Deaths of Law Enforcement Officers by Motor Vehicle Crashes:

A Review of FARS Data for the Years 1996 to 2007

National Highway Traffic Safety Administration

By James D. Bean, Crash Investigation Division
Eun Young Noh, Contractor, Math Analysis Division

Background

Deaths of law enforcement officers (LEOs) in the line of duty have been tracked by the Department of Justice/ Federal Bureau of Investigation (FBI) since the 1930's. The data has been provided to law enforcement agencies throughout the United States and analyzed to provide for a better understanding of the circumstances surrounding LEO deaths. The data is then analyzed and used for training purposes to create more realistic scenarios.

The FBI is mandated by Congress to maintain a database of LEOs deaths and analyze law enforcement officers' deaths in the line of duty. This program is referred to as "Law Enforcement Officers Killed and Assaulted (LEOKA)."

The data from LEOKA shows that LEOs have been killed more frequently by violent means in years past. However, recent trends have started to indicate that the deaths of LEOs by motor vehicle crashes are increasing when compared to other causes of law enforcement deaths in the line of duty.

This change has initiated an analysis of the deaths of LEOs in motor vehicle crashes. This article first illustrates the changes in the circumstances of the deaths of LEOs based on the LEOKA database. This trend data shows cause for further review of motor vehicle crashes as the cause of LEO deaths. The National Highway Traffic Safety Administration's (NHTSA) Fatality Analysis Reporting System (FARS) is then used to analyze the surrounding conditions and potentially causative factors of the deaths of LEOs in motor vehicle crashes.

Law Enforcement Officers Killed and Assaulted (LEOKA)

Data: The LEOKA database was used to show trends in the deaths of law enforcement officers for the period from 1980 to 2007. While this database is comprehensive for the nation and includes information to identify the involvement of a motor vehicle, it does not yet include specific details about the fatal incidents.

Trends Analysis: The total number of deaths of LEOs in the past 28 years are shown in Figure 1. Total deaths of law enforcement officers are trending downward with a decrease of around 20 percent when comparing the date ranges 2005–2007 to 1980–1982. However, in the 1980's, the deaths of LEOs in motor vehicle crashes were significantly lower than the deaths of LEOs from the other reasons. Deaths of LEOs in motor vehicle crashes include officers killed by motor vehicle crashes as a driver, occupant, motorcyclist, or pedestrian.

The deaths of LEOs in motor vehicle crashes have increased by around 80 percent during the past 28 years, while the deaths of LEOs by other reasons have decreased by around 50 percent. Recent trends have also started to indicate that, since the late 1990s, approximately half of all LEO deaths are a result of motor vehicle crashes.

Figure 2 shows deaths of LEOs in motor vehicle crashes according to the role of the officer - an occupant of motor vehicle, a motorcyclist, or a pedestrian struck by a motor vehicle. The figure shows that the number of deaths of LEOs as pedestrians or motorcyclists has remained relatively constant. However, the number of deaths of LEOs as occupants of motor vehicles has increased since the late 1990's.

While the numbers of LEO deaths for pedestrians and motorcyclists have remained relatively constant, their proportion of the total motor vehicle-involved deaths has dropped. In the early 1980's, the deaths of LEOs in motor vehicle crashes accounted for 26 percent of all LEO deaths and the death of LEOs as occupants of vehicles accounted for only 15 percent of deaths. Most deaths of LEOs were caused from other reasons (feloniously assaulted, accidentally shot). However, the deaths of LEOs by motor vehicle crashes increased gradually and reached 54 percent for the period of 2005 to 2007. The LEO deaths as occupants of vehicles accounted for 39 percent of all LEO deaths. Currently, motor vehicle crashes are the leading cause of deaths of LEOs. The increasing proportions are a direct result of deaths of LEOs as occupants of vehicles. The majority of LEO deaths occur when the LEO is the driver in the motor vehicle crash.

FIGURE 1

Deaths of Law Enforcement Officers 1980-2007

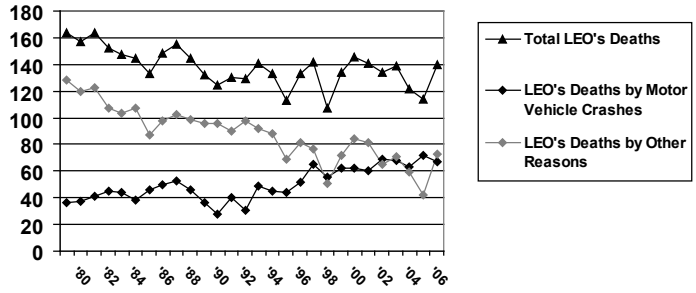
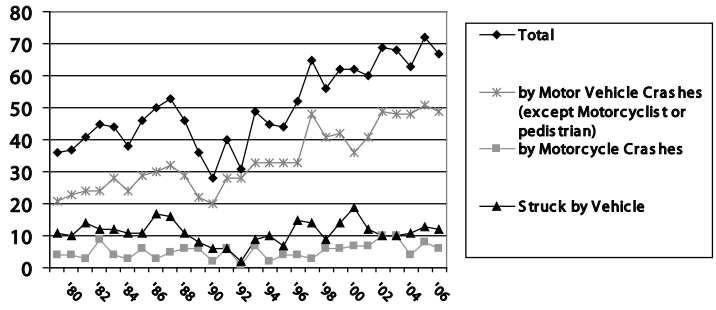


FIGURE 2

LEO's Deaths by Motor Vehicle Crashes 1980-2007



Fatality Analysis Reporting System (FARS)

Data and Methodology: The Fatality Analysis Reporting System (FARS) is maintained by NHTSA and contains data on a census of fatal traffic crashes within the 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands.

FARS currently is the only database that contains detailed information on fatal crashes involving LEOs. This section of analysis utilizes FARS data that could assist in explaining the increasing number of deaths of LEOs in motor vehicle crashes.

FARS data was reviewed for the period of 1996 to 2007 because the trend analysis based on the LEOKA data shows that the deaths of LEOs by motor vehicle crashes greatly increased in numbers and proportions from the late 1990's.

In FARS, the definition for police vehicle refers to a readily identifiable (lights or markings) vehicle which is owned by any local, county, state, or federal police agency. The vehicles are presumed to be in special police use at all times. Special police use in FARS is a designation that this vehicle is being used as a police vehicle. Personal vehicles (vehicles not owned by the agency) that are used by officers or agents (e.g., undercover) are excluded (FARS definition through 2008.)

FARS has a smaller number of deaths of LEOs than other databases due to the following factors:

- There are definitional differences in describing a police vehicle.
- FARS has a requirement that the death must occur within 30 days of the crash.
- FARS is dependant upon state data filing requirements.

Based upon the search criteria, a total of 353 crashes were identified as having at least one LEO death during the years 1996 to 2007. Of these, 45 crashes were excluded from analysis because they were related to a motorcycle or pedestrian. Thus, the remaining 308 crashes are those included in the analysis and referred to as "crashes with fatal LEOs."

For the 308 crashes with fatal LEOs, additional data was retrieved including time, day of week, month, restraint system use, ejection, first and most harmful event, traffic flow, travel speed, manner of collision, initial impact location, rollover, related factors, emergency use, roadway function class, atmospheric condition, roadway surface condition, roadway alignment and profile, vehicle maneuver, and crash avoidance.

These 308 crashes are analyzed as an aggregate as oppose to trend analysis. This analysis is performed to identify potential causes for the large number of LEO deaths from motor vehicle crashes rather than to look at changes in the crashes over time.

Trend: FARS data also shows that there is an increase of the deaths of LEOs in motor vehicle crashes. Figure 3 compares the fatality rate of LEOs per 10,000 LEOs and the total fatality rate per 10,000 population during the years of 1996 to 2007. The fatality rate of LEOs' deaths per 10,000 LEOs gradually increased, while the total fatality rate per 10,000 population decreased steadily.

Figure 3

Analyses: The time of occurrence of the crashes with fatal LEOs was examined and officer's were placed in 8-hour blocks for a typical working shift. The analysis showed that 27.4 percent of the crashes with fatal LEOs occurred in the 0800 to 1559 shift, 34.2 percent occurred in the 1600 to 2359 shift, and 38.4 percent occurred in the 0000 to 0759 shift.

Figure 4 shows the occurrence of the crashes with fatal LEOs by the month of the year. The y-axis of the graph represents the average number of crashes per month. There is no dominant pattern of crashes occurring in particular months.

In general, crashes with fatal LEOs were distributed largely evenly on the days of the week, Sunday accounted for 15 percent of fatal LEOs, while Monday accounted for 17 percent, Tuesday accounted for 17 percent, Wednesday accounted for 18 percent, Thursday accounted for 15 percent, Friday accounted for 15 percent, and Saturday accounted for16 percent.

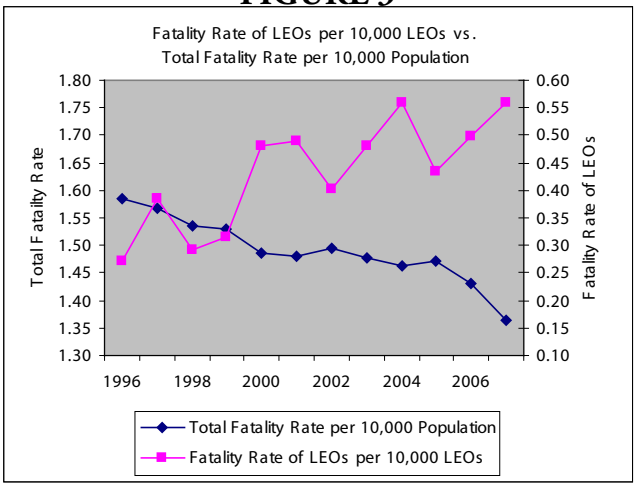
The age of LEOs who died as occupants are shown in Table 1. This data appears to be a reflection of the demographics of the LEOs, but it could also be a reflection of the proximity to driver training and re-training. LEO's usually receive some type of driver training during an initial training period but generally are not re-trained.

Table 1: Deaths of LEOs in Fatal Crashes by Age

Age	20–29	30–39	40–49	50–59	60+	Total
Death of LEOs	31%	38%	18%	9%	4%	100%

Restraint system use is explained below in Figure 5. In FARS, restraint system use is the reported use or lack of use by the investigating officer or by Emergency Medical Services (EMS). Most *state laws* exempt LEOs from mandatory restraint use, but most or all law enforcement *agencies* require LEOs to wear seat belts at all times while on duty.

FIGURE 3



Ejection data in FARS shows that 24 percent of the total deaths of LEOs as occupants of a vehicle were ejected while 76 percent were not ejected. In ejection types, 18 percent were totally ejected and 6 percent were partially ejected.

The first harmful event is defined in FARS *as the first property damage (including to vehicles) or injury-producing event*. The data for first harmful event shows that 44 percent of the crashes with fatal LEOs involve a vehicle in transport, 42 percent involve an object off the road, and 6 percent involve a rollover. A vehicle in-transport means on a roadway or in motion within or outside the trafficway.

Traffic Flow describes the characteristics of the roadway as far as barriers dividing the lanes are concerned. Sixty-four percent of the crashes with fatal LEOs occurred on a "not physically divided roadway (or "A barrier does not exist" roadway)." Twenty three percent of fatal LEOs occurred on a divided highway, median strip (without traffic barrier) and 10 percent occurred on a divided highway, median strip (with traffic barrier). A traffic barrier is defined as a *physical structure such as a guardrail, a concrete safety barrier or a rock wall which has the primary function of preventing cross-median travel by deflecting and redirecting vehicles along the roadway on which they were traveling. Therefore, trees, curbing, rumble strips and drain depressions are not barriers.*

FARS has a variable called "Impact Point Initial" described as the point that identifies the area on the vehicle that produced the first instance of injury or property damage involving the vehicle. FARS reports the "Impact Point Initial" based on the clock position on the vehicle. In this report, the clock positions of the Impact Point Initial were classified into four groups: front, left side, right side, and rear. The o'clock numbers 11, 12, and 1 represent the front; 2, 3, and 4 represent the right side; 5, 6, and 7 represent the rear; and 8, 9, and 10 represent the left side. The data shows that 48 percent of initial impact points occurred in the front, 20 percent occurred on the left side, 14 percent occurred on the right side, and 9 percent were rear impacts.

In FARS a rollover is defined as any vehicle rotation of 90 degrees or more, about any true longitudinal or lateral axis. The rollover data shows that 36 percent of police vehicles in the crash with fatal LEOs rolled over, while 64 percent did not rollover. Among the vehicles with rollover, 18 percent of the vehicles showed rollover as the first event, and for the remaining 82 percent the rollover was the subsequent event that followed after striking a motor vehicle, tree, ditch, or another object.

"Emergency Use" in FARS is defined as a vehicle that is traveling with physical emergency signals in use; such as red light blinking, siren sounding, etc. In FARS, for the vehicle to be in emergency use the police vehicle must have been utilizing the "emergency equipment." Emergency use data shows that 58 percent of the police vehicles with fatal LEOs were not in emergency use at the time of the crash while 42 percent were in emergency use.

FARS "Roadway Function Classes" classifies roads by rural or urban location and classifies road types as arterials, collectors, locals, and interstates. When viewed by location, 56

FIGURE 4

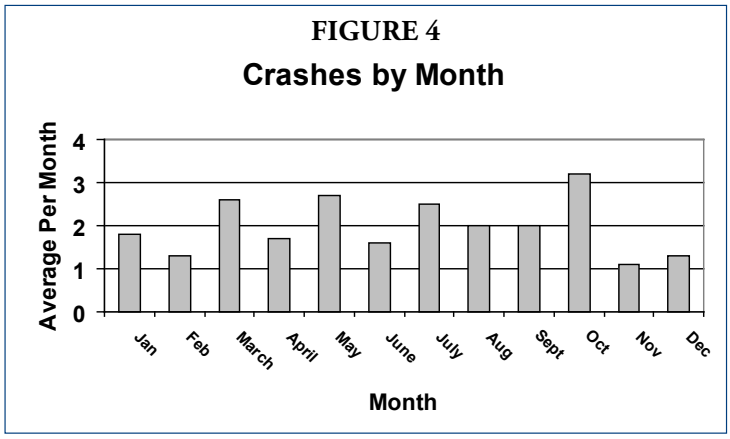
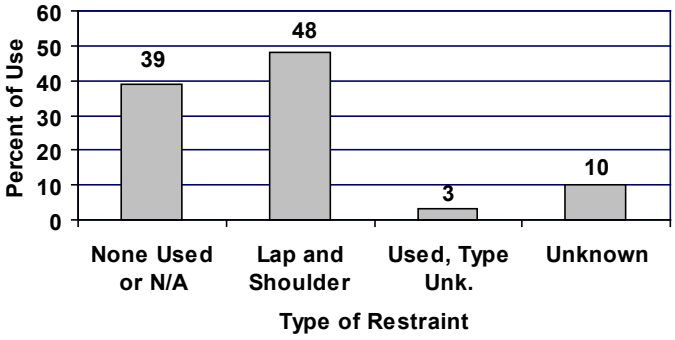


FIGURE 5

Restraint Use



percent of these crashes occurred on roadways in rural areas and 43 percent occurred on roadways in urban areas (Figure 6). Furthermore, the crashes with fatal LEOs were classified by the road types: 33 percent of crashes with fatal LEOs occurred on arterials, 22 percent occurred on collectors, 15 percent occurred on local roadways, and 13 percent occurred on interstates (Figure 7).

Weather and roadway surface were also examined. Weather is described as "Atmospheric Conditions" in FARS. In 83 percent of the crashes with fatal LEOs, the weather was designated to have no adverse conditions (clear/cloudy), 12 percent of the crashes involved rain, and 2 percent involved snow. The "Roadway Surface Condition" is described as the present condition of the road not as contributing to the crash. The surface condition was identified as dry in 75 percent of the crashes, wet in 19 percent, snow/slush in 2 percent, and ice in 3 percent. Based on this data it appears that bad weather or roadway conditions do not play a significant role in the crashes with fatal LEOs.

Finally, the "Roadway Alignment" and "Roadway Profile" were reviewed. The "Road Alignment" data shows that 70 percent of the crashes with fatal LEOs occur on a straight section of road and 29 percent occur on a curve. The "Road Profile" shows that 65 percent of the crashes with fatal LEOs occur on a level road, 31 percent occur on a grade, and 3 percent occur on a hillcrest. The greatest percentage of crashes occurred on a straight level section of roadway.

Summary

The death of LEOs in motor vehicle crashes have increased by 48 percent in the past 28 years. Between the years 2005 to 2007, 54 percent of all LEO deaths "in the line of duty" were motor vehicle crash involved.

When comparing the fatality rate of LEOs to the general population, during the years from 1996 to 1999 LEOs deaths by motor vehicle crashes were at the same or lower rate than the general population (see Figure 3.) Since the year 2000 the fatality rate for the general population has steadily declined, but the LEO fatality rate has been increasing.

The age bracket that has the largest amount of crashes is in the 30 to 39 years of age. But, in the 20 to 39 year grouping, they account for 69 percent of all fatal crashes.

The non-use of restraints by LEOs in fatal crashes is at 39 percent. In accordance with non-use of restraints, 24 percent of crashes involve an ejection of the occupant.

The data shows that 42 percent of all fatal crashes for LEOs involve an object off the road. Thusly, the police vehicle is running off the road in some manner. Along with this, the initial point of impact on the police vehicle is the front in 48 percent of the crashes. ✪

FIGURE 6

Roadway Function Class

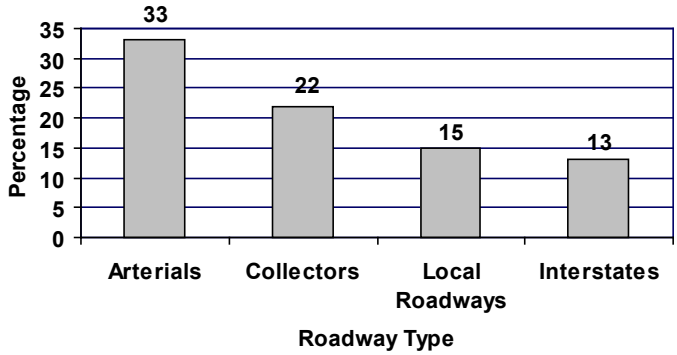


FIGURE 7

Rural vs. Urban