children had a slightly higher rate compared with females. (Figure 33)

Emergency departments visits were highest for ages 5-9 (8.1 per 100,000) followed by ages 10-14 (6.2 per 100,000) and ages 0-4 (5.8 per 100,000). Males had an emergency department visit rate which was almost 1.5 times higher than that of females (5.3 per 100,000). (Figure 34)

TABLE 13: Estimated Hospitalization Charges Resulting from Child Unintentional Pedestrian Injuries in North Carolina, Age 0-14: 2007-2010

Total Charges	**$1,984,945**
Median Charges	**$20,787**
Average Charge	**$36,089**

Figure 32: N.C. Childhood Unintentional Pedestrian Related Injury Deaths by Age and Gender, Age 0-14: 2007-2010 (N=23)

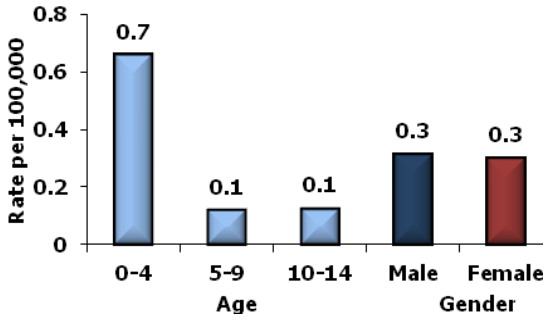


Figure 33: N.C. Childhood Unintentional Pedestrian Injury Related Hospitalizations by Age and Gender, Age 0-14: 2007-2010 (N=55)

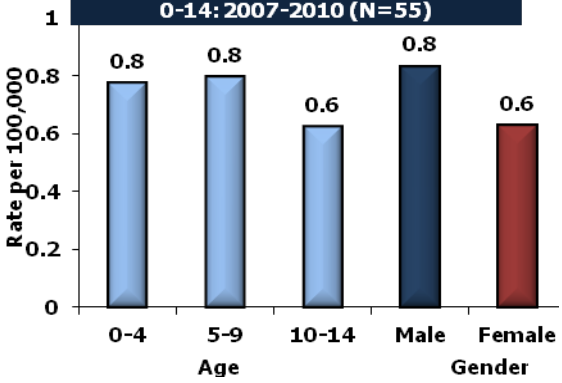
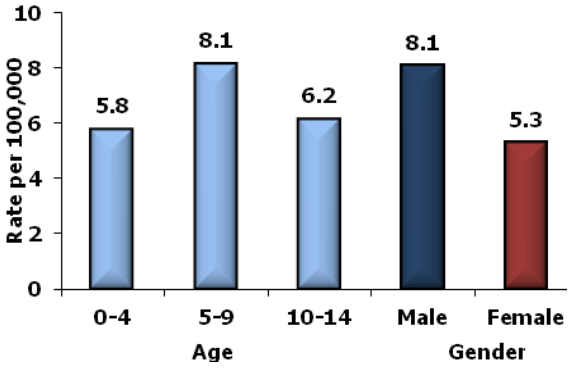


Figure 34: N.C. Childhood Unintentional Pedestrian Injury Related Emergency Department Visits by Age and Gender, Age 0-14: 2009-2010 (N=255)



2.2 Intentional Injury: Assault

Assault was the third overall leading cause of death among children 0-14 in North Carolina from 2007-2010. A total of 112 children died due to assault-related injuries and 592 were hospitalized from 2007-2010. In addition, 2,898 children were treated at the emergency department for an assault-related injury from 2009-2010. In terms of total hospitalization charges, assault ranked fifth with an estimated charge of $19.7 million and was the leading contributor to median hospitalization charges of $15,188 and an average charge of $ 33,394.

Figure 35 shows that the mortality rate for assault related injuries for children ages 0-4 was almost six times higher than the rate for children in the age group 5-9 (0.5 per 100,000). Male children were at a slightly higher risk than females for assault injuries.

From 2007-2010, hospitalization rates for children ages 0-4 were almost eight times higher than those ages 5-9. Rates for children age 10-14 were almost three times higher than children age 5-9. Males had almost twice the hospitalization rates of females in the same age group. (Figure 36)

Emergency department visits for assault-related injuries in children for 2009-2010 (Figure 37) showed the highest rates for children age 10-14 followed by those ages 5-9 and the lowest rates for children ages 0-4. Males had slighter higher rates when compared to those of females.

Figure 35: N.C. Childhood Intentional Assault-Related Injury Deaths by Age and Gender, Age-0-14: 2007-2010 (N=112)

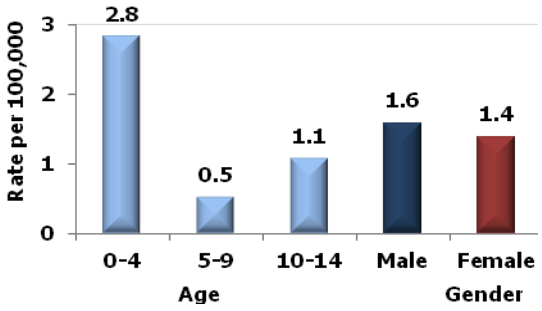


Figure 36: N.C. Childhood Intentional Assault-Related Injury Hospitalizations by Age and Gender, Age 0-14: 2007-2010 (N=592)

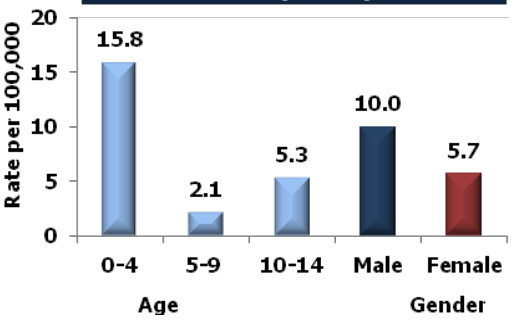
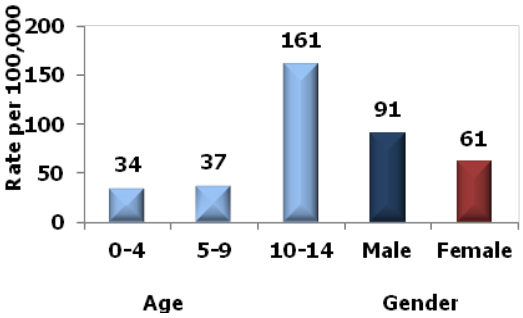


Figure 37: N.C. Childhood Intentional Assault Related Injury Emergency Department Visits by Age and Gender, Age 0-14: 2009-2010 (N=2,898)



*n=1 undetermined gender

TABLE 14: Estimated Hospitalization Charges Resulting from Child Assault-Related Injuries in North Carolina, Age 0-14: 2007-2010

Total Charges	**$19,735,868**
Median Charges	**$15,188**
Average Charges	**$33,394**

Table 15 lists the leading causes of assault injury deaths from 2007 to 2010 for children ages 0-14 in North Carolina. There were a total of 112 deaths from assault-related injuries (6 per 100,000); the table indicates the relative importance of firearms in comparison to other means of assault. Firearms account for 28 percent of assaults. Unspecified assaults account for another 27 percent and other specific causes of assault account for 26 percent of assault cases. A much smaller percentage of adults is hospitalized (13%) or visit an emergency department (2%) for assault-related firearm injuries, compared with children. Cut/pierce remains a leading cause of assault death (15%), hospitalizations (17%) and emergency department visits (8%). In summary, assault remains a problem for children and is a contributor to morbidity and mortality. Overall, 15 percent of the deaths are due to assault.

TABLE 15: N.C. Types of Child Assault Injury Deaths, Age 0-14: 2007-2010

Type of Assault Injury	Number of Deaths
Firearm	31
Unspecified	30
Otherspec/class	29
Cut/pierce	7
Otherspec/NEC*	6
Suffocation	5
Poisoning	2
All other causes	2
Total	**112**

TABLE 16: N.C. Types of Child Assault Injury Hospitalizations, Age 0-14: 2007-2010

Type of Assault Injury	Number of Hospitalizations
Otherspec/class	293
Otherspec/NEC	98
Unspecified	94
Struck	36
Firearm	35
Cut/Burn	17
Suffocation	13
All other causes	6
Total	**592**

TABLE 17: N.C. Types of Childood Assault Injury Emergency Department Visits, Age 0-14: 2009-2010

Type of Assault Injury	Number of ED Visits
Struck	1,369
Otherspec/class	615
Otherspec/NEC*	479
Unspecified	318
Cut/pierce	71
Firearm	24
Fall	8
All other causes	14
Total	**2,898**

***NEC** = not elsewhere classified

2.3 Self-Inflicted Injury: Suicide

In North Carolina from 2007-2010, self-inflicted injuries were the sixth leading cause of death, with 24 reported cases, all children ages 10-14. During the same period, 637 children were hospitalized with self-inflicted injuries. From 2009-2010, 700 children between the ages 0-14 were treated in emergency departments for self-inflicted injuries. The total hospitalization charges from 2007-2010 are $5.7 million. (Table 18)

From Figure 38, it can be seen that children ages 10-14 had the highest mortality rates (0.9 per 100,000) from suicide. Males had slightly higher rates than females.

From 2007-2010, hospitalization rates for children showed the highest rates for ages 10-14, reducing for ages 5-9 (0.5 per 100,000) with the lowest rates for those ages 0-4 (0.3 per 100,000). Females (12.7 per 100,000) had a higher rate compared to males (4.4 per 100,000).

For children treated in emergency departments (Figure 40), the trends were similar to those of hospitalizations, with the highest rates for children ages 10-14 and the lowest rates for those ages 0-4. Again, female children had higher rates than males.

TABLE 18: Estimated Hospitalization Charges Resulting from Intentional Self-Inflicted Injuries in Children in North Carolina, Age 0-14: 2007-2010

Total Charges	**$5,723,516**
Median Charges	**$7,113**
Average Charge	**$8,985**

Figure 38: N.C. Childhood Intentional Self-Inflicted Realted Injury Deaths by Age and Gender, Age 0-14: 2007-2010 (N=24)

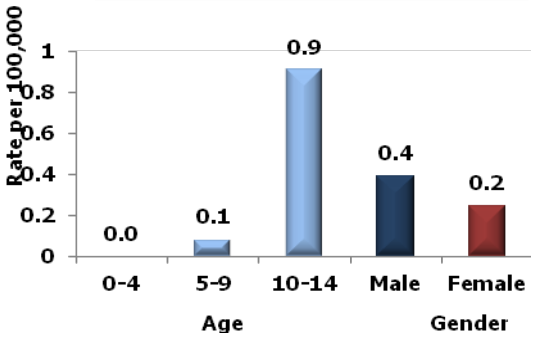


Figure 39: N.C. Childhood Intentional Self-Afflicted Injury Related Hospitalizations by Age and Gender, Age 0-14: 2007-2010 (N=637)

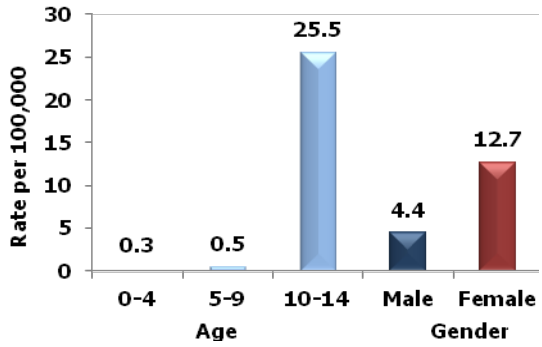
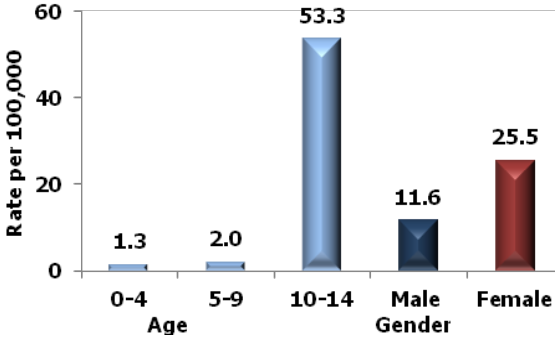


Figure 40: N.C. Childhood Intentional Self-Afflicted Related Injury Emergency Department Visits by Age and Gender, Age 0-14: 2009-2010 (N= 700)



***n = 1 undetermined gender**

Self-inflicted injury, all methods combined, contributes to injuries mainly in the age range 10 to 14, indicating its significance as an injury-related issue to this age-population in particular. However, it accounts for only three percent of deaths when compared to unintentional, assault, and other mechanisms/intent-related deaths (Figure 2). Among self-inflicted injuries, poisoning accounts for slightly more than 50 percent of all emergency room visits and hospitalizations, followed by cut/pierce, which accounts for another 20 percent of hospitalizations and 35 percent of emergency room visits.

In summary, for children in North Carolina, there were a total of 24 suicides (Table 19) from 2007 to 2010 (0.3 per 100,000). For 2007 to 2010, there were 637 hospitalizations related to self-inflicted injury (Table 20). For 2009 to 2010, there were 700 visits to the emergency department for injuries that were self-inflicted. Suicide mortality rates were highest for children ages 10-14 (0.9 per 100,000). The leading cause of self-inflicted death among children is suffocation (71%). Self-inflicted poisoning led both hospitalizations (58%) and emergency department visits (50%) followed by cut/pierce, 21 percent and 35 percent, respectively.

TABLE 19: N.C. Types of Child Self-Inflicted Injury Deaths, Age 0-14: 2007-2010

Type of Self-Inflicted Injury	Number of Deaths
Suffocation	17
Firearm	4
Poisoning	2
Otherspec/NEC*	1
Total	**24**

TABLE 20: N.C. Types of Child Self-Inflicted Injury Hospitalizations, Age 0-14: 2007-2010

Type of Self-Inflicted Injury	Number of Hospitalizations
Poisoning	370
Cut/pierce	133
Unspecified	92
Otherspec/NEC*	21
Suffocation	11
Firearm	4
Othrspec/class	3
All other causes	3
Total	**637**

TABLE 21: N.C. Types of Child Self-Inflicted Injury Emergency Department (ED) Visits, Age 0-14: 2009-2010

Type of Self-Inflicted Injury	Number of ED Visits
Poisoning	351
Cut/pierce	242
Otherspec/NEC *	63
Unspecified	28
Suffocation	8
Otherspec/class	3
Fall	2
All other causes	3
Total	**700**

***NEC** = not elsewhere classified

3. Conclusions and Recommendations

Injury is a significant source of morbidity and mortality for North Carolina children ages 0-14, and it is a largely preventable problem. The purpose of this report is to achieve a greater understanding of the most significant causes of child injury in the state, especially those that create the greatest social, psychological and economic burden on society. A better understanding of these injuries would help guide prevention efforts in the right direction.

Summary of Statistics

- In North Carolina from 2007-2010, a total of 728 children died due to an injury. A total of 23,991 were hospitalized due to an injury-related event and 305,632 children made emergency department visits.
    - 78 percent of injury deaths were unintentional in nature.
    - Males in general had higher injury deaths rates compared to females across most age groups.
- The top three mechanisms of death amongst children from 2007-2010 in North Carolina are motor vehicle crashes (27%), suffocation (17%) and drowning (13%).
- The leading causes of injury death varied by age group: suffocation and drowning had the largest mortality rates for ages 0-4, while motor vehicle crashes resulted in the highest rates for children ages 10-14.
- Leading causes of hospitalizations in North Carolina from 2007-2010 are adverse effects of medications, falls, and motor vehicle crashes.
- Leading causes of emergency department visits for children between ages 0-14 from 2009-2010 are falls, being struck (unintentional), and natural/environmental events such as insect bites.
- Mortality rates for children in North Carolina have been consistently higher than the national average. However, a slight decline is observed from 2009-2010. In order to determine if the observed decrease is the beginning of a trend, additional years of data are required.

Recommendations

The child injury rates in North Carolina are comparable to national rates for child injury; hence, statewide injury prevention efforts should *mirror national initiatives* to reduce injury rates. Many of the recommendations listed below mirror those outlined by the CDC's National Action Plan for Prevention of Child Injury [1].

- Car crashes, suffocation, drowning, poisoning, fire, and falls were the most common methods by which children were killed in the state of North Carolina. Motor vehicle crashes were once again the leading cause of death in children and the third leading cause of hospitalization in children ages 0-14 in North Carolina from 2007-2010. Children ages 10-14 consistently had the highest injury rates as compared to the other age groups of 0-4 and 5-9. Male children were more likely to die in a motor vehicle-related crash than females. Public health prevention efforts and policies directed towards ensuring proper usage of car safety seats, booster seats, and seat belts recommended for the child's age and weight could help reduce these statistics [1].
- Suffocation was the second leading cause of death among children 0-14 years of age. Children ages 0-4 had the highest death, hospitalization, and emergency department visit rates in the state. Educating new parents about safe environments for their infants and children could help bring down these statistics. Practicing safe methods such as ensuring that infants sleep alone on a firm surface either in a crib or bassinet that meets safety standards without soft toys in the crib would help reduce infant suffocation rates.

- Falls were the leading cause of emergency department visits and the second leading cause for hospitalizations for children ages 0-14. Once again, children ages 0-4 had the highest death, hospitalization and emergency department visit rates among all age groups 0-14. Public health education and prevention policies educating parents about the using soft landing surfaces on playgrounds, practices of wearing protective gear like helmets during sports, biking and other applicable forms of recreation, and installing protective rails on bunk beds and staircases would help reduce the burden incurred as a consequence of falls.
- Drowning was the fourth leading cause of death for children in North Carolina ages 0-14. Similar to suffocation, the highest number of fatalities, hospitalizations, and emergency department visits were for children ages 0-4. Ensuring safe bath environments for infants in particular may help reduce the mortality rates in 0-4 age category. Also, raising awareness about parents and children learning how to swim, using pool fences, and supervising children while they swim are the primary recommendations that can be made to help reduce drowning-related injuries.
- Assault was the third leading cause of death for children ages 0-14, with the highest death and hospitalization rates for children ages 0-4. Children ages 10-14 had the highest emergency visit rates. Male children had higher rates than female children.
- Almost all cases of death, hospitalization and emergency department visits from self-inflicted (suicides) injuries are among children between the ages 10-14. Thus, prevention methods should target mainly this age group.
- A large percentage of intent data in Hospitalization (18%) and Emergency Departments (18%) is missing. *Proper injury coding* would help reduce this, and it would enable a greater understanding of the bigger injury picture.
- The financial burden due to child injuries in North Carolina is estimated at $337 million in total hospitalization charges from 2007-2010. In order to reduce this economic burden, it is necessary to *direct child injury prevention efforts* towards the leading causes of injuries such as motor vehicle crashes, fall, and assault-related injuries.

4. Appendix

Appendix A: Data Sources and Technical Notes

Comparison of U.S. and North Carolina Injury Rates 1999-2010

The Web-based Injury Statistics Query and Reporting System (WISQARS) from the Centers for Disease Control and Prevention, National Center for Injury Prevention and Control provided the comparative U.S. and North Carolina fatal injury rates for the years 1999 to 2009 and by injury type for 2007 to 2009. Crude rates were reported unless otherwise noted. The WISQARS injury mortality reports were retrieved on July 20, 2012, from: http://webappa.cdc.gov/sasweb/ncipc/mortrate10_sy.html.

North Carolina Population Estimates 2007-2010

The North Carolina State Center for Health Statistics (SCHS) provided North Carolina population data for the years 2007 to 2010. SCHS obtained the population data from the CDC National Center for Health Statistics bridged population file (2010 version).

North Carolina Death Data 2007-2010

The North Carolina State Center for Health Statistics provided death certificate data for every death in North Carolina. Only state residents with a North Carolina county address and an age of 0 to 14 years were analyzed for this report. Primary cause of death was assigned with the International Classification, 10th Revision; Clinical Modification (ICD-10) codes. Injuries were then classified into manner and mechanism using CDC's standard injury matrix framework.

North Carolina Hospital Discharge Data 2007-2010

The North Carolina State Center for Health Statistics provided data for every North Carolina hospital discharge of North Carolina residents ages 0-14. A hospital discharge occurs after a patient leaves a hospital following admission. These data do not represent number of patients, but number of discharges (multiple discharges per patient are possible). Cause of injury was assigned with International Classification, 9th Revision; Clinical Modification (ICD-9-CM) External Causes of Injury codes (E Codes). Injuries were then classified into manner and mechanism using CDC's standard injury matrix framework.

North Carolina Emergency Department Data 2009-2010

The North Carolina Disease Event Tracking and Epidemiologic Collection Tool (NC DETECT) provided emergency department data for North Carolina residents ages 65 or older. NC DETECT is a state system that receives data on at least a daily basis from hospital emergency departments (EDs) statewide to provide early event detection and timely public health surveillance to public health officials and hospital users. In 2009, an estimated 99.5% of all ED records from 24/7 acute care hospital-affiliated EDs in North Carolina were sent to NC DETECT. Near real-time data were extracted from 111 of 114 eligible hospitals' administrative and clinical electronic databases. In 2010, NC DETECT captured ED records from 113 of 114 (99%) 24/7 acute care hospital-affiliated EDs in N.C. and captured an estimated 99.5% of all eligible ED visits. Therefore, data for these years are not representative of all EDs in the state, although the majority of EDs were reporting. The ED data, death data, and the hospital discharge data are not mutually exclusive. Cause of injury was assigned by hospital coders using International Classification, 9th Revision; Clinical Modification (ICD-9-CM) External Causes of Injury codes (E Codes). Injuries were then classified into manner and mechanism using the CDC's standard injury matrix framework.

Unintentional Motor Vehicle, Traffic (MVT)

Unintentional Motor Vehicle, Traffic (MVT) injuries were categorized as an occupant, pedestrian and/or motorcyclist injured in a motor vehicle traffic crash with an unintentional intent. This definition included injuries from incidents that involved automobiles, trucks, vans, motorcycles, and motorized cycles traveling on public roadways. This classification did not include motor vehicle non-traffic, other land transport and other transport. Cause of death codes: V30-V79 (.4-.9), V83-V86 (.0-.3), V20-V28 (.3-.9), V29 (.4-.9), V12-V14

(.3-.9), V19 (.4-.6), V02-V04 (.1, .9), V09.2, V80 (.3-.5), V81.1, V82.1, V87 (.0-.8), V89.2. Hospital and emergency department E-codes: E810-E819 (.0-.9).

Unintentional Suffocation or Choking
Deaths, Hospitalizations and ED visits resulting from choking and suffocation refer to mechanical causes (e.g., plastic bags, refrigerator entrapment, or fallen earth); pressure on the trachea (e.g., drapery cords, clothing drawstrings); and inhalation of food or foreign bodies. Fatal choking in young children typically involves not only round food products such as candies, nuts, grapes and hot dogs, but also non-food products such as undersized pacifiers, small toys, and latex balloons. Cause of death codes: W75-W84. Hospital and ED E-codes: E911-E913.9

Unintentional Drowning or Near Drowning:
Drowning and near-drowning injuries refer to those injuries causes by suffocation or near-suffocation as a result of submersion in water. If the victim survives the suffocation, sever neurological injuries may result. Drowning and near-drowning primarily occur in three environments: pools, bathtubs, and naturally occurring bodies of water such as streams, lakes, and waters along the North Carolina coast. Cause of death codes: W65-W74. Hospital and ED E-codes: E830.0-.9, E832.0-.9, E910.0-.9.

Unintentional Fall
Unintentional falls included falls with an unintentional intent and the following mechanisms: on same level involving ice and snow; on same level from slipping, tripping and stumbling; involving ice-skates, skis, roller-skates or skateboards; on same level due to collision with, or pushing by, another person; while being carried or supported by other persons; involving wheelchair, bed, chair or other furniture; involving playground equipment; on and from stairs and steps; on and from ladder; on and from scaffolding; from, out of, or through a building or structure; from tree; from cliff; diving or jumping into water causing injury other than drowning or submersion; from one level to another; other on same level; and unspecified. Cause of death codes: W00-W19. Hospital and emergency department E-codes: E880.0-E-886.9, E888.

Unintentional Fire or Burn
Unintentional fire or burn injuries included injuries categorized with an unintentional intent and resulting from exposure to a fire and contact with heat or hot substances. Cause of death codes: X00-X19. Hospital and emergency department E-codes: E890.0-E899, E924.0-.9.

Unintentional Poisonings
Unintentional poisoning included injuries with an unintentional intent resulting from ingestion of harmful drugs, medicines, gases, household products, solvents, chemicals, acids, and poisonous foods or plants. Cause of death codes: X40-X49. Hospital and emergency department E-codes: E850.0-E869.9.

Unintentional Pedestrian Injuries (Non-motor vehicle related)
Deaths, hospitalizations, and ED visits resulting from pedestrian-related injuries are coded in two different categories: as a subcategory under motor vehicle traffic collision (meaning the injury resulted from a collision with a motor vehicle on a public highway) or through a category labeled “Pedestrian, Other”. A “Pedestrian, Other” injury involves a pedestrian injured in a collision with a railway vehicle, a motor vehicle not on public highway, or other road vehicle (e.g., bicycle, animal being ridden, streetcar, non-motorized vehicle of object in motion). “Pedestrian, other” injuries are reported in this document. Cause of death codes: V01, V02-V04 (.0), V05, V06, V09 (.0,.3,.9). Hospital and ED E-codes: E800-807 (.2), E820-E825 (.7), E826-E829 (.0)

Assault
Assault injuries were categorized as assault intent by any mechanism (e.g., firearm, struck, etc.). Cause of death codes: X85-Y09. Hospital and emergency department E-codes: E960.0-E969.9, E979, E999.1.

Self-Inflicted
Self-inflicted injuries were categorized as self-inflicted intent by any mechanism (e.g., firearm, poisoning, etc.). Cause of death code: X60-X84. Hospital and emergency department E-codes: E950-E959.

Methods
In order to explore the extent of the current older adult injury problem in North Carolina, two methodological approaches were undertaken: (a) a quantitative analysis of mortality, hospital discharge data and emergency department visits to determine injury rates; and (b) a description of hospital charges for injuries.

Injury Rate Calculations
Crude rates were reported unless otherwise specified. Mortality and hospitalization rates were calculated based on the North Carolina Death and Hospitalization files for 2007 to 2010 and 2007 to 2009, respectively. Emergency department visit rates were calculated based on NC DETECT for 2009 to 2010. The processes for calculating the rates for North Carolina older adult injuries were similar. First, duplicate records or records with a primary diagnosis other than injury were excluded. Next, E-codes using CDC's injury matrix standard definitions were collapsed to create injury groups that were suitable for describing the external causes of injuries. Denominators for rate calculations were based upon age group population estimates over the specified time period (2007-2010 for deaths, 2007-2009 for hospitalizations; 2009-2010 for emergency department visits) from the North Carolina State Center for Health Statistics and were expressed "per 100,000 persons" unless otherwise noted.

Hospital Charges Calculations
Hospital charge estimates were computed by summing the charges across all cases within each injury group (e.g., overall, unintentional falls, motor vehicle traffic, etc). Please note that hospital charges reflect only part of the cost of injuries. Physician charges, emergency vehicle services, out-patient drug charges, medical equipment and time lost from work were not included in this report. All charges were reported in that year's dollars and were not adjusted for inflation. Hospital charges also reflect contracts that hospitals have with insurance companies.

Other E-Codes Used in Analysis
Additional injury coding was used to categorize differing types of unintentional injuries. These codes were based on the CDC Injury Matrix Framework: Deaths/Mortality:
www.cdc.gov/nchs/data/ice/icd10_transcode.pdf

Hospitalization Discharge and Emergency Department Visits Nonfatal:
www.cdc.gov/ncipc/osp/matrix2.htm

Appendix B: Injury Prevention Resources

CDC Centers of Excellence
UNC Injury Prevention Research Center
University of North Carolina
Bank of America Building, Suite 500
137 East Franklin Street, CB#7505
Chapel Hill, NC 27599-7505
Phone: (919) 966-2251
www.iprc.unc.edu/
Director: Stephen Marshall, PhD

Injury and Violence Prevention Branch
Chronic Disease and Injury, North Carolina Division of Public Health
North Carolina Department of Health and Human Services
1915 Mail Service Center
Raleigh, NC 27699-1915
Phone: (919) 707-5425
Email: beinjuryfreenc@ncmail.net
www.communityhealth.dhhs.state.nc.us/injury
Branch Head: Alan Dellapenna
Chief Director of Chronic Disease and Injury: Ruth Petersen

National Center for Injury Prevention and Control (NCIPC)
(Centers for Disease Control and Prevention)
Mailstop F63
4770 Buford Highway NE
Atlanta, GA 30341-3717
Phone: 800-CDC-INFO/(800-232-4636)
TTY: (888) 232-6348
24 Hours/Every Day
Email: cdcinfo@cdc.gov
www.cdc.gov/injury
Acting Director: Linda C. Degutis, DrPH, MSN

North Carolina Safe Kids Coalition
North Carolina Department of Insurance Office
Of Safety and Fire Marshall
1202 Mail Service Center
Raleigh, NC 27699-1202
Phone☹919) 733-3901
www.ncdoi.com/OSFM/ProgramsPreventionAndGrants/SafeKidsMesssage.asp
Chairman: Wayne Goodwin
Deputy Director: Kelly Ransdell

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Department of Health and Human Services
Aldona Z. Wos, M.D., Secretary

Division of Public Health
Robin Cummings, M.D., State Health Director

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www.injuryfreenc.ncdhhs.gov

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