



COVER SHEET

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The economic, medical and social costs of road traffic crashes in rural north Queensland: a 5-year multi-phase study

Craig Veitch, James Cook University, **Mary Sheehan**, Queensland University of Technology, **Richard Turner**, James Cook University, **Vic Siskind**, Queensland University of Technology, **Dennis Pashen**, Mt Isa Centre for Rural and Remote Health

INTRODUCTION

People living in rural and remote regions of Australia are significantly over-represented in road transport-related fatality and injury figures. The costs of these events are also significantly higher than for similar injuries in urban communities. In Queensland in the year 2000, for example, the risk of dying (per capita) in a rural versus urban crash was 4.2 times higher¹, with costs 2-3 times higher in rural areas compared to urban areas. Additionally, Indigenous Australians are highly over-represented in road crash statistics.

Despite rural populations being over-represented in road transport-related crashes both nationally and internationally, very few road safety policies and interventions have targeted rural and remote populations and problems. "The rural and remote road safety problem has received minimal attention in comparison to the efforts directed at reducing crashes in urban areas"² primarily due to population distribution.³ Policy-makers stand to reap bigger returns for dollars invested in urban areas, while the cost of conducting research in rural areas is substantially higher. Likewise, little research has focused on the social, economic and medical costs of non-urban crashes.

This paper outlines a five-year multi-stage study aimed at increasing knowledge about rural and remote road crashes and informing road safety policy. The purpose of this paper is to introduce the study to delegates of Australia's premier rural health conference. The particular focus of this paper is on the multi-phase study design and measures used to increase rural community awareness of and participation in various aspects of the study. The conference presentation will also briefly outline some early information from the data collected to date. As data collection is on-going, no results are presented in this paper (October 2004), but information relating to the first year's data collection will be presented during the conference presentation (March, 2005).

BACKGROUND

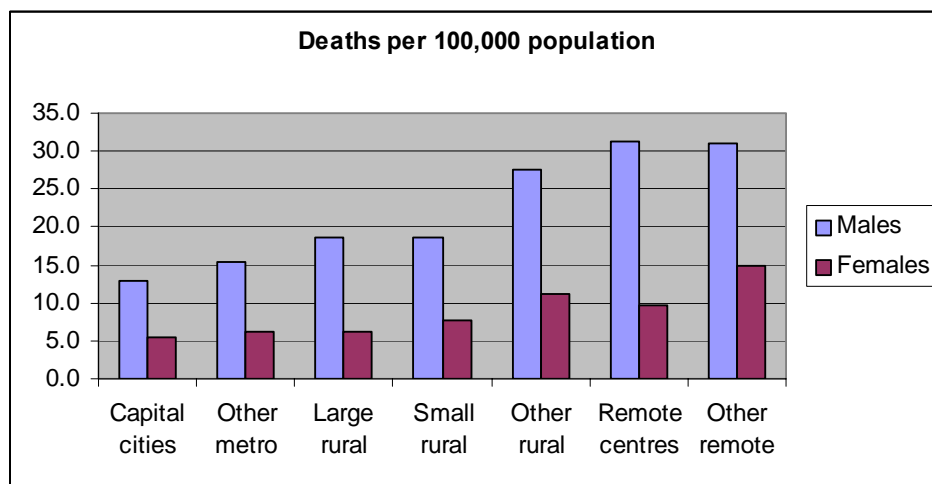
Rural and remote road safety was identified as a priority area in the inaugural (1992) *National Road Safety Strategy 1992-2000*⁴, and led to the first national Rural Road Safety Seminar held in Wodonga in 1995. In 1996, the Australian Transport Safety Council and transport ministers from all States and Territories championed the development of a separate rural and remote road safety action plan - *The Commonwealth Rural Road Safety Action Plan (1996)*⁵ - 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 toward alcohol, excessive speed, seatbelt compliance and driving while fatigued.²

Rural road safety

Despite this effort to raise awareness of rural road safety in Australia, there is still a paucity of research examining rural road trauma⁶⁻⁸ and the risk of dying in road crashes in rural and remote areas remains significantly greater than in urban areas.¹ A recent review of the implementation of initiatives specified in the Rural Road Safety Action Plan (RRSAP) highlighted some key issues, including higher hospitalization and death rates resulting from rural road crashes, higher financial costs, and variations in crash characteristics.⁹

The increased risk of death resulting from a motor vehicle crash in remote and rural regions (using the Rural, Remote and Metropolitan Areas [RRaMA] classification¹⁰) is demonstrated in Figure 1 and Table 1. Rural and remote area residents are over-represented (per capita) in most high-cost injuries¹¹ and fatality and injury rates tend to escalate with increased remoteness from metropolitan centres. Along with suicide, road crashes are one the main causes of these increased rates and the risk of death or injury from motor vehicle crashes increases with remoteness.¹²



Source: AIHW 1998

Figure 1: National fatality rates for motor vehicle crashes 1992-1996 by RRaMA category

Table 1: National fatality rates for motor vehicle crashes 1992-1996 using the RRaMA system

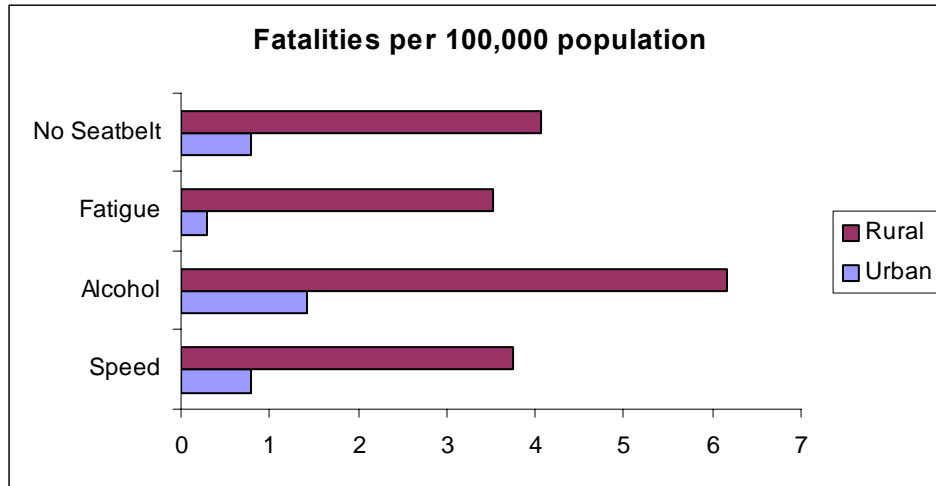
Sex	Metropolitan		Rural			Remote		Total
	Capital Cities	Other	Large Centres	Small Centres	Other	Centres	Other	
Males	13.0	15.5	*18.7	*18.5	*27.6	*31.4	*31.0	16.2
Females	5.5	6.2	6.2	7.8	*11.2	9.7	*15.0	6.6

*Significantly different from 'Capital Cities' at 5% level [Age-standardised to the Australian population at 30 June 1991]
Source: AIHW (1998, p.21) – Extracted from AIHW National Mortality Database

The crash rates ascribed to rural areas vary according to the rural indicator chosen, so it is difficult to accurately ascertain the comparative crash risk of rural and urban areas. However, the general consensus in the Australian literature is that the rural road crash injury rate is at least double that of urban road crashes.^{1,9} In Queensland for the year 2000, the per capita risks of dying, or being hospitalized, as a result of a rural road crash were 4.2 times and 2.3 times higher respectively than in an urban crash.¹³

Characteristics of rural road crashes

Rural and remote road crashes are: typically more severe, in terms of casualties; associated with higher social and financial costs; not decreasing at the same rate as urban crashes; and are spread over a wide area due to the vastness of rural road networks.⁹ Increased exposure through greater distances travelled and a lack of transport alternatives, coupled with higher speeds, poorer road quality, increased diversity in types of vehicles, lower seatbelt wearing rates, increased alcohol consumption, the presence of livestock/wildlife, and delays in emergency response and retrieval time inevitably contribute to the higher proportion of deaths occurring on country roads.⁹ The research project, outlined here, is particularly focused on the disproportionate involvement of behavioural factors (fatal four) in rural fatalities. (See Figure 2).¹⁴⁻¹⁶ Other issues which the literature indicates may have particular relevance to rural and remote Queensland include the age of the vehicular fleet, the over-representation of Indigenous persons, risk-taking by youth, and injury and rehabilitation.¹⁷⁻²⁴ An emerging issue is the role of fatigue which may be caused by both lack of adequate sleep and monotonous driving conditions.¹¹



Source: Travelsafe (2000)

Figure 2: Urban and rural fatalities by nature of crash – Queensland (2000)

Shortcomings of national approaches to rural and remote road safety

Despite rural populations being over-represented in road transport-related crashes both nationally and internationally, very few road safety policies and interventions have targeted rural and remote populations and problems.² As noted earlier, this is primarily due to the rural population being sparsely distributed and therefore not as readily amenable to some of the interventions used in urban areas.³ Additionally, the cost of conducting research in rural areas is substantially higher.

Australia's RRSAP marked the first national strategy to acknowledge that rural and remote road safety is different to urban road safety and thus requires a separate management approach.³ The United States is currently drafting guidelines for addressing rural and remote road safety based on the Australian plan but with an increased focus on trialing Intelligent Transport System (ITS) technologies.²⁵ For each action specified in the RRSAP, responsible and supporting government agencies were identified to ensure its implementation. Unfortunately, due to the cost barriers mentioned above, many of the initiatives were not guided by research or a sound understanding of the causal factors specific to rural crashes, nor implemented with the total involvement and commitment of regional stakeholders.

The RRSAP was a necessary national initiative to reduce a significant and growing component of the road toll involving crashes on rural roads. As a policy response, however, it was flawed in a number of ways. Firstly, it was created as a top down strategy. Secondly, it was developed exclusively of key rural road safety stakeholders. Thirdly, it failed to address the resource implications for government and non-government agencies nominated to undertake specific actions. And lastly its implementation was not monitored as originally intended (p.81).¹³

THE CURRENT STUDY

In response, the Centre for Accident Research and Road Safety – Queensland (CARRS-Q) at Queensland University of Technology and James Cook University have designed a **program of research to reduce the incidence and economic, medical and social costs of road crashes in Northern Queensland through the development and implementation of tailored road safety interventions**. Following a Community Cabinet meeting [14 October 2001] and several presentations to key government stakeholders, an interdepartmental funding consortium agreed to sponsor the five-year prospective program of research which comprises a nested methodology including: (i) a screening study; (ii) an in-depth injury study; (iii) a case-control study; (iv) focus groups; and (v) the development and delivery of rural interventions (Figure 3). Ethics approval has been obtained from James Cook University and Queensland University of Technology Human Ethics Committees and the Townsville Health District and Cairns Health District Ethics Committees.

[INSERT FIGURE 3 HERE]

AIMS

Although each phase of the study has a set of specific aims, the overall aims of the study are to:

- understand behavioural and social factors contributing to crash involvement in order to inform prevention strategies;
- develop and/or identify and trial targeted counter measures;
- study the experience, outcomes and costs of rehabilitation for patients admitted to hospital after a road crash.

METHOD

The study involves a series of discrete, but nested, data collections, most of which are running concurrently (Figure 3). The primary data collection is the screening study, which collects information on all road crashes in north Queensland that meet the study criteria during a 3 year period (mid-2003 – mid-2006). The in-depth injury and case-control studies relate to crashes identified in the screening study that meet additional criteria. The key aspects of each study are outlined below.

Screening study

Data collection for the screening study began in mid-2003 and will continue for three years. Based on previous north Queensland hospital data, it is estimated that approximately 700 people will die from, or present to the catchment hospitals [Cairns, Townsville, Charters Towers, Mt Isa, Mareeba, Atherton and Innisfail] with an injury sustained in a serious road crash in the three-year period. All persons presenting with road trauma at the catchment hospitals will be given a brief [informative] intervention addressing a local road safety problem and one or more of the ‘Fatal Four’ messages. The location of each fatality and

hospitalisation crash will be established to determine its eligibility for inclusion in the in-depth injury study. That is, any persons involved in a fatality or hospitalisation crash that occurred in the catchment area [but not in the major centres of Townsville or Cairns] will be included in the in-depth injury study. Crashes occurring in the Statistical Local Areas (SLAs) of Townsville City – Part A, Thuringowa City - Part A, and Cairns City - Part A will not be included in the subsequent studies. However, persons living in these areas but involved in crashes outside these jurisdictions are included. All fatality and hospitalisation crashes occurring in other smaller provincial towns are also included in the study.

In-depth injury study

Of the original 700 persons identified in the screening study, it is anticipated that approximately 400 persons will meet the eligibility criteria for inclusion in the in-depth injury study. Hospitalised persons recruited to the in-depth injury study will be asked questions regarding human factors [attitudes, intentions and behaviour], trip characteristics, knowledge and access to prevention information, their experience of the road environment, and the design and condition of the vehicle(s) involved. Information about fatal crashes will be obtained from Coroner's inquests. The knowledge gained about the circumstances of the crashes and the characteristics of the persons involved, coupled with clinical records, police incident records and emergency response information from QAS records, will inform the development and implementation of culturally-appropriate interventions which are likely to use education, enforcement [deterrence], engineering, ITS and other prevention strategies.

Case-control study

The next phase of the research uses a case-control design to compare the experiences of persons involved in crashes with other road users travelling on the same stretch of road one week later. The study area crashes are those occurring within approximately 100km of the catchment hospitals. It is estimated that 250 of the 400 participants in the in-depth injury study will have been involved in a crash within the study area. These 250 crashes [**cases**] will be matched to persons travelling one week later at approximately the same time, direction and location, who voluntarily agree to provide similar personal and trip information [**controls**]. As matching will be done by crash site and time [rather than demography or vehicle characteristics], the number of controls will be over-sampled by a factor of four ($n = 1000$) to increase statistical power.

Focus groups

Focus groups were conducted during late 2002 and early 2003 with rural and remote populations, Indigenous communities, and other high-risk groups [motorcyclists, truck/fleet drivers, mine workers] to identify: (i) individual and collective experiences and attitudes to road safety; (ii) similar and distinct issues/problems facing different populations; and (iii) opportunities for intervention. The focus group meetings were aimed at incorporating rural community knowledge, experience and beliefs into all aspects of the study, both to increase relevance to those most likely to be involved in and benefit from the study. In the first instance, these focus groups served to ensure that the instrument(s) used in the in-depth injury and case-control studies are both culturally-appropriate and to examine the diverse

range of behavioural, vehicular, environmental and post-crash factors contributing to rural road trauma. Secondly, the focus group data were used to prioritise intervention areas and identify problematic attitudes and behaviours requiring modification.

Rural road safety interventions

Localised rural road safety interventions [particularly targeting attitude and behaviour change] will be developed and implemented by mid-2005 based on knowledge generated to date. The overall goal of the program is to develop and deliver culturally-appropriate interventions grounded in research findings and examine their impact through the duration of the project with a view to sustainable solutions. It is in this phase of the study that community participation and involvement will be most pronounced. Also Community representatives, along with key stakeholder representatives will be equally and actively involved in the development of initiatives that are both based on the study's findings and delivered in community-relevant ways so as to maximize their impact.

Policy implications

At the completion of the five-year funding cycle, the project team will document the contribution of the research program to better understanding the causal factors underpinning rural road trauma and provide an evaluation of the interventions delivered in terms of tangible road safety outcomes. The primary goal is to reduce serious road-related casualties in the study area by 10 percent over the duration of the project. This stand-alone report will: (i) identify rural and remote road safety research and intervention priority areas; (ii) inform a revision of the *National Rural Road Safety Strategy*; and, most importantly, (iii) raise the profile of road safety among rural Australians.

STRATEGIES TO INCREASE COMMUNITY AWARENESS & PARTICIPATION

A number of strategies have been employed to both increase community awareness of the project and also to increase participation in the various phases. In the first instance, the focus group meetings ensured that issues relevant to north Queensland road users and communities were identified and addressed. Secondly, key stakeholders in north Queensland were invited to project planning meetings, again to ensure relevance and commitment ('ownership'). These stakeholders included Queensland Police Service, Queensland Ambulance Services, Queensland Transport, Main Roads Department, Queensland Rail, Mines Department, Queensland Health, Primary Industries, and Local Government. Six-monthly 'updates' are planned for the duration of the project with the twin purposes of providing information on the study's progress and seeking feedback on aspects of the project's method and effectiveness.

Community awareness has been raised by regular media coverage of aspects of the study, including item-specific coverage on local radio and television, and also in local newspapers. Community Service Announcements have been aired on local television and radio since the very beginning of the study. In addition, researchers from local sites have attended local activities (eg Rural Days and Rural Shows) to promote the study and provide information. To coincide with the beginning of the road-side (control) interviews, every

household in north Queensland (n = 170,000) was posted an introductory letter and information leaflet outlining the study and the importance of householders' participation in the study. Additional print and broadcast media coverage also occurred at this time.

RESULTS

The following information relates to data collected up to December 31st 2004. The information is necessarily descriptive at this stage, partly because of the numbers involved and partly because exhaustive analysis has not yet begun. It needs to be understood that the information reported here is dependent entirely on the data collected up to this point and that the final results and conclusions may vary from these.

Of the first 100 crashes, requiring hospitalisation of at least one person for at least 24 hours, 52 occurred in the Cairns region, 29 in the Mt Isa region, 12 in Townsville region and 7 on the Atherton Tableland. Eighty percent of crashes occurred on public roads, with the remaining 20 percent occurring on private property. A further 21 crashes resulted in 24 fatalities – 8 (9 fatalities) in Cairns, 8 (10) in Mt Isa and 5 (5) in Townsville regions respectively.

Nearly eighty percent of crashes involved a single vehicle, 16 percent involved two vehicles and 4 percent involved more than two vehicles. In one instance, a pedestrian was hit by a vehicle and hospitalised.

A total of 158 people were in the vehicles (ranging from 1 to seven). Table 2 sets out the location and road user type of the 100 crash interviews. Seventy-two of the interviewees were male.

Table 2: Hospital interviews by region and road user type

Road user type	Townsville	Cairns	Mt Isa	Atherton	Total
Driver/Rider	12	39	19	3	73
Passenger	1	11	8	4	24
Cyclist	0	1	0	0	2
Pedestrian	0	1	1	0	1
TOTAL	13	52	28	7	100

Table 3 sets out the age of interviewees by road user type. The numbers of drivers hospitalised as a result of crashes reduced with age. This pattern was not repeated for passengers.

Table 3: Age of interviewees by road user type

Age	Driver/Rider	Passenger	Cyclist	Pedestrian
16-24	19	6	0	0
25-34	19	7	0	0
35-44	12	2	0	0
45-54	10	1	1	0
55-64	10	5	1	0
65+	3	3	0	1
TOTAL	73	24	2	1

Sixteen drivers, eight passengers and the pedestrian indicated that they had been distracted immediately before the crash. A few of these participants indicated that they had been distracted for a considerable period (eg the entire trip). The sources of distraction included: people/objects/events outside the vehicle (n = 12); using vehicle features (n = 3); distraction within the vehicle (n = 5); inattention (n = 3); other cause (n = 2).

Seven drivers indicated that they were tired immediately before the crash. Three of these participants indicated that they had been tired for the entire trip. None believed that their tiredness had contributed to their crash.

Table 4 sets out the types of vehicle involved in the 100 crashes. Motorcycles accounted for 57 of the 89 responses.

Table 4: Type of vehicle involved in crash by road user type

Vehicle type	Driver/rider	Passenger
Sedan	6	5
Station wagon	1	0
4WD / Sports Utility Vehicle	8	6
Road Motorcycle	17	0
Off-road Motorcycle	20	0
Utility	11	7
Quad Bike	2	0
Van	2	2
Prime Mover	1	0
Campervan	0	1
TOTAL	68	21

Eighty-four participants were able to identify the age of the vehicle in which they had crashed. The majority of vehicles involved in crashes were relatively modern, with 38 less than 5 years old. Another 31 were less than 15 years old, while the remaining 15 were greater than 15 years old.

CONCLUSION

This study is unique in its approach and its all-of-government support. The study focuses on an issue of great importance and concern to rural communities throughout Australia. Road crashes have heavy social, economic and medical impacts on rural residents and their communities, particularly when local people are killed. The study involves a nested methodology aimed at maximizing the validity of the data obtained and the relevance of interventions developed therefrom.

The early data from the study suggests that crashes requiring hospitalisation occur disproportionately to population density, with Cairns and Mt Isa accounting for the majority of crashes and fatalities. This may reflect the more demanding driving conditions in those two areas. The disproportionately high fatality rate in Mt Isa is in line with other findings that fatality rates increase with remoteness. The decrease in numbers of participants with age is in line with other data that younger road users are at greater risk of crashing and injury. The apparently high number of males involved in crashes is open to speculation at this point. Setting aside the known higher risk-taking levels of males and that males outnumber females in rural and remote areas, we do not as yet have sufficient information from our roadside interviews to indicate whether males are higher rate road users and therefore more 'at risk' in this respect. The number of motorcyclists involved in crashes requiring hospitalisation would appear to be disproportionately high compared to their relative proportion of all vehicles, but in line with the expectation that hospitalisation is more likely to result from a motorcycle crash than a car crash.

It is anticipated that the study will: identify rural and remote road safety research and intervention priority areas; inform a revision of the *National Rural Road Safety Strategy*; and, most importantly, and raise the profile of road safety among rural Australians.

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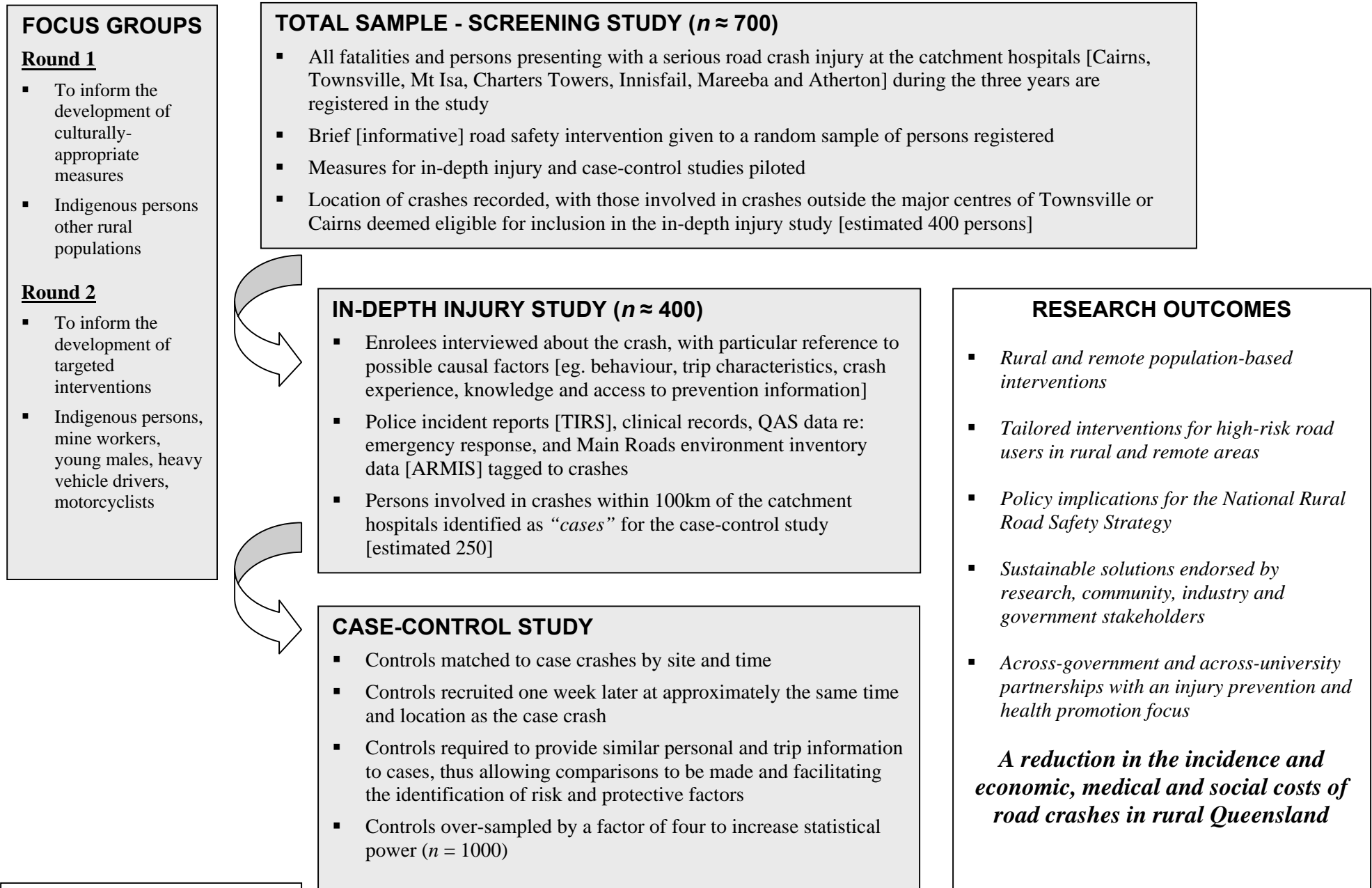


Figure 3: Program plan