

Rural Alcohol-related Crashes in North Carolina: Characteristics and Enforcement Options

RD Foss
AH Goodwin

University of North Carolina Highway Safety Research Center, 730 Airport Road CB 3430, Chapel Hill, NC 27599-3430, USA

Background

Law enforcement and DWI researchers are well aware of the problem of alcohol-related crashes in rural areas. A majority of fatal crashes in the U.S. occur on rural roads (1). Although small towns and rural areas constitute 38% of the United States population, they represent 59% of all alcohol-related fatal crashes. These findings are of increasing concern among persons working to reduce drinking-driving because (a) we know very little about drinking drivers in rural areas, (b) most current DWI countermeasures are based on notions of drinking and driving in urban/suburban areas and (c) despite substantial effort to discourage driving after drinking, alcohol-related crashes have remained unchanged for several years in the U.S.

Drinking may be more frequent in rural areas simply because there are limited opportunities for other forms of entertainment (2). When persons who live in rural areas drink in commercial establishments or at the homes of friends or relatives, they may need to drive much greater distances to get home. Alternative forms of transportation, such as buses, taxis, trains or simply walking are rarely available in rural areas of the U.S. In addition, roads in rural areas may present greater challenges for impaired drivers. Two-lane highways, non-existent shoulders, numerous poorly marked intersections and limited sight distance due to hills and curves are all common attributes of rural roads. Finally, delays in post-crash emergency response time resulting in delayed notification as well as greater travel distances, can decrease the likelihood that victims will survive serious crashes in remote areas.

There are also a number of specific challenges facing law enforcement in rural areas. Police must patrol large geographic regions with limited manpower. Fewer resources are available to conduct targeted enforcement efforts such as checkpoints and saturation patrols. There is often a lack of funds to purchase equipment necessary for DWI enforcement (e.g., preliminary breath testing devices) and the distance to the nearest testing facility may be quite far. In the United States, enforcement in rural areas is often under the purview of state highway patrol and sheriff departments. In the case of sheriffs, there is sometimes pressure for deputies *not* to enforce traffic violations because such efforts are considered political “suicide” for the sheriff (3). Drinkers in rural areas likely recognize the difficulties facing law enforcement, and they may believe there is little chance they will ever be caught.

Despite its large population (8.4 million), North Carolina is a very rural state. In 79 of North Carolina’s 100 counties there are more rural than urban residents. Although the rural areas are not comparable in size to those in the western U.S., Canada and Australia, they nonetheless involve many lightly traveled, relatively dangerous roadways of the sort that are typically found in rural areas. Unlike many of the rural areas elsewhere, rural roads in North Carolina are frequently lined with dense forests, with the result that even relatively minor roadway departures inevitably involve collisions with immovable objects. Because of

the issues mentioned above alcohol may be involved more frequently in rural than urban crashes. If this is the case, given North Carolina's large rural population, effectively addressing rural DWI is key to reducing the overall alcohol-related crash rate in the state.

Objective

The present study was undertaken to develop a better understanding of drinking-driving in rural areas to better combat this problem. The purpose of this analysis is to provide information that will help shape and target DWI enforcement activities as a part of North Carolina's overall DWI countermeasure program. The present analyses focus only on alcohol involvement in crashes; future work will examine types and levels of enforcement in rural vs. urban areas.

Method

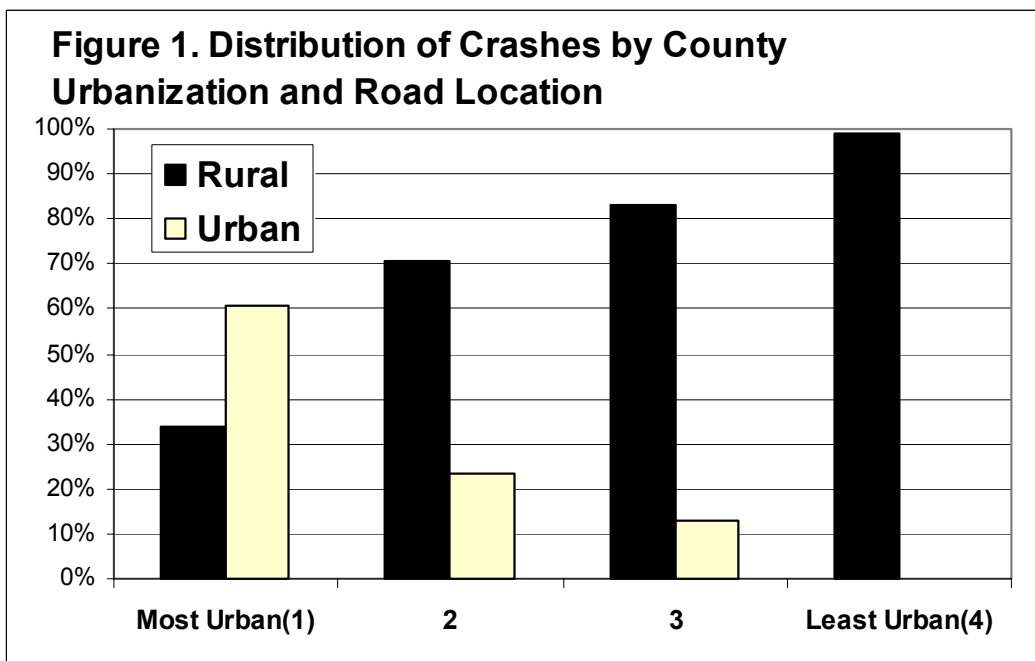
Data on all reportable motor vehicle crashes in North Carolina occurring between January 1, 2000 and December 31, 2002 were examined to determine the extent of alcohol involvement as a function of crash location (rural vs. non-rural). Several codes in the crash file provide an indication of the rural-urban character of the crash site, however, these are imprecise at best. Our goal was to find those crashes that occurred in a genuinely rural location, away from populated areas, on the sort of roadways typically found in rural North Carolina and which are traveled by a large proportion of the population when driving home. Because the goal of this study was to learn whether law enforcement efforts to deter and detect alcohol-impaired drivers are optimally deployed, we needed to identify crashes that occur in areas where it is rare, and logistically difficult, to establish sobriety checkpoints or to use "saturation" patrols.

To measure the urban-rural nature of counties a number of existing coding schemes were considered. Ultimately, we decided that the following best suited our needs for the present study. Counties were ranked according to the proportion of the population that lives within the boundaries of a municipality of 2,500 individuals or more. These range from a county of 600,000 residents where 95% live in a municipality to a county of 17,000 where no one lives within a municipality. Ranked counties were then divided into quartiles from most urbanized to most rural.

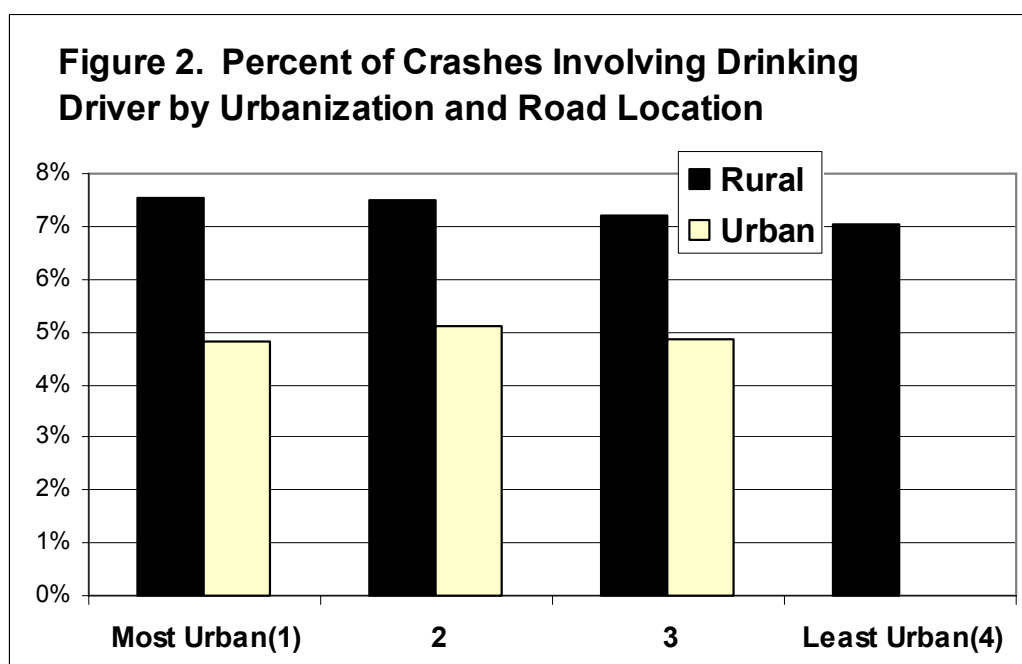
Results

During the three-year investigation period, 7% of crashes in North Carolina occurred on Interstate Highways (4-lane, divided, controlled-access roadways); these were excluded from the present analyses because the design characteristics of these roads are similar in rural and urban areas. In addition, by comparison with non-Interstates, a disproportionately large number of drivers on these roads do not live in the area through which the road passes. For the remaining roadways, crash locations were defined as rural using a combination of two codes in the crash report (road type and urban-rural designation of the crash location; hence, crashes on "paved rural roads" were considered rural even if they were designated as occurring in an "urban" area. These inconsistencies occurred in less than .4% of crashes).

Forty-five percent of crashes occurred on a roadway defined as rural by the coding scheme we created. Even in the most urbanized quartile of counties, 26% occurred on a rural road. Among the remaining counties, 77% of all crashes occurred on rural roads. Because of the heavy population concentration in the most urbanized counties (56% of the entire state population), 36% of all rural crashes occurred in these counties. Figure 1 shows the distribution of crashes by road location and degree of county urbanization.

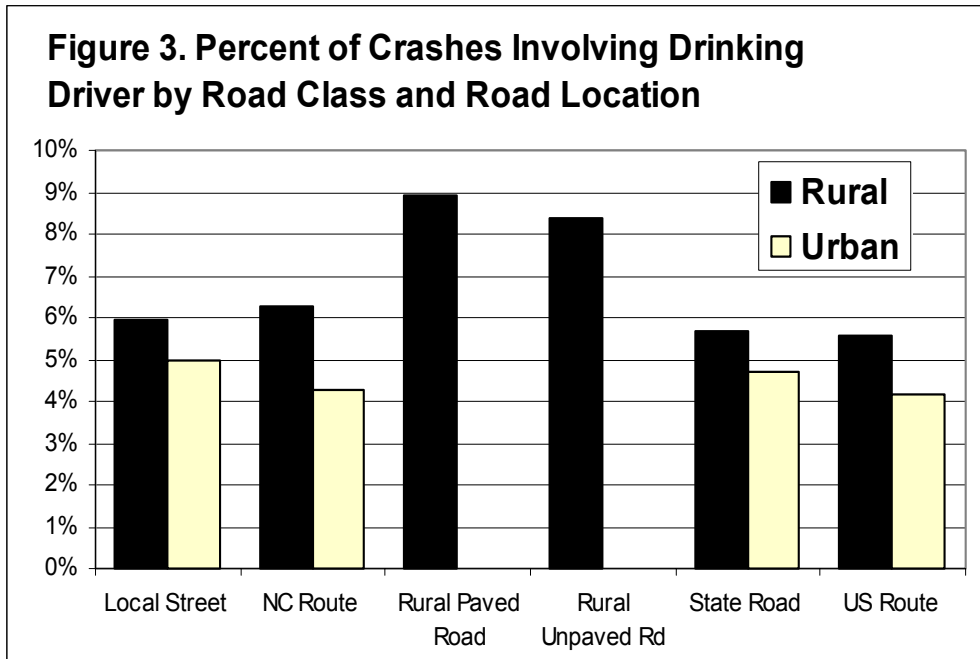


Overall, alcohol was involved most often in crashes that occurred in the most rural counties and least often in the most urban counties (7.6%, 7.3%, 7.2%, 5.8% respectively; data not shown in Figure). This difference is due to the greater proportion of rural crashes in the less urbanized counties. However, across all counties, crashes at rural road locations were 57% more likely than crashes at urban road sites to involve a drinking driver. This ratio was almost constant across counties regardless of their general urban-rural character. As Figure 2 shows, when crash site is controlled, there are few differences in alcohol-involvement as a function of county urbanization. Accordingly, subsequent analyses will ignore county urbanization and focus on roadway type and location.

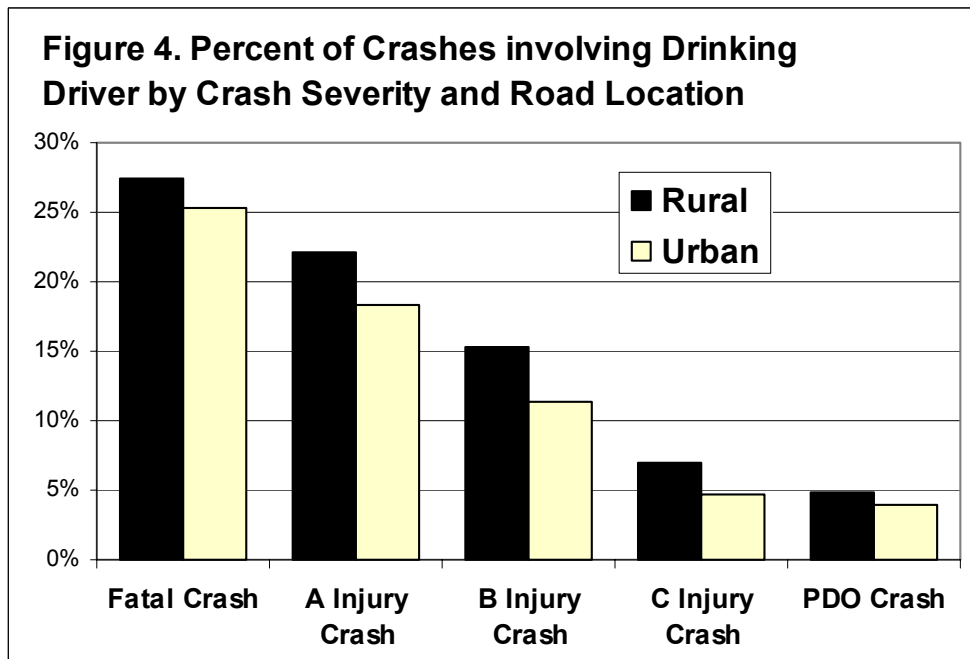


Another way to look at roadways is in terms of their designated classification. This classification is usually determined by jurisdictional responsibility for maintaining the road

and general equates with engineering design features and, therefore with safety of the roadway. To some degree this also overlaps, but is certainly not synonymous, with urban vs. rural location. Interestingly, for every road type, crashes that occur in rural areas are



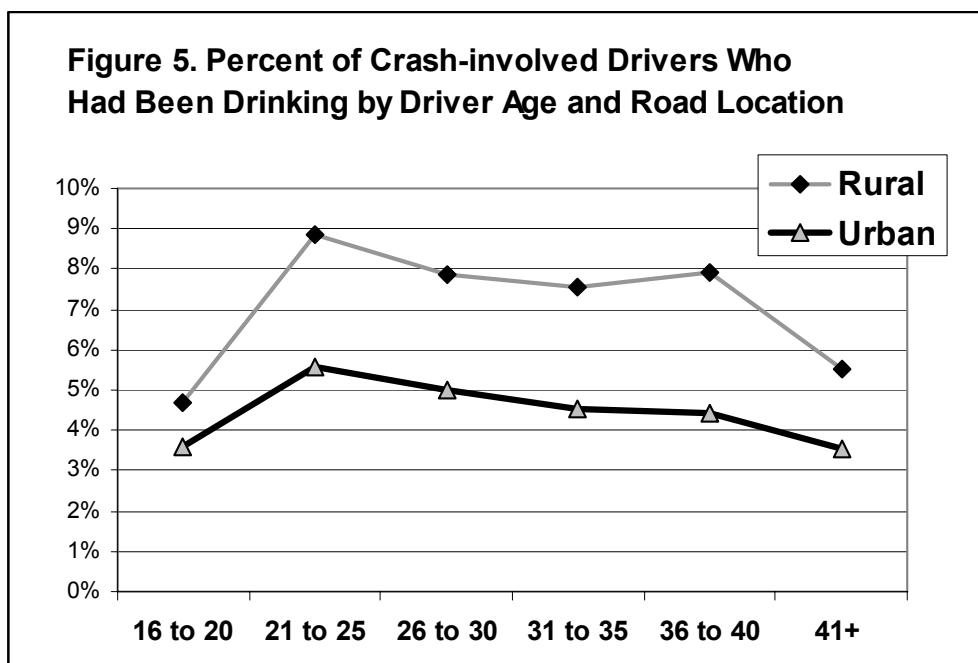
more likely than crashes in an urban location to involve a drinking driver. Moreover, crashes on the most rural road types, which are formally classified as rural roads, are most likely to involve a drinking driver (see Figure 3.) Forty-nine percent of all crashes and 22% of rural crashes occur on these roadways explicitly designated as rural (98% of which are paved, so the unpaved class is of relatively little concern here).



It is well understood that alcohol is more likely to be involved in the most serious crashes. Figure 4 shows this pattern clearly, with a greater proportion of crashes involving alcohol at each increasing level of severity. Perhaps more importantly it is also apparent that for

every level of crash severity, crashes that occur in rural locations are more likely to involve a drinking driver. The difference is smallest for the most and least severe crashes. Fatal crashes in rural locations were 11% more likely than those in urban locations to involve a drinking driver; property damage (PDO) crashes in rural locations were 26% more likely to involve a drinking driver. On the other hand, injury crashes were 72% more likely to involve a drinking driver if the crash occurred on a rural roadway.

A partial explanation for why alcohol is involved more frequently in crashes on rural roads if found in the different distribution of crash types and their association with alcohol. Overall, single vehicle crashes are 57% more likely than multiple vehicle crashes to involve alcohol and single vehicle crashes are more than 7 times as likely (RR=7.3) to occur on rural roadways. This likely has more to do with the nature of the roadways and their lack of congestion than with rural drivers. For example, as shown by the similar shape of the curves in Figure 5, there is relatively little difference in the relationship between driver age and drinking for crashes that occur on urban vs. rural roadways. A similar analysis shows virtually no difference in the association between driver race/ethnicity and alcohol use in on urban vs. rural roads.



Discussion and Conclusions

Alcohol-related motor vehicle crashes are most likely in the most rural counties of North Carolina (defined by population concentration within towns in cities). However, this does not appear to be due to the nature of the population itself and characteristically different behaviors in more vs. less rural areas. Instead, it appears to result from the different distribution and concentration of driving challenges. The more rural counties have many more miles of rural roadways and far less congested traffic. It is well-established that single vehicle crashes are more likely to involve a drinking driver, and rural roadways are more conducive to single vehicle crashes both by virtue of their low traffic density and the roadway geometry found on many rural roads, at least in North Carolina. When an impaired driver confronts a driving situation more difficult than he is able to manage on a rural roadway, the likelihood is greater that he will not hit another vehicle. In contrast, when an impaired driver is overwhelmed by conditions on an urban roadway, those conditions and the resulting crash are more likely to involve another vehicle by virtue of the

greater traffic density. Nonetheless, regardless of county urbanization, type of roadway, crash severity, or even the age or ethnicity of the driver, those crashes that occur in a rural location are more likely to involve a drinking driver. Even though we have relatively little information in the present study to determine why this is the case, these results clearly point to the need for law enforcement programs that are suited to controlling drinking driving in rural locations. Because it is impossible to adequately patrol all rural roadways, programs that can adequately address this fact are important if alcohol-related crashes are to be reduced in a state where a large majority of the population lives in areas that require a substantial amount of driving on rural roadways.

It is not presently clear what such programs would be. A few drinking-driving prevention programs have been developed that were targeted to persons living in rural areas. For example, a program implemented in Queensland, Australia involved a community approach to control drinking-driving, and provided a 12 session intervention for offenders living in areas that had limited resources for alcohol treatment (4). Although preliminary, the program appeared to have several positive effects, including reductions in recidivism among drinking-driving offenders.

However, it does seem that well-publicized sobriety checkpoint programs could be designed specifically for rural areas. This would involve using limited staffing at checkpoints, conducting them for brief periods of time along several rural arteries, and cooperative working relationships between multiple law enforcement agencies to ensure the adequate staffing to conduct such operations in jurisdictions where law enforcement personnel are already spread thinly.

References

1. Blatt J & Furman SM (1998). Residence location of drivers involved in fatal crashes. *Accident Analysis and Prevention*; 30:705-711.
2. Blyth A, Stewart L & Maskill C (1995). *Perceptions of drink-driving and alcohol-related crashes in rural areas of New Zealand*. Auckland, New Zealand: Alcohol and Public Health Research Unit.
3. National Highway Traffic Safety Administration (1992). *Rural initiatives for traffic safety*. Prepared by the National Sheriffs' Association.
4. Sheehan M, Schonfel C & Davey J (1995). A community based prevention/rehabilitation programme for drink drivers in a rural region: "Under the Limit" (FORS Monograph CR 156). Canberra, Australia: Federal Office of Road Safety.