Rural and remote road crashes: piecing together the story

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Introduction and background

Deaths from rural road crashes continue at a higher rate per head of population than that for major cities[1,2], with the risk of dying on rural roads exceeding that on motorways by four to six times.[2] In particular the male death rate from motor vehicle crashes in rural and remote areas of Australia is significantly higher than the male death rate in major cities.[2] In 1992, rural and remote road safety was identified as a priority area in the inaugural *National Road Safety Strategy 1992–2000*.[3] This led to the first national Rural Road Safety Seminar in 1995, at which the Australian Transport Safety Council and transport ministers from all States and Territories championed the development of a separate rural and remote road safety action plan—*Commonwealth Rural Road Safety Action Plan (1996)*[4]—designed to reduce the incidence and severity of road crashes in country areas by: (i) increasing public awareness of the economic costs of rural crashes; (ii) addressing known deficiencies in identified crash areas; and (iii) improving driver behaviour and attitudes towards alcohol, excessive speed, seatbelt compliance and driving while fatigued.

The National Road Safety Strategy 2001–2010[5] aims to reduce the road fatality rate from 9.3 per 100 000 population (in 2000) to 5.6 per 100 000 by 2010. By July 2006 the fatality rate had fallen to 7.9 per 100 000[6], although still higher than the targeted 7.0 for this stage of the Strategy. Although fatality rates have dropped for pedestrians, bicyclists, multiple-vehicle crashes and articulated vehicle crashes, rates have not dropped for motorcyclists or occupants of single vehicle crashes[6] which account for the majority of deaths. The current two-year national road safety plan[7] states that road deaths and injuries are public health problems, rather than just transport problems, and concedes that the target of 5.6 deaths per 100 000 population by 2010 will be difficult to achieve, given current progress.

Evidence from several studies undertaken during the 1990s and reported by Austroads[2] demonstrated that several behavioural factors influence the frequency and severity of road crashes in rural areas; including the effects of alcohol, fatigue, and driving on unfamiliar roads. Speeding on rural roads combined with youth contribute to increased driver errors.[8] Another study concluded that risk factors included driving under the influence of alcohol or cannabis, young age, driving an unfamiliar vehicle, not using seat belts and receiving social security payments.[9]

In response to such evidence and the paucity of research specifically examining rural road trauma, a five-year multi-component study aimed at increasing knowledge about rural and remote road crashes and informing road safety policy was designed.[10] The overall aims of the study are to:

- understand behavioural and social factors contributing to crash involvement in order to inform prevention strategies
- develop, identify and trial targeted countermeasures
- study the experience, outcomes and costs of rehabilitation for patients admitted to hospital after a motor vehicle crash.

The study is being undertaken in northern Queensland with data collection commencing in March 2004 and scheduled to end in March 2007. The study area encompasses that part of Queensland north and west of Bowen (approximately 40% of Queensland's land area), excluding the major urban centres of Townsville, Thuringowa and Cairns—defined by the Australian Bureau of Statistics as 'Part A' urban statistical local areas). Figure 1 illustrates the study area. Table 1 demonstrates that the area's population is younger (median age) and more masculine (M:F ratio) than Queensland's population as a whole.

Figure 1 **Study area: northern Queensland**

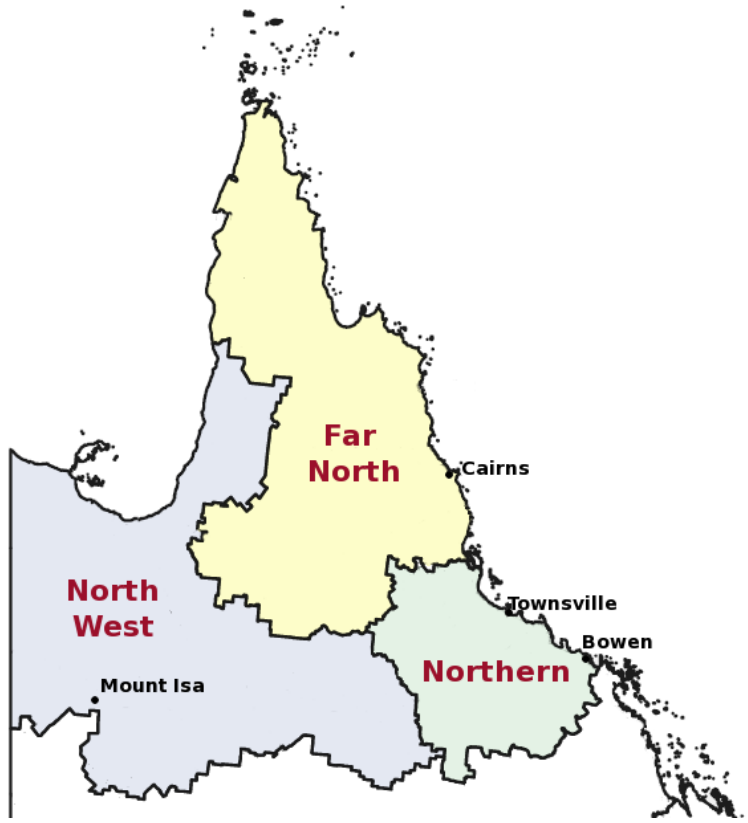

Table 1 **Demographic characteristics of North Queensland**

Region	2005 pop.	15–29	30–49	50–64	65+	Age[1]	M:F Ratio
Northern	205 628	48 529	59 845	32 181	20 926	33.2	1.04
Far North	238 454	48 411	74 103	40 094	23 916	35.1	1.05
North West	34 167	7 880	10 473	4 648	2 294	30.5	1.17
North Qld	478 249	104 820	144 421	76 923	47 136	33.9	1.05
Queensland	3 156 903	826 895	1 159 156	690 716	480 136	35.9	1.00

[1] = Median Age in years
Source: Australian Bureau of Statistics (2006)

This paper presents some initial results from one component of the study: interviews with road crash patients admitted to hospital between March 2004 and May 31 2006. Demographic data, use of safety restraints and helmets, levels of drinking and attitudes to road safety practices and enforcement are reported.

Methods and data

Figure 2 outlines all the key data sources used in this component of the study along with two related components not reported here (roadside interviews and fatal crash data). However, the data presented in this paper are drawn only from interviews with people hospitalised after a road crash (hereafter called the hospital group). Other region-wide data are also used to assist with profiling crashes. All police-reported crashes within the region are accessed through Queensland Transport's road crash database. Further information on crash-related injuries is collected through Queensland Health admissions data for each of the hospitals within the study area. Ethical clearance has been received

from James Cook University, Queensland University of Technology, relevant Queensland Health Districts, Queensland Ambulance Service and Queensland Police Service.

The hospital group interviews were undertaken with drivers, motorcycle riders, passengers, pedestrians and cyclists admitted to hospital for a minimum of 24 hours following a motor vehicle crash and who fulfilled the following eligibility criteria: aged 16 years or over; had been given medical clearance to take part in the study; the motor vehicle crash occurred in the study area; and the crash involved no fatalities. Written consent to take part in the study was obtained from each participant. All eligible patients in The Townsville Hospital, Cairns Base Hospital and Mount Isa Base Hospital were approached and invited to discuss their crash. Interview questions included human factors (attitudes, intentions and behaviour), trip characteristics, knowledge and access to road safety information, their experience of the road environment, and the design and condition of the vehicle(s) involved. Interviews were **not** conducted with surviving occupants or other vehicle controllers involved in fatal crashes. However, details of fatal crashes occurring within the study area are being recorded, with data being collected from Queensland Transport's road crash database and the National Coroner's Information System.

Variables and measures

Two sources of data with respect to alcohol use and drink driving are reported in this paper: a self-report measure of alcohol use; and self-reported drink driving behaviours. The three-question version of the Alcohol Use Disorders Identification Test (AUDIT-C) was administered. This test collects data on the frequency and quantity of drinking and the frequency of binge drinking (6 or more standard drinks in a session). Males scoring above 5 and females scoring above 4 out of a maximum of 12 were classified as 'harmful drinkers' in line with other studies. During the course of the study, the roadside questionnaire was shortened in order to reduce administration time. Some questions related to alcohol use were removed, although the AUDIT-C questions were retained.

Participants' attitudes towards road safety practices and enforcement were sought with respect to desired changes in enforcement, the perceived effectiveness of various counter-measures and previous driving offences. Five-point Likert-type scales were used to determine strength of attitude or belief (1 = very effective, 2 = effective, 3 = satisfactory, 4 = not very effective, 5= not effective at all).

Data management

All data were entered into an SPSS (version 12) database and checked for accuracy. Parametric and non-parametric statistical tests were used to assess statistical significance (p-value <.05). Tests were used according to data type and distribution and in line with analytical processes used in other similar studies.

Results

A total of 255 hospital interviews were undertaken between March 2004 and May 2006. Table 2 presents a summary of the demographic characteristics of the hospitalised interviewees.

Table 2 **Demographic characteristics of hospital interviewees and north Queensland residents at 2001 Census**

Variable	Group	
	Hospital (N=255)	North Qld* (N=478 249)
Resident of Australia	97%	96%
Median age	35 years (16–86 years)	35.9 years
Gender		
Male:	82%	51%
Female:	18%	49%
Highest education level		
Year 10 or less:	40%	-
Year 12:	16%	-
Trade, apprentice., certificate or diploma	33%	22% (Cert/Dip Only)
Bachelor degree or higher:	8%	9%
Occupation		
Tradesperson:	18%	14%
Clerical, sales and service:	16%	29%
Labourer and related:	22%	11%
Production and transport:	19%	10%
Manager and professional:	25%	34%
Median years driving in Australia	18 (<1–69)	-
Median years driving crash vehicle	5 (0–60)	-
< 1 Year Driving Crash Vehicle	31%	-

* Source: Australian Bureau of Statistics, 2001

The median age of interviewees is similar to that for the population of north Queensland. Males are disproportionately represented compared to the north Queensland population. There is a statistically significant difference between the hospital group and the north Queensland population in terms of occupation with 'labourer and related' and 'production and transport' being over-represented in the hospital group, while 'clerical, sales and service' and 'managerial and professional' being under-represented ($\chi^2 = 69.72$, $df = 4$, $p = .000$). The group's median years driving experience appears to be directly commensurate with median age—in other words, it appears that most interviewees have had driving licences since age 17 years. Although driving experience was generally high, years of experience driving a vehicle of the type crashed was substantially lower.

Table 3 outlines restraint (seat-belts) and helmet use between the two groups.

Table 3 **Restraint use**

Seatbelt non-use	13.7% (n=95)
Helmet non-use	13.9% (n=144)

Approximately one in eight hospitalised motorcyclists reported not wearing a helmet, and a similar proportion of hospitalised vehicle occupants reported not wearing seat-belts.

Table 4 sets out the self-reported alcohol use levels by gender.

Table 4 Alcohol use by gender

	Male		Female	
Alcohol use level	No.	%	No.	%
Harmful drinkers	120	62%	23	50%
Drinkers	49	25%	16	35%
Non-drinkers	24	12%	7	15%

At least half of each gender was classified as harmful drinkers, with harmful drinking being higher among males than females. However, there is no statistically significant difference in alcohol use by gender ($\chi^2 = 2.35$, $df = 2$, $p = .31$).

Table 5 reports the results of one way Analysis of Variance (ANOVA) analyses to assess the differences in self-reported alcohol use (mean AUDIT-C score) for those who reported drink driving behaviours versus those who did not. The data (and participant numbers) in this and subsequent tables relate only to those participants who were asked the relevant questions.

Table 5 Comparison of alcohol use (AUDIT-C) and self-reported drink driving behaviours (One-way ANOVA)

DD behaviour	n	AUDIT-C	SD	Sig.
Booked for DD?				
Yes	23	8.1	2.6	<.001
No	210	4.4	2.8	
Drink driven?				
Yes	47	7.0	2.5	<.001
No	186	4.2	2.8	
Passenger of DD?				
Yes	44	6.9	2.9	<.001
No	189	4.2	2.8	

The mean AUDIT-C scores were significantly higher among those that reported taking part in drink driving behaviours than for those who did not.

Table 6 presents respondents' desired changes in enforcement levels for each of speeding, drink driving and general road rule breaking offences.

Table 6 Respondents' desired changes in enforcement of road rules

Enforcement	Decrease	%	No change	%	Increase	%
Speeding	33	16%	86	42%	88	43%
Drink driving	3	1%	71	33%	142	66%
Breaking road rules	23	11%	108	53%	74	36%

Respondents generally believed that drink driving enforcement should be increased. There was, however, less support for increased enforcement of speeding or general road rules. There was generally limited support for decreasing enforcement; most particularly for drink driving.

Respondents were asked '*How effective do you think the following are in reducing road crashes and injuries?*' The percentages of respondents who chose either end of the 5-point scale ranging from 'not at all effective' to 'very effective' are set out in Table 7. Nett percentage differences are used to rank the perceived effectiveness of the various interventions.

Table 7 Respondents' ratings of the effectiveness of various road safety interventions

Effectiveness of interventions	% very effective	% not effective at all	% V.Eff – %NEffAtall
Better roads	62.4%	0.8%	61.6%
Courtesy buses from pubs, clubs	58.3%	0.4%	57.9%
Identifying road hazards	55.4%	0.8%	54.6%
Over-taking lanes	53.9%	0.4%	53.5%
Loss of licence for serious offences	46.7%	3.3%	43.4%
Improved mobile phone range	47.5%	6.3%	41.2%
Roadside rest facilities	41.2%	0.8%	40.4%
Road-based fatigue initiatives	36.6%	1.2%	35.4%
Safety programs for heavy and fleet drivers	30.3%	0.8%	29.5%
Police riding in back of utes	29.6%	2.9%	26.7%
Driver education	28.8%	2.9%	25.9%
Special programs for serious offenders	31.0%	5.4%	25.6%
Random Breath Testing	26.2%	0.8%	25.4%
Police patrols	24.2%	1.6%	22.6%
Public education programs	23.1%	2.1%	21.0%
Restrictions for learner and provisional drivers	24.3%	5.3%	19.0%
Police overloading in cars	21.8%	2.9%	18.9%
Random checks for un-roadworthy vehicles	19.3%	7.4%	11.9%
Losing points for traffic offences	17.8%	6.6%	11.2%
Speed cameras	18.4%	8.6%	9.8%
Fines for traffic offences	12.7%	7.0%	5.7%

On average, most interventions were considered to be at least 'satisfactory' by participants. Of the four interventions believed to be most effective for increasing road safety three were related to road environment issues and one was a community service intervention. With the exception of 'loss of licence for serious offences' (ranked 5th), enforcement-related interventions were considered to be the least effective for increasing road safety.

Table 8 sets out the results of chi-square test analyses examining the relationship between being booked for a specific offence in the past and desired changes in the level of enforcement for speeding, drink driving and road rule breaking amongst respondents. These results demonstrate that those respondents who reported being booked for a traffic offence in the past 5 years were less likely to want to see enforcement of that offence increased, than those who had not been booked for that offence.

Table 8 **Relationship between being booked for infringement and desired change in level of enforcement—hospital group**

Enforcement category	Booked for offence	Desired changes in enforcement: Decrease n	Decrease %	No change n	No change %	Increase n	Increase %	Sig.
Speeding enforcement								
Any offence	Yes	24	20%	48	40%	47	39%	.101
	No	8	9%	36	42%	41	48%	
Speeding offence	Yes	21	24%	38	43%	30	34%	.005
	No	10	9%	46	40%	58	51%	
Drink driving	Yes	5	23%	10	45%	7	32%	.416
	No	26	14%	74	41%	81	45%	
Driving without licence	Yes	3	25%	5	42%	4	33%	.581
	No	28	15%	79	41%	84	44%	
Other offence	Yes	4	11%	11	31%	21	58%	.143
	No	27	16%	72	43%	67	40%	
Drink driving enforcement								
Any offence	Yes	3	2%	41	33%	80	65%	.342
	No	0	0%	30	34%	57	66%	
Speeding offence	Yes	3	3%	30	33%	58	64%	.136
	No	0	0%	41	34%	78	66%	
Drink driving	Yes	0	0%	14	64%	8	36%	.007
	No	3	2%	57	30%	128	68%	
Driving without licence	Yes	0	0%	8	62%	5	38%	.089
	No	3	2%	63	32%	131	66%	
Other offence	Yes	0	0%	9	24%	28	76%	.255
	No	3	2%	62	36%	107	62%	
Break road rule enforcement								
Any offence	Yes	18	16%	68	59%	30	26%	.001
	No	5	6%	37	44%	43	51%	
Speeding offence	Yes	13	15%	51	59%	23	26%	.028
	No	10	9%	53	47%	50	44%	
Drink driving	Yes	4	18%	15	68%	3	14%	.057
	No	19	11%	89	50%	70	39%	
Driving without licence	Yes	2	15%	10	77%	1	8%	.082
	No	21	11%	94	50%	72	39%	
Other offence	Yes	7	21%	16	48%	10	30%	.159
	No	16	10%	88	53%	62	37%	

Discussion

The predominance of male interviewees in the hospitalised group is in line with their well-recorded greater propensity to participate in risky behaviours and so be involved in crashes.[2] However, it is not known if males are also more frequent road users than females, which thus puts them, as a group, at potentially greater risk of having a crash.[10] Although this seems likely, as 75% of roadside participants have been male (and males are generally less likely to participate in surveys than females), we intend to explore this particular question when all data collection is completed (hospital and roadside

interviews). Additionally, hospitalised interviewees were more likely to be involved in occupations which involve travel (ie 'labourer and related' and 'production and transport'), while those occupations generally involving less travel were under-represented amongst interviewees, which would suggest that, as with males, greater road use (ie 'exposure') increases the likelihood ('risk') of crashing.

It is noteworthy that the median age of hospitalised respondents is similar to that of the north Queensland population, despite the apparent preponderance of males. Perhaps most noteworthy is that one-third of hospitalised respondents had less than 1 years' experience of driving the type of vehicle which they crashed. Indeed, a sizeable proportion of interviewees actually noted in their narrative crash description (not reported here) that their relative inexperience with the particular type of vehicle contributed to their crash.

Of some concern is that about 14% each of hospitalised motorists and cyclists did not use seat-belts and helmets respectively. Perhaps, this reflects a sub-group of people who knowingly not only take these risks, but also knowingly defy the law in this respect. That said, it is reasonable to expect that people who do not use these safety devices are more likely to be severely injured in a crash and so require hospitalisation, so the figure may not reflect the use of seat-belts and helmets in the broader road-using population.

The apparently high levels of harmful drinking reported by both male and female respondents are of concern. While the result for males is broadly in line with other studies that have demonstrated higher rates of drinking amongst males involved in road crashes[2], the fact that female overall drinking patterns were not significantly different raises some interesting questions. Do the results reflect an increasing trend of risk-taking amongst females (as with smoking rates)? Do the results reflect that rural females take similar drinking risks as rural males? If so; could this reflect social 'norms' of high alcohol intake and perhaps high risk-taking overall? Certainly, participation in drink driving behaviours was significantly higher amongst those who self-reported high levels of drinking—a finding in line with expectations and the literature.[2,8,9] The mean AUDIT-C levels for those who participate in drink driving behaviours were 1.5–2 times higher than for those who did not—a finding which again is in line with expectations.

With respect to road laws and enforcement, participants only indicated strong support for increasing drink driving enforcement measures. The majority of respondents supported current enforcement measures for breaking road rules and were ambivalent about increasing speeding enforcement. Given the finding that people booked for a particular offence generally did not favour increased enforcement for that offence, it might be reasonable to ponder on whether this indicates that many respondents indulged in regular speeding. Regardless, the result does suggest that negative attitudes to enforcement, especially increased enforcement, are related to previous booking history.

It is interesting to note that the road safety interventions considered by hospital respondents to be 'very effective' are mostly system-based, or amenable to system intervention. Those interventions that focused on individual behaviours or attitudes were less well supported. This might suggest that most respondents, despite recovering from a serious road crash, believe that they drive responsibly and safely, and possibly also believe that they possess high level driving skills.[11,12] Indeed, this was demonstrated in many respondents' narrative descriptions of their crashes and the contributing circumstances which they believed to be beyond their control and not related to their driving (even in the face of counter evidence).

Conclusion

These early results from this yet to be completed study suggest that there is a sub-group of the rural population that holds inappropriate attitudes to road safe behaviour and law enforcement. That these attitudes were displayed by people currently hospitalised as a result of a serious crash raises the possibility that people with such attitudes are potentially at greater risk of being involved in a serious crash.

Policy implications

Amongst rural road users hospitalised as a result of a road crash, there is a group who continue to participate in unsafe and illegal activities. As a group, these people are less likely to value strengthened enforcement in general, but particularly with respect to enforcements that impact on their (unsafe) behaviours. They are, therefore, less likely to respond positively to such enforcements. New means need to be found that will bring about long-term behavioural change in this group, rather than simply increasing enforcement measures.

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Presenter

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Figure 2 **Data sources used in the Rural and Remote Road Safety Study**