

## **NEBRASKA CODES**

**Nebraska Crash Outcome Data Evaluation System (CODES)**



# **Nebraska 1999 Motor Vehicle Crash Outcome Report**

**September 2001**

NEBRASKA HEALTH AND HUMAN SERVICES SYSTEM



# Nebraska 1999 Motor Vehicle Crash Outcome Report

Richard P. Nelson, Director  
Nebraska Department of Health and Human Services Regulation and Licensure

Richard A. Raymond, M.D., Chief Medical Officer

Robert Leopold, M.C.R.P., Director  
Public Health Assurance Division

Adi Pour, Ph.D., Administrator  
Section of Environmental, Disease, and Vector Surveillance

Thomas J. Safranek, M.D.  
State Epidemiologist

## **Report prepared by**

Haifeng Guo, M.S.  
CODES Research-Assistant

Ming Qu, MEd.  
CODES Administrator

Dan Christensen, M.S.  
CODES Data Analyst

## **Edited by**

J. Arturo Coto, M.P.H.

Adi Pour, Ph.D.

## Members of the Nebraska CODES Advisory Committee

1. Dean Cole	NHHSS R&L* - EMS Program
2. Dr. Paul Collicott	Lincoln General Hospital Trauma Center
3. Stanley Cooper	NHHSS F&S** - Vital Records Services
4. Steve Frederick	NHHSS R&L - Data Management
5. Sandi Kahlandt	NHHSS F&S - Medicaid Division
6. Robert Grant	Nebr. Department of Roads, Highway Safety
7. Dr. Robert L. Muelleman	University of Nebraska Medical Center
8. Rita Weiler Williams	Nebraska EMS Association
9. Fred E. Zwonechek	Nebr. Dept. of Motor Vehicles, Office of Highway Safety
10. Betty Johnson	Nebr. Dept. of Motor Vehicles, Driver Vehicle Records
11. Kevin Conway	Nebr. Association of Hospitals & Health Systems
12. Keith Hansen	NHHSS Injury Control and Prevention Program Coordinator
13. Bob Corner	Nebr. Dept. of Motor Vehicles, Office of Highway Safety
14. Doug Donscheski	Nebraska State Patrol
15. Pramod Dwivedi	Epidemiologist, Lincoln-Lancaster Co. Health Dept.
16. Sam Prieb	Nebr. Department of Roads, Highway Safety
17. Bernie Guy	Legislative liaison, Nebr. Brain Injury Association
18. Doug Fuller	NHHSS EMS Program
19. Robert Peabody	EMS Rescue Squad Volunteer
20. Jeannine Rediger	Nebraska State Patrol
21. Monica Seeland	Nebraska Association of Hospitals & Health Systems
22. Dick Buntgen	Data Analyst, Douglas County Health Dept.
23. Marla Augustine	NHHSS Communications & Legislative Services
24. Sherri Wren	NHHSS EMS Trauma Coordinator

\*Nebraska Health and Human Services System, Department of Regulation and Licensure

\*\*Nebraska Health and Human Services System, Department of Finance and Support

# Table of Contents

<u>Section</u>	<u>Page Number</u>
Introduction .....	1
Overview .....	2
Age .....	3
Gender .....	5
Drivers	
Age of Driver .....	5
Gender of Driver .....	6
Pedestrian and Pedalcyclists	
Injuries and Deaths by Age and Gender.....	6
Injuries and Deaths by Month .....	7
Behavior	
Alcohol.....	8
Occupant Restraint Use.....	9
Improper Driving.....	11
Crash Type .....	12
Vehicle Type .....	13
Posted Speed Limit.....	13
Crash Time	
Month of Crash .....	14
Day of Week of Crash.....	14
Time of Day of Crash.....	15
Payer Source.....	15
EMS Run-times .....	16

## Glossary

***Injury severity:*** We defined the injury severity based on the initial determination by law enforcement at the scene and the results of data linkage. Anyone who required emergency medical services (EMS) transport or hospital care was assumed to have been injured. Additionally, any person with a record that did not link but was classified as having a disabling or visible injury by law enforcement was assumed to have been injured. A person was determined to have died in a crash if there was a law enforcement report indicating the person was dead, or if a crash record linked to a death certificate record to that individual, or both.

Crash records were assigned to one of the following categories:

- Not injured: Records reported by law enforcement as either a possible injury or not injured, and did not link to an EMS or a hospital discharge database (HDD) record.
- Injured: Records reported by law enforcement as injured and/or the record linked to an EMS or a HDD record.
- Died: Records reported by law enforcement as killed and/or the record linked to a Death Certificate Data record.

***Hospital Charges:*** Hospital charges are the sum of the charges recorded on the bill for all HDD records that correspond to an individual involved in a motor vehicle crash and treated in an acute care hospital. Hospital charges were obtained based on the records in the hospital discharge database linked to crash files.

***Payer Source:*** Payer source is divided into commercial insurance (includes all private insurance companies), Medicaid, Medicare, self-pay, and federal programs (military insurance). Payer source was obtained based on the records in the hospital discharge database linked to crash files.

***EMS run-times:*** EMS run times were calculated based on the EMS records that linked to the Crash files.

- Dispatch to arrival at the scene (Arrival time): the number of minutes that elapse from the time the EMS unit was dispatched until the time when the unit arrives at the scene of the crash.
- Time spent at the scene (Scene time): the number of minutes that elapse from the time the EMS unit arrives at the scene until the time when the unit departs from the scene.
- Departure from the scene to the receiving medical facility (Departure time): the number of minutes that elapse from the time the EMS unit departs from the scene until the time when the unit arrives at the receiving medical facility.
- Total time: the number of minutes that elapse from the time the EMS unit was dispatched until the time when the unit arrives at the receiving medical facility.

***Location of motor vehicle crash:*** According to the U.S. Census classification, which takes into account the number of people living in the largest city within the county as well as the total county population, Nebraska's 93 counties were grouped as follows:

- *Metropolitan urban* includes at least one community with at least 50,000 residents or more and a local county population of at least 100,000.
- *Non-metropolitan urban* includes at least one community with between 10,000 and 50,000 residents.
- *Large rural:* not metropolitan or non-metropolitan urban and the county's largest community has a population between 2,500 to 10,000.
- *Small rural:* all other counties.

## **Introduction**

Motor vehicle crashes are the leading cause of deaths due to injuries in the United States for people ages 1-34. These deaths are often preventable, but only if we understand the factors contributing to crashes and their consequences. The first step for developing effective interventions to prevent motor vehicle crashes and their devastating consequences is to accurately describe the problem. The Nebraska Crash Outcome Data Evaluation System (CODES) is a multi-agency program that links and uses motor vehicle crash data (police reports) and data from emergency medical services (EMS), hospital discharge data from the Nebraska Association of Hospitals and Health Systems, death certificates and other sources such as drivers registry data. As a result, we have created a unique population-based database, which can help public health policy makers and program managers to better define the impact of motor vehicle crashes in Nebraska.

This report is funded in part by grant DTNH22-98-H-07086 from the National Highway Traffic Safety Administration (NHTSA).

It is a challenge to organize motor vehicle crash data in a simple and clear fashion. With CODES data, we are able to provide sufficient detail about risk factors and populations at risk. The purpose of this report is to highlight motor vehicle crash outcomes in a simple and graphic presentation.

We acknowledge Marla Augustine, Steve Frederick, Doug Fuller, Keith Hansen, Kevin Conway, Monica Seeland, Fred Zwonechek, Bob Corner, and Robert Grant for their review and guidance.

If you have any questions or comments regarding this report, or for more detailed information, please contact:

Nebraska CODES Program  
Office of Epidemiology  
Department of Regulation and Licensure

Nebraska Health and Human Services System  
301 Centennial Mall South  
P.O Box 95007  
Lincoln, NE 68509

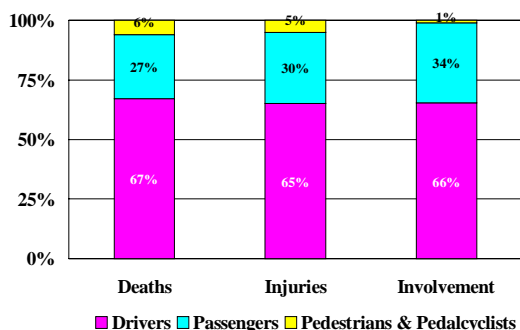
Phone: (402) 471-0566

## Overview

In 1999, 112,560 individuals and 73,769 vehicles were involved in 42,928 motor vehicle crashes in Nebraska, which includes fatal, injury, and non-injury (property damage only) crashes. These crashes resulted in 297 fatalities and 17,193 injured persons. These crashes also contributed to a total of \$2,149,177,200 in economic losses including medical and emergency expenses, according to *1999 Nebraska Traffic Accident Facts: Annual Report* from the Nebraska Department of Roads.

Among the persons involved in motor vehicle crashes, 73,749 (66%) were drivers, 37,807 (34%) were passengers, and 1,004 (1%) were pedestrians or pedalcyclists (Figure 1). Pedestrians and pedalcyclists were over-represented in deaths and injuries. They accounted for 1% of persons involved in crashes and made up 6% of crash deaths and 5% of crash injuries (Figure 1).

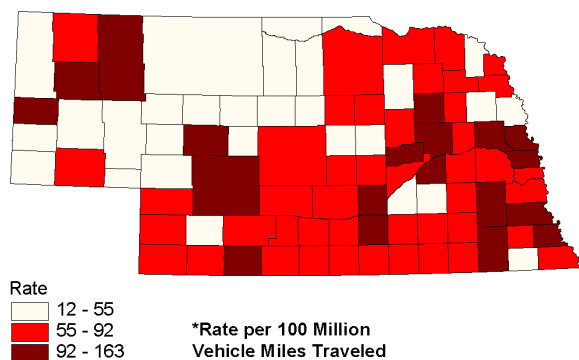
**Figure 1. Persons Involved, Injured, and Killed in Motor Vehicle Crashes, Nebraska, 1999**



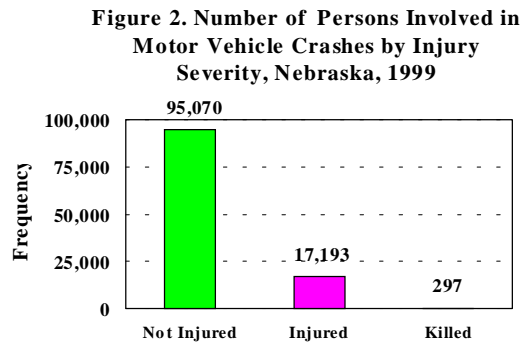
Map 1 shows injury rates (including fatalities) per 100 million vehicle miles traveled for individuals involved in crashes by county. Generally, the higher injury rates were in southern and eastern Nebraska, with additional high rates in the far northwest. Madison County had the highest injury rate (163), followed by Lancaster County (144), and Dodge County (143). In contrast, Grant County had the lowest injury rate (12), followed by Arthur County (14).

**Map 1**

**Injury and Fatality Rate\* for Individuals Involved in Motor Vehicle Crashes by County Nebraska 1999**

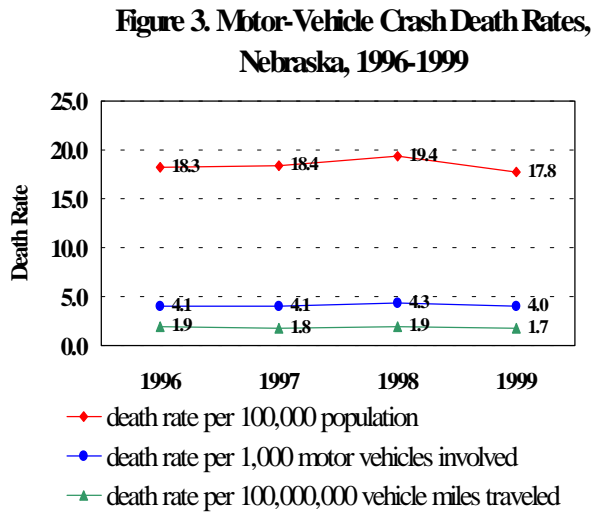


Among the persons involved in motor vehicle crashes, 95,070 (85%) were not injured, 17,193 (15.3%) were injured, and 297 (0.3%) were killed (Figure 2).



During the 1996 -1999 period (Figure 3):

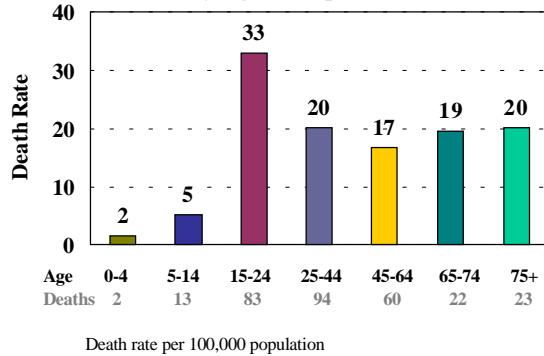
- Death rates per 100,000 population increased from 18.3 to 19.4 from 1996 to 1998, then dropped to 17.8 in 1999.
- Death rates per 1,000 motor vehicles involved in crashes increased from 4.1 to 4.3 from 1996 to 1998 then decreased to 4.0 in 1999.
- Death rates per 100 million vehicle miles traveled dropped from 1.9 in 1998 to 1.7 in 1999.



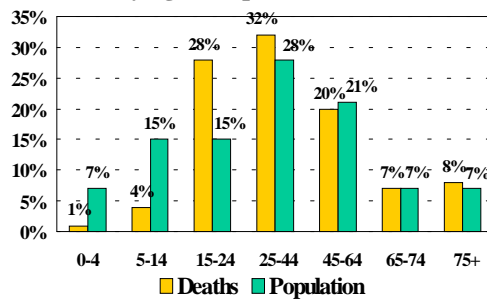
## Age

Motor vehicle death rates varied by age, with the peak at 15-24 years of age. (Figure 4). This age group was also over-represented in deaths. They accounted for 15% of the population but accounted for 22% of the deaths. (Figure 5).

**Figure 4. Motor Vehicle Crash Death Rates by Age Group, Nebraska, 1999**



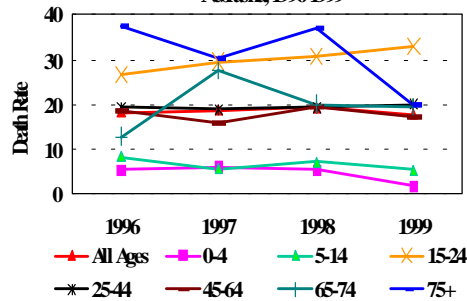
**Figure 5. Comparison of Proportions of Motor Vehicle Crash Deaths and Population by Age Group, Nebraska, 1999**



Trend

The death rate for all ages (red line) was nearly steady from 1996 to 1999. However, some age groups exhibited changes: the death rates for the 65-74 and the 75 or older age groups fluctuated from year to year; the rate for the 65-74 age group increased from 1996 to 1997, decreased in 1998, then flattened in 1999. The opposite trend of the 65-74 age group was seen for the 75 or older age group from 1996-1998, then their rate decreased in 1999. The death rate for the 15-24 age group gradually increased from 26.6 to 32.9. (Figure 6). The death rate for all other age groups remained relatively stable.

**Figure 6. Motor Vehicle Crash Death Rates by Age Group Nebraska, 1996-1999**

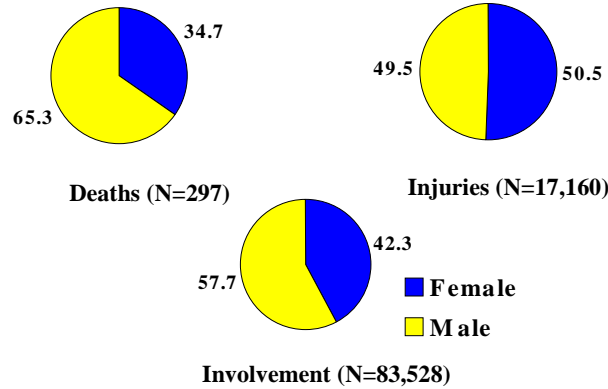


Death rate per 100,000 population

## Gender

In 1999, more males (48,154, 58%) than females (35,374, 42%) were involved in motor vehicle crashes. Although more females were injured (8,659, 50.5%) than males (8,501, 49.5%), more males (194, 65%) were killed than females (103, 35%) (Figure 7).

**Figure 7. Persons Involved, Injured, and Killed in Motor Vehicle Crashes by Gender, Nebraska, 1999**



## Drivers

### Age of Driver

Generally speaking, the crash involvement rate decreased as driver age increased in 1999 (Table 1). The same trend showed in 1996, 1997, and 1998.

In 1999, the 16-19 age group had the highest death rate (32.6), followed by the 20-24 age group (21.7), and the 75-and-older age group (18.8) (Table 1). In contrast, during 1996 and 1997, the highest death rates were among the 75 and older age group, followed by the 16 to 19 age group. In 1998 the highest death rates were among the 20-24 age group and the 55-64 age group.

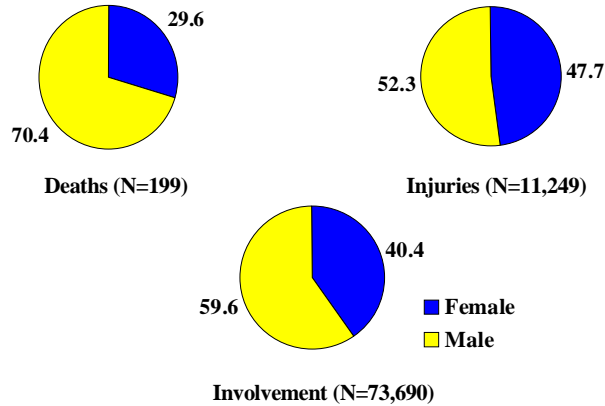
**Table 1. Comparison of Licensed Drivers and Drivers Involved and Killed in Motor Vehicle Crashes by Age Group, Nebraska, 1999**

Age Group	Licensed Drivers		Drivers Involved in Crashes			
	Number	Percent	Fatal		Involvement	
			Number	Rate	Number	Rate
16-19	94,966	7.9%	31	32.6	14,357	15.1
20-24	105,944	8.8%	23	21.7	10,829	10.2
25-34	212,158	17.7%	32	15.1	13,985	6.6
35-44	248,610	20.7%	35	14.1	13,337	5.4
45-54	213,898	17.8%	30	14.0	9,195	4.3
55-64	133,690	11.1%	16	12.0	4,957	3.7
65-74	106,329	8.9%	14	13.2	3,531	3.3
75 and over	84,937	7.1%	16	18.8	2,737	3.2
<b>Total</b>	<b>1,200,532</b>	<b>100.0%</b>	<b>197</b>	<b>16.4</b>	<b>72,928</b>	<b>6.1</b>
Death rate per 100,000 registered drivers						
16 and 17 year old licensed driver numbers include permits						
Involvement rate per 100 registered drivers						

### Gender of Driver

Of the 1,202,541 licensed drivers in 1999, 602,714 (50.1%) were males and 599,827 (49.9%) were females. Generally, drivers involved in crashes, injured in crashes, and killed in crashes were more likely to be male. Of all drivers involved in crashes, 59.6% were males. Male drivers accounted for 70.4% of driver deaths. Differing from 1998, more injured drivers were male (52.3%) than female (47.7%) in 1999 (Figure 8).

**Figure 8. Drivers Involved, Injured, and Killed in Motor Vehicle Crashes by Gender, Nebraska, 1999**



### **Pedestrians and Pedalcyclists**

In 1999, 820 pedestrians and pedalcyclists were injured and 18 were killed in motor vehicle crashes. In comparison, there were 783 injuries and 28 deaths in 1998.

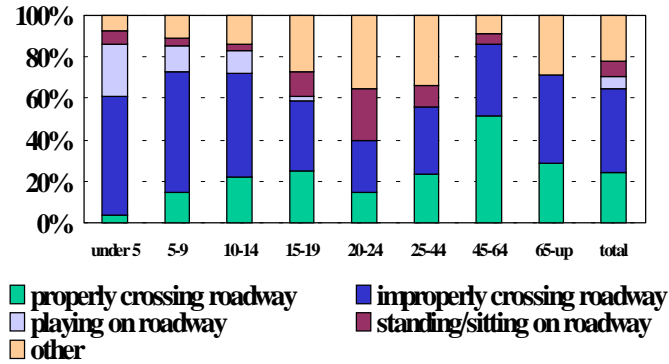
Excluding individuals whose action was coded as not stated, approximately 40% of pedestrian and pedalcyclist injuries and deaths were due to improperly crossing roadways. Individuals who were properly crossing roadways incurred another 24% of the pedestrian and pedalcyclist injuries and deaths (Figure 9).

### Injuries and Deaths by Age and Gender

Among injured (including killed) pedestrians and pedalcyclists, children (under 15) and the elderly (65 or older) were more likely than any other age group to improperly cross roadways (Figure 9).

In addition to improperly crossing roadways, playing on roadways was another major cause of injuries and deaths for children under 15 (25%, 12% and 11% for the under 5, the 5-9 age and the 10-14 age groups, respectively) (Figure 9).

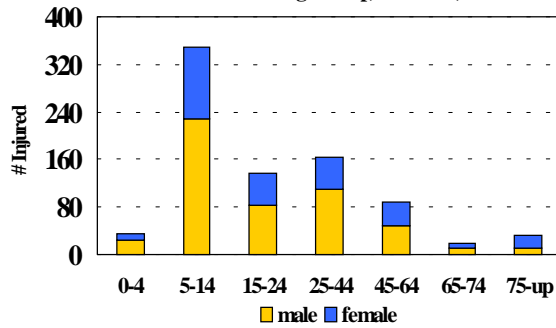
**Figure 9. Pedestrian and Pedalcyclist Injuries and Deaths by Age Group and Action, Nebraska, 1999**



The 5-14 age group accounted for the greatest number of pedestrian and pedalcyclist injuries (including deaths) in 1999 with 350 (42%) out of 838. The second leading age group was 25-44 with 164 (20%) injuries and deaths (Figure 10).

Males accounted for 63% of all pedestrian and pedalcyclist injuries in 1999 (Figure 10).

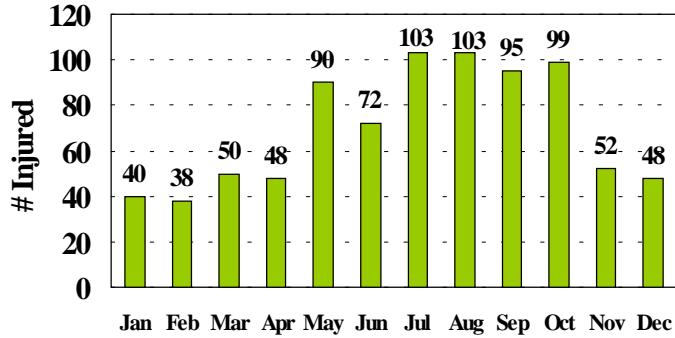
**Figure 10. Pedestrian and Pedalcyclist Injuries and Deaths by Gender and Age Group, Nebraska, 1999**



Injuries and Deaths by Month

The number of injuries including deaths for pedestrians and pedalcyclists involved in motor vehicle crashes was highest from May through October in 1999 (Figure 11).

**Figure 11. Pedestrian and Pedalcyclist Injuries by Month, Nebraska, 1999**

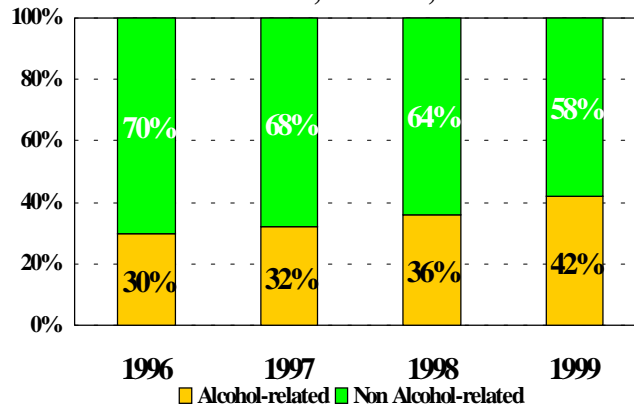


## Behavior

### Alcohol

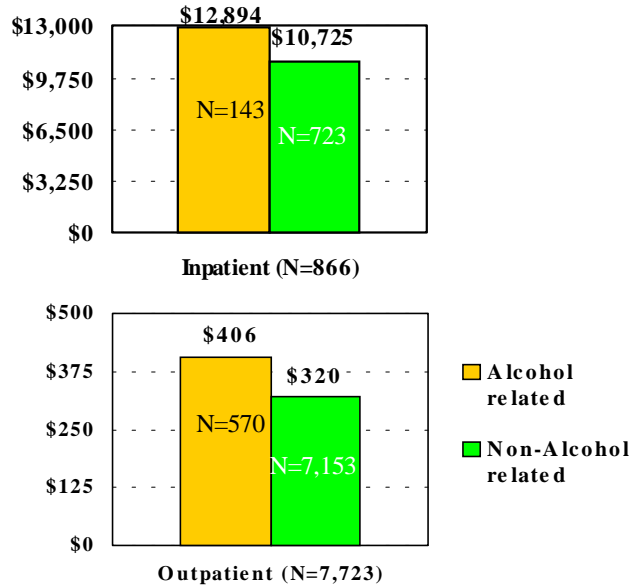
One hundred and twenty four persons were killed in alcohol-related crashes in 1999. These deaths accounted for 42% of all crash deaths. The percent of deaths involving alcohol increased from 30% in 1996 to 42% in 1999.

**Figure 12. Percent of Persons Killed in Alcohol-related Crashes, Nebraska, 1996-1999**



Generally, patients involved in alcohol-related crashes had a larger hospital charge than those involved in crashes where alcohol was not a factor. The median hospital charges for crashes involving alcohol was about \$2,000 more than crashes not involving alcohol for inpatient services (Figure 13).

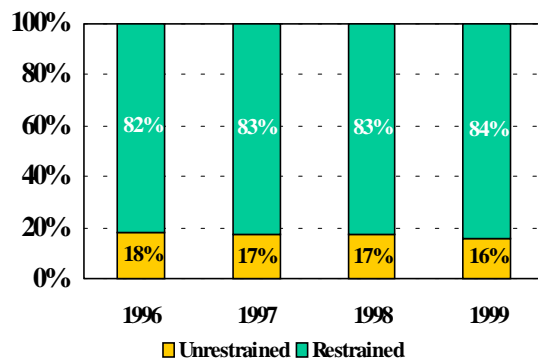
**Figure 13. Median Hospital Charges by Type of Patient and Alcohol Involvement, Nebraska, 1999**



Occupant Restraint Use

In 1999, 84% of those involved in motor vehicle crashes were using some form of restraint, based on police reports. The percent of occupant restraint use increased from 82% in 1996 to 84% in 1999 (Figure 14).

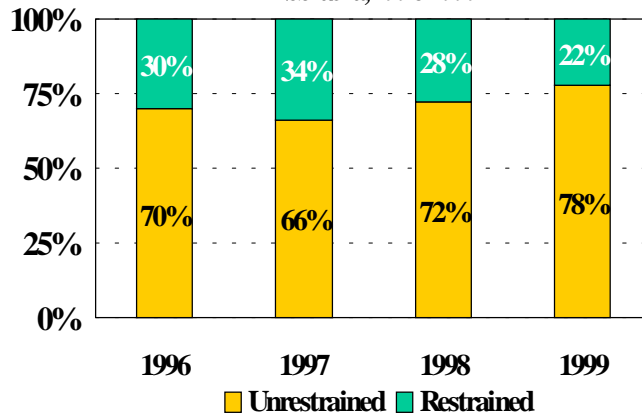
**Figure 14. Percent of Occupants Involved in Motor Vehicle Crashes by Restraint Use, Nebraska, 1996-1999**



Note: Records with missing or unknown restraint use information were excluded.

In 1999, 78% of fatally injured occupants were recorded as not using any form of restraint, up from 72% in 1998 and 66% in 1997 (Figure 15).

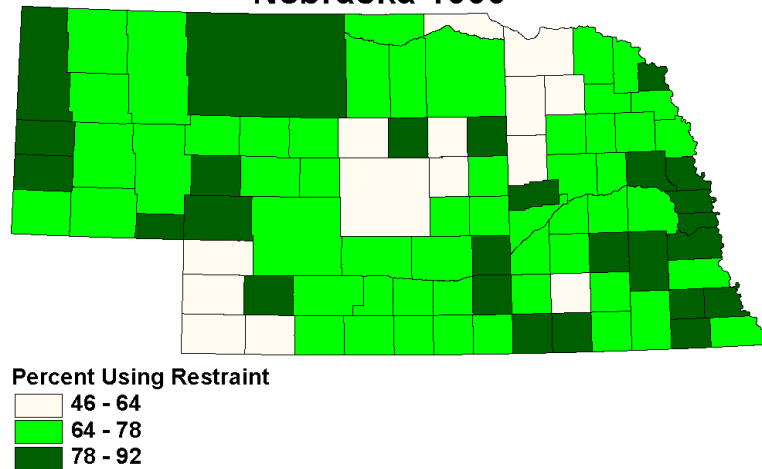
**Figure 15. Percent of Occupants Killed in Motor Vehicle Crashes by Restraint Use, Nebraska, 1996-1999**



Generally speaking, occupant restraint use by individuals involved in crashes was higher in the more populated counties. Map 2 shows that the highest percent restraint use occurred in Hayes (92.0%), Sarpy (92.0%), Douglas (91.3%), and Lancaster (89.1%) counties, while Dundy (46.2%), Chase (51.2%), and Antelope (52.1%) had the lowest.

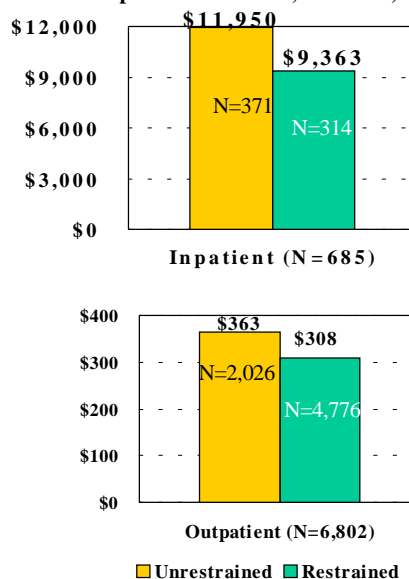
**Map 2**

**Safety Restraint Use for Individuals Involved in Motor Vehicle Crashes by County Nebraska 1999**



Median hospital charges for persons who were unrestrained were larger than for those who were restrained. The amount of difference in charges between persons using restraint and unrestrained persons in 1998 was dramatically different from that of 1999. Unrestrained persons had charges about \$2600 higher for inpatients in 1999 compared to about \$600 higher in 1998 (Figure 16).

Figure 16. Median Hospital Charges for Patients by Occupant Restraint Use, Nebraska, 1999



### Improper Driving

Right-of-way violations predominated in the injuries and persons-involved categories. Speeding or driving too fast was the most common error causing deaths. Right of way violations and driving left of center were second and third respectively. Speeding or driving too fast and driving left of center were over-represented in crash deaths. Speeding or driving too fast accounted for 8.3% of all persons involved in crashes but accounted for 23.9% of crash deaths. Driving left of center accounted for 1.9% of persons involved in crashes and made up 18.9% of crash deaths (Table 2).

Table 2. Number and Percent of Persons Involved, Injured, and Killed by Improper Driving, Nebraska, 1999

Kind of improper Driving	Fatal		Injury		Involvement	
	Number	Percent	Number	Percent	Number	Percent
Improper driving	265	93.0%	15,266	92.0%	97,513	90.1%
Speeding or driving too fast	68	23.9%	2,172	13.1%	8,958	8.3%
Right of way	62	21.8%	6,259	37.7%	35,535	32.8%
Failing to yield	35	12.3%	4,353	26.2%	27,031	25.0%
Disregarding signal	9	3.2%	1,240	7.5%	5,829	5.4%
Passing stop sign	18	6.3%	666	4.0%	2,675	2.5%
Driving left of center	54	18.9%	544	3.3%	2,041	1.9%
Making improper turn	2	0.7%	291	1.8%	3,236	3.0%
Improper overtaking	5	1.8%	186	1.1%	1,626	1.5%
Improper lane change	2	0.7%	154	0.9%	2,893	2.7%
Evasive action	22	7.7%	945	5.7%	3,626	3.3%
Following too close	2	0.7%	2,041	12.3%	21,345	19.7%
Other improper driving	48	16.8%	2,674	16.1%	18,253	16.9%
No improper driving	20	7.0%	1,326	8.0%	10,742	9.9%
<b>Total</b>	<b>285</b>	<b>100.0%</b>	<b>16,592</b>	<b>100.0%</b>	<b>108,255</b>	<b>100.0%</b>

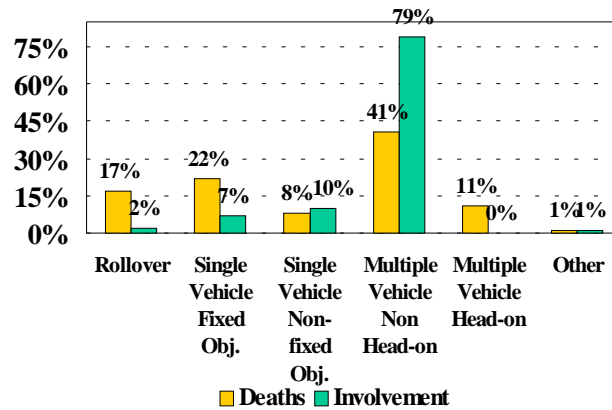
\*Improper driving information was not available for all individuals

## Crash Type

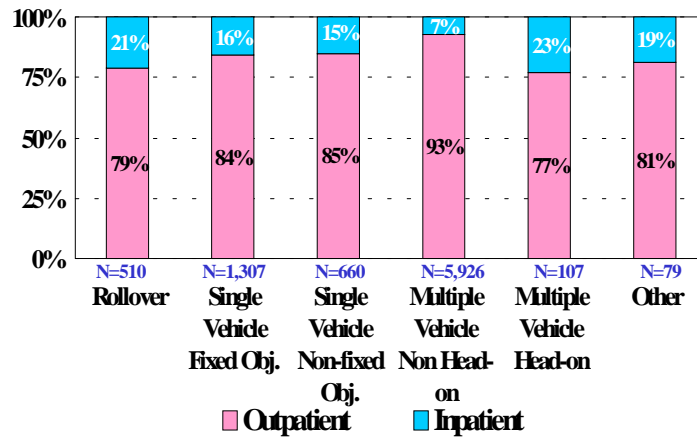
Rollover, single vehicle fixed object and multiple head-on crashes were over-represented in crash deaths. They accounted for 2%, 7%, and 0.5% of all crash involvement, but contributed 17%, 22%, and 11% to all motor vehicle crash deaths, respectively (Figure 17).

Most patients (5,926) were involved in multiple vehicle non head-on crashes, but only 7% of them were inpatients. In contrast, fewer patients were involved in multiple vehicle head-on crashes but 23% of them were inpatients (Figure 18).

**Figure 17. Percent of Persons Involved and Killed in Motor Vehicle Crashes by Type of Crash, Nebraska, 1999**



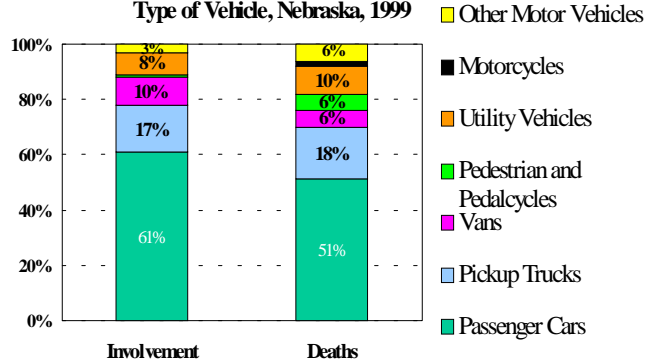
**Figure 18. Percent of Persons injured in Motor Vehicle Crashes by Type of Hospital Care and Type of Crash, Nebraska, 1999**



## Vehicle Type

In 1999, occupants of passenger cars comprised about 61% of all persons involved and 51% of all persons killed in motor vehicle crashes (Figure 19). Occupants of pickup trucks and utility vehicles accounted for 18% and 10% of all motor vehicle crash deaths, respectively (Figure 19). Pedestrians and pedalcyclists (1%) and motorcyclists (0.3%) represented a small portion of all persons involved in motor vehicle crashes, but they comprised 6% and 2% of all motor vehicle crash deaths, respectively (Figure 19).

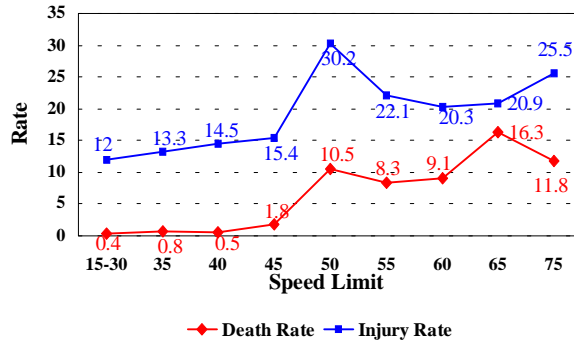
**Figure 19. Percent of Individuals Involved and Killed in Crashes by Type of Vehicle, Nebraska, 1999**



## Posted Speed Limits

In general, death rates were higher at higher posted speed limits. The largest increase in injury and death rates occurred between 45 miles per hour (MPH) and 50 MPH (Figure 20).

**Figure 20. Death and Injury Rates by Posted Speed Limit, Nebraska, 1999**



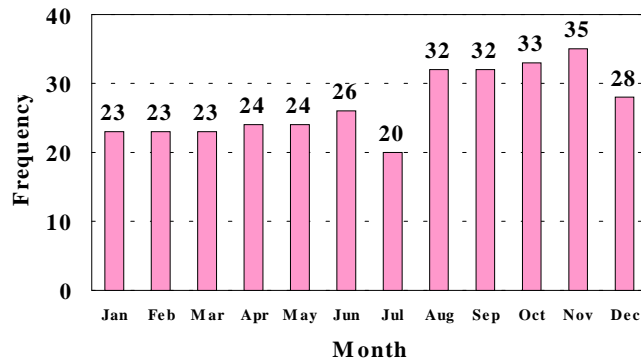
◆ Death Rate    ◆ Injury Rate  
 Death rate per 1,000 involved persons  
 Injury rate per 100 involved persons

## Crash Time

### Month of Crash

There were more crash deaths from August to November (an average of 33 deaths per month) than from December to July (24 deaths per month) in 1999 (Figure 21).

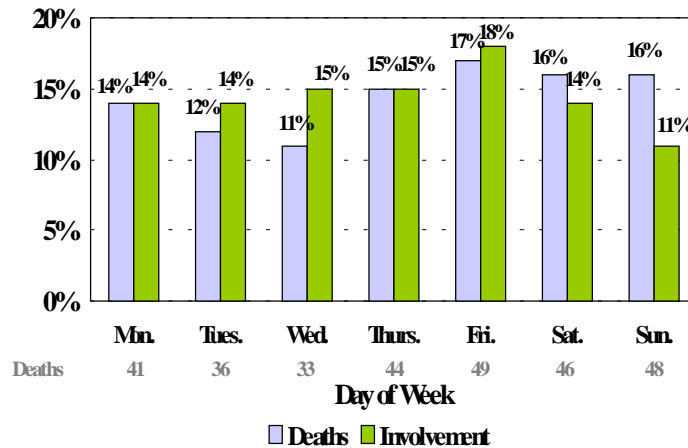
**Figure 21. Persons Killed in Motor Vehicle Crashes by Month of Crash, Nebraska, 1998**



### Day of Week of Crash

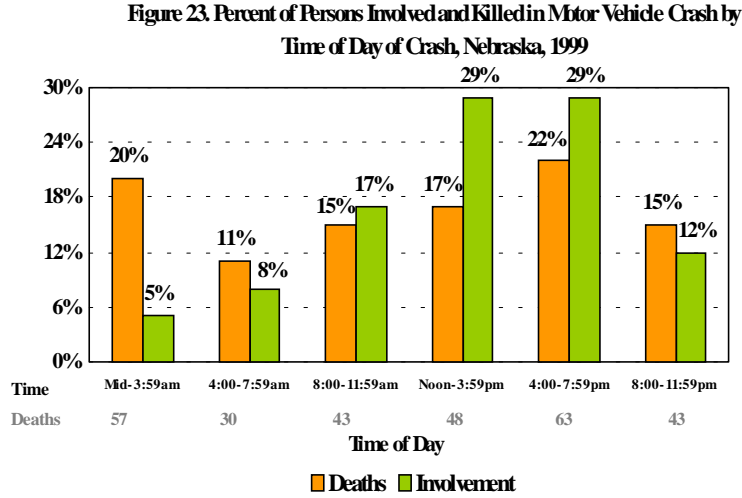
More deaths occurred from Friday to Sunday than any other period of the week in 1999. Seventeen percent of the deaths occurred on Friday, compared to a low of 11% on Wednesday. Crashes occurring during the weekends were over-represented in deaths (Figure 22).

**Figure 22. Percent of Persons Involved and Killed in Motor Vehicle Crashes by Day of Week of Crash, Nebraska, 1999**



### Time of Day of Crash

Most crashes occurred between noon and 7:59 p.m. (Figure 23). Five percent of crashes occurred from midnight to 3:59 am, but accounted for 20% of deaths (Figure 23).

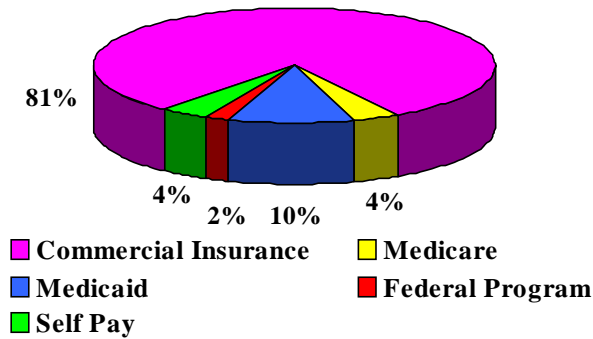


### Payer Source

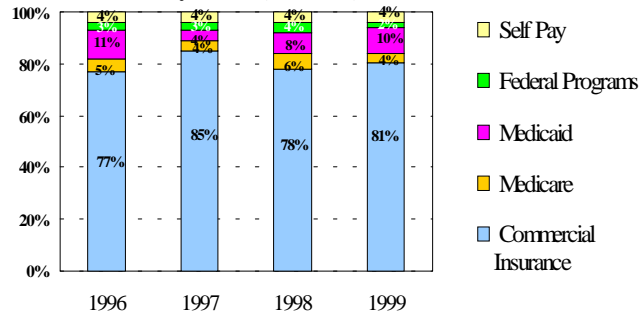
Hospital charges reflect some of the health care cost due to motor vehicle crashes. In 1999, the majority of charges were paid for by commercial insurance organizations (81%). Public funds (combined Federal programs, Medicaid, and Medicare) paid for 16% (Figure 24).

Commercial insurance agencies comprised a larger proportion of payments in 1997 (85%) than in 1996 (77%), 1998 (78%) and 1999 (81%). Payment by Medicaid declined from 11% in 1996 to 4% in 1997 then rose to 10% in 1999 (Figure 25).

**Figure 24. Percent of Patients Injured in Motor Vehicle Crash by Payer Source, Nebraska, 1999**



**Figure 25. Percent of Patients Injured in Motor Vehicle Crashes by Payer Source, Nebraska, 1996-1999**

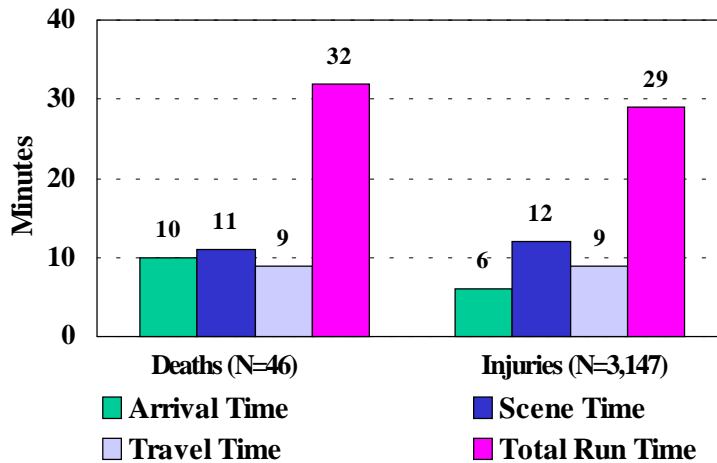


### EMS Run Times

EMS response times include dispatch to arrival at scene (arrival time), time spent at scene (scene time), depart scene to receiving facility (travel time), and dispatch to receiving facility (total run time).

Median EMS arrival time and total run time for persons killed in crashes were longer than for persons injured in crashes. The median arrival time for deaths was 4 minutes longer than that for injuries (Figure 26).

**Figure 26. Persons Injured and Killed in Motor Vehicle Crashes by Median EMS Response Times, Nebraska, 1999**



Median EMS total run time increased from metropolitan urban areas to small rural areas. Small rural areas had the longest EMS response times (Figure 27).

**Figure 27. Persons Involved in Motor Vehicle Crashes by Crash Location and Median EMS Response Times, Nebraska, 1999**

