

RURAL ROAD SAFETY –
OVERVIEW OF CRASH STATISTICS

by

Mark Symmons
Narelle Haworth
Ian Johnston

March, 2004

Report No. 212

MONASH UNIVERSITY ACCIDENT RESEARCH CENTRE
REPORT DOCUMENTATION PAGE

Report No.	Date	ISBN	Pages
212	March 2004	0 7326 1722 7	62+app

Title and sub-title:

Rural road safety – Overview of crash statistics

Author(s):

Mark Symmons, Narelle Haworth and Ian Johnston

Sponsoring Organisation(s):

Royal Automobile Club of Victoria (RACV) Ltd

Abstract:

This report was prepared to provide a basis for future policy and program development by RACV that specifically relates to rural roads and road users. The report provides a detailed overview of road trauma occurring on rural Victorian roads from 1 January 1997 to 31 December 2001.

The report provides a snapshot of the rural road trauma problem. Comparisons with road trauma in the metropolitan area have not been made and trends have not been presented. Estimation of crash and injury risks on a population or distance travelled basis was beyond the scope of this project.

Crashes in low speed zones, at intersections and involving multiple vehicles were common but less severe than other crashes. Crashes on curves, single vehicle crashes and pedestrian crashes were less common but more severe. More than a quarter of the crashes involved an impact with a roadside object, commonly a tree or a pole, and almost half of these crashes resulted in fatal or serious injury. Male drivers were over-involved in crashes and young drivers were over-involved in single vehicle crashes.

Both the patterns of crash types and crash severity differed substantially among rural cities, rural towns & other areas and remote areas, confirming the need to examine the issues in these areas separately.

Key Words:

Rural road safety, road trauma, crash, injury, fatality

Disclaimer

This report is disseminated in the interest of information exchange. The views expressed here are those of the authors, and not necessarily those of Monash University

Reproduction of this page is authorised

Monash University Accident Research Centre,
Building 70, Clayton Campus, Victoria, 3800, Australia.
Telephone: +61 3 9905 4371, Fax: +61 3 9905 4363

Preface

Project Manager / Team Leader:

Narelle Haworth

Research Team:

- Bruce Corben
- Ian Johnston
- Mark Symmons

Acknowledgements

This research was commissioned and funded by the Royal Automobile Club of Victoria (RACV) Limited.

The authors wish to express their appreciation of the guidance and insightful comments of Ann Harris and Peter Daly of RACV.

Bruce Corben of MUARC made valuable input to an earlier version of this report.

The crash data were kindly provided by VicRoads.

Contents

EXECUTIVE SUMMARY	XI
1.0 INTRODUCTION	1
1.1 AIM OF THE REPORT	1
1.2 SCOPE AND STRUCTURE OF THE REPORT	2
2.0 METHOD	3
2.1 TASK 1: PREPARATION OF CRASH DATA SET	3
2.2 TASK 2: CHARACTERISTICS OF RURAL CRASHES	3
2.3 TASK 3: CHARACTERISTICS OF ROAD USERS IN RURAL CRASHES.....	4
2.4 TASK 4: SUMMARY BY LOCAL GOVERNMENT AREA	6
3.0 CHARACTERISTICS OF RURAL CRASHES	7
3.1 OVERVIEW.....	7
3.2 CRASHES ON OPEN ROADS AND BUILT-UP AREAS	7
3.3 ROAD GEOMETRY	9
3.3.1 Intersections	9
3.3.2 Curves	10
3.4 CRASH TYPE.....	10
3.5 ROADSIDE HAZARDS.....	12
3.6 ROAD QUALITY	15
3.7 TEMPORAL CHARACTERISTICS	15
3.7.1 Day of week	15
3.7.2 Time of day	17
3.8 SUMMARY	17
3.8.1 Differences between types of rural areas	18
4.0 CHARACTERISTICS OF ROAD USERS IN RURAL CRASHES	19
4.1 OVERVIEW.....	19
4.2 TYPES OF ROAD USER IN CRASHES	21
4.3 AGE AND GENDER OF ROAD USERS IN CRASHES	22
4.3.1 Age.....	22
4.3.2 Gender.....	23
4.4 ALCOHOL IN CRASHES.....	25
4.4.1 BAC values	25
4.4.2 Persons in crashes in high- and low-alcohol hours	26
4.5 DRIVER RESIDENCE AND CRASH LOCATION.....	26
4.5.1 Local versus non-local drivers	27
4.5.2 Country versus city drivers	27
4.6 USE OF SEATBELTS	28
4.6.1 Drivers.....	28
4.6.2 Passengers	28
4.7 USE OF MOTORCYCLE HELMETS	28

4.8 SUMMARY	28
4.8.1 Differences between types of rural areas	29
4.8.2 Alcohol in crashes	29
4.8.3 Local and non-local drivers.....	30
5.0 SUMMARY OF CRASH STATISTICS BY LOCAL GOVERNMENT AREA	31
6.0 SUMMARY AND CONCLUSIONS.....	39
REFERENCES	42
APPENDIX 1: CHAPTER 3 DATA TABLES.....	43
APPENDIX 2: CHAPTER 4 DATA TABLES.....	55

Tables

TABLE 3.1	NUMBER OF CASUALTY CRASHES AT EACH LEVEL OF SEVERITY IN EACH RURAL LOCAL GOVERNMENT AREA IN VICTORIA. 1997-2001.....	8
TABLE 4.1	NUMBER OF ROAD USERS INVOLVED IN CASUALTY CRASHES AT EACH LEVEL OF INJURY SEVERITY IN EACH RURAL LOCAL GOVERNMENT AREA IN VICTORIA. 1997-2001.....	20
TABLE 4.2	NUMBERS OF EACH TYPE OF ROAD USER WHO WERE INJURED OR NOT INJURED IN CASUALTY CRASHES. VICTORIA 1997-2001.	21
TABLE 5.1	THE NUMBERS OF CRASHES AND NUMBERS OF PERSONS INJURED AND THE NUMBERS OF DRIVERS, MOTORCYCLISTS AND PILLIONS, PEDESTRIANS AND BICYCLISTS INJURED AT EACH LEVEL OF SEVERITY IN EACH RURAL LOCAL GOVERNMENT AREA. VICTORIA 1997-2001.....	32
TABLE 5.2	THE NUMBERS OF CRASHES THAT WERE MULTI VEHICLE, SINGLE VEHICLE (NO PEDESTRIAN), INVOLVED IMPACTS WITH POLES OR TREES, AND THE NUMBER OF CRASHES THAT OCCURRED IN LOW AND HIGH ALCOHOL HOURS IN EACH RURAL LOCAL GOVERNMENT AREA. VICTORIA 1997-2001.	34
TABLE 5.3	THE NUMBER OF YOUNG (UNDER 25) AND OLDER (60+) DRIVERS AND THE NUMBER OF RURAL AND METROPOLITAN DRIVERS IN EACH RURAL LOCAL GOVERNMENT AREA. VICTORIA 1997-2001.....	36
TABLE A3.1	NUMBER OF CASUALTY CRASHES AT EACH LEVEL OF SEVERITY IN EACH AREA OF RURAL VICTORIA. 1997-2001.	43
TABLE A3.2	NUMBER OF CASUALTY CRASHES ACCORDING TO SPEED ZONE IN EACH AREA OF RURAL VICTORIA. 1997-2001.	43
TABLE A3.3	NUMBER OF CASUALTY CRASHES IN LOW (60 KM/H OR LESS), MEDIUM (70-90 KM/H) AND HIGH (100, 110 KM/H) SPEED ZONES IN EACH AREA OF RURAL VICTORIA. 1997-2001.	43
TABLE A3.4	NUMBER OF FATAL, SERIOUS INJURY AND OTHER INJURY CRASHES IN LOW (60 KM/H OR LESS), MEDIUM (70-90 KM/H) AND HIGH (100, 110 KM/H) SPEED ZONES IN RURAL CITIES AND RURAL & REMOTE AREAS OF VICTORIA. 1997-2001.	44
TABLE A3.5	NUMBER OF FATAL, SERIOUS INJURY AND OTHER INJURY CRASHES AT INTERSECTION OR NOT IN RURAL CITIES OR RURAL & REMOTE AREAS OF VICTORIA. 1997-2001.	45
TABLE A3.6	NUMBER OF FATAL, SERIOUS INJURY AND OTHER INJURY CRASHES ON STRAIGHT AND CURVED SECTIONS OF ROAD IN RURAL CITIES AND RURAL AND REMOTE AREAS OF VICTORIA. 1997 TO 2001.	45
TABLE A3.7	NUMBER OF FATAL, SERIOUS INJURY AND OTHER INJURY CRASHES ON STRAIGHT AND CURVED SECTIONS OF ROAD NOT AT INTERSECTIONS IN RURAL CITIES AND RURAL AND REMOTE AREAS OF VICTORIA. 1997 TO 2001.....	46
TABLE A3.8	NUMBER OF MULTI VEHICLE, SINGLE VEHICLE (WITH PEDESTRIAN) AND SINGLE VEHICLE (NO PEDESTRIAN) CASUALTY CRASHES IN EACH TYPE OF RURAL AREA. VICTORIA 1997-2001.....	46
TABLE A3.9	NUMBER OF FATAL, SERIOUS INJURY AND OTHER INJURY MULTI VEHICLE, SINGLE VEHICLE (WITH PEDESTRIAN) AND SINGLE VEHICLE (NO PEDESTRIAN) CRASHES IN RURAL CITIES AND IN RURAL & REMOTE AREAS OF VICTORIA. 1997-2001.	47
TABLE A3.10	NUMBERS OF CASUALTY CRASHES OF EACH DCA GROUP IN EACH TYPE OF RURAL AREA. VICTORIA 1997-2001.	48
TABLE A3.11	NUMBER OF CASUALTY CRASHES INVOLVING IMPACTS WITH ROADSIDE OBJECTS IN EACH TYPE OF RURAL AREA OF VICTORIA. 1997-2001.....	49
TABLE A3.12	NUMBER OF FATAL, SERIOUS INJURY AND OTHER INJURY CRASHES INVOLVING IMPACTS WITH POLES, TREES, FENCE-WALLS AND EMBANKMENTS IN RURAL CITIES AND RURAL AND REMOTE AREAS OF VICTORIA. 1997-2001.	50
TABLE A3.13	NUMBER OF CASUALTY CRASHES IN 100 AND 110 KM/H SPEED ZONES ON DIVIDED ROADS AND ROADS NOT CODED AS DIVIDED IN EACH TYPE OF RURAL AREA OF VICTORIA. 1997-2001.	51
TABLE A3.14	NUMBER OF FATAL, SERIOUS INJURY AND OTHER INJURY CRASHES IN 100 AND 110 KM/H SPEED ZONES ON DIVIDED ROADS AND ROADS NOT CODED AS DIVIDED IN RURAL CITIES AND RURAL AND REMOTE AREAS OF VICTORIA. 1997-2001.	51
TABLE A3.15	NUMBER OF MULTI-VEHICLE, SINGLE VEHICLE PEDESTRIAN AND SINGLE VEHICLE WITHOUT PEDESTRIAN CASUALTY CRASHES IN 100 AND 110 KM/H SPEED ZONES ON DIVIDED ROADS AND ROADS NOT CODED AS DIVIDED IN RURAL VICTORIA. 1997 TO 2001.	51
TABLE A3.16	NUMBER OF MULTI-VEHICLE, SINGLE VEHICLE PEDESTRIAN AND SINGLE VEHICLE WITHOUT PEDESTRIAN CASUALTY CRASHES OF EACH LEVEL OF SEVERITY IN 100 AND 110 KM/H SPEED ZONES ON DIVIDED ROADS AND ROADS NOT CODED AS DIVIDED IN RURAL VICTORIA. 1997 TO 2001.	52
TABLE A3.17	NUMBER OF CRASHES ON EACH DAY OF THE WEEK IN EACH TYPE OF RURAL AREA. VICTORIA 1997-2001.....	52

TABLE A3.18 NUMBER OF FATAL, SERIOUS INJURY AND OTHER INJURY CRASHES IN RURAL VICTORIA ON WEEKENDS AND WEEKDAYS.	53
TABLE A3.19 NUMBER OF FATAL, SERIOUS INJURY AND OTHER INJURY CRASHES ON WEEKENDS AND WEEKDAYS IN RURAL CITIES AND IN RURAL & REMOTE AREAS OF VICTORIA. 1997-2001.....	53
TABLE A3.20 NUMBER OF FATAL, SERIOUS INJURY AND OTHER INJURY DAYTIME (6AM-6PM) AND NIGHT-TIME (6PM-6AM) CASUALTY CRASHES IN RURAL CITIES AND RURAL AND REMOTE AREAS OF VICTORIA. 1997-2001.....	54
TABLE A4.1 NUMBER OF ROAD USERS INVOLVED IN CRASHES AT EACH LEVEL OF INJURY SEVERITY IN EACH AREA OF RURAL VICTORIA. 1997-2001.....	55
TABLE A4.2 NUMBER OF EACH TYPE OF ROAD USER INVOLVED IN CASUALTY CRASHES IN EACH TYPE OF RURAL AREA. VICTORIA 1997-2001.	55
TABLE A4.3 NUMBER OF EACH TYPE OF ROAD USER INVOLVED IN CASUALTY CRASHES AT EACH LEVEL OF INJURY SEVERITY IN EACH TYPE OF RURAL AREA. VICTORIA 1997-2001.....	56
TABLE A4.4 NUMBER OF CAR, ARTICULATED TRUCK AND RIGID TRUCK DRIVERS INVOLVED IN CASUALTY CRASHES AT EACH LEVEL OF INJURY SEVERITY IN EACH TYPE OF RURAL AREA. VICTORIA 1997-2001.....	58
TABLE A4.5 NUMBER OF ROAD USERS IN EACH AGE GROUP INVOLVED IN CASUALTY CRASHES IN EACH TYPE OF RURAL AREA. VICTORIA 1997-2001.....	59
TABLE A4.6 NUMBERS OF PEDESTRIANS, DRIVERS, PASSENGERS, MOTORCYCLISTS AND BICYCLISTS INVOLVED IN CASUALTY CRASHES IN RURAL VICTORIA. 1997-2001.	59
TABLE A4.7 NUMBERS OF MALE AND FEMALE ROAD USERS INVOLVED IN CASUALTY CRASHES AT EACH LEVEL OF INJURY SEVERITY IN RURAL CITIES AND RURAL & REMOTE AREAS OF VICTORIA. 1997-2001.	60
TABLE A4.8 NUMBERS OF MALE AND FEMALE PEDESTRIANS, DRIVERS, PASSENGERS, MOTORCYCLISTS AND BICYCLISTS INVOLVED IN CASUALTY CRASHES IN RURAL VICTORIA. 1997-2001.	60
TABLE A4.9 BLOOD ALCOHOL CONCENTRATION OF DRIVERS IN CRASHES AT EACH LEVEL OF INJURY SEVERITY IN RURAL CITIES AND RURAL & REMOTE AREAS OF VICTORIA. 1997-1999.	61
TABLE A4.10 BLOOD ALCOHOL CONCENTRATION OF MOTORCYCLE RIDERS IN CRASHES AT EACH LEVEL OF INJURY SEVERITY IN RURAL CITIES AND RURAL & REMOTE AREAS OF VICTORIA. 1997-1999.	62
TABLE A4.11 BLOOD ALCOHOL CONCENTRATION OF PEDESTRIANS IN CRASHES AT EACH LEVEL OF INJURY SEVERITY IN RURAL CITIES AND RURAL & REMOTE AREAS OF VICTORIA. 1997-1999.	63
TABLE A4.12 NUMBER OF DRIVERS IN CRASHES IN HIGH AND LOW ALCOHOL HOURS IN EACH TYPE OF RURAL AREA. VICTORIA 1997-2001.	63
TABLE A4.13 NUMBER OF MOTORCYCLE RIDERS IN CRASHES IN HIGH AND LOW ALCOHOL HOURS IN EACH TYPE OF RURAL AREA. VICTORIA 1997-2001.....	63
TABLE A4.14 NUMBER OF PEDESTRIANS IN CRASHES IN HIGH AND LOW ALCOHOL HOURS IN EACH TYPE OF RURAL AREA. VICTORIA 1997-2001.....	64
TABLE A4.15 NUMBER OF DRIVERS IN CASUALTY CRASHES IN EACH TYPE OF RURAL AREA WHERE POSTCODE OF RESIDENCE AND POSTCODE OF CRASH MATCHED OR DID NOT MATCH. VICTORIA 1997-2001.....	64
TABLE A4.16 NUMBER OF DRIVERS IN CASUALTY CRASHES IN EACH TYPE OF RURAL AREA ACCORDING TO POSTCODE OF RESIDENCE. VICTORIA 1997-2001.....	64
TABLE A4.17 NUMBER OF DRIVERS IN CASUALTY CRASHES IN EACH TYPE OF RURAL AREA ACCORDING TO SEATBELT USE. VICTORIA 1997-2001.	65
TABLE A4.18 NUMBER OF FATALLY INJURED DRIVERS IN CASUALTY CRASHES IN EACH TYPE OF RURAL AREA ACCORDING TO SEATBELT USE. VICTORIA 1997-2001.....	65
TABLE A4.19 NUMBER OF PASSENGERS IN CASUALTY CRASHES IN EACH TYPE OF RURAL AREA ACCORDING TO SEATBELT USE. VICTORIA 1997-2001.	65
TABLE A4.20 NUMBER OF FATALLY INJURED PASSENGERS IN EACH TYPE OF RURAL AREA ACCORDING TO SEATBELT USE. VICTORIA 1997-2001.	66
TABLE A4.21 NUMBER OF MOTORCYCLE RIDERS WEARING HELMETS IN CASUALTY CRASHES IN RURAL CITIES AND RURAL & REMOTE AREAS OF VICTORIA. 1997-2001.....	66
TABLE A4.22 NUMBER OF MOTORCYCLE RIDERS WEARING HELMETS IN CRASHES OF EACH LEVEL OF INJURY SEVERITY IN RURAL CITIES AND RURAL & REMOTE AREAS OF VICTORIA. 1997-2001.....	67
TABLE A4.23 NUMBER OF MALE AND FEMALE DRIVERS IN MULTI VEHICLE, SINGLE VEHICLE (WITH PEDESTRIAN) AND SINGLE VEHICLE (NO PEDESTRIAN) CRASHES IN RURAL VICTORIA 1997-2001.....	67
TABLE A4.24 AGE GROUP OF DRIVERS IN MULTI VEHICLE, SINGLE VEHICLE (WITH PEDESTRIAN) AND SINGLE VEHICLE (NO PEDESTRIAN) CRASHES IN RURAL VICTORIA 1997-2001.	68
TABLE A4.25 DRIVERS' BAC IN MULTI VEHICLE, SINGLE VEHICLE (WITH PEDESTRIAN) AND SINGLE VEHICLE (NO PEDESTRIAN) CRASHES IN RURAL VICTORIA 1997-2001.....	68
TABLE A4.26 DRIVERS' BAC AS A FUNCTION OF GENDER IN MULTI VEHICLE, SINGLE VEHICLE (WITH PEDESTRIAN) AND SINGLE VEHICLE (NO PEDESTRIAN) CRASHES IN RURAL VICTORIA 1997-2001.....	68

TABLE A4.27 DRIVERS IN MULTI VEHICLE, SINGLE VEHICLE (WITH PEDESTRIAN) AND SINGLE VEHICLE (NO PEDESTRIAN) CRASHES AS A FUNCTION OF GENDER IN RURAL CITIES AND RURAL & REMOTE AREAS OF VICTORIA 1997-2001.....	69
TABLE A4.28 DRIVERS IN MULTI VEHICLE, SINGLE VEHICLE (WITH PEDESTRIAN) AND SINGLE VEHICLE (NO PEDESTRIAN) CRASHES AS A FUNCTION OF AGE GROUP IN RURAL CITIES AND RURAL & REMOTE AREAS OF VICTORIA 1997-2001.	69
TABLE A4.29 NUMBER OF FEMALE AND MALE DRIVERS ACCORDING TO RECORDED BAC LEVEL IN RURAL CITIES AND RURAL & REMOTE AREAS OF VICTORIA 1997-2001.....	70
TABLE A4.30 DRIVERS' BAC ACCORDING TO WHETHER IT WAS A MULTI VEHICLE, SINGLE VEHICLE (WITH PEDESTRIAN) OR SINGLE VEHICLE (NO PEDESTRIAN) CRASH IN RURAL CITIES AND RURAL & REMOTE AREAS OF VICTORIA 1997-2001.....	70

Figures

FIGURE 1.1 NUMBER OF SERIOUS CASUALTY (FATAL AND SERIOUS INJURY) CRASHES AND OTHER INJURY CRASHES IN RURAL AND METROPOLITAN VICTORIA. 1997-2001.	1
FIGURE 3.1 NUMBER OF CASUALTY CRASHES IN LOW (60 KM/H OR LESS), MEDIUM (70-90 KM/H) AND HIGH (100, 110 KM/H) SPEED ZONES IN EACH AREA OF RURAL VICTORIA. 1997-2001.	9
FIGURE 3.2 NUMBER OF FATAL, SERIOUS INJURY AND OTHER INJURY CRASHES AT INTERSECTION OR NOT IN RURAL CITIES OR RURAL & REMOTE AREAS OF VICTORIA. 1997-2001.	10
FIGURE 3.3 NUMBER OF FATAL, SERIOUS INJURY AND OTHER INJURY CRASHES ON STRAIGHT AND CURVED SECTIONS OF ROAD IN RURAL VICTORIA. 1997 TO 2001.	11
FIGURE 3.4 NUMBERS OF MULTI VEHICLE, SINGLE VEHICLE (WITH PEDESTRIAN) AND SINGLE VEHICLE (NO PEDESTRIAN) CASUALTY CRASHES IN EACH TYPE OF RURAL AREA. VICTORIA 1997-2001.....	11
FIGURE 3.5 NUMBER OF FATAL, SERIOUS INJURY AND OTHER INJURY MULTI VEHICLE, SINGLE VEHICLE (WITH PEDESTRIAN) AND SINGLE VEHICLE (NO PEDESTRIAN) CRASHES IN RURAL VICTORIA. 1997-2001. ...	13
FIGURE 3.6 NUMBERS OF CASUALTY CRASHES OF EACH DCA GROUP IN EACH TYPE OF RURAL AREA. VICTORIA 1997-2001.	13
FIGURE 3.7 NUMBER OF CASUALTY CRASHES INVOLVING IMPACTS WITH ROADSIDE OBJECTS IN RURAL VICTORIA. 1997-2001.	14
FIGURE 3.8 NUMBER OF FATAL, SERIOUS INJURY AND OTHER INJURY CRASHES INVOLVING IMPACTS WITH POLES, TREES, FENCE-WALLS AND EMBANKMENTS IN RURAL VICTORIA. 1997-2001.	14
FIGURE 3.9 NUMBER OF MULTI-VEHICLE, SINGLE VEHICLE PEDESTRIAN AND SINGLE VEHICLE WITHOUT PEDESTRIAN CASUALTY CRASHES IN 100 AND 110 KM/H SPEED ZONES ON DIVIDED ROADS AND ROADS NOT CODED AS DIVIDED IN RURAL VICTORIA. 1997 TO 2001.	16
FIGURE 3.10 NUMBER OF CRASHES ON EACH DAY OF THE WEEK IN EACH TYPE OF RURAL AREA. VICTORIA 1997-2001.	16
FIGURE 4.1 NUMBER OF ROAD USERS INVOLVED IN CRASHES AT EACH LEVEL OF INJURY SEVERITY IN EACH AREA OF RURAL VICTORIA. 1997-2001.	19
FIGURE 4.2 NUMBER OF EACH TYPE OF ROAD USER INVOLVED IN CASUALTY CRASHES AT EACH LEVEL OF INJURY SEVERITY IN RURAL VICTORIA 1997-2001.....	22
FIGURE 4.3 NUMBER OF ROAD USERS IN EACH AGE GROUP INVOLVED IN CASUALTY CRASHES IN EACH TYPE OF RURAL AREA. VICTORIA 1997-2001.	23
FIGURE 4.4 NUMBER OF ROAD USERS IN EACH AGE GROUP INVOLVED IN CASUALTY CRASHES IN RURAL VICTORIA 1997-2001.	24
FIGURE 4.5 NUMBERS OF MALE AND FEMALE ROAD USERS INVOLVED IN CASUALTY CRASHES AT EACH LEVEL OF INJURY SEVERITY IN RURAL VICTORIA. 1997-2001.	24
FIGURE 4.6 NUMBERS OF MALE AND FEMALE PEDESTRIANS, DRIVERS, PASSENGERS, MOTORCYCLISTS AND BICYCLISTS INVOLVED IN CASUALTY CRASHES IN RURAL VICTORIA. 1997-2001.	25
FIGURE 4.7 NUMBER OF DRIVERS IN CASUALTY CRASHES IN EACH TYPE OF RURAL AREA ACCORDING TO POSTCODE OF RESIDENCE. VICTORIA 1997-2001.....	27

EXECUTIVE SUMMARY

The aim of this report was to provide a basis for future policy and program development by RACV that specifically relates to rural roads and road users. The report provides a detailed overview of road trauma occurring on rural Victorian roads from 1 January 1997 to 31 December 2001. Comparisons with road trauma in the metropolitan area have not been made and trends have not been presented. Estimation of crash and injury risks on a population or distance travelled basis was beyond the scope of this project.

CHARACTERISTICS OF RURAL CRASHES

More than 40% of casualty crashes in rural Victoria occurred in low speed zones (60 km/h or less) and these crashes may be similar to those occurring in metropolitan areas. However, crash severity was higher in higher speed zones.

Over a third of crashes occurred at intersections but these crashes were less severe, on average. In contrast, crashes on curves made about one-fifth of crashes in rural Victoria but were more severe than crashes on straight sections of road.

Half of the crashes involved more than one vehicle but these crashes were less severe, on average. Single vehicle crashes (not involving a pedestrian) comprised 44% of crashes and pedestrian crashes comprised 6% of crashes.

More than a quarter of the crashes involved an impact with a roadside object, most commonly a tree or a pole. More than half of the crashes with trees and 45% of crashes with poles resulted in fatal or serious injury.

Crashes on divided and undivided (not coded as divided) 100 and 110 km/h sections of road were compared to provide a measure of the effect of road standard on crashes. About 90% of crashes occurred on undivided roads, and these crashes were more likely to result in fatal or serious injury. Surprisingly, divided roads had relatively more multi vehicle crashes than undivided roads which may reflect greater traffic volumes on divided roads, rather than a greater risk of single vehicle crashes on these roads.

Somewhat more crashes occurred on weekend days than weekdays and weekend crashes were more severe. About a quarter of crashes occurred at night (6pm to 6am) but these were more severe than daytime crashes. The most severe crashes were those occurring on weekend nights.

Given the different mix of speed zones across rural areas, the characteristics of crashes in rural cities, rural towns and other areas and remote areas were compared. The comparisons were influenced by the likelihood that less severe crashes may have been less likely to be reported in rural towns and other areas and (particularly) remote areas.

Crashes in rural cities were more likely to involve:

- Low (60 km/h or less) speed zones
- Intersections
- Pedestrians
- Multiple vehicle crashes

Crashes in remote areas were more likely to involve:

- Impacts with roadside objects (particularly trees)
- Night-time (6pm-6am) crashes

Crashes in rural towns & other areas were more likely than crashes in remote areas or rural cities to involve:

- Curves
- Crashes on weekends

CHARACTERISTICS OF ROAD USERS IN RURAL CRASHES

Drivers and passengers comprised the largest numbers of road users in crashes in rural Victoria in 1997-2001 but pedestrians, bicyclists and motorcyclists were more severely injured, on average. The severity of injury was generally higher in rural & remote areas compared with rural cities.

Under 25 year olds comprised the largest group of road users involved in crashes and many of these were passengers. The largest group of drivers in crashes were those aged 25 to 39. The proportion of crashes that were single vehicle crashes (not involving a pedestrian) was greatest for drivers aged under 25 and decreased with driver age. Conversely, involvement in multi vehicle crashes increased with age.

More males than females were involved in crashes in rural Victoria and males were more severely injured, on average, than females. There were more males than females for all road user groups except passengers.

Given the different mix of speed zones across rural areas, the characteristics of road users in crashes in rural cities, rural towns and other areas and remote areas were compared. The comparisons were influenced by the likelihood that less severe crashes may have been less likely to be reported in rural towns and other areas and (particularly) remote areas.

Road users in crashes in rural cities were more likely to be:

- Pedestrians
- Females
- Pedestrians or bicyclists

Road users in crashes in remote areas were more likely to be:

- Persons aged 60 and over
- Not wearing a seatbelt

Road users in crashes in rural cities were **less** likely than road users in other rural areas to be passengers or motorcyclists.

Road users in crashes in remote areas were **less** likely than road users in other rural areas to be aged under 25.

Information about Blood Alcohol Concentration (BAC) was poorly recorded, with the majority of values for non-fatally injured drivers and riders being missing. Overall, 22%

of fatally injured drivers had a BAC of 0.05 or greater, for fatally injured riders the figure was 10%, and 33% of fatally injured pedestrians had a BAC of 0.05 or higher. In each case there seemed to be little difference in alcohol involvement between rural cities and rural & remote areas.

In an alternative approach to examining the role of alcohol in crashes, crashes in high and low alcohol hours were compared. The percentage of crashes that occurred in high alcohol hours was higher for pedestrians (44%), than drivers (38%) and motorcycle riders (38%). For drivers, the percentage of crashes that occurred in high alcohol hours was lowest in rural cities, intermediate in rural towns & other areas and highest in remote areas. For motorcycle riders and pedestrians, the data showed the same pattern but the differences were not statistically significant. These findings suggest that alcohol involvement in crashes is potentially more of a problem in remote areas. Alternatively, some of this pattern may reflect the overlap of high alcohol hours with those hours in which fatigue-related crashes (or collisions with animals) are more likely.

More than one-third of drivers lived in the same postcode as the crash occurred and over 75% of drivers lived in rural Victoria. Only 14% of drivers lived in the Victorian metropolitan area. Drivers in crashes in rural cities were more likely to be country drivers than were drivers in crashes in other rural areas. Drivers in crashes in remote areas were more likely to have non-Victorian postcodes than drivers in crashes in other rural areas. This may reflect that the remote areas were relatively close to the New South Wales and South Australian borders.

1.0 INTRODUCTION

While most fatal and serious injury crashes occur in the metropolitan area, crashes in rural and remote areas are, on average, more severe than those in the metropolitan area (see Figure 1.1). Fatal and serious injury rates per head of population are substantially greater in rural Victoria than in metropolitan Melbourne.

A range of research studies has suggested that improvements in road safety in Victoria have been greater in the metropolitan area than in rural areas. Analyses conducted by MUARC for the Victorian Parliamentary Committee on Road Safety proposed *Inquiry into the road toll in Victoria between 1988 and 2001* found that, when corrected for shifts in population, the increase in the number of serious casualties in 2001 occurred predominantly in rural Victoria.

RACV commissioned MUARC to prepare an overview of crash statistics that will assist them in developing future policies and programs to improve road safety on rural Victorian roads.

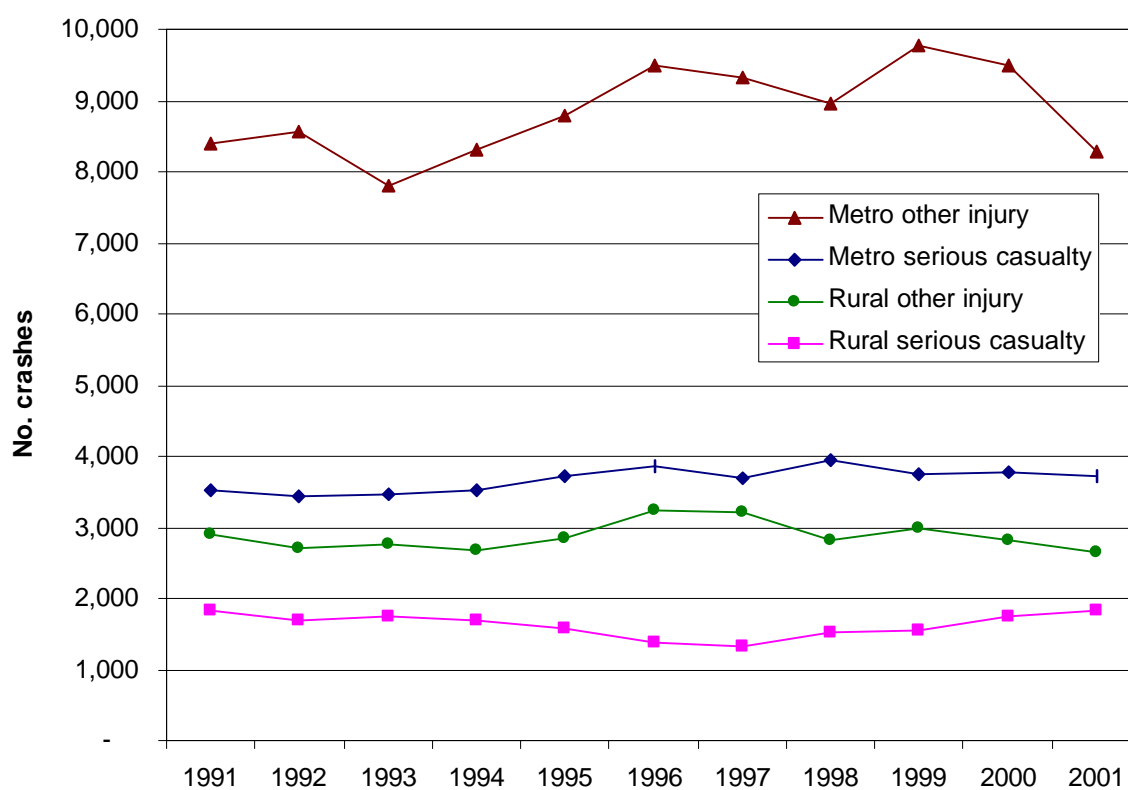


Figure 1.1 Number of serious casualty (fatal and serious injury) crashes and other injury crashes in rural and metropolitan Victoria. 1997-2001.

1.1 AIM OF THE REPORT

The aim of the report is to provide a basis for future policy and program development by RACV that specifically relates to rural roads and road users. The report provides a detailed overview of road trauma occurring on rural Victorian roads.

1.2 SCOPE AND STRUCTURE OF THE REPORT

The report provides a snapshot of the rural road trauma problem. Comparisons with road trauma in the metropolitan area have not been made and trends have not been presented. Estimation of crash and injury risks on a population or distance travelled basis was beyond the scope of this project.

Chapter 2 describes the methods used for each of the Tasks undertaken. The characteristics of crashes in rural Victoria are described in Chapter 3 and the characteristics of the road users involved are outlined in Chapter 4. A summary of the crashes in each Local Government Area is provided in Chapter 5. Detailed data are provided in tables in the Appendices.

2.0 METHOD

The research comprised several tasks:

Task 1: Preparation of data set

Task 2: Analysis of characteristics of rural crashes

Task 3: Analysis of characteristics of road users in rural crashes

Task 4: Preparation of summary of crash statistics by Local Government Area

The methods used for these tasks are described in more detail below.

2.1 TASK 1: PREPARATION OF CRASH DATA SET

The crash data was extracted from the Victorian State Traffic Accident Record database provided to MUARC by VicRoads. This database holds information relating to police-reported crashes in Victoria that resulted in a casualty (i.e. fatal, serious or minor injury). Data for the five-year period from 1 January 1997 to 31 December 2001 were analysed, because calendar year data are likely to be more easily understood when used for advocacy purposes. Final data for 2002 was not available during the term of this project.

The operational definitions of “rural” and categories of rural areas were developed in consultation with RACV. It was agreed that rural Victoria would be defined as those Local Government Areas that are classified as non-metropolitan by the Municipal Association of Victoria. Given that some of these municipalities contain large cities (e.g. Geelong), rural Victoria was divided into three types of area:

- Rural cities (Ballarat, Bendigo, Geelong, Shepparton and Wodonga)
- Remote areas (Buloke, Hindmarsh, West Wimmera and Yarriambiack)
- Rural towns & other areas (the remaining rural municipalities)

It should be noted that each of the types of area listed above comprises a mix of different speed zones and road types, and the mix is likely to differ among the three types of area. For example, there are relatively more high speed open roads in remote areas than in rural cities.

The remote areas were chosen based on categories of rural and remote areas that have been developed and used widely in the public health and road safety domains. These could not be directly used, however, since most of these definitions relate to the Statistical Local Areas (SLA) used by the Australian Bureau of Statistics, rather than Local Government Areas (LGA) as recorded in the crash data (although SLAs are usually subsets of LGAs).

After discussions with RACV, both crash-based and person-based versions of the crash data file were created.

2.2 TASK 2: CHARACTERISTICS OF RURAL CRASHES

This component of the project focuses on the characteristics of crashes occurring in rural areas and therefore involves crash-based analyses of the data file.

RACV has expressed interest in comparing crashes by road classification (M, A, B or C roads). Unfortunately, this classification is not available in the crash data. The “road type” variable in the database has 116 categories (e.g. av, ave, avenue, bvd etc), of which highway and freeway comprise only a small proportion. In addition, while all freeways would be expected to be M-roads, highways may be A or B roads, thus complicating the analysis. While comparing the safety of M, A, B and C roads is of interest, it would require considerable work (probably using GIS) that is outside the timeline of this project.

As an alternative, crashes on 100 and 110 km/h sections of road were grouped into those on divided roads and those on undivided roads. This demonstrates some of the effects of duplicating carriageways, which is arguably the major difference between M and A roads.

There is relatively little information about road characteristics in the crash database. The crash data variables that were analysed include:

- Crash severity
- Crash location (LGA, type of rural area as defined in Task 1)
- Speed zone
- Intersection/non-intersection
- Road alignment (straight, curve)
- Divided/undivided carriageway
- Number of vehicles in crash
- Involvement of roadside hazards
- Temporal characteristics

2.3 TASK 3: CHARACTERISTICS OF ROAD USERS IN RURAL CRASHES

RACV requested a number of analyses of the characteristics of road users in rural crashes. These included information on the types of road user involved in crashes (e.g. drivers, pedestrians), their age and gender, road user behaviour factors likely to have contributed to crashes, whether drivers were local residents or not, and the presence of passengers in crashes.

Type of road user was analysed using a combination of the crash database variables “road user type” and “vehicle type” to distinguish car drivers from truck drivers, etc. In addition, passengers, pedestrians, bicyclists and motorcyclists were identified.

The number of passengers in crashes was analysed, but the results represent an underestimate, as uninjured passengers are often not recorded in the crash database.

The crash database limits the investigation of the involvement of alcohol, drugs and speed in crashes. There are no variables that allow the involvement of drugs and speed to be directly identified. While proxy definitions of speed-related crashes have been developed, they are more appropriate for trend analyses than estimation of the size of the problem and they may not be appropriate for use with rural crashes.

There is a variable entitled BAC in the crash database, but past analyses have shown that this information is missing for about half of the drivers, and that the extent of missing data

is much greater for less severe crashes. Unfortunately, the pattern of missing data is highly non-random, making interpretation of these data very difficult.

For these reasons, the analysis of BAC was supplemented by the comparison of crashes in High and Low Alcohol Hours, an alternative approach that has been used widely by MUARC in trend and evaluation studies. These are times of the week when the percentage of drivers with illegal alcohol levels is relatively high and relatively low respectively. While this approach does not provide a measure of the extent of alcohol involvement in crashes, it does provide a picture of the types of crash and road user that are more likely to be involved in alcohol-related crashes.

There is considerable community interest in whether drivers in rural crashes are local people or city people driving through. In addition to issues of ownership of rural road trauma, fatigue or unfamiliarity with local conditions could contribute to crashes involving non-local residents.

There is a number of possible methods of identifying whether crashed drivers are local or non-local residents from the crash database. Postcode and LGA are recorded for the crash location, but only postcode for the residence of the person. Thus, using a simple definition, local drivers were defined as drivers whose postcode of residence is the same as the postcode of the crash location (and non-local drivers would have different crash and residential postcodes). This simple definition may be too strict, however, and many drivers defined as “non-local” may live in rural areas not far from the crash location.

A broader definition of local/non-local drivers was also used that involved classifying postcodes into metropolitan Victoria, rural Victoria and interstate. Australia Post has developed such a classification and it has been used in earlier MUARC studies. Using this definition, a local driver in these rural crashes was someone whose residential postcode is in rural Victoria. A “city driver” was someone whose residential postcode is in metropolitan Victoria. The treatment of interstate postcodes needs careful consideration, however. For example, Moama residents might correctly be considered local drivers if they crashed in Echuca.

Preliminary analyses undertaken for this proposal have identified that residential postcode is coded for about 85% of drivers, motorcyclists, bicyclists and pedestrians, but it is largely missing for passengers and pillion passengers.

The crash data variables that were analysed for this task included:

- Crash severity
- Injury severity
- Road user type
- Vehicle type
- Driver age
- Driver gender
- BAC
- High/Low Alcohol Time
- Seat belt/helmet worn

2.4 TASK 4: SUMMARY BY LOCAL GOVERNMENT AREA

RACV requested that a summary of road crashes and trauma by Local Government Area be prepared that includes a breakdown by key factors. The LGAs were grouped (as decided in Task 1) to make comparisons more meaningful. The summary included numbers of crashes and numbers of road users at each level of severity (both overall and for particular road user groups) as well as numbers of single vehicle crashes etc. The summary is incorporated into the report and will also be provided in a spreadsheet format to allow RACV to modify the format and ordering if required.

MUARC notes that VicRoads has produced a comprehensive summary of road crashes in Victorian municipalities for the period 1996 to 2000 (available from www.mav.asn.au/saferoads). Task 4 provides a summary that is more up-to-date and includes a grouping of rural LGAs to allow better comparisons.

3.0 CHARACTERISTICS OF RURAL CRASHES

Analyses of the characteristics of rural crashes are presented in this section. Where the numbers are sufficiently large, they are presented separately for rural cities, rural towns & other areas and remote areas. Where the numbers are not sufficiently large, rural towns & other areas and remote areas are combined to form a new category, rural & remote areas. Detailed data tables are provided in Appendix 1.

3.1 OVERVIEW

There were 22,446 casualty crashes in rural Victoria in the five years 1997-2001. More crashes occurred in rural towns & other areas (15,248) than in rural cities (6,848) and the least number of crashes occurred in remote areas (350). This pattern is also true at each level of crash severity (fatal, serious injury and other injury) but the proportion of crashes at each level of severity differed significantly across the types of rural areas ($\chi^2(4)=287.3$, $p<.001$). The proportion of crashes that was fatal was greater in remote areas than in rural towns & other areas than in rural cities (7% vs 4% vs 2%). The same pattern was observed for serious injury crashes (44% vs 34% vs 26%). Thus, crashes in remote areas were more severe, on average, than in rural towns & other areas, than in rural cities.

The interpretation of this finding is not altogether clear. It may reflect a true state of affairs that crashes in remote areas have more severe outcomes (possibly related to higher travel speeds and/or longer emergency response times). However, at least part of the finding may reflect a lower rate of reporting of less severe crashes in other areas.

Table 3.1 lists the numbers of fatal, serious injury and other injury crashes in each of the Local Government Areas in rural Victoria. The Local Government Areas are grouped according to the type of rural area (rural city, rural towns & other areas, remote areas).

3.2 CRASHES ON OPEN ROADS AND BUILT-UP AREAS

Not surprisingly, most crashes occurred in 100 km/h and 60 km/h speed zones (43% and 40%, respectively). Overall, 43% of crashes occurred in low speed zones (60 km/h or less), 10% occurred in medium speed zones (70-90 km/h) and 46% occurred in high speed zones (100, 110 km/h); in the remaining 1% of cases the speed zone was not recorded. Figure 3.1 shows that the proportions of casualty crashes in low, medium and high speed zones differed significantly across the types of rural areas, ($\chi^2(6)=3,365.9$, $p<.001$). Most crashes in rural cities occurred in low speed zones. In rural towns & other areas almost two-thirds of crashes occurred in high speed zones and almost one-third occurred in low speed zones. More than three-quarters of crashes in remote areas occurred in high speed zones. It is likely that the distributions of crashes match the distributions of speed zones in these areas.

As expected, crash severity increased with speed zone group. The percentage of crashes that resulted in fatality or serious injury increased from 26% in low speed zones to 33% in medium speed zones to 45% in high speed zones.

Table 3.1 Number of casualty crashes at each level of severity in each rural Local Government Area in Victoria. 1997-2001.

Type of area	Local Government area	Fatal	Serious injury	Other injury	Total
Rural city	Ballarat	18	346	1,043	1,407
	Bendigo	34	379	955	1,368
	Geelong	51	597	2,034	2,682
	Shepparton	24	353	612	989
	Wodonga	9	109	284	402
	Total	136	1,784	4,928	6,848
Rural towns & other	(French Island)	-	-	1	1
	Alpine	10	111	179	300
	Ararat	9	78	92	179
	Bass Coast	21	164	248	433
	Baw Baw	32	247	541	820
	Campaspe	22	195	339	556
	Central Goldfields	9	63	108	180
	Colac-Otway	18	183	324	525
	Corangamite	17	124	192	333
	Delatite	17	208	304	529
	East Gippsland	39	258	523	820
	Gannawarra	7	67	81	155
	Glenelg	16	102	182	300
	Golden Plains	20	79	125	224
	Hepburn	12	83	132	227
	Horsham	10	97	181	288
	Indigo	11	107	141	259
	La Trobe	13	220	809	1,042
	Loddon	7	63	98	168
	Macedon Ranges	26	185	391	602
	Mildura	14	265	464	743
	Mitchell	29	240	420	689
	Moira	22	148	211	381
	Moorabool	21	190	288	499
	Mount Alexander	14	114	177	305
	Moyne	12	89	123	224
	Murrindindi	32	217	327	576
	Northern Grampians	18	101	135	254
	Pyrenees	10	68	70	148
	Queenscliffe	-	12	11	23
	South Gippsland	26	198	367	591
	Southern Grampians	13	91	109	213
	Strathbogie	26	93	152	271
	Surf Coast	15	141	309	465
Swan Hill	9	101	191	301	
Towong	6	66	66	138	
Wangaratta	12	169	232	413	
Warrnambool	5	96	250	351	
Wellington	32	211	479	722	
Total	632	5,244	9,372	15,248	

Table 3.1 (continued)

Remote	Buloke	6	37	45	88
	Hindmarsh	8	43	46	97
	West Wimmera	7	39	37	83
	Yarriambiack	3	36	43	82
	Total	24	155	171	350

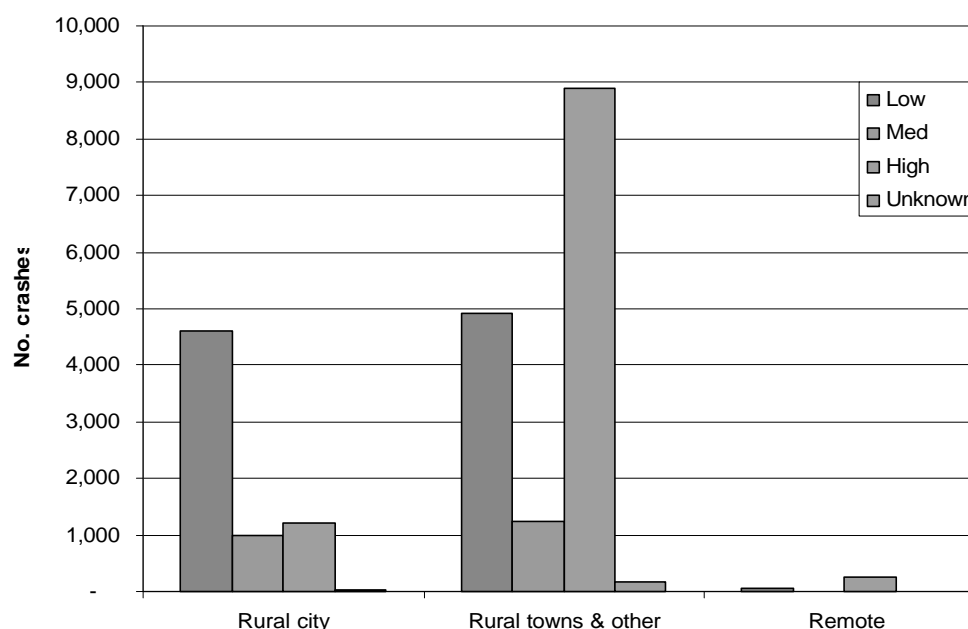


Figure 3.1 Number of casualty crashes in low (60 km/h or less), medium (70-90 km/h) and high (100, 110 km/h) speed zones in each area of rural Victoria. 1997-2001.

Crashes in the rural & remote areas (compared with rural cities) were more severe, even for low ($\chi^2(2)=54.4$, $p<.001$) and medium speed zones ($\chi^2(2)=9.3$, $p<.05$). In the high speed zones, the severity of crashes in the rural & remote areas is not significantly different from that in the rural cities ($\chi^2(2)=0.1$, $p>.05$). Thus, the higher severity of crashes in rural & remote areas is not completely explained by the larger proportion of crashes occurring in higher speed zones. Thus, under-reporting of crashes of lower severity in more remote areas, as discussed earlier, may be contributing to this pattern.

3.3 ROAD GEOMETRY

3.3.1 Intersections

Overall, 37% of crashes in rural Victoria occurred at intersections. The proportion was highest in rural cities (54%), intermediate in rural towns & other areas (30%) and lowest in remote areas (21%).

Figure 3.2 shows that crashes at intersections were less severe, on average, than crashes not at intersections. This was true in both rural cities and in rural & remote areas (rural cities: $\chi^2(2)=92.0$, $p<.001$, rural & remote areas: $\chi^2(2)=160.4$, $p<.001$).

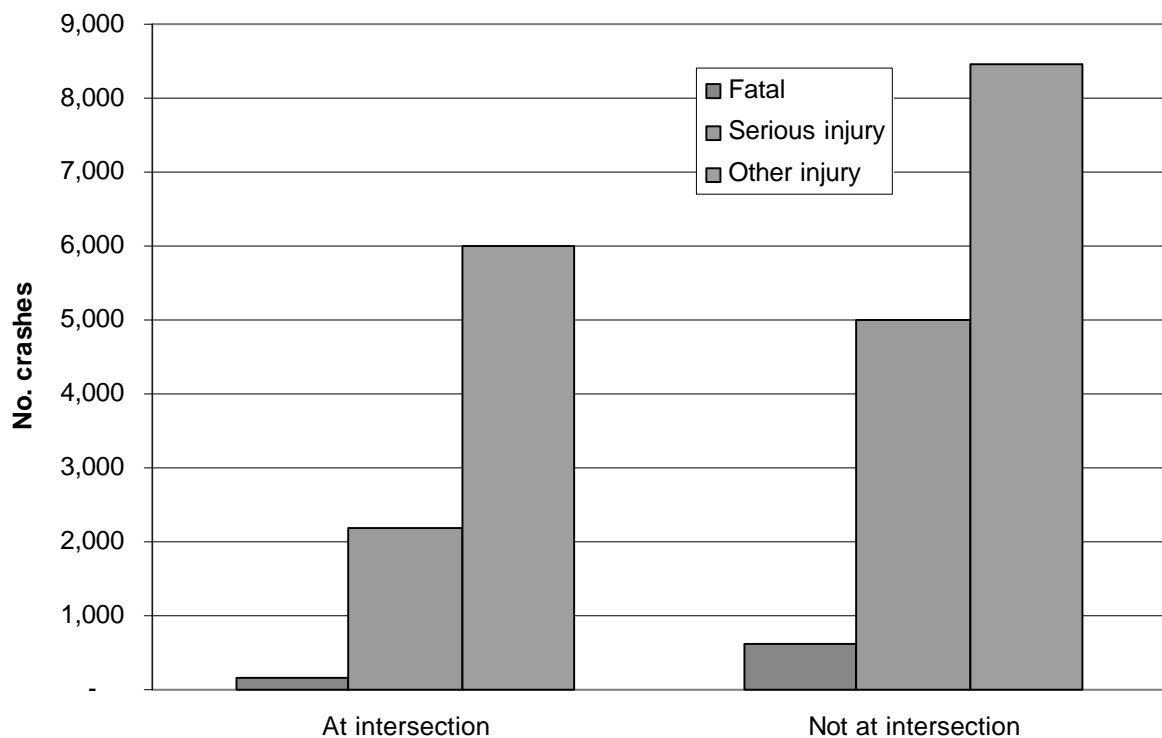


Figure 3.2 Number of fatal, serious injury and other injury crashes at intersection or not in rural cities or rural & remote areas of Victoria. 1997-2001.

3.3.2 Curves

Overall, 21% of crashes in rural Victoria occurred on curves. The proportion was highest in rural towns & other areas (27%), intermediate in remote areas (15%) and lowest in rural cities (7%).

Figure 3.3 shows that crashes on curves were more severe, on average, than crashes on straight sections of roads. This was true in both rural cities ($\chi^2(2)=59.4$, $p<.001$) and in rural & remote areas ($\chi^2(2)=67.5$, $p<.001$). The pattern was also found when only crashes not at intersections were examined (rural cities: $\chi^2(2)=34.5$, $p<.001$ and rural & remote areas $\chi^2(2)=12.3$, $p<.005$).

3.4 CRASH TYPE

Overall, 50% of casualty crashes involved more than one vehicle (multi vehicle), 6% involved one vehicle and a pedestrian (single vehicle with pedestrian) and 44% involved one vehicle and no pedestrian. However, the pattern of crash types differed significantly among the types of rural areas ($\chi^2(4)=1,765$, $p<.005$). Figure 3.4 shows that there were relatively more multi vehicle crashes in rural cities than in rural towns & other areas than in remote areas (68% versus 43% versus 29%) and the opposite pattern was true for single vehicle crashes with no pedestrian (23% versus 53% versus 70%). However, the absolute number of each type of crash remained highest in rural towns & other areas.

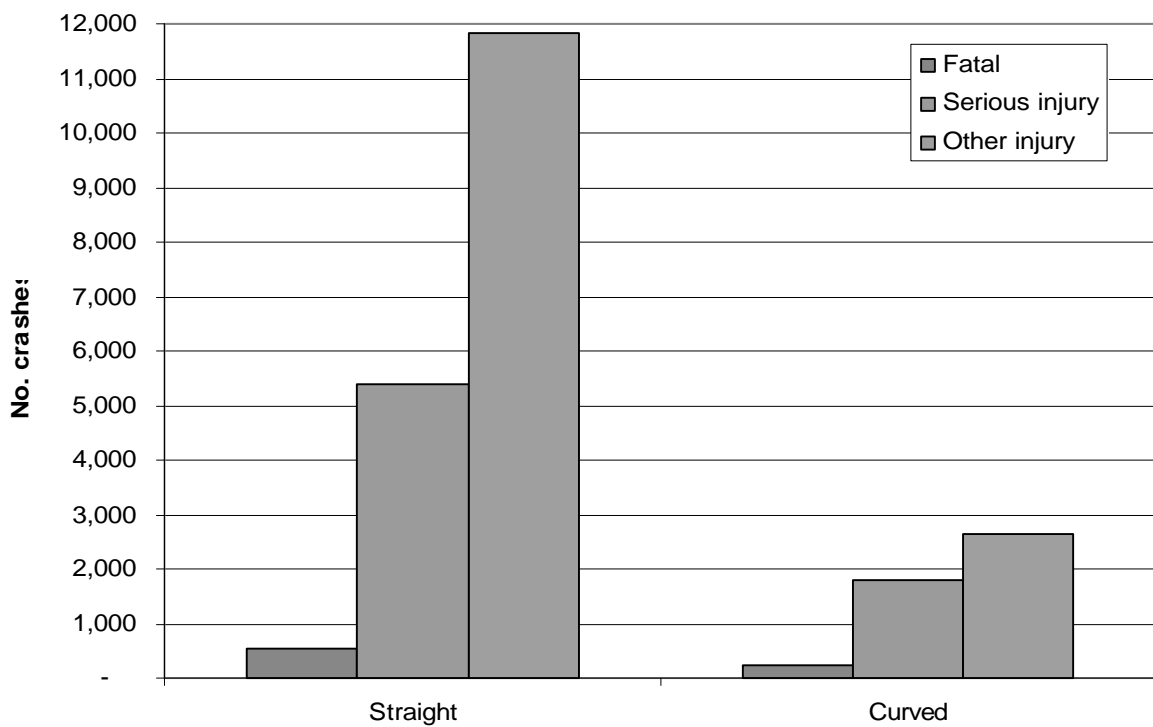


Figure 3.3 Number of fatal, serious injury and other injury crashes on straight and curved sections of road in rural Victoria. 1997 to 2001.

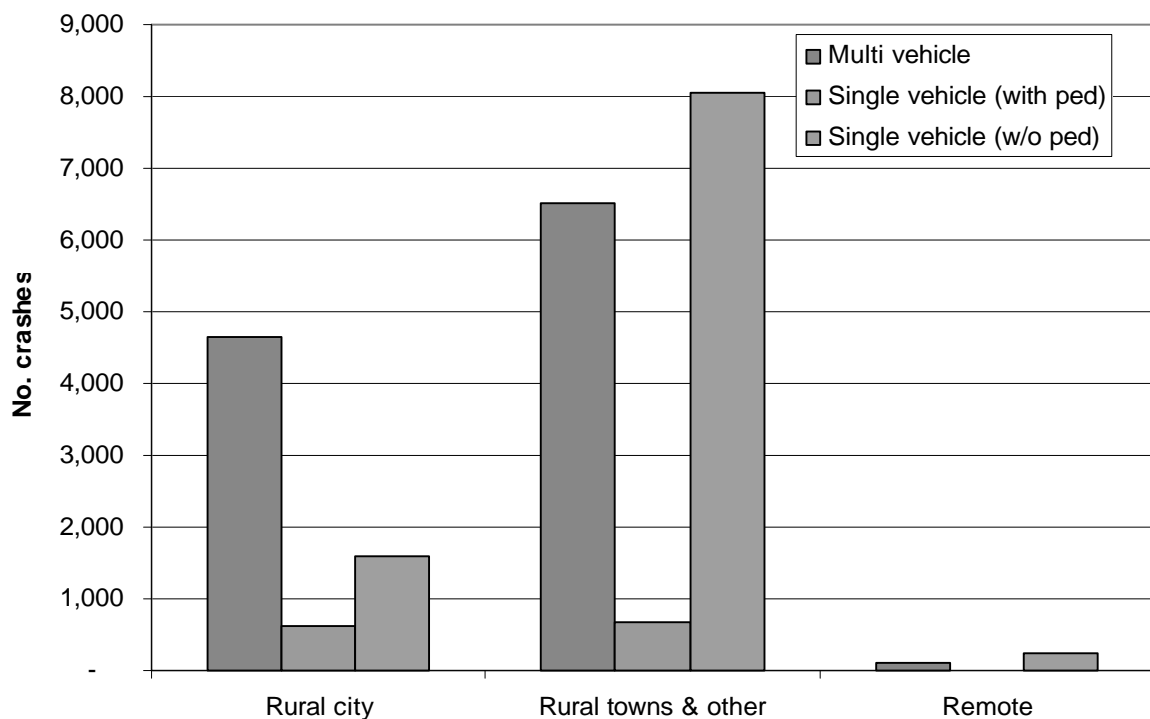


Figure 3.4 Numbers of multi vehicle, single vehicle (with pedestrian) and single vehicle (no pedestrian) casualty crashes in each type of rural area. Victoria 1997-2001.

Figure 3.5 shows that multi vehicle crashes were less likely to result in fatal or serious injury than single vehicle (with pedestrian) or single vehicle (without pedestrian) crashes. This was true in both rural cities and rural & remote areas (rural cities: $\chi^2(4)=198.8$, $p<.001$; rural & remote areas: $\chi^2(4)=212.7$, $p<.001$).

More detail about the types of crashes is provided by the Definitions of Classifying Accidents (DCA) codes. These codes are summarised in Figure 3.6 and it is indicated where the groupings map (not exactly) to the single and multi vehicle categories used in the previous tables. The DCA groups with the most crashes were off path (straight) (25.6%), off path (curve) (16.4%) and adjacent (intersections) (15.3%).

As expected from the previous analyses, the pattern of DCA groups differed among the three types of rural areas ($\chi^2(18)=2,179.3$, $p<.001$). Among the single vehicle (no pedestrian) crashes, there were relatively more off path (curve) crashes in rural towns & other compared to remote areas. This might reflect the relatively flatter topography of the remote areas.

The “crash type” variable in the crash database shows that 2% of crashes involved striking an animal. This figure differed little among the types of areas (rural city: 1%, rural towns & other areas: 2%, remote areas: 3%).

3.5 ROADSIDE HAZARDS

Overall, 28% of crashes involved an impact with a roadside object. The percentage of crashes in which a roadside object was hit was greatest in remote areas (45%), intermediate in rural towns & other areas (33%) and lowest in rural cities (17%).

Trees were the most commonly hit roadside objects in all three types of rural areas (see Figure 3.7). In rural cities, poles were the next most commonly hit roadside objects. While poles made up a smaller proportion of roadside objects hit in rural towns & other areas, the total number of poles struck in these areas was greater than in rural cities. In rural towns & other areas, embankments were the second most common roadside objects struck.

The severity of crashes involving impacts with roadside objects was examined for the most commonly struck roadside objects (see Figure 3.8). Overall, 52% of casualty crashes with trees resulted in fatal or serious injury, compared with 45% of crashes with poles, 38% of crashes with embankments and 34% of crashes with fence-walls. Impacts with poles were more severe in rural & remote areas than in rural cities ($\chi^2(2)=7.6$, $p<.05$). No other roadside object showed statistically significant differences in severity in different rural areas.

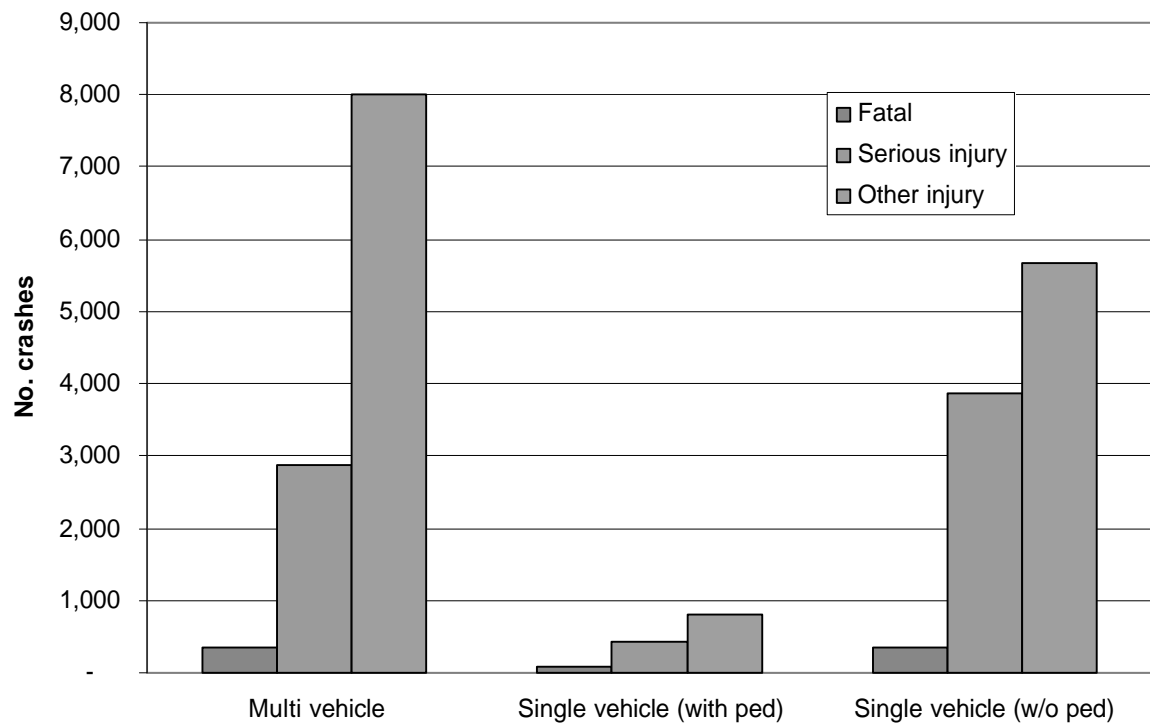


Figure 3.5 Number of fatal, serious injury and other injury multi vehicle, single vehicle (with pedestrian) and single vehicle (no pedestrian) crashes in rural Victoria. 1997-2001.

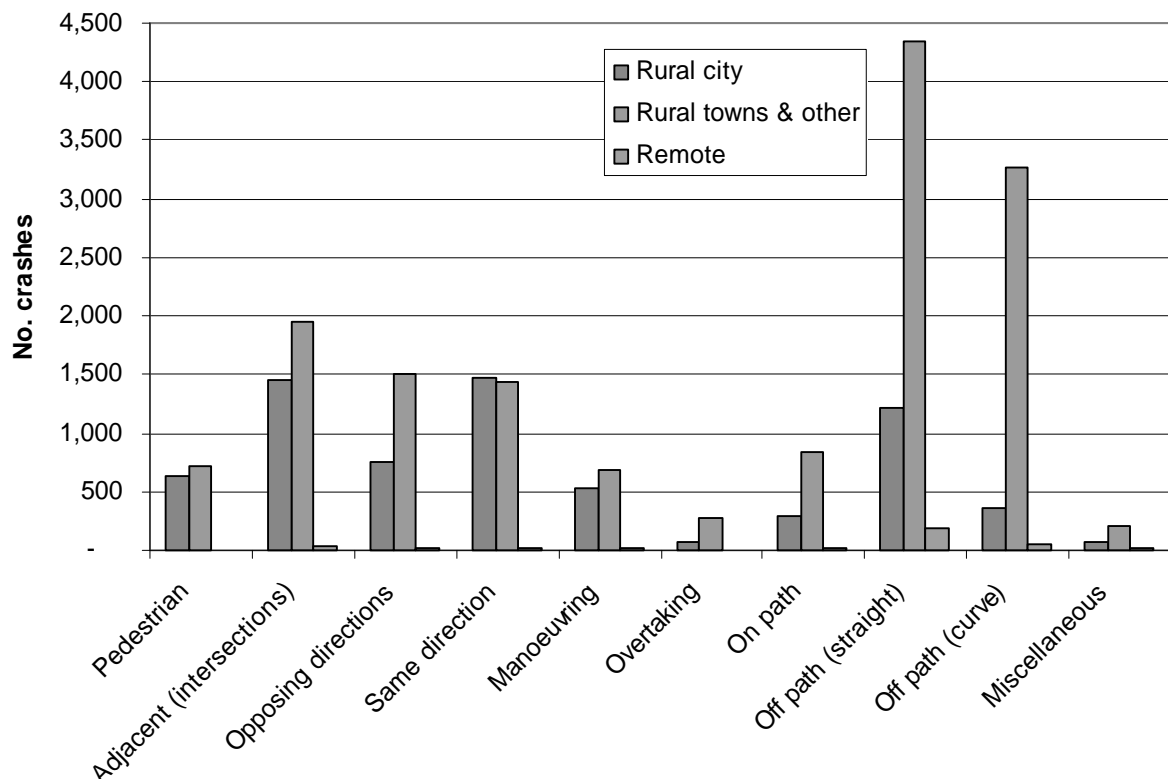


Figure 3.6 Numbers of casualty crashes of each DCA group in each type of rural area. Victoria 1997-2001.

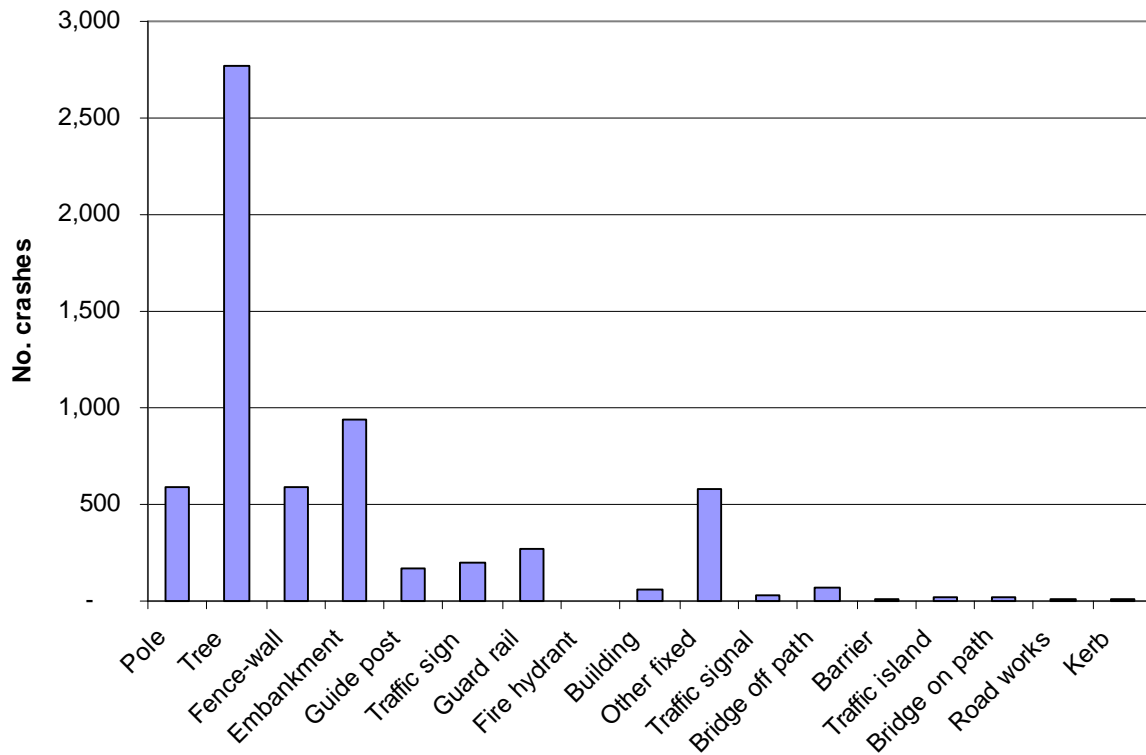


Figure 3.7 Number of casualty crashes involving impacts with roadside objects in rural Victoria. 1997-2001.

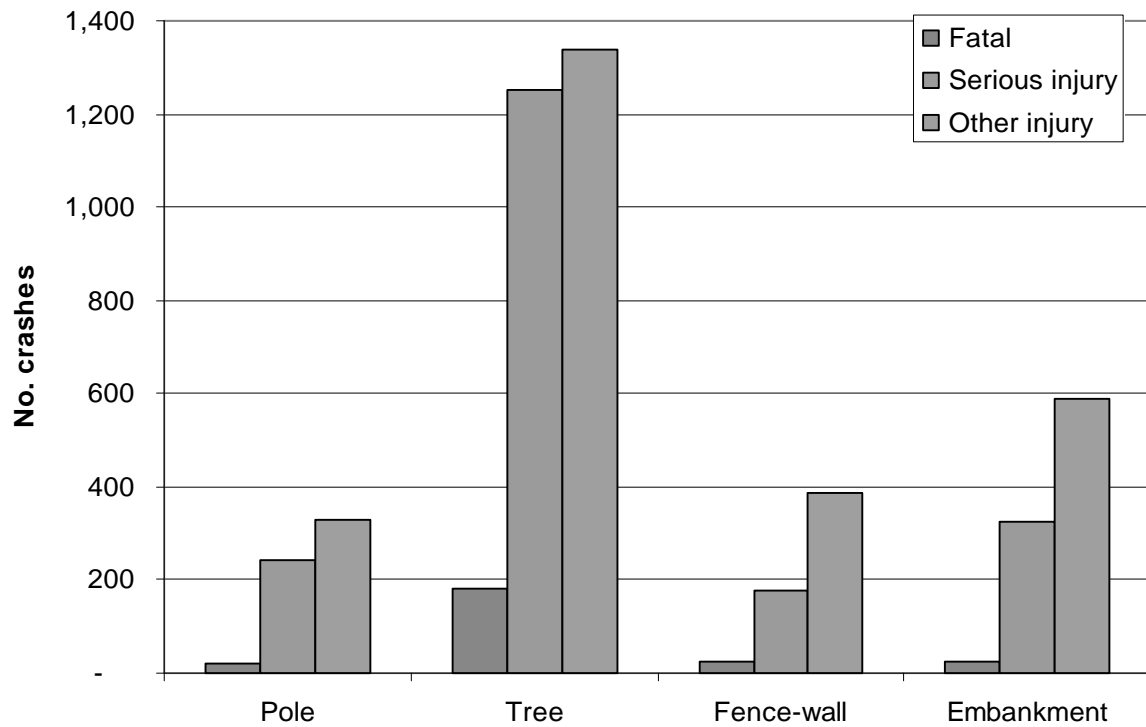


Figure 3.8 Number of fatal, serious injury and other injury crashes involving impacts with poles, trees, fence-walls and embankments in rural Victoria. 1997-2001.

3.6 ROAD QUALITY

The crash database contains very few variables that describe the standard of the road on which the crash occurred. In an attempt to examine some aspects of the relationship between road standard and crashes, additional analyses were conducted of crashes on high speed (100 and 110 km/h) divided and undivided roads. It was assumed that divided roads would generally be of a higher standard of construction which may influence crash outcomes, in addition to the divided aspect reducing the likelihood of head-on crashes.

The crash database does not clearly code roads as divided or not divided. The coding allows divided roads to be identified, however. The analyses that follow assume that roads that were not coded as divided were undivided.

Of the 10,388 crashes in high speed zones, 90% occurred on roads not coded as divided. The percentage of crashes that occurred on divided roads was greatest in rural cities (16%) and least in remote areas (2%, $\chi^2(2)=74.2$, $p<.001$).

Crashes on undivided roads were more likely to result in fatal or serious injury than crashes on divided roads (45% versus 41%). The severity of crashes on divided and undivided roads differed significantly in rural and remote areas ($\chi^2(2)=6.9$, $p<.05$) but not in rural cities ($\chi^2(2)=0.7$, $p>.05$) but this may have reflected the smaller number of crashes in 100 and 110 km/h zones in rural cities. .

Divided roads and roads not coded as divided in 100 and 110 km/h speed zones had a different mix of crash types ($\chi^2(2)=181.7$, $p<.001$). On divided roads, about half of the crashes involved more than one vehicle and the other half comprised single vehicle crashes without pedestrians (see Figure 3.9). On roads not coded as divided, more than two-thirds of the crashes were single vehicle crashes (without pedestrians) and almost one-third were multi vehicle crashes. The greater representation of multi vehicle crashes on divided roads than on undivided roads may reflect the greater traffic volumes on divided roads, rather than a greater risk of single vehicle crashes.

Although there were relatively more multi vehicle crashes on divided roads, these crashes were less severe than on roads not coded as divided ($\chi^2(2)=16.3$, $p<.001$). Overall, 37% of multi vehicle crashes on divided roads resulted in fatality or serious injury, compared with 47% of multi vehicle crashes on roads not coded as divided. This probably reflects fewer head-on crashes on divided roads.

3.7 TEMPORAL CHARACTERISTICS

3.7.1 Day of week

The largest numbers of crashes occurred on Fridays, Saturdays and Sundays (over 3,500 per day) and the lowest on Mondays, Tuesdays and Wednesdays (less than 3,000). The pattern of crashes across days of the week varied significantly among the types of rural areas ($\chi^2(12)=204.5$, $p<.001$, see Figure 3.10). In rural cities, the least number of crashes occurred on Sundays, with increasing numbers until Friday and then a drop to Saturday. The weekly pattern of crashes in rural towns & other areas was remarkably bowed, with the largest number of crashes on Sundays, dropping by about one-third to Monday and then to a low on Tuesday before gradually climbing again.

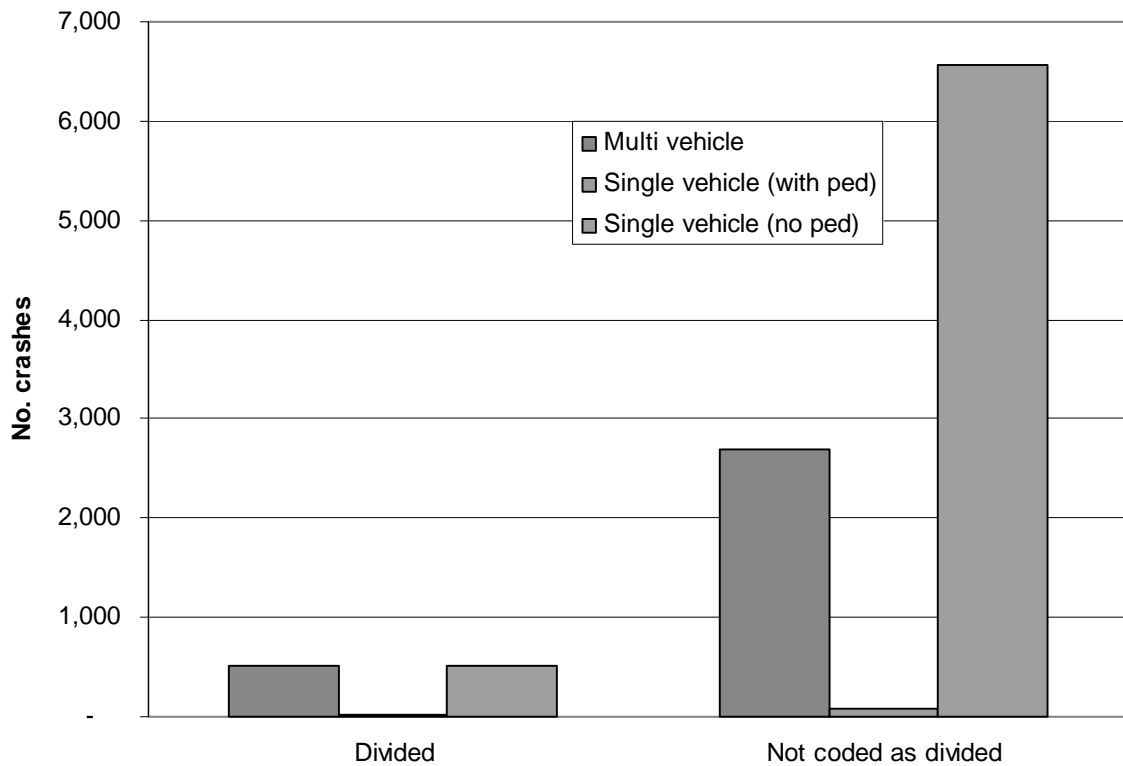


Figure 3.9 Number of multi-vehicle, single vehicle pedestrian and single vehicle without pedestrian casualty crashes in 100 and 110 km/h speed zones on divided roads and roads not coded as divided in rural Victoria. 1997 to 2001.

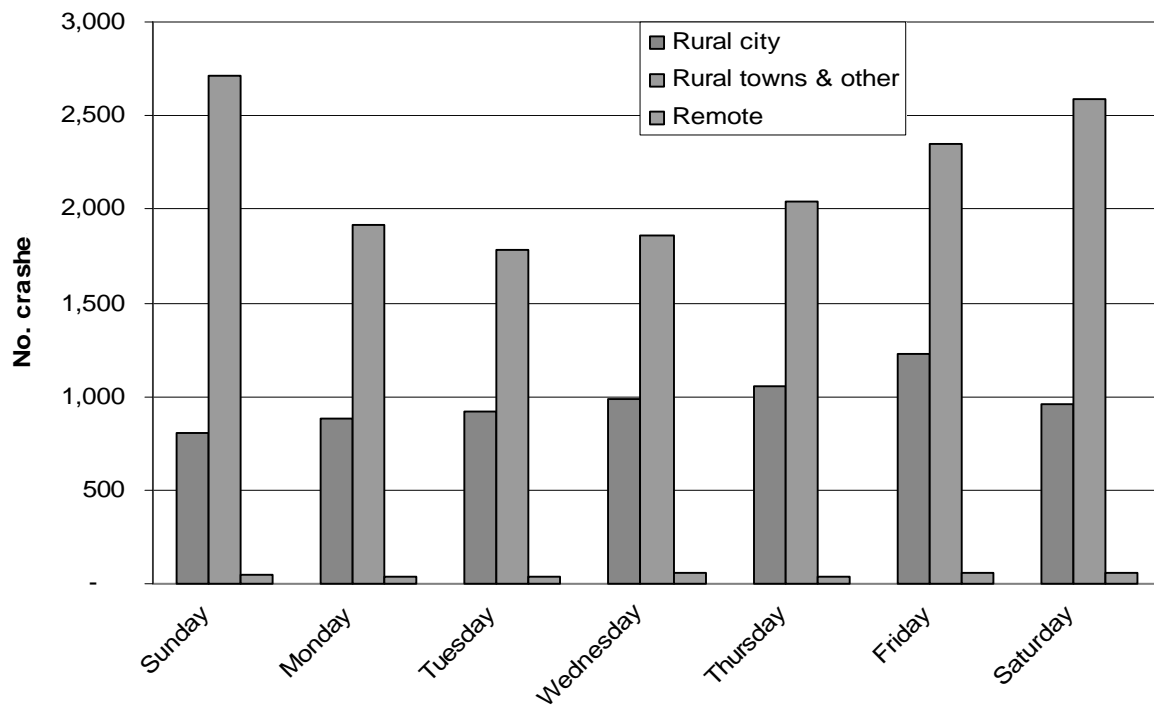


Figure 3.10 Number of crashes on each day of the week in each type of rural area. Victoria 1997-2001.

Overall, 32% of crashes occurred on weekends, which is somewhat higher than the 29% that would be expected if all days had equal frequencies. The percentage of crashes that occurred on weekends was highest in rural towns & other areas (35%), intermediate for remote areas (31%) and lowest for rural cities (26%).

Crashes on weekends were more severe, on average, than crashes occurring on weekdays ($\chi^2(2)=76.3$, $p<.001$). Overall, 40% of weekend crashes were fatal and serious injury crashes, compared with 34% of weekday crashes. This pattern was true for both rural cities ($\chi^2(2)=17.2$, $p<.001$) and rural & remote areas ($\chi^2(2)=46.5$, $p<.001$).

3.7.2 Time of day

Overall, 28% of crashes occurred at night (defined as 6pm-6am). However, relatively more crashes occurred at night in remote areas (38%) than in rural cities (29%) or rural towns & other areas (28%, $\chi^2(2)=18.2$, $p<.001$).

Night-time crashes were more severe than daytime crashes. Overall, 40% of night-time casualty crashes resulted in a fatality or serious injury, compared to 33% of daytime crashes. This pattern was true for both rural cities ($\chi^2(2)=48.4$, $p<.001$) and rural & remote areas ($\chi^2(2)=77.8$, $p<.001$).

Additional analyses were undertaken to assess whether the day of week and time of day patterns combined to produce particular combinations that were of greater concern. Overall, the percentage of casualty crashes that resulted in fatality or serious injury was highest on weekend nights (43%), followed by weekday nights (39%), weekend days (38%) and weekday days (32%).

3.8 SUMMARY

Despite it being rural Victoria, more than 40% of casualty crashes occurred in low speed zones (60 km/h or less) and these crashes may be similar to those occurring in metropolitan areas. However, crash severity increased with speed zone group.

Over a third of crashes occurred at intersections but these crashes were less severe, on average. In contrast, crashes on curves made up 21% of crashes in rural Victoria and were more severe on average, than crashes on straight sections of road.

Half of the crashes involved more than one vehicle but these crashes were less severe, on average. Single vehicle crashes (not involving a pedestrian) comprised 44% of crashes and pedestrian crashes comprised 6% of crashes.

More than a quarter of the crashes involved an impact with a roadside object, most commonly a tree or a pole. More than half of the crashes with trees and 45% of crashes with poles resulted in fatal or serious injury.

Crashes on divided and undivided (not coded as divided) 100 and 110 km/h sections of road were compared to provide a measure of the effect of road standard on crashes. About 90% of crashes occurred on undivided roads, and these were more likely to result in fatal or serious injury. Surprisingly, divided roads had relatively more multi vehicle crashes than undivided roads which may reflect greater traffic volumes on divided roads, rather than a greater risk of single vehicle crashes on these roads.

Somewhat more crashes occurred on weekend days than weekdays and weekend crashes were more severe. About a quarter of crashes occurred at night (6pm to 6am) but these were more severe than daytime crashes. The most severe crashes were those occurring on weekend nights.

3.8.1 Differences between types of rural areas

Given the different mix of speed zones across rural areas, the characteristics of crashes in rural cities, rural towns and other areas and remote areas were compared. The comparisons were influenced by the likelihood that less severe crashes may have been less likely to be reported in rural towns and other areas and (particularly) remote areas.

The following characteristics were **more** common in crashes in rural cities:

- Low (60 km/h or less) speed zones
- Intersections
- Pedestrians
- Multiple vehicle crashes

The following characteristics were **more** common in crashes in remote areas:

- Impacts with roadside objects (particularly trees)
- Night-time (6pm-6am) crashes

Crashes in rural towns & other areas were more likely than in remote areas or rural cities to involve:

- Curves
- Crashes on weekends

4.0 CHARACTERISTICS OF ROAD USERS IN RURAL CRASHES

Analyses of the characteristics of the road users involved in rural crashes are presented in this section. They are presented separately for rural cities, rural towns & other areas and remote areas where the numbers are sufficiently large. Where the numbers do not permit this, rural towns & other areas and remote areas are combined to form a new category, rural & remote areas. Detailed data tables are provided in Appendix 2.

4.1 OVERVIEW

A total of 55,844 road users were involved in casualty crashes in rural Victoria during the five-year period 1997 to 2001. More road users were involved in crashes in rural towns & other areas (36,211) than in rural cities (18,881) and the least number of road users were involved in crashes in remote areas (752). Figure 4.1 shows that while pattern is also true at each level of injury severity (fatal, serious injury, other injury and non-injury), the proportion of road users involved in crashes at each level of injury severity differed significantly across the types of rural areas ($\chi^2(6)=983.1, p<.001$). The proportions of road users fatally injured (4% vs 2% vs 1%) and seriously injured (27% vs 19% vs 12%) were greater in remote areas than in rural towns & other areas than in rural cities. Thus, road users in crashes in remote areas were more severely injured, on average, than in rural towns & other areas, than in rural cities. As noted in Section 3.1, this may reflect the true situation or potentially lower reporting rates for less severe crashes in more remote areas.

Table 4.1 lists the numbers of road users involved in casualty crashes in each of the Local Government Areas in rural Victoria as a function of injury severity (fatal, serious injury, other injury, non-injury). The Local Government Areas are grouped according to the type of rural area (rural city, rural towns & other areas, remote areas).

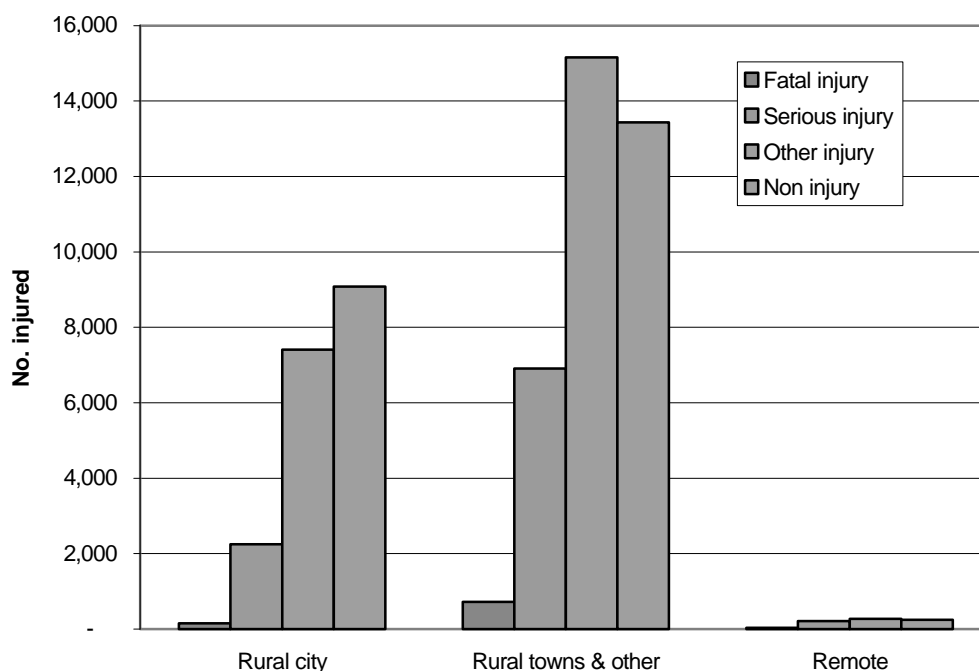


Figure 4.1 Number of road users involved in crashes at each level of injury severity in each area of rural Victoria. 1997-2001.

Table 4.1 Number of road users involved in casualty crashes at each level of injury severity in each rural Local Government Area in Victoria. 1997-2001.

Type of area	Local Govt Area	Fatal injury	Serious injury	Other injury	Non injury	Total
Rural city	Ballarat	18	438	1,605	1,911	3,972
	Bendigo	38	466	1,474	1,684	3,662
	Geelong	59	763	2,938	3,804	7,564
	Shepparton	27	448	997	1,133	2,605
	Wodonga	9	126	398	545	1,078
	Total	151	2,241	7,412	9,077	18,881
Rural towns & other	(French Island)	-	-	2	1	3
	Alpine	11	129	276	226	642
	Ararat	9	127	177	148	461
	Bass Coast	23	256	497	505	1,281
	Baw Baw	33	301	798	744	1,876
	Campaspe	25	241	554	544	1,364
	Central Goldfields	9	81	163	165	418
	Colac-Otway	21	251	578	400	1,250
	Corangamite	23	167	331	288	809
	Delatite	19	255	470	338	1,082
	East Gippsland	46	358	859	702	1,965
	Gannawarra	8	87	134	133	362
	Glenelg	18	138	309	306	771
	Golden Plains	23	126	195	134	478
	Hepburn	13	102	218	155	488
	Horsham	12	140	270	285	707
	Indigo	11	128	210	171	520
	La Trobe	14	263	1,230	1,207	2,714
	Loddon	7	83	161	95	346
	Macedon Ranges	29	241	613	540	1,423
	Mildura	15	328	738	886	1,967
	Mitchell	32	320	668	568	1,588
	Moira	26	203	348	299	876
	Moorabool	29	256	473	450	1,208
	Mount Alexander	16	167	307	257	747
	Moyne	13	117	210	131	471
	Murrindindi	34	293	520	297	1,144
	Northern Grampians	25	135	220	205	585
	Pyrenees	11	90	118	115	334
	Queenscliffe	-	13	13	24	50
	South Gippsland	28	251	651	455	1,385
	Southern Grampians	14	130	195	210	549
	Strathbogie	33	137	245	191	606
	Surf Coast	16	177	471	424	1,088
	Swan Hill	11	133	308	280	732
	Towong	6	86	106	60	258
Wangaratta	12	211	389	356	968	
Warrnambool	6	111	376	496	989	
Wellington	41	274	753	638	1,706	
Total	722	6,906	15,154	13,429	36,211	

Table 4.1 contd.

Remote	Buloke	10	57	68	50	185
	Hindmarsh	8	54	81	60	203
	West Wimmera	10	52	60	84	206
	Yarriambiack	4	43	58	53	158
	Total	32	206	267	247	752

4.2 TYPES OF ROAD USER IN CRASHES

Drivers were the largest group of road users involved in casualty crashes in rural Victoria (52%), followed by passengers (35%, see Table 4.2). The representation of passengers may be underestimated, however, because details of uninjured passengers are often not recorded by Police. Overall, drivers and passengers were the road users most likely to be uninjured in casualty crashes (43% and 49%, respectively). Despite this, in terms of persons injured in road crashes, drivers remained the largest group (16,916 or 51% of all persons injured), followed by passengers (9,987 or 30% of all persons injured).

The mix of road users differed significantly across the types of rural areas ($\chi^2(16)=616.4$, $p<.001$). The percentages of road users who were pedestrians or bicyclists were greater in rural cities than rural towns & other areas than remote areas. There appeared to be relatively fewer passengers and motorcyclists in crashes in rural cities.

Figure 4.2 shows the distribution of injury severity for each type of road user (with the exception of pillion passengers where the numbers were very small). As expected, the severity was higher, on average, for pedestrians, motorcyclists and bicyclists than for drivers and passengers.

Table 4.2 Numbers of each type of road user who were injured or not injured in casualty crashes. Victoria 1997-2001.

Road user type	Injured	Not injured	Total
Pedestrian	1,447	31	1,478
Driver (cars/trucks/etc)	16,916	12,582	29,498
Passenger (car/truck/bike..)	9,987	9,477	19,464
Motor cyclist	2,929	108	3,037
Pillion passenger	241	31	272
Bicyclist	1,375	49	1,424
Other driver (horse/tram/train)	12	42	54
Other passenger	13	63	76
Unknown	171	370	541
Total	33,091	22,753	55,844

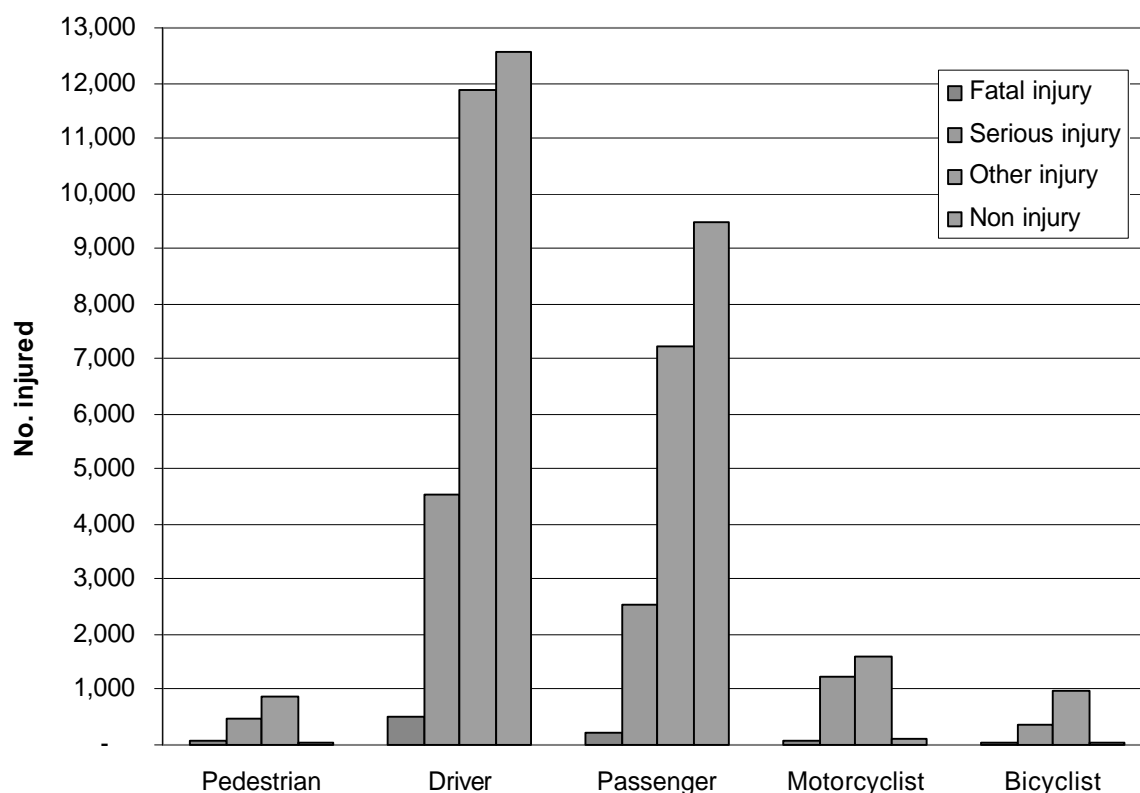


Figure 4.2 Number of each type of road user involved in casualty crashes at each level of injury severity in rural Victoria 1997-2001.

Of the drivers involved in crashes, 27,359 were driving cars, 999 were driving articulated trucks and 718 were driving rigid trucks. A larger proportion of car drivers (58%) than articulated truck drivers (48%) than rigid truck drivers (42%) were injured in casualty crashes. The higher severity of crashes in rural & remote areas compared with rural cities identified earlier was true also for drivers of articulated trucks and rigid trucks. The percentages of drivers involved in casualty crashes that were injured in rural & remote areas was 52% for articulated trucks and 48% for rigid trucks compared with 31% and 25%, respectively, in rural cities.

4.3 AGE AND GENDER OF ROAD USERS IN CRASHES

4.3.1 Age

Overall, under 25 year olds comprised the largest group of road users involved in crashes in rural Victoria (37%). The age distribution of road users in crashes differed across the three rural areas ($\chi^2(8)=104.3$, $p<.001$, see Figure 4.3), with relatively fewer under 25 year olds in crashes and relatively more aged 60 and over in remote areas than in other areas of rural Victoria.

Age groups were also examined for different road user groups. Passengers aged under 25 were the largest sub-group of road users, followed by drivers aged 25 to 39. The largest numbers of pedestrians, passengers and bicyclists were aged under 25, while the largest numbers of drivers and motorcyclists were aged 25 to 39.

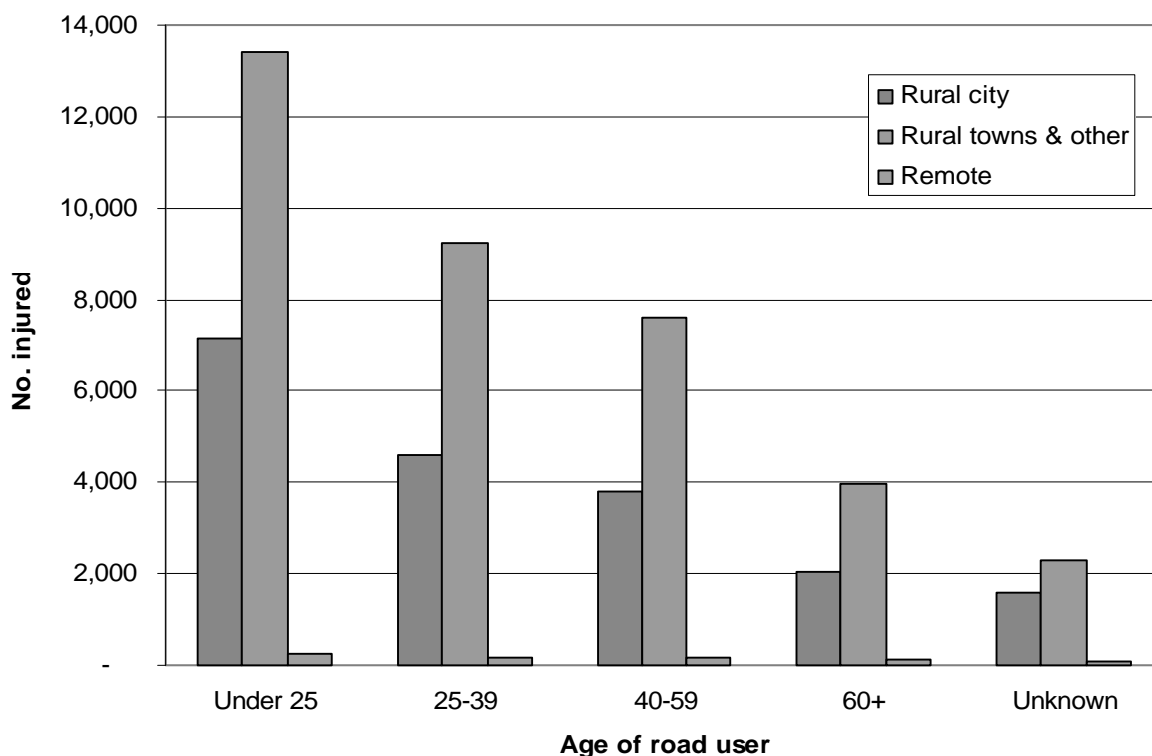


Figure 4.3 Number of road users in each age group involved in casualty crashes in each type of rural area. Victoria 1997-2001.

The mix of crash types differed significantly among age groups of drivers ($\chi^2(8)=769.1$, $p<.001$, see Figure 4.4), with the proportion of crashes that were single vehicle (without pedestrian) being greatest for drivers aged under 25 and decreasing with age. Conversely, the proportion of crashes that were multi vehicle increased with driver age.

4.3.2 Gender

Overall, 57% of road users involved in crashes in rural Victoria were male, 40% were female and gender was not recorded for 3% of road users. The gender mix differed significantly across types of rural areas ($\chi^2(6)=168.5$, $p<.001$), with relatively more females involved in crashes in rural cities than rural towns & other areas and remote areas (42% versus 39% versus 39%).

Among injured road users, 56% of were male and 44% were female. Figure 4.5 shows that males were more severely injured, on average, than females. There were more than twice as many males as females fatally injured, about 50% more males than females seriously injured and roughly similar numbers of males and females sustaining other injuries.

There were more males than females for each road user group, except passengers (see Figure 4.6). The over-representation of males was most marked for motorcyclists and bicyclists.

The mix of crash types by gender of driver was statistically significantly different ($\chi^2(4)=319.1$, $p<.001$), but this reflected only a small over-involvement of male drivers in single vehicle crashes (without pedestrians) and a small over-involvement of female drivers in multi vehicle crashes.

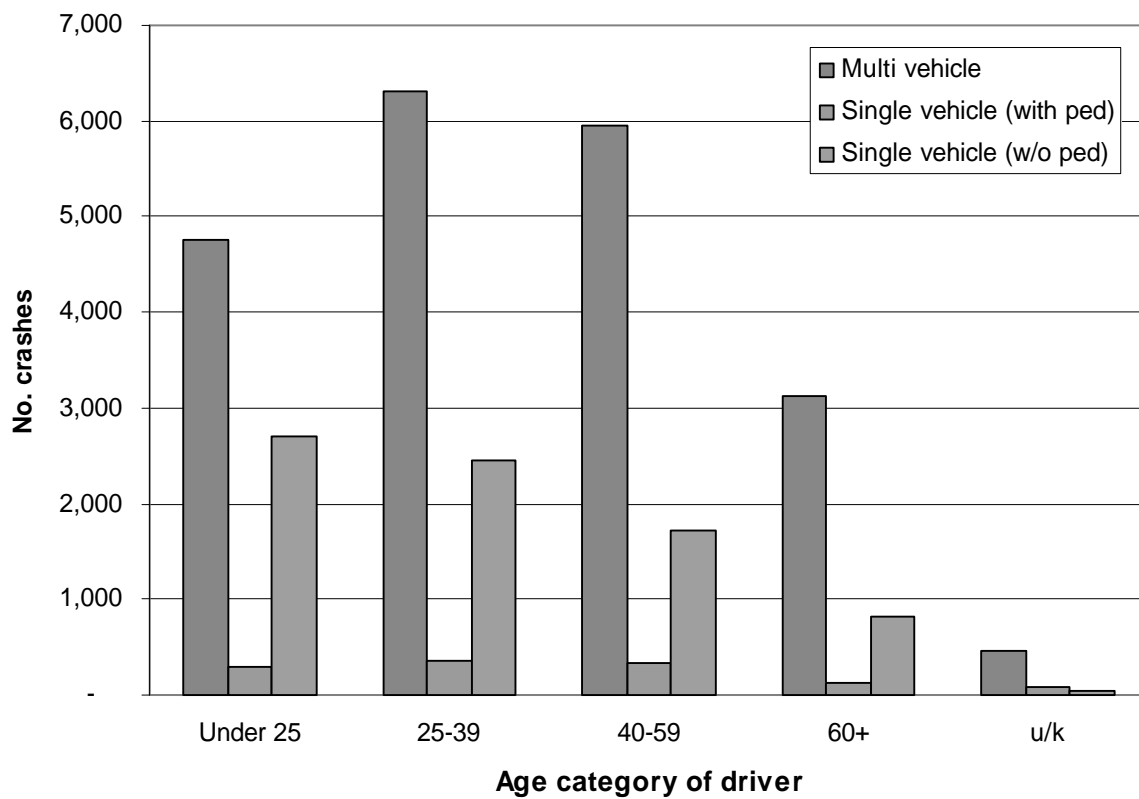


Figure 4.4 Number of road users in each age group involved in casualty crashes in rural Victoria 1997-2001.

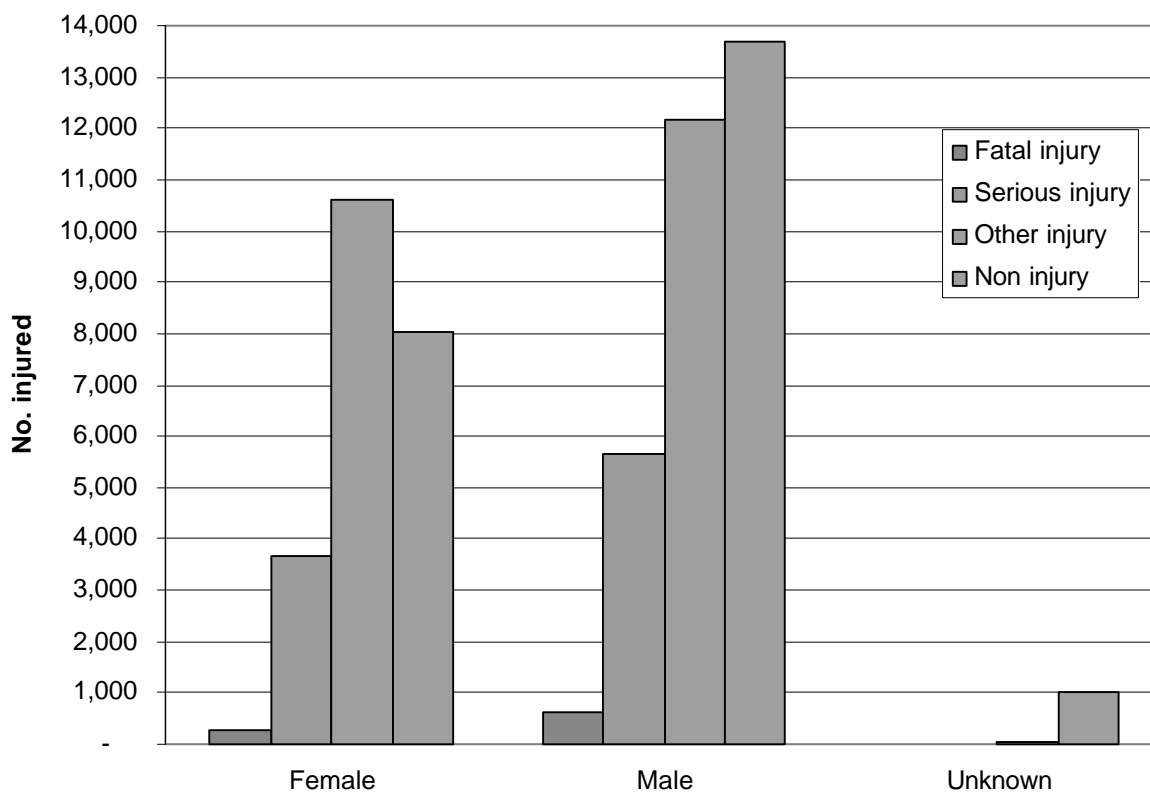


Figure 4.5 Numbers of male and female road users involved in casualty crashes at each level of injury severity in rural Victoria. 1997-2001.

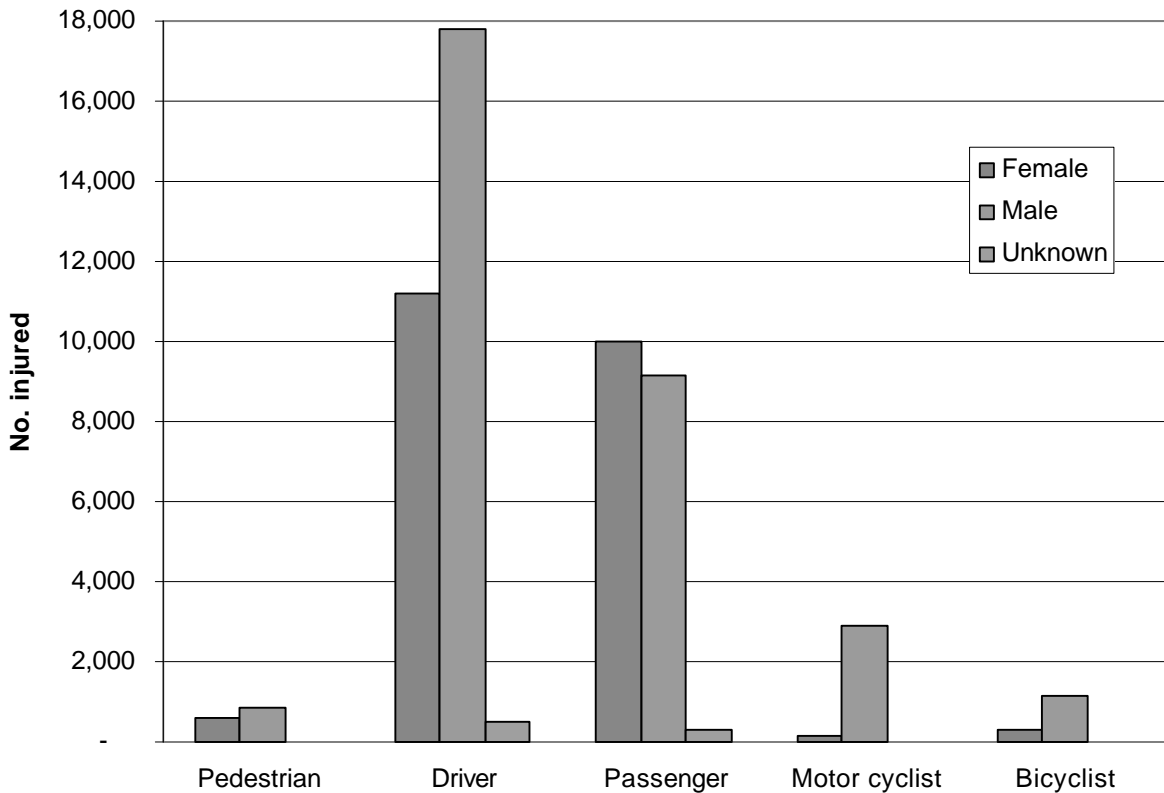


Figure 4.6 Numbers of male and female pedestrians, drivers, passengers, motorcyclists and bicyclists involved in casualty crashes in rural Victoria. 1997-2001.

4.4 ALCOHOL IN CRASHES

4.4.1 BAC values

The available blood alcohol concentration (BAC) values for drivers, motorcycle riders and pedestrians in casualty crashes in rural Victoria are summarised separately in the sections that follow. Preliminary analyses of the database revealed a particularly high number of missing or unknown values, primarily in the 2000 and 2001 data (presumably the database had not yet been finally updated with full coroner's data for those years). Accordingly, the analyses in this section used the data for 1997, 1998 and 1999, where the proportion of unknown BAC values for killed road users was consistently low. Unfortunately, BAC data was still missing for the majority of road users who were not killed.

Drivers

The percentage of BAC values for drivers that was missing was lowest for those who were fatally injured (0% in rural cities and 6% in rural & remote areas). Overall, 22% of fatally injured drivers had a BAC of 0.05 or greater. This did not differ between rural cities and rural & remote areas (22% versus 24% respectively). For seriously injured drivers, the level of missing data was much higher (55% overall) and the percentages of drivers with BAC at or exceeding 0.05 were similar in rural cities and rural and remote areas (9% and 12%).

Motorcycle riders

BAC values were missing for 0% of fatally injured riders in rural cities and 5% in rural & remote areas. Overall, 10% of fatally injured riders had a BAC of 0.05 or higher. The numbers of riders killed were too small to compare the involvement of alcohol between rural cities and rural & remote areas. For seriously injured riders, the level of missing data was much higher (68% overall) and the percentages of riders with BAC of 0.05 or higher were similar in rural cities and rural and remote areas (5% and 7%).

Pedestrians

BAC values were missing for 11% of fatally injured pedestrians in rural cities and 16% in rural & remote areas. Overall, 33% of fatally injured pedestrians had a BAC of 0.05 or higher. The numbers of pedestrians killed were too small to compare the involvement of alcohol between rural cities and rural & remote areas. For seriously injured pedestrians, the level of missing data was much higher (94% overall) which precluded any comparisons.

4.4.2 Persons in crashes in high- and low-alcohol hours

Given the large amount of missing BAC data, a proxy for alcohol involvement in crashes – high- and low-alcohol hours was used. Day of week and time of day were recoded into high- and low-alcohol hours (rural). The low alcohol hours (rural) were defined by Rogerson, Newstead and Cameron (1994) as:

- 0600-1759 Mondays to Thursdays
- 0600-1559 Fridays
- 0800-1359 Saturdays
- 1000-1559 Sundays

Overall, 38% of drivers were involved in crashes in high alcohol hours. The percentages of drivers that were in crashes in high alcohol hours differed significantly among the three types of areas ($\chi^2(2)=32.8$, $p<.001$), being lowest in rural cities (36%), intermediate in rural towns & other areas (39%) and highest in remote areas (44%).

In addition, 38% of motorcycle riders were involved in crashes in high alcohol hours. While the percentages of riders that were in crashes in high alcohol hours appears to be larger in remote areas, this difference was not statistically significant ($\chi^2(2)=4.8$, $p>.05$).

A larger percentage (44%) of pedestrians were involved in crashes in high alcohol hours. The percentages of pedestrians that were in crashes in high alcohol hours did not differ significantly between rural cities and rural & remote areas ($\chi^2(1)=0.1$, $p>.05$).

4.5 DRIVER RESIDENCE AND CRASH LOCATION

A comparison of driver residence and crash location was undertaken to estimate the proportion of crashes that involved local drivers. Two methods were used (described in Section 2.3), examining whether drivers lived in the same postcode area as the crash, and examining whether drivers in rural crashes were country or city residents.

4.5.1 Local versus non-local drivers

The postcodes of the crash and the residence of the driver were available for 93% of drivers in casualty crashes. In total, 35% of drivers lived in the same postcode as the crash occurred and 58% of drivers lived in a different postcode. The pattern was similar for each of the types of rural areas, although the statistical analysis suggested that postcodes were somewhat more likely to not match in remote areas ($\chi^2(4)=10.0, p<.05$).

4.5.2 Country versus city drivers

Overall, 75% of drivers in crashes in rural Victoria lived in rural Victoria (see Figure 4.7). Only 14% lived in the Victorian metropolitan area and 4% had non-Victorian postcodes. It should be noted that some of the drivers with non-Victorian postcodes may have been involved in crashes in border areas, just as some of the drivers with metropolitan postcodes may have been involved in crashes in nearby rural areas.

The pattern of driver residence versus crash location differed significantly across the three types of rural areas ($\chi^2(6)=951.1, p<.001$). Drivers in crashes in rural cities were more likely to have Victorian country postcodes and less likely to have Victorian metropolitan postcodes than drivers in crashes in other areas. Drivers in crashes in remote areas were more likely to have non-Victorian postcodes than drivers in crashes in other rural areas.

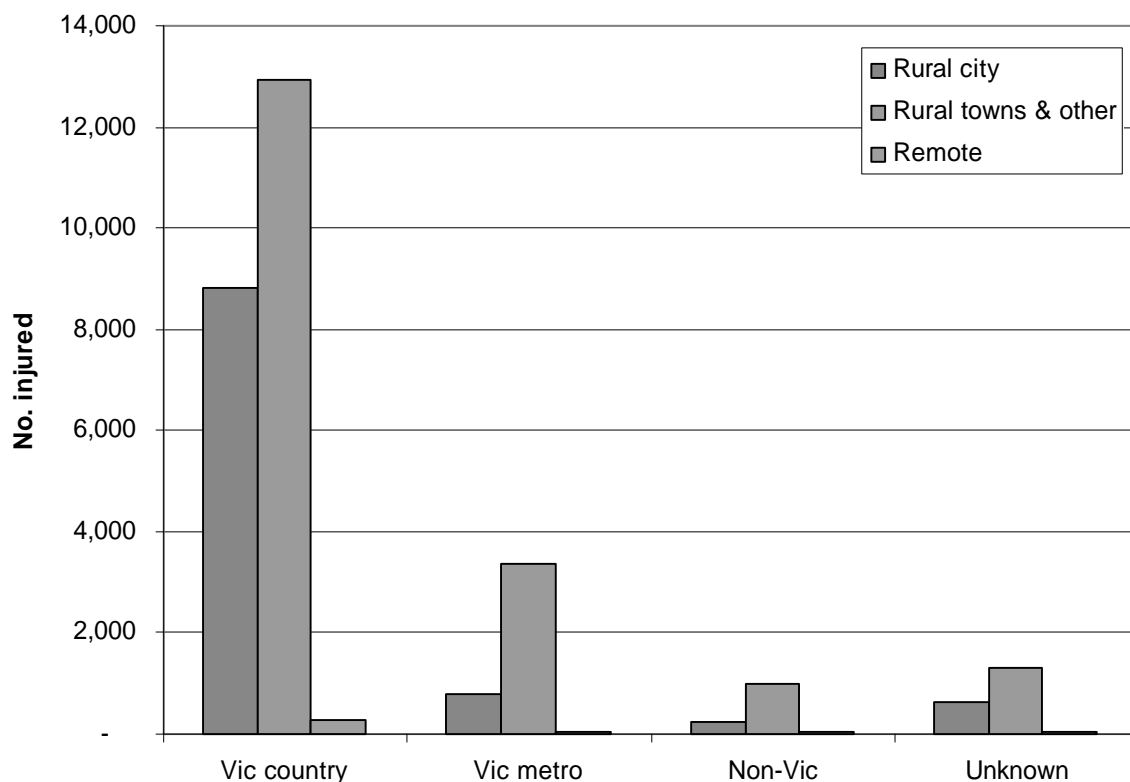


Figure 4.7 Number of drivers in casualty crashes in each type of rural area according to postcode of residence. Victoria 1997-2001.

4.6 USE OF SEATBELTS

The use of seatbelts is examined separately for drivers and passengers involved in casualty crashes in the sections that follow. However, the percentages not wearing a seatbelt as recorded by Police are likely to be underestimates. Accordingly, data are also presented for seatbelt use among drivers and passengers who were killed, as this data is likely to be more accurate.

4.6.1 Drivers

Overall, 86% of drivers were coded as having worn a seatbelt at the time of the crash. The pattern of seatbelt use differed significantly across the three types of rural areas ($\chi^2(6)=79.1$, $p<.001$), with seatbelt use being similar in rural cities and in rural towns & other areas (87% and 86% of drivers) but lower in remote areas (78%).

Only 59% of fatally injured drivers were coded as having worn a seatbelt at the time of the crash. Seatbelts were least likely to be worn in remote areas (48% of the crashes where a driver was killed) than in rural cities and in rural towns & other areas (57% and 59% of fatally injured drivers respectively), however the difference was not statistically significant. Surprisingly, the percentage of fatally injured drivers where seatbelt use was unknown was higher than for all drivers in casualty crashes.

4.6.2 Passengers

Overall, 85% of passengers were coded as having worn a seatbelt and 2% were coded as wearing a child restraint at the time of the crash. This is an equivalent wearing rate to that found for drivers in the previous section. The rate of seatbelt use was similar in rural cities and in rural towns & other areas (85% of passengers) but lower in remote areas (73%), where seatbelt use status was unknown for 26% of crashes.

A seatbelt was worn in 56% of crashes where the passenger was killed. Seatbelts were most likely to be worn in remote areas (71% of the crashes where a passenger was killed) than in rural cities and in rural towns & other areas (49% and 57% of fatally injured passengers respectively), however the difference was not statistically significant. As for drivers, seatbelt use was unknown for a larger proportion of killed passengers than for passengers in casualty crashes as a whole.

4.7 USE OF MOTORCYCLE HELMETS

The percentage of motorcycle riders involved in crashes who were recorded by Police as not wearing a helmet is likely to be an underestimate, with the most accurate figures applying to those fatally injured. The information regarding helmets use was missing for 29% of motorcycle riders in crashes in rural Victoria. Helmets were recorded as worn by 68% of riders and in only 2% of crashes were helmets not worn. The pattern of helmet wearing differed significantly between rural cities and rural & remote areas ($\chi^2(3)= 31.3$, $p<.001$). The wearing rate was lower and the unknown rate was higher in rural cities than in rural & remote areas. This was true at each level of injury severity.

4.8 SUMMARY

Drivers and passengers comprised the largest numbers of road users in crashes in rural Victoria in 1997-2001 but pedestrians, bicyclists and motorcyclists were more severely

injured, on average. The severity of injury was generally higher in rural & remote areas compared with rural cities.

Under 25 year olds comprised the largest group of road users involved in crashes and many of these were passengers. The largest group of drivers in crashes were those aged 25 to 39. The proportion of crashes that were single vehicle crashes (not involving a pedestrian) was greatest for drivers aged under 25 and decreased with driver age. Conversely, involvement in multi vehicle crashes increased with age.

More males than females were involved in crashes in rural Victoria and males were more severely injured, on average, than females. There were more males than females for all road user groups except passengers.

4.8.1 Differences between types of rural areas

Given the different mix of speed zones across rural areas, the characteristics of road users in crashes in rural cities, rural towns and other areas and remote areas were compared. The comparisons were influenced by the likelihood that less severe crashes may have been less likely to be reported in rural towns and other areas and (particularly) remote areas.

The following characteristics were **more** common in crashes in rural cities:

- Pedestrians
- Females involved
- Pedestrians or bicyclists involved

The following characteristics were **more** common in crashes in remote areas:

- Persons aged 60 and over involved
- Not wearing a seatbelt

The road users in crashes in rural cities were **less** likely than road users in other rural areas to be passengers or motorcyclists.

The road users in crashes in remote areas were **less** likely than road users in other rural areas to be aged under 25.

4.8.2 Alcohol in crashes

Blood Alcohol Concentration (BAC) values had particularly high numbers of unknowns in the 2000 and 2001 data. Accordingly, analyses of alcohol involvement in crashes was limited to the three years 1997, 1998 and 1999, where the data were more complete for fatally injured road users (but still most values were missing for those not fatally injured).

For each of the analyses for drivers, motorcycle riders and pedestrians, the percentage of missing values was lowest for fatally injured individuals. Overall, 22% of fatally injured drivers had a BAC of 0.05 or greater, for fatally injured riders the figure was 10%, and 33% of fatally injured pedestrians had a BAC of 0.05 or higher. In each case there seemed to be little difference in alcohol involvement between rural cities and rural & remote areas.

In an alternative approach to examining the role of alcohol in crashes, crashes in high and low alcohol hours were compared. The percentage of crashes that occurred in high alcohol

hours was higher for pedestrians (44%), than drivers (38%) and motorcycle riders (38%). For drivers, the percentage of crashes that occurred in high alcohol hours was lowest in rural cities, intermediate in rural towns & other areas and highest in remote areas. For motorcycle riders and pedestrians, the data showed the same pattern but the differences were not statistically significant. These findings suggest that alcohol involvement in crashes is potentially more of a problem in remote areas. Alternatively, some of this pattern may reflect the overlap of high alcohol hours with those hours in which fatigue-related crashes (or collisions with animals) are more likely.

4.8.3 Local and non-local drivers

More than one-third of drivers lived in the same postcode as the crash occurred and over 75% of drivers lived in rural Victoria. Only 14% of drivers lived in the Victorian metropolitan area. Drivers in crashes in rural cities were more likely to be country drivers than were drivers in crashes in other rural areas. Drivers in crashes in remote areas were more likely to have non-Victorian postcodes than drivers in crashes in other rural areas. This may reflect that the remote areas were relatively close to the New South Wales and South Australian borders.

5.0 SUMMARY OF CRASH STATISTICS BY LOCAL GOVERNMENT AREA

This section presents summaries of the casualty crash statistics for 1997-2001 for each of the Local Government Areas (LGAs) in rural Victoria. Table 5.1 summarises the numbers of crashes and numbers of persons injured at each level of severity and the numbers of drivers, motorcyclists and pillion, pedestrians and bicyclists injured. Table 5.2 provides information about the numbers of crashes that were multi vehicle, single vehicle (no pedestrian), involved impacts with poles or trees, and the number of crashes that occurred in low and high alcohol hours. Table 5.3 focuses on the road users involved in crashes and summarises the number of young (under 25) and older (60+) drivers and the number of rural and metropolitan drivers.

Table 5.1 The numbers of crashes and numbers of persons injured and the numbers of drivers, motorcyclists and pillions, pedestrians and bicyclists injured at each level of severity in each rural Local Government Area. Victoria 1997-2001.

Rural area	Municipality	No. crashes				No. persons injured				Drivers & passengers injured				Motorcyclists & pillions injured				Pedestrians injured				Bicyclists injured			
		F	SI	OI	Total	F	SI	OI	Total	F	SI	OI	Total	F	SI	OI	Total	F	SI	OI	Total	F	SI	OI	Total
Cities	Ballarat	18	346	1,043	1,407	18	438	1,605	2,061	15	333	1,370	1,718	-	40	65	105	3	30	74	107	-	35	90	125
	Bendigo	34	379	955	1,368	38	466	1,474	1,978	25	328	1,187	1,540	2	54	88	144	9	35	80	124	2	37	104	143
	Geelong	51	597	2,034	2,682	59	763	2,938	3,760	41	555	2,385	2,981	4	71	159	234	11	94	216	321	3	42	172	217
	Shepparton	24	353	612	989	27	448	997	1,472	21	336	845	1,202	1	57	44	102	4	33	44	81	1	18	53	72
	Wodonga	9	109	284	402	9	126	398	533	9	74	319	402	-	25	30	55	-	20	19	39	-	7	23	30
	Total		136	1,784	4,928	6,848	151	2,241	7,412	9,804	111	1,626	6,106	7,843	7	247	386	640	27	212	433	672	6	139	442
Towns etc	(French Is)	-	-	1	1	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Alpine	10	111	179	300	11	129	276	416	8	65	209	282	1	45	47	93	1	3	10	14	1	16	10	27
	Ararat	9	78	92	179	9	127	177	313	7	112	159	278	1	7	11	19	1	3	3	7	-	4	4	8
	Bass Coast	21	164	248	433	23	256	497	776	16	204	422	642	2	36	44	82	4	8	17	29	1	8	7	16
	Baw Baw	32	247	541	820	33	301	798	1,132	26	198	633	857	3	86	127	216	3	8	27	38	1	6	11	18
	Campaspe	22	195	339	556	25	241	554	820	25	181	462	668	-	25	27	52	-	18	21	39	-	15	39	54
	Cntrl Goldflds	9	63	108	180	9	81	163	253	7	58	138	203	1	7	5	13	1	8	10	19	-	5	10	15
	Colac-Otway	18	183	324	525	21	251	578	850	14	175	451	640	5	60	91	156	1	5	14	20	1	8	15	24
	Corangamite	17	124	192	333	23	167	331	521	21	147	305	473	1	14	14	29	1	4	2	7	-	1	7	8
	Delatite	17	208	304	529	19	255	470	744	16	159	356	531	2	74	78	154	1	6	10	17	-	14	25	39
	East Gipps	39	258	523	820	46	358	859	1,263	37	287	731	1,055	7	43	79	129	2	17	18	37	-	11	28	39
	Gannawarra	7	67	81	155	8	87	134	229	6	73	117	196	-	6	5	11	2	4	2	8	-	3	7	10
	Gleneig	16	102	182	300	18	138	309	465	10	116	265	391	7	9	22	38	1	6	13	20	-	7	9	16
	Golden Pl	20	79	125	224	23	126	195	344	20	111	175	306	1	10	17	28	1	3	-	4	1	2	1	4
	Hepburn	12	83	132	227	13	102	218	333	11	84	191	286	1	12	12	25	1	1	4	6	-	4	4	8
	Horsham	10	97	181	288	12	140	270	422	11	111	218	340	-	13	17	30	-	7	9	16	-	8	26	34
	Indigo	11	107	141	259	11	128	210	349	10	101	184	295	-	21	12	33	-	4	4	8	1	2	7	10
	La Trobe	13	220	809	1,042	14	263	1,230	1,507	8	199	1,057	1,264	-	34	65	99	5	15	44	64	1	15	58	74
	Loddon	7	63	98	168	7	83	161	251	7	77	152	236	-	5	2	7	-	1	3	4	-	-	2	2
	Macedon Rg	26	185	391	602	29	241	613	883	20	191	551	762	3	36	37	76	4	11	14	29	-	3	9	12
	Mildura	14	265	464	743	15	328	738	1,081	8	259	615	882	4	39	45	88	3	14	36	53	-	13	39	52
	Mitchell	29	240	420	689	32	320	668	1,020	27	255	582	864	1	47	46	94	4	16	22	42	-	2	10	12
	Moira	22	148	211	381	26	203	348	577	22	166	301	489	4	18	21	43	-	10	12	22	-	8	12	20
	Moorabool	21	190	288	499	29	256	473	758	24	203	420	647	3	34	31	68	1	13	12	26	1	5	7	13
	Mt Alexander	14	114	177	305	16	167	307	490	11	147	271	429	3	11	15	29	1	3	13	17	1	5	8	14
	Moyn	12	89	123	224	13	117	210	340	11	109	188	308	-	5	12	17	1	-	2	3	1	2	8	11
Murrindindi	32	217	327	576	34	293	520	847	26	193	393	612	8	90	115	213	-	6	4	10	-	2	8	10	

Nthn Gramps	18	101	135	254	25	135	220	380	20	101	175	296	1	24	20	45	4	5	8	17	-	4	12	16
Pyrenees	10	68	70	148	11	90	118	219	10	78	105	193	1	7	10	18	-	3	2	5	-	-	1	1
Queenscliffe	-	12	11	23	-	13	13	26	-	6	10	16	-	2	1	3	-	4	2	6	-	1	-	1
Sth Gipps	26	198	367	591	28	251	651	930	25	195	593	813	3	38	37	78	-	14	5	19	-	3	14	17
Sthn Gramps	13	91	109	213	14	130	195	339	14	99	162	275	-	17	13	30	-	10	9	19	-	4	11	15
Strathbogie	26	93	152	271	33	137	245	415	32	120	227	379	-	11	8	19	1	5	3	9	-	1	7	8
Surf Coast	15	141	309	465	16	177	471	664	10	109	342	461	4	58	94	156	1	6	19	26	1	4	12	17
Swan Hill	9	101	191	301	11	133	308	452	8	108	262	378	1	19	17	37	1	4	13	18	-	2	14	16
Towong	6	66	66	138	6	86	106	198	4	57	84	145	1	27	18	46	1	1	1	3	-	-	1	1
Wangaratta	12	169	232	413	12	211	389	612	6	151	336	493	1	32	18	51	3	8	8	19	2	16	27	45
Warrnambl	5	96	250	351	6	111	376	493	3	66	297	366	-	19	20	39	2	10	25	37	1	15	30	46
Wellington	32	211	479	722	41	274	753	1,068	34	192	620	846	4	65	74	143	2	5	25	32	1	12	34	47
Total	632	5,244	9,372	15,248	722	6,906	15,154	22,782	575	5,263	12,759	18,597	74	1,106	1,327	2,507	54	269	446	769	15	231	534	780
Remote Buloke	6	37	45	88	10	57	68	135	9	54	66	129	-	3	1	4	1	-	-	1	-	-	1	1
Hindmarsh	8	43	46	97	8	54	81	143	7	50	72	129	1	2	3	6	-	1	2	3	-	1	1	2
West Wimm	7	39	37	83	10	52	60	122	10	46	58	114	-	3	2	5	-	-	-	-	-	1	-	1
Yarriambiack	3	36	43	82	4	43	58	105	4	37	50	91	-	4	4	8	-	1	1	2	-	1	3	4
Total	24	155	171	350	32	206	267	505	30	187	246	463	1	12	10	23	1	2	3	6		3	5	8
Grand Total	792	7,183	14,471	22,446	905	9,353	22,833	33,091	716	7,076	19,111	26,903	82	1,365	1,723	3,170	82	483	882	1,447	21	373	981	1,375

Table 5.2 The numbers of crashes that were multi vehicle, single vehicle (no pedestrian), involved impacts with poles or trees, and the number of crashes that occurred in low and high alcohol hours in each rural Local Government Area. Victoria 1997-2001.

Rural area	Municipality	No. multi vehicle crashes				No. single vehicle (no ped) crashes				No. crashes into poles				No. crashes into trees				No. low alc hour crashes				No. high alc hours crashes			
		F	SI	OI	Tot	F	SI	OI	Tot	F	SI	OI	Tot	F	SI	OI	Tot	F	SI	OI	Tot	F	SI	OI	Tot
Cities	Ballarat	13	224	810	1,047	3	92	166	261	2	10	38	50	1	25	25	51	10	199	649	858	8	146	393	547
	Bendigo	13	193	633	839	12	153	245	410		8	23	31	9	63	70	142	13	214	612	839	21	162	341	524
	Geelong	28	337	1,519	1,884	13	174	320	507	2	56	61	119	5	36	69	110	22	308	1,249	1,579	29	286	778	1,093
	Shepparton	14	184	415	613	6	141	164	311		18	18	36	6	48	43	97	10	198	375	583	14	153	236	403
	Wodonga	4	53	196	253	5	40	69	114		6	11	17	1	11	15	27	4	67	184	255	5	42	100	147
	Total	72	991	3,573	4,636	39	600	964	1,603	4	98	151	253	22	183	222	427	59	986	3,069	4,114	77	789	1,848	2,714
Towns etc	(French Is)							1	1							1	1			1	1				
	Alpine	5	30	61	96	4	78	111	193	1	3	1	5	1	18	19	38	7	60	115	182	3	51	64	118
	Ararat	1	23	47	71	7	52	42	101		3	1	4	3	25	12	40	4	51	51	106	5	26	41	72
	Bass Coast	13	94	148	255	4	63	86	153	1	4	4	9	2	23	12	37	9	83	152	244	12	81	95	188
	Baw Baw	13	74	219	306	17	164	298	479	3	6	10	19	9	52	78	139	10	150	339	499	21	97	202	320
	Campaspe	10	86	201	297	12	91	120	223	2	8	7	17	5	28	16	49	9	110	213	332	13	82	126	221
	Cntrl Goldflds	3	19	62	84	5	36	38	79		2	1	3	4	14	7	25	6	25	66	97	3	38	42	83
	Colac-Otway	13	84	127	224	4	95	184	283	1	4	6	11		10	24	34	13	107	203	323	5	76	121	202
	Corangamite	7	37	73	117	9	84	117	210		5	5	10	1	15	16	32	8	62	113	183	8	61	79	148
	Delatite	6	43	107	156	10	160	188	358		2		2	9	36	44	89	13	109	182	304	4	98	118	220
	East Gipps	20	75	223	318	17	169	283	469		4	6	10	11	61	58	130	25	154	337	516	14	103	183	300
	Gannawarra	3	21	34	58	2	44	45	91		2	1	3	1	5	9	15	2	45	44	91	5	22	37	64
	Glenelg	6	37	84	127	9	59	86	154	1	1	4	6	2	31	22	55	7	55	116	178	9	45	66	120
	Golden Pl	8	25	42	75	11	53	83	147	1	2	4	7	3	21	16	40	8	32	58	98	12	44	67	123
	Hepburn	6	30	58	94	6	52	70	128		1	6	7	4	19	14	37	6	50	72	128	6	33	59	98
	Horsham	5	47	108	160	5	46	64	115		4	3	7	5	13	15	33	4	55	120	179	6	41	60	107
	Indigo	4	20	44	68	7	83	93	183		3		3	4	35	33	72	7	56	76	139	4	50	64	118
	La Trobe	4	104	493	601	4	102	274	380		13	20	33		37	75	112	5	116	492	613	8	101	317	426
	Loddon	2	18	25	45	5	44	71	120				2	2	18	25	45	3	28	63	94	4	34	35	73
	Macedon Rg	12	68	185	265	11	107	193	311	1	8	5	14	5	46	64	115	14	99	235	348	12	84	155	251
	Mildura	7	134	313	454	4	119	118	241		7	9	16	2	34	32	68	8	144	293	445	6	118	168	292
	Mitchell	8	67	154	229	19	156	245	420		1	9	10	12	77	84	173	15	132	245	392	14	107	173	294
	Moira	8	58	104	170	14	82	95	191	1	7	4	12	6	31	28	65	10	80	118	208	12	68	92	172
	Moorabool	11	67	122	200	9	111	158	278	1	6	9	16	2	29	37	68	12	101	174	287	9	88	114	211
	Mt Alexander	6	34	86	126	7	78	80	165		2	3	5	5	35	28	68	6	57	117	180	8	55	60	123
	Moyne	6	28	51	85	5	61	70	136		4	3	7		13	5	18	5	49	65	119	5	40	56	101
	Murrindindi	19	62	63	144	13	152	262	427	1	1	4	6	6	45	59	110	17	128	192	337	15	88	133	236

Nthn Gramps	4	34	51	89	10	62	77	149		3	2	5	8	29	30	67	7	61	84	152	11	40	51	102
Pyrenees	4	16	28	48	6	49	40	95					2	18	5	25	3	31	46	80	7	36	24	67
Queenscliffe		4	6	10		4	3	7		1		1		1		1		4	6	10		8	5	13
Sth Gipps	9	71	166	246	17	115	197	329		5	9	14	8	32	50	90	13	121	234	368	13	75	132	220
Sthn Gramps	6	26	52	84	7	56	49	112		5	1	6	3	15	7	25	7	53	60	120	5	38	49	92
Strathbogrie	6	24	60	90	19	66	89	174	1			1	13	32	29	74	13	47	85	145	13	44	67	124
Surf Coast	7	51	125	183	7	84	167	258	3	8	9	20	1	17	30	48	7	73	179	259	8	68	130	206
Swan Hill	3	35	92	130	5	62	86	153		2	3	5	2	19	22	43	5	58	113	176	4	42	76	122
Towong	1	14	12	27	4	51	53	108			2	2	1	8	4	13	4	36	38	78	2	29	27	58
Wangaratta	4	63	134	201	5	98	91	194		2	4	6	4	33	17	54	7	82	144	233	5	85	87	177
Warrnambl	1	59	192	252	2	27	36	65		7	5	12	1	3	5	9	2	56	137	195	3	40	113	156
Wellington	17	75	235	327	13	132	222	367		8	13	21	6	36	51	93	17	120	312	449	15	91	166	272
Total	268	1,857	4,387	6,512	315	3,147	4,585	8,047	18	144	175	337	153	1,014	1,083	2,250	318	2,880	5,690	8,888	309	2,327	3,654	6,290
Remote Buloke	3	8	13	24	2	29	32	63		2	1	3	1	8	7	16	5	22	30	57	1	15	15	31
Hindmarsh	5	9	12	26	3	33	32	68			1	1	2	14	8	24	1	15	24	40	7	28	22	57
West Wimm	5	9	12	26	2	30	25	57					2	18	10	30	4	21	18	43	3	18	19	40
Yarriambiack	2	2	20	24	1	33	22	56		1		1		13	8	21	2	13	29	44	1	23	13	37
Total	15	28	57	100	8	125	111	244	-	3	2	5	5	53	33	91	12	71	101	184	12	84	69	165
Grand Total	355	2,876	8,017	11,248	362	3,872	5,660	9,894	22	245	328	595	180	1,250	1,338	2,768	389	3,937	8,860	13,186	398	3,200	5,571	9,169

Table 5.3 The number of young (under 25) and older (60+) drivers and the number of rural and metropolitan drivers in each rural Local Government Area. Victoria 1997-2001.

Rural area	Municipality	Drivers under 25					Drivers 60+					Rural residing drivers					Metro residing drivers				
		F	SI	OI	NI	Tot	F	SI	OI	NI	Tot	F	SI	OI	NI	Tot	F	SI	OI	NI	Tot
Cities	Ballarat	1	76	253	359	689	6	41	121	137	305	7	217	792	977	1,993	4	15	36	48	103
	Bendigo	2	59	224	250	535	1	35	103	131	270	9	179	657	818	1,663	4	20	44	51	119
	Geelong	5	102	409	581	1,097	5	54	228	244	531	17	322	1,331	1,848	3,518	5	25	158	268	456
	Shepparton	4	70	160	161	395	3	45	76	70	194	14	201	485	539	1,239	1	20	28	35	84
	Wodonga	1	12	67	89	169	2	5	20	31	58	5	39	162	215	421		4	2	6	12
	Total		13	319	1,113	1,440	2,885	17	180	548	613	1,358	52	958	3,427	4,397	8,834	14	84	268	408
Towns etc	(French Is)																				
	Alpine	1	11	34	27	73	1	4	13	12	30	3	28	80	72	183		2	23	16	41
	Ararat		13	27	19	59	2	11	12	14	39	4	34	70	57	165		10	10	8	28
	Bass Coast	2	36	59	55	152	2	35	33	44	114	6	89	130	132	357	4	37	75	87	203
	Baw Baw	4	35	127	89	255	5	18	54	39	116	12	100	324	240	676	5	20	45	44	114
	Campaspe	7	30	82	76	195	1	28	38	51	118	11	106	225	238	580	3	12	20	27	62
	Cntrl Goldflds	1	8	29	28	66	2	10	15	10	37	5	33	78	78	194		4	8	4	16
	Colac-Otway	1	25	64	44	134	4	18	18	25	65	11	71	180	143	405		16	35	41	92
	Corangamite	3	23	57	25	108	2	24	19	15	60	12	84	151	83	330		9	15	17	41
	Delatite	4	20	43	34	101	2	18	41	30	91	8	49	125	118	300	4	31	42	36	113
	East Gipps	6	33	94	71	204	4	25	88	63	180	14	110	302	275	701	6	21	81	48	156
	Gannawarra	2	20	20	15	57	1	8	10	7	26	3	42	56	48	149		5	4	7	16
	Glenelg		21	35	37	93	2	15	18	22	57	4	48	109	117	278	1	7	7	4	19
	Golden Pl	4	14	35	15	68	8	7	13	8	36	15	57	99	60	231	2	3	10	2	17
	Hepburn		19	36	16	71	3	12	15	9	39	6	50	94	70	220	2	6	17	10	35
	Horsham	1	12	38	45	96	1	12	14	17	44	4	45	118	124	291		8	14	10	32
	Indigo	2	19	42	15	78	2	15	13	12	42	3	53	88	58	202	2	6	9	4	21
	La Trobe	3	28	234	166	431		23	64	71	158	5	117	590	620	1,332		7	40	30	77
	Loddon		20	26	11	57	4	8	15	6	33	5	44	80	27	156		6	6	13	25
	Macedon Rg	3	40	108	53	204	4	15	46	31	96	7	31	105	89	232	5	85	249	169	508
	Mildura		36	91	116	243	2	34	63	79	178	5	125	287	395	812		9	18	21	48
	Mitchell	4	39	102	53	198	2	22	44	29	97	11	72	128	133	344	10	74	158	112	354
	Moira	6	30	44	35	115	7	22	22	23	74	12	80	144	121	357	4	9	23	17	53
	Moorabool	3	39	71	43	156	1	16	24	23	64	8	69	92	66	235	5	64	152	123	344
	Mt Alexander	1	27	41	24	93	3	16	21	23	63	5	65	136	112	318	1	16	22	17	56
	Moyne	3	25	47	15	90	2	8	13	9	32	9	62	101	53	225		6	12	3	21
	Murrindindi	2	31	60	33	126	6	24	30	7	67	6	40	74	50	170	10	61	124	67	262
Nthn Gramps	5	17	35	23	80	1	13	10	7	31	14	40	73	74	201	1	12	19	9	41	
Pyrenees		18	13	9	40	3	10	7	11	31	7	40	35	40	122		9	14	5	28	

Queenscliffe		1	1	4	6			2	4	6		4	3	12	19			1	2	3
Sth Gipps	6	36	104	48	194	3	23	52	34	112	14	95	307	165	581	4	17	58	34	113
Sthn Gramps	3	24	36	23	86	5	11	17	14	47	11	41	75	76	203	1	6	4	7	18
Strathbogie	3	11	39	14	67	5	11	17	16	49	9	30	71	59	169	4	28	40	23	95
Surf Coast	4	20	62	55	141	1	7	15	24	47	6	47	135	133	321	1	10	43	56	110
Swan Hill	3	18	45	36	102	2	9	17	32	60	4	46	127	120	297		5	10	6	21
Towong		5	20	2	27		7	3	3	13	3	18	32	11	64		4	7	3	14
Wangaratta	2	23	62	44	131		18	29	37	84	2	71	158	153	384	2	9	16	15	42
Warrnambl	1	20	66	81	168		10	21	34	65	2	44	163	253	462			6	9	15
Wellington	6	30	103	83	222	6	28	56	36	126	20	87	306	261	674	4	19	60	33	116
Total	96	877	2,232	1,582	4,787	99	595	1,002	931	2,627	286	2,267	5,451	4,936	12,940	81	653	1,497	1,139	3,370
Remote Buloke	1	5	7	6	19	1	7	12	3	23	5	17	32	12	66	1	8	7	4	20
Hindmarsh	2	8	15	2	27	4	7	3	4	18	5	19	32	17	73	1	11	2	2	16
West Wimm	1	8	7	1	17	3	4	5	3	15	4	18	29	13	64		3	2	4	9
Yarriambiack	1	9	10	6	26	1	3	7	5	16	3	24	28	21	76		1	4	4	9
Total	5	30	39	15	89	9	21	27	15	72	17	78	121	63	279	2	23	15	14	54
Grand Total	114	1,226	3,384	3,037	7,761	125	796	1,577	1,559	4,057	355	3,303	8,999	9,396	22,053	97	760	1,780	1,561	4,198

6.0 SUMMARY AND CONCLUSIONS

This report aimed to provide a basis for future policy and program development by RACV that specifically relates to rural roads and road users. The report has provided a detailed overview of road trauma occurring on rural Victorian roads.

The report has provided a snapshot of the rural road trauma problem. Comparisons with road trauma in the metropolitan area have not been made and trends have not been presented. Estimation of crash and injury risks on a population or distance travelled basis was beyond the scope of this project.

The overview of crash statistics provided in this report should assist RACV in developing future policies and programs to improve road safety on rural Victorian roads.

6.1 CHARACTERISTICS OF RURAL CRASHES

More than 40% of casualty crashes occurred in low speed zones (60 km/h or less) and these crashes may be similar to those occurring in metropolitan areas. However, crash severity was higher in higher speed zones.

Over a third of crashes occurred at intersections but these crashes were less severe, on average. In contrast, crashes on curves made about one-fifth of crashes in rural Victoria but were more severe than crashes on straight sections of road.

Half of the crashes involved more than one vehicle but these crashes were less severe, on average. Single vehicle crashes (not involving a pedestrian) comprised 44% of crashes and pedestrian crashes comprised 6% of crashes.

More than a quarter of the crashes involved an impact with a roadside object, most commonly a tree or a pole. More than half of the crashes with trees and 45% of crashes with poles resulted in fatal or serious injury.

Crashes on divided and undivided (not coded as divided) 100 and 110 km/h sections of road were compared to provide a measure of the effect of road standard on crashes. About 90% of crashes occurred on undivided roads, and these crashes were more likely to result in fatal or serious injury. Surprisingly, divided roads had relatively more multi vehicle crashes than undivided roads which may reflect greater traffic volumes on divided roads, rather than a greater risk of single vehicle crashes on these roads.

Somewhat more crashes occurred on weekend days than weekdays and weekend crashes were more severe. About a quarter of crashes occurred at night (6pm to 6am) but these were more severe than daytime crashes. The most severe crashes were those occurring on weekend nights.

Given the different mix of speed zones across rural areas, the characteristics of crashes in rural cities, rural towns and other areas and remote areas were compared. The comparisons were influenced by the likelihood that less severe crashes may have been less likely to be reported in rural towns and other areas and (particularly) remote areas.

Crashes in rural cities were more likely to involve:

- Low (60 km/h or less) speed zones
- Intersections

- Pedestrians
- Multiple vehicle crashes

Crashes in remote areas were more likely to involve:

- Impacts with roadside objects (particularly trees)
- Night-time (6pm-6am) crashes

Crashes in rural towns & other areas were more likely than crashes in remote areas or rural cities to involve:

- Curves
- Crashes on weekends

6.2 CHARACTERISTICS OF ROAD USERS IN RURAL CRASHES

Drivers and passengers comprised the largest numbers of road users in crashes in rural Victoria in 1997-2001 but pedestrians, bicyclists and motorcyclists were more severely injured, on average. The severity of injury was generally higher in rural & remote areas compared with rural cities.

Under 25 year olds comprised the largest group of road users involved in crashes and many of these were passengers. The largest group of drivers in crashes were those aged 25 to 39. The proportion of crashes that were single vehicle crashes (not involving a pedestrian) was greatest for drivers aged under 25 and decreased with driver age. Conversely, involvement in multi vehicle crashes increased with age.

More males than females were involved in crashes in rural Victoria and males were more severely injured, on average, than females. There were more males than females for all road user groups except passengers.

Given the different mix of speed zones across rural areas, the characteristics of road users in crashes in rural cities, rural towns and other areas and remote areas were compared. The comparisons were influenced by the likelihood that less severe crashes may have been less likely to be reported in rural towns and other areas and (particularly) remote areas.

Road users in crashes in rural cities were more likely to be:

- Pedestrians
- Females
- Pedestrians or bicyclists

Road users in crashes in remote areas were more likely to be:

- Persons aged 60 and over
- Not wearing a seatbelt

Road users in crashes in rural cities were **less** likely than road users in other rural areas to be passengers or motorcyclists.

Road users in crashes in remote areas were **less** likely than road users in other rural areas to be aged under 25.

Information about Blood Alcohol Concentration (BAC) was poorly recorded, with the majority of values for non-fatally injured drivers and riders being missing. Overall, 22% of fatally injured drivers had a BAC of 0.05 or greater, for fatally injured riders the figure was 10%, and 33% of fatally injured pedestrians had a BAC of 0.05 or higher. In each case there seemed to be little difference in alcohol involvement between rural cities and rural & remote areas.

In an alternative approach to examining the role of alcohol in crashes, crashes in high and low alcohol hours were compared. The percentage of crashes that occurred in high alcohol hours was higher for pedestrians (44%), than drivers (38%) and motorcycle riders (38%). For drivers, the percentage of crashes that occurred in high alcohol hours was lowest in rural cities, intermediate in rural towns & other areas and highest in remote areas. For motorcycle riders and pedestrians, the data showed the same pattern but the differences were not statistically significant. These findings suggest that alcohol involvement in crashes is potentially more of a problem in remote areas. Alternatively, some of this pattern may reflect the overlap of high alcohol hours with those hours in which fatigue-related crashes (or collisions with animals) are more likely.

More than one-third of drivers lived in the same postcode as the crash occurred and over 75% of drivers lived in rural Victoria. Only 14% of drivers lived in the Victorian metropolitan area. Drivers in crashes in rural cities were more likely to be country drivers than were drivers in crashes in other rural areas. Drivers in crashes in remote areas were more likely to have non-Victorian postcodes than drivers in crashes in other rural areas. This may reflect that the remote areas were relatively close to the New South Wales and South Australian borders.

REFERENCES

Rogerson, P.A., Newstead, S.V., & Cameron, M.H. (1994). *Evaluation of the speed camera program in Victoria 1990-1991. Phase 3: Localised effects on casualty crashes and crash severity. Phase 4: General effects on speed* (Report No. 54). Melbourne: Monash University Accident Research Centre.

Victorian Parliamentary Road Safety Committee (2002). *Inquiry into rural road safety and infrastructure*. Melbourne, Australia: Victorian Government Printer.

APPENDIX 1: CHAPTER 3 DATA TABLES

Table A3.1 Number of casualty crashes at each level of severity in each area of rural Victoria. 1997-2001.

Crash severity	Rural city	Rural towns & other	Remote	Total
Fatal	136	632	24	792
	2	4	7	4
Serious injury	1,784	5,244	155	7,183
	26	34	44	32
Other injury	4,928	9,372	171	14,471
	72	61	49	64
Total	6,848	15,248	350	22,446
	100	100	100	100

Table A3.2 Number of casualty crashes according to speed zone in each area of rural Victoria. 1997-2001.

Speed zone	Rural city	Rural towns & other	Remote	Total
40 km/h	25	55	1	81
50 km/h	173	330	5	508
60 km/h	4,415	4,542	64	9,021
70 km/h	412	283		695
75 km/h	2	5		7
80 km/h	523	847	12	1,382
90 km/h	46	114		160
100 km/h	1,189	8,261	258	9,708
110 km/h	36	635	9	680
Unknown/missing	27	176	1	204
Total	6,848	15,248	350	22,446

Table A3.3 Number of casualty crashes in low (60 km/h or less), medium (70-90 km/h) and high (100, 110 km/h) speed zones in each area of rural Victoria. 1997-2001.

Speed zone	Rural city	Rural towns & other	Remote	Total
Low	4,613	4,927	70	9,610
	67	32	20	43
Med	983	1,249	12	2,244
	14	8	3	10
High	1,225	8,896	267	10,388
	18	58	76	46
Unknown/missing	27	176	1	204
	0	1	0	1
Total	6,848	15,248	350	22,446
	100	100	100	100

Table A3.4 Number of fatal, serious injury and other injury crashes in low (60 km/h or less), medium (70-90 km/h) and high (100, 110 km/h) speed zones in rural cities and rural & remote areas of Victoria. 1997-2001.

Speed zone		Rural city	Rural & remote areas	Total
Low	Fatal	34	90	124
		1	2	1
	Serious injury	1,034	1,360	2,394
		22	27	25
Other injury	3,545	3,547	7,092	
	77	71	74	
	Total	4,613	4,997	9,610
		100	100	100
Med	Fatal	32	39	71
		3	3	3
	Serious injury	262	411	673
		27	33	30
Other injury	689	811	1,500	
	70	64	67	
	Total	983	1,261	2,244
		100	100	100
High	Fatal	70	525	595
		6	6	6
	Serious injury	477	3,555	4,032
		39	39	39
Other injury	678	5,083	5,761	
	55	55	55	
	Total	1,225	9,163	10,388
		100	100	100
Unknown/missing	Fatal	0	2	2
		0	1	1
	Serious injury	11	73	84
		41	41	41
Other injury	16	102	118	
	59	58	58	
	Total	27	177	204
		100	100	100

Table A3.5 Number of fatal, serious injury and other injury crashes at intersection or not in rural cities or rural & remote areas of Victoria. 1997-2001.

	Crash severity	At intersection	Not at intersection	Total
Rural city	Fatal	40 1	96 3	136 2
	Serious injury	840 23	944 30	1,784 26
	Other injury	2,835 76	2,093 67	4,928 72
	Total	3,715 100	3,133 100	6,848 100
Rural & remote areas	Fatal	121 3	535 5	656 4
	Serious injury	1,339 29	4,060 37	5,399 35
	Other injury	3,176 69	6,367 58	9,543 61
	Total	4,636 100	10,962 100	15,598 100

Table A3.6 Number of fatal, serious injury and other injury crashes on straight and curved sections of road in rural cities and rural and remote areas of Victoria. 1997 to 2001.

	Crash severity	Straight	Curved	Total
Rural city	Fatal	109 2	27 6	136 2
	Serious injury	1,631 26	153 34	1,784 26
	Other injury	4,656 73	272 60	4,928 72
	Total	6,396 100	452 100	6,848 100
Rural & remote areas	Fatal	437 4	219 5	656 4
	Serious injury	3,764 33	1,634 39	5,398 35
	Other injury	7,182 63	2,361 56	9,543 61
	Total	11,383 73	4,214 100	15,597 100

Table A3.7 Number of fatal, serious injury and other injury crashes on straight and curved sections of road not at intersections in rural cities and rural and remote areas of Victoria. 1997 to 2001.

	Crash severity	Straight	Curved	Total
Rural city	Fatal	69	27	96
		3	7	3
	Serious injury	813	131	944
		29	36	30
	Other injury	1,882	211	2,093
		68	57	67
	Total	2,764	369	3,133
		100	100	100
Rural & remote areas	Fatal	335	200	535
		5	5	5
	Serious injury	2,554	1,505	4,059
		36	39	37
	Other injury	4,210	2,157	6,367
		59	56	58
	Total	7,099	3,862	10,961
		100	100	100

Table A3.8 Number of multi vehicle, single vehicle (with pedestrian) and single vehicle (no pedestrian) casualty crashes in each type of rural area. Victoria 1997-2001.

Type of crash	Rural city	Rural towns & other	Remote	Total
Multi vehicle	4,636	6,512	100	11,248
	68	43	29	50
Single vehicle (with ped)	609	689	6	1,304
	9	5	2	6
Single vehicle (no ped)	1,603	8,047	244	9,894
	23	53	70	44
Total	6,848	15,248	350	22,446
	100	100	100	100

Table A3.9 Number of fatal, serious injury and other injury multi vehicle, single vehicle (with pedestrian) and single vehicle (no pedestrian) crashes in rural cities and in rural & remote areas of Victoria. 1997-2001.

	Crash severity	Multi vehicle	Single vehicle (with ped)	Single vehicle (without ped)	Total
Rural city	Fatal	72	25	39	136
		2	4	2	2
	Serious injury	991	193	600	1,784
		21	32	37	26
	Other injury	3,573	391	964	4,928
		77	64	60	72
	Total	4,636	609	1,603	6,848
		100	100	100	100
Rural & remote areas	Fatal	283	50	323	656
		4	7	4	
	Serious injury	1,885	242	3,272	5,399
		29	35	39	35
	Other injury	4,444	403	4,696	9,543
		67	58	57	61
	Total	6,612	695	8,291	15,598
		100	100	100	100

Table A3.10 Numbers of casualty crashes of each DCA group in each type of rural area. Victoria 1997-2001.

DCA groupings	Rural city	Rural towns & other	Remote	Total
Pedestrian	632	712	6	1,350
	9	5	2	6
Multi vehicle				
Adjacent (intersections)	1,459	1,947	28	3,434
	21	13	8	15
Opposing directions	756	1,506	15	2,277
	11	10	4	10
Same direction	1,470	1,445	15	2,930
	22	10	4	13
Manoeuvring	523	689	18	1,230
	8	5	5	6
Overtaking	74	273	8	355
	1	2	2	2
Single vehicle (no pedestrian)				
On path	294	838	15	1,147
	4	6	4	5
Off path (straight)	1,213	4,351	188	5,752
	18	29	54	26
Off path (curve)	362	3,276	48	3,686
	5	22	14	16
Miscellaneous	65	211	9	285
	1	1	3	1
Total	6,848	15,248	350	22,446
	100	100	100	100

Table A3.11 Number of casualty crashes involving impacts with roadside objects in each type of rural area of Victoria. 1997-2001.

Object hit	Rural city	Rural towns & other	Remote	Total
Pole	253	337	5	595
Tree	427	2,250	91	2,768
Fence-wall	131	439	20	590
Embankment	80	846	15	941
Guide post	21	144	10	175
Traffic sign	55	139	4	198
Guard rail	41	230	1	272
Fire hydrant	2	1		3
Building	21	41	1	63
Other fixed	86	487	9	582
Traffic signal	25	10		35
Bridge off path	12	57		69
Barrier	2	6		8
Traffic island	6	10		16
Bridge on path	5	17		22
Road works	1	10		11
Kerb	4	4		8
Total	1,172	5,028	156	6,356

Table A3.12 Number of fatal, serious injury and other injury crashes involving impacts with poles, trees, fence-walls and embankments in rural cities and rural and remote areas of Victoria. 1997-2001.

Object hit	Crash severity	Rural city	Rural & remote areas	Total
Pole	Fatal	4	18	22
		2	5	4
	Serious injury	98	147	245
		39	43	41
	Other injury	151	177	328
		60	52	55
	Total	253	342	595
		100	100	100
Tree	Fatal	22	158	180
		5	7	7
	Serious injury	183	1,067	1,250
		43	46	45
	Other injury	222	1,116	1,338
		52	48	48
	Total	427	2,341	2,768
		100	100	100
Fence-wall	Fatal	5	20	25
		4	4	4
	Serious injury	39	139	178
		30	30	30
	Other injury	87	300	387
		66	65	66
	Total	131	459	590
		100	100	100
Embankment	Fatal	1	24	25
		1	3	3
	Serious injury	30	296	326
		38	34	35
	Other injury	49	541	590
		61	63	63
	Total	80	861	941
		100	100	100

Table A3.13 Number of casualty crashes in 100 and 110 km/h speed zones on divided roads and roads not coded as divided in each type of rural area of Victoria. 1997-2001.

	Rural city	Rural towns & other	Remote	Total
Divided	197	833	5	1,035
	16	9	2	10
Not coded as divided	1,028	8,063	262	9,353
	84	91	98	90
Total	1,225	8,896	267	10,388
	100	100	100	100

Table A3.14 Number of fatal, serious injury and other injury crashes in 100 and 110 km/h speed zones on divided roads and roads not coded as divided in rural cities and rural and remote areas of Victoria. 1997-2001.

	Crash severity	Divided	Not coded as divided	Total
Rural city	Fatal	10	60	70
	Serious injury	73	404	477
	Other injury	114	564	678
	Total	197	1,028	1,225
Rural & remote areas	Fatal	53	472	525
	Serious injury	290	3,265	3,555
	Other injury	495	4,588	5,083
	Total	838	8,325	9,163

Table A3.15 Number of multi-vehicle, single vehicle pedestrian and single vehicle without pedestrian casualty crashes in 100 and 110 km/h speed zones on divided roads and roads not coded as divided in rural Victoria. 1997 to 2001.

Crash type	Divided	Not coded as divided	Total
Multi vehicle	507	2,695	3,202
	49	29	31
Single vehicle (with ped)	13	85	98
	1	1	1
Single vehicle (no ped)	515	6,573	7,088
	50	70	68
Total	1,035	9,353	10,388
	100	100	100

Table A3.16 Number of multi-vehicle, single vehicle pedestrian and single vehicle without pedestrian casualty crashes of each level of severity in 100 and 110 km/h speed zones on divided roads and roads not coded as divided in rural Victoria. 1997 to 2001.

Crash type	Crash severity	Divided	Not coded as divided	Total
Multi vehicle	Fatal	30	237	267
		6	9	8
	Serious injury	158	1,018	1,176
		31	38	37
	Other injury	319	1,440	1,759
		63	53	55
	Total	507	2,695	3,202
		100	100	100
Single vehicle (with ped)	Fatal	5	15	20
		39	18	20
	Serious injury	3	44	47
		23	52	48
	Other injury	5	26	31
		39	31	32
	Total	13	85	98
		100	100	100
Single vehicle (no ped)	Fatal	28	280	308
		5	4	4
	Serious injury	202	2,607	2,809
		39	40	40
	Other injury	285	3,686	3,971
		55	56	56
	Total	515	6,573	7,088
		100	100	100

Table A3.17 Number of crashes on each day of the week in each type of rural area. Victoria 1997-2001.

Day of Week	Rural city	Rural towns & other	Remote	Total
Sunday	809	2,709	52	3,570
Monday	884	1,914	40	2,838
Tuesday	923	1,782	43	2,748
Wednesday	988	1,864	62	2,914
Thursday	1,058	2,038	40	3,136
Friday	1,230	2,352	57	3,639
Saturday	956	2,589	56	3,601
Total	6,848	15,248	350	22,446

Table A3.18 Number of fatal, serious injury and other injury crashes in rural Victoria on weekends and weekdays.

Crash severity	Weekend	Weekday	Total
Fatal	264 4	528 4	792 4
Serious injury	2,572 36	4,611 30	7,183 32
Other injury	4,335 61	10,136 66	14,471 65
Total	7,171 100	15,275 100	22,446 100

Table A3.19 Number of fatal, serious injury and other injury crashes on weekends and weekdays in rural cities and in rural & remote areas of Victoria. 1997-2001.

	Crash severity	Weekend	Weekday	Total
Rural city	Fatal	48 3	88 2	136 2
	Serious injury	508 29	1,276 25	1,784 26
	Other injury	1,209 68	3,719 73	4,928 72
	Total	1,765 100	5,083 100	6,848 100
Rural & remote areas	Fatal	216 4	440 4	656 4
	Serious injury	2,064 38	3,335 33	5,399 35
	Other injury	3,126 58	6,417 63	9,543 61
	Total	5,406 100	10,192 100	15,598 100

Table A3.20 Number of fatal, serious injury and other injury daytime (6am-6pm) and night-time (6pm-6am) casualty crashes in rural cities and rural and remote areas of Victoria. 1997-2001.

	Crash severity	Daytime	Night-time	Total
Rural city	Fatal	71	65	136
		1	3	2
	Serious injury	1,184	591	1,775
		24	30	26
	Other injury	3,588	1,329	4,917
		74	67	72
	Total	4,843	1,985	6,828
		100	100	100
Rural & remote areas	Fatal	403	248	651
		4	6	4
	Serious injury	3,707	1,655	5,362
		33	38	35
	Other injury	7,061	2,453	9,514
		63	56	61
	Total	11,171	4,356	15,527
		72	28	100

APPENDIX 2: CHAPTER 4 DATA TABLES

Table A4.1 Number of road users involved in crashes at each level of injury severity in each area of rural Victoria. 1997-2001.

Injury severity	Rural city	Rural towns & other	Remote	Total
Fatal	151 1	722 2	32 4	905 2
Serious injury	2,241 12	6,906 19	206 27	9,353 17
Other injury	7,412 39	15,154 42	267 36	22,833 41
Non-injury	9,077 48	13,429 37	247 33	22,753 41
Total	18,881 100	36,211 100	752 100	55,844 100

Table A4.2 Number of each type of road user involved in casualty crashes in each type of rural area. Victoria 1997-2001.

Road user type	Rural city	Rural towns & other	Remote	Total
Pedestrian	679 4	793 2	6 1	1,478 3
Driver(cars/trucks/etc)	10,495 55	18,595 51	408 54	29,498 52
Passenger(car/truck/bike..)	6,163 32	13,009 36	292 39	19,464 35
Motor cyclist	616 3	2,398 7	23 3	3,037 5
Pillion passenger	52 0	218 1	2 0	272 0
Bicyclist	606 3	810 2	8 1	1,424 3
Other driver(horse/tram/train)	12 0	41 0	1 0	54 0
Other passenger	46 0	29 0	1 0	76 0
Unknown	511 3	627 2	13 2	1,151 2
Total	19,180 100	36,520 100	754 100	56,454 100

Table A4.3 Number of each type of road user involved in casualty crashes at each level of injury severity in each type of rural area. Victoria 1997-2001.

	Injury Level	Rural city	Rural & remote	Total
Pedestrian	Fatal injury	27	55	82
		4	7	6
	Serious injury	212	271	483
		31	34	33
	Other injury	433	449	882
		64	56	60
	Non injury	7	24	31
		1	3	2
	Total	679	799	1,478
		100	100	100
Driver	Fatal injury	70	425	495
		1	2	2
	Serious injury	1,105	3,439	4,544
		11	18	15
	Other injury	3,930	7,947	11,877
		37	42	40
	Non injury	5,390	7,192	12,582
		51	38	43
	Total	10,495	19,003	29,498
		100	100	100
Passenger (car, truck, bike)	Fatal injury	41	180	221
		1	1	1
	Serious injury	521	2,011	2,532
		9	15	13
	Other injury	2,176	5,058	7,234
		35	38	37
	Non injury	3,425	6,052	9,477
		56	46	49
	Total	6,163	13,301	19,464
		100	100	100
Motorcyclist	Fatal injury	7	69	76
		1	3	3
	Serious injury	227	1,023	1,250
		37	42	41
	Other injury	359	1,244	1,603
		58	51	53
	Non injury	23	85	108
		4	4	4
	Total	616	2,421	3,037
		100	100	100

Table A4.3 contd

Pillion Passenger	Fatal injury	0	6	6
		0	3	2
	Serious injury	20	95	115
		39	43	42
	Other injury	27	93	120
		52	42	44
	Non injury	5	26	31
		10	12	11
	Total	52	220	272
		100	100	100
Bicyclist	Fatal injury	6	15	21
		1	2	2
	Serious injury	139	234	373
		23	29	26
	Other injury	442	539	981
		73	66	69
	Non injury	19	30	49
		3	4	3
	Total	606	818	1,424
		100	100	100

Table A4.4 Number of car, articulated truck and rigid truck drivers involved in casualty crashes at each level of injury severity in each type of rural area. Victoria 1997-2001.

	Injury Level	Rural city	Rural & remote areas	Total
Car	Fatal injury	65	379	444
		1	2	2
	Serious injury	1,064	3,172	4,236
		11	18	15
	Other injury	3,835	7,434	11,269
		38	43	41
	Non injury	5,043	6,367	11,410
		50	37	42
	Total	10,007	17,352	27,359
		100	100	100
Artic truck	Fatal injury	1	25	26
		1	3	3
	Serious injury	20	143	163
		10	18	16
	Other injury	38	253	291
		20	31	29
	Non injury	134	385	519
		69	48	52
	Total	193	806	999
		100	100	100
Rigid truck	Fatal injury	0	15	15
		0	3	2
	Serious injury	12	77	89
		7	14	12
	Other injury	33	164	197
		18	31	27
	Non injury	136	281	417
		75	52	58
	Total	181	537	718
		100	100	100

Table A4.5 Number of road users in each age group involved in casualty crashes in each type of rural area. Victoria 1997-2001.

Age categories	Rural city	Rural towns & other	Remote	Total
Under 25	7,152 37	13,424 37	240 32	20,816 37
25-39	4,604 24	9,238 25	175 23	14,017 25
40-59	3,790 20	7,604 21	164 22	11,558 20
60+	2,064 11	3,974 11	110 15	6,148 11
Missing/unknown	1,570 8	2,280 6	65 9	3,915 7
Total	19,180 100	36,520 100	754 100	56,454 100

Table A4.6 Numbers of pedestrians, drivers, passengers, motorcyclists and bicyclists involved in casualty crashes in rural Victoria. 1997-2001.

	Age Categories	Pedestrian	Driver	Passenger	Motor Cyclist	Bicyclist
Rural city	Under 25	304 45	2,885 27	3,319 54	199 32	371 61
	25-39	144 21	3,234 31	785 13	272 44	117 19
	40-59	100 15	2,774 26	666 11	130 21	76 13
	60+	119 18	1,358 13	535 9	11 2	27 4
	Missing/unknown	12 2	244 2	858 14	4 1	15 2
	Total	679 100	10,495 100	6,163 100	616 100	606 100
Rural & remote areas	Under 25	381 48	4,876 26	7,170 54	589 24	480 59
	25-39	129 16	5,857 31	1,990 15	1,175 49	131 16
	40-59	121 15	5,230 28	1,565 12	583 24	132 16
	60+	137 17	2,699 14	1,120 8	55 2	48 6
	Missing/unknown	31 4	341 2	1,456 11	19 1	27 3
	Total	799 100	19,003 100	13,301 100	2,421 100	818 100

Table A4.7 Numbers of male and female road users involved in casualty crashes at each level of injury severity in rural cities and rural & remote areas of Victoria. 1997-2001.

	Crash severity	Female	Male	Unknown	Total
Rural city	Fatal	43	108	-	151
		1	1	-	1
	Serious injury	932	1,309	-	2,241
		12	13	-	12
	Other injury	3,750	3,646	16	7,412
		46	35	4	39
	Non-injury	3,352	5,296	429	9,077
		42	51	96	48
	Total	8,077	10,359	445	18,881
		100	100	100	100
Rural & remote areas	Fatal	226	528	-	754
		2	2	-	2
	Serious injury	2,751	4,358	3	7,112
		19	20	0	19
	Other injury	6,870	8,523	28	15,421
		47	39	4	42
	Non-injury	4,676	8,403	597	13,676
		32	39	95	37
	Total	14,523	21,812	628	36,963
		100	100	100	100

Table A4.8 Numbers of male and female pedestrians, drivers, passengers, motorcyclists and bicyclists involved in casualty crashes in rural Victoria. 1997-2001.

	Person Sex	Pedestrian	Driver	Passenger	Motor Cyclist	Bicyclist
Rural city	Female	309	4,255	3,290	31	94
		46	41	53	5	16
	Male	367	6,029	2,744	582	506
		54	57	45	94	83
	Unknown	3	211	129	3	6
		0	2	2	0	1
	Total	679	10,495	6,163	616	606
		100	100	100	100	100
Rural & remote areas	Female	305	6,964	6,724	109	183
		38	37	51	5	22
	Male	490	11,751	6,384	2,303	629
		61	62	48	95	77
	Unknown	4	288	193	9	6
		1	2	1	0	1
	Total	799	19,003	13,301	2,421	818
		100	100	100	100	100

Table A4.9 Blood alcohol concentration of drivers in crashes at each level of injury severity in rural cities and rural & remote areas of Victoria. 1997-1999.

Injury Level	Type of area	Blood alcohol content			Total
		<0.05	0.05+	Unknown/ missing	
Fatal injury	Rural city	28	9	-	37
		76	24	-	100
	Rural & remote areas	172	53	15	240
		72	22	6	100
	Total	200	62	15	277
		72	22	5	100
Serious injury	Rural city	188	56	372	616
		31	9	60	100
	Rural & remote areas	646	229	971	1,846
		35	12	53	100
	Total	834	285	1,343	2,462
		34	12	55	100
Other injury	Rural city	320	109	2,029	2,458
		13	4	83	100
	Rural & remote areas	687	293	3,999	4,979
		14	6	80	100
	Total	1,007	402	6,028	7,437
		14	5	81	100
Non injury	Rural city	26	39	3,298	3,363
		1	1	98	100
	Rural & remote areas	55	66	4,234	4,355
		1	2	97	100
	Total	81	105	7,532	7,718
		1	1	98	100

Table A4.10 Blood alcohol concentration of motorcycle riders in crashes at each level of injury severity in rural cities and rural & remote areas of Victoria. 1997-1999.

Injury Level	Type of area	Blood alcohol content			Total
		<0.05	0.05+	Unknown/ missing	
Fatal injury	Rural city	5	-	-	5
		100	-	-	100
	Rural & remote areas	31	4	2	37
		84	11	5	100
	Total	36	4	2	42
		86	10	5	100
Serious injury	Rural city	34	7	95	136
		25	5	70	100
	Rural & remote areas	135	36	359	530
		25	7	68	100
	Total	169	43	454	666
		25	6	68	100
Other injury	Rural city	20	13	183	216
		9	6	85	100
	Rural & remote areas	63	22	620	705
		9	3	88	100
	Total	83	35	803	921
		9	4	87	100
Non injury	Rural city	-	-	16	16
		-	-	100	100
	Rural & remote areas	1	2	50	53
		2	4	94	100
	Total	1	2	66	69
		1	3	96	100

Table A4.11 Blood alcohol concentration of pedestrians in crashes at each level of injury severity in rural cities and rural & remote areas of Victoria. 1997-1999.

Injury Level	Rural categories 2	Blood alcohol content			Total
		<0.05	0.05+	Unknown/ missing	
Fatal injury	Rural city	9 50	7 39	2 11	18 100
	Rural & remote areas	17 55	9 29	5 16	31 100
	Total	26 53	16 33	7 14	49 100
Serious injury	Rural city	1 1	3 2	133 97	137 100
	Rural & remote areas	6 5	5 4	122 92	133 100
	Total	7 3	8 3	255 94	270 100
Other injury	Rural city	1 0	2 1	278 99	281 100
	Rural & remote areas	7 3	- -	267 97	274 100
	Total	8 1	2 0	545 98	555 100
Non injury	Rural city			5 100	5 100
	Rural & remote areas			14 100	14 100
	Total			19 100	19 100

Table A4.12 Number of drivers in crashes in high and low alcohol hours in each type of rural area. Victoria 1997-2001.

	Rural city	Rural towns & other	Remote	Total
Low alcohol hours	6,727	11,340	228	18,295
	64	61	56	62
High alcohol hours	3,749	7,194	179	11,122
	36	39	44	38
Total	10,476	18,534	407	29,417
	100	100	100	100

Table A4.13 Number of motorcycle riders in crashes in high and low alcohol hours in each type of rural area. Victoria 1997-2001.

	Rural city	Rural towns & other	Remote	Total
Low alcohol hours	365	1,506	11	1,882
	59	63	48	62
High alcohol hours	249	882	12	1,143
	41	37	52	38
Total	614	2,388	23	3,025
	100	100	100	100

Table A4.14 Number of pedestrians in crashes in high and low alcohol hours in each type of rural area. Victoria 1997-2001.

	Rural city	Rural & remote	Total
Low alcohol hours	385	446	831
	57	56	56
High alcohol hours	292	350	642
	43	44	44
Total	677	796	1,473
	100	100	100

Table A4.15 Number of drivers in casualty crashes in each type of rural area where postcode of residence and postcode of crash matched or did not match. Victoria 1997-2001.

Postcode of driver	Rural city	Rural towns & other	Remote	Total
Postcodes match	3,778	6,479	140	10,397
	36	35	34	35
Postcodes do not match	6,075	10,831	245	17,151
	58	58	60	58
Either/both postcodes missing	642	1,285	23	1,950
	6	7	6	7
Total	10,495	18,595	408	29,498
	100	100	100	100

Table A4.16 Number of drivers in casualty crashes in each type of rural area according to postcode of residence. Victoria 1997-2001.

Postcode of driver	Rural city	Rural towns & other	Remote	Total
Vic country postcode	8,834	12,940	279	22,053
	84	70	68	75
Vic metro postcode	774	3,370	54	4,198
	7	18	13	14
Non-Vic postcode	245	996	52	1,293
	2	5	13	4
Missing/unknown	642	1,289	23	1,954
	6	7	6	7
Total	10,495	18,595	408	29,498
	100	100	100	100

Table A4.17 Number of drivers in casualty crashes in each type of rural area according to seatbelt use. Victoria 1997-2001.

	Rural city	Rural towns & other	Remote	Total
Seatbelt worn	9,090	15,958	317	25,365
	87	86	78	86
Seatbelt not worn	99	324	19	442
	1	2	5	2
Other	31	64	5	100
	0	0	1	0
Unknown	1,275	2,249	67	3,591
	12	12	16	12
Total	10,495	18,595	408	29,498
	100	100	100	100

Table A4.18 Number of fatally injured drivers in casualty crashes in each type of rural area according to seatbelt use. Victoria 1997-2001.

	Rural city	Remote	Rural towns & other	Total
Seatbelt worn	40	11	239	290
	57	48	59	59
Seatbelt not worn	13	8	67	88
	19	35	17	18
Other	-	-	2	2
	-	-	0	0
Unknown	17	4	94	115
	24	17	23	23
Total	70	23	402	495
	100	100	100	100

Table A4.19 Number of passengers in casualty crashes in each type of rural area according to seatbelt use. Victoria 1997-2001.

Seat Belt Use	Rural city	Rural towns & other	Remote	Total
Seatbelt worn	5,150	10,812	204	16,166
	85	85	73	85
Seatbelt not worn	73	294	14	381
	1	2	5	2
Child restraint worn	81	282	3	366
	1	2	1	2
Child restraint not worn	2	12		14
	0	0	0	0
No seatbelt/restraint	34	51		85
	1	0	0	0
Other	39	59		98
	1	0	0	1
Unknown	781	1,487	71	2,339
	13	12	26	12
Total	6,087	12,714	278	19,080
	100	100	100	100

Table A4.20 Number of fatally injured passengers in each type of rural area according to seatbelt use. Victoria 1997-2001.

Seat Belt Use	Rural City	Remote	Rural Towns & Other	Total
Seatbelt Worn	20	5	98	123
	49	71	57	56
Seatbelt Not Worn	7	1	24	32
	17	14	14	14
Child Restraint Worn	-	-	4	4
	-	-	2	2
No Seatbelt/Restraint	-	-	2	2
	-	-	1	1
Not Appropriate	-	-	1	1
	-	-	1	0
Unknown	14	1	44	59
	34	14	25	27
Total	41	7	173	221
	100	100	100	100

Table A4.21 Number of motorcycle riders wearing helmets in casualty crashes in rural cities and rural & remote areas of Victoria. 1997-2001.

	Rural city	Rural & remote areas	Total
Helmet worn	368	1,692	2,060
	60	70	68
Helmet not worn	10	60	70
	2	3	2
Other	6	8	14
	1	0	1
Unknown	232	661	893
	38	27	29
Total	616	2,421	3,037
	100	100	100

Table A4.22 Number of motorcycle riders wearing helmets in crashes of each level of injury severity in rural cities and rural & remote areas of Victoria. 1997-2001.

Injury Level		Other	Helmet worn	Helmet not worn	Unknown	Total
Fatal injury	Rural city	0	5	0	2	7
		0	71	0	29	100
	Rural & remote areas	0	56	6	7	69
		0	81	9	10	100
	Total	0	61	6	9	76
		0	80	8	12	100
Serious injury	Rural city	2	131	7	87	227
		1	58	3	38	100
	Rural & remote areas	7	726	39	251	1,023
		1	71	4	25	100
	Total	9	857	46	338	1,250
		1	69	4	27	100
Other injury	Rural city	4	219	3	133	359
		1	61	1	37	100
	Rural & remote areas	1	851	13	379	1,244
		0	68	1	31	100
	Total	5	1,070	16	512	1,603
		0	67	1	32	100
Non injury	Rural city	0	13	0	10	23
		0	57	0	44	100
	Rural & remote areas	0	59	2	24	85
		0	69	2	28	100
	Total	0	72	2	34	108
		0	67	2	32	100

Table A4.23 Number of male and female drivers in multi vehicle, single vehicle (with pedestrian) and single vehicle (no pedestrian) crashes in rural Victoria 1997-2001.

	Female	Male	Unknown	Total
Multi vehicle	7,970	12,218	386	20,574
	71	69	77	70
Single vehicle (with ped)	402	695	85	1,182
	4	4	17	4
Single vehicle (w/o ped)	2,847	4,867	28	7,742
	25	27	6	26
Total	11,219	17,780	499	29,498
	100	100	100	100

Table A4.24 Age group of drivers in multi vehicle, single vehicle (with pedestrian) and single vehicle (no pedestrian) crashes in rural Victoria 1997-2001.

	Under 25	25-39	40-59	60+	Unknown	Total
Multi vehicle	4,754 61	6,299 69	5,946 74	3,121 77	454 78	20,574 70
Single vehicle (with ped)	293 4	347 4	333 4	120 3	89 15	1,182 4
Single vehicle (w/o ped)	2,714 35	2,445 27	1,725 22	816 20	42 7	7,742 26
Total	7,761 100	9,091 100	8,004 100	4,057 100	585 100	29,498 100

Table A4.25 Drivers' BAC in multi vehicle, single vehicle (with pedestrian) and single vehicle (no pedestrian) crashes in rural Victoria 1997-2001.

	<0.05	0.05+	Unknown	Total
Multi vehicle	1,666 56	338 23	18,570 74	20,574 70
Single vehicle (with ped)	10 0	19 1	1,153 5	1,182 4
Single vehicle (w/o ped)	1,288 43	1,115 76	5,339 21	7,742 26
Total	2,964 100	1,472 100	25,062 100	29,498 100

Table A4.26 Drivers' BAC as a function of gender in multi vehicle, single vehicle (with pedestrian) and single vehicle (no pedestrian) crashes in rural Victoria 1997-2001.

	Female	Male	Unknown	Total
<0.05	1,264 11	1,700 10	- -	2,964 10
0.05+	253 2	1,219 7	- -	1,472 5
Unknown	9,702 86	14,861 84	499 100	25,062 85
Total	11,219 100	17,780 100	499 100	29,498 100

Table A4.27 Drivers in multi vehicle, single vehicle (with pedestrian) and single vehicle (no pedestrian) crashes as a function of gender in rural cities and rural & remote areas of Victoria 1997-2001.

		Female	Male	Unknown	Total
Rural city	Multi vehicle	3,605	4,884	162	8,651
		85	81	77	82
	Single vehicle (with ped)	194	322	42	558
		5	5	20	5
	Single vehicle (w/o ped)	456	823	7	1,286
		11	14	3	12
	Total	4,255	6,029	211	10,495
		100	100	100	100
Rural & remote	Multi vehicle	4,365	7,334	224	11,923
		63	62	78	63
	Single vehicle (with ped)	208	373	43	624
		3	3	15	3
	Single vehicle (w/o ped)	2,391	4,044	21	6,456
		34	34	7	34
	Total	6,964	11,751	288	19,003
		100	100	100	100

Table A4.28 Drivers in multi vehicle, single vehicle (with pedestrian) and single vehicle (no pedestrian) crashes as a function of age group in rural cities and rural & remote areas of Victoria 1997-2001.

		Under 25	25-39	40-59	60+	U/k	Total
Rural city	Multi vehicle	2,218	2,662	2,367	1,211	193	8,651
		77	82	85	89	79	82
	Single vehicle (with ped)	156	167	150	42	43	558
		5	5	5	3	18	5
	Single vehicle (w/o ped)	511	405	257	105	8	1,286
		18	13	9	8	3	12
	Total	2,885	3,234	2,774	1,358	244	10,495
		100	100	100	100	100	100
Rural & remote	Multi vehicle	2,536	3,637	3,579	1,910	261	11,923
		52	62	68	71	77	63
	Single vehicle (with ped)	137	180	183	78	46	624
		3	3	3	3	13	3
	Single vehicle (w/o ped)	2,203	2,040	1,468	711	34	6,456
		45	35	28	26	10	34
	Total	4,876	5,857	5,230	2,699	341	19,003
		100	100	100	100	100	100

Table A4.29 Number of female and male drivers according to recorded BAC level in rural cities and rural & remote areas of Victoria 1997-2001.

	BAC	Female	Male	Unknown	Total
Rural city	<0.05	348	389	-	737
		8	6	-	7
	0.05+	68	328	-	396
		2	5	-	4
	Unknown	3,839	5,312	211	9,362
		90	88	100	89
	Total	4,255	6,029	211	10,495
		100	100	100	100
Rural & remote	<0.05	916	1,311	-	2,227
		13	11	-	12
	0.05+	185	891	-	1,076
		3	8	-	6
	Unknown	5,863	9,549	288	15,700
		84	81	100	83
	Total	6,964	11,751	288	19,003
		100	100	100	100

Table A4.30 Drivers' BAC according to whether it was a multi vehicle, single vehicle (with pedestrian) or single vehicle (no pedestrian) crash in rural cities and rural & remote areas of Victoria 1997-2001.

		<0.05	0.05+	Unknown	Total
Rural city	Multi vehicle	526	139	7,986	8,651
		71	35	85	82
	Single vehicle (with ped)	4	4	550	558
		1	1	6	5
	Single vehicle (w/o ped)	207	253	826	1,286
		28	64	9	12
	Total	737	396	9,362	10,495
		100	100	100	100
Rural & remote	Multi vehicle	1,140	199	10,584	11,923
		51	18	67	63
	Single vehicle (with ped)	6	15	603	624
		0	1	4	3
	Single vehicle (w/o ped)	1,081	862	4,513	6,456
		49	80	29	34
	Total	2,227	1,076	15,700	19,003
		100	100	100	100