Pedestrian Fatalities on the Navajo Reservation, 1986-1991.

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Abstract

Unintentional injuries are the leading cause of death in the Navajo Area of the Indian Health Service. Especially devastating among the Navajo people are motor-vehicle related fatalities. A retrospective study was conducted to determine the extent and characteristics of motor-vehicle/pedestrian fatalities on the Navajo Reservation from 1986 to 1991. Fatal Accident Reporting System data reports from the states of Arizona and New Mexico were analyzed to determine the extent of the problem and police reports were examined to learn the characteristics of the incidents. 87 motor-vehicle/pedestrian fatalities were recorded during the 6-year period. Pedestrian fatalities per 100,000 population on the Navajo Reservation were 2.5 times the New Mexico rate, 3 times the Arizona rate, and 4.5 times the United States rate.

Introduction

New Mexico and Arizona rank first and fourth highest, respectively, among states in pedestrian fatality rates (PFRs).[1] Nationally, when death rates from motor-vehicle/pedestrian crashes were compared by race and type of fatality, Native Americans were shown to have a higher PFR than whites, blacks, and Asians.[2] A retrospective study was conducted to determine the extent and characteristics of pedestrian fatalities on the Navajo Reservation.

The Navajo Reservation, which covers approximately 25,000 square miles, is a mostly rural area in northeastern Arizona, northwestern New Mexico, and southeastern Utah. According to the National Safety Council, rural areas account for only 14.3% of non-fatal pedestrian injuries, but 25% of pedestrian fatalities.[3] An inverse relationship has been noted between pedestrian fatality rates and per capita income.[2] Census data from 1990 show that over 50% of the Navajo population is below the poverty level.

Methods

Information was obtained from police reports on all pedestrian fatalities within the boundaries of the Navajo Reservation that were reported to the states of Arizona and New Mexico. Areas excluded from the study include that portion of the Reservation in the state of Utah and Navajo Trust Lands in Arizona and New Mexico. The Alamo and Canoncito Reservations and the Ramah Community in New Mexico were also excluded. These small areas of the Navajo Nation are widespread and often have hard-to-define borders. The final sample represented 82% of the people living within the Navajo Nation. All pedestrian fatalities were studied regardless of the race of the victim.

Police reports in each state are submitted to the Fatal Accident Reporting System (FARS) analyst. In Arizona, the FARS analyst works for the Accident Analysis Unit (AAU) of the Traffic Engineering Section, Department of Transportation. The FARS analyst in New Mexico works for the Transportation Statistics Bureau (TSB), Highway and Transportation Department. These offices provided a police report and computer information summary on pedestrian fatalities from 1986 through 1991.

Circumstances surrounding the incidents were determined by examining the police reports and computer printouts. The police reports contain a narrative description of the circumstances surrounding the event. Since site information was included in most reports, on-site investigations were not conducted.

Arizona's statewide pedestrian fatality data were provided by the AAU, and data for New Mexico's pedestrian fatalities were furnished by the TSB. 1990 population denominators are from the United States Census Bureau; data from other years are estimates based on the 1990 census.

The New Mexico TSB obtains records from the New Mexico Office of the Medical Investigator (OMI) that include information on blood alcohol concentrations (BACs) of the pedestrians. Even though reservations do not fall within the jurisdiction of the OMI, most Native American deaths that occur in New Mexico are investigated by the OMI.[4] Blood alcohol information was available only when stated in the police reports for Arizona and was not confirmed by Arizona coroner reports.

Age-specific rates for the six-year period were calculated using 1990 population figures. Years of productive life lost (YPLL) are calculated by subtracting the age-at-death from 65 and summing the result over all deaths. Daytime is considered 0600 to 1800 hours. A data collection form was developed using the Epi Info Version 5 software package.[5] Data from the above sources were entered into Epi Info for analysis.

Results

From 1986-1991, 87 motor-vehicle/pedestrian fatalities were recorded on the Navajo Reservation, a rate of 12.3 per 100,000 per year. This Navajo pedestrian fatality rate (PFR) is 2.4 times the New Mexico rate, 3.1 times the Arizona rate, and 4.6 times the national rate (5.1, 4, and 2.7 per 100,000 respectively).[6] During each year of the study, the PFR was higher on the Navajo Reservation than in either state or the United States as a whole. Also, the Navajo PFR increased from 10.9 per 100,000 in 1986 to 17.5 per 100,000 in 1991. Arizona, New Mexico, and U.S. PFRs decreased over this same period.

When Reservation PFRs were broken down by state and compared, it was found that New Mexico's Reservation PFR was higher than Arizona's. For the study period, New Mexico had an average Navajo PFR of 13.56 per 100,000 while Arizona had an average Navajo PFR of 11.81 per 100,000.

Of the 87 pedestrians killed, 74 (85%) were male. The mean age of the victim was 35.1. This translated into a total of 2,484 YPLL over the period of the study. The 15-19 and 25-29 year age groups experienced the greatest number of fatalities with 12 each. The 65-69 year age group had the highest death rate at 52 per 100,000 population.

Alcohol use by the pedestrian was indicated in 20 (39%) of the fatalities in Arizona; the mean BAC is unknown. Alcohol use was not a factor in 9% and unknown in 52% of the cases. On the New Mexico portion of the Reservation, alcohol use by the pedestrian was indicated in 21 (84%) of the 25 cases; the mean BAC was 0.24. Of the 41 cases where alcohol use is known on the Reservation, 46% of the pedestrians were between the ages of 15 and 30 and the mean BAC was 0.26. Males represented 85% (35) of the victims known to be intoxicated.

Reservation-wide, one third of the fatalities occurred when the pedestrian was crossing the road. Dark clothing without reflective material was worn 91% (n=34) of the time by the pedestrian in fatalities that occurred at night.

Less information is known about the motorists since 28% of the pedestrian fatalities involved hit and run drivers. In 49% of the cases the driver was not charged with a violation. For the whole Reservation, alcohol use by the driver is indicated in only 12% of the incidents, but was unknown 41% of the time. In 75% of the cases the driver was traveling straight ahead. Pickup trucks were implicated in 36% of the cases. The vehicle type was unknown or not indicated in 31% of the incidents.
84% of the fatalities occurred at night. Lighting conditions are known for 65 of the 71 sites where fatalities occurred at night. None of these sites was lighted. Weather conditions were clear 90% (n=80) of the time, and the grade of the road was level 79% (n=75) of the time. In 62 (95%) of the 65 cases where the curvature of the road is known, the road was straight. 40% of the fatalities occurred on Friday and

Saturday. More pedestrians (11) were killed during November than in any other month. May and December followed with ten fatalities each. April had the fewest pedestrian fatalities with two.

Several cluster areas were noted during the six-year period. There were eight pedestrian fatalities within a 1.6-mile stretch of Arizona Highway 264 between Window Rock and Saint Michaels, Arizona. Also noted was a 2.9-mile span of U.S. Highway 191 near Chinle, Arizona with six fatalities. A 6.7-mile length of Navajo Route 64 between Tsaile and Chinle, Arizona had eight fatalities.

Police reports indicated ethnicity in 49 of the cases. Fifty-nine percent of the pedestrian fatalities were categorized as Native American or Indian, while 39% were categorized as Navajo and 2% were categorized as other.

Discussion

This study illustrates an increasingly severe pedestrian-fatality problem on the Navajo Reservation. While Arizona, New Mexico, and national PFRs decreased, Reservation PFRs increased at an alarming frequency. It is believed that Navajos comprised the vast majority of the pedestrian fatalities on the Reservation. There are no specific choices on the police report for race, and many times this is recorded as "Indian" or left blank. The 1990 Census lists 97% of Reservation residents as American Indian.

Males are over-represented in each age group examined. This agrees with national data where males constitute 69% of all pedestrian fatalities.[6] While bad weather or unusual road conditions were not factors, time-of-day and lighting were major environmental factors in pedestrian fatalities on the Navajo Reservation. This study concurs with other studies that the majority of pedestrian fatalities occur at night.[7] With dark clothing being worn by the pedestrians and no illumination, pedestrians are almost impossible to see at night. With these factors and with the majority of the fatalities occurring when the pedestrian attempts to cross the road, the motorist often has little chance to avoid the collision. It is conceivable that some of the hit-and-run drivers did not realize that they hit a person.

Reservation statistics and national data indicate that Friday and Saturday have the highest incidence of pedestrian fatalities.[1] Nationally this pattern has been attributed to increased pedestrian traffic.[3] That September through December are high in fatalities on the Reservation is understandable due to the short daylight hours. Since 90% of the fatalities occurred during clear weather, the drop-off in January and February could be due to inclement weather when pedestrians are less likely to be on the road.

Sale or possession of alcohol on the Navajo Reservation is illegal. One study suggests an association between off-reservation alcohol sales and high off-reservation PFRs among New Mexico Native Americans.[4] Two of the cluster sites mentioned, U.S. Highway 191 and Navajo Route 64 near Chinle, Arizona, are located in the interior of the Reservation. Since alcohol is known to be involved in 10 of these 14 fatalities, there is a high probability that bootlegging is associated with the high, on-reservation PFRs.

The New Mexico portion of the Reservation is closer to border towns where alcohol can be obtained legally. This could be one reason for the higher PFR on the New Mexico side. It has been observed that many persons who travel from the Reservation to the border towns and back do so by a combination of hitchhiking and walking.

Even though data indicating alcohol use by the pedestrian is incomplete in this study, case control studies have shown that intoxicated pedestrians are three to four times more likely to be struck by an automobile than their non-intoxicated counterparts.[8] Also, the data from the OMI in New Mexico shows a high

percentage of alcohol involvement by the pedestrian. It is not possible to get a true picture of the alcohol problem associated with pedestrian fatalities using only FARS data.

One possible limitation of the study could be under-reporting of pedestrian fatalities to the states. This seems unlikely for fatalities on public highways, but could be a factor on private land. Another limitation was not using Navajo Tribal records, which might include more information on alcohol involvement, to augment state data. Not having medical investigator records to confirm ethnicity and residence of the pedestrian is one possible bias of this study. Another possible bias is the lack of BAC testing from Arizona and reliance on police reports alone.

Conclusions and Recommendations

Pedestrian fatality rates (PFRs) on the Navajo Reservation are many times higher than those of the states surrounding the Reservation and the US as a whole. The highest contributing factors to the elevated rates on the Reservation are poor visibility (dark clothing at night and no illumination) and intoxication among pedestrians. Roadway lighting has been shown to be effective in reducing nighttime pedestrian "accidents" and is warranted when more than 66% of the "accidents" occur at night.[7] It is hoped that the information in this study will be used to implement lighting projects at the noted cluster sites.

Other than lighting, how can people be seen at night? Educational campaigns need to be developed that promote light-colored clothing for pedestrians. Drinking establishments could give out reflective patches to customers as they leave. Employees at these establishments need to be trained to recognize when customers are at risk and to form alliances with other groups to provide transportation for these individuals. More importantly, servers should not provide alcohol to customers who are inebriated. In addition to studying legal drinking establishments off the Reservation, future research should address the possible link between high Reservation PFRs and bootlegging. Finally, future studies need to compare PFRs with non-fatal injury rates to pedestrians on the Reservation. One study has suggested that higher speeds alone do not account for higher case-fatality rates in rural areas.[9] Are there other reasons why so many pedestrians are dying?

References

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