

NORTH CAROLINA

THE BURDEN OF

**Motor Vehicle Traffic-Related Injuries
North Carolina, 2012**

**NORTH CAROLINA DIVISION OF PUBLIC HEALTH
INJURY AND VIOLENCE PREVENTION BRANCH**

**North Carolina Department of Health and Human Services
March 2014**

**THE BURDEN OF
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Anna Austin, MPH



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Highlights:

- Motor vehicle traffic-related (MVT) injuries were the second leading cause of injury death in North Carolina in 2012 resulting in 1,185 deaths among North Carolinians.
- For every MVT-related death in 2012, there were 5.2 hospitalizations and 79.7 Emergency Department visits for MVT-related injuries.
- The rate of MVT-related deaths in 2012 was 12.1 deaths per 100,000 North Carolina residents.
- Males were more than twice as likely to die from MVT-related injuries as females.
- Young adults between the ages 15 and 24 had the highest rates of MVT-related deaths in 2012.

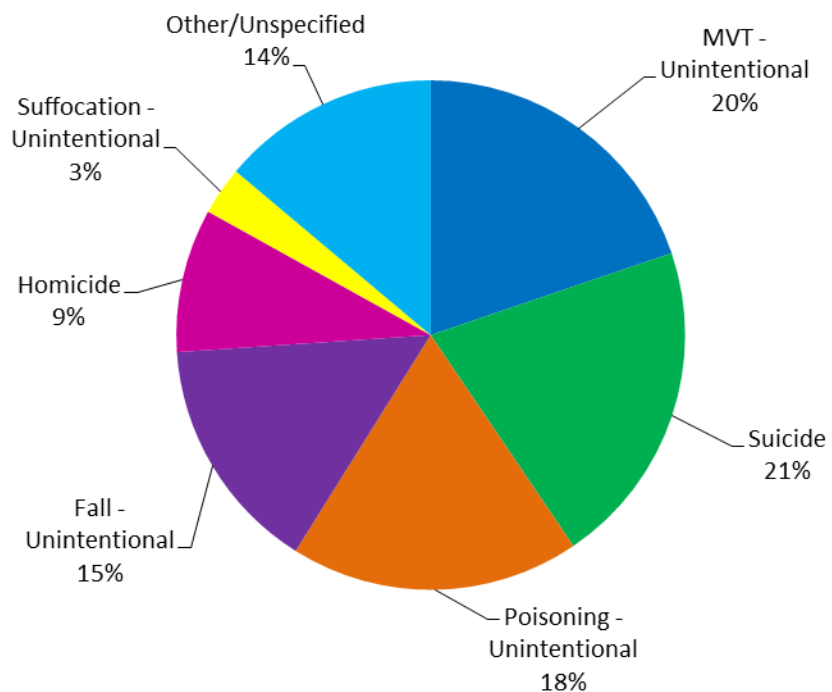
Section 1: Overview of Motor Vehicle Traffic (MVT) Injuries in North Carolina

Injury is the third-leading cause of death in North Carolina; only cancer and heart disease result in more deaths in the state. Injury is the leading cause of death in individuals between the ages of 1 and 60. In 2012, injury was the primary cause of death for 5,989 individuals.¹

The leading cause of injury death in North Carolina in 2012 was suicide followed by unintentional MVT-related deaths, accounting for 20 percent of all injury deaths (Figure 1). Among those ages 1 to 34, unintentional MVT-related deaths were the leading cause of injury death in 2012. Although the rate of MVT deaths has declined over the past decade, in 2012, there were 1,185 deaths, many of which were preventable.

The Centers for Disease Control and Prevention (CDC) defines an MVT-related event as “any vehicle incident occurring on a public highway, street, or road.” An MVT-related death or injury can involve occupants of motorized vehicles, pedestrians, pedal cyclists, or occupants of non-motorized vehicles.² In this report, MVT refers to *only* unintentional deaths and injuries. Motor vehicle traffic crashes with homicidal, suicidal, or undetermined intent and crashes that occur on private property or off roads are excluded.

Figure 1. Percent of Injury Deaths by Type: N.C. Residents, 2012

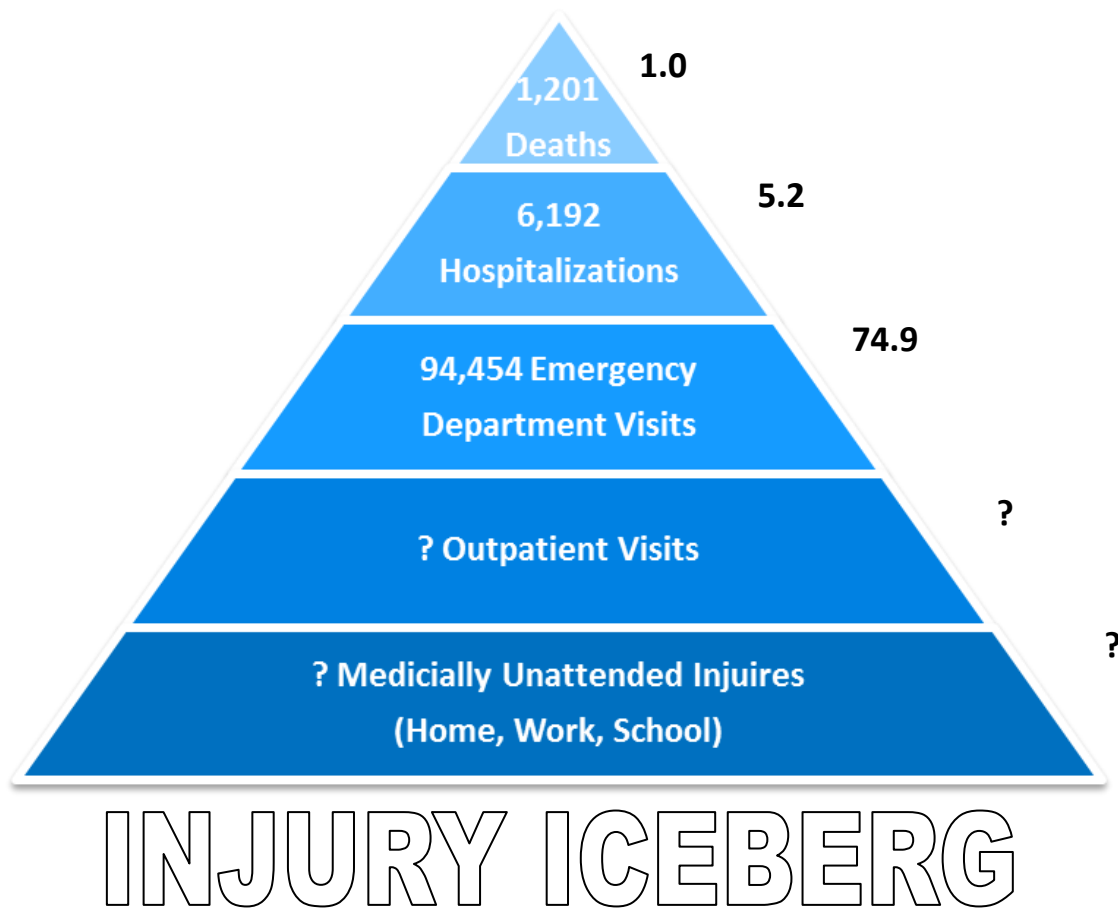


Data: N.C. State Center for Health Statistics, 2012
Analysis: Injury Epidemiology & Surveillance Unit

MVT crashes are costly in terms of lives lost, injuries sustained, and economic impact. An analysis by the CDC examined the costs of MVT crash deaths by state. North Carolina ranked 6th among all 50 states in terms of medical and work loss costs associated with MVT crash deaths with a total of \$1.5 billion crash-related death costs each year. Medical costs accounted for \$18 million of total costs, while work loss costs accounted for \$1.48 billion of the total.³

The Injury Iceberg illustrates the overall burden of MVT-related deaths and injuries in North Carolina. Deaths account for only the tip of the iceberg in regard to MVT-related injuries. In 2011 for each MVT-related death, there were approximately five hospitalizations and 755 ED visits for MVT-related injuries.^{4,5} Surveillance data are not available for outpatient clinics or for injuries that are medically unattended; however, these numbers are likely to be far higher than the number of ED visits (Figure 2).

Figure 2. The Injury Iceberg—MVT Injuries: N.C. Residents, 2011

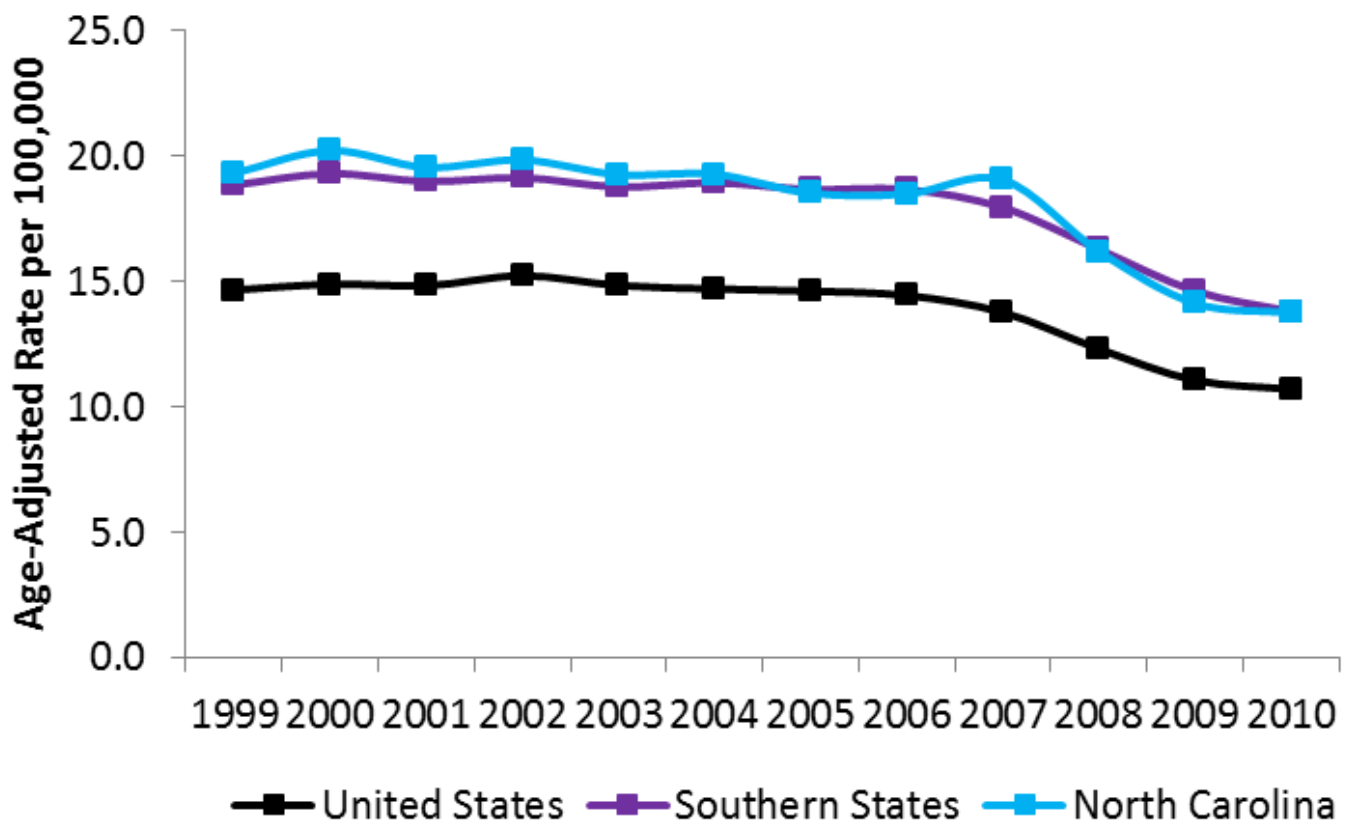


Data: Death: N.C. State Center for Health Statistics, 2011;
 Hospitalizations: N.C. State Center for Health Statistics, 2011;
 Emergency Department: NC DETECT, 2011
 Analysis: Injury Epidemiology & Surveillance Unit

In 2010, the last year that both national and state data are available from the CDC, North Carolina had a significantly higher rate of MVT-related deaths than the United States as a whole. Overall, between 1999 and 2010, rates for North Carolina, Southern states, and the United States decreased over time (Figure 3). In 2010, N.C. had the 15th highest rate of MVT-related deaths in the nation (13.7 deaths per 100,000). Mississippi had the highest rate in the nation (22.2 deaths per 100,000) while Massachusetts had the lowest (5.2 deaths per 100,000).⁶

Between 1999 and 2007, the rate of MVT-related deaths in North Carolina was relatively stable, fluctuating between 18.5 and 20.2 deaths per 100,000 N.C. residents. Beginning in 2008, the rate of MVT-related deaths dropped substantially and continued to decline through 2010.⁷ The reduction in deaths is believed to be due to many factors including rising gas prices, the economic downturn, unemployment, improvements in vehicle design, and highway safety programs.⁸

Figure 3. Comparison of Age-Adjusted Rates of MVT-Related Deaths Between the United States, Southern States*, and N.C.: 1999-2010



*Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia.
Data & Analysis: CDC WISQARS, 1999-2010

Section 2: Demographics of MVT-Related Deaths

In 2012, 1,185 North Carolina residents died from unintentional MVT-related injuries. The age-adjusted rate for N.C. was 12.1 deaths per 100,000 North Carolina residents. Table 1 provides counts and age-adjusted rates of MVT-related deaths for select populations. In North Carolina, certain populations are at a greater risk of dying from a MVT crash than other populations.

- In 2012, males were more than twice as likely to die from MVT-related injuries as females. The age-adjusted rate for males was 17.7 deaths per 100,000 while the rate for females was 6.7 deaths per 100,000.
- Rates did not vary considerably between individuals of Hispanic and non-Hispanic ethnicity.
- American Indians had the highest rate of MVT-related deaths of all racial groups examined (22.2 deaths per 100,000), nearly double the rate of whites.
- The rate of MVT-related deaths was highest among teenagers and young adults ages 15 to 24 (16.5 deaths per 100,000) followed by adults ages 25 to 34 (15.9 deaths per 100,000).

Definitions

The CDC defines a motor vehicle traffic-related incident as:

“Any vehicle incident occurring on a public highway, street, or road.”²

- MVT-related crashes must involve a motor vehicle (car, truck, van, SUV, etc.) and another motor vehicle, off-road vehicle, motorcycle, pedal cyclist, pedestrian, other transport vehicle, or object.
- If a report does not specify if a crash was traffic-related and the incident involved a motor vehicle crash, then it is assumed that the incident was traffic-related.
- If a report does not specify if a crash was traffic-related and the incident involved an off-road vehicle crash (crashes involving a motorcycle, ATV, go-cart, etc.), then it is assumed that the incident was not traffic-related.
- Fatal injuries sustained when boarding/alighting a vehicle then it is assumed that the incident was not traffic-related unless the report specifically noted that the injuries were traffic-related.

All MVT-related deaths and injuries are classified using the World Health Organization’s International Classification of Disease codes ICD-10 (deaths) and ICD-9-CM (nonfatal injuries). Supplemental information is provided in the Notes (page 28) and Glossary sections (page 29).^{9,10}

Table 1: Age-Adjusted Rates of MVT-Related Deaths by Selected Demographics: N.C. Residents, 2012

	Number	Percent	Rate [†]	95% Confidence Interval	
				Lower	Upper
Sex					
Male	844	71.2%	17.7	16.5	18.9
Female	341	28.8%	6.7	6.0	7.5
Hispanic Ethnicity					
Hispanic	79	6.7%	9.1	7.0	11.1
Non-Hispanic	1,103	93.3%	12.2	11.5	12.9
Race					
Asian	6	0.5%	*	*	*
American Indian	35	3.0%	22.2	15.0	29.4
Black	280	23.6%	12.8	11.3	14.3
Other	3	0.3%	*	*	*
White	861	72.7%	11.9	11.1	12.7
Age Group					
0-14	47	4.0%	2.5	1.8	3.2
15-24	223	18.8%	16.5	14.4	18.7
25-34	201	17.0%	15.9	13.7	18.1
35-44	182	15.4%	13.9	11.9	15.9
45-54	204	17.2%	14.9	12.9	17.0
55-64	142	12.0%	11.8	9.9	13.8
65+	186	15.7%	13.8	11.8	15.8
Total	1,185	100.0%	12.1	11.4	12.7

*<10 deaths; rate is suppressed.

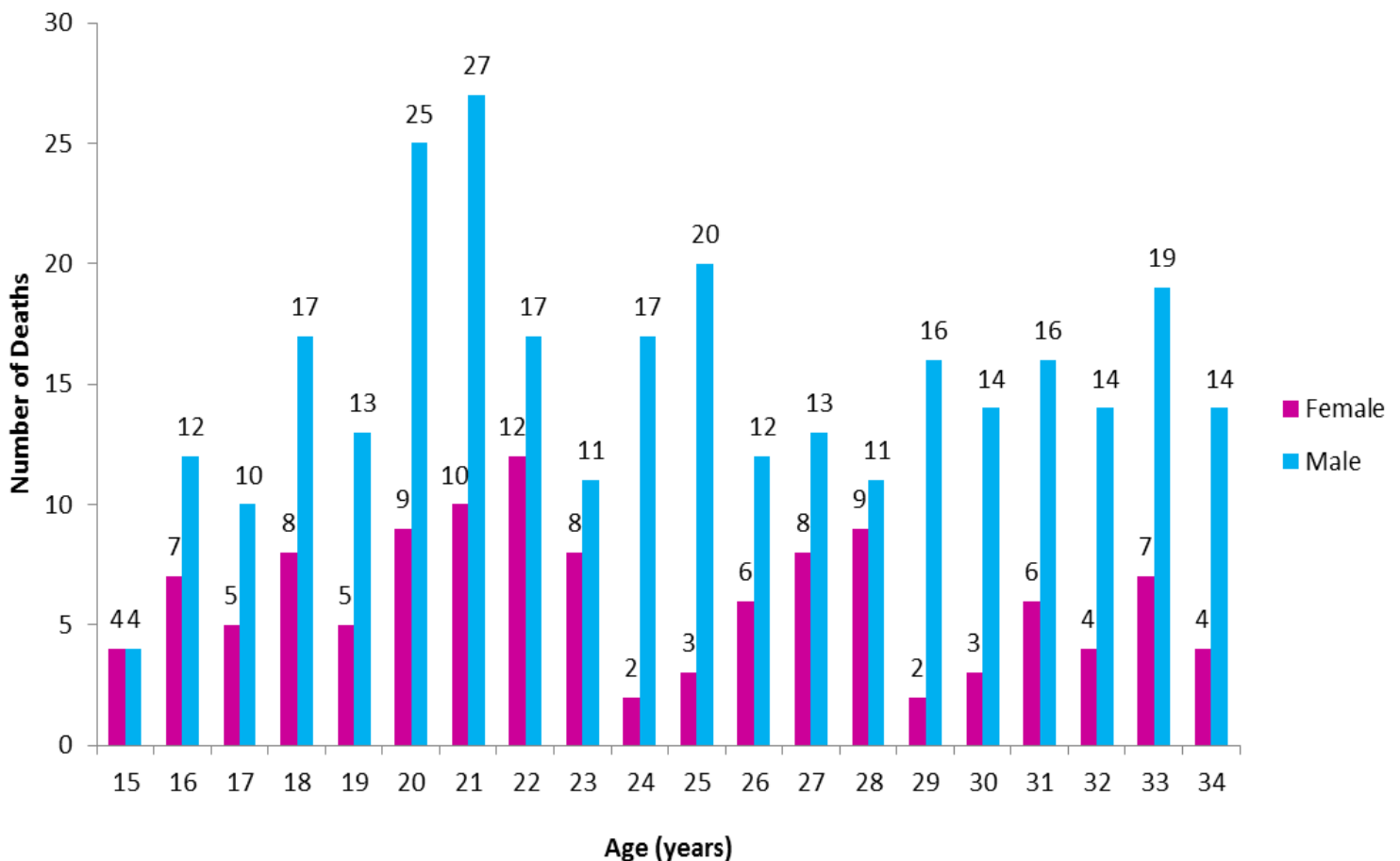
†All rates are age adjusted and per 100,000 North Carolina residents.

Data: N.C. State Center for Health Statistics, 2012
Analysis: Injury Epidemiology & Surveillance Unit

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Rates of MVT-related deaths are highest among teenagers and young adults ages 15 to 24 and ages 25 to 34. In fact, MVT-related injuries are the leading cause of death in these age groups. In 2012, for all ages, males had a higher number of deaths than females. For both males and females, the number of MVT-related deaths began to increase from ages 16 to 18 and peaked between the ages of 20 and 22. The number of deaths then remained relatively stable through age 34 despite a small increase at age 33 (Figure 4). There are many reasons why teenagers and young adults are at a higher risk of sustaining fatal injury related to an MVT crash. For example, teenagers and young adults may be more likely to engage in risky driving behavior (speeding, tailgating, etc.), drive at night, and fail to wear a seat belt.¹¹⁻¹⁶ In addition, for drivers age 15 to 19 involved in fatal crashes, 21 percent of the distracted drivers were distracted by the use of a cell phone.¹⁷

Figure 4. Number of MVT-related Deaths for Youth and Young Adults: N.C. Residents, 2012



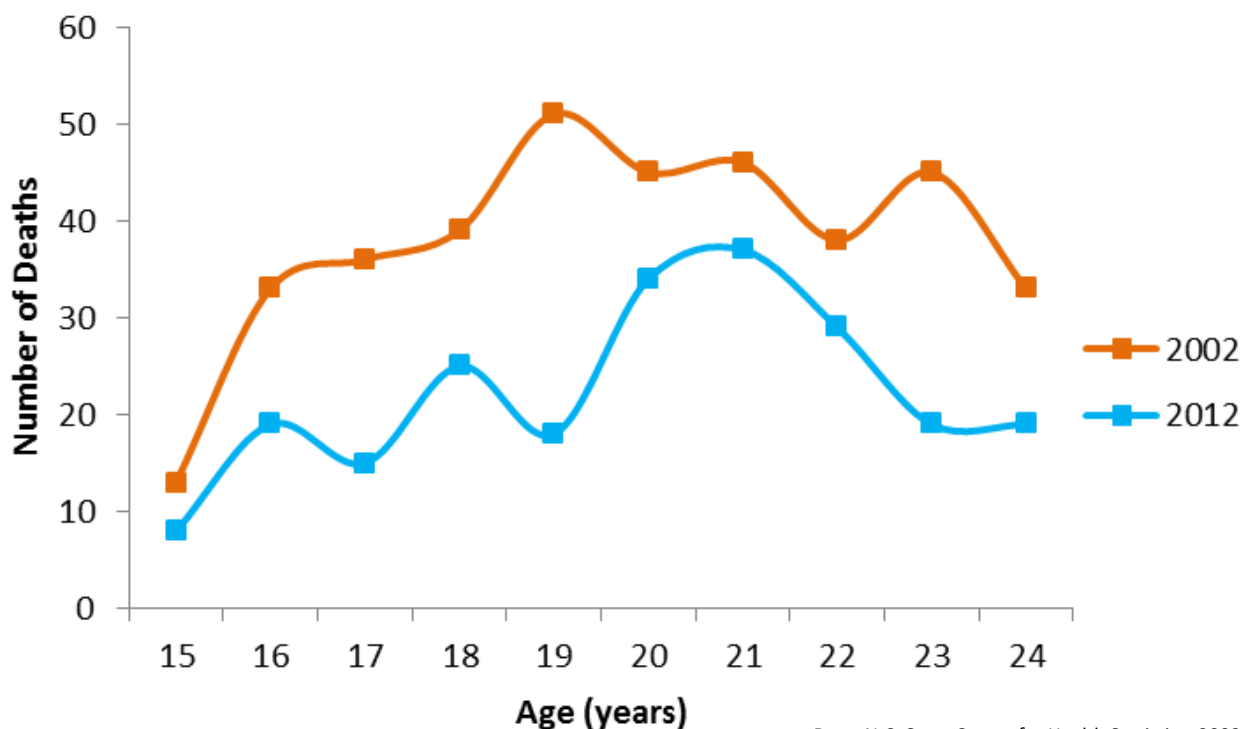
Data: N.C. State Center for Health Statistics, 2012
Analysis: Injury Epidemiology & Surveillance Unit

North Carolina has a graduated license program designed to reduce the number of MVT-related deaths among teenagers. The North Carolina Graduated Driver Licensing (GDL) system went into effect on December 1, 1997. Prior to the enactment of the GDL system, individuals ages 16 and older could drive unsupervised immediately following the passage of a driver education class, vision test, sign recognition test, and written driving test. With the enactment of the GDL, individuals between ages 15 and 18 are required to hold a Limited Driving Permit (LDP) for one year after the passage of the previously mentioned tests. Under the LDP, drivers must be supervised by a licensed parent or legal guardian while driving. For the first six months of the LDP, driving privileges are limited to the hours of 5 a.m. to 9 p.m.

After holding the LDP for one year with no moving violations or seat belt infractions, individuals between ages 16 and 18 can progress to the Limited Provisional License (LPL). Unsupervised driving is limited to the hours between 5 a.m. and 9 p.m. under the LPL, and after six months, if the driver has not received any traffic violations or is age 18 or older, the driver may advance to the Full Provisional License (FPL).¹⁸ After the passage of the N.C. GDL, rates of crashes in teenagers decreased significantly.¹⁹

In 2002, North Carolina passed a second law (NCGS 20-11(e)(4) that required holders of a LPL to restrict the number of passengers under the age of 21 to one unless the passengers are immediate family. According to the University of North Carolina Center for the Study of Young Drivers, crashes in this age group have decreased by 42 percent since the passage of the second law.²⁰ Figure 5 highlights the reduction in the number of MVT-related deaths among teenagers and young adults, particularly ages 16 to 18, since the passage of the second law in 2002.

Figure 5. Comparison of Number of MVT-Related Deaths Pre- and Post-Passage of a Graduated License Law: N.C. Residents, 2002 and 2012



Data: N.C. State Center for Health Statistics, 2002, 2012
 Analysis: Injury Epidemiology & Surveillance Unit

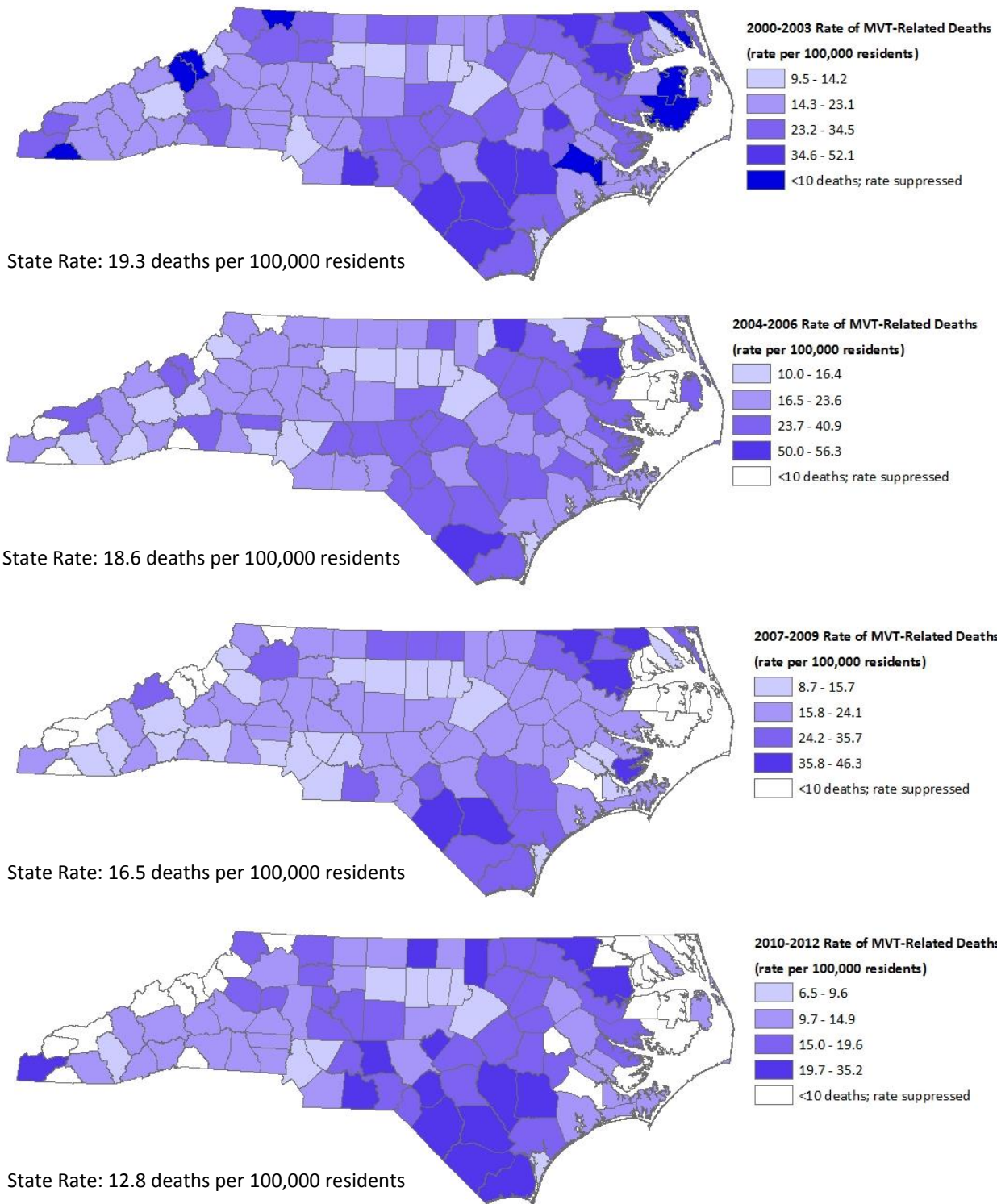
Section 3: County Rates of MVT-Related Deaths

The rates of MVT-related deaths are not distributed equally across the state of North Carolina. Figure 6 displays the crude rates of MVT-related deaths by county of residence of the decedent for the years 2000 through 2012. Counties with fewer than 10 deaths may have statistically unreliable crude rates, and thus the rates for these counties have been suppressed. Please note that the county of residence of the decedent is not necessarily the county where the MVT crash occurred.

Differences in rates between counties and over time may be due to an array of factors including differences in population, socioeconomic factors, infrastructure, and geography. Rate cut-offs were based on “natural breaks” occurring in the rates of MVT-related deaths for each time period. Caution should be used when comparing maps over time as the rate cut-offs differ between the time periods examined.

- Overall, rates of MVT-related deaths declined from 2000 to 2012. For all years, counties in the northeastern and southeastern regions of the state had the highest rates of MVT-related deaths.
- For 2010-2012, Columbus (35.2 deaths per 100,000), Bladen (32.4 deaths per 100,000), Robeson (28.9 deaths per 100,000), Montgomery (28.9 deaths per 100,000), and Sampson (27.7 deaths per 100,000) counties had the highest crude rates of MVT-related deaths.
- For 2010-2012, Jackson (8.3 deaths per 100,000), Durham (7.7 deaths per 100,000), Wake (7.6 deaths per 100,000), Orange (7.4 deaths per 100,000), and Mecklenburg (6.5 deaths per 100,000) counties had the lowest crude rates of MVT-related deaths.

Figure 6: Crude Rates of MVT-Related Deaths by County: N.C. Residents, 2000-2012



Data: N.C. State Center for Health Statistics, 2000-2012
Analysis: Injury Epidemiology & Surveillance Unit

Section 4: Hospitalizations Due to MVT-Related Injuries

As mentioned previously, deaths are only the tip of the iceberg in regard to the burden of MVT crashes. In 2008, there were more than five times as many hospitalizations (6,192 hospitalizations) due to MVT-related injuries as MVT-related deaths (1,185 deaths). Table 2 presents hospital discharge data for MVT-related injuries for 2011.

In 2011, the median hospital bill for all hospital discharges due to MVT-related injuries was \$36,867 per admission (\$456 - \$1,191,173). The total hospital charges for North Carolina were over \$400 million.

- The demographic profile of hospitalizations is similar to that of deaths. In 2011, males and young adults were at the highest risk of a hospitalization due to injuries sustained from a MVT crash.
- More than 60 percent of all hospitalizations due to MVT-related injuries were among males. The age-adjusted rate of hospitalization among males was 81.8 hospitalizations per 100,000 and among females was 46.0 hospitalizations per 100,000.
- Hospitalization rates were lowest among children and youth ages 0 to 14 (13.6 deaths per 100,000) and highest among teenagers and young adults ages 15 to 24 (96.2 deaths per 100,000).

Table 2: Age-Adjusted Rates of Hospitalizations for MVT-related Injuries by Selected Demographics: N.C Residents, 2012

	Number	Percent	Rate [†]	95% Confidence Interval	
				Lower	Upper
Sex					
Male	3,859	62.3%	81.8	79.2	84.4
Female	2,341	37.7%	46.0	44.1	47.9
Age Group					
0-14	259	4.2%	13.6	11.9	15.2
15-24	1,282	20.7%	96.2	91.0	101.5
25-34	1,014	16.4%	80.3	75.4	85.3
35-44	858	13.9%	65.2	60.8	69.5
45-54	1,016	16.4%	74.2	69.6	78.7
55-64	783	12.6%	65.9	61.3	70.6
65+	980	15.8%	76.6	71.8	81.4
Total	6,192	100.0%	63.3	61.7	64.9

[†]All rates are age-adjusted and per 100,000 North Carolina residents.

Data: N.C. State Center for Health Statistics, 2012
Analysis: Injury Epidemiology & Surveillance Unit

Section 5: Emergency Department (ED) Visits Due to MVT-Related Injuries

In 2012, there were almost 80 times as many ED visits due to MVT-related injuries (94,454 ED visits) as MVT-related deaths (1,185 deaths). There were a total of 94,454 ED visits in 2012, equal to more than ten ED visits per hour, for MVT-related injuries across the state. Table 3 presents data on ED visits for MVT-related injuries for 2012.

- The demographic profile of ED visits due to MVT-related injuries differs somewhat from that of hospitalizations and deaths. In 2012, females had a higher age-adjusted rate of ED visits due to MVT-related injuries (1,037.8 visits per 100,000) than males (933.7 visits per 100,000).
- With respect to age, the demographic profile of ED visits due to MVT-related injuries is similar to that of hospitalization and deaths. Age-adjusted ED visit rates were highest among teenagers and young adults ages 15 to 24 (1,890.1 visits per 100,000) and lowest among children ages 0 to 14 (348.1 visits per 100,000).

Table 3: Age-Adjusted Rates of Emergency Department (ED) Visits for MVT-Related Injuries by Selected Demographics: N.C. Residents, 2012

	Number	Percent	Rate [†]	95% Confidence Interval	
				Lower	Upper
Sex*					
Male	44,227	46.8%	933.7	925.1	942.4
Female	50,213	53.2%	1,037.8	1,029.0	1,046.6
Age Group[§]					
0-14	6,651	7.0%	348.1	339.7	356.4
15-24	25,477	27.0%	1,890.1	1,866.9	1,916.4
25-34	20,581	21.8%	1,623.8	1,601.6	1,646.0
35-44	15,483	16.4%	1,179.7	1,161.2	1,198.3
45-54	13,087	13.9%	957.8	941.4	974.2
55-64	7,656	8.1%	638.4	624.1	652.7
65+	5,518	5.8%	409.4	398.6	420.2
Total	94,454	100.0%	984.9	978.8	991.1

†All rates are age-adjusted and per 100,000 North Carolina residents.

*Missing 14 of unknown sex

§Missing 1 of unknown age.

Data: N.C. DETECT, 2012

Analysis: Injury Epidemiology & Surveillance Unit

Section 6: North Carolina Department of Transportation (N.C. DOT) and University of North Carolina Highway Safety Research Center (UNC-HSRC) Data on Reportable Crashes in North Carolina

The University of North Carolina Highway Safety Research Center (UNC-HSRC) collaborates with the North Carolina Department of Transportation (N.C. DOT) and North Carolina Governor's Highway Safety Research Program (GHSP) to provide summary statistics of crashes recorded in the N.C. DOT live crash database. All data are extracted from the UNC-HSRC N.C. Crash Data Query Website. UNC-HSRC data differs somewhat from death certificate data on the number of fatalities associated with motor vehicle crashes. In 2012, UNC-HSRC recorded 1,190 motor vehicle crash fatalities. In comparison, 1,185 deaths due to motor vehicle-traffic collisions were identified by the state using death certificate data.²¹

Definitions

Crashes are classified according to the N.C. DOT Division of Motor Vehicles (DMV) Crash Report Instruction Manual.²² All reportable crashes must:

- Occur on a traffic way or occur after the motor vehicle runs off a traffic way, but before events are stabilized. A traffic way is defined as any land way open to the public as a matter of right or custom for moving persons or property from one place to another.
- Result in at least one of the following criteria:
 - A fatality
 - A non-fatal injury
 - Total property damage of \$1,000 or more
 - A seized vehicle

After the completion of the crash investigation, the investigating agency has 10 days to submit the report to the N.C. DMV as required by N.C. General Statute 20-166.1.

Information collected during the investigation includes:

- General crash information (locality, weather, road surface condition, ambient light, etc.)
- Harmful event/contributing circumstances
- Occupant and non-motorist information (sex, age, seating position, etc.)
- Reporting and control information (number of vehicles involved, etc.)
- Driver/owner information (license number, drug/alcohol involvement, etc.)
- Sequence of events
- Vehicle information (make, year, estimated speed at time of crash, etc.)

According to the National Safety Council (NSC), approximately one out of 85 individuals will die in a motor vehicle crash. However, the risk of sustaining a non-fatal injury in a motor vehicle crash is far higher.²³

- In 2012, there were 213,641 reportable motor vehicle crashes in North Carolina or approximately one crash every two and a half minutes (Figure 7).
- The 213,641 reportable crashes in 2012 involved 378,065 vehicles and 541,103 people or approximately 1.8 vehicles and 2.5 people per crash (Figure 7).
- Of the 213,641 reportable crashes, 64 percent did not result in an injury (Figure 8).
- Nearly one-third of all reportable crashes involved a non-fatal injury (Figure 8).
- Less than 1 percent of all reportable crashes resulted in a fatal injury. The number of crashes involving no injury was 115 times the number of crashes involving a fatal injury, and the number of crashes involving a non-fatal injury was 59 times the number of crashes involving a fatal injury (Figure 8).

Figure 7. Number of Reportable Crashes and People/Vehicles Involved in N.C.: UNC-HSRC, 2012

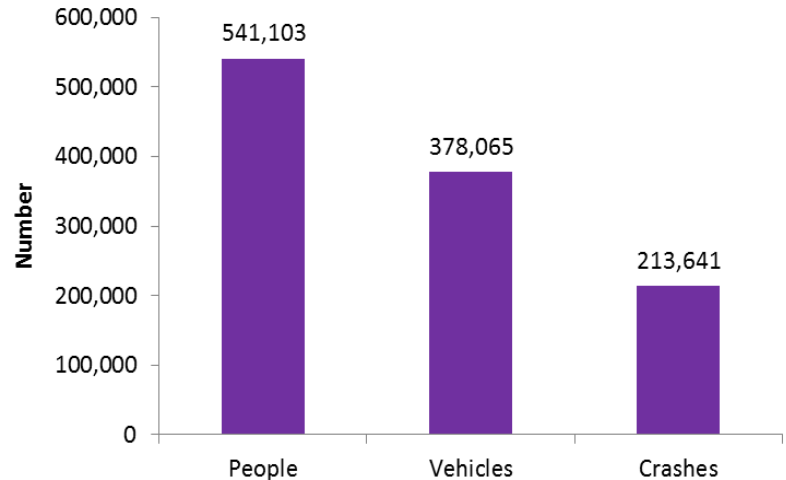
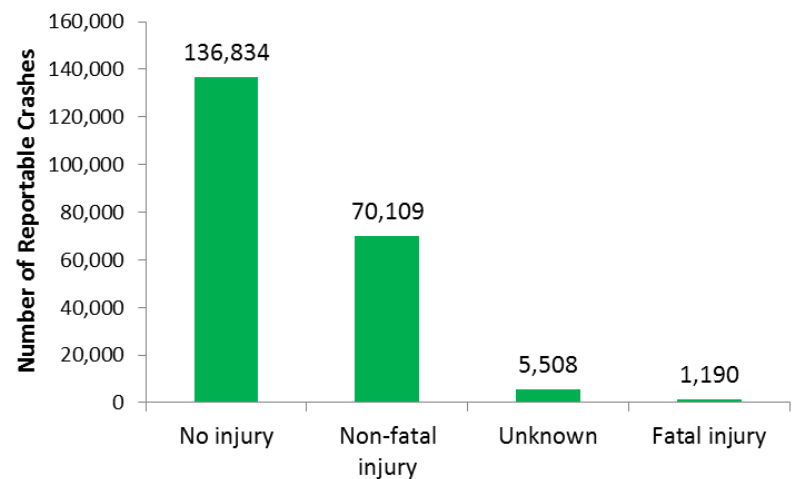


Figure 8. Severity of Reportable Crashes in N.C.: UNC-HSRC, 2012



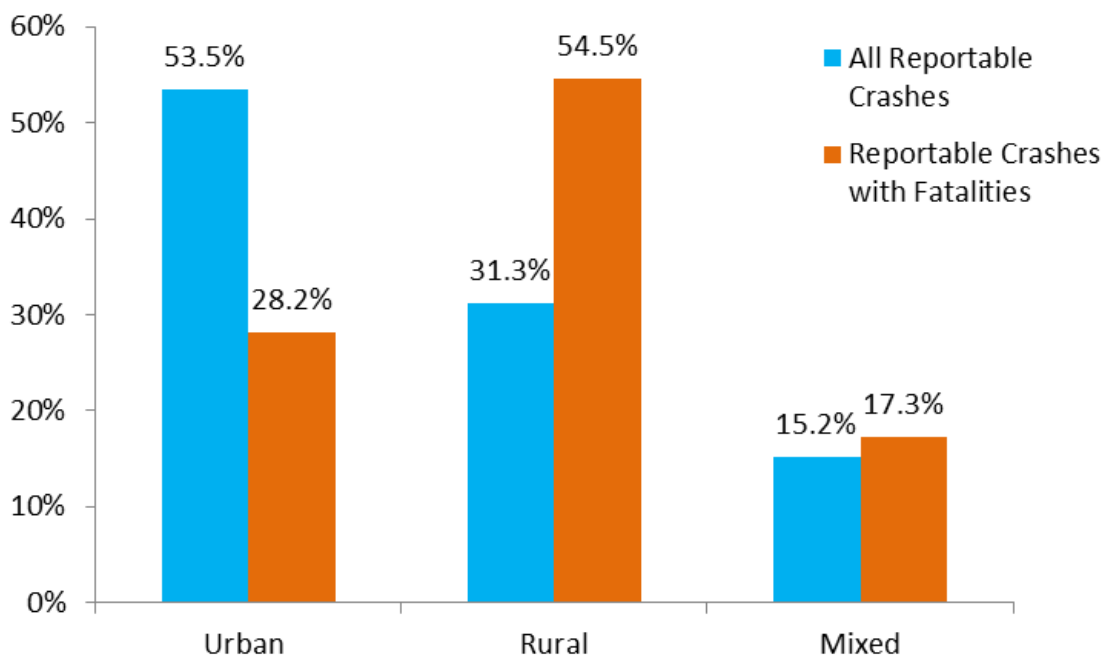
Data: UNC Highway Safety Research Council, 2012
Analysis: Injury Epidemiology & Surveillance Unit

Section 7: Locality of Reportable Crashes

National evidence suggests that the risk of being involved in a fatal motor vehicle crash is higher in rural areas than in urban areas.²⁴ Although fewer vehicle miles are traveled in rural areas and crash density is higher in urban areas, crash severity is often greater in rural areas.^{25,26} The scientific literature proposes a number of different explanations for the difference in mortality rates between rural and urban motor vehicle crashes in addition to crash severity including differences in the number of intoxicated drivers, proximity to emergency medical services, and seatbelt compliance.^{27, 28, 29}

- In 2012, 114,330 reportable crashes occurred in urban localities, 66,772 occurred in rural localities, and 32,539 occurred in mixed localities. Also in 2012, 335 fatal crashes occurred in urban localities, 649 occurred in rural localities, and 206 occurred in mixed localities.
- While more than half of all reportable crashes occurred in urban localities (53.5%), more than half of fatal crashes occurred in rural localities (54.5%)
- In 2012, of all fatal crashes involving alcohol, a greater percentage occurred in rural (53.0%) versus urban (29.9%) localities. Similarly, of all fatal crashes involving speeding, a greater percentage occurred in rural (62.6%) versus urban (21.5%) localities (data not shown).
- In 2012, of all fatal crashes involving a pedestrian, a greater percentage occurred in urban (51.3%) versus rural (29.9%) localities, though the number of fatal crashes involving a pedestrian is low (data not shown).

Figure 9. Locality* of Reportable Crashes in N.C.: UNC-HSRC, 2012



*Locality: rural is defined as <30% developed, mixed as 30% to 70% developed, and urban is defined as >70% developed.

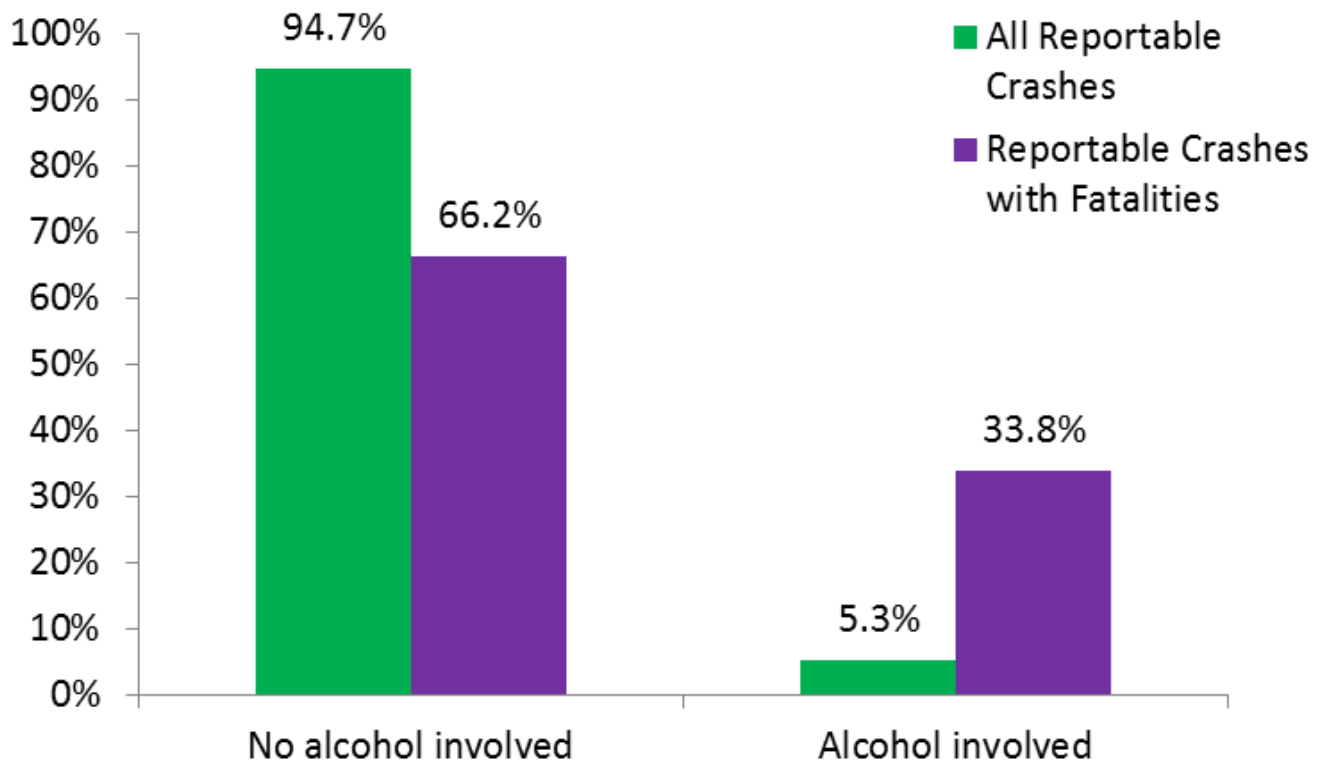
Data: UNC Highway Safety Research Council, 2012
Analysis: Injury Epidemiology & Surveillance Unit

Section 8: Alcohol Impairment in Reportable Crashes

Alcohol impairment of drivers is one of the most important contributing factors to severe and fatal motor vehicle crash injuries.³⁰ In North Carolina, alcohol is involved in only about 5 percent of reportable crashes. However, alcohol is involved in approximately one-third of all fatal crashes (Figure 10). In North Carolina, an individual is considered Driving While Impaired (DWI) if he/she has a blood alcohol concentration (BAC) of 0.08 percent or greater (0.04 percent or more if driving a commercial vehicle) or if the law enforcement officer can demonstrate that a driver's physical or mental fitness has been impaired by alcohol or drugs.³¹ Between July 1, 2012 and June 30, 2013, 51,582 individuals in North Carolina were charged with a DWI.³²

The Forensic Tests for Alcohol (FTA) Branch in the Chronic Disease and Injury Section of the N.C. Division of Public Health works to reduce the occurrence of impaired driving in North Carolina. The FTA Branch provides training to law enforcement personnel regarding the detection and apprehension of alcohol impaired drivers and has developed and implemented a Breath Alcohol Testing (BAT) Mobile Unit Program that includes six buses equipped to process impaired drivers. The BAT Mobile Units are used in conjunction with law enforcement agencies to conduct DWI check points across the state and are also involved in community outreach and educational efforts. The BAT Mobile Units are considered a highly effective and visible public health service program in educating North Carolinians about the dangers of drinking and driving.³³

Figure 10. Alcohol Involvement in Reportable Crashes in N.C.: UNC-HSRC, 2012



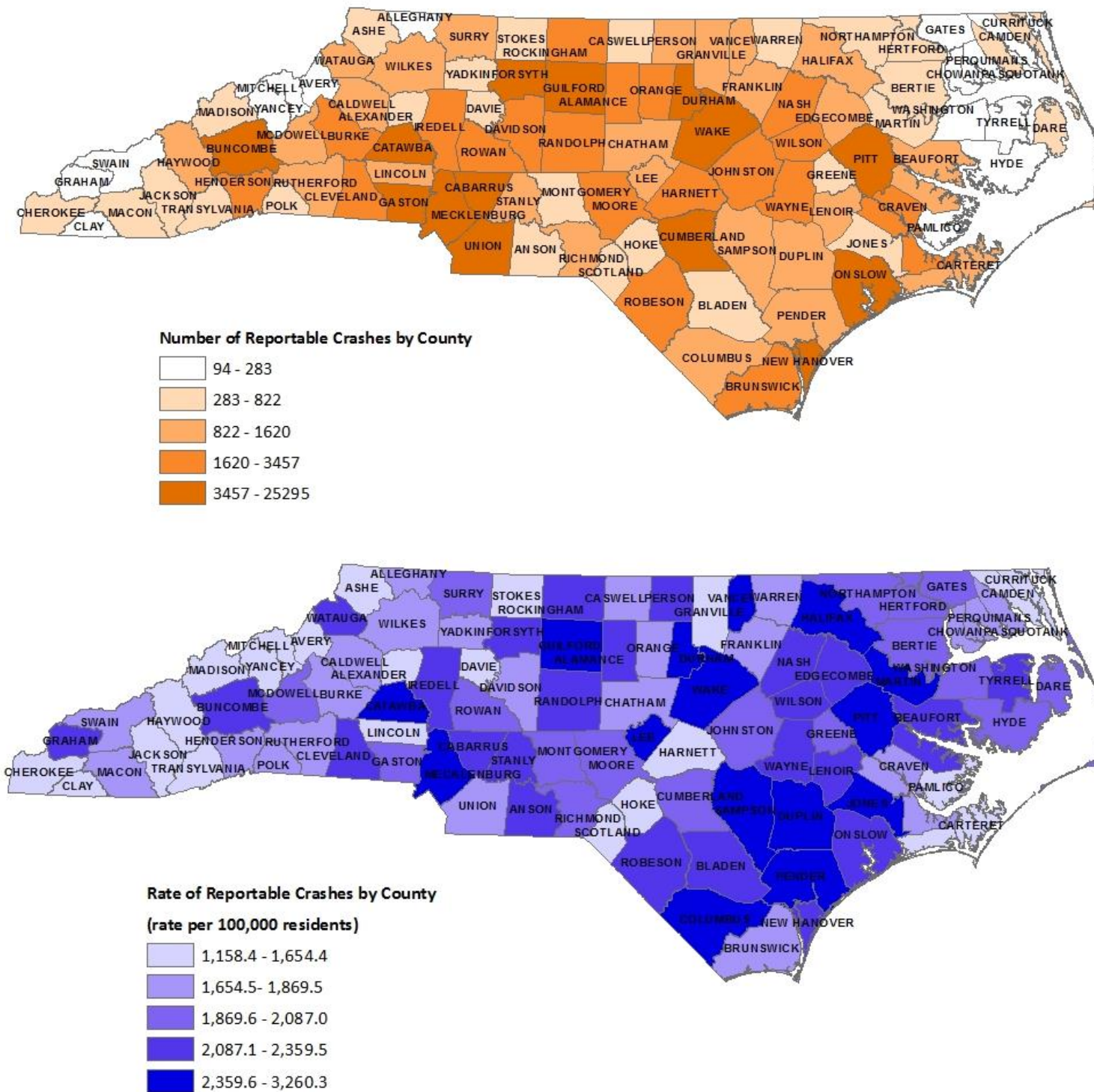
Data: UNC Highway Safety Research Council, 2012
Analysis: Injury Epidemiology & Surveillance Unit

Section 9: Reportable Crashes by County

The occurrence of reportable motor vehicle crashes is not distributed equally across the state of North Carolina. Figure 11 displays the number and crude rate of reportable motor vehicle crashes by county for 2012.

- In general, the most populous counties had the highest number of reportable crashes.
- Overall, the eastern region of North Carolina had higher rates of reportable crashes per county.
- The state rate of reportable crashes was 2,190.7 crashes per 100,000 residents in 2012.
- For 2012, Mecklenburg (25,295 crashes), Wake (23,592 crashes), Guilford (12,034 crashes), Durham (8,039 crashes), and Forsyth counties (7,724 crashes) had the highest number of reportable crashes. Tyrrell (94 crashes), Hyde (113 crashes), Clay (123 crashes), Camden (137 crashes), and Pamlico (169 crashes) counties had the lowest number of reportable crashes.
- For 2012, Jones (3,260.3 crashes per 100,000), Durham (2,874.8 crashes per 100,000), Vance (2,763.0 crashes per 100,000), Duplin (2,698.5 crashes per 100,000), and Pitt (2,685.5 crashes per 100,000) counties had the highest rates of reportable crashes. Clay (1,158.4 crashes per 100,000), Alexander (1,204.8 crashes per 100,000), Pamlico (1,292.6 crashes per 100,000), Yancey (1,355.6 crashes per 100,000), and Camden (1,357.8 crashes per 100,000) counties had the lowest rates of reportable crashes.

Figure 11. Number and Crude Rates of Reportable Crashes in N.C. by County: UNC-HSRC, 2012

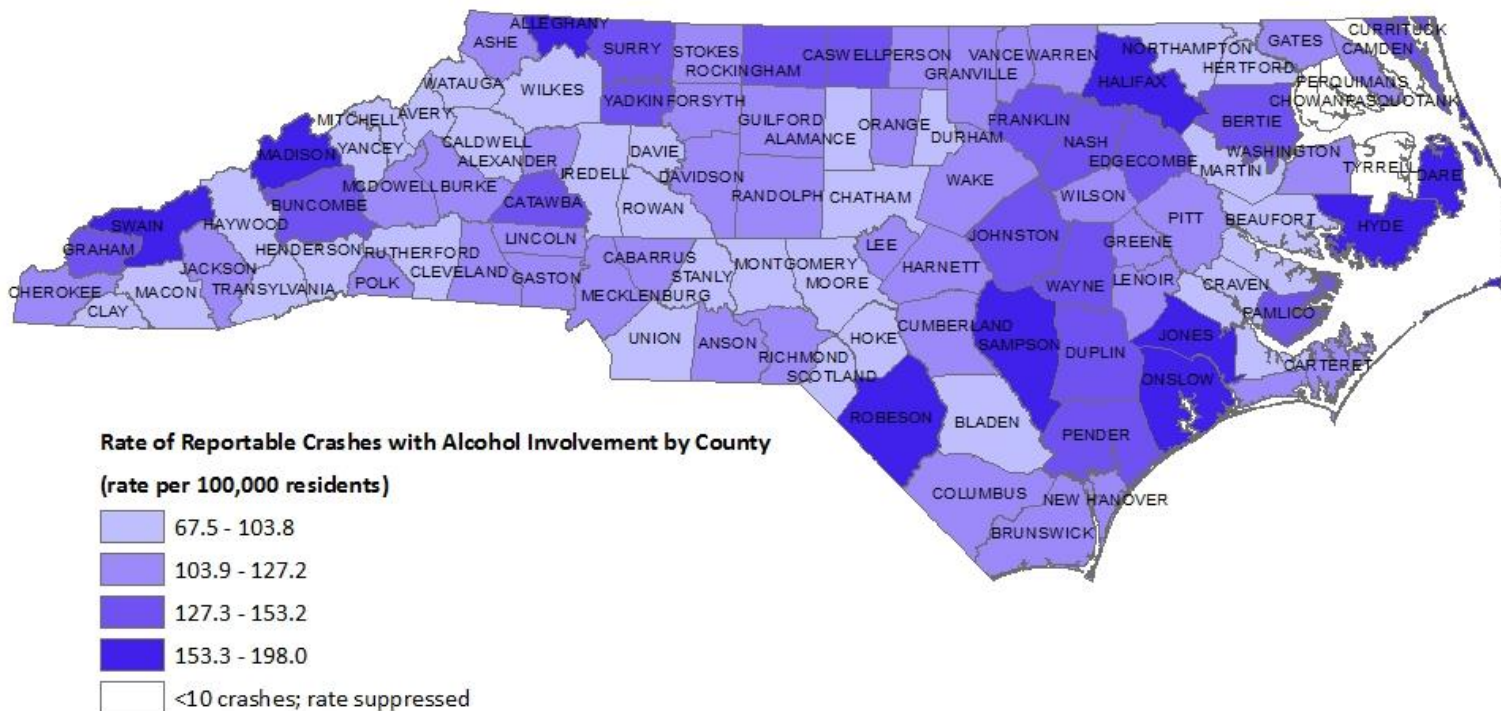


Data: UNC Highway Safety Research Council, 2012
 Analysis: Injury Epidemiology & Surveillance Unit

Figure 12 displays rates of reportable crashes with alcohol involvement by county for 2012.

- For 2012, the overall state rate of reportable crashes with alcohol involvement was 115.6 crashes per 100,000 North Carolina residents.
- Swain (198.0 crashes per 100,000), Hyde (187.7 crashes per 100,000), Martin (183.6 crashes per 100,000), Sampson (179.8 crashes per 100,000), and Alleghany (173.9 crashes per 100,000) counties had the highest crude rates of crashes with alcohol involvement.
- Madison (67.5 crashes per 100,000), Transylvania (76.1 crashes per 100,000), Northampton (79.3 crashes per 100,000), Montgomery (79.3 crashes per 100,000), and Hertford (81.8 crashes per 100,000) counties had the lowest rates of crashes with alcohol involvement.

Figure 12. Crude Rates of Reportable Crashes with Alcohol Involvement in N.C. by County: UNC-HSRC, 2012



Data: UNC Highway Safety Research Council, 2012
Analysis: Injury Epidemiology & Surveillance Unit

Section 10: Fatality Analysis Reporting System (FARS) Data on Fatal Motor Vehicle Crashes in North Carolina

The National Highway Safety Traffic Administration (NHSTA)'s Fatality Analysis Reporting System (FARS) has collected data on all fatal crashes in all 50 states, the District of Columbia, and Puerto Rico since 1975. FARS's purpose is:

“To provide an overall measure of highway safety, to help identify traffic safety problems, to suggest solutions, and to help provide an objective basis to evaluate the effectiveness of motor vehicle safety standards and highway safety programs.”³⁴

All data are extracted from the FARS Data Resource Website. FARS data differs somewhat from death certificate data on the number of fatalities associated with motor vehicle crashes. In 2012, FARS recorded 1,222 crashes associated with 1,292 deaths compared to 1,185 deaths associated with motor vehicle-traffic collisions identified by the state of North Carolina using death certificate data.³⁵

Definitions

FARS collects data on all incidents that involve a motor vehicle crash on a traffic way (a roadway open to the public) that results in a fatality (vehicle occupant or non-motorist) within 30 days of the crash.

FARS works with state FARS analysts to gather data from some or all of the following agencies:

- Police Accident Reports
- State Vehicle Registration Files
- State Driver Licensing Files
- State Highway Department Data
- Vital Statistics
- Death Certificates
- Coroner/Medical Examiner Reports
- Hospital Medical Reports
- Emergency Medical Service Reports

Data elements are reported on four separate forms:

- **Crash:** includes location, time of crash, number of vehicles involved, weather conditions, etc.
- **Vehicle:** includes type of vehicle, role of vehicle in crash, most harmful event, etc.
- **Driver:** includes driver's record and license information
- **Person:** includes age, sex, drug/alcohol involvement, injury severity, seatbelt use, etc.³⁴

Section 11: Fatalities in N.C. Motor Vehicle Crashes by Person Type

In 2012, FARS captured 1,292 deaths due to motor vehicle crashes. Table 5 displays the number of fatalities by person type.

- More than 80 percent of fatalities were among occupants of motor vehicles (82.5%). The remainder of fatalities were among non-occupants such as pedestrians and pedal cyclists (17.5%).
- Of the fatalities among vehicle occupants, the majority were among drivers (64.4%) as opposed to passengers (17.5%).
- A total of 198 (18.6%) of fatalities among vehicle occupants were among motorcyclists (data not shown.)

Table 5: Fatalities in N.C. Crashes by Person Type: FARS, 2012

	Number	Percent
Vehicle Occupants		
Drivers	833	64.4%
Passengers	226	17.5%
Unknown	8	0.5%
Subtotal	1,067	82.5%
Non-Occupants		
Pedestrians	197	15.3%
Pedal Cyclists	27	2.1%
Other/Unknown	1	0.08%
Subtotal	225	17.5%
Total	1,292	100.0%

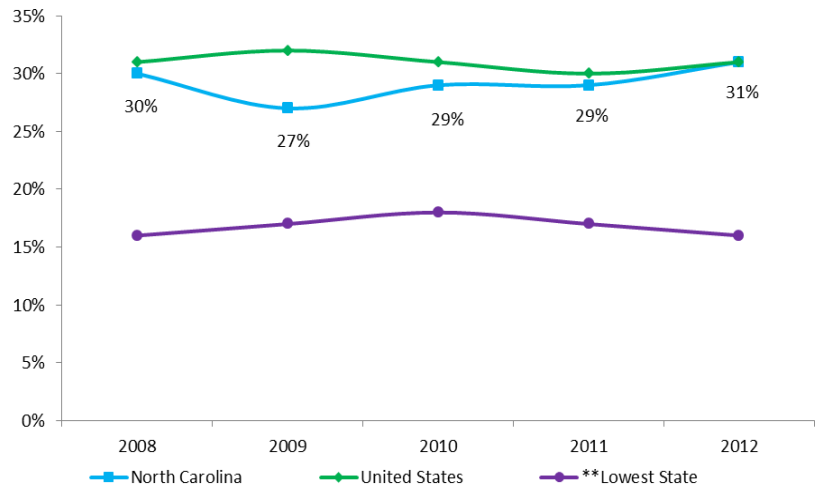
Data: Fatality Analysis Reporting System, 2012
Analysis: Injury Epidemiology & Surveillance Unit

Section 12: Alcohol Involvement in Fatal Motor Vehicle Crashes

Alcohol is a major factor in fatal motor vehicle crashes. Nationally, alcohol impaired driving contributes to 32 percent of fatal motor vehicle crashes or a total of more than 11,000 fatalities annually.³⁶ In North Carolina, according to the Behavioral Risk Factor Surveillance System (BRFSS), 3.1 percent of adults reported that they have driven one or more times in the past 30 days when they have perhaps had too much to drink.³⁷ Figures 13 and 14 present data on fatal crashes involving alcohol in North Carolina in 2012.

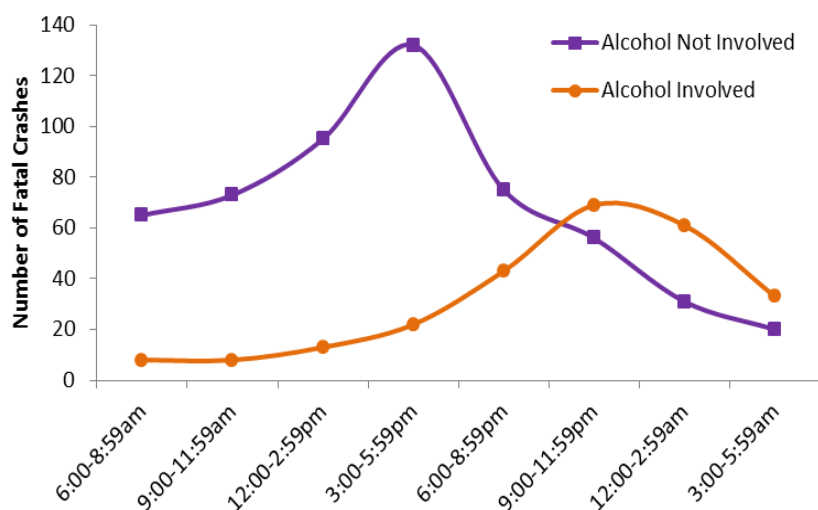
- Of the 1,292 motor vehicle crash fatalities that occurred in 2012 in North Carolina, 402 (31 percent) were caused by alcohol impaired driving (Figure 13).
- Since 2008, the percentage of motor vehicle crash fatalities due to alcohol impaired driving in North Carolina has increased slightly, but remained at or below the national percentage (Figure 13).
- Fatal motor vehicle crashes involving alcohol occurred most frequently between 9 p.m. and 2:59 a.m. whereas fatal motor vehicle crashes not involving alcohol occurred most frequently between 3 p.m. and 5:59 p.m. (Figure 14).
- Alcohol-related crashes occurred most frequently on the weekends. Over half (60.6%) of fatal crashes involving alcohol occurred on Friday, Saturday, or Sunday. Less than half of crashes without alcohol involvement occurred on the weekend (44.5%; data not shown).

Figure 13. Percentage of Motor Vehicle Crash Fatalities in N.C. due to Alcohol Impaired Driving*: FARS, 2012



*Alcohol Impaired Driving is defined as BAC .08+
 **Lowest State is defined as the state with the lowest percent of motor vehicle crash fatalities due to alcohol impaired driving, could be in different states in different years

Figure 14. Time of Fatal Motor Vehicle Crashes in N.C. by Alcohol Involvement: FARS, 2012



Data: Fatality Analysis Reporting System, 2012
 Analysis: Injury Epidemiology & Surveillance Unit

Section 13: Restraint Use in Motor Vehicle Crashes

According to the CDC, lap and shoulder seatbelts are the most effective measures to prevent death and serious injury from motor vehicle crashes.³⁸ FARS estimates back seat lap belts reduce the risk of sustaining a fatal injury by 33 percent and that front seat lap/shoulder belts reduce the risk of a fatal injury by 44 percent.³⁹ In North Carolina, according to the Behavioral Risk Factor Surveillance System (BRFSS), 90.6 percent of adults responded that they always wear a seatbelt when they operate or ride in a motor vehicle.³⁷ According to the N.C. Youth Risk Behavior Survey (YRBS), 8.1 percent of high school students report never or rarely wearing a seatbelt when riding or driving a motor vehicle.⁴⁰ Table 6 displays restraint use by injury severity.

- In 2012, of motor vehicle occupants not using a shoulder and/or lap belt or a child restraint system, 63.2 percent suffered a fatal injury in a motor vehicle crash. In addition, 31.9 percent sustained a non-fatal injury, and only 4.9 percent did not sustain an injury.
- In contrast, fatal injuries were less common among those using some type of seat belt or restraint. Fatal injuries occurred among 25.5 percent of those using a shoulder and/or lap belt and 9.9 percent of those in a child restraint system.

Table 6. Restraint Use by Injury Severity in N.C. Motor Vehicle Crashes: FARS, 2012

	<u>No Injury</u>		<u>Non-Fatal Injury</u>		<u>Fatal Injury</u>		<u>Total*</u>	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Shoulder and/or Lap Belt	512	31.2%	709	43.2%	419	25.5%	1,640	100.0%
Child Restraint System	22	27.2%	51	62.9%	8	9.9%	81	100.0%
No Seat Belt or Restraint	28	4.9%	181	31.9%	359	63.2%	568	100.0%

Data: Fatality Analysis Reporting System, 2012
 Analysis: Injury Epidemiology & Surveillance Unit
 *Unknown restraint use and helmet use not included in table.

Section 14: Conclusions

Motor vehicles are a major source of morbidity and mortality for North Carolina residents and exact a heavy toll on the life, health, and economic security of the individual, family unit, community, and state. Motor vehicle-related injuries affect all residents of North Carolina regardless of age, sex, or race. However, certain populations are at a greater risk of injury, such as youth and young adults. Despite significant decreases in the number of deaths due to motor vehicle-traffic crashes, motor vehicle-related injuries are still the second leading cause of injury death in North Carolina and the leading cause of death in young adults. To fully address this complex public health issue, organizations with backgrounds in health, advocacy, research, education, law enforcement, and policy must partner to alleviate the burden of motor vehicle traffic-related injuries in North Carolina. Additionally, continuing population-based surveillance is necessary to provide data on changing trends regarding motor vehicle-related injuries and inform such efforts.

Section 15: Additional Sources of Information

North Carolina:

North Carolina Division of Public Health, Injury and Violence Prevention Branch

Phone: (919) 707-5425

Email: beinjuryfreenc@dhhs.nc.gov

Website: www.injuryfreenc.ncdhhs.gov

North Carolina Division of Public Health, Forensic Tests for Alcohol Branch

Phone: (919) 707-5250

Email: cdi@dhhs.nc.gov

Website: www.ncpublichealth.com/chronicdiseaseandinjury/fta/

North Carolina Department of Transportation, Governor's Highway Safety Program

Phone: (919) 715-7000

Website: www.ncdot.org/programs/ghsp/

University of North Carolina Highway Safety Research Center

Phone: (919) 962-2202

Email: info@hsrc.unc.edu

Website: www.hsrc.unc.edu/index.cfm

National:

Centers for Disease Control and Prevention, National Center for Injury Prevention and Control

Phone: (800) 232-4636

Email: cdcinfo@cdc.gov

Website: www.cdc.gov/motorvehiclesafety/

National Highway Traffic Safety Administration

Phone: (888) 327-4236

Website: www.nhtsa.gov/

Section 16: Notes

Rates: All rates (unless documented otherwise) are per 100,000 North Carolina residents. Rates are not age-adjusted, unless labeled as such.

95 Percent Confidence Intervals: Data are frequently reported as point estimates with an associated 95 percent confidence interval. A confidence interval is the range of values within which the expected “true” value falls 95 percent of the time. In general, a rate with a large numerator will have a narrower 95 percent confidence interval than a rate with a small numerator.⁴¹

Population Estimates: The North Carolina State Center for Health Statistics provided population data for the years 1990-2009. These estimates originate from the National Center of Health Statistics’ Bridged Population Files.

Death Data: The North Carolina State Center for Health Statistics provided death certificate data for every death in North Carolina. Only North Carolina residents with a North Carolina county address were considered in our analyses. Deaths were limited to events in which the primary cause of death was identified as an injury. Primary cause of death was assigned with the International Classification, 10th Revision (ICD-10) codes. The coding used to classify deaths due to motor vehicle-traffic (MVT) collisions was: V02–V04 (.1, .9), V09.2, V12–V14 (.3–.9), V19 (.4–.6), V20–V28 (.3–.9), V29 (.4–.9), V30–V39 (.4–.9), V40–V49 (.4–.9), V50–V59 (.4–.9), V60–V69 (.4–.9), V70–V79 (.4–.9), V80 (.3–.5), V81.1, V82.1, V83–V86 (.0–.3), V87 (.0–.8), and V89.2.

Hospital Discharge Data: The North Carolina Center for Health Statistics provided hospital discharge data for every hospital discharge of North Carolina residents. A hospital discharge occurs after a patient leaves a hospital following admission. This data does 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). The coding used to classify hospitalizations due to motor vehicle-traffic (MVT) collisions was: E810–E819.

Emergency Department Data: The North Carolina Disease Event Tracking and Epidemiologic Collection Tool (NC DETECT) is a state system that collects and monitors emergency department (ED) for public health purposes. NC DETECT receives data on at least a daily basis from hospital emergency departments statewide to provide early detection and timely public health surveillance. As of 2010, NC DETECT captured ED records from 113 of 114 (99%) 24/7 acute care hospital-affiliated EDs in NC and captured and estimated 99.5% of all eligible ED visits. The ED data and the hospital discharge data are not mutually exclusive. Cause of injury was assigned with International Classification, 9th Revision, Clinical Modification (ICD-9-CM) External Causes of Injury codes (E Codes). The coding used to classify ED visits due to motor vehicle-traffic (MVT) collisions was: E810–E819.

Section 17: Glossary⁹

Adult: Person 18 years of age or older at date of death/injury.

Assault: Injury resulting from an act of violence where physical force by one or more persons is used with the intent of causing harm, injury, or death to another person.

Child: Person less than 18 years of age at date of death/injury.

Intent of injury: Whether or not an act that caused an injury was committed on purpose.

Intentional injury: An injury caused by a purposeful act by oneself (self-inflicted) or another individual (assault).

Mechanism (cause) of death: The reason or event that precipitates the death/injury.

Motor vehicle-traffic (MVT): A crash involving a motor vehicle on a public highway, street, or road.

North Carolina resident: A resident of North Carolina with a verifiable county of residence. All deaths and injuries reported in this report are North Carolina residents.

Other-not classifiable: An injury by a known cause that does not fit into an established category.

Pedal cyclist: An injury to a pedal cyclist caused by a collision with a human, animal, or inanimate object such as a vehicle.

Pedestrian: An injury to a person caused by a collision with a vehicle including a motor vehicle, bicycle, train, and etc.

Rate: Calculated as count x 100,000/population.

Struck: An injury caused by being hit or crushed by a human, animal, or inanimate object other than a vehicle or machinery.

Transport-other: An injury caused by a person boarding or riding a vehicle other than a motor vehicle or bicycle such as animal-drawn vehicles, ATVs, ski-lifts, and etc.

Undetermined Intent: An injury in which the medical examiner/hospital/emergency department did not have enough information to describe the intent of injury.

Unintentional injury: An injury that is not caused by an act with intent to harm oneself or another individual.

Unspecified injury: An injury in which the medical examiner/hospital/emergency department did not have enough information to describe the cause of injury.

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