

Contrasting Rural and Urban Fatal Crashes 1994 - 2003



U.S. Department
of Transportation
**National Highway
Traffic Safety
Administration**

NCSA
NHTSA's National Center for Statistics & Analysis

www.nhtsa.dot.gov
nhtsa
people saving people

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings, and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Technical Report Documentation Page

| | | | |
|---|---|--|-----------|
| 1. Report No. DOT HS 809 896 | 2. Government Accession No. | 3. Recipients's Catalog No. | |
| 4. Title and Subtitle Contrasting Rural and Urban Fatal Crashes 1994-2003 | | 5. Report Date December 2005 | |
| | | 6. Performing Organization Code NPO-121 | |
| 7. Author(s) Marilouise Burgess | | 8. Performing Organization Report No. | |
| 9. Performing Organization Name and Address Mathematical Analysis Division National Center for Statistics and Analysis National Highway Traffic Safety Administration U.S. Department of Transportation NPO-121, 400 Seventh Street, S.W. Washington, DC 20590 | | 10. Work Unit No. (TRAIS)n code | |
| | | 11. Contract of Grant No. | |
| 12. Sponsoring Agency Name and Address Mathematical Analysis Division, National Center for Statistics and Analysis National Highway Traffic Safety Administration U.S. Department of Transportation NPO-121, 400 Seventh Street, S.W. Washington, DC 20590 | | 13. Type of Report and Period Covered NHTSA Technical Report | |
| | | 14. Sponsoring Agency Code | |
| 15. Supplementary Notes | | | |
| 16. Abstract Data from the Fatality Analysis Reporting System (FARS) for the period 1994 – 2003 were used to compare the characteristics of fatal rural and urban crashes. The study found that there are approximately 42 percent more fatal crashes in rural areas compared to urban areas; however there are fewer vehicle miles traveled in rural areas than urban areas. In addition, fatal rural crashes are more likely to involve multiple fatalities, rollovers, and more trucks. Fatal rural crashes more often occur on curved roadways and have greater vehicle damage. Head-on crashes are more prevalent in rural areas than in urban areas. Finally, the length of time for emergency medical services to arrive at the scene is longer in rural areas than in urban areas. | | | |
| 17. Key Words fatalities, rural, urban, crash rate, VMT, road type, speed limit, EMS arrival, time of day, day of week, roadway profile, manner of collision, rollover, fire, trailing vehicle, alcohol involved drivers, license status, speeding, violations, maneuver, ejection, extrication, restraint use, severity, age | | 18. Distribution Statement Document is available to the public through the National Technical Information Service, Springfield, VA 22161 http://www.ntis.gov | |
| 19. Security Classif. (of this report) Unclassified | 20. Security Classif. (of this page) Unclassified | 21. No of Pages | 22. Price |

Form DOT F1700.7 (8-72)

Reproduction of completed page authorized



NHTSA's National Center for Statistics and Analysis 400 Seventh St., SW., Washington, DC 20590

Table of Contents

| | |
|--|-----------|
| 1.0 SUMMARY HIGHLIGHTS | I |
| 1.1 Highlight from the analysis of FARS data on rural versus urban fatal crashes | I |
| 2.0 INTRODUCTION | 1 |
| 2.1 Data | 1 |
| 2.2 Definition of RURAL and URBAN Crashes in FARS | 1 |
| 3.0 FATAL CRASH ANALYSIS – CRASH LEVEL | 5 |
| 3.1 Percent of Rural | 5 |
| 3.2 Fatal Crashes | 7 |
| 3.3 Vehicle Miles Traveled | 9 |
| 3.4 Fatal Crash Rate | 11 |
| 3.5 Fatalities | 13 |
| 3.6 Fatalities Rate | 15 |
| 3.7 Road Type | 17 |
| 3.8 Vehicle Miles Traveled by Road Type | 19 |
| 3.9 Fatal Crash Rate by Road Type | 20 |
| 3.10 Speed Limit | 21 |
| 3.11 EMS Arrival Comparison | 23 |
| 3.12 Hit and Run | 24 |
| 3.13 Paved Roads | 25 |
| 3.14 Time of Day | 26 |
| 3.15 Weekday versus Weekend | 27 |
| 3.16 Fatalities Per Crash | 28 |
| 3.17 Roadway Profile | 29 |
| 3.18 Light Condition | 30 |
| 3.19 Roadway Alignment | 32 |
| 3.20 Manner of Collision | 33 |
| 4.0 FATAL CRASH ANALYSIS – VEHICLE LEVEL | 37 |
| 4.1 Vehicles Involved in Fatal Crashes | 37 |
| 4.2 Vehicle Involvement Rate | 39 |
| 4.3 Fire Occurrence | 40 |
| 4.4 Vehicle Role | 41 |
| 4.5 Rollover | 43 |
| 4.6 Trailing Vehicle | 44 |

| | | |
|--|--|-----------|
| 4.7 | Vehicle Type | 45 |
| 4.8 | Vehicle Damage | 47 |
| 4.9 | Alcohol-Involved Drivers | 49 |
| 4.10 | License Status | 50 |
| 4.11 | Vehicle Speeding | 51 |
| 4.12 | Driver Violation Charged | 52 |
| 4.13 | Vehicle Maneuver | 53 |
| 5.0 FATAL CRASH ANALYSIS – PERSON LEVEL | | 57 |
| 5.1 | Persons Involved in Fatal Crashes | 57 |
| 5.2 | Person Involvement Rate | 59 |
| 5.3 | Deaths in Fatal Crashes | 61 |
| 5.4 | Fatality Rate | 63 |
| 5.5 | Ejection | 65 |
| 5.6 | Extrication | 66 |
| 5.7 | Restraint Use | 67 |
| 5.8 | Hospital (Taken to) | 69 |
| 5.9 | Individual Location and Person Type | 70 |
| 5.10 | Injury Severity | 72 |
| 5.11 | Age of Fatally Injured Persons and Survivors | 74 |
| 10.0 GLOSSARY | | 78 |

List of Tables

| | | |
|----------|---|----|
| Table 1 | Fatal Crashes by State and Percent of Rural | 5 |
| Table 2 | Fatal Crashes by Road Type | 17 |
| Table 3 | VMT by Road Type | 19 |
| Table 4 | Fatal Crashes by Speed Limit | 21 |
| Table 5 | Cumulative EMS Arrival Time Distribution, Maximum Minutes | 23 |
| Table 6 | Hit and Run | 24 |
| Table 7 | Fatal Crashes on Paved/Unpaved | 25 |
| Table 8 | Fatal Crashes by Time of Day | 26 |
| Table 9 | Fatal Crashes by Day of Week | 27 |
| Table 10 | Fatalities Per Crash | 28 |
| Table 11 | Fatal Crashes by Roadway Profile | 29 |
| Table 12 | Fatal Crashes by Light Condition | 30 |
| Table 13 | Fatal Crashes by Roadway Alignment | 32 |
| Table 14 | Fatal Crashes by Manner of Collision | 33 |
| Table 15 | Fire Occurrence | 40 |
| Table 16 | Vehicle Role | 41 |
| Table 17 | Rollover | 43 |
| Table 18 | Trailing Vehicle | 44 |
| Table 19 | Vehicle Type | 45 |
| Table 20 | Vehicle Damage | 47 |
| Table 21 | License Status | 50 |
| Table 22 | Vehicle Speeding | 51 |

| | | |
|----------|--------------------------|----|
| Table 23 | Driver Violation Charged | 52 |
| Table 24 | Vehicle Maneuver | 53 |
| Table 25 | Ejected | 65 |
| Table 26 | Extricated | 66 |
| Table 27 | Restraint Used Properly | 67 |
| Table 28 | Hospital (Taken to) | 69 |
| Table 29 | Individual Location | 70 |
| Table 30 | Injury Severity | 72 |

List of Figures

| | | |
|-----------|-------------------------------|----|
| Figure 1 | Fatal Crashes | 7 |
| Figure 2 | Fatal Crashes by Year | 8 |
| Figure 3 | Trillions of VMT | 9 |
| Figure 4 | Billions of VMT by Year | 10 |
| Figure 5 | Fatal Crash Rate | 11 |
| Figure 6 | Fatal Crash Rate by Year | 12 |
| Figure 7 | Fatalities | 13 |
| Figure 8 | Fatalities by Year | 14 |
| Figure 9 | Fatalities Rate | 15 |
| Figure 10 | Fatalities Rate by Year | 16 |
| Figure 11 | Fatal Crashes by Road Type | 18 |
| Figure 12 | VMT by Road Type | 19 |
| Figure 13 | Fatal Crash Rate by Road Type | 20 |
| Figure 14 | Fatal Crashes by Speed Limit | 22 |

| | | |
|-----------|---|----|
| Figure 15 | EMS Arrival Comparison | 23 |
| Figure 16 | Fatal Crashes by Hit and Run | 24 |
| Figure 17 | Fatal Crashes by Road Surface Type | 25 |
| Figure 18 | Fatal Crashes by Time of Day | 26 |
| Figure 19 | Fatal Crashes by Day of Week | 27 |
| Figure 20 | Fatalities Per Crash | 28 |
| Figure 21 | Crashes by Roadway Profile | 29 |
| Figure 22 | Fatal Crashes by Light Condition | 31 |
| Figure 23 | Fatal Crashes by Alignment | 32 |
| Figure 24 | Fatal Crashes by Manner of Collision | 34 |
| Figure 25 | Vehicle Involved in Fatal Crashes | 37 |
| Figure 26 | Vehicles Involved in Fatal Crashes by Year | 38 |
| Figure 27 | Vehicle Involvement Rate | 39 |
| Figure 28 | Vehicle Involvement Rate by Year | 39 |
| Figure 29 | Fire Occurrence | 40 |
| Figure 30 | Vehicle Role | 42 |
| Figure 31 | Rollover | 43 |
| Figure 32 | Trailing Vehicle | 44 |
| Figure 33 | Vehicle Type | 46 |
| Figure 34 | Vehicle Damage | 48 |
| Figure 35 | Distribution of Blood Alcohol Concentration of Drivers Involved In Fatal Crashes by Location | 49 |
| Figure 36 | License Status | 50 |
| Figure 37 | Vehicle Speeding | 51 |

| | | |
|-----------|---|----|
| Figure 38 | Driver Violation Charged | 52 |
| Figure 39 | Vehicle Maneuver | 53 |
| Figure 40 | Persons involved in Fatal Crashes | 57 |
| Figure 41 | Persons involved in Fatal Crashes by Year | 58 |
| Figure 42 | Individual Involvement Rate | 59 |
| Figure 43 | Individual Involvement Rate by Year | 60 |
| Figure 44 | Deaths in Fatal Crashes | 61 |
| Figure 45 | Deaths in Fatal Crashes by year | 62 |
| Figure 46 | Fatality Rate | 63 |
| Figure 47 | Fatality Rate by Year | 64 |
| Figure 48 | Ejection | 65 |
| Figure 49 | Extricated | 66 |
| Figure 50 | Restraint Use | 68 |
| Figure 51 | Hospital (Taken to) | 69 |
| Figure 52 | Individual Location | 71 |
| Figure 53 | Person Type | 71 |
| Figure 54 | Injury Severity | 73 |
| Figure 55 | Fatalities by Individual's Age | 74 |
| Figure 56 | Survivors by Individual's Age | 74 |

1.0 SUMMARY HIGHLIGHTS

This document is an update of the 1996 report, *Rural and Urban Crashes: A Comparative Analysis (DOT HS 808 450)*. Like the earlier report, it is a statistical abstract concerned with differences and similarities between rural and urban crashes rather than a paper, with a specific agenda. The purpose of this report is to provide a reference tool for those who wish to examine rural and urban fatal crashes, rather than support a particular policy. For this reason, highlights of the results are summarized, but there are no conclusions or recommendations. Furthermore, for brevity, the analysis has been purposely limited to examining a single variable at a time. In so doing, this work points to several areas for possible future investigation. An in-depth study of the rural crash problem examining the interaction of various factors may be warranted. There are, however, two results that are confirmed by virtually all of the measures of effectiveness used in this report: First, considerably more crashes occur in rural areas than urban areas, and second, rural crashes are more severe, cause greater injury, and pose a more difficult challenge to the highway safety community than do urban crashes.

Data from the Fatal Accident Reporting System (FARS) were used to examine the similarities and differences between rural and urban fatal crashes.

1.1 Highlights from the analysis of FARS data on rural versus urban fatal crashes are:

There are approximately 35 percent more crashes, vehicles involved, individuals involved, and deaths in rural areas than in urban areas (Figures 1, 2, 19, 25, 26, 40, 41, 44, and 45). However, there are fewer vehicle miles traveled, VMT, in rural areas, 11.6 trillion from 1990 to 2001, than in urban areas, 17.9 trillion (Figures 3 and 4). These combine to provide higher rural involvement rates per 100 million vehicle miles traveled, for all levels of the study (Figures 5, 6, 27, 28, 42, 43, 46, and 47).

Rural areas with 55 mph and urban areas with 35 mph speed limits have more fatal crashes on roadways than any other speed limit. Rural roadways with a 55 mph speed limit account for 50 percent of rural fatal crashes, the corresponding urban roadways with a 35 mph speed limit account for 19 percent of urban fatal crashes (Table 4 and Figure 14).

The time for emergency medical services to reach the scene of a fatal crash, once they have been notified, is usually longer in rural areas than in urban areas. The largest difference occurs for responses within ten minutes. However, the effect is measurable for all response times (Table 5 and Figure 15).

Rural fatal crashes result in multiple deaths 11 percent of the time, whereas urban fatal crashes result in multiple deaths 7 percent of the time (Table 10 and Figure 20).

Vehicle rollovers occur in 24 percent of rural fatal crashes, but only 10 percent of urban fatal crashes (Table 17 and Figure 31).

A larger portion of rural fatal crashes involve trucks, both light trucks and large trucks, 37 percent and 10 percent respectively, than urban fatal crashes with a light/large trucks involvement rate of 30 percent and 6 percent respectively. The results, for cars and motorcycles, are in the opposite direction (Table 19 and Figure 33).

A larger portion of vehicles in rural fatal crashes suffers severe vehicle damage, 79 percent, than urban fatal vehicles, 64 percent (Table 20 and Figure 34).

A larger portion of vehicles in rural fatal crashes are involved in head-on collisions, 25 percent, than in urban crashes, 14 percent (Table 14 and Figure 24).

A larger portion of individuals are ejected in rural fatal crashes, 17percent, than urban crashes, 8 percent (Table 25 and Figure 48).

Not all individuals involved in a fatal crash are killed. Of the individuals not killed in the crash, a larger portion of individuals in rural fatal crashes are injured than in urban fatal crashes (Table 27 and Figure 54).

Approximately 40 percent of individuals involved in fatal rural crashes are passengers compared to 33 percent in urban crashes. There is a corresponding reduction in the portion of pedestrian fatalities in rural crashes, 3 percent, as opposed to 9 percent for urban fatal crashes (Table 29 and Figures 52 and 53).

The pattern for death by age for rural and urban deaths is similar. Both curves have a steep rise at the ages of 18 and 21. The rural deaths obtain their maximum of 3.5 percent at 18 years, the urban deaths obtain their maximum at 21 years, 2.9 percent. The general pattern holds for all years of the study (Figure 55).

2.0 INTRODUCTION TO ANALYSIS OF DATA FROM FARS

2.1 Data

The objective of this section of the study is to provide a statistical abstract of the differences and similarities between rural and urban fatal crashes, as a function of crash, vehicle and individual characteristics. This study uses data from the Fatal Accident Reporting System (FARS). FARS consists of a census of all fatal crashes that occurred on a public roadway, and is therefore not a representative sample of all crashes. Fatalities that occurred within thirty days of the crash are included in FARS.

Data are collected and therefore reported in FARS on three different levels. FARS' accident level provides information that pertains to all vehicles and individuals involved in the crash, e.g., time of the crash. The vehicle or driver level contains information on each individual vehicle, e.g., type of vehicle, including its driver. The person level contains information about each individual in the crash, which includes each occupant of any vehicle involved in the crash and any injured non-occupant of any injury severity. From 1994 to 2003 there have been a total of 374,691 fatal crashes included in FARS. These crashes involved 569,014 vehicles 1,008,301 people, and resulted in 417,477 deaths that can be identified as either occurring in rural or urban locations.

This report makes extensive use of univariate and bivariate tables, which examine the effects of the data one or two variables at a time. These tables contain point estimates, as well as the lowest and highest yearly percent for each category. These tables often provide useful insight to understanding the differences and similarities between rural and urban crashes. Yet the possibility exists that the results may be confounded with one or more variables. This is a limitation of this type of analysis, which may be overlooked.

2.2 Definition of RURAL and URBAN Crashes in FARS

The fatal crash data are partitioned by rural and urban using information provided to FARS by the Federal Highway Administration. The FARS variable ROAD_FNC, from 1994, are used to partition the rural/urban data.

**FATAL
CRASH
ANALYSIS
-
CRASH
LEVEL**

3.0 FATAL CRASH ANALYSIS - CRASH LEVEL

3.1 Percent of Rural

Table 1 presents the percent of rural fatal crashes by jurisdiction from 1994 to 2003, which are the basic data, used throughout this report.

| Table 1 Fatal Crashes by State and Percent of Rural ¹ | | | | | | | | | | |
|---|------|------|------|------|------|----------------|----------------|----------------|------|----------------|
| State | Year | | | | | | | | | |
| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
| Alabama | 68.9 | 66.0 | 67.9 | 62.4 | 63.6 | 69.9 | 69.6 | 70.0 | 73.8 | 66.6 |
| Alaska | 72.9 | 64.0 | 72.2 | 70.6 | 63.5 | 67.1 | 64.5 | 58.8 | 48.7 | 61.9 |
| Arizona | 52.7 | 46.3 | 49.7 | 48.7 | 51.5 | 50.6 | 51.0 | 48.3 | 50.1 | 53.8 |
| Arkansas | 80.9 | 80.7 | 80.7 | 79.1 | 76.0 | 77.8 | 78.4 | 78.1 | 76.3 | 75.7 |
| California | 39.8 | 40.8 | 37.9 | 39.7 | 40.4 | 40.0 | 36.6 | 37.7 | 40.1 | 38.0 |
| Colorado | 57.9 | 59.1 | 58.0 | 57.7 | 60.8 | 61.8 | 54.3 | 61.5 | 57.0 | 57.0 |
| Connecticut | 29.9 | 27.2 | 26.7 | 31.1 | 26.1 | 27.4 | 26.8 | 26.2 | 15.9 | 20.9 |
| Delaware | 61.0 | 51.8 | 50.5 | 57.5 | 53.8 | 50.5 | 57.8 | 50.4 | 63.2 | 51.9 |
| Dist. Of Col. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | - ² | - ² | - ² | 0.0 | - ² |
| Florida | 44.4 | 44.4 | 43.3 | 44.2 | 44.8 | 45.5 | 46.8 | 46.3 | 44.0 | 48.5 |
| Georgia | 55.3 | 57.3 | 58.3 | 57.2 | 59.3 | 58.3 | 55.5 | 56.3 | 59.9 | 55.6 |
| Hawaii | 36.4 | 33.9 | 46.3 | 41.9 | 42.5 | 52.2 | 35.3 | 46.2 | 33.0 | 35.9 |
| Idaho | 84.0 | 83.7 | 82.5 | 88.2 | 90.6 | 85.7 | 85.1 | 83.1 | 80.0 | 83.5 |
| Illinois | 47.0 | 44.9 | 41.5 | 42.0 | 41.2 | 42.6 | 38.0 | 40.9 | 38.9 | 43.9 |
| Indiana | 58.9 | 58.6 | 59.2 | 68.0 | 68.1 | 70.2 | 58.8 | 78.5 | 79.8 | 66.6 |
| Iowa | 74.7 | 78.7 | 79.8 | 75.7 | 76.4 | 79.2 | 76.9 | 75.3 | 76.9 | 74.6 |
| Kansas | 75.9 | 72.8 | 76.7 | 72.1 | 71.1 | 72.0 | 77.8 | 73.6 | 75.1 | 72.9 |
| Kentucky | 82.5 | 80.5 | 75.3 | 79.8 | 77.7 | 80.0 | 75.6 | 75.3 | 75.7 | 77.3 |
| Louisiana | 75.6 | 72.0 | 69.3 | 64.1 | 67.3 | 69.5 | 70.7 | 67.8 | 66.8 | 65.7 |
| Maine | 77.1 | 79.4 | 83.4 | 81.4 | 81.8 | 81.5 | 82.2 | 85.3 | 90.9 | 94.1 |
| Maryland | 39.4 | 44.6 | 39.2 | 45.9 | 40.1 | 39.2 | 40.0 | 41.7 | 40.7 | 43.2 |
| Massachusetts | 21.0 | 19.1 | 22.7 | 19.5 | 25.5 | 26.2 | 20.0 | 19.5 | 19.6 | 20.0 |
| Michigan | 50.4 | 50.5 | 53.5 | 50.4 | 55.8 | 49.9 | 51.1 | 52.5 | 56.2 | 48.3 |
| Minnesota | 67.0 | 69.7 | 68.0 | 69.9 | 70.8 | 73.5 | 71.1 | 66.9 | 72.2 | 69.9 |

¹ Partitioning fatal crash data between rural and urban locations is dependent on the procedures used within each state or jurisdiction and can change over time. Occasionally as with all large data sets, some crashes may be miscoded. However, although one needs to be aware of possibility of miscoded data, these relatively rare crashes may reduce the perceived difference between rural and urban crashes but do not substantially change the results of this study.

² The percent of rural crashes is suppressed due to suspected miscoding of some crashes.

Table 1 (Continued)
Fatal Crashes by State and Percent of Rural

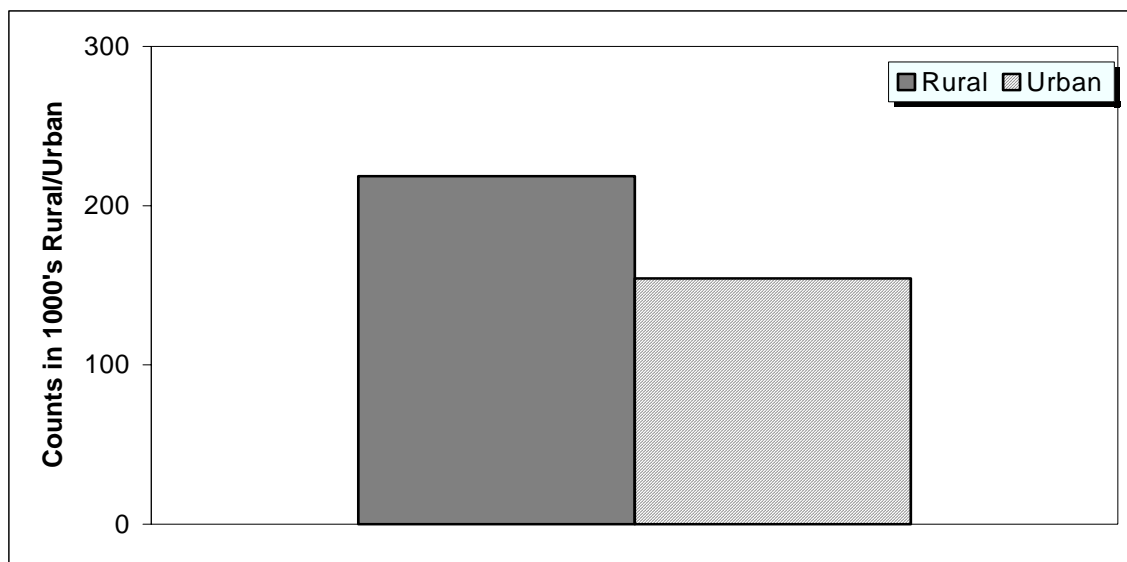
| State | Year | | | | | | | | | |
|----------------|------|------|------|------|------|------|------|------|------|------|
| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
| Mississippi | 79.7 | 79.3 | 83.3 | 98.8 | 98.3 | 99.0 | 99.6 | 99.7 | 99.0 | 75.3 |
| Missouri | 69.2 | 68.5 | 68.0 | 67.9 | 69.3 | 71.4 | 69.4 | 64.6 | 70.4 | 70.1 |
| Montana | 95.6 | 90.9 | 89.9 | 93.3 | 88.9 | 90.7 | 93.1 | 95.5 | 92.2 | 95.4 |
| Nebraska | 76.9 | 82.7 | 77.9 | 80.8 | 81.5 | 83.1 | 83.9 | 72.1 | 81.3 | 79.0 |
| Nevada | 51.5 | 51.3 | 44.8 | 44.7 | 51.7 | 47.9 | 39.8 | 45.3 | 43.0 | 37.9 |
| Nebraska | 76.9 | 82.7 | 77.9 | 80.8 | 81.5 | 83.1 | 83.9 | 72.1 | 81.3 | 79.0 |
| Nevada | 51.5 | 51.3 | 44.8 | 44.7 | 51.7 | 47.9 | 39.8 | 45.3 | 43.0 | 37.9 |
| New Hampshire | 63.8 | 62.6 | 62.4 | 72.5 | 77.4 | 66.9 | 68.4 | 69.4 | 71.8 | 69.0 |
| New Jersey | 31.5 | 25.0 | 21.8 | 27.9 | 24.3 | 26.8 | 24.0 | 23.2 | 23.8 | 24.4 |
| New Mexico | 70.6 | 73.6 | 69.7 | 75.8 | 76.2 | 75.5 | 73.1 | 70.8 | 67.3 | 73.0 |
| New York | 35.5 | 33.3 | 40.7 | 48.1 | 59.2 | 55.9 | 55.9 | 57.4 | 43.6 | 38.0 |
| North Carolina | 70.4 | 70.2 | 69.8 | 68.3 | 63.9 | 60.4 | 63.2 | 67.6 | 72.0 | 73.2 |
| North Dakota | 81.6 | 87.7 | 88.8 | 89.9 | 87.3 | 89.1 | 81.3 | 95.8 | 86.9 | 81.1 |
| Ohio | 60.0 | 59.0 | 58.4 | 57.4 | 59.6 | 62.9 | 38.9 | 61.6 | 65.1 | 69.6 |
| Oklahoma | 71.1 | 72.7 | 70.1 | 71.3 | 71.7 | 70.8 | 73.2 | 71.6 | 71.7 | 72.6 |
| Oregon | 70.2 | 71.0 | 71.4 | 69.9 | 74.6 | 71.4 | 78.1 | 73.6 | 77.1 | 72.5 |
| Pennsylvania | 55.2 | 53.9 | 53.4 | 54.7 | 55.8 | 57.8 | 60.5 | 54.4 | 61.1 | 64.6 |
| Rhode Island | 21.0 | 15.6 | 18.5 | 18.2 | 17.1 | 15.3 | 15.1 | 14.1 | 19.8 | 17.7 |
| South Carolina | 84.1 | 87.6 | 91.2 | 89.3 | 84.4 | 85.4 | 87.1 | 89.1 | 89.1 | 89.6 |
| South Dakota | 89.4 | 84.3 | 85.9 | 90.6 | 89.9 | 86.0 | 92.0 | 89.0 | 89.9 | 91.9 |
| Tennessee | 57.3 | 63.3 | 60.8 | 57.6 | 62.7 | 63.6 | 65.3 | 63.9 | 62.5 | 58.6 |
| Texas | 53.5 | 52.2 | 54.9 | 54.9 | 54.7 | 56.1 | 54.9 | 53.9 | 53.9 | 57.3 |
| Utah | 62.3 | 61.8 | 74.3 | 80.6 | 77.9 | 96.2 | 94.7 | 74.0 | 70.8 | 74.8 |
| Vermont | 89.9 | 88.4 | 86.5 | 87.5 | 83.0 | 89.0 | 91.8 | 91.7 | 91.3 | 84.1 |
| Virginia | 62.9 | 65.6 | 61.9 | 65.3 | 61.8 | 63.0 | 59.8 | 61.9 | 60.6 | 63.5 |
| Washington | 59.7 | 58.5 | 59.4 | 59.3 | 53.1 | 60.1 | 56.1 | 59.0 | 64.8 | 62.7 |
| West Virginia | 82.4 | 81.8 | 86.3 | 86.3 | 82.4 | 82.2 | 84.5 | 85.1 | 85.8 | 82.3 |
| Wisconsin | 75.9 | 77.2 | 77.4 | 76.2 | 75.9 | 77.5 | 75.3 | 78.2 | 75.2 | 76.0 |
| Wyoming | 84.6 | 84.8 | 81.0 | 88.9 | 87.6 | 87.0 | 95.5 | 87.7 | 84.1 | 80.1 |
| U.S. Total | 57.0 | 56.9 | 57.1 | 58.4 | 59.4 | 60.0 | 58.1 | 58.6 | 59.1 | 58.5 |
| Puerto Rico | 37.8 | 39.2 | 37.7 | 37.1 | 39.1 | 38.4 | 41.5 | 39.4 | 49.4 | 47.3 |

Source: NCSA, NHTSA, FARS 1994-2003

3.2 Fatal Crashes

From 1994 to 2003 there were 218,539 rural fatal crashes and 154,199 urban fatal crashes for a total of 374,691 fatal crashes; see Figure 1. There are approximately 42 percent more rural crashes than urban crashes. To compare the effects of a factor on rural and urban crashes the proportion or percentage that have a particular characteristic are compared.

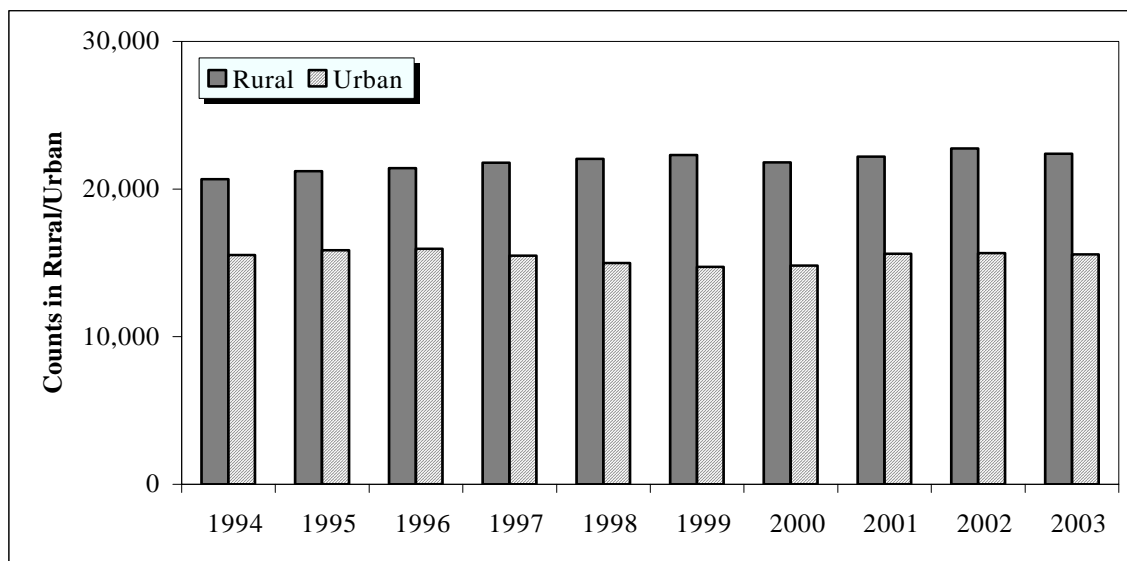
Figure 1
Fatal Crashes



Source: NCSA, NHTSA, FARS 1994-2003

It is interesting to examine these data on a yearly basis. The lowest number of rural fatal crashes, 20,671, occurred in 1994, the highest number of rural fatal crashes, 22,758, occurred in 2002. The average number of rural fatal crashes from 1994 to 2003 was 21,854, fatal crashes per year. The lowest number of urban fatal crashes, 14,740, occurred in 1999, the highest number of urban fatal crashes, 15,957, occurred in 1996. The average number of urban fatal crashes from 1994 to 2003 was 15,420, fatal crashes per year. Figure 2 shows the annual fatal crashes for rural and urban locations.

Figure 2
Fatal Crashes by Year

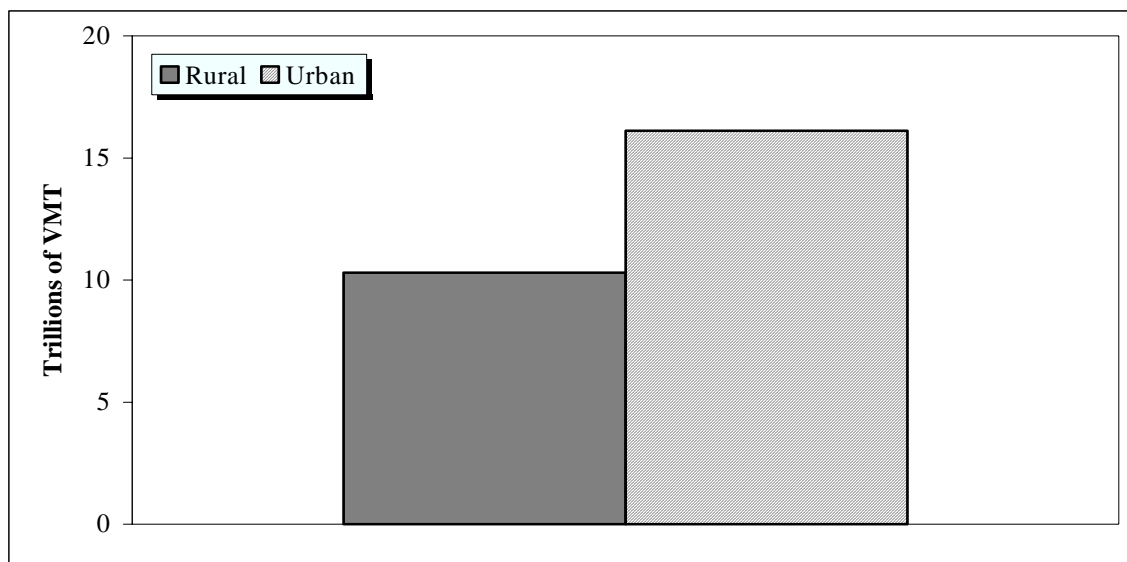


Source: NCSA, NHTSA, FARS 1994-2003

3.3 Vehicle Miles Traveled

Data from the Federal Highway Administration on rural and urban vehicle miles traveled (VMT) shows that from 1994 to 2003 10.3 trillion miles were driven on rural roads; during this same time period, 16.1 trillion miles were driven on urban roads. Note that although most of the fatal crashes occurred in rural areas, most of the vehicle miles traveled occurred in urban areas; see Figure 3.

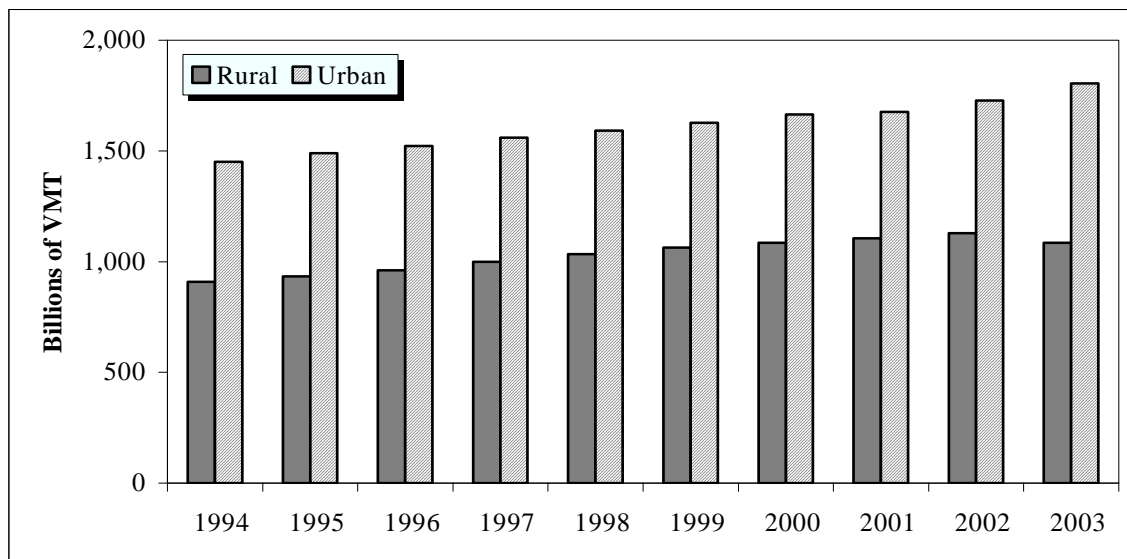
Figure 3
Trillions of VMT



Source: FHWA, VMT data 1994-2003

The pattern of VMT by year reveals an increasing trend over time. In particular, although both rural and urban VMT increase over time, the urban VMT has increased at a higher rate. As a result, the spread between rural and urban VMT has increased over the years; see Figure 4.

Figure 4
Billions of VMT by Year

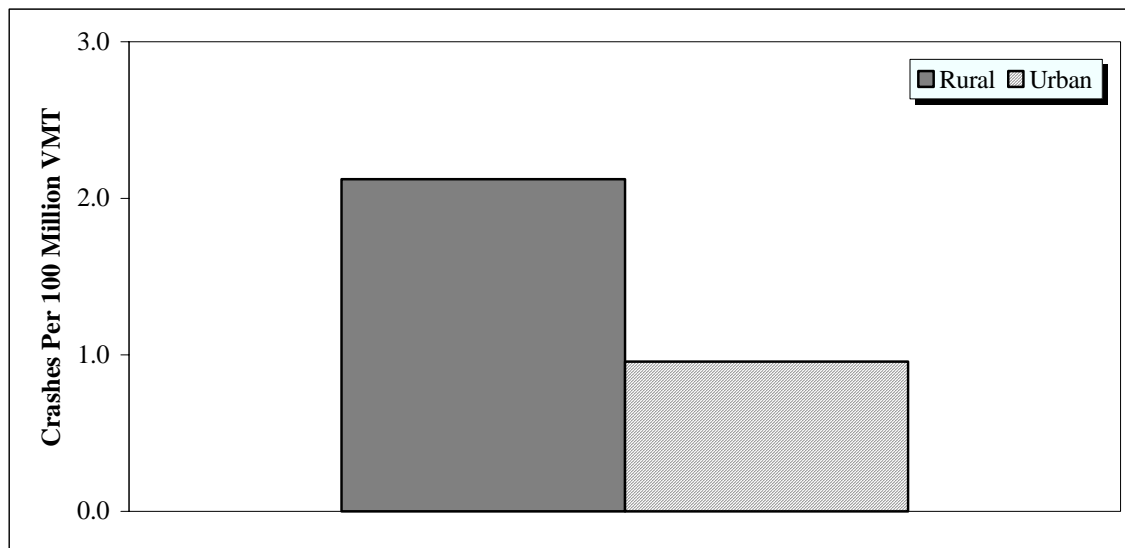


Source: FHWA, VMT data 1994-2003

3.4 Fatal Crash Rate

The fatal crash rate is calculated by dividing the number of fatal crashes by the VMT. The rural fatal crash rate from 1994 to 2003 is 2.1 crashes per 100 million vehicle miles traveled. The corresponding urban fatal crash rate is 1.0 crash per 100 million vehicle miles traveled. Note that the rural crash rate is more than twice the urban crash rate; see Figure 5.

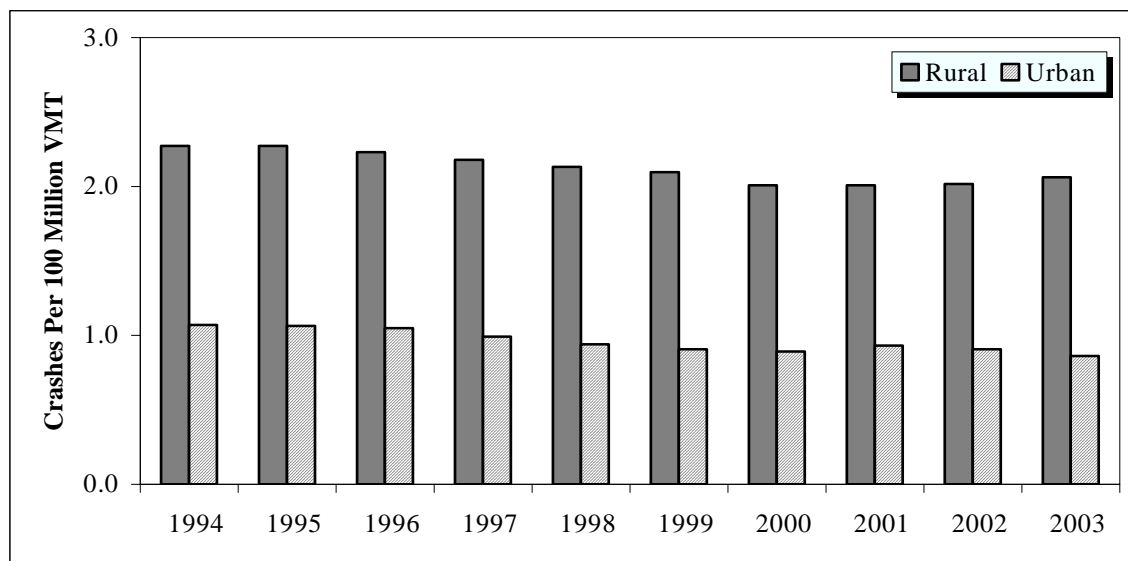
Figure 5
Fatal Crash Rate



Source: NCSA, NHTSA, FARS 1994-2003 and FHWA, VMT data 1994-2003

Figure 6 depicts the rural and urban fatal crash rate by year. Since 1994 both rural and urban crash rates have generally declined.

Figure 6
Fatal Crash Rate by Year

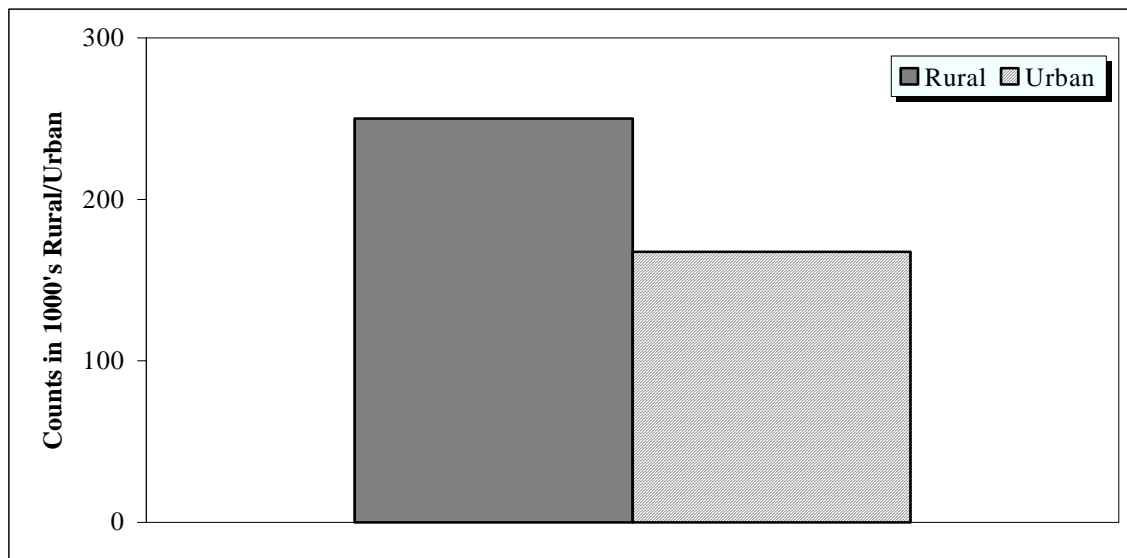


Source: NCSA, NHTSA, FARS 1994-2003 and FHWA, VMT data 1994-2003

3.5 Fatalities

From 1994 to 2003 there were 249,986 rural fatalities and 167,491 urban fatalities, for a total of 417,477 fatalities; see Figure 7. There were approximately 49 percent more rural fatalities than urban fatalities. To compare the effects of a factor on rural and urban fatalities the proportion or percentage that have a particular characteristic are compared.

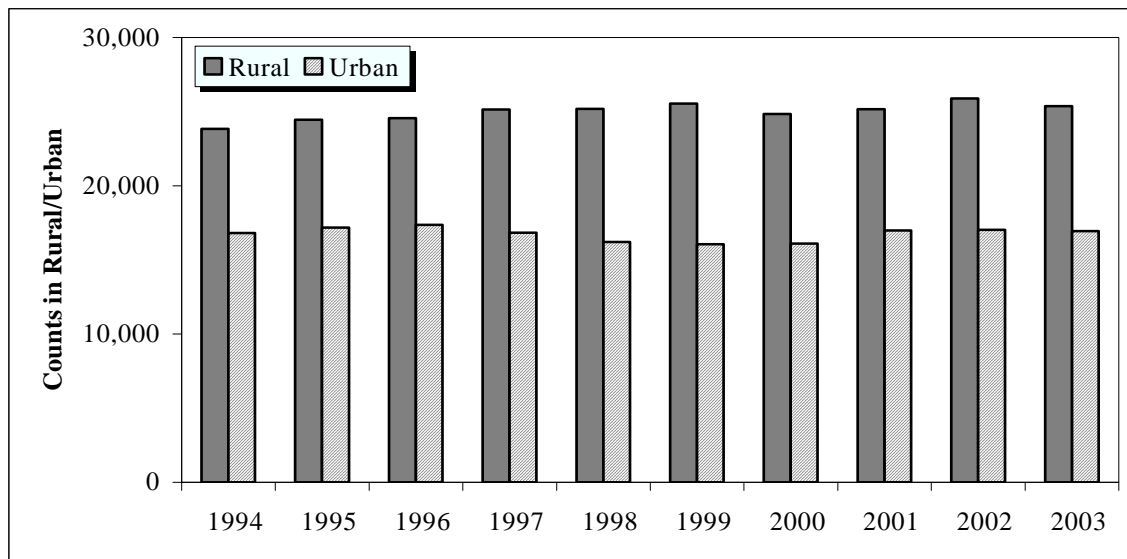
Figure 7
Fatalities



Source: NCSA, NHTSA, FARS 1994-2003

The lowest number of rural fatalities, 23,841, occurred in 1994, the highest number of rural fatalities, 25,896, occurred in 2002. The average number of rural fatalities from 1994 to 2003 was 24,999 fatalities per year. The lowest number of urban fatalities, 16,058, occurred in 1999, the highest number of urban fatalities, 17,368, occurred in 1996. The average number of urban fatalities from 1994 to 2003 was 16,749 fatalities per year. Figure 8 shows the annual fatalities for rural and urban locations. It appears that the number of rural fatalities is slowly increasing over time, whereas number of urban fatalities remains rather constant.

Figure 8
Fatalities by Year

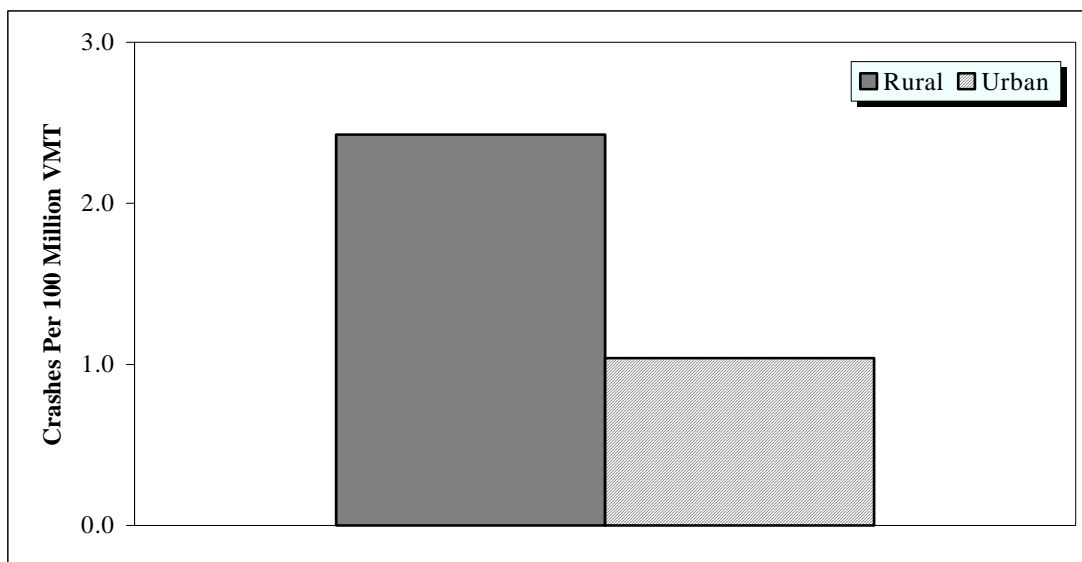


Source: NCSA, NHTSA, FARS 1994-2003

3.6 Fatality Rate

The fatality rate is calculated by dividing the number of fatalities by the vehicle miles traveled; see Figure 3. The rural fatalities rate from 1994 to 2003 is 2.4 fatalities per 100 million vehicle miles traveled. The corresponding urban fatalities rate is 1.0 fatalities per 100 million vehicle miles traveled. Note that the rural fatalities rate is more than twice the urban fatalities rate; see Figure 9.

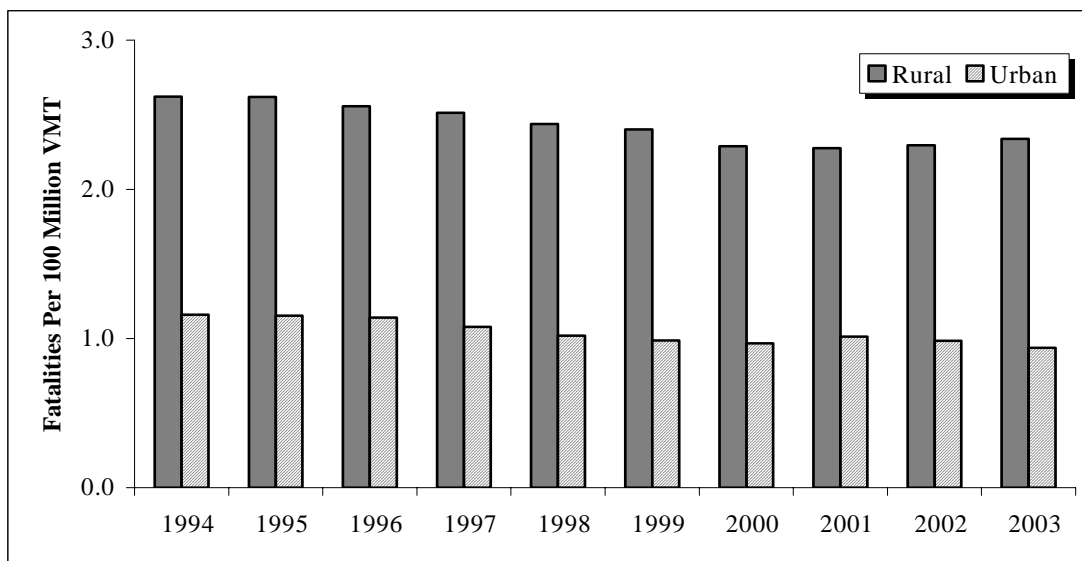
Figure 9
Fatality Rate



Source: NCSA, NHTSA, FARS 1994-2003 and FHWA, VMT data 1994-2003

Figure 10 shows the rural and urban fatalities rate by year. Since 1994 both rural and urban fatality rates have generally declined.

Figure 10
Fatalities Rate by Year



Source: NCSA, NHTSA, FARS 1994-2003 and FHWA, VMT data 1994-2003

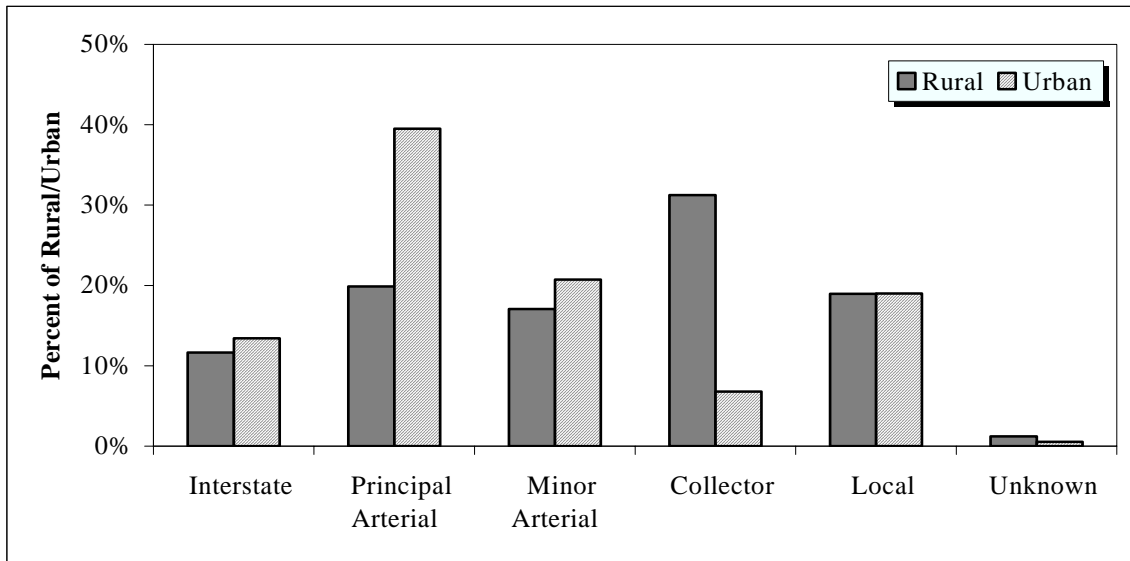
3.7 Road Type

There are significant differences between rural and urban localities when the types of roadways on which the crashes occurred are examined¹. Roadways types are partitioned into interstates, principal arterials, minor arterials, collectors, local roads, and unknown. The data are collected from 1994 to 2003. Table 2 and Figure 11 report that rural localities have a lower portion of fatal crashes on principal arterials, 20 percent, compared to urban localities, 39 percent. However, the rural collectors account for 31 percent of all rural fatal crashes, whereas the urban collectors account for only 7 percent of urban fatal crashes.

| Road Type | Rural | | | | Urban | | | |
|--------------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| Interstate | 25,425 | 10.42 1995 | 11.63 | 12.59 2000 | 20,689 | 12.11 1995 | 13.42 | 14.46 2000 |
| Principal Arterial | 43,375 | 18.48 2002 | 19.85 | 20.63 1997 | 60,894 | 37.46 2003 | 39.49 | 40.62 1994 |
| Minor Arterial | 37,261 | 16.27 2000 | 17.05 | 18.53 2003 | 31,956 | 19.18 2002 | 20.72 | 22.07 1995 |
| Collector | 68,289 | 29.93 2000 | 31.25 | 33.09 1994 | 10,482 | 6.39 2000 | 6.80 | 7.18 1994 |
| Local | 41,471 | 18.37 1994 | 18.98 | 20.23 2002 | 29,323 | 17.87 1996 | 19.02 | 20.85 2002 |
| Unknown | 2,718 | 0.21 1995 | 1.24 | 3.55 2000 | 855 | 0.18 1995 | 0.55 | 1.63 2000 |
| Total | 218,539 | | 100% | | 154,199 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003

Figure 11
Fatal Crashes by Road Type



Source: NCSA, NHTSA, FARS 1994-2003

¹For Road Type Classification, see the Federal Highway Publication at:
<http://www.fhwa.dot.gov/environment/flex/ch03.htm> or
<http://ntl.bts.gov/lib/23000/23100/23121/09RoadFunction.pdf>

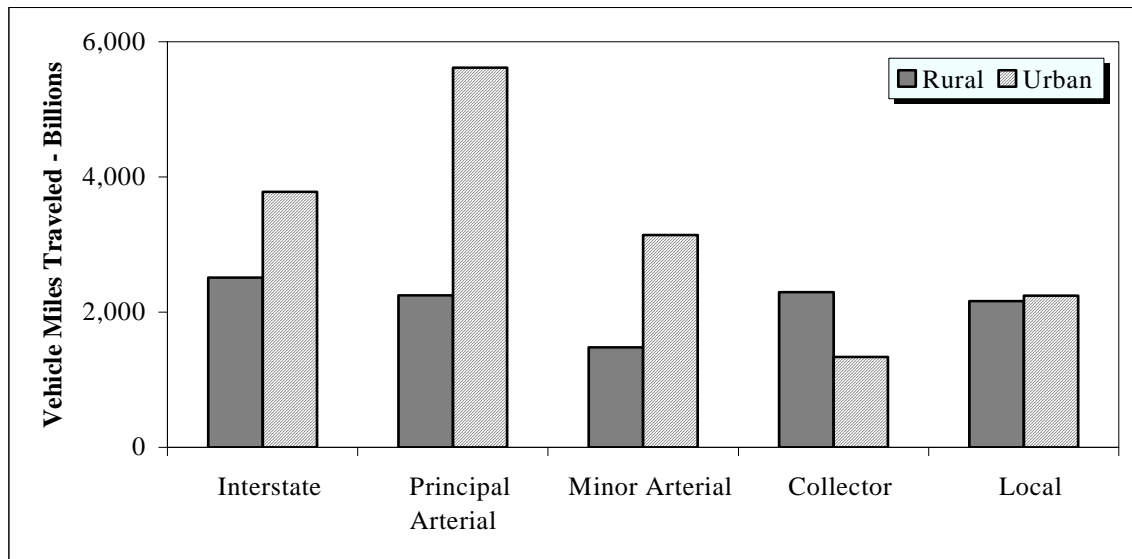
3.8 Vehicle Miles Traveled by Road Type

Data for the VMT by road type from 1994 to 2003 appear in Table 3 and Figure 12. The urban VMT exceed the rural VMT for all categories except collectors. Rural interstates contribute 23 percent of the rural VMT. The largest contributor to VMT for urban areas is principal arterials, which account for 35 percent of urban VMT.

| Road Type | Rural | | Urban | |
|--------------------|--------------|---------|--------------|---------|
| | Billions VMT | Percent | Billions VMT | Percent |
| Interstate | 2,510 | 23.45 | 3,778 | 23.44 |
| Principal Arterial | 2,249 | 21.02 | 5,617 | 34.85 |
| Minor Arterial | 1,480 | 13.83 | 3,143 | 19.50 |
| Collector | 2,298 | 21.47 | 1,337 | 8.30 |
| Local | 2,165 | 20.23 | 2,242 | 13.91 |
| Total | 10,702 | 100% | 16,117 | 100% |

Source: FHWA, VMT data 1994-2003

**Figure 12
VMT by Road Type**

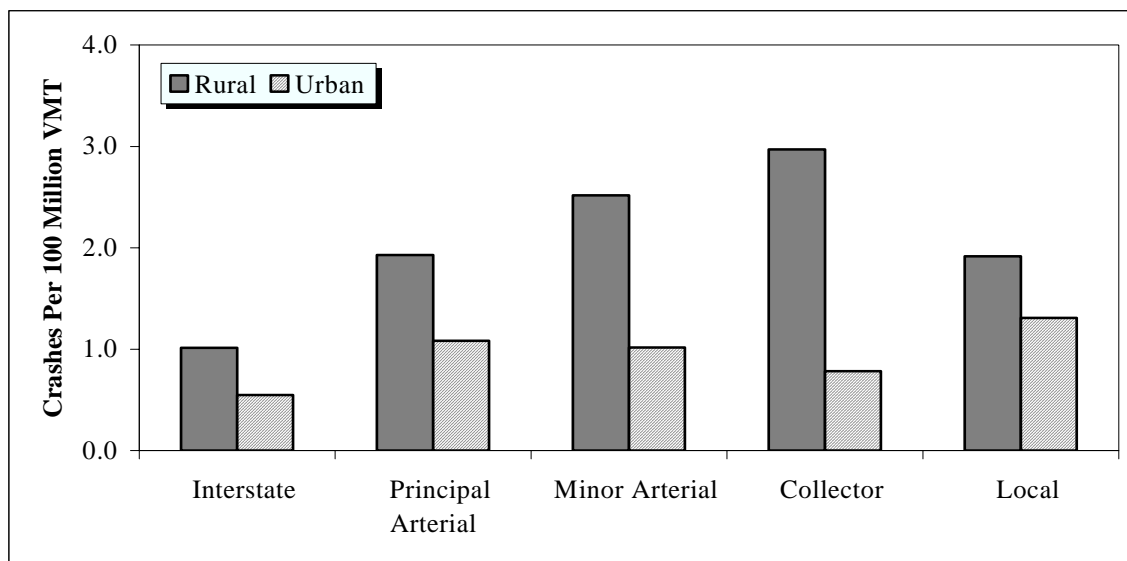


Source: FHWA, VMT data 1994-2003

3.9 Fatal Crash Rate by Road Type

The fatal crash rate is calculated by dividing the number of fatal crashes by the (VMT). The fatal crash rate by road type from 1994 to 2003 shows that as rural roads become “less complex” (that is, the change from interstate, to principle arterial, to minor arterial, to collector), the difference between rural and urban crash rates increases. Local roads do not follow this pattern; however, for all road types, the fatal crash rate on rural roads exceeds the fatal crash rate for the corresponding urban roads.

Figure 13
Fatal Crash Rate by Road Type



Source: NCSA, NHTSA, FARS 1994-2003 and FHWA, VMT data 1994-2003

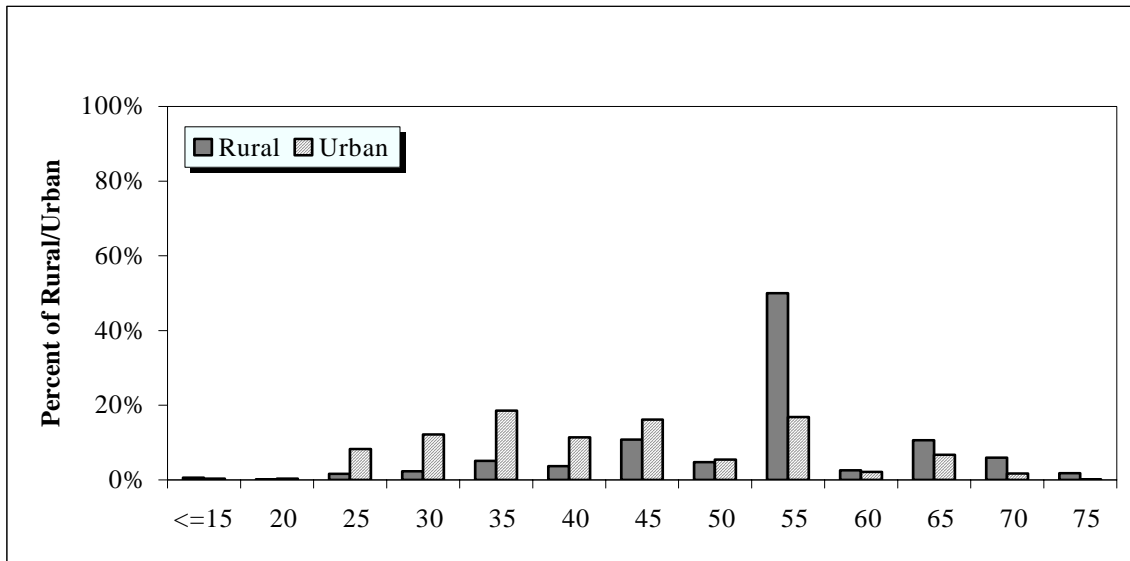
3.10 Speed Limit

There are noticeable differences in the distribution of rural and urban fatal crashes when partitioned by speed limit. Approximately 71 percent of rural fatal crashes occurred on roadways with speed limits of 55 mph or higher. In urban areas less than 27 percent of the fatal crashes occurred on roadways with speed limits of 55 mph or higher. Table 4 and Figure 14 cover years 1994 to 2003. Note that urban areas in some states have a speed limit up to 75 mph.

| Speed Limit | Rural | | | | Urban | | | |
|-------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| <=15 | 1,355 | 0.40 1995 | 0.63 | 0.79 1998 | 569 | 0.33 2002 | 0.38 | 0.51 2003 |
| 20 | 449 | 0.18 2003 | 0.21 | 0.23 2001 | 479 | 0.26 2000 | 0.32 | 0.38 1995 |
| 25 | 3,518 | 1.47 1996 | 1.64 | 1.74 1999 | 12,300 | 7.55 2000 | 8.22 | 8.68 1994 |
| 30 | 4,979 | 2.06 2002 | 2.32 | 2.57 1999 | 18,159 | 10.52 2002 | 12.13 | 15.17 1994 |
| 35 | 11,057 | 4.68 1994 | 5.14 | 5.81 2001 | 27,716 | 18.18 2003 | 18.52 | 18.73 1994 |
| 40 | 7,848 | 3.36 1994 | 3.65 | 3.85 1999 | 17,061 | 10.89 1994 | 11.40 | 12.04 2003 |
| 45 | 23,238 | 9.56 1995 | 10.80 | 11.87 2002 | 24,150 | 15.10 1994 | 16.14 | 16.87 2003 |
| 50 | 10,168 | 4.43 2003 | 4.73 | 5.09 1994 | 8,168 | 5.27 2003 | 5.46 | 5.87 1995 |
| 55 | 107,457 | 44.53 2001 | 49.99 | 63.42 1994 | 25,194 | 13.64 2003 | 16.83 | 23.53 1994 |
| 60 | 5,485 | 0.05 1994 | 2.55 | 3.89 2003 | 3,134 | 0.02 1995 | 2.09 | 3.35 2003 |
| 65 | 22,827 | 9.36 1994 | 10.62 | 11.40 2003 | 10,041 | 1.75 1994 | 6.71 | 8.87 2001 |
| 70 | 12,766 | 0.00 1994 | 5.94 | 8.51 2000 | 2,492 | 0.00 1994 | 1.67 | 2.79 2000 |
| 75+ | 3,826 | 0.00 1994 | 1.78 | 2.50 2003 | 191 | 0.00 1994-95 | 0.13 | 0.29 2002 |
| Total | 214,973 | | 100% | | 149,654 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003
Note: Excludes Speed Limit Unknown

Figure 14
Fatal Crashes by Speed Limit



Source: NCSA, NHTSA, FARS 1994-2003

Note: Excludes Speed Limit Unknown

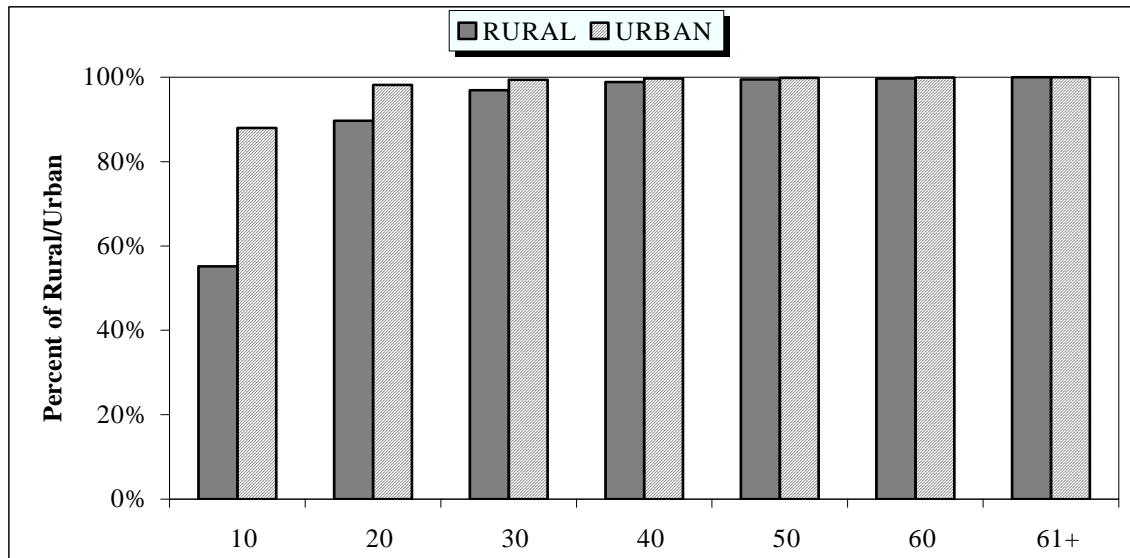
3.11 EMS Arrival Comparison

The cumulative distributions of the length of time from the notification of a fatal crash to the arrival of the emergency medical services (EMS) for both the rural and urban areas appear in Table 5 and Figure 15. The data represent fatal crashes for the period 1994 to 2003. The times required for EMS to respond, to rural fatal crashes tend to be somewhat longer than for urban fatal crashes. In approximately 55 percent of the rural fatal crashes the times for the emergency medical services to arrive, once they have been notified, is not more than 10 minutes. Likewise, for approximately 88 percent of the urban fatal crashes, the times for the emergency medical services to arrive, once they have been notified, is not more than 10 minutes. The largest difference between rural and urban areas in the arrival of EMS occurs for times of 10 minutes and less. As can be seen in Table 5, it takes approximately 10 minutes longer in rural areas to obtain the same response rate of urban areas.

| Time Minutes | Rural | | Urban | |
|--------------|----------------|--------------|---------------|--------------|
| | Count | Mean Percent | Count | Mean Percent |
| 10 | 77,800 | 55.18 | 69,917 | 87.99 |
| 20 | 126,509 | 89.72 | 78,031 | 98.21 |
| 30 | 136,665 | 96.93 | 78,983 | 99.40 |
| 40 | 139,386 | 98.86 | 79,239 | 99.73 |
| 50 | 140,274 | 99.49 | 79,334 | 99.85 |
| 60 | 140,596 | 99.71 | 79,380 | 99.90 |
| 61+ | 141,000 | 100% | 79,457 | 100% |

Source: NCSA, NHTSA, FARS 1994-2003

**Figure 15
EMS Arrival Comparison**



Source: NCSA, NHTSA, FARS 1994-2003

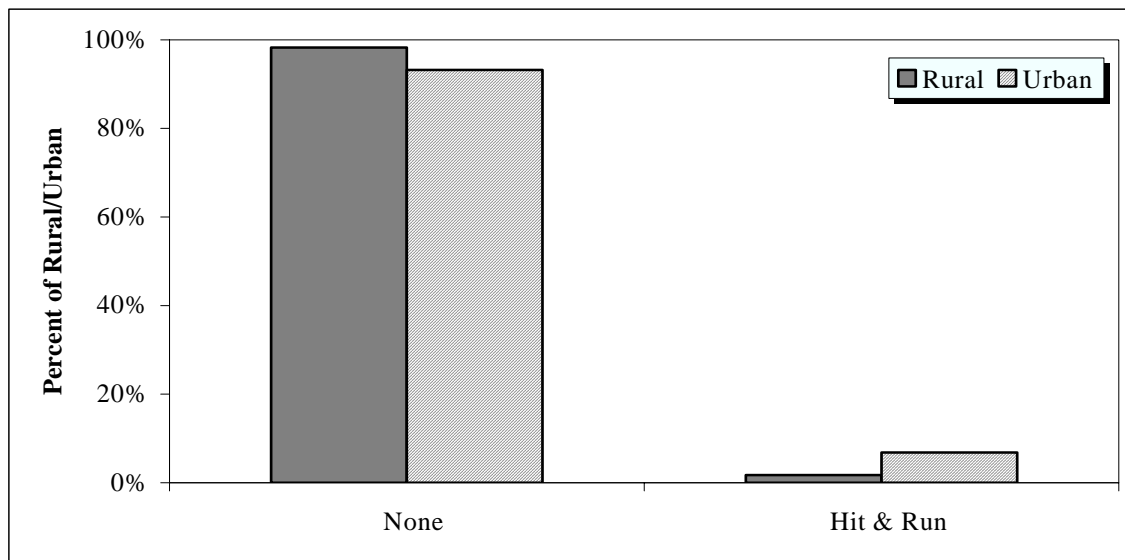
3.12 Hit and Run

Less than two percent of the fatal rural crashes from 1994 to 2003 are classified as hit and run, where-as 7 percent of the fatal urban crashes from 1994 to 2003 are classified as hit and run; see Table 6 and Figure 16.

| Table 6 Hit and Run | | | | | | | | |
|------------------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| Hit and Run | Rural | | | | Urban | | | |
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| None | 214,786 | 98.22 2001 | 98.28 | 98.39 1996 | 143,732 | 92.92 1994 | 93.21 | 93.46 1998 |
| Hit & Run | 3,753 | 1.61 1996 | 1.72 | 1.78 2001 | 10,467 | 6.54 1998 | 6.79 | 7.08 1994 |
| Total | 218,539 | | 100% | | 154,199 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003

Figure 16
Fatal Crashes by Hit and Run



Source: NCSA, NHTSA, FARS 1994-2003

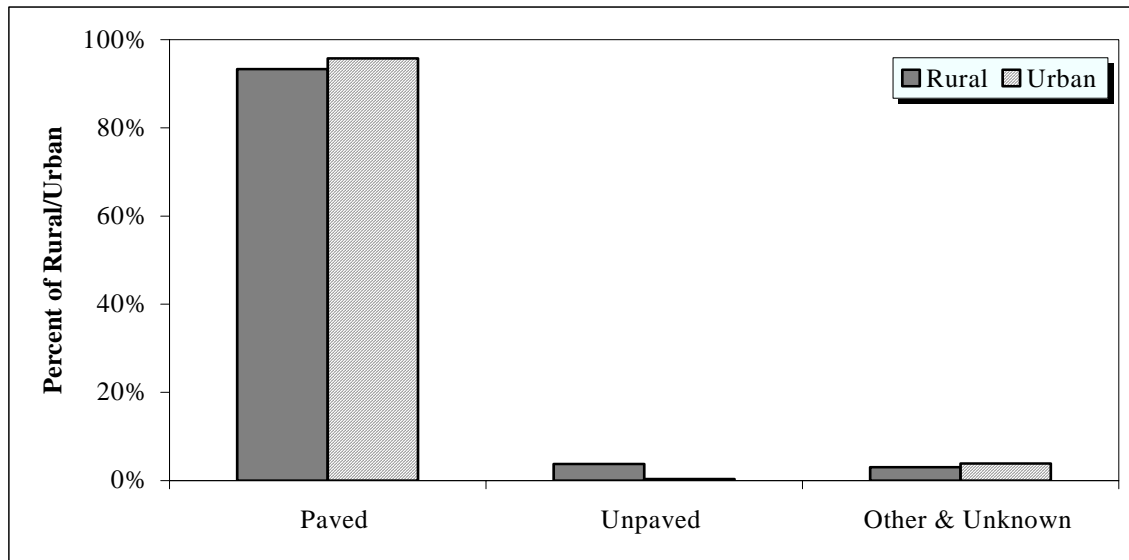
3.13 Paved Roads

Almost 4 percent of the fatal rural crashes from 1994 to 2003 occur on unpaved dirt and gravel roadways. Less than one half of a percent of the fatal urban crashes from 1994 to 2003 occurred on unpaved roads; see Table 7 and Figure 17.

| Table 7 Fatal Crashes on Paved/Unpaved | | | | | | | | |
|---|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| Roadway Surface Type | Rural | | | | Urban | | | |
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| Paved | 203,892 | 91.48 2002 | 93.30 | 94.78 1999 | 147,625 | 93.23 2003 | 95.74 | 96.60 1999 |
| Unpaved | 8,111 | 3.32 2001 | 3.71 | 4.18 1994 | 544 | 0.24 2001 | 0.35 | 0.50 1994 |
| Other & Unknown | 6,536 | 1.53 1995 | 2.99 | 5.06 2002 | 6,030 | 3.05 1999 | 3.91 | 6.47 2003 |
| Total | 218,539 | | 100% | | 154,199 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003

Figure 17
Fatal Crashes by Road Surface Type



Source: NCSA, NHTSA, FARS 1994-2003

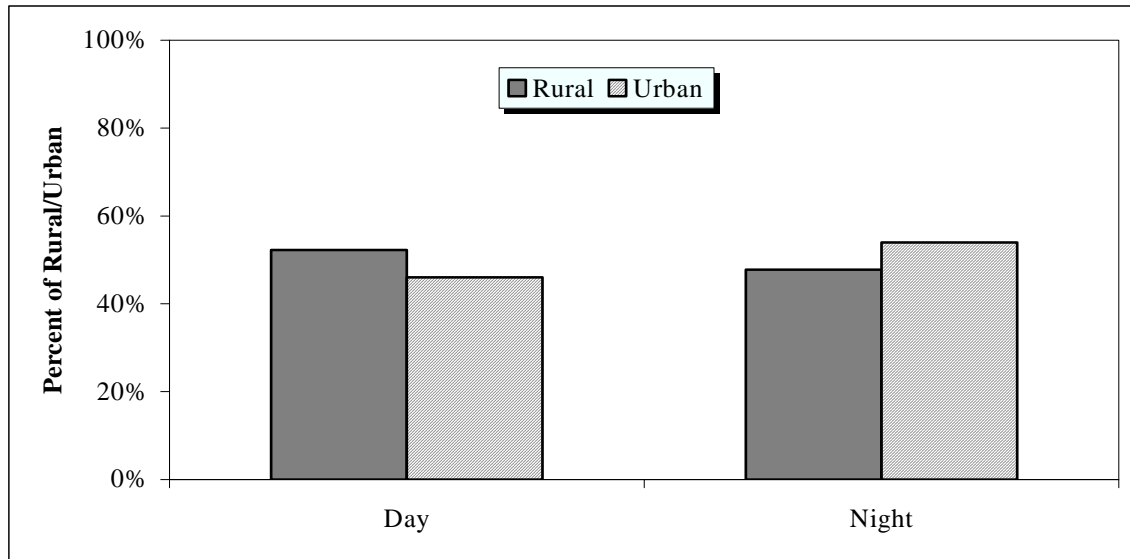
3.14 Time of Day

Approximately 52 percent of the rural fatal crashes from 1994 to 2003 occurred during the day. In this same time frame, just over 46 percent of the urban fatal crashes occurred during the day, see Table 8 and Figure 18. Note that Time of Day does not necessarily correspond to “daylight” conditions; see Section 3.18, Light Condition, Table 12 and Figure 22 later in this report.

| Time of Day | Rural | | | | Urban | | | |
|-------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| Day | 112,851 | 50.48 1995 | 52.27 | 53.05 2000 | 70,699 | 44.24 2002 | 46.04 | 47.41 1998 |
| Night | 103,039 | 46.95 2000 | 47.73 | 49.52 1995 | 82,861 | 52.59 1998 | 53.96 | 55.76 2002 |
| Total | 215,890 | | 100% | | 153,560 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003
 Note: Excludes Speed Limit Unknown (Rural - 2,649 and Urban - 639)
 Day - (6 a.m. – 5:59 p.m.) and Night - (6 p.m. – 5:59 a.m.)

**Figure 18
Fatal Crashes by Time of Day**



Source: NCSA, NHTSA, FARS 1994-2003
 Note: Exclude Time of Day Unknown (Rural - 2,649 and Urban - 639)
 Day - (6:00 am – 5:59 pm) and Night - (6:00 pm and 5:59 am)

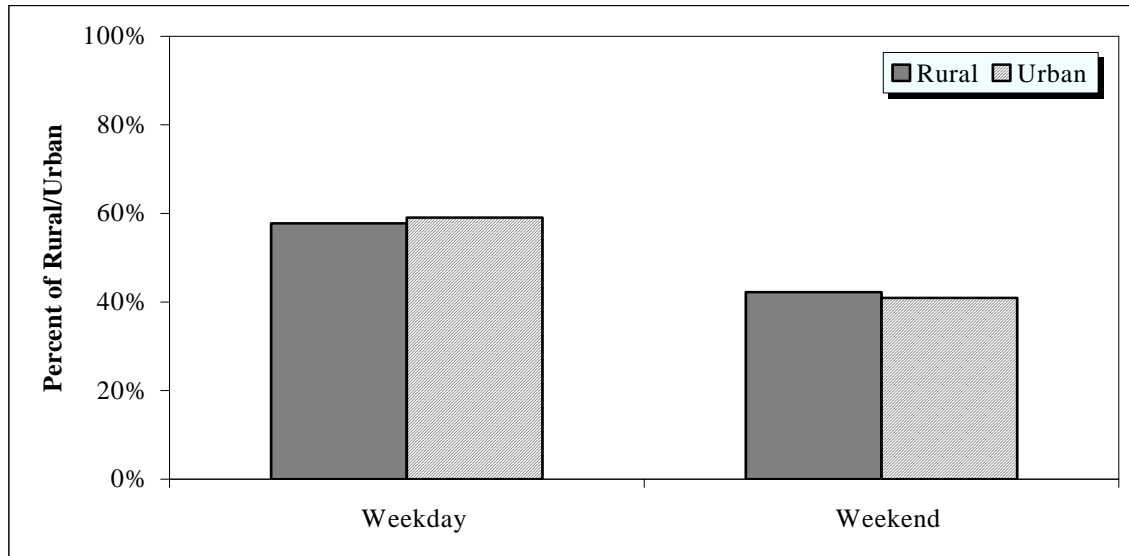
3.15 Weekday versus Weekend

Data on the Weekday versus Weekend for the occurrence of fatal crashes has been partitioned by weekday and weekend. The weekend begins at 6 p.m. on Friday and ends at 6:00 a.m. on Monday. There is a slightly higher portion of fatal crashes on the weekend in rural areas, 42 percent, than in urban areas, 41 percent. There is a complementary reduction in fatal rural weekday crashes, 58 percent, when compared to fatal urban weekday crashes 59 percent; see Table 9 and Figure 19.

| Weekday or Weekend | Rural | | | | Urban | | | |
|--------------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| Weekday | 125,799 | 56.15 1994 | 57.76 | 58.43 1998 | 90,961 | 57.99 2003 | 59.06 | 59.90 1996 |
| Weekend | 91,994 | 41.57 1998 | 42.24 | 43.85 1994 | 63,065 | 40.10 1996 | 40.94 | 42.01 2003 |
| Total | 217,793 | | 100% | | 154,026 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003
 Note: Excludes Day of Week Unknown (Rural - 746 and Urban - 173)
 Weekday - (6 a.m. Monday thru 5:59 p.m. Friday) and Weekend - (6 p.m. Friday thru 5:59 a.m. Monday)

**Figure 19
Fatal Crashes by Day of Week**



Source: NCSA, NHTSA, FARS 1994-2003
 Note: Excludes Day of Week Unknown (Rural - 746 and Urban - 173)
 Weekday - (6 a.m. Monday thru 5:59 p.m. Friday) and Weekend - (6 p.m. Friday thru 5:59 a.m. Monday)

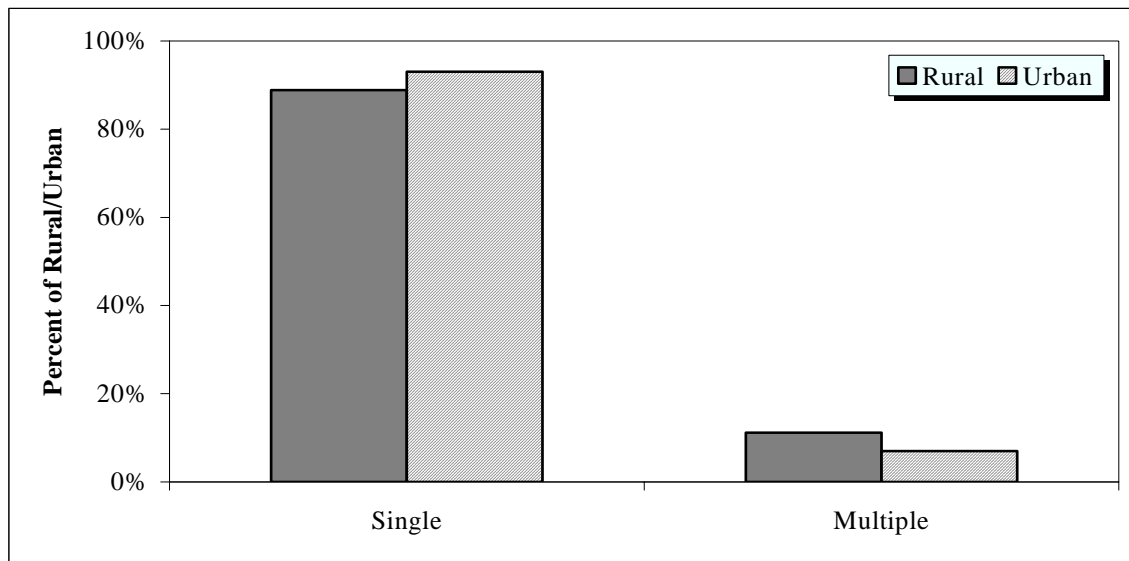
3.16 Fatalities Per Crash

There is a lower rate of rural fatal crashes involving a single fatality from 1994 to 2003 (89 %) than there were urban crashes involving a single fatality (93 %); see Table 10 and Figure 20.

| Fatalities | Rural | | | | Urban | | | |
|------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| Single | 194,171 | 88.25 1997 | 88.85 | 89.49 2001 | 143,429 | 92.81 1996 | 93.02 | 93.27 1995 |
| Multiple | 24,368 | 10.51 2001 | 11.15 | 11.75 1997 | 10,770 | 6.73 1995 | 6.98 | 7.19 1996 |
| Total | 218,539 | | 100% | | 154,199 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003

**Figure 20
Fatalities Per Crash**



Source: NCSA, NHTSA, FARS 1994-2003

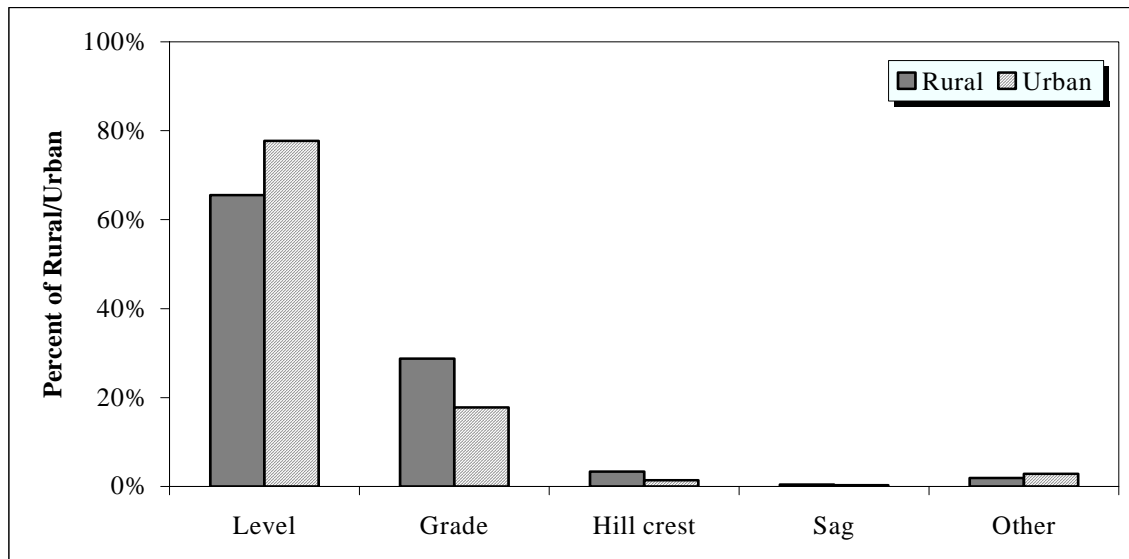
3.17 Roadway Profile

Approximately 3 out of 10 rural fatal crashes occur on a grade, 29 percent, from 1994 to 2003. For urban fatal crashes the rate is 18 percent. Rural fatal crashes occurring on level ground have a lower rate of occurrence, 65 percent, than similar urban fatal crashes, 78 percent, see Table 11 and Figure 21.

| Road Type | Rural | | | | Urban | | | |
|------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| Level | 143,123 | 63.94 1995 | 65.49 | 67.03 2001 | 119,807 | 75.37 2003 | 77.70 | 78.88 2000 |
| Grade | 62,855 | 26.75 2002 | 28.76 | 30.21 1996 | 27,363 | 17.18 2000 | 17.75 | 18.58 1999 |
| Hill Crest | 7,317 | 3.09 2001 | 3.35 | 3.70 2002 | 2,244 | 1.24 2001 | 1.45 | 1.69 2002 |
| Sag | 959 | 0.30 2001 | 0.44 | 0.51 1994 | 391 | 0.19 1996 | 0.25 | 0.34 1994 |
| Other | 4,285 | 1.25 1999 | 1.96 | 2.94 2003 | 4,394 | 2.14 1996 | 2.85 | 5.74 2003 |
| Total | 218,539 | | 100% | | 154,199 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003

**Figure 21
Fatal Crashes by Roadway Profile**



Source: NCSA, NHTSA, FARS 1994-2003

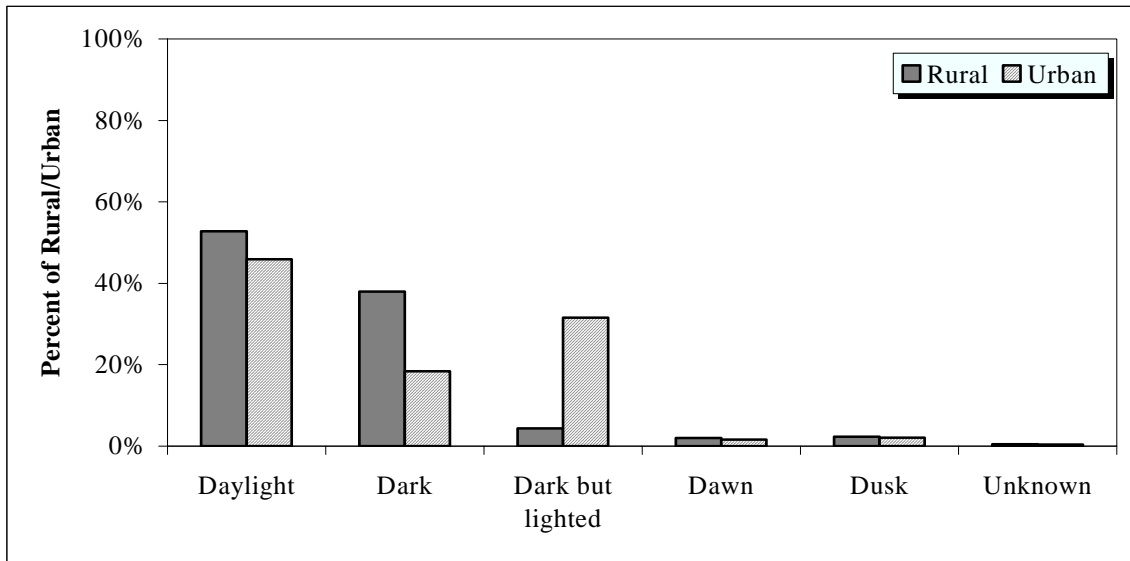
3.18 Light Condition

In rural areas, 53 percent of the crashes occur in daylight, while 42 percent are in the dark. In urban areas the situation is the opposite, with 46 percent of the crashes occurring in daylight and 50 percent of the crashes in the dark. Within crashes that occur in the dark, there is a large difference between crashes that occur in the dark but with lighted conditions (i.e. streetlamps). About 4 percent of the rural crashes occur in the dark but with lighted conditions; however almost 32 percent of the urban crashes occur in the dark but with lighted conditions; see Table 12 and Figure 22.

| Light Condition | Rural | | | | Urban | | | |
|------------------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| Daylight | 115,353 | 51.05 1995 | 52.78 | 53.98 2001 | 70,759 | 44.42 2002 | 45.89 | 47.32 1998 |
| Dark | 82,935 | 36.77 2001 | 37.95 | 39.95 1995 | 28,422 | 18.06 2001 | 18.43 | 18.89 1996 |
| Dark but Lighted | 9,542 | 4.07 2003 | 4.37 | 4.73 2000 | 48,670 | 30.13 1998 | 31.56 | 33.27 2002 |
| Dawn | 4,490 | 1.83 1995 | 2.05 | 2.24 1994 | 2,526 | 1.51 2003 | 1.64 | 1.78 2000 |
| Dusk | 5,175 | 2.09 2003 | 2.37 | 2.55 1995 | 3,245 | 1.94 2000 | 2.10 | 2.36 1999 |
| Unknown | 1,044 | 0.34 1998 | 0.48 | 0.79 2003 | 577 | 0.16 1994 | 0.37 | 1.50 2003 |
| Total | 218,539 | | 100% | | 154,199 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003

Figure 22
Fatal Crashes by Light Condition



Source: NCSA, NHTSA, FARS 1994-2003

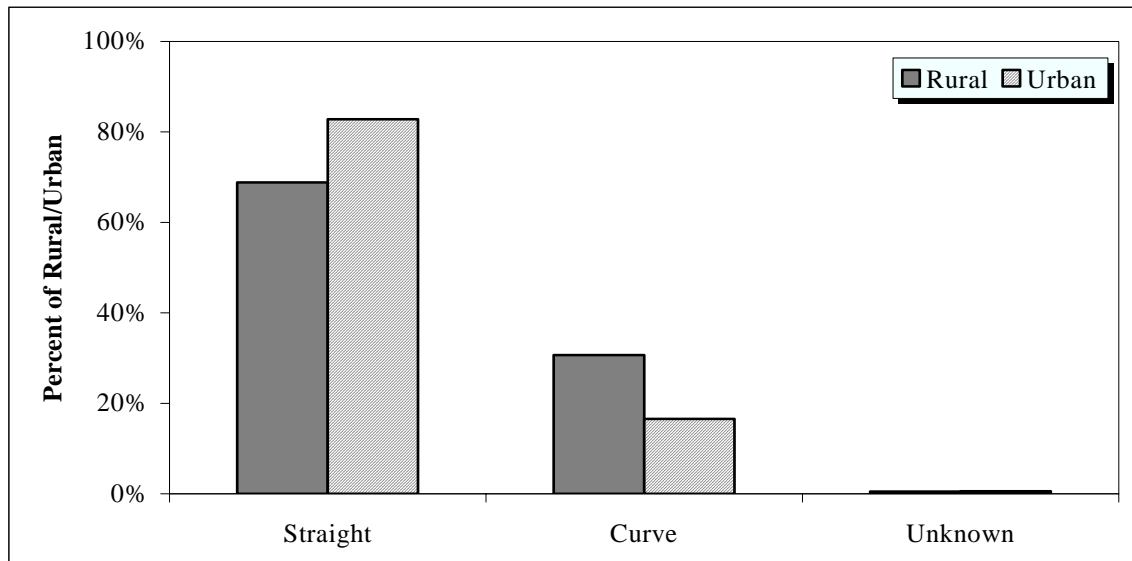
3.19 Roadway Alignment

From 1994 to 2003 approximately 69 percent of fatal rural crashes occurred on straight roads, where-as 83 percent of fatal urban crashes were on straight roads; see Table 13 and Figure 23.

| Roadway Alignment | Rural | | | | Urban | | | |
|-------------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| Straight | 150,403 | 67.99 2002 | 68.82 | 69.52 1996 | 127,706 | 81.36 2003 | 82.82 | 83.63 1995 |
| Curve | 66,991 | 29.92 1996 | 30.66 | 31.43 2001 | 25,590 | 16.01 1995 | 16.59 | 17.12 2002 |
| Unknown | 1,145 | 0.39 1998 | 0.52 | 0.89 2003 | 903 | 0.31 1994 | 0.59 | 1.93 2003 |
| Total | 218,539 | | 100% | | 154,199 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003

**Figure 23
Fatal Crashes by Alignment**



Source: NCSA, NHTSA, FARS 1994-2003

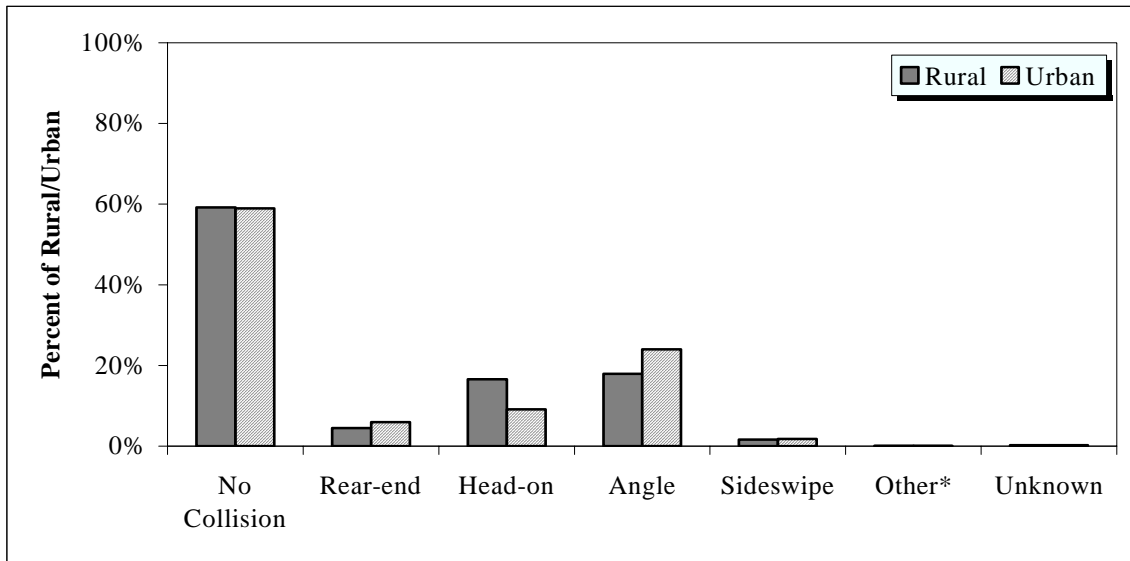
3.20 Manner of Collision

From 1994 to 2003 head-on crashes were more prevalent in rural areas, making up 17 percent of all rural fatal crashes. In urban areas, head-on crashes were responsible for 9 percent of all urban fatal crashes; see Table 14 and Figure 24. (Note: There were several years when no rear-to-rear crashes were reported.)

| Table 14 | | | | | | | | |
|---|----------------|---------------------------|--------------|------------------------|----------------|------------------------------------|--------------|------------------------|
| Fatal Crashes by Manner of Collision | | | | | | | | |
| Manner of Collision | Rural | | | | Urban | | | |
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| No Collision | 129,246 | 57.69 1997 | 59.14 | 60.77 2002 | 90,837 | 58.14 2000 | 58.91 | 59.67 1995 |
| Rear-End | 9,810 | 3.93 1995 | 4.49 | 4.88 2003 | 9,160 | 5.22 1995 | 5.94 | 6.41 2000 |
| Head-On | 36,238 | 12.05 2002 | 16.58 | 18.93 1994 | 14,031 | 7.05 2003 | 9.10 | 10.04 1996 |
| Angle | 39,124 | 16.35 1994 | 17.90 | 20.05 2002 | 36,948 | 23.50 2001 | 23.96 | 24.84 2002 |
| Sideswipe | 3,557 | 1.31 1994 | 1.63 | 2.20 2002 | 2,732 | 1.41 1995 | 1.77 | 2.19 2002 |
| Other * | 102 | 0.00 1995 & 2000 | 0.05 | 0.22 2002 | 84 | 0.00 1996- 1999 & 2001 | 0.06 | 0.27 2002 |
| Unknown | 462 | 0.13 2001 | 0.21 | 0.38 2003 | 407 | 0.07 1998 | 0.26 | 1.33 2003 |
| Total | 218,539 | | 100% | | 154,199 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003
 Note: *Other = Rear-to-Rear, Rear-to-Side, End-Swipes, etc.

Figure 24
Fatal Crashes by Manner of Collision



Source: NCSA, NHTSA, FARS 1994-2003

Note: *Other = Rear-to-Rear, Rear-to-Side, End-Swipes, etc.

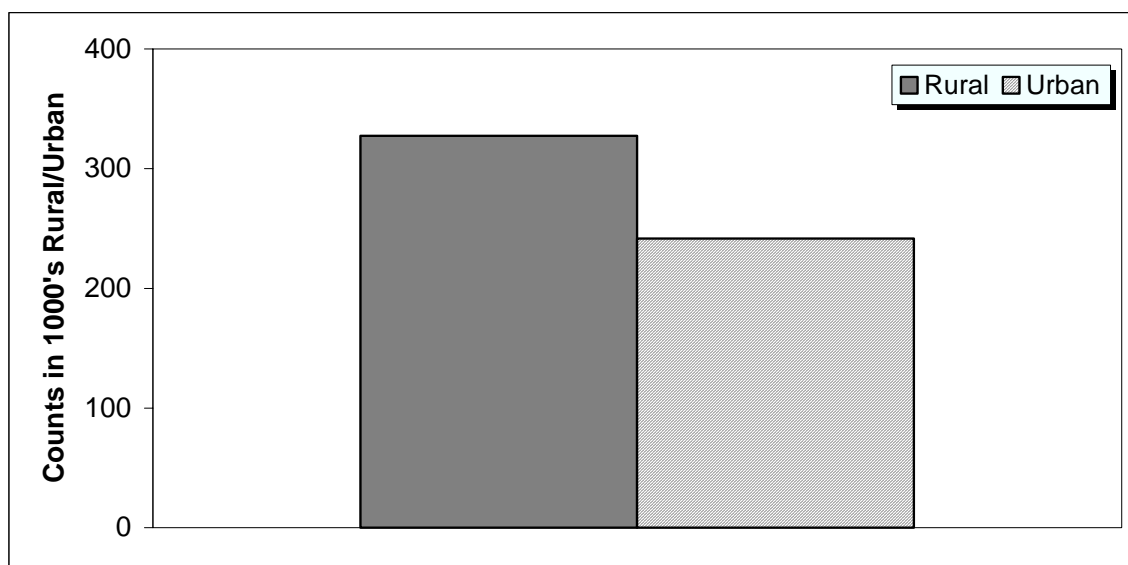
**FATAL
CRASH
ANALYSIS
-
VEHICLE
LEVEL**

4.0 FATAL CRASH ANALYSIS - VEHICLE LEVEL

4.1 Vehicles Involved in Fatal Crashes

From 1994 to 2003 in FARS, there were 327,445 vehicles involved in rural fatal crashes and 241,569 vehicles involved in urban fatal crashes; see Figure 25. There were approximately 36 percent more vehicles involved in fatal rural crashes than urban crashes. To compare the effects of a factor on vehicles involved in rural versus urban fatal crashes, the portion or percentage that have a particular characteristic are compared.

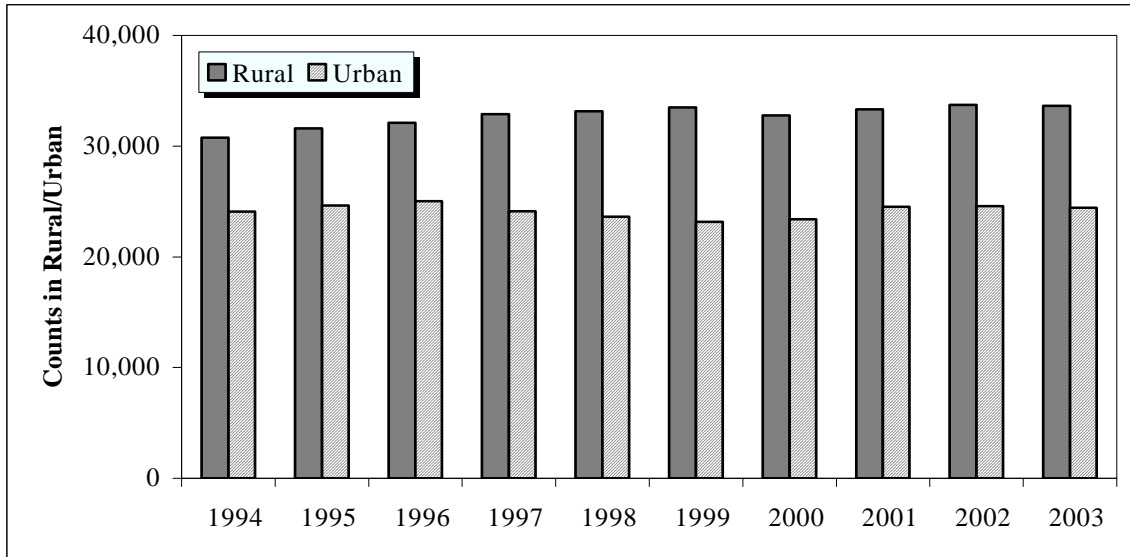
Figure 25
Vehicle Involved in Fatal Crashes



Source: NCSA, NHTSA, FARS 1994-2003

Displaying the vehicle data on a yearly basis provides a reference for longitudinal considerations. The lowest number of vehicles in rural fatal crashes, 30,756, occurred in 1994; the highest number of vehicles in rural fatal crashes, 33,729, occurred in 2002. The average number of vehicles in rural fatal crashes, from 1994 to 2003 was 32,745 vehicles per year. The lowest number of vehicles in urban fatal cases, 23,163, occurred in 1999, the highest number of vehicles in urban fatal cases, 25,031, occurred in 1996. The average number of vehicles in urban fatal crashes, from 1994 to 2003 was 24,157 vehicles per year; see Figure 26.

Figure 26
Vehicles involved in Fatal Crashes by Year

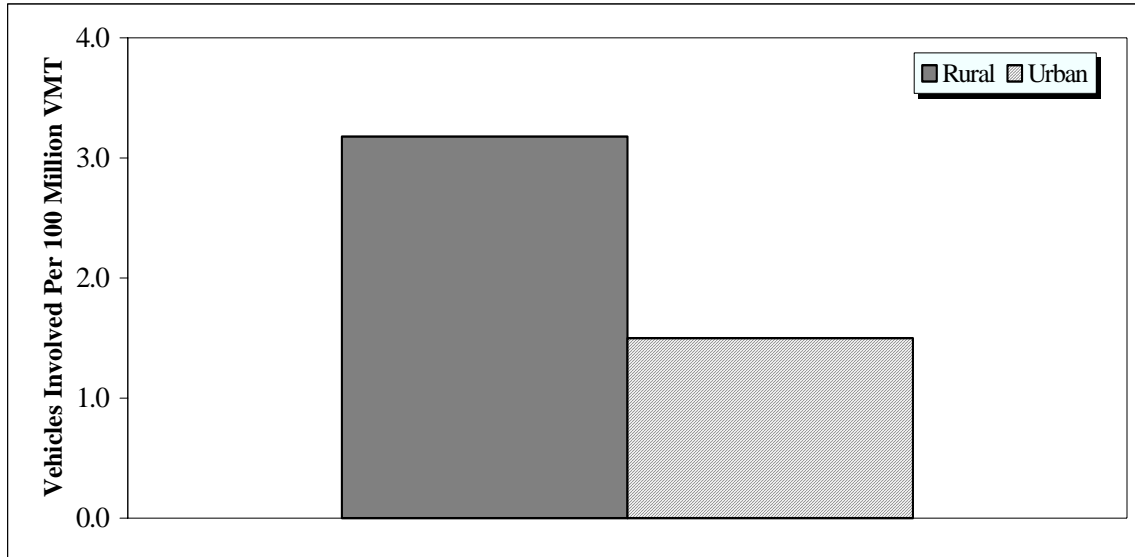


Source: NCSA, NHTSA, FARS 1994-2003

4.2 Vehicle Involvement Rate

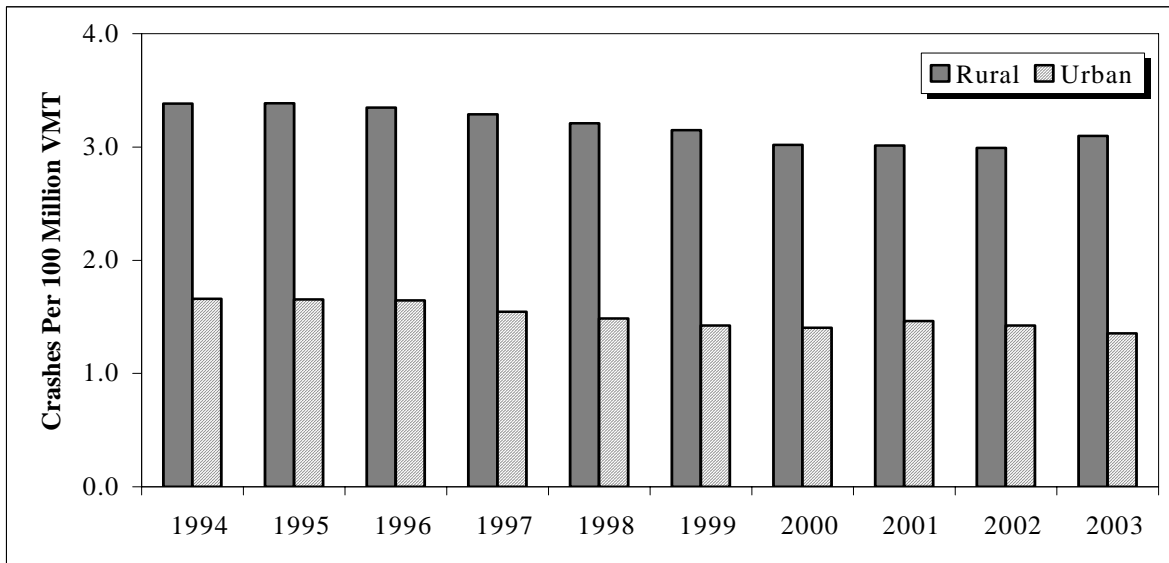
The vehicle involvement rate is the number of vehicles involved in fatal rural/urban crashes divided by the rural/urban vehicle miles traveled, for the given time period, see Figures 3 and 4 for VMT. From 1994 to 2003, the rural rate of vehicle involvement in fatal crashes was 3.2 vehicles per 100 million miles traveled. The urban vehicle involvement rate was 1.5 per 100 million miles traveled; see Figure 27. The vehicle involvement rate for fatal crashes has generally declined from 1994 to 2003 for both rural and urban crashes.

Figure 27
Vehicle Involvement Rate



Source: NCSA, NHTSA, FARS 1994-2003 and FHWA, VMT data 1994-2003

Figure 28
Vehicle Involvement Rate by Year



Source: NCSA, NHTSA, FARS 1994-2003, FHWA, VMT data 1994-2003

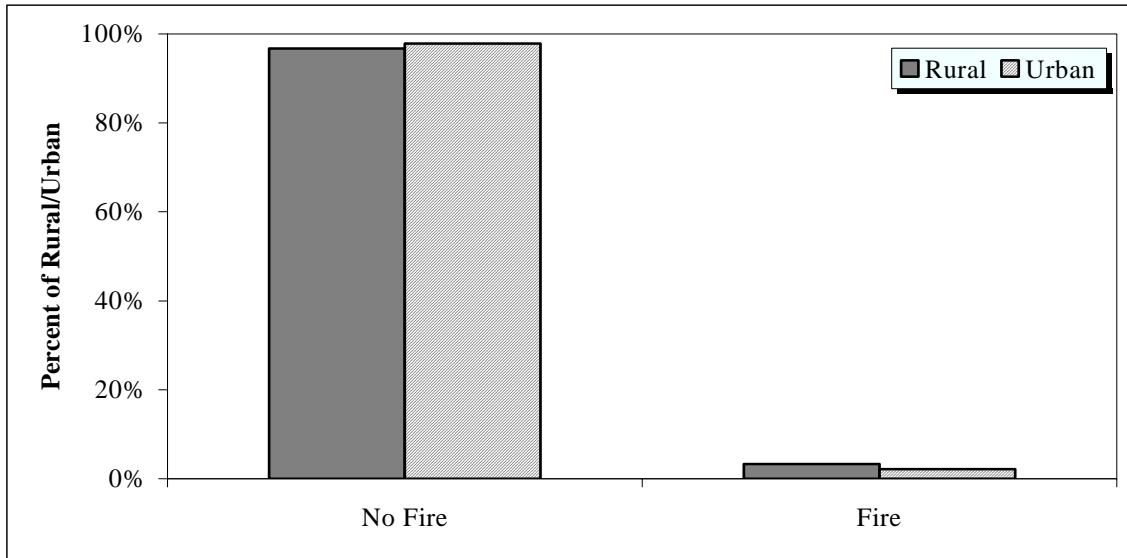
4.3 Fire Occurrence

The rate of fire occurrence in fatal crashes for vehicles in rural areas, 3 percent, is more than 50 percent higher than the rate of fire occurrence for vehicles in urban areas, 2 percent; see Table 15 and Figure 29. However, fire occurrence is a rare event in both rural and urban areas.

| Fire Occurrence | Rural | | | | Urban | | | |
|-----------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| No Fire | 316,602 | 86.48 2002 | 96.69 | 96.94 1997 | 236,451 | 97.66 2001 | 97.88 | 98.12 1996 |
| Fire | 10,843 | 3.06 1997 | 3.31 | 3.52 2002 | 5,118 | 1.88 1996 | 2.12 | 2.34 2001 |
| Total | 327,445 | | 100% | | 241,569 | | 100% | |

Source: NCSA, NHTSA, FARS 1990-2001

**Figure 29
Fire Occurrence**



Source: NCSA, NHTSA, FARS 1994-2003

4.4 Vehicle Role

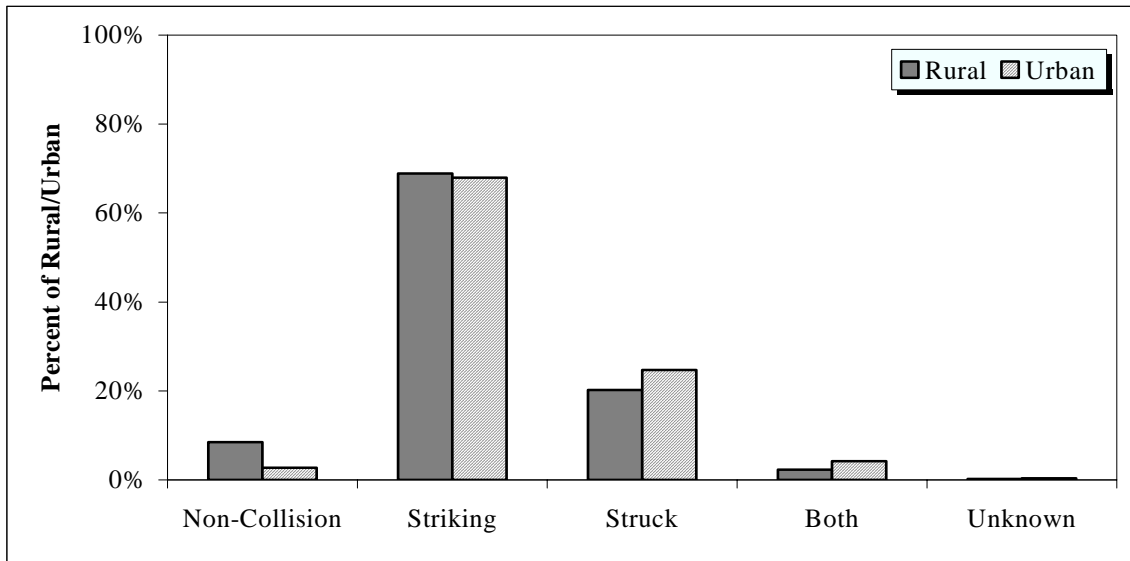
The vehicle role in fatal crashes from 1994 to 2003, has been partitioned into non-collision, striking, struck, both, and unknown in this study. In a multi-vehicle crash each vehicle is assigned a vehicle role. For example, with a chain reaction crash involving three vehicles traveling on the same roadway in the same direction, the first vehicle stops abruptly. The second vehicle strikes the first vehicle in the rear. The third vehicle then strikes the second vehicle in the rear. The vehicle role of the first vehicle is struck. The vehicle role of the second vehicle is both and the vehicle role of the third vehicle is striking.

Non-collision shows the greatest difference between rural and urban fatal crashes. Vehicles were coded non-collision 8 percent of the time for rural fatal crashes, but only 3 percent of the time for urban fatal crashes; see Table 16 and Figure 30.

| Vehicle Role | Rural | | | | Urban | | | |
|---------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| Non-Collision | 27,751 | 7.94 1998 | 8.47 | 9.01 2002 | 6,615 | 2.39 1998 | 2.74 | 3.09 2003 |
| Striking | 225,435 | 59.32 2003 | 68.85 | 72.55 1994 | 164,180 | 61.51 2003 | 67.96 | 70.39 1994 |
| Struck | 66,168 | 16.75 1994 | 20.21 | 28.76 2003 | 59,683 | 22.71 1995 | 24.71 | 29.72 2002 |
| Both | 7,395 | 1.76 1997 | 2.26 | 2.88 2003 | 10,245 | 3.53 1997 | 4.24 | 4.71 2003 |
| Unknown | 696 | 0.06 1994 | 0.21 | 0.40 2003 | 846 | 0.14 1995 | 0.35 | 1.40 2003 |
| Total | 327,445 | | 100% | | 241,569 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003

Figure 30
Vehicle Role



Source: NCSA, NHTSA, FARS Source: NCSA, NHTSA, FARS 1994-2003

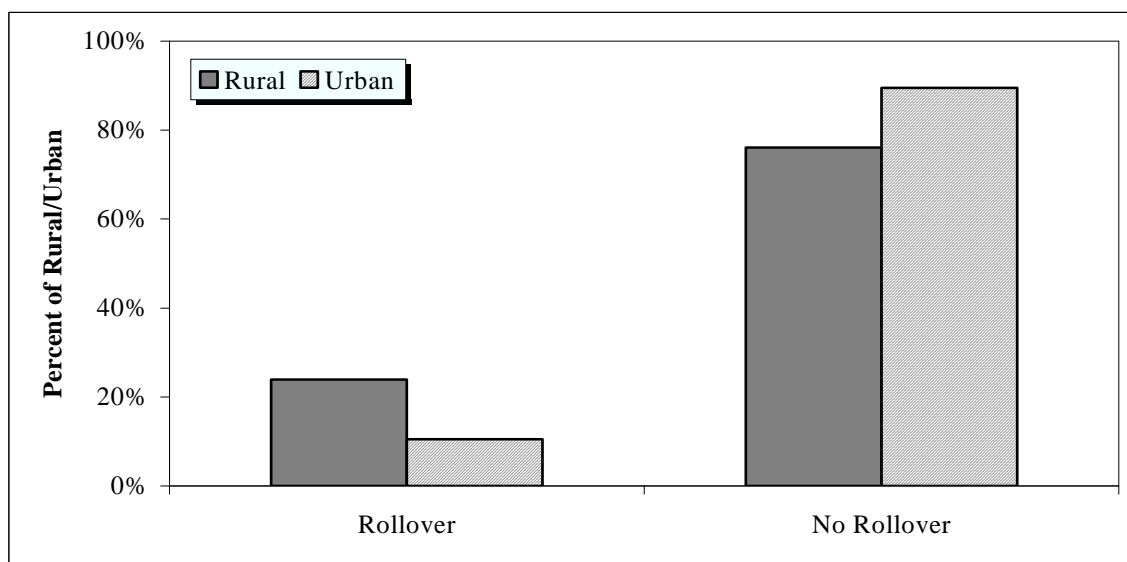
4.5 Rollover

Vehicles involved in fatal crashes in rural areas are more than twice as likely to rollover (24 %), than in urban fatal crashes, (10 %). These data are shown in Table 17 and Figure 31.

| Table 17 Rollover | | | | | | | | |
|----------------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| Rollover | Rural | | | | Urban | | | |
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| Rollover | 78,258 | 23.14 1997 | 23.90 | 25.13 2002 | 25,268 | 9.57 1994 | 10.46 | 11.33 2002 |
| No Rollover | 249,187 | 74.87 2002 | 76.10 | 76.86 1997 | 216,301 | 88.67 2002 | 89.54 | 90.43 1994 |
| Total | 327,445 | | 100% | | 241,569 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003

Figure 31
Rollover



Source: NCSA, NHTSA, FARS 1994-2003

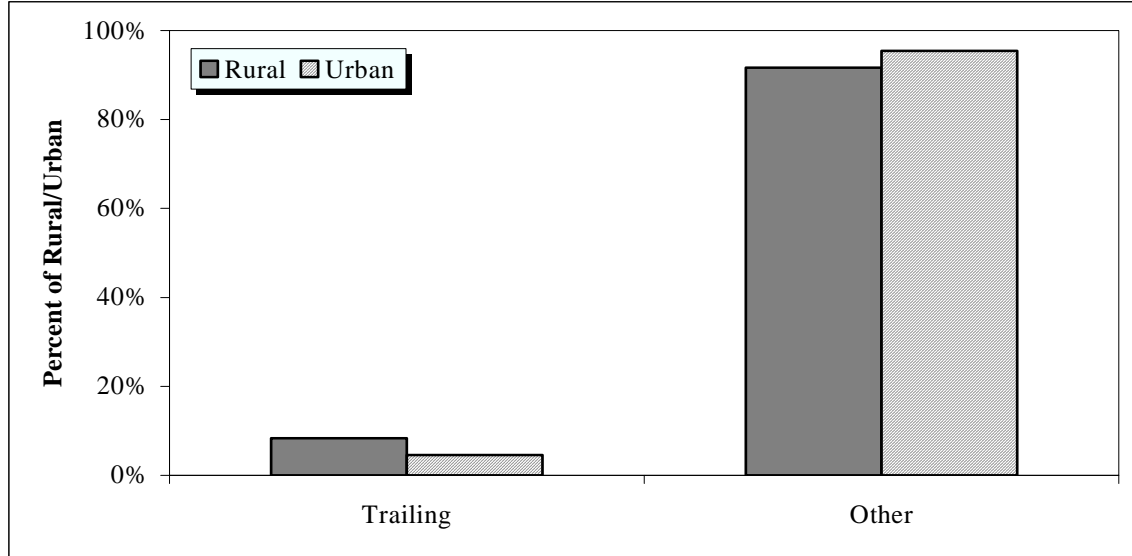
4.6 Trailing Vehicle

This variable applies not only to tractor trailers, but also to boats, cars, and rental-trailer-type vehicles, so long as the towed vehicle is attached by a trailer hitch. A vehicle pulled by a rope or chain is **not** counted as a towed vehicle. From 1994 to 2003, 8 percent of the vehicles involved in rural fatal crashes were towing a vehicle. In urban areas, 5 percent of the vehicles involved in urban fatal crashes were towing another vehicle; see Table 18 and Figure 32.

| Trailing Vehicle | Rural | | | | Urban | | | |
|------------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| Trailing | 27,231 | 7.79 1995 | 8.32 | 8.75 2000 | 11,092 | 4.26 2003 | 4.59 | 4.95 1999 |
| Other | 300,214 | 91.25 2000 | 91.68 | 92.21 1995 | 230,477 | 95.05 1999 | 95.41 | 95.74 2003 |
| Total | 327,445 | | 100% | | 241,569 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003

**Figure 32
Trailing Vehicle**



Source: NCSA, NHTSA, FARS 1994-2003

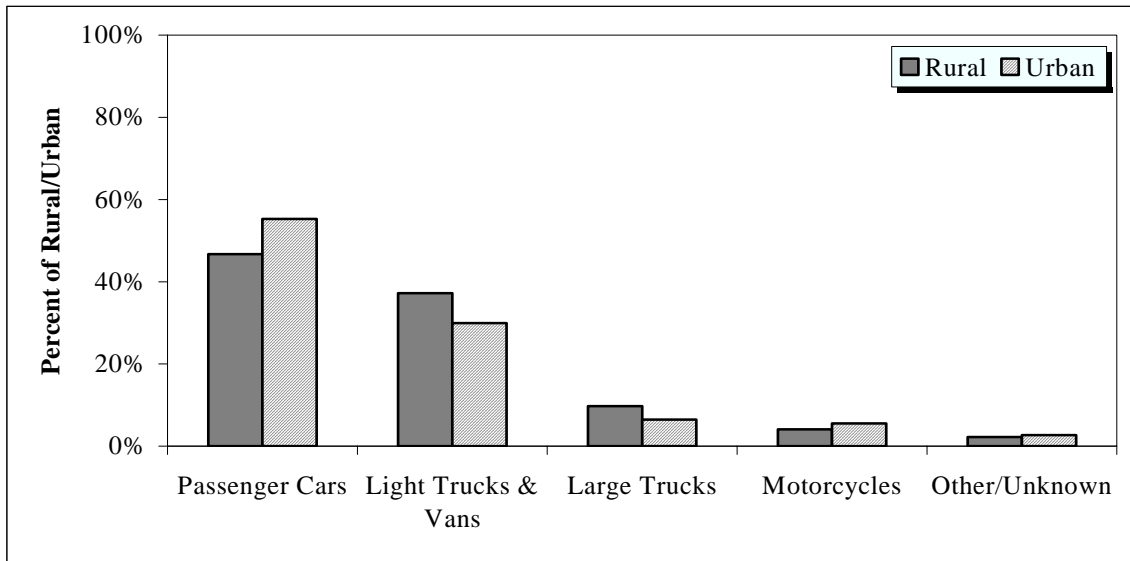
4.7 Vehicle Type

There are noticeable differences among the types of vehicles involved in fatal crashes between rural and urban areas. Both light trucks and large trucks were proportionately involved in more fatal crashes in rural areas, 37 percent and 10 percent respectively, than in urban areas, 30 percent and 6 percent respectively. Cars and motorcycles were proportionately involved in fewer rural fatal crashes, 47 percent and 4 percent respectively, than urban fatal crashes, 55 percent and 6 percent; see Table 19 and Figure33.

| Table 19 Vehicle Type | | | | | | | | |
|----------------------------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| Vehicle Type | Rural | | | | Urban | | | |
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| Passenger Car | 152,880 | 41.56 2003 | 46.69 | 51.19 1994 | 133,585 | 49.06 2003 | 55.30 | 60.18 1994 |
| Light Trucks & Vans | 121,962 | 33.13 1994 | 37.25 | 40.75 2003 | 72,370 | 25.50 1994 | 29.96 | 33.78 2003 |
| Large Trucks | 31,754 | 8.99 1995 | 9.70 | 10.12 2000 | 15,670 | 5.88 2003 | 6.48 | 6.88 1998 |
| Motorcycles | 13,476 | 3.19 1996 | 4.11 | 5.70 2003 | 13,497 | 4.55 1997 | 5.59 | 7.36 2003 |
| Other/Unknown | 7,373 | 1.98 1995 | 2.25 | 2.59 2003 | 6,447 | 2.30 1998 | 2.67 | 3.93 2003 |
| Total | 327,445 | | 100% | | 241,569 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003

Figure 33
Vehicle Type



Source: NCSA, NHTSA, FARS 1994-2003

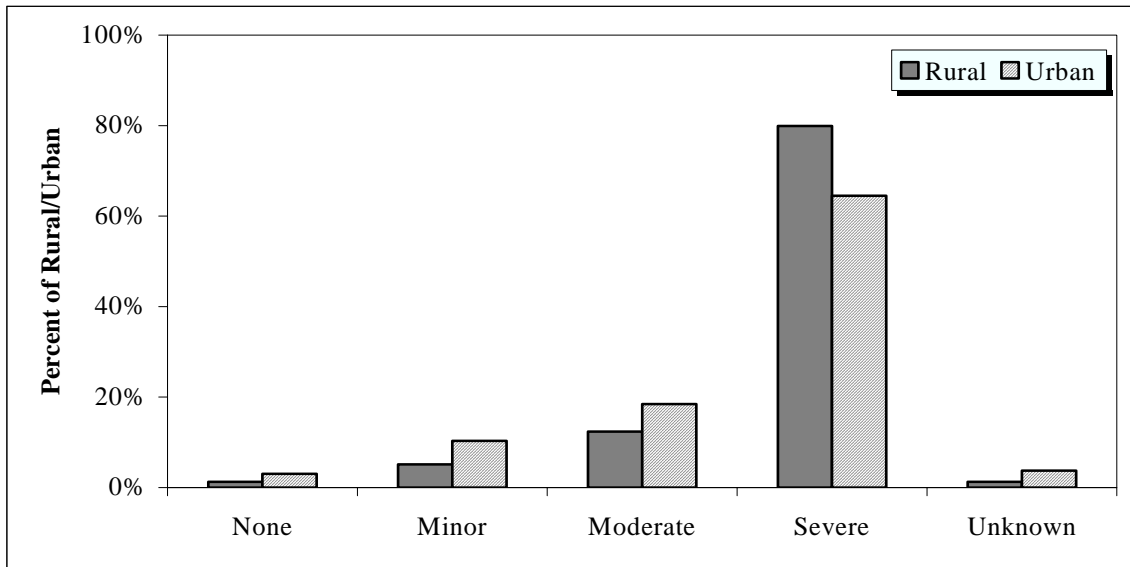
4.8 Vehicle Damage

The damage to vehicles involved in fatal crashes is partitioned into five categories: none, minor, moderate, severe, and unknown. Vehicle damage is generally determined by the investigating police officer. It is not surprising that most of the vehicles involved in fatal crashes have severe vehicle damage. A larger portion of vehicles involved in rural fatal crashes was considered severely damaged, 80 percent as compared to severely damaged vehicles in urban fatal crashes, 64 percent. Vehicles involved in rural fatal crashes were classified with damage at levels of none, minor, or moderate of 1 percent, 5 percent, and 12 percent, compared to vehicles involved in urban fatal crashes classified with damage at the same levels at 3 percent, 10 percent, and 18 percent, respectively. These data suggest that rural fatal crashes were more serious, as characterized by vehicle damage, than urban fatal crashes; see Table 20 and Figure 34.

| Vehicle Damage | Rural | | | | Urban | | | |
|-----------------------|----------------|------------------------------|---------------------|-------------------------------|----------------|------------------------------|---------------------|-------------------------------|
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| None | 4,231 | 1.16 1998 | 1.29 | 1.43 1994 | 7,263 | 2.67 2002 | 3.00 | 3.44 1994 |
| Minor | 16,826 | 4.77 1999 | 5.14 | 5.49 1996 | 24,974 | 9.87 2003 | 10.34 | 11.89 1994 |
| Moderate | 40,405 | 10.96 2002 | 12.34 | 13.34 1997 | 44,586 | 17.08 2003 | 18.46 | 19.29 1994 |
| Severe | 261,756 | 78.53 1996 | 79.94 | 81.69 2002 | 155,759 | 62.40 1994 | 64.48 | 66.26 2002 |
| Unknown | 4,227 | 1.16 2001 | 1.29 | 1.38 1994 | 8,987 | 3.29 2001 | 3.72 | 4.61 2003 |
| Total | 327,445 | | 100% | | 241,569 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003

Figure 34
Vehicle Damage

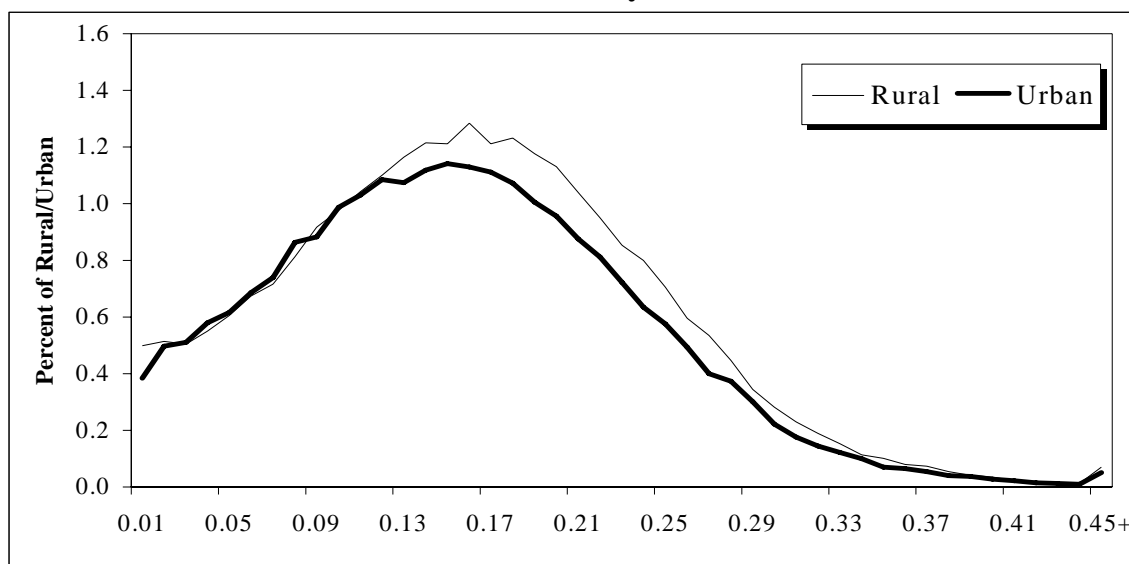


Source: NCSA, NHTSA, FARS 1994-2003

4.9 Alcohol-Involved Drivers

The blood alcohol concentration (BAC) of drivers involved in fatal crashes appears in Figure 35. The distribution was similar for both rural and urban drivers for BAC levels below .11, For virtually all levels of BAC above 0.11, the percent of rural drivers with a given BAC exceeded the percent of urban drivers with that same BAC level.

Figure 35
Distribution of Blood Alcohol Concentration of Drivers Involved
In Fatal Crashes by Location



Source: NCSA, NHTSA, FARS 1994-2003

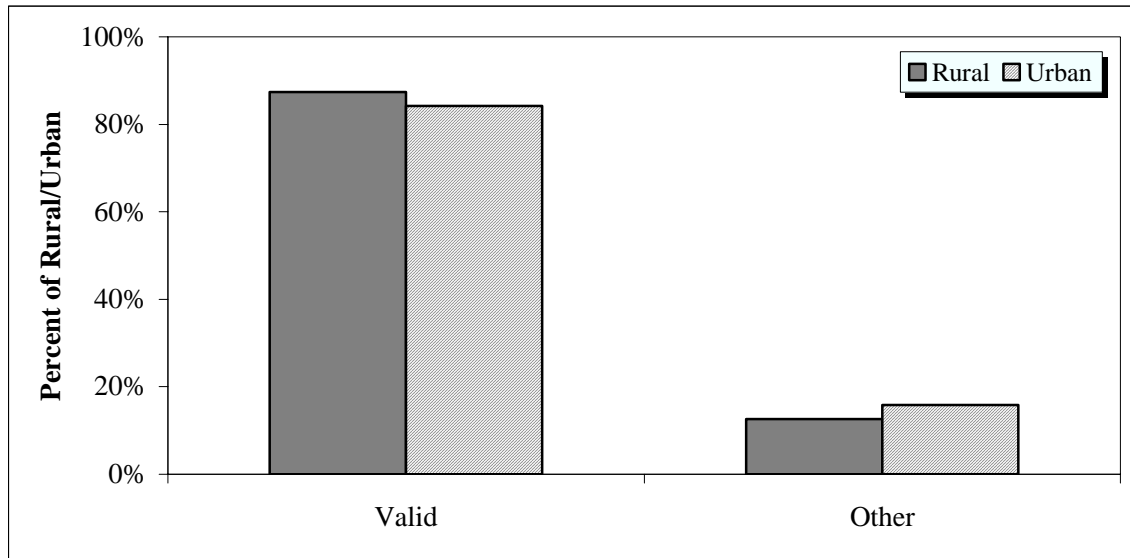
4.10 License Status

There is a slight difference in the portion of drivers who have a valid drivers license involved in fatal crashes in rural areas compared to those involved in fatal crashes in urban areas. Drivers in rural areas involved in fatal crashes from 1994 to 2003 had valid licenses 87 percent of the time. Drivers involved in fatal crashes in urban areas had valid licenses 84 percent of the time; see Table 21 and Figure 36.

| License Status for Drivers Involved | Rural | | | | Urban | | | |
|-------------------------------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| Valid | 286,151 | 86.58 1995 | 87.39 | 87.99 1997 | 203,309 | 82.83 2003 | 84.16 | 85.03 1998 |
| Other | 41,294 | 12.01 1997 | 12.61 | 13.42 1995 | 38,260 | 14.97 1998 | 15.84 | 17.17 2003 |
| Total | 327,445 | | 100% | | 241,569 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003

**Figure 36
License Status**



Source: NCSA, NHTSA, FARS 1994-2003

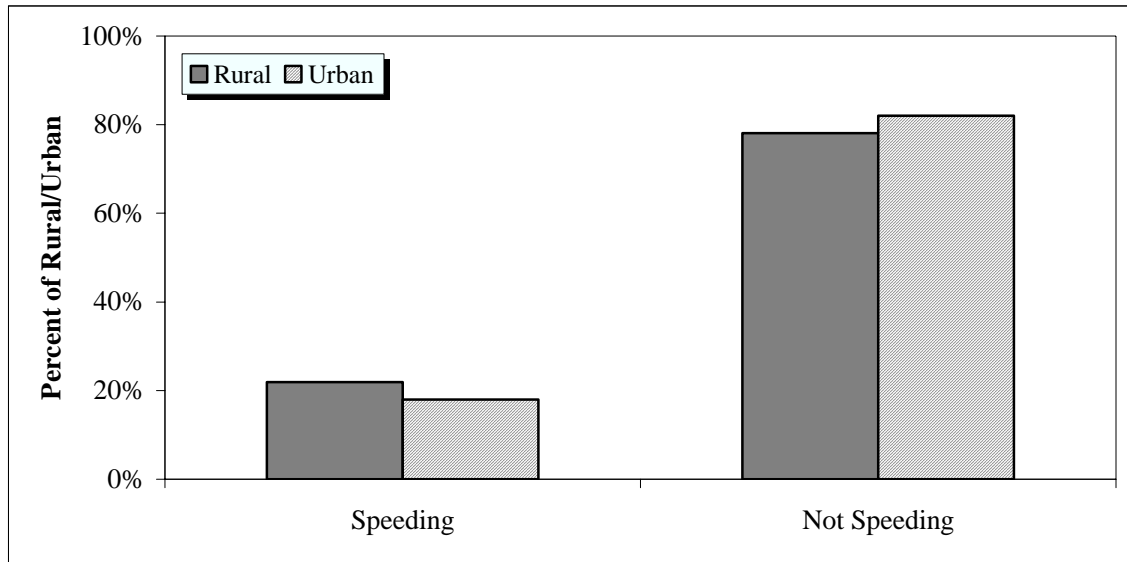
4.11 Vehicle Speeding

Fatal crash information on speeding is captured using the driver-related factors and violations charged. From 1994 to 2003, 22 percent of the vehicles involved in rural fatal crashes were identified as speeding. In this same time frame, 18 percent of the vehicles involved in urban fatal crashes were identified as speeding; see Table 22 and Figure 37.

| Speeding | Rural | | | | Urban | | | |
|-------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| Speeding | 71,786 | 20.73 2000 | 21.92 | 23.28 1995 | 43,520 | 17.16 1998 | 18.02 | 19.18 2002 |
| No Speeding | 255,659 | 76.72 1995 | 78.08 | 79.27 2000 | 198,049 | 80.82 2002 | 81.98 | 82.84 1998 |
| Total | 327,445 | | 100% | | 241,569 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003

**Figure 37
Vehicle Speeding**



Source: NCSA, NHTSA, FARS 1994-2003

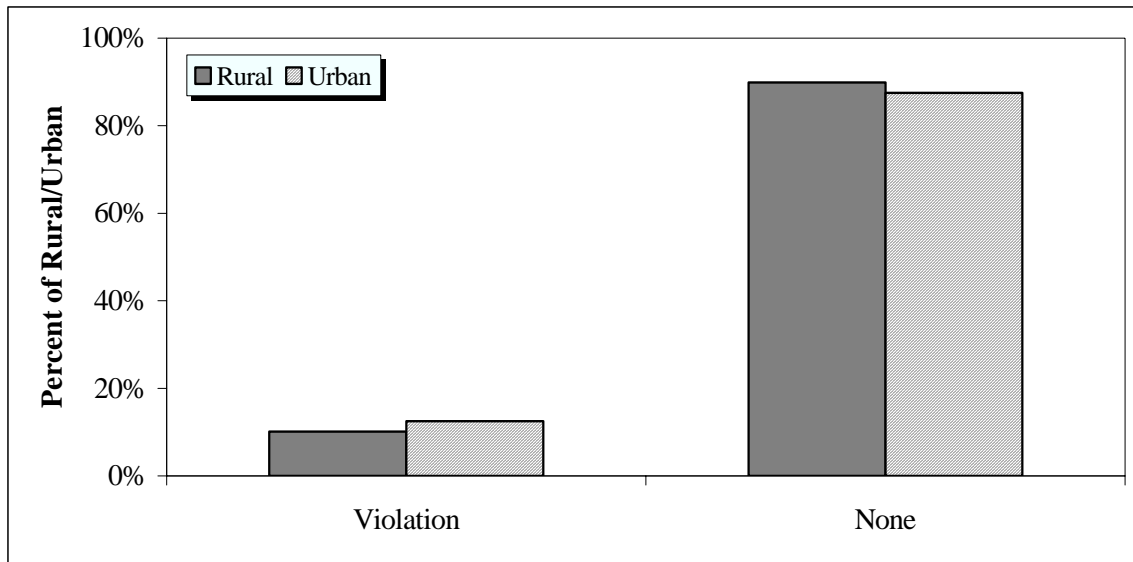
4.12 Driver Violation Charged

Violations that may be charged in conjunction with the fatal crash include, but are not limited to, alcohol, drugs, speeding, reckless driving, or driving without a valid drivers license. From 1994 to 2003, almost 10 percent of drivers in rural fatal crashes were charged with one or more violations, while for drivers involved in urban fatal crashes, the rate was approximately 13 percent; see Table 23 and Figure 38.

| Violations Charged | Rural | | | | Urban | | | |
|--------------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| Violation | 33,191 | 8.80 2001 | 10.14 | 11.92 1994 | 30,211 | 11.06 2003 | 12.51 | 14.25 1994 |
| None | 294,254 | 88.08 1994 | 89.86 | 91.20 2001 | 211,358 | 85.75 1994 | 87.19 | 88.94 2003 |
| Total | 327,445 | | 100% | | 241,569 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003

**Figure 38
Driver Violation Charged**



Source: NCSA, NHTSA, FARS 1994-2003

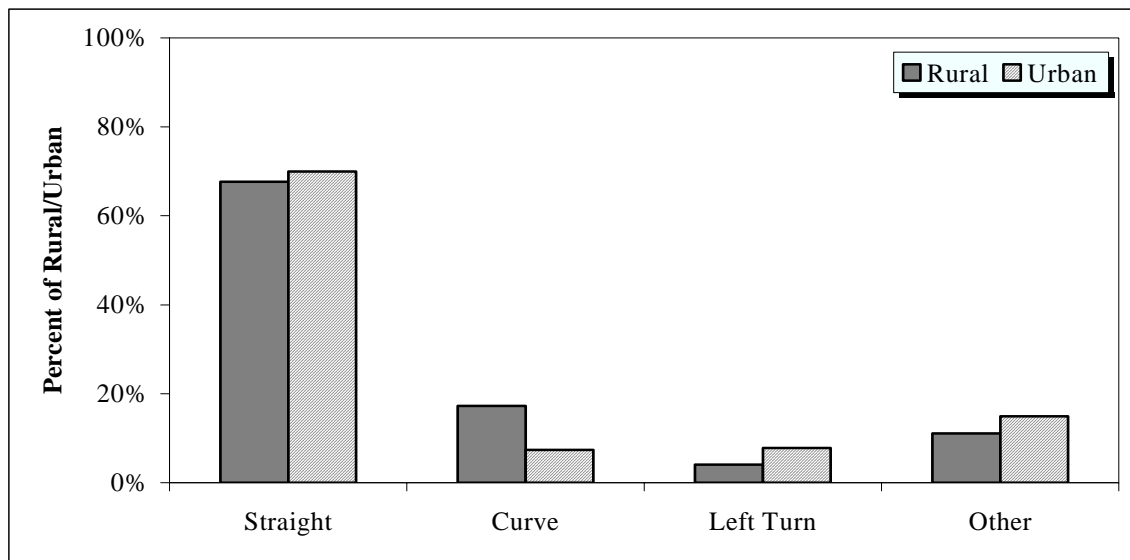
4.13 Vehicle Maneuver

The “Vehicle maneuver” refers to the action of the driver just prior to entering a crash situation. There are noticeable differences in reported vehicle maneuvers for rural versus urban fatal crashes. These differences were found for the maneuvers: going straight, negotiating a curve, and making a left turn. The largest difference was found for the maneuver “negotiating a curve.” Vehicles involved in rural fatal crashes were negotiating a curve 17 percent of the time just prior to entering a crash situation, while vehicles involved in urban fatal crashes were negotiating a curve about 7 percent of the time. These data are presented in Table 26 and Figure 40.

| Vehicle Maneuver | Rural | | | | Urban | | | |
|------------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| Straight | 221,616 | 66.77 1998 | 67.68 | 68.04 2003 | 168,959 | 68.97 2003 | 69.94 | 71.67 1995 |
| Curve | 56,489 | 16.21 2003 | 17.25 | 18.36 1994 | 17,833 | 6.65 2003 | 7.38 | 7.64 1998 |
| Left Turn | 13,207 | 3.86 1995 | 4.03 | 4.21 1998 | 18,775 | 7.32 1995 | 7.77 | 7.99 2000 |
| Other | 36,133 | 10.15 1994 | 11.04 | 11.67 1998 | 36,002 | 13.42 1995 | 14.91 | 16.51 2003 |
| Total | 327,445 | | 100% | | 241,569 | | 100% | |

Source: NCSA, NHTSA, FA445RS 1994-2003

**Figure 39
Vehicle Maneuver**



Source: NCSA, NHTSA, FARS 1994-2003

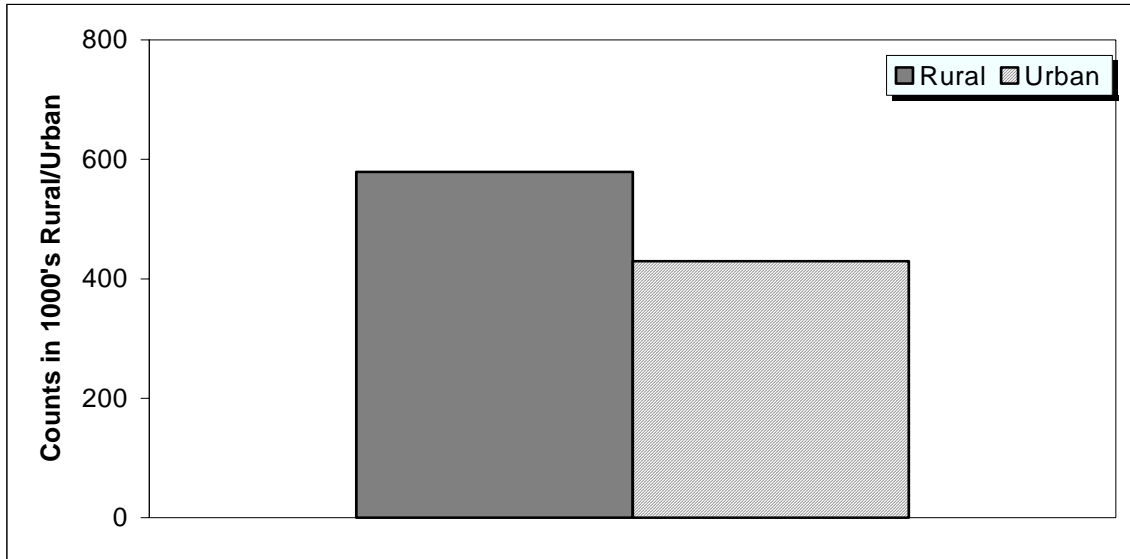
**FATAL
CRASH
ANALYSIS
-
PERSON
LEVEL**

5.0 FATAL CRASH ANALYSIS - PERSON LEVEL

5.1 Persons Involved in Fatal Crashes

From 1994 to 2003 there were 578,755 persons involved in rural fatal crashes and 429,546 persons in urban fatal crashes; see Figure 40. Persons involved in fatal crashes include but are not limited to occupants of vehicles involved in fatal crashes and injured pedestrians or cyclists. There were approximately 35 percent more persons involved in rural fatal crashes than urban fatal crashes. To examine the effects of variables involved in rural and urban fatal crashes, the portion or percentage that have a particular characteristic are compared.

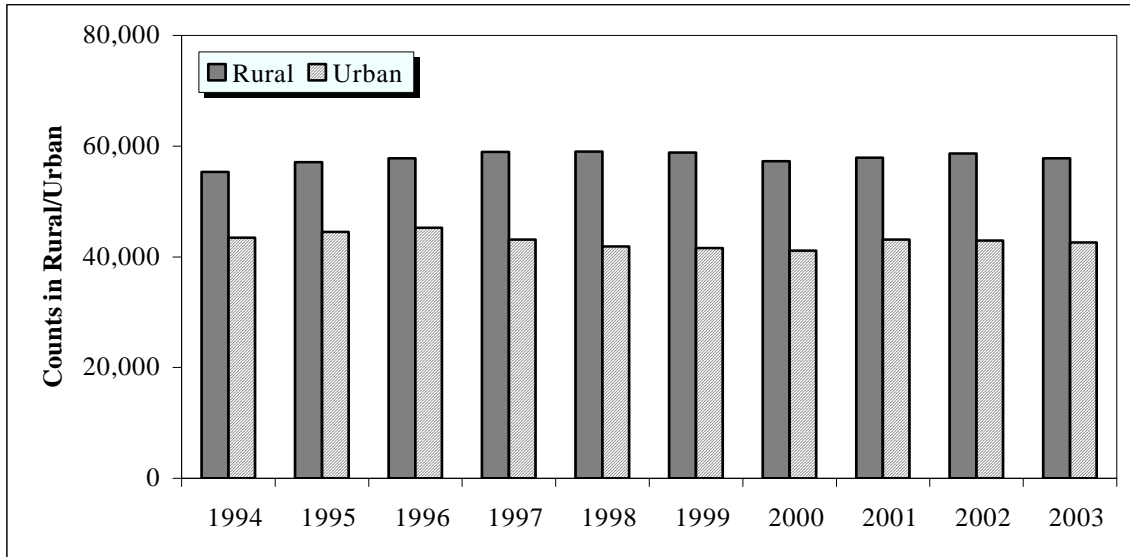
Figure 40
Persons involved in Fatal Crashes



Source: NCSA, NHTSA, FARS 1994-2003

Displaying the yearly data on persons involved in fatal crashes provides a reference for longitudinal considerations. The lowest number of persons involved in rural fatal crashes from 1994 to 2003, 55,364, occurred in 1994; the highest, 58,641, persons occurred in 2002. The average number of persons involved in rural crashes from 1994 to 2003 was 57,876 persons per year. The lowest number of persons involved in urban fatal crashes from 1994 to 2003, 41,567, occurred in 1999; the highest, 45,221, occurred in 1996. The average number of persons involved in urban fatal crashes from 1994 to 2003 was 42,955 individuals per year.

Figure 41
Persons involved in Fatal Crashes by Year

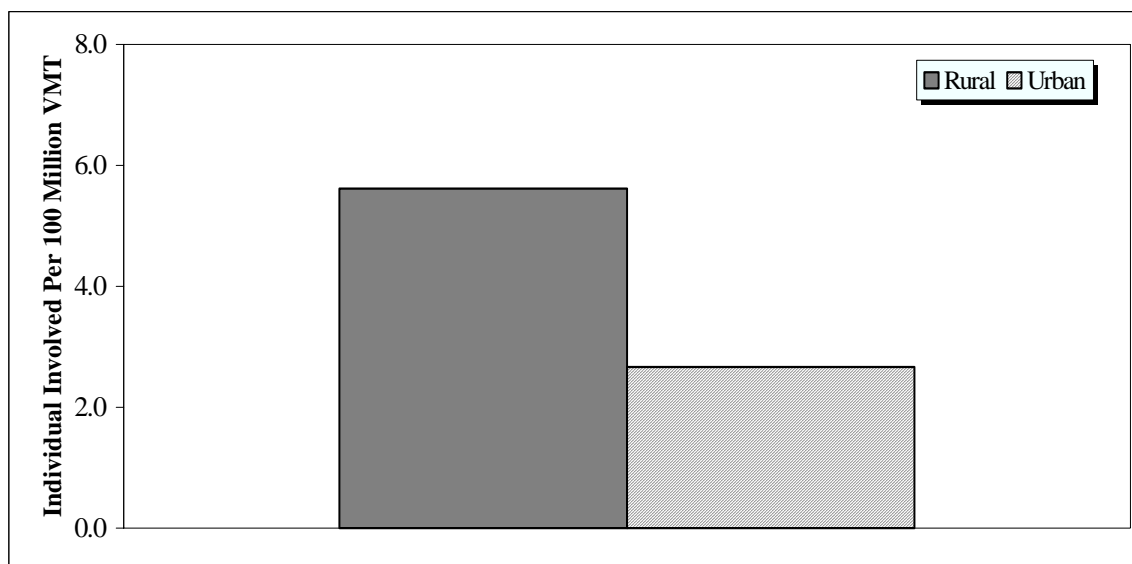


Source: NCSA, NHTSA, FARS 1994-2003

5.2 Person Involvement Rate

The person involvement rate is the number of people involved in rural versus urban fatal crashes divided by the rural/urban vehicle miles traveled for the given time period. The person involvement rate for rural fatal crashes from 1994 to 2003 was 5.6 persons per 100 million VMT. Over the same time period, the corresponding rate for urban fatal crashes was 2.7 individuals per 100 million VMT; see Figure 42.

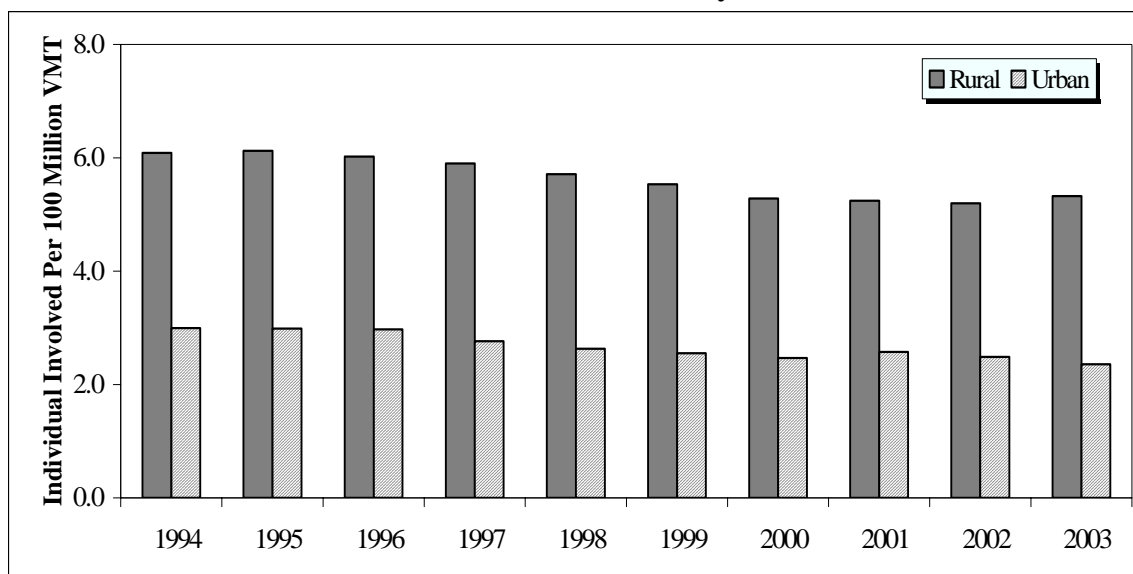
Figure 42
Person Involvement Rate



Source: NCSA, NHTSA, FARS 1994-2003, FHWA, VMT data 1994-2003

The person involvement rate, per 100 million miles driven, has generally declined over the time period of the study, 1994 to 2003, for both rural and urban areas; see Figure 43. For rural fatal crashes from 1994 to 2003, the lowest person involvement rate of 5.2 per 100 million miles driven, occurred in 2002, the highest, 6.1, occurred in 1995. For urban fatal crashes, the lowest individual involvement rate, 2.4 per 100 million miles driven, occurred in 2003, the highest, 3.0, occurred in 1994.

Figure 43
Person Involvement Rate by Year

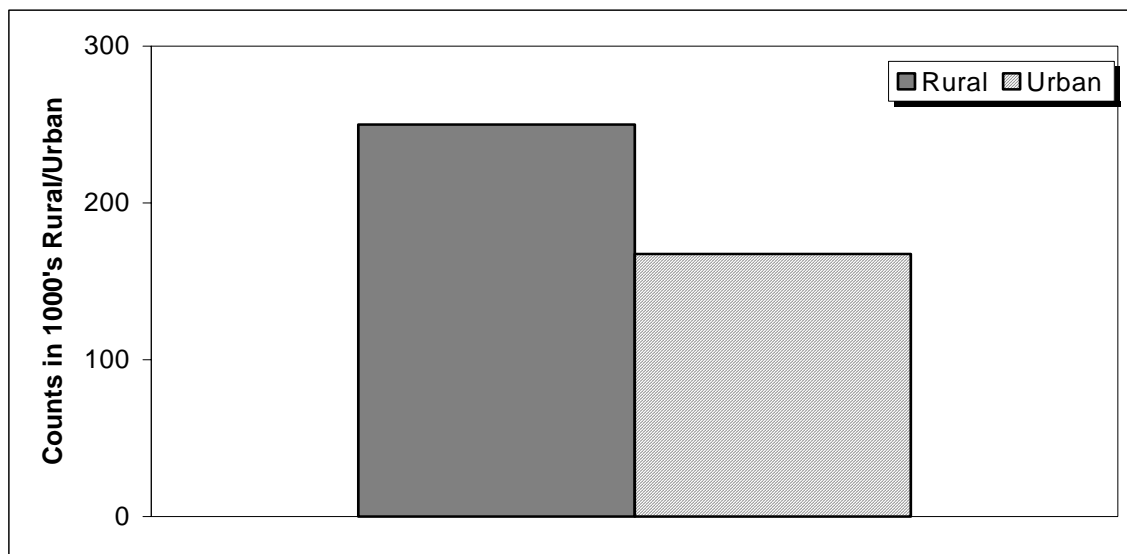


Source: NCSA, NHTSA, FARS 1994-2003, FHWA, VMT data 1994-2003

5.3 Deaths in Fatal Crashes

From 1994 to 2003 there were 249,986 deaths in rural fatal crashes and 167,491 deaths in urban fatal crashes; see Figure 44. There were approximately 49 percent more deaths in rural fatal crashes than urban fatal crashes.

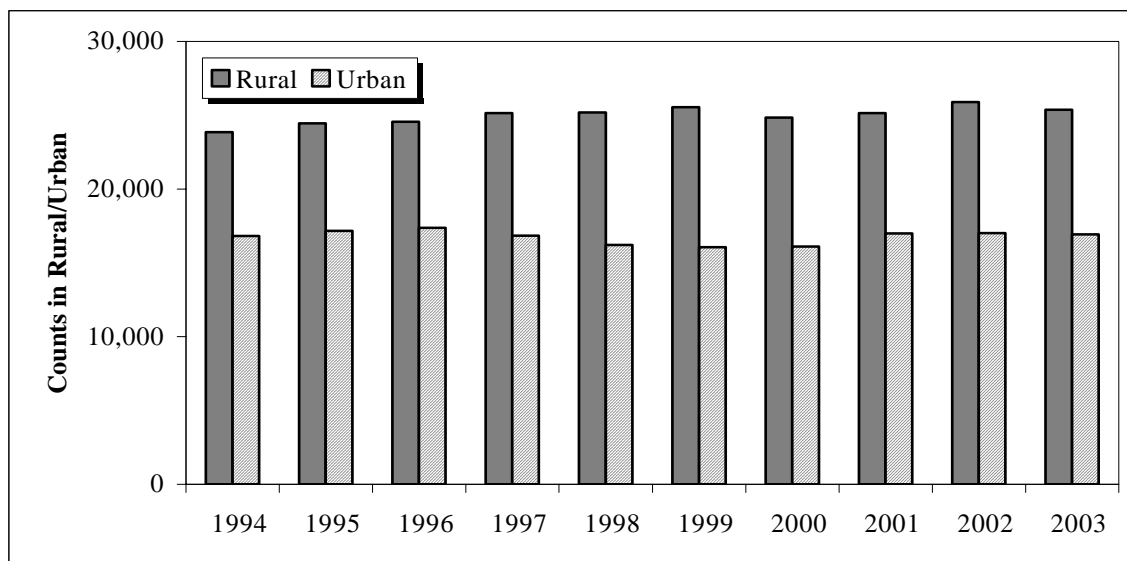
Figure 44
Deaths in Fatal Crashes



Source: NCSA, NHTSA, FARS 1994-2003

Displaying the yearly data on deaths in fatal crashes provides a reference for longitudinal considerations. The lowest number of deaths attributed to rural fatal crashes from 1994 to 2003, 23,841, occurred in 1994; the highest, 25,896, occurred in 2002. The average number of deaths attributed to rural fatal crashes from 1994 to 2003 was 24,999 deaths per year. The lowest number of deaths attributed to urban fatal crashes from 1994 to 2003, 16,058, occurred in 1999; the highest, 17,368, occurred in 1996. The average number of deaths attributed to urban fatal crashes from 1994 to 2003 was 16,749 deaths per year. See Figure 45.

Figure 45
Deaths in Fatal Crashes by Year

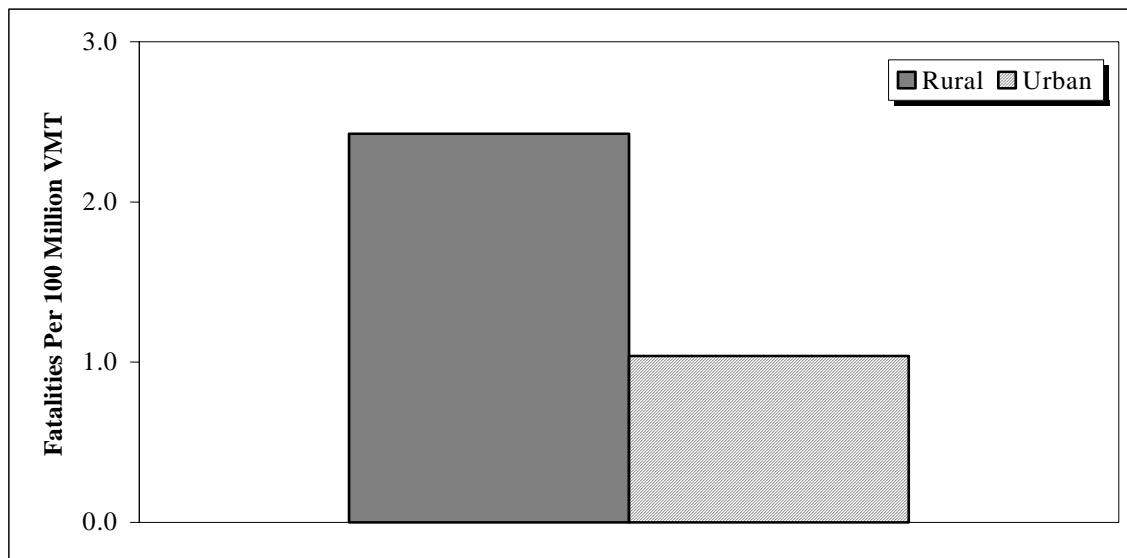


Source: NCSA, NHTSA, FARS 1994-2003

5.4 Fatality Rate

The fatality rate is the number of fatalities due to rural/urban fatal crashes divided by the rural/urban VMT for the given time period. From 1994 to 2003 the rural fatality rate was 2.4 fatalities per 100 million VMT. The corresponding urban fatality rate was 1.0 fatalities per 100 million VMT; see Figure 46.

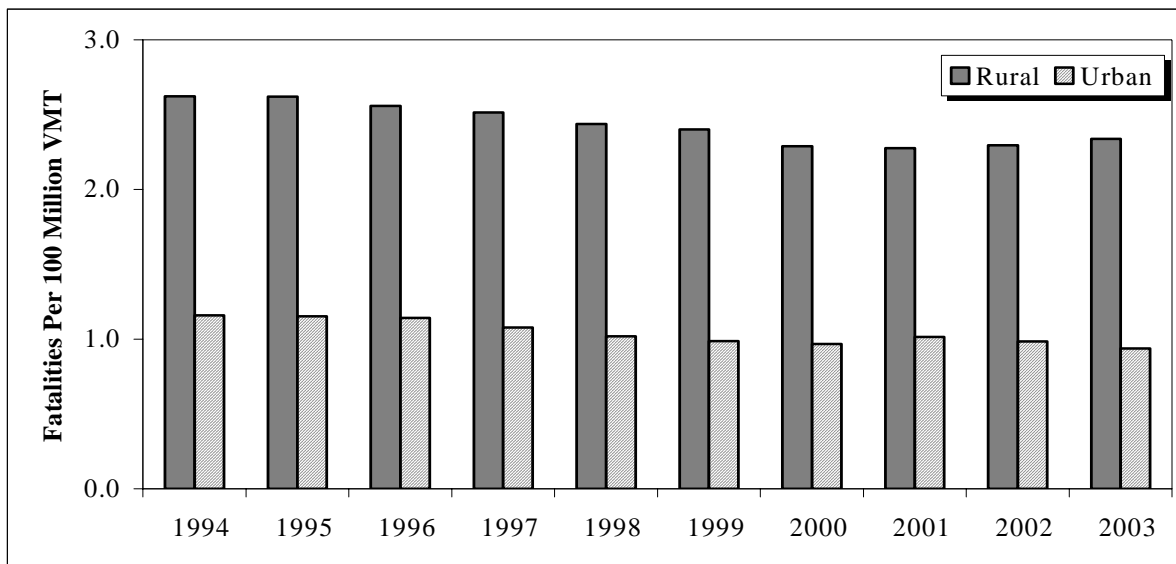
Figure 46
Fatality Rate



Source: NCSA, NHTSA, FARS 1994-2003, FHWA, VMT data 1994-2003

From 1994 to 2003 the Fatality rate generally declined for both rural and urban areas. The lowest fatality rate per 100 million miles vehicle driven in rural fatal crashes from 1994 to 2003, 2.3, occurred in 2001; the highest, 2.6, occurred in 1994. The lowest fatality rate per 100 million vehicle miles driven in urban fatal crashes from 1994 to 2003, 1.0, occurred in 2000; the highest, 1.2, occurred in 1994.

Figure 47
Fatality Rate by Year



Source: NCSA, NHTSA, FARS 1994-2003, FHWA, VMT data 1994-2003

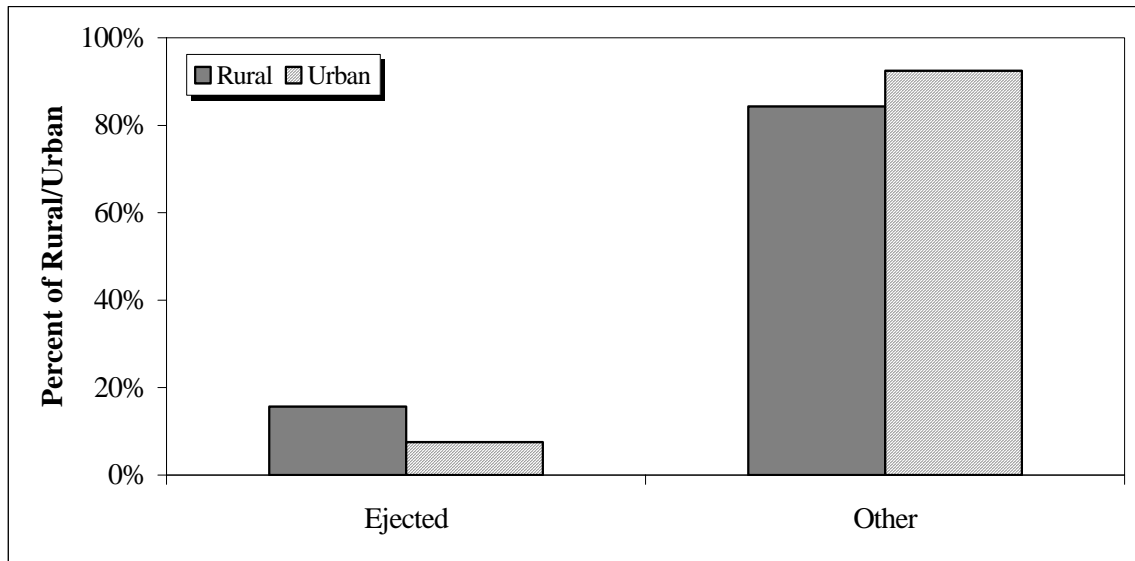
5.5 Ejection

Ejection is more prevalent in rural areas than in urban areas. Individuals involved in rural fatal crashes from 1994 to 2003 were ejected approximately 17 percent of the time. Individuals involved in urban fatal crashes from 1994 to 2003 were ejected approximately 8 percent of the time, i.e., the ejection rate for rural crashes is more than twice the ejection rate for urban crashes; see Table 25 and Figure 48. Five percent of the ejected individuals were belted in both rural and urban area.

| Table 25 Ejection | | | | | | | | |
|----------------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| Ejection | Rural | | | | Urban | | | |
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| Ejected | 90,704 | 14.97 2003 | 16.67 | 16.07 1995 | 32,399 | 7.11 2003 | 7.54 | 7.96 2001 |
| Other | 488,051 | 83.93 1995 | 84.33 | 85.03 2003 | 397,147 | 92.04 2001 | 92.56 | 92.89 |
| Total | 578,755 | | 100% | | 429,546 | | 100% | 2003 |

Source: NCSA, NHTSA, FARS 1994-2003

Figure 48
Ejection



Source: NCSA, NHTSA, FARS 1994-2003

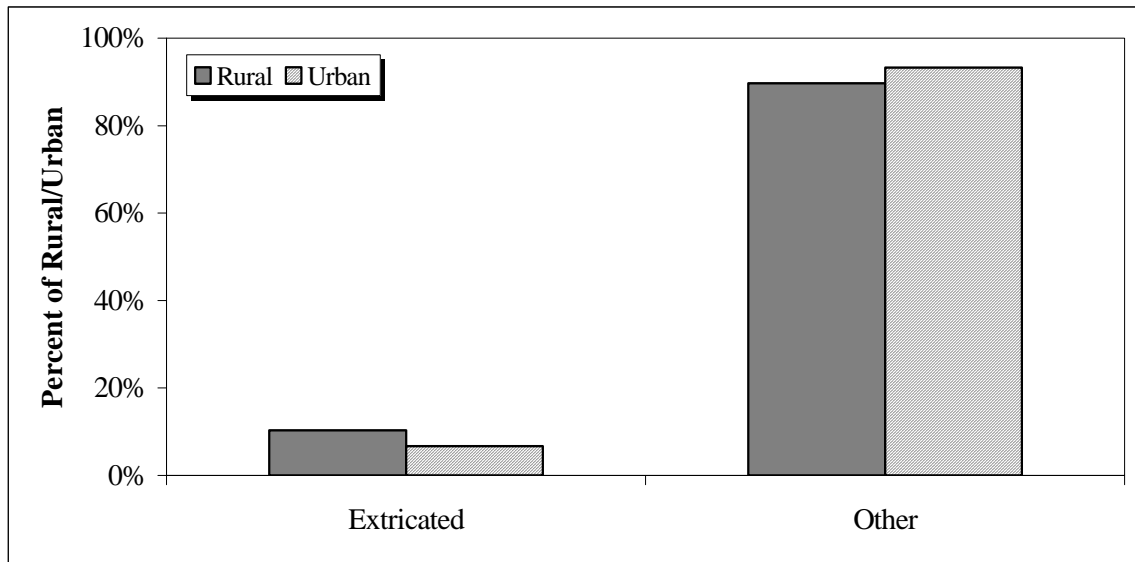
5.6 Extrication

Individuals in fatal crashes are recorded as extricated if equipment was used to remove them from the vehicle, i.e., mechanical means are used to remove the people. From 1994 to 2003, 10 percent of the individuals involved in rural fatal crashes were extricated. During this same time period approximately 7 percent of the individuals involved in urban fatal crashes were extricated; see Table 26 and Figure 49.

| Table 26 Extricated | | | | | | | | |
|------------------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| Extrication | Rural | | | | Urban | | | |
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| Extricated | 59,631 | 7.88 1995 | 10.30 | 12.33 2002 | 28,806 | 5.39 1995 | 6.71 | 8.25 2003 |
| Other | 519,124 | 87.67 2002 | 89.70 | 92.12 1995 | 400,740 | 91.75 2003 | 93.29 | 94.61 1995 |
| Total | 578,755 | | 100% | | 429,546 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003

Figure 49
Extricated



Source: NCSA, NHTSA, FARS 1994-2003

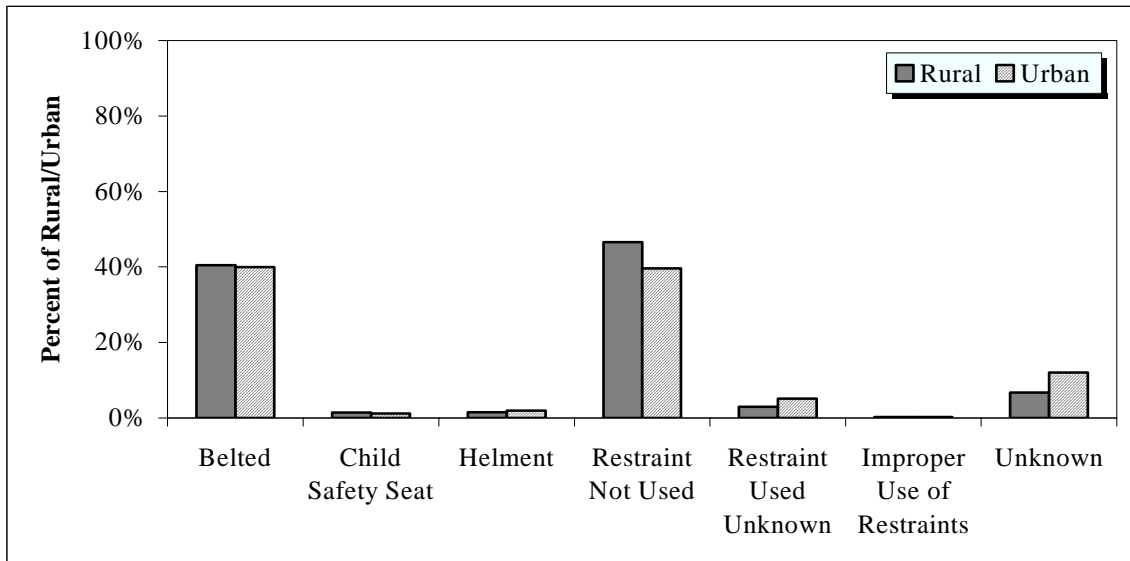
5.7 Restraint Use

Reported proper restraint use appears to be similar for all people involved in rural and urban fatal crashes. For the purposes of this study, restraint use was partitioned into seven levels: belted, child safety seat, helmet, restraint not used, restraint use unknown, improper use of restraints, and unknown. The average reported proper restraint use for fatal crashes for the period 1994 to 2003 is about 43 percent. Just under 47 percent of rural people involved in fatal crashes were not restrained, compared to about 40 percent in urban areas; see Table 27 and Figure 50.

| Restraint Use | Rural | | | | Urban | | | |
|----------------------------|----------------|------------------------------|---------------------|-------------------------------|----------------|------------------------------|---------------------|-------------------------------|
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| Belted | 234,306 | 33.71 1994 | 40.48 | 46.88 2003 | 171,550 | 32.61 1994 | 39.94 | 45.59 2003 |
| Child Safety Seat | 8,438 | 1.16 1995 | 1.46 | 1.87 2003 | 5,166 | 0.93 1994 | 1.20 | 1.58 2003 |
| Helmet | 8,829 | 1.17 1996 | 1.53 | 2.16 2003 | 8,265 | 1.58 1998 | 1.92 | 2.49 2003 |
| Restraint Not Used | 269,497 | 40.82 2003 | 46.56 | 51.55 1994 | 170,198 | 35.26 2003 | 39.62 | 43.83 1994 |
| Restraint Use Unknown | 17,161 | 1.61 2003 | 2.96 | 5.32 1994 | 21,877 | 2.68 2003 | 5.09 | 8.01 1994 |
| Improper Use of Restraints | 1,428 | 0.19 1995 | 0.25 | 0.29 2003 | 968 | 0.14 1994 | 0.23 | 0.29 2001 |
| Unknown | 39,096 | 6.35 2002 | 6.76 | 7.21 1996 | 51,522 | 10.92 2002 | 12.00 | 12.66 1994 |
| Total | 578,755 | | 100% | | 429,546 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003

Figure 50
Restraint Use



Source: NCSA, NHTSA, FARS 1994-2003

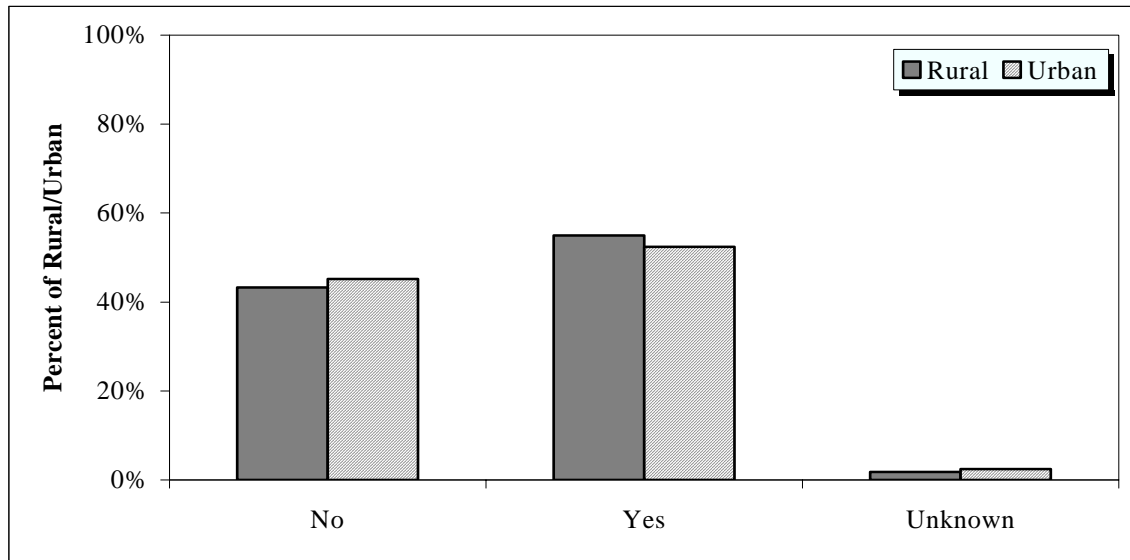
5.8 Hospital (Taken to)

A slightly larger portion of individuals involved in fatal crashes was taken to hospitals in rural areas, 55 percent, compared to urban areas, 52 percent. Almost twice the portion, 4 percent, of individuals involved in rural fatal crashes died at the scene compared to 2 percent who died at the scene in urban fatal crashes in 1999-2000; see Table 28 and Figure 51.

| Hospital (Taken to) | Rural | | | | Urban | | | |
|---------------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| No* | 250,499 | 40.82 1994 | 43.28 | 46.98 2003 | 194,016 | 43.24 1995 | 45.17 | 48.56 2006 |
| Yes* | 318,051 | 51.65 2003 | 54.96 | 56.94 1995 | 225,148 | 49.38 2003 | 52.41 | 54.50 1997 |
| Unknown | 10,205 | 1.36 2003 | 1.76 | 2.75 1994 | 10,382 | 1.72 2001 | 2.42 | 3.85 1994 |
| Total | 578,755 | | 100% | | 429,546 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003
 * No for 1999-2000 include Died at the Scene and Yes for 1999-2000 include Died En Route

**Figure 51
Hospital (Taken to)**



Source: NCSA, NHTSA, FARS 1994-2003
 *1999-2000 only

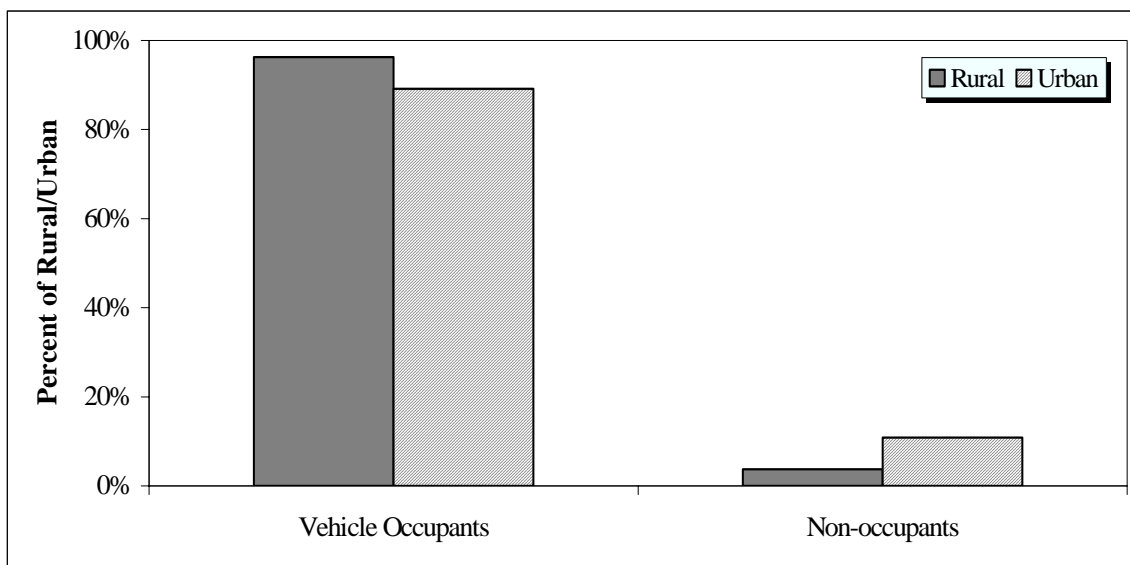
5.9 Individual Location and Person Type

From 1994 to 2003, less than 4 percent of the individuals involved in rural fatal crashes were non-occupants. During this same period, almost 11 percent of the individuals involved in urban fatal crashes were non-occupants. More than 40 percent of the individuals involved in rural fatal crashes were passengers. During this same period, over 33 percent of the individuals involved in urban fatal crashes were passengers. Almost 3 percent of the individuals involved in rural fatal crashes were pedestrians. The corresponding result for pedestrians in urban fatal crashes is slightly over 9 percent; see Table 29 and Figure 52 - 53.

| Location | Rural | | | | Urban | | | |
|-------------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| Vehicle Occupants | | | | | | | | |
| Drivers | 325,809 | 55.04 1995 | 56.29 | 57.86 2003 | 239,839 | 54.90 1995 | 55.84 | 56.92 2003 |
| Passengers | 231,560 | 40.85 1995 | 40.01 | 38.92 2003 | 143,160 | 34.21 1996 | 33.33 | 32.63 2003 |
| Subtotal | 557,369 | | 96.30 | | 382,999 | | 89.17 | |
| Non-occupants | | | | | | | | |
| Pedestrian | 16,582 | 2.56 2003 | 2.87 | 3.19 1995 | 39,148 | 8.69 2001 | 9.11 | 9.82 1994 |
| Cyclist | 2,743 | 0.36 2003 | 0.47 | 0.59 1994 | 4,988 | 1.03 2003 | 1.16 | 1.27 1995 |
| Other | 2,061 | 0.26 2002 | 0.36 | 0.345 1997 | 2,411 | 0.40 2001 | 0.56 | 0.81 1999 |
| Subtotal | 21,386 | | 3.70 | | 46,547 | | 10.83 | |
| Total | 578,755 | | 100% | | 429,546 | | | |

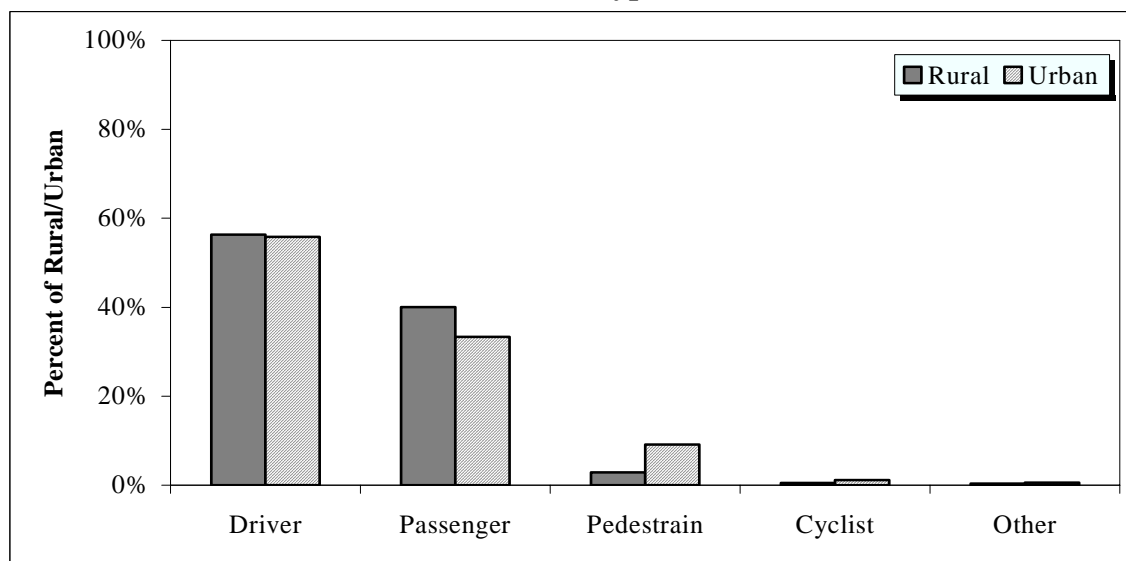
Source: NCSA, NHTSA, FARS 1994-2003

Figure 52
Individual Location



Source: NCSA, NHTSA, FARS 1994-2003

Figure 53
Person Type



Source: NCSA, NHTSA, FARS 1994-2003

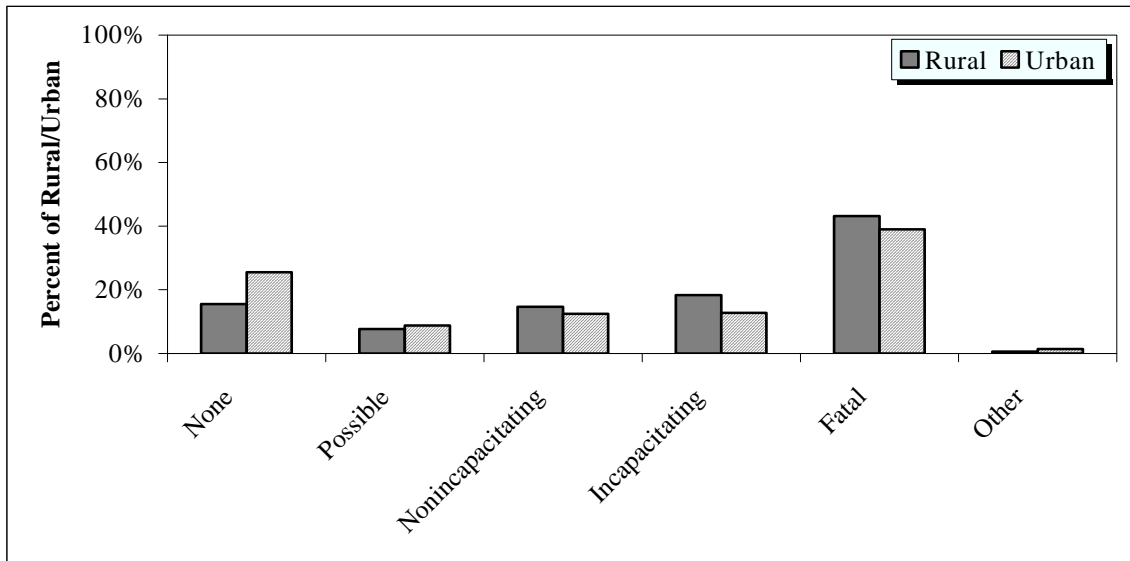
5.10 Injury Severity

To be included in the national census of fatal crashes, a crash must result in the death of at least one vehicle occupant or non-motorist within 30 days of the crash. As a result, data is captured for other vehicle occupants or non-motorists who were not fatally injured. From 1994 to 2003, less than half of all individuals involved in fatal crashes were fatally injured. More than 15 percent of the individuals involved in rural fatal crashes were not injured, compared to 25 percent of the individuals involved in urban fatal crashes. In general the injury severity level rate was higher in rural areas than in urban areas. In particular for non-incapacitating injuries, incapacitating injuries, and fatal injuries the rate was always higher for rural crashes than for urban crashes; see Table 30 and Figure 54.

| Injury Severity | Rural | | | | Urban | | | |
|--------------------|----------------|-----------------------|--------------|------------------------|----------------|-----------------------|--------------|------------------------|
| | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent | Count | Lowest Yearly Percent | Mean Percent | Highest Yearly Percent |
| None | 90,174 | 15.09 1995 | 15.58 | 16.01 2003 | 109,765 | 25.06 1997 | 25.55 | 26.21 2003 |
| Possible | 44,239 | 7.09 1995 | 7.65 | 8.44 2003 | 37,699 | 8.48 1994 | 8.78 | 9.09 2003 |
| Non-incapacitating | 84,738 | 13.97 1994 | 14.64 | 15.15 1999 | 53,559 | 12.22 1994 | 12.47 | 12.76 1999 |
| Incapacitating | 106,142 | 16.05 2003 | 18.34 | 20.02 1994 | 54,884 | 10.82 2003 | 12.78 | 13.93 1995 |
| Fatal | 249,986 | 42.47 1996 | 43.19 | 43.91 2003 | 167,491 | 38.41 1996 | 38.99 | 39.74 2003 |
| Other | 3,476 | 0.52 2002 | 0.60 | 0.67 1995 | 6,148 | 1.27 1997 | 1.43 | 1.66 2001 |
| Total | 578,755 | | 100% | | 429,546 | | 100% | |

Source: NCSA, NHTSA, FARS 1994-2003

Figure 54
Injury Severity

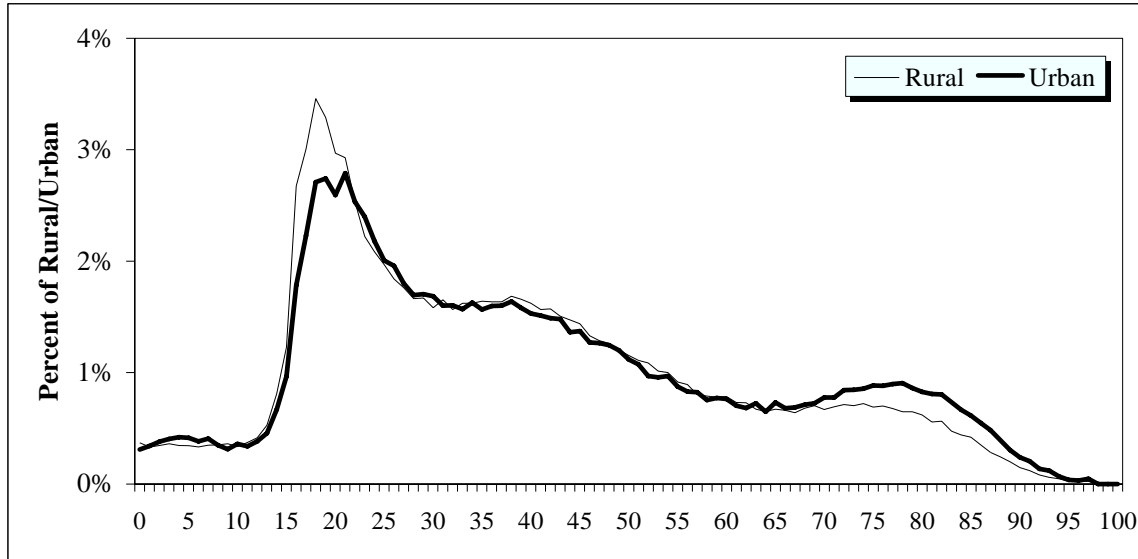


Source: NCSA, NHTSA, FARS 1994-2003

5.11 Age of Fatally Injured Persons and Survivors

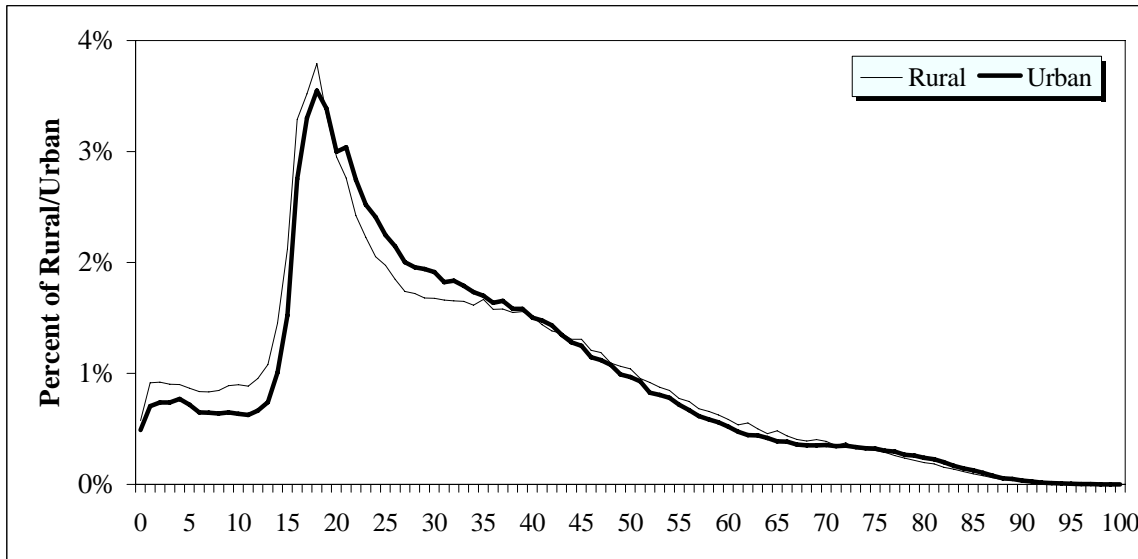
For both rural and urban fatal crashes, the distribution of the age of fatally injured persons including non-occupants appears to be similar. For fatalities in rural fatal crashes, the high of 3.46 percent occurs at age 18; for fatalities in urban fatal crashes, the high of 2.79 percent occurs at age 21. Figure 55 graphs the percentage of all crash fatalities by age, from 1994 to 2003. The general pattern holds for all years. The age distribution of survivors of a fatal crash is similar; see Figures 55 and 56.

Figure 55
Fatalities by Individual's Age



Source: NCSA, NHTSA, FARS 1994-2003

Figure 56
Survivors by Individual's Age



Source: NCSA, NHTSA, FARS 1994-2003

GLOSSARY

10.0 Glossary

Age: The age of an individual in crash as recorded.

Crash: An event that produces injury and/or property damage, involves a motor vehicle in transport, and occurs on a trafficway or while the vehicle is still in motion after running off the trafficway.

Crash Severity:

1. **Fatal Crash:** A police-reported crash involving a motor vehicle in transport on a trafficway in which at least one person dies within 30 days of the crash.
2. **Injury Crash:** A police-reported crash that involved a motor vehicle in transport on a trafficway in which no one died but at least one person was reported to have: (1) an incapacitating injury; (2) a visible but not incapacitating injury; (3) a possible, not visible injury; or (4) an injury of unknown severity.
3. **Property-Damage-Only Crash:** A police-reported crash involving a motor vehicle in transport on a trafficway in which no one involved in the crash suffered any injuries.

Day of Week: This variable is treated as a dichotomous variable.

1. **Weekday:** From 6 a.m. Monday to 5:59 p.m. Friday.
2. **Weekend:** From 6 p.m. Friday to 5:59 a.m. Monday.

Deaths in Fatal Crashes: The number of deaths that can be attributed to a qualifying crash that occurred within 30 days of the crash.

Death Rate: All qualifying deaths in fatal crashes in FARS for the given time period, divided by the corresponding number of vehicle miles traveled, VMT. This rate is reported as the number of deaths per 100 million vehicle miles traveled.

Drinking Driver: This variable is coded as drinking if there is evidence, within the police accident report, that the driver had been drinking.

Driver Violation Charged: This variable is coded if the driver is charged with a violation. Violations that may be charged include, but are not limited to, DWI, drugs, speeding, reckless driving, or driving without a valid drivers license.

Ejection: Ejection refers to individuals being completely or partially thrown from a compartment of a vehicle during the course of a crash. Ejection is not applicable to persons riding on the exterior of a vehicle, to motorcycle occupants, or to non-motorists. Exterior of vehicles includes running boards, roofs, fenders and bumpers, but not the bed of pickup trucks.

Extrication: Extrication refers to the use of equipment or other force to remove one or more persons from a vehicle, i.e., more than just lifting or carrying an individual out of the wreckage.

Fatal Crash Rate: The number of FARS crashes, for a given time period, divided by the corresponding vehicle miles traveled, VMT. This rate is reported as the number of crashes per 100 million vehicle miles traveled.

Fatalities per Crash: This variable is treated as a dichotomous variable, i.e., two levels. The levels of this variable are a single fatality and multiple fatalities.

Fire Occurrence: If a vehicle involved in the crash were also involved in a fire.

Hit and Run: A dichotomous variable, i.e., two levels, either the crash involved a case of hit and run or it did not.

Individual Location: This variable divides the population as inside a vehicle or not.

1. **Vehicle Occupants:** Any person who is in or upon a motor vehicle in transport. Includes the driver, passengers, and people riding on the exterior of a motor vehicle.
2. **Non-occupants:** Any person who is not an occupant of a motor vehicle in transport and includes the pedestrians, pedalcyclist, occupants of parked motor vehicles and others such as joggers, skateboard riders, people riding on animals, and people riding in animal-drawn conveyances.

Individuals Involved in Fatal Crashes: All individuals involved in fatal crashes recorded in FARS, including occupants of involved vehicles, pedestrians, and cyclists.

Individual Involvement Rate: The number of individuals involved in fatal crashes for the given time period, divided by the corresponding number of vehicle miles traveled, VMT. This rate is reported as the number of individuals involved per 100 million vehicle miles traveled.

Injury Severity: This variable is partitioned into six levels:

1. **None:** No injury indicates there is no reason to believe the person received bodily harm from the motor vehicle crash.
2. **Possible:** No visible signs of injury but complaint of pain or momentary unconsciousness.
3. **Nonincapacitating:** Any visible injuries such as bruises, abrasions, limping, etc.
4. **Incapacitating:** Any visible signs of injury from the crash and the person had to be carried from the scene.
5. **Fatal:** Any injury sustained in the motor vehicle crash that results in death within 30 days.
6. **Other:** Injured, Severity Unknown, Died Prior to Accident, and Unknown

License Status: This variable is coded valid if the driver of the vehicle had a valid driver license for the type of vehicle driven.

Manner of Collision:

1. **Angle:** Collisions which are not head-on, rear-end, rear-to-rear, or sideswipe.
2. **Head-on:** Refers to a collision where the front end of one vehicle collides with the front-end of another vehicle while the two vehicles are traveling in opposite directions
3. **Other:** Collisions which are rear-end, rear-to-rear, or sideswipe.

Person Type:

1. **Driver:** An occupant of a vehicle who is in physical control of a motor vehicle in transport, or for an out-of-control vehicle, an occupant who was in control until control was lost.
2. **Passenger:** Any occupant of a motor vehicle who is not a driver.
3. **Pedestrian:** Any person not in or upon a motor vehicle or other vehicle.
4. **Cyclist:** A person on a vehicle that is powered solely by pedals.
5. **Other:** Including occupant of a motor vehicle not in transport, occupant of a non motor vehicle transport device, unknown occupant type in a motor vehicle in transport, unknown type of non motorist and unknown.

Paved/Unpaved Roads: Roadway surface type partitions roadways into paved roads, which consist of concrete, blacktop, etc., or unpaved roads of gravel, stone, or dirt.

Probability of EMS arrival: The probability that the emergency medical services have arrived at the scene of the crash within the specified time. The time is calculated from the time of notification of the crash to the time of EMS arrival. This is a cumulative probability distribution and the results are reported as a percentage.

Restraint Use: The occupant's use of available vehicle restraints including lap belt, shoulder belt, or automatic belt.

1. **Belted:** Including shoulder belt, lap belt, and automatic belt.
2. **Child SS:** Child Safety Seat
3. **Helmet:** Including motorcycle helmet
4. **Other:** Type unknown or other including other helmet or unknown restraint used

Road type: The roadways are classified:

1. **Interstate:** Limited access divided facilities of at least four lanes designated by the Federal Highway Administration as part of the Interstate System.
2. **Principal Arterial:** All urban principal arterial with limited control of access not on the Interstate system. Major streets or highways, many with multi-lane or freeway design, serving high-volume traffic corridor movements that connect major generators of travel.
3. **Minor Arterial:** Streets and highways linking cities and larger towns in rural areas in distributing trips to small geographic areas in urban areas (not penetrating identifiable neighborhoods).
4. **Collector:** In rural areas, routes serving intra-county, rather than statewide travel. In urban areas, streets providing direct access to neighborhoods as well as direct access to arterials.
5. **Local:** Streets and roads whose primary purpose is feeding higher order systems, providing direct access with little or no through traffic.
6. **Unknown:**

Roadway Profile: This variable has five categories, level, grade, crest, sag, and other.

Rollover: Rollover is defined as any vehicle rotation of 90 degrees or more about any true longitudinal or lateral axis. Includes rollovers occurring as a first harmful event or subsequent event.

Speed limit: The posted speed limit in mph.

Time of Day:

1. **Day:** From 6 a.m. to 5:59 p.m.
2. **Night:** From 6 p.m. to 5:59 a.m.

Trailing Vehicle: This variable applies to vehicles that are being towed by a trailer hitch. It does not apply to vehicles that are pulled by a rope or chain.

Vehicle Damage: This variable, sometimes called extent of deformation, has been partitioned into five levels: none, minor, moderate, severe, and unknown. If the police accident report indicates that the vehicle was “totaled,” but the vehicle was driven away, then the damage is considered moderate. If the police accident report indicates that the vehicle was “totaled” and the vehicle was towed away, then damage is considered severe.

Vehicles Involved in Crashes: The number of vehicles involved in crashes as recorded in the database. The data are reported as totals by year.

Vehicle Involvement Rate: The number of vehicles involved in crashes for the given time period, divided by the corresponding number of vehicle miles traveled, VMT. This rate is reported as the number of vehicles involved in fatal crashes per 100 million vehicle miles traveled.

Vehicle Maneuver: This variable refers to the action of the driver just prior to entering the fatal crash situation. This is not a crash avoidance maneuver. The data have been partitioned into four levels, going straight, negotiating a curve, making a left turn, and other.

Vehicle Miles Traveled, VMT: The number of miles traveled by vehicles on public roadways. The Federal Highway Administration provides these data.

Vehicle Role: For the purpose of this study the “vehicle role” has been partitioned into five levels: no collision, striking, struck, both and unknown.

Vehicle Speeding: These codes are part of the driver related factors and violations charged. This variable is coded as driving too fast for conditions, in excess of posted speed limit, racing speeding (above the speed limit), speed greater than reasonable and prudent (Not necessarily over the limit), exceeding special speed limit (e.g., for trucks, buses, cycles, or on bridge, in school zone, etc.), energy speed (exceeding 55 mph, non-pointable), or speed related violations generally.

Vehicle Type: A series of motor vehicle body types that have been grouped together because of the design similarities. The principal vehicle types used in this report are passenger car, light truck including SUVs, large truck, motorcycle, and other vehicle.

Passenger Cars: Motor vehicles used primarily for carrying passengers, including convertibles, sedans, and station wagons.

Light Trucks and Vans: Trucks of 10,000 pounds gross vehicle weight rating or less, including pickups, SUVs, vans, truck-based station wagons, and utility vehicles.

Large Trucks: Trucks over 10,000 pounds gross vehicle weight rating, including single-unit trucks, combination trucks and tractors (cab only or with any number of trailing units; any weight).

Motorcycles: A two- or three-wheeled motor vehicle designed to transport one or two people, including motorscooters, minibikes, and mopeds.

Other/Unknown: Consists of the following types of vehicles:

1. Bus (large motor vehicles used to carry more than 10 passengers, including school buses, inter city buses, and transit buses)
2. Large limousine (more than four side doors or stretched chassis)
3. Three-wheel automobile or automobile derivative
4. Van-based motorhome
5. Light-truck-based motorhome (chassis-mounted)
6. Large-truck-based motorhome
7. ATV (all-terrain vehicle, including dune/swamp buggy) and ATC (all-terrain cycle)
8. Snowmobile
9. Farm equipment other than trucks
10. Construction equipment other than trucks (includes graders)
11. Other type vehicle (includes go-cart, fork lift, city streetsweeper)
12. Unknown.

Year: The calendar year in which the crash occurred.

DOT HS 809 896
December 2005