

# Rural Local Road Crashes: System Diagnosis and Countermeasures

Local rural road travel has the highest injury crash incidence in North Dakota. These roads are typically narrow two-lane roads with limited or no shoulder, and often unpaved surfaces that account for 1 in 5 rural travel miles beyond the interstate system. Local roads accounted for nearly half of serious crashes between 2006 and 2010 (Figure 1) with injury crash risk about 3 times greater than on the state's heavily traveled rural principal arterial roads.

In this research, local road crashes were studied to understand contributing factors and characteristics. Additional empirical analysis was conducted to estimate the magnitude of the individual factors. Figure 2 shows that many factors differed significantly when considering injury crashes on local versus other rural roads between 2006 and 2010. Road departure, no seat belt, unpaved surfaces, speed, and impaired driving were all more common as factors in local road injury crashes.

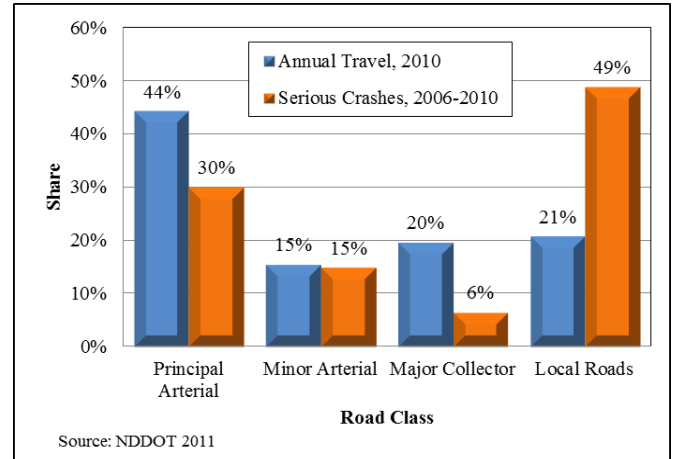


Figure 1. ND Travel and Serious Crashes, by Road Class

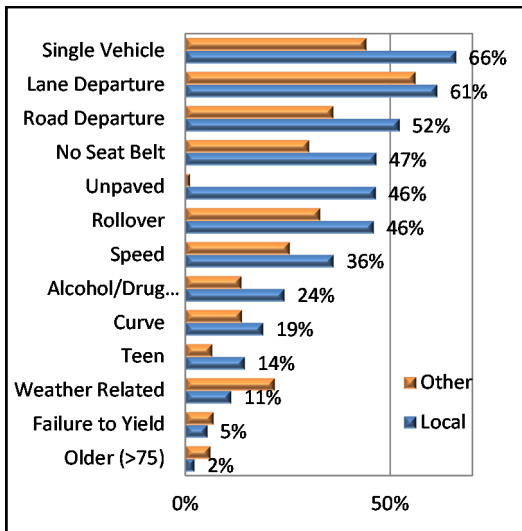


Figure 2. Significant Difference in Rural Injury Crash Factors, 2006-2010 by Road Class

Crash causes and mitigation are generally discussed around four major components: human, roadway, vehicle, and environment. Within these four areas, data elements were selected from information available in the state crash reports from 2006 to 2010.

*Human Factors* - Impaired driving has the largest weight among factors in modeling injury likelihood in local rural roads crashes. Crash involvement is 5.6 times greater for impaired drivers than non-impaired drivers. Unbelted drivers are nearly three times more likely to be injured when involved in a crash on local rural roads than drivers who are belted. Speed, defined as driving too fast for conditions, was also found to be linked to driver injury, with crash risk nearly double compared to cases where the driver is traveling at appropriate speeds. Teen drivers also had a heightened chance for injury - 59.3% more likely when the driver was between the ages of 14 and 17.

*Roadway Factors* - Several road factors were also significant in understanding injury likelihood. Crashes reported to be intersection-related have a 93.4% increased likelihood to be associated with driver injury. Unpaved surfaces were also associated with increased probability for injury with 81.4% greater likelihood than other road surfaces. Although smaller in magnitude, curve and hill road features are associated with 45.5% and 63.4% higher probability of injury crash events than when crashes occur on flat, straight stretches of road.

*Vehicle & Environmental Factors* - Local roads crashes that occur in the dark are associated with a 47.5% lower injury crash likelihood than those crashes that occurred with daylight or lighted conditions. This may be associated with factors such as differing nighttime and daytime travel speeds or the traffic interaction levels. Vehicles equipped with anti-lock brakes were found to be 16.3% less likely to be associated with injury crash events than unequipped vehicles.

## RESULTS

Results show several potential focus areas for improving rural local road safety. Driver behaviors, including impaired driving and seat belt use, have the largest role in likelihood for injury. Intersections and unpaved road surfaces were found to be most significant in increased likelihood for injury outcomes among the road factors. Table 1 on the back page offers a county-level summary of the model factors for the counties with the crash incidence above the state average. The average crash incidence for local roads is based on the mean of the population and VMT incidence rates for these roads. The results reinforce notions that local rural roads truly require a combination of interventions related to the driver, road, vehicle, and environment.

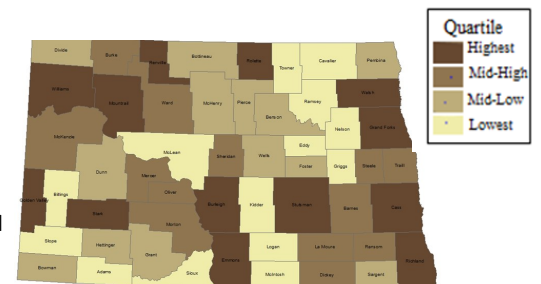


Figure 3. Local Rural Roads VMT-Based Injury Crash Incidence by County, 2006 to 2010

**Table 1. Highest Incidence of Factors in Local Crashes for Counties with Above Average Crash Rates on Local Roads, 2006-2010**

County	Driver Factors				Road Factors				Intervention Area		
	Alcohol/ Drug Involved	No Seat Belt	Speed	Teen	Intersection	Unpaved	Hill	Curve	Driver	Combined	Road
Barnes							X		0	1	1
Burke									0	0	0
Burleigh					X				0	1	1
Cass					X				0	1	1
Dickey				X					1	1	0
Divide			X					X	1	2	1
Emmons							X		0	1	1
Golden Valley			X			X	X	X	1	4	3
Grand Forks					X				0	1	1
La Moure				X		X			1	2	1
McKenzie					X		X	X	0	3	3
Morton					X			X	0	2	2
Mountrail					X	X	X		0	3	3
Oliver		X	X			X		X	2	4	2
Ransom		X				X			1	2	1
Renville									0	0	0
Richland									0	0	0
Rolette					X				0	1	1
Sheridan		X	X			X	X		2	4	2
Stark	X								1	1	0
Steele	X	X				X			2	3	1
Stutsman								X	0	1	1
Traill			X						1	1	0
Walsh	X		X		X				2	3	1
Ward					X				0	1	1
Williams			X		X			X	1	3	2

X: Indicates 75th percentile, highest quartile, for factor.

**Common Problems and Low-Cost Countermeasures**

Countermeasures ideas available from NDLTAP, NDDOT, and FHWA.

**Common Rural Local Road Problems**

- Inadequate sight distance
- Insufficient signage
- Impaired drivers
- No seat belt
- Faded pavement markings
- Poor sign retroreflectivity
- Edge drop-offs/shoulder deterioration
- Short turn lane lengths
- Improper speed limits
- Poor lighting
- Missing/outdated features (e.g. guardrails)

**Common Low-Cost Crash Countermeasures**

- Create/expand clear zone
- Improved signage (e.g. curve chevrons)
- Enhanced intersection lighting
- Increased enforcement
- Public education
- Remove/mark/move fixed objects
- Eliminate/restrict turn maneuvers
- Community Safe-Ride Programs
- Better pavement markings
- Rumble strips/stripes

To read the entire research report and find references, visit the RTSSC website: <http://www.ugpti.org/rtssc>



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