

Adolescent & Young Adult Injuries in North Carolina 2007 to 2010

Injury Epidemiology and Surveillance Unit
Injury & Violence Prevention Branch
North Carolina Division of Public Health

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**Injuries to Adolescents & Young Adults in North Carolina:
2007-2010**

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1. Overview of Adolescent & Young Adult Injury in North Carolina: 2007-2010

Introduction

Injury has a serious, but largely preventable, public health impact on the health independence, and well-being of the entire populace, particularly those ages 15 to 34 years. Unintentional injury is the leading cause of death among adolescents and young adults 15 to 34 years of age, resulting in about 29,000 deaths each year from 2007 to 2009 in the United States (Centers for Disease Control and Prevention (CDC), 2010a). In addition, injuries among adolescents and young adults represent a significant number of visits, approximately 10.5 million nonfatal injuries, treated in hospital emergency departments each year between 2007 and 2009 in the U.S. (CDC, 2010b). Adolescent and young adult injuries impose a substantial health, social, and economic burden on individuals, families and communities.

This report provides the latest overview of the public health burden of injuries among adolescent and young adult ages 15 to 34 years in the state of North Carolina. To evaluate the scope of the injury problem in North Carolina, an analysis was performed on adolescent and young adult injury deaths from 2007 to 2010, hospitalizations from 2007 to 2009, and emergency department visits from 2009 to 2010 with stratification by type of injury, age and gender. Injury death, hospitalization and emergency department visit rates were calculated per 100,000 persons in the North Carolina adolescent and young adult population over the specified time. In addition, injury hospitalization charges were calculated to provide an estimate of the economic impact of adolescents and young adult injury in North Carolina. The methodology and data sources analyzed for this report are defined in Appendix A. The reporting format and content are based on prior reports by the North Carolina Division of Public Health (2010)-*Injuries to North Carolina Children: 2004-2007* and *Older Adults Injuries in North Carolina: 2004-2007*.

This report is intended to provide state and local health officials, policy-makers, researchers, and the public with information to guide allocation of resources, development of strategy and evaluation of injury prevention programs in North Carolina. Prevention of injuries is essential to helping adolescents and young adults live healthy and productive lives. Compared to other age groups, adolescents and young adults are more frequently exposed to certain risk factors and may not have developed the skills, experience, or judgment to reduce their injury risks. Attention to adolescent and young adult injury prevention is imperative as this population assumes more independent roles and engages in risky behaviors.

Highlighted within this report are some leading causes of injury in adolescents and young adults in North Carolina from 2007 to 2010, including unintentional motor vehicle crashes, poisoning, falls, firearms as well as intentional assault and self-inflicted injuries. The most common cause of injury in adolescents and young adults is from unintentional motor vehicle-related injuries, which has the highest rate of fatalities and the greatest economic toll based on total hospitalization charges compared to all other causes of injury in adolescents and young adults.

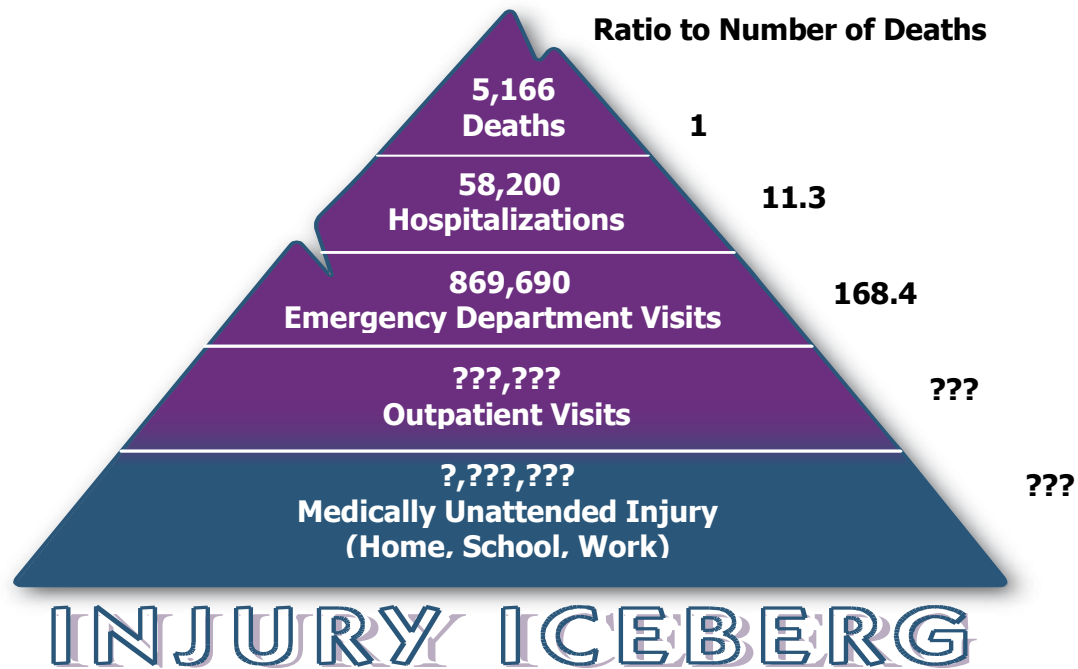
However, the most severe outcomes of injury-related deaths, hospitalizations, and emergency department visits summarized in this report represent only a fraction of the occurrence of adolescents and young adult injuries. This report does not reflect the full extent of the adolescents and young adult injury problem in North Carolina because injuries that were self-treated or treated in urgent care clinics, health centers, and private providers' offices are not included.

The burden of injury can be more clearly understood as an iceberg, as illustrated in Figure 1, with levels of injury severity and scope of medical intervention. Fatal injuries are the most visible to the public but represent the tip of the iceberg in describing the extent of injury occurrence. Non-fatal injuries requiring hospitalization or an emergency department visit are much more common than fatal injuries. For every adolescent and young adult death caused by an injury, there were 11 hospitalizations and 168 emergency department visits in North Carolina between 2007 and 2009.

Furthermore, the numbers of injuries are estimated to be even greater for those treated at outpatient visits and for those who do not seek medical care. Data on outpatient visits and medically unattended injuries were not available to capture the complete scope of adolescent and young adult injury for this report.

Despite the limitation of available data on less severe injury outcomes, the prevalence of injury presented in this report highlights the importance of efforts to prevent adolescent and young adult injury in the state of North Carolina. Preventing the most severe injury outcomes of death, hospitalization, and visits to the emergency department is vital to mitigate the loss of health and productivity of adolescents and young adults.

FIGURE 1: Injury Iceberg, North Carolina Adolescent & Young Adult Injuries, Age 15-34: 2007-2009. Injury and Violence Prevention Branch, Chronic Disease and Injury Section, Division of Public Health.



The Problem of Adolescent & Young Adult Injury

In North Carolina, adolescents and young adults ages 15 to 34 experienced 6,696 injury deaths (66 per 100,000) from 2007 to 2010, 58,200 hospitalizations (772 per 100,000) from 2007 to 2009, and 584,024 emergency department visits (11,415 per 100,000) from 2009 to 2010. The age group at greatest risk for injury was among ages 20-24 years, accounting for 29.6 percent of all adolescent and young adult injury deaths (77 per 100,000), 25.2 percent of all injury hospitalizations (751 per 100,000) and 27.6 percent of all injury-related emergency department visits (8,647 per 100,000). However, adults ages 30 to 34 were more likely to be hospitalized, accounting for 28.2 percent of all hospitalizations (909 per 100,000).

Unintentional injuries caused 61 percent of deaths (Figure 2), 39 percent of hospitalizations (Figure 3) and 71 percent of emergency department visits (Figure 4) related to injury in adolescent and young adults. Among North Carolina adolescent and young adults, unintentional injuries accounted for 4,113 deaths (41 per 100,000) from 2007 to 2010, 23,011 hospitalizations (305 per 100,000) from 2007 to 2009, and 416,493 emergency department visits (8,140 per 100,000) for treatment from 2009 to 2010.

Of all adolescent and young adult injury deaths, 18 percent resulted from a self-inflicted injury (suicide) and 19 percent were from an assault (homicide). In contrast, self-inflicted injuries resulted in 15 percent of all hospitalizations and 2 percent of all emergency department visits. Assault injuries were reported in less than 10 percent of all injury-related hospitalizations and emergency department visits for adolescent and young adults.

Legal intervention, other, or undetermined intent of injury was reported for 2 percent of injury deaths, 23 percent of injury hospitalizations and 3 percent of emergency department visits related to injury in adolescent and young adults. About one-fifth of all adolescent and young adult injury hospitalizations and emergency department visits were missing injury intent information. This is primarily due to incomplete e-coding.

FIGURE 2: N.C. Adolescent & Young Adult Injury Deaths by Intent, Age 15-34: 2007-2010 (N=6,696)

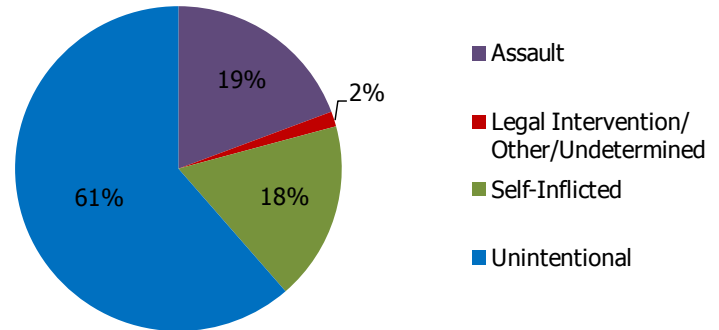


FIGURE 3: N.C. Adolescent & Young Adult Injury Hospitalizations by Intent, Age 15-34: 2007-2009 (N=58,200)

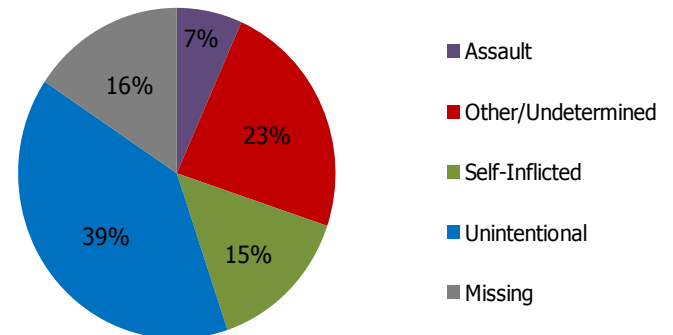
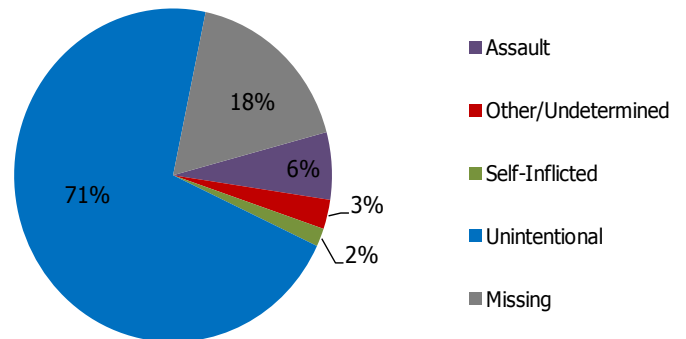


FIGURE 4: N.C. Adolescent & Young Adult Injury Emergency Department Visits by Intent, Age 15-34: 2009-2010 (N=584,024)



Causes of Adolescent & Young Adult Injury

Unintentional motor vehicle traffic crash was the leading cause of injury-related deaths during 2007 to 2010 and emergency department visits during 2009 to 2010 in adolescents and young adults in North Carolina. Similarly, unintentional motor vehicle traffic crashes were the third leading cause of injury hospitalizations between 2007 and 2009. Among adolescents and young adults, unintentional motor vehicle traffic crashes accounted for 35 percent of all injury deaths (Table 1), 14.3 percent of all injury hospitalizations (Table 2), and 15.2 percent of all injury emergency department visits (Table 3).

The first leading cause of injury hospitalizations among adolescents and young adults was adverse effects of medical care and medications, which contributed to 21.2 percent of all injury hospitalizations in North Carolina between 2007 and 2009. Besides adverse effects, self-inflicted injuries were the second leading cause of injury hospitalizations, representing 14.7 percent of all injury hospitalizations. The most injury deaths, hospitalizations and emergency department visits were from unintentional injuries. Although the greatest number of injury deaths was from unintentional injuries, intentional injuries of assault (homicide) were the second leading cause of injury death and self-inflicted (suicide) were the fourth leading cause of injury death among this population.

TABLE 1: N. C. Leading Types of Adolescent & Young Adult Injury Deaths, Age 15-34: 2007-2010 (N=6,696)

Injury Type	Number of Deaths
Motor Vehicle - Unintentional	2,344
Assault (Homicide)	1,294
Poisoning - Unintentional	1,216
Self-Inflicted (Suicide)	1,189
Drowning - Unintentional	142
Other land transport- Unintentional	63
Fall - Unintentional	62
Poisoning - Undetermined	54
Unspecified - Unintentional	51
Firearm - Unintentional	39
All Other Causes	242
Total	6,696

TABLE 2: N. C. Leading Types of Adolescent & Young Adult Injury Hospitalizations, Age 15-34: 2007-2009 (N=58,200)

Injury Type	Number of Hospitalizations
Adverse Effects - Other	12,318
Self-Inflicted (Intentional)	8,537
Motor Vehicle - Unintentional	8,330
Assault - (Intentional)	3,870
Fall - Unintentional	3,080
Other spec/class - Unintentional	2,060
Poisoning - Unintentional	2,011
Unspecified - Unintentional	1,429
Transport, other - Unintentional	1,148
All Other Causes	6,328
Missing Causes	9,089
Total	58,200

TABLE 3: N. C. Leading Types of Adolescent & Young Adult Injury Emergency Department Visits, Age 15-34: 2009-2010 (N=584,024)

Injury Type	Number of Visits
Motor Vehicle - Unintentional	88,763
Fall - Unintentional	74,483
Struck - Unintentional	55,766
Overexertion - Unintentional	51,022
Unspecified - Unintentional	42,217
Assault - (Intentional)	38,136
Cut/Pierce - Unintentional	31,641
Natural/Environ - Unintentional	21,019
Other spec/class - Unintentional	15,814
All Other Causes	62,694
Missing Causes	102,469
Total	584,024

Causes of Adolescent & Young Adult Unintentional Injury

Focusing only on unintentional injuries, motor vehicle traffic crash was the most common injury among adolescents and young adults, exceeding all other unintentional injury types in the rate of deaths, hospitalizations, and emergency department visits. Injuries related to motor vehicle crashes represented 57 percent of all unintentional injury deaths (Table 4) from 2007 to 2010, 36.2 percent of all unintentional injury hospitalizations (Table 5) from 2007 to 2009, and 21.3 percent of all unintentional injury emergency department visits (Table 6) from 2009 to 2010 for adolescents and young adults in North Carolina.

In addition to motor vehicle-related injuries, another leading type of unintentional injury in adolescent and young adults was due to fall-related injuries, representing 1.5 percent of deaths, 13.4 percent of hospitalizations, and 17.9 percent of emergency department visits for all unintentional injuries. The second leading cause of unintentional injury death for adolescents and young adults during 2007 to 2010 was poisoning, accounting for 29.6 percent of all unintentional injury deaths and the third leading cause of death due to unintentional injury was drowning, accounting for 3.5 percent of all unintentional injury deaths.

TABLE 4: N. C. Leading Types of Adolescent & Young Adult Unintentional Injury Deaths, Age 15-34: 2007-2010 (N=4,113)	
Unintentional Injury Type	Number of Deaths
Motor Vehicle	2,344
Poisoning	1,216
Drowning	142
Other land transport	63
Fall	62
Unspecified	51
Firearm	39
Other spec/class	38
Fire/Burn	31
Suffocation	31
All Other Causes	96
TOTAL	4,113

TABLE 5: N. C. Leading Types of Adolescent & Young Adult Unintentional Injury Hospitalizations, Age 15-34: 2007-2009 (N=23,011)	
Unintentional Injury Type	Number of Hospitalizations
Motor Vehicle	8,330
Fall	3,080
Other spec/class	2,060
Poisoning	2,011
Unspecified	1,429
Transport other	1,148
Struck	922
Natural/Environ	815
Fire/Burn	690
Cut/Pierce	569
All Other Causes	1,957
TOTAL	23,011

TABLE 6: N. C. Leading Types of Adolescent & Young Adult Unintentional Injury Emergency Department Visits, Age 15-34: 2009-2010 (N=416,493)	
Unintentional Injury Type	Number of Visits
Motor Vehicle	88,763
Fall	74,483
Struck	55,766
Overexertion	51,022
Unspecified	42,217
Cut/Pierce	31,641
Natural/Environ	21,019
Other spec/class	15,814
Other spec/not class	9,862
Transport other	8,175
All Other Causes	17,731
TOTAL	416,493

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

The age distribution trend among adolescents and young adults in North Carolina mostly peaked around ages 20 to 29 for the rate of injury deaths and emergency department visits, but around ages 30 to 34 for the rate of injury hospitalizations. By gender, adolescent and young adult males have a higher rate of injury death, hospitalizations and emergency department visits than females.

From 2007 to 2010, young adults ages 20 to 24 were 1.6 times as likely to die from an injury as adolescents ages 15 to 19 (76 vs. 48 deaths per 100,000, respectively) (Figure 5). At the same time, men were 3.4 times more likely to die from an injury than women (102 per 100,000 for males and 30 per 100,000 for females). In particular, men ages 20 to 24 had the highest injury death rate (117 per 100,000), whereas women ages 15 to 19 had the lowest rate (24 per 100,000).

In contrast, adults ages 30 to 34 were 1.5 times more likely to be hospitalized than adults ages 15 to 19 (909 vs. 613 hospitalizations per 100,000, respectively) during 2007 to 2009 (Figure 6). Once more, men have a slightly higher injury hospitalization rate than women (852 per 100,000 for males and 689 per 100,000 for females). Also among adults ages 30 to 34 years, the highest rate of hospitalization for injury occurred in men (974 per 100,000).

Adults ages 20 to 24 were 1.2 times as likely to visit an emergency department between 2009 and 2010 for an injury as compared to the 30 to 34 age group (12,251 vs. 10,524 visits per 100,000, respectively) (Figure 7). Moreover, men were 1.1 times more likely to visit an emergency room for an injury than women (12,137 per 100,000 for males and 10,673 per 100,000 for females) with the highest rate of emergency department visits for injury occurring in men ages 20 to 24 (12,675 per 100,000).

FIGURE 5: N.C. Adolescent and Young Adult Injury Deaths by Age and Gender, Age 15-34: 2007-2010 (N=6,696)

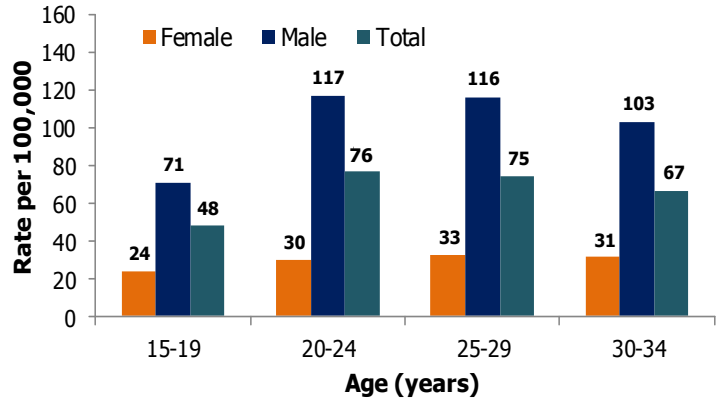
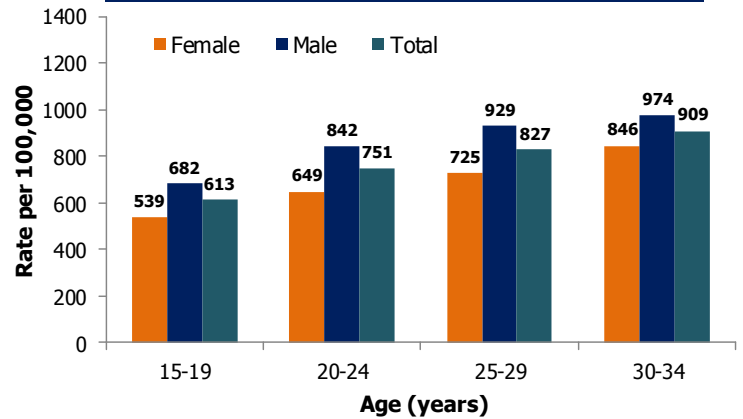
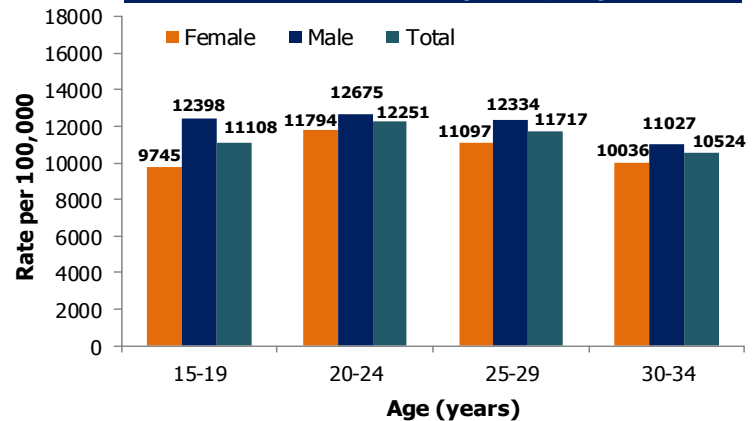


FIGURE 6: N.C. Adolescent and Young Adult Injury Hospitalizations by Age and Gender, Age 15-34: 2007-2009 (N=58,200)*



* n=8 unknown gender

FIGURE 7: N.C. Adolescent and Young Adult Injury Emergency Department Visits by Age and Gender, Age 15-34: 2009-2010 (N=584,024)*



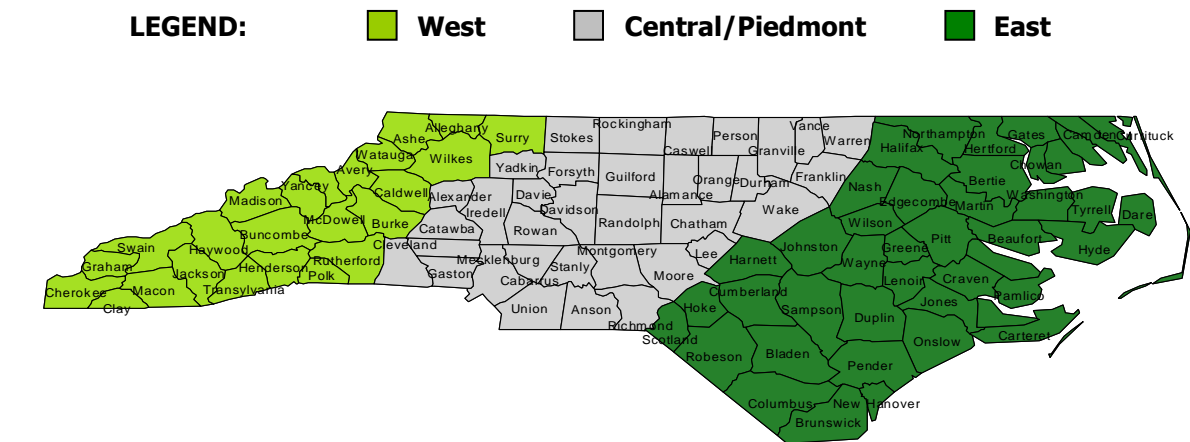
* n=14 unknown gender

Regional Injury Rates

Figure 8 displays the adolescents and young adults injury rate for deaths from 2007 to 2010, for hospitalizations from 2007 to 2009, and for emergency department visits from 2009 to 2010 in the western, central (Piedmont) and eastern regions of North Carolina. While the injury rates across the three regions were relatively close, adolescents and young adults in the eastern region of North Carolina had the highest rate of mortality and morbidity related to injury.

The adolescent and young adult injury death rate was 77 per 100,000 in the western region, 59 per 100,000 in the central region and 77 per 100,000 in the eastern region of the state. The western region had the highest hospitalization rate for adolescent and young adult injury (857 per 100,000), followed by the eastern region (814 per 100,000) and the central region (736 per 100,000). The rate of emergency department visits for adolescent and young adult injuries was also highest in the western region (12,358 per 100,000), followed by the eastern region (12,306 per 100,000) and the central region (10,793 per 100,000) of North Carolina.

FIGURE 8: North Carolina Adolescent & Young Adult Injury Rates by Region, Age 15-34 Deaths (n=6,696): 2007-2010, Hospitalizations (n=58,200): 2007-2009 and Emergency Department Visits (n=584,024): 2009-2010

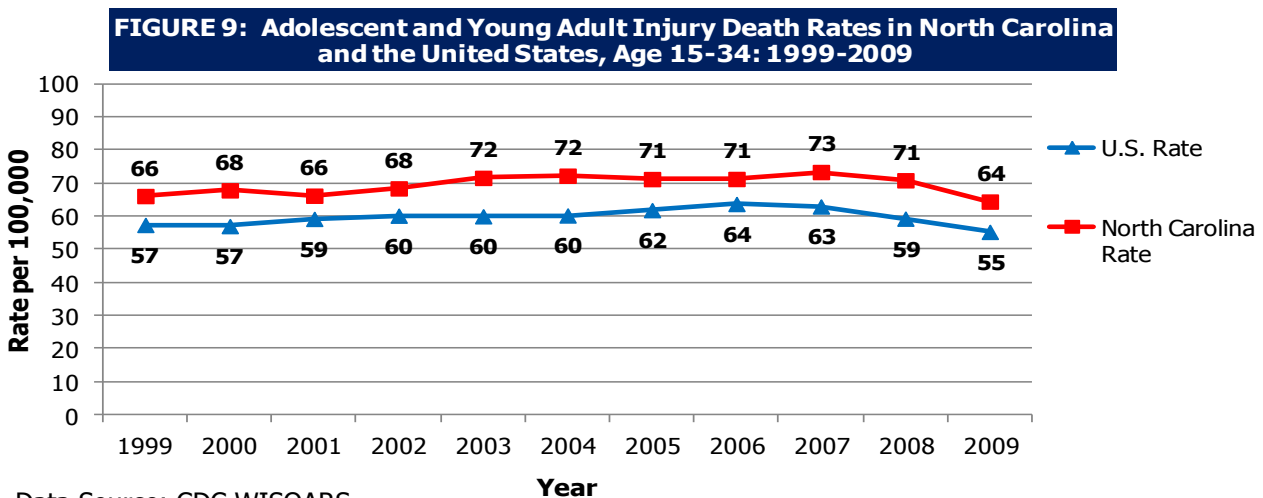


	West	Central	East
Deaths per 100,000	77	59	77
Hospitalizations per 100,000	857	736	814
Emergency Visits per 100,000	12,358	10,793	12,306

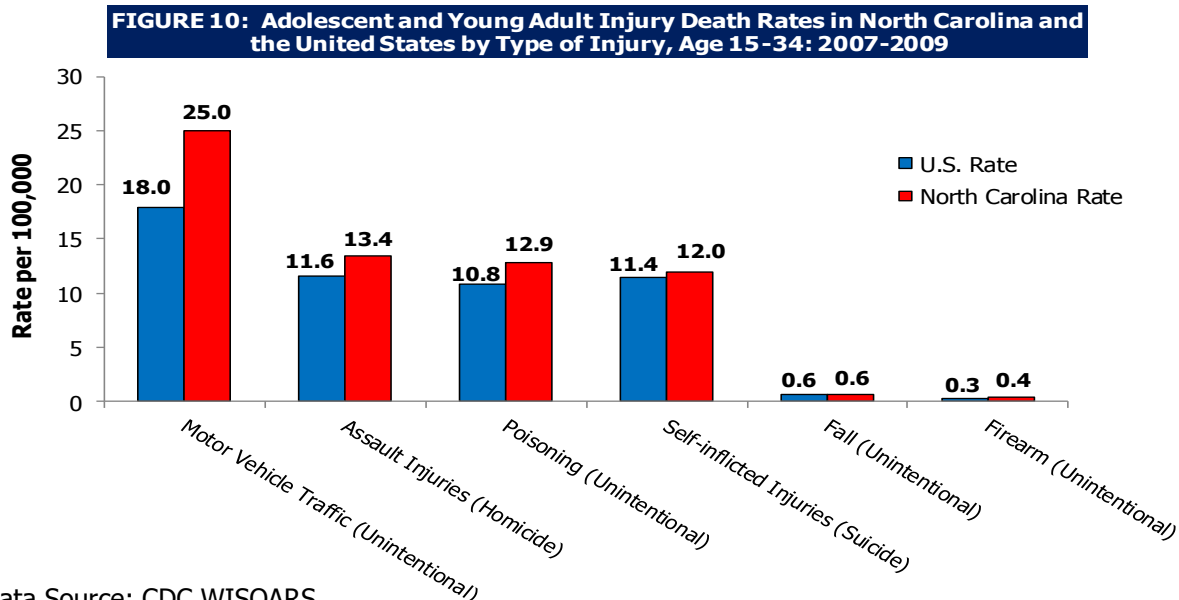
Comparison to United States and Comparison Over Time

The adolescent and young adult injury death rate in North Carolina and the United States remained relatively stable from 1999 to 2009 (Figure 9). North Carolina had a higher injury death rate for adolescents and young adults compared to the U.S. during the same time period. In 2009, the most recent year the national data were available, the adolescent and young adult injury death rate was 64 per 100,000 in North Carolina and 55 per 100,000 in the United States.

Unintentional motor vehicle traffic was the leading cause of adolescent and young adult injury death for both North Carolina (25 per 100,000) and the United States (18 per 100,000) from 2007 to 2009 (Figure 10). For many of the causes of injury deaths in adolescent and young adults during this time, North Carolina had a higher rate of deaths than the United States. Compared to the United States, the adolescent and young adult injury death rate in North Carolina was 1.2 times higher for assault (homicide) injuries (11.6 U.S. vs. 13.4 North Carolina per 100,000) and unintentional poisoning (10.8 United States vs. 12.9 North Carolina per 100,000), and 1.1 times higher for self-inflicted injuries (11.4 United States vs. 12.0 North Carolina per 100,000).



Data Source: CDC WISOARS



Data Source: CDC WISQARS

Hospitalization Charges for Adolescent & Young Adult Injuries in 2007-2009

The economic burden of adolescent and young adult injuries is demonstrated by the total hospitalization charges of \$1.8 billion in North Carolina from 2007 to 2009, including \$800 million for all unintentional injuries (Figure 11). The majority of the remaining \$1 billion in total charges was for hospitalizations for other causes, such as adverse effects and hospitalizations without cause data. These charges provide an estimate of the financial toll of the medical care requiring hospitalization for adolescent and young adult injuries, but do not account for the indirect costs of loss in productivity and quality of life that contribute to a greater burden on individuals and families.

The extent of unintentional motor vehicle crashes as a major concern for adolescent and young adults is evident by the estimated \$421 million in total hospitalization charges related to a motor vehicle injury in North Carolina between 2007 and 2009 (Figure 12). Other types of adolescent and young adult injury with a noticeable economic impact based on total hospitalization charges were assault injuries with \$127 million, self-inflicted injuries with \$85 million and unintentional falls with \$79 million.

In addition to being the most common type of injury in adolescent and young adults with the greatest total hospitalization charges, unintentional motor vehicle traffic injury also had the most costly median hospitalization charges with an estimate of \$28,893 (Figure 13). Median hospitalization charges provide an estimate of the charges per injury. Differences in median hospitalization charges by injury type are related to the extent of damage to the body, the procedures required for treatment, and the length of the hospitalization stay. The next injury types with the most expensive median hospitalization charges for adolescent and young adults were unintentional firearm (\$23,502) followed by assault injuries (\$19,352). The least costly median hospitalization charges were self-inflicted injuries (\$6,740).

FIGURE 11: Total Hospitalization Charges for Adolescent and Young Adult Injuries in North Carolina, Age 15-34: 2007-2009

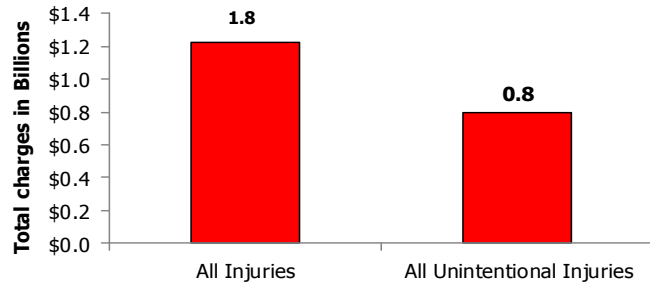


FIGURE 12: Total Hospitalization Charges for Adolescent and Young Adult Injuries in North Carolina by Type of Injury, Age 15-34: 2007-2009

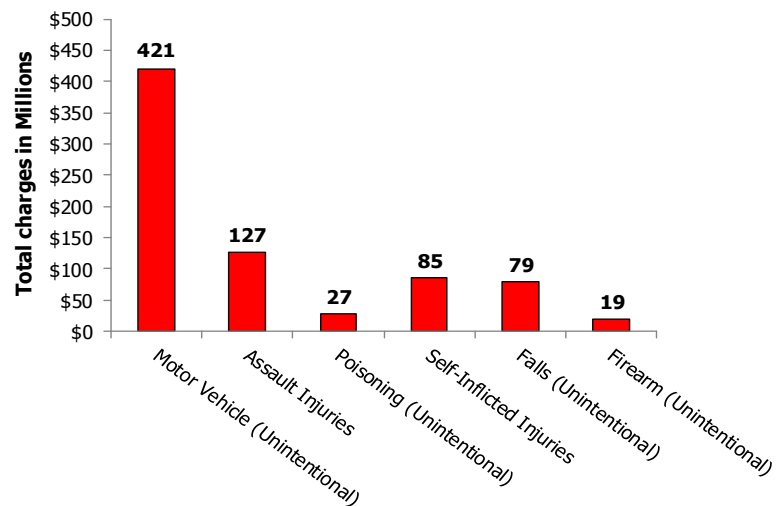
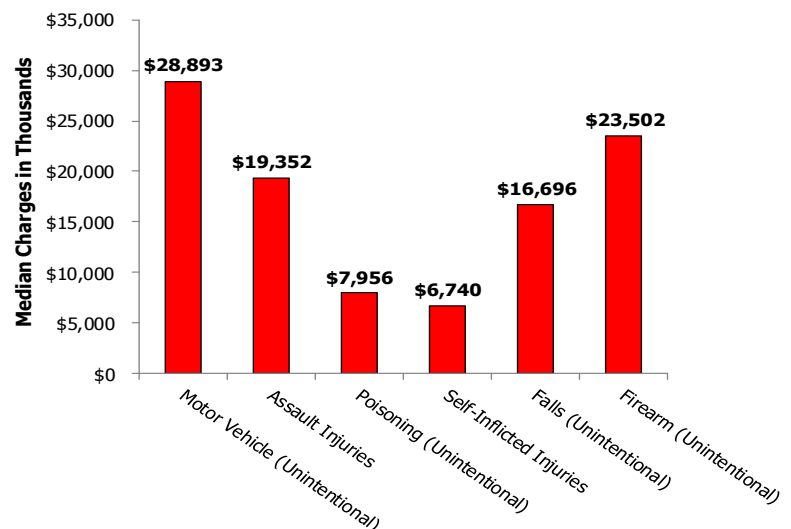


FIGURE 13: Median Hospitalization Charges for Adolescent and Young Adult Injuries in North Carolina by Type of Injury, Age 15-34: 2007-2009



2. Types of Adolescent & Young Adult Injury

Motor Vehicle Injuries (Unintentional)

Among adolescents and young adults ages 15 to 34 in North Carolina, unintentional motor vehicle traffic crashes were a major cause of injury mortality and morbidity. Unintentional motor vehicle-related injury was the first leading cause of injury deaths and emergency department visits, but the third leading cause of injury hospitalizations for adolescents and young adults in North Carolina during the evaluated time period.

Motor vehicle-related injuries among adolescents and young adults accounted for 2,344 deaths (23 per 100,000) from 2007 to 2010, 8,330 hospitalizations (111 per 100,000) from 2007 to 2009 and 88,763 emergency department visits (1,795 per 100,000) from 2009 to 2010. The economic consequences of motor vehicle injuries among adolescents and young adults are notable with total hospitalization charges of \$421 million from 2007 to 2009 (Table 7). Motor vehicle-related injuries were the most expensive per injury of all causes of adolescents and young adult injury based on the median hospitalization charges of \$28,893 and the third highest average charges of \$50,506.

The rate of unintentional motor vehicle injury death (Figure 14), hospitalizations (Figure 15) and emergency department visits (Figure 16) varied by age, increasing between the ages of 15 to 24 years and then decreasing between the ages of 25 to 34 years. Adolescent and young adult men were about three times more likely to die (34 males vs. 12 females per 100,000) or twice as likely to be hospitalized (143 males vs. 77 females per 100,000) from a motor vehicle-related injury compared to women. However, the rate of emergency department visits (1,863 females vs. 1,610 males per 100,000) was almost close for women and men as a result of injuries sustained from a motor vehicle crash.

TABLE 7: Estimated Hospitalization Charges Resulting from Adolescent and Young Adult Unintentional Motor Vehicle-Related Injuries in North Carolina, Age 15-34: 2007-2009	
Total Charges	\$420,562,914
Median Charges	\$28,893
Average Charges	\$50,506

FIGURE 14: N.C. Adolescent and Young Adults Unintentional Motor Vehicle-Related Injury Deaths by Age and Gender, Age 15-34: 2007-2010 (N=2,344)

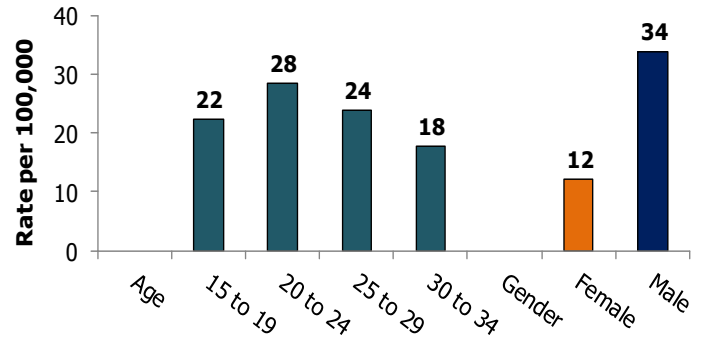
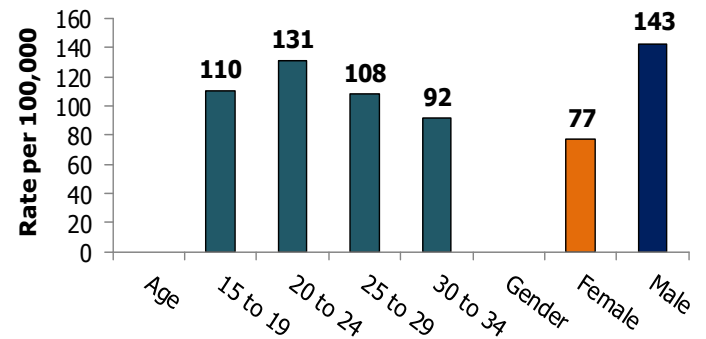
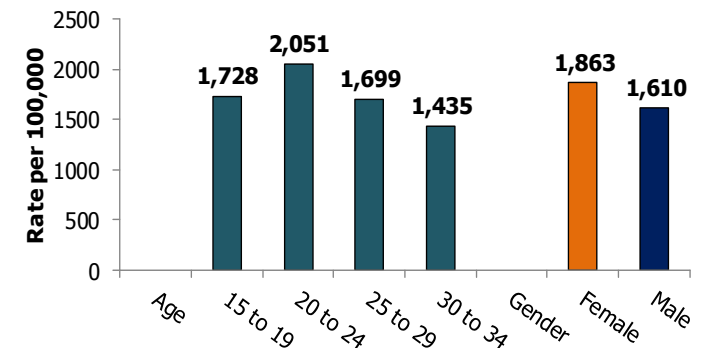


FIGURE 15: N.C. Adolescent and Young Adults Unintentional Motor Vehicle-Related Injury Hospitalizations by Age and Gender, Age 15-34: 2007-2009 (N=8,330*)



*n=3 undetermined gender

FIGURE 16: N.C. Adolescent and Young Adults Unintentional Motor Vehicle-Related Injury Emergency Department Visits by Age and Gender, Age 15-34: 2009-2010 (N=88,763*)



*n=2 undetermined gender

Assault Injuries

Adolescent and young adults are at risk for being victims of both fatal and non-fatal assaults. Homicide (assault) was the second leading cause of death due to all injuries and the leading cause of death due to intentional injury from 2007 to 2010 among adolescents and young adults in North Carolina. During this time, 1,294 young adults (13 per 100,000) died from a homicide and 3,870 young adults (51 per 100,000) were hospitalized after an assault. Though during 2009 to 2010, 38,136 young adults (745 per 100,000) visited an emergency department for assault injuries. The total hospitalization charges incurred from assault injuries among adolescents and young adults were \$127 million during 2007 to 2009 in North Carolina (Table 8). Assault injuries had the third most expensive median hospitalization charges (\$19,352) and average hospitalization charges (\$32,688) for all of the injury causes among adolescents and young adults.

The rate of homicide among adolescent and young adult age groups ranged between eight and 16 deaths per 100,000 (Figure 17). Assault injuries in young adults ages 20 to 24 were 1.8 times more likely to be hospitalized (65 vs. 36 hospitalizations per 100,000) (Figure 18) and 1.4 times more likely to visit the emergency department (943 vs. 664 visits per 100,000) (Figure 19) than adolescents ages 15 to 19. The rates of deaths, hospitalizations, and emergency department visits for assault injuries peaked around young persons between ages 20 to 29 years.

Young adult men were at greatest risk for severe outcomes of assault. The rate of assault injuries in men were five times as likely to cause death (21 male vs. four female deaths per 100,000), six times more likely to require hospitalization (85 male vs. 16 female hospitalizations per 100,000), and 1.4 times more likely to be treated at an emergency department (864 male vs. 624 female visits per 100,000) than in women.

TABLE 8: Estimated Hospitalization Charges Resulting from Adolescent and Young Adult Assault Injuries in North Carolina, Age 15-34: 2007-2009

Total Charges	\$126,502,844
Median Charges	\$19,352
Average Charges	\$32,688

FIGURE 17: N.C. Adolescent and Young Adults Assault Injury Deaths (Homicide) by Age and Gender, Age 15-34: 2007-2010 (N=1,294)

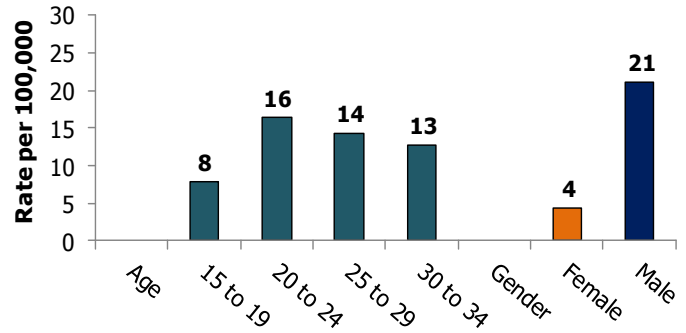


FIGURE 18: N.C. Adolescent and Young Adults Assault Injury Hospitalizations by Age and Gender, Age 15-34: 2007-2009 (N=3,870*)

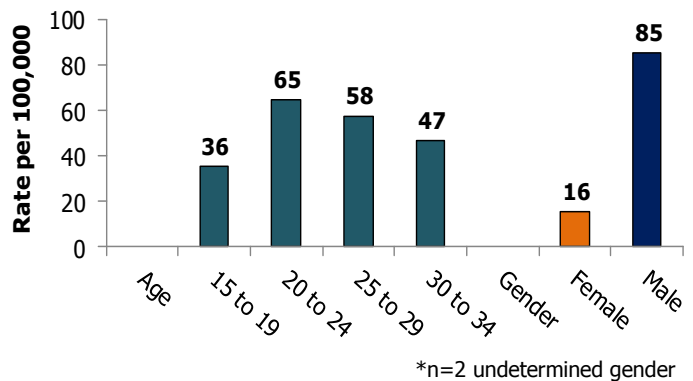
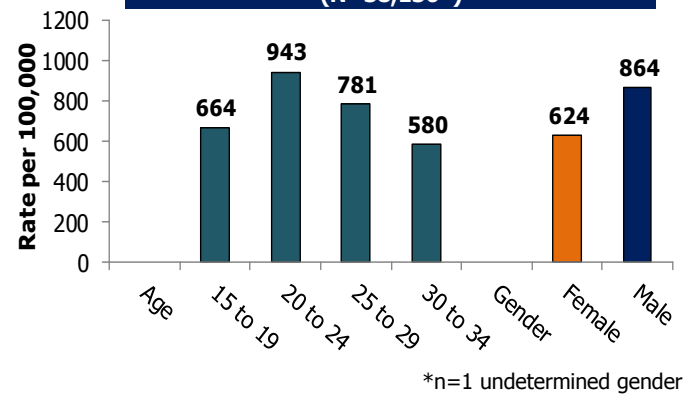


FIGURE 19: N.C. Adolescent and Young Adults Assault Injury Emergency Department Visits by Age and Gender, Age 15-34: 2009-2010 (N=38,136*)



Adolescent & Young Adult Injuries in North Carolina: 2007 to 2010

The leading type of assault or homicide injury resulting in death and hospitalizations among adolescents and young adults in North Carolina was firearms. During 2007 to 2010, firearms took the lives of 1,044 young people in North Carolina, accounting for 81 percent of all assault injury deaths (Table 9). In addition, there was 1,251 (32 percent) young adults who were hospitalized in 2007 to 2009 (Table 10) and 1,404 (4 percent) young adults who visited the emergency department in 2009 to 2010 (Table 11) for an assault injury from a firearm.

However, the most common mechanism of assault injury that requires an emergency department visit among adolescents and young adults was an injury suffered from being struck. From 2009 to 2010, 19,902 young North Carolinians age 15 to 34 visited the emergency department for an assault-related injury sustained from being struck by a person or object, accounting for 52 percent of emergency department visits. Furthermore, 938 young adults were hospitalized after being struck, which represented 24 percent of hospitalizations related to assault injuries during 2007 to 2009 in North Carolina.

TABLE 9: N. C. Types of Adolescent and Young Adult Assault Injury Deaths, Age 15-34: 2007-2010 (N=1,294)	
Assault Injury Type	Number of Deaths
Firearm	1,044
Cut/pierce	123
Unspecified	64
Suffocation	37
Other spec/NEC*	14
Drowning	2
Fire/Burn	2
Other land transport	2
Other spec/class	2
Poisoning	2
Stuck	2
Total	1,294

TABLE 10: N. C. Types of Adolescent & Young Adult Assault Injury Hospitalizations, Age 15-34: 2007-2009 (N=3,870)	
Assault Injury Type	Number of Hospitalizations
Firearm	1,251
Struck	938
Cut/pierce	811
Other spec/not class	309
Unspecified	301
Other spec/class	212
Motor Vehicle	18
Fire/Burn	16
Suffocation	8
Poisoning	4
Fall	2
Total	3,870

TABLE 11: N. C. Types of Adolescent & Young Adult Assault Injury Emergency Department Visits, Age 15-34: 2009-2010 (N=38,136)	
Assault Injury Type	Number of Visits
Struck	19,902
Unspecified	5,513
Other spec/not class	4,985
Cut/pierce	3,028
Other spec/class	2,999
Firearm	1,404
Motor Vehicle	97
Suffocation	84
Fire/Burn	57
Fall	39
Poisoning	28
Total	38,136

* Not Classified Elsewhere (NEC)

Poisoning (Unintentional)

Unintentional poisoning was the third leading cause of injury death during 2007 to 2010 and the seventh leading cause of injury-related hospitalizations between 2007 and 2009 among adolescents and young adults. During these time periods in North Carolina, unintentional poisoning among adolescents and young adults caused 1,216 deaths (12 per 100,000) from 2007 to 2010, 2,011 hospitalizations (27 per 100,000) from 2007 to 2009 and 4,752 emergency department visits (93 per 100,000) during 2009 to 2010. The total hospitalization charges in North Carolina related to unintentional poisoning of adolescents and young adults between 2007 and 2009 was estimated at \$27 million with the lowest median charges of \$7,956 and average charges of \$13,272 (Table 12).

Among young North Carolinians, the death rate for unintentional poisoning was 3.4 times higher in adults ages 25 to 29 (17 per 100,000) than adults ages 15 to 19 (5 per 100,000) (Figure 20). However, adults ages 30 to 34 (30 per 100,000) were 1.4 times more likely to be hospitalized for unintentional poisoning than adults ages 15 to 19 (21 per 100,000) (Figure 21). Conversely, young adults ages 20 to 24 had an emergency department visit rate for unintentional poisoning that was 1.2 times greater than adults ages 30 to 34 (100 vs. 82 per 100,000, respectively) (Figure 22).

Adolescent and young adult men were three times more likely to die from unintentional poisoning than women (18 male vs. 6 female deaths per 100,000). However, the rate of hospitalization and emergency department visits as a result of injuries sustained from unintentional poisoning was approximately equal by gender among adolescent and young adults.

TABLE 12: Estimated Hospitalization Charges Resulting from Adolescent and Young Adult Unintentional Poisoning Injuries in North Carolina, Age 15-34: 2007-2009

Total Charges	\$26,676,376
Median Charges	\$7,956
Average Charges	\$13,272

FIGURE 20: N.C. Adolescent and Young Adults Unintentional Poisoning Injury Deaths by Age and Gender, Age 15-34: 2007-2010 (N=1,216)

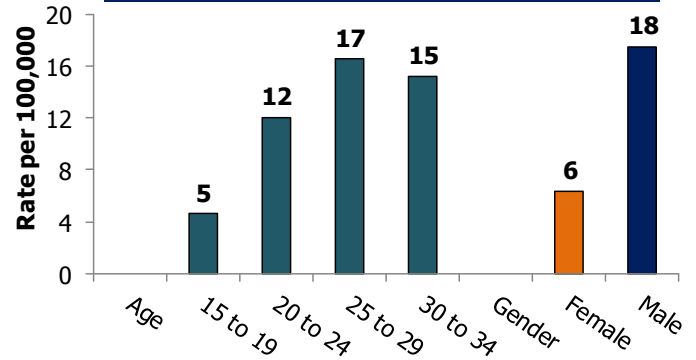


FIGURE 21: N.C. Adolescent and Young Adults Unintentional Poisoning Injury Hospitalizations by Age and Gender, Age 15-34: 2007-2009 (N=2,011)

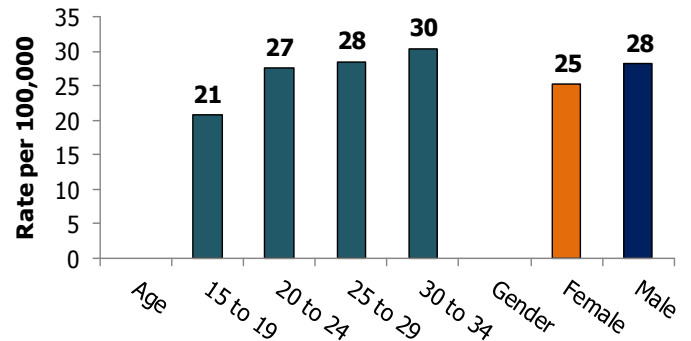
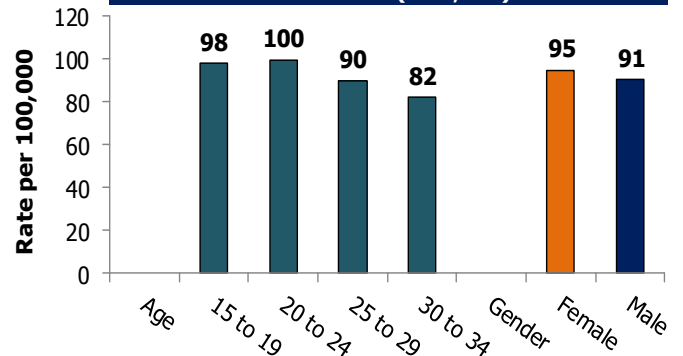


FIGURE 22: N.C. Adolescent and Young Adults Unintentional Poisoning Injury Emergency Department Visits by Age and Gender, Age 15-34: 2009-2010 (N=4,752)



Self-Inflicted Injuries

Suicide (self-inflicted) was the fourth leading cause of death due to all injuries and the second leading cause of death due to intentional injury from 2007 to 2010 among adolescents and young adults in North Carolina. It was also the second leading cause of injury hospitalizations during 2007 to 2009. In contrast, self-inflicted injury was not reported as a leading cause of adolescent and young adult injury for emergency department visits from 2007 to 2010.

During the assessed time period, the rate of suicide or self-inflicted injuries was 12 deaths per 100,000 adolescents and young adults ages 15 to 34 (1,189 deaths) from 2007 to 2010, 113 hospitalizations per 100,000 young adults (8,537 injury hospitalizations) from 2007 to 2009, and 201 emergency department visits per 100,000 young adults (10,297 injury visits) from 2009 to 2010 in North Carolina. Hospitalization charges for self-inflicted injuries in adolescents and young adults totaled \$85 million between 2007 and 2009 in North Carolina with median charges of \$6,740 and average charges of \$9,964 (Table 13).

The rate of death from self-inflicted injury increased with age among adolescents and young adults and peaked at 15 deaths per 100,000 for adults ages 30 to 34 (Figure 23). However, the rate of hospitalization among young adults was similar across age groups (Figure 24). On the other hand, adolescents and young adults ages 15 to 19 were 1.4 times more likely to visit the emergency department (235 vs. 164 visits per 100,000) for self-inflicted injury than young adults ages 30 to 34 (Figure 25).

While young adult females are more likely to be hospitalized or treated in the emergency department for self-inflicted injury, the suicide rate among young adult males was much higher almost four times that of young females (19 vs. 5 deaths per 100,000). The gender difference in the suicide death rate is due to the method used to commit suicide. Young females tend to use less fatal methods of attempted suicide than young males such as poisoning.

TABLE 13: Estimated Hospitalization Charges Resulting from Adolescent and Young Adult Self-Inflicted Injuries in North Carolina, Age 15-34: 2007-2009

Total Charges	\$85,031,291
Median Charges	\$6,740
Average Charges	\$9,964

FIGURE 23: N.C. Adolescent and Young Adults Self-Inflicted Injury Deaths (Suicide) by Age and Gender, Age 15-34: 2007-2010 (N=1,189)

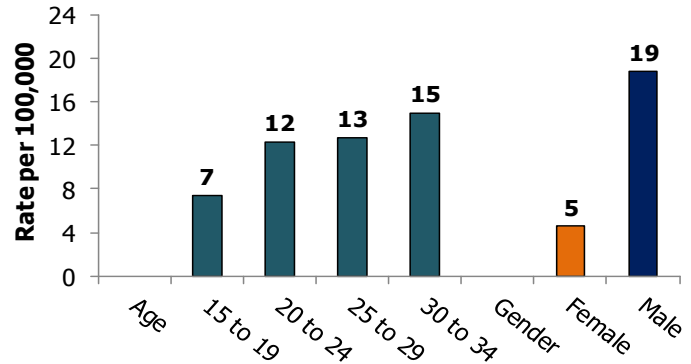


FIGURE 24: N.C. Adolescent and Young Adults Self-inflicted Injury Hospitalizations by Age and Gender, Age 15-34: 2007-2009 (N=8,537)

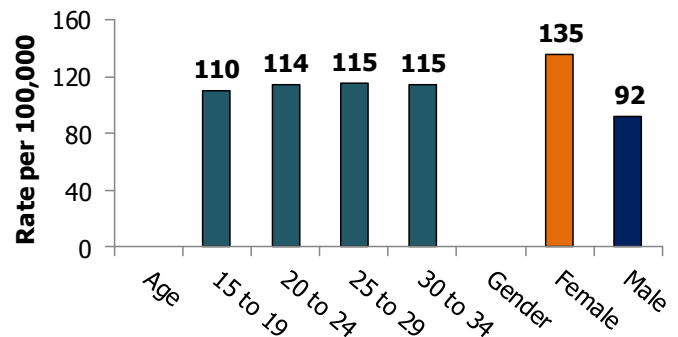
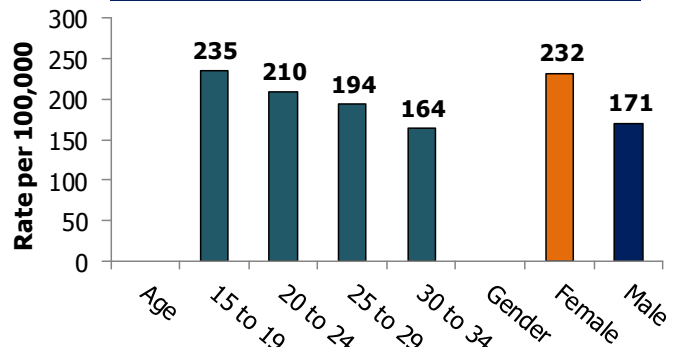


FIGURE 25: N.C. Adolescent and Young Adults Self-Inflicted Injury Emergency Department Visits by Age and Gender, Age 15-34: 2009-2010 (N=10,297)



Adolescent & Young Adult Injuries in North Carolina: 2007 to 2010

Similar to assault or homicide injuries, the most common type of self-inflicted or suicide death among adolescents and young adults was from firearms. In 2007 to 2010 in North Carolina, 621 adolescents and young adults committed suicide using a firearm, represented for 52 percent of all self-inflicted injury deaths (Table 14). Firearm injuries were the fifth most common type of self-inflicted injury for young adults that required hospitalization and the sixth common type of emergency department visit. Among young North Carolinians, 100 adults were hospitalized between 2007 and 2009 (Table 15) and 84 adults presented at the emergency department between 2009 and 2010 (Table 16) for treatment of a self-inflicted firearm injury.

Poisoning was the leading mechanism of self-inflicted injury requiring hospitalization or an emergency department visit, accounting for 78 percent of hospitalizations and 64 percent of emergency department visits in adolescents and young adults. Self-inflicted poisoning led to 160 deaths from 2007 to 2010, 6,621 hospitalizations from 2007 to 2009, and 6,600 emergency department visits from 2009 to 2010 for young people ages 15 to 34. The second leading method of self-inflicted injury hospitalization and emergency department visit among young people was cutting/piercing, accounting for 15 percent of hospitalizations and 26 percent of emergency department visits.

TABLE 14: N. C. Types of Adolescent and Young Adult Self-Inflicted Injury Deaths, Age 15-34: 2007-2010 (N=1,189)	
Self-Inflicted Injury Type	Number of Deaths
Firearm	621
Suffocation	349
Poisoning	160
Other spec/NEC	18
Cut/pierce	12
Fall	9
Drowning	7
Other spec/class	6
Unspecified	4
Fire/Burn	2
Other land transport	1
Total	1,189

TABLE 15: N. C. Types of Adolescent and Young Adult Self-Inflicted Injury Hospitalizations, Age 15-34: 2007-2009 (N=8,537)	
Self-Inflicted Injury Type	Number of Hospitalizations
Poisoning	6,621
Cut/pierce	1,316
Unspecified	165
Other spec/not class	147
Firearm	100
Suffocation	65
Fire/Burn	40
Other spec/class	36
Fall	35
Motor Vehicle	11
Drowning	1
Total	8,537

TABLE 16: N. C. Types of Adolescent and Young Adult Self-Inflicted Injury Emergency Department Visits, Age 15-34: 2009-2010 (N=10,297)	
Self-Inflicted Injury Type	Number of Visits
Poisoning	6,600
Cut/pierce	2,701
Other spec/not class	493
Unspecified	218
Suffocation	95
Firearm	84
Other spec/class	34
Fall	33
Fire/Burn	26
Motor Vehicle	9
Other Injury Types	4
Total	10,297

Falls (Unintentional)

Unintentional fall was the second leading cause of injury-related emergency department visits and the fourth leading cause of injury hospitalizations among adolescents and young adults in North Carolina during the evaluated time periods. Between 2007 and 2010, 62 adolescents and young adults (0.6 per 100,000) in North Carolina died as a result of an unintentional fall. However, 3,080 adolescents and young adults (41 per 100,000) required hospitalization due to injuries from unintentional falls. In 2009 to 2010, 74,483 adolescents and young adults (1,456 per 100,000) visited an emergency department for an unintentional fall-related injury. Although unintentional fall injuries had the second highest total hospitalization charges (\$79 million) among adolescent and young adult injury types, the median charges (\$16,696) and average charges (\$25,549) were relatively low during 2007 to 2009 in North Carolina (Table 17).

Adolescents and young adults ages 30 to 34 were three times more likely to die from an unintentional fall compared to adults ages 15 to 19 (0.8 vs. 0.3 per 100,000, respectively) (Figure 26). Similarly, injury from an unintentional fall was more likely to require hospitalization (Figure 27) or an emergency department visit (Figure 28) with advancing age. Adults ages 30 to 34 were 1.7 times as likely to be hospitalized (53 vs. 32 per 100,000) and 1.1 times more likely to visit an emergency department (1,496 vs. 1,356 per 100,000) compared to young adults ages 15 to 19.

Adolescent and young adult men were seven times more likely to die (1.1 male vs. 0.16 female deaths per 100,000) and two times more likely to be hospitalized (53 male vs. 29 female deaths per 100,000) from fall injuries than women. However, the rate of emergency department visit from a fall-related injury for women was 1.1 times higher than for men.

Total Charges	\$78,665,060
Median Charges	\$16,696
Average Charges	\$25,549

FIGURE 26: N.C. Adolescent and Young Adults Unintentional Fall-Related Injury Deaths by Age and Gender, Age 15-34: 2007-2010 (N=62)

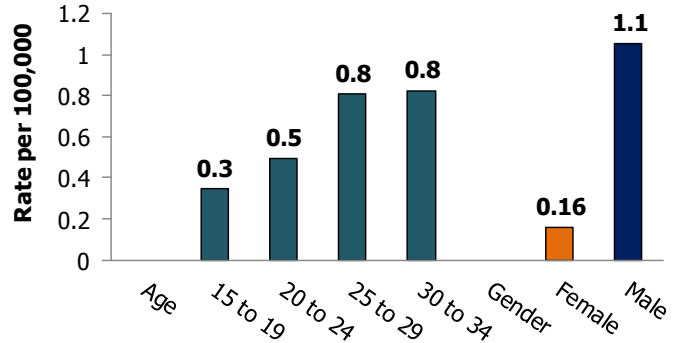


FIGURE 27: N.C. Adolescent and Young Adults Unintentional Fall-Related Injury Hospitalizations by Age and Gender, Age 15-34: 2007-2009 (N=3,080)

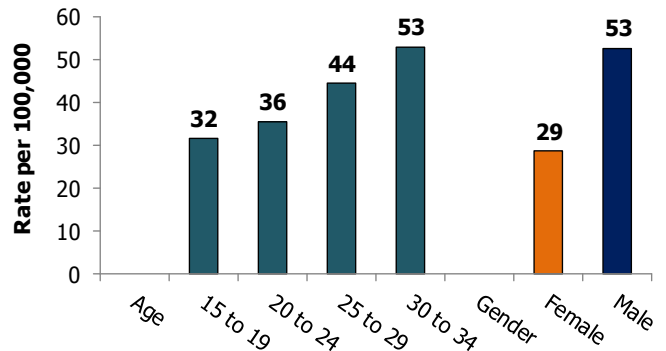
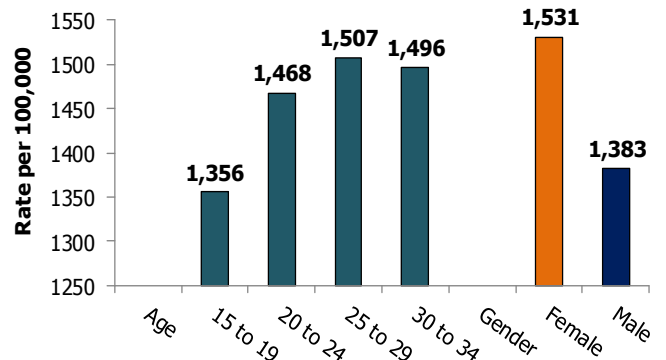


FIGURE 28: N.C. Adolescent and Young Adults Unintentional Fall-Related Injury Emergency Department Visits by Age and Gender, Age 15-34: 2009-2010 (N=74,483*)



*n=1 undetermined gender

Firearm (Unintentional)

Unintentional injuries caused by firearm discharges account for 0.6 percent of all deaths among adolescents and young adults in North Carolina. They led to 39 deaths (0.4 per 100,000) from 2007 to 2010, 496 hospitalizations (7 per 100,000) from 2007 to 2009, and 1,178 emergency department visits (23 per 100,000) from 2009 to 2010. In addition, unintentional firearm injuries resulted in total hospitalization charges of \$19 million with median charges of \$23,502, and average charges of \$39,024 among adolescents and young adults in North Carolina between 2007 and 2009 (Table 18).

The highest rate of deaths (Figure 29), hospitalizations (Figure 30), and emergency department visits (Figure 31) for unintentional firearm injuries was among young people between the ages of 20 to 24, and the lowest rate was among young adults between the ages of 30 to 34. Compared to adults ages 30 to 34, young adults ages 20 to 24 were 1.7 times more likely to die (0.5 vs. 0.3 per 100,000, respectively), 1.6 times more likely to be hospitalized (8 vs. 5 per 100,000, respectively), and twice as likely to visit the emergency department (32 vs. 16 per 100,000, respectively) from an unintentional injury related to a firearm.

Once again, adolescent and young adult men had higher rates of deaths, hospitalizations and emergency department visits for an unintentional injury caused by a firearm than women. Most notably, men were nine times more likely to die (0.7 male vs. 0.08 female deaths per 100,000), seven times more likely to be hospitalized (11 male vs. 1.6 female hospitalizations per 100,000), and 10.5 times more likely to be seen in the emergency department (42 male vs. 4 female emergency department visits per 100,000) as result to injuries from unintentional firearm than women.

TABLE 18: Estimated Hospitalization Charges Resulting from Adolescent and Young Adult Unintentional Firearm Injuries in North Carolina, Age 15-34: 2007-2009

Total Charges	\$19,355,830
Median Charges	\$23,502
Average Charges	\$39,024

FIGURE 29: N.C. Adolescent and Young Adults Unintentional Firearm Injury Deaths by Age and Gender, Age 15-34: 2007-2010 (N=39)

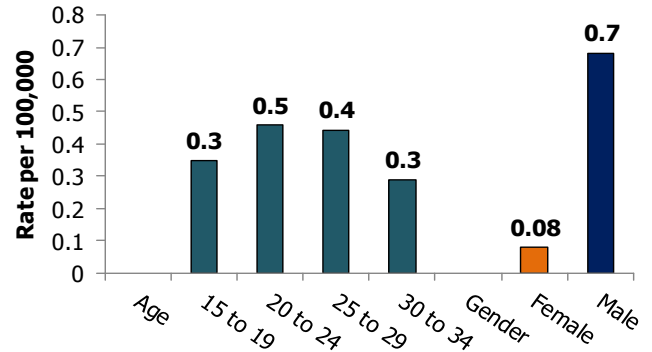


FIGURE 30: N.C. Adolescent and Young Adults Unintentional Firearm Injury Hospitalizations by Age and Gender, Age 15-34: 2007-2009 (N=496)

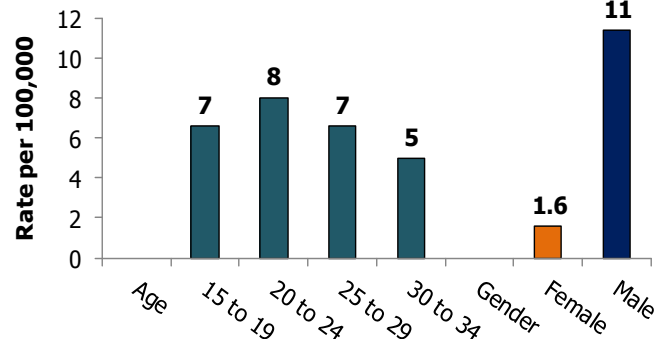
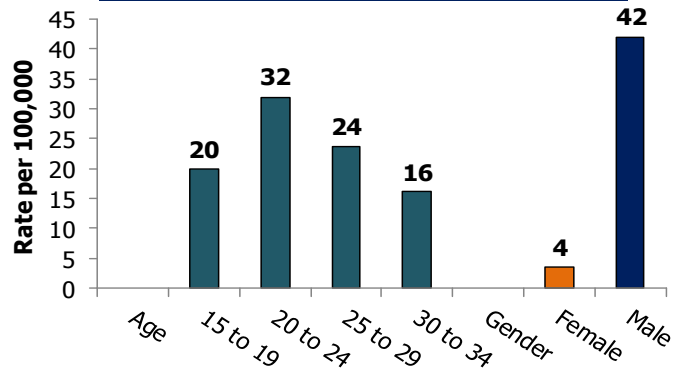


FIGURE 31: N.C. Adolescent and Young Adults Unintentional Firearm Injury Emergency Department Visits by Age and Gender, Age 15-34: 2009-2010 (N=1,178)



3. Conclusions and Recommendations

- Injury among adolescents and young adults is a significant source of morbidity and mortality in North Carolina that endangers their lives, health and productivity and creates a substantial economic toll on individuals, families and communities.
- Prevention of injuries in adolescents and young adults is important in reducing the public health burden. Injury among adolescents and young adults is largely preventable, and its consequences can be reduced. Understanding the most common causes of injury and identifying those at greatest risk are the first steps in guiding decision-making policies and prevention efforts.
- Injury-related outcomes of deaths, hospitalizations, and emergency department visits represent only a fraction of the burden of adolescents and young adult injury in North Carolina. The full scope of the adolescent and young adult injury problem is estimated to be greater when considering injuries treated at outpatient visits and medically unattended injuries.
- The majority of adolescent and young adult injuries resulting in death (61 percent), hospitalization (39 percent) and a visit to the emergency department (71 percent) are unintentional. In addition, a significant proportion of deaths, hospitalizations, and emergency department visits for unintentional injuries in adolescents and young adults have no specified or missing cause. For intentional injury, both self-inflicted (suicide) and assault (homicide), firearms were the leading mechanism of death.
- Adolescents and young adults in the eastern and western regions of North Carolina had higher rates of injury-related mortality and morbidity than those in the central region. The injury death rate has not shown any significant change between 1999 and 2009 in the United States or in North Carolina. However, North Carolina consistently has had higher death rates than the United States for most types of adolescent and young adult injury, especially for unintentional motor vehicle traffic, poisoning, drowning, and firearm injuries. New strategies to prevent injury among adolescents and young adults may be needed to lower the injury rates nationally and in our state.
- The medical and economic consequences of adolescents and young adult injuries are estimated at \$1.8 billion in total hospitalization charges from 2007 to 2009 in North Carolina. Efforts to reduce cost should focus on decreasing hospitalizations of adolescents and young adults for other causes, such as adverse effects and reducing motor vehicle traffic injuries.
- The risk of death, hospitalization and emergency department visit from injury increases noticeably in young adults ages 20 to 29 and in men. This age group, 20 to 29 years of age, requires special attention with targeted interventions to reduce their risk for injury. Increased efforts to prevent injuries to adolescents and young adults are necessary. These efforts should include addressing the importance of seat belt use, raising awareness about alcohol-impaired driving, or the best ways, tools and resources that can take effective actions to reduce injuries.
- Unintentional motor vehicle traffic injury was the leading cause of injury deaths and emergency department visits and the third leading cause of injury hospitalizations among adolescents and young adults in North Carolina. Motor vehicle injuries among young people increased between the ages of 15 to 24 years and then decreased between the ages of 25 to 34 years. Unintentional motor vehicle injuries were the most costly of all causes of adolescent and young adult injury in terms of total hospitalization charges incurred. Therefore, public health efforts and resources should focus on policies and prevention programs toward motor vehicle crashes among adolescents and young adults. Intervention strategies to reduce the risk of unintentional motor vehicle crashes among adolescents and young adults should include emphasizing the importance of the use of safety belt law; enforcing the speed limits; granting driving privileges in stages through the graduated driver licensing (GDL)

Adolescent & Young Adult Injuries in North Carolina: 2007 to 2010

program; prohibiting cell phone use and texting while driving; and implementing vigorous policies such as sobriety checkpoints to deter drinking and driving (CDC, 2011a).

- Homicide (assault) was the second leading cause of injury death among adolescents and young adults in North Carolina. Men were at greater risk for assault injuries than women. Young North Carolinians ages 20 to 29 were more likely to die and be treated for assault injuries than those in other age groups. Eighty-one percent of homicides involved the use of firearms and 52 percent of emergency department visits for assault injuries involved being struck by a person or object. Prevention strategies to reduce homicide deaths and assaultive injuries should focus on identifying risk and protective factors for all types of young adult violence at individual, interpersonal, community and societal levels (CDC, 2011b).
- Poisoning was the third leading cause of death due to unintentional injury and the seventh leading cause of injury related hospitalizations among adolescents and young adults in North Carolina. Among young people ages 25 to 34 years, unintentional poisoning tended to cause more injury-related deaths and hospitalizations than young adults ages 15 to 24. However, unintentional poisoning had the least expensive median and average hospitalization charges incurred. To help prevent unintentional poisoning injuries among adolescents and young adults, efforts should focus on educating on the importance of misusing or abusing prescription or over-the-counter medications; reading all warning labels on medications and following the directions on the labels to avoid drug interactions; keeping medications in their original container; never sharing or selling medication; disposing of unused, unneeded and expired medications; and utilization of a Prescription Drug Monitoring Program (PDMP) to help guide prevention programs (CDC, 2012a).
- Suicide (self-inflicted) was the fourth leading cause of injury death among North Carolinians ages 15 to 34. Young males were nearly 4 times more likely to die from suicide than young females; however, females accounted for most suicide attempts. Young adults ages 30 to 34 had the highest suicide death rate, while adolescents ages 15 to 19 had the highest rate of self-inflicted injuries treated in the emergency department. Firearm was the most common mechanism used in suicide deaths, whereas poisoning was the mechanism commonly used for self-inflicted injury hospitalization and emergency department visit, followed by cutting and piercing. Suicide prevention strategies should be directed at programs to promote awareness of risk factors for attempting or committing suicide and encourage commitment to social change (CDC, 2010c), especially toward young men aged 30 to 34.
- Other leading causes of death due to unintentional injury among adolescents and young adults in North Carolina include falls and firearm-related injuries. Falls accounted for 5 percent of injuries resulting in hospitalization and 13 percent resulting in emergency department visits among adolescents and young adults. Unintentional firearm-related injuries were the second most expensive cause of adolescent and young adult injury in terms of median and average hospitalization charges incurred. Strategies to prevent these injuries in adolescents and young adults should focus on: (1) increasing awareness of wearing a helmet when riding bikes, scooters, in-line skates or skateboarding as well as during team sports such as football and hockey (CDC, 2012c); and (2) state laws promoting safe storage of firearms and ammunition separately as well as educating adolescents and young adults about the dangers of guns as well as ways to prevent unintentional firearm-related injuries and death.
- Attention to documenting more complete coding of hospitalizations and emergency department visits is needed to fully capture the underlying causes of adolescent and young adult injury, which will facilitate identification of suitable methods for injury prevention.

4. Appendix

Appendix A: Data Sources and Technical Notes

Comparison of U.S. and North Carolina Injury Rates 1999-2009

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 March 25, 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 (2007 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 15 years to 34 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 -2009

The North Carolina State Center for Health Statistics provided data for every hospital discharge of North Carolina residents ages 15 to 34. 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 15 to 34. NC DETECT is a statewide syndromic surveillance system that receives data on at least a daily basis from hospital emergency departments (EDs) to provide early event detection and timely public health surveillance to public health officials and hospital users. In 2010, NC DETECT was receiving data daily from 112 of the 114 24/7/365 EDs in North Carolina. In 2009, NC DETECT was receiving data daily from 110 of the 112 24/7/365 EDs in North Carolina. This does not include military, federal, or tribal EDs. Therefore, data for these years are not representative of all EDs in the state, although the majority of EDs were reporting. The ED data, hospital discharge data, and death 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), V81.1, V82.1, 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), V87 (.0-.8), V89.2. Hospital and emergency department E-codes: E810-E819 (.0-.9).

Assault

Assault injuries were categorized as assault intent by any mechanism (e.g., firearm, struck, etc.). Cause of death codes: X85-Y09, Y87.1,*U01-*U02. Hospital and emergency department E-codes: E960.0-E969.9, E979, E999.1.

Unintentional Poisoning

Unintentional poisoning were categorized 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.

Self-Inflicted

Self-inflicted injuries were categorized as self-inflicted intent by any mechanism (e.g., firearm, poisoning, etc.). Cause of death codes: X60-X84, Y87.0,*U03. Hospital and emergency department E-codes: E950-E959.

Unintentional Fall

Unintentional falls were categorized 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 Firearm

Unintentional firearms were categorized as unintentional intent by any firearm mechanism. Cause of death code: W32-W34. Hospital and emergency department E-codes: E922.0-.3, .8, .9

Methods

In order to explore the extent of the current adolescent and young 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 rates were calculated based on the North Carolina Death files for 2007 to 2010; hospitalization rates were calculated based on the North Carolina Hospitalization files for 2007 to 2009; and emergency department visit rates were calculated based on NC DETECT files for 2009 to 2010. The processes for calculating the rates for North Carolina adolescent and young 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; and 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 motor vehicle traffic, poisoning, etc.). It is important to note that hospital charges reflect only a 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

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: Robin Ikeda, MD, MPH, CAPT, USPHS

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; Fax: (919) 870-4803

Email: beinjuryfreenc@ncmail.net

www.communityhealth.dhhs.state.nc.us/injury

Chief, Chronic Disease and Injury Section: Ruth Petersen, MD, MPH

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; Fax: (919) 966-0466

www.iprc.unc.edu/

Director: Steve Marshall, MPH, PhD

5. References

Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. *Web-based Injury Statistics Query and Reporting System (WISQARS)* [online]. (2012) Retrieved March 29, 2012 from: www.cdc.gov/injury/wisqars

Centers for Disease Control and Prevention (CDC), National Center for Injury Prevention and Control. (2010a). *WISQARS leading causes of death reports, National and Regional, 1999-2009*. Retrieved March 29, 2012 from: http://webappa.cdc.gov/sasweb/ncipc/leadcaus10_us.html

Centers for Disease Control and Prevention (CDC), National Center for Injury Prevention and Control. (2010b). *WISQARS nonfatal injury reports*. Retrieved March 29, 2012 from: <http://webappa.cdc.gov/sasweb/ncipc/nfirates2001.html>

Centers for Disease Control and Prevention (CDC), National Center for Injury Prevention and Control. (2010c). *Suicide: prevention strategies*. Retrieved July 2, 2012 from: <http://www.cdc.gov/ViolencePrevention/suicide/prevention.html>

Centers for Disease Control and Prevention (CDC), National Center for Injury Prevention and Control. (2011a). *Motor vehicle safety: prevention policies*. Retrieved May 26, 2012 from: <http://www.cdc.gov/MotorVehicleSafety/costs/policy.html>

Centers for Disease Control and Prevention (CDC), National Center for Injury Prevention and Control, Division of Unintentional Injury Prevention. (2011b). *Youth violence: prevention strategies*. Retrieved July 2, 2012 from: <http://www.cdc.gov/ViolencePrevention/overview/social-ecologicalmodel.html>

Centers for Disease Control and Prevention (CDC), National Center for Injury Prevention and Control, Division of Unintentional Injury Prevention. (2012a). *Prevent unintentional poisoning*. Retrieved May 26, 2012 from: <http://www.cdc.gov/Features/PoisonPrevention/>

Centers for Disease Control and Prevention (CDC), National Center for Injury Prevention and Control, Division of Unintentional Injury Prevention. (2012c). *Falls among older adults: an overview*. Retrieved May 29, 2012 from: <http://www.cdc.gov/HomeandRecreationalSafety/Falls/adultfalls.html>

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North Carolina Division of Public Health, Injury and Violence Prevention Branch, Injury Epidemiology and Surveillance Unit. (2010). *Older Adults Injuries in North Carolina: 2004-2007*. Raleigh, NC: North Carolina Division of Public Health.



**State of North Carolina
Beverly Eaves Perdue, Governor**

**Department of Health and Human Services
Albert A. Delia, Acting Secretary**

**Division of Public Health
Laura Gerald, M.D., M.P.H, State Health Director**

Injury and Violence Prevention Branch

www.injuryfreenc.ncdhhs.gov

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