University of Southern Queensland
Faculty of Engineering and Surveying

Involvement of Older Drivers at Crashes at Unsignalised and Signalised Intersections

A dissertation submitted by

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towards the degree of

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Abstract

By the year 2044 the population aged over sixty in Australia is predicted to double. The consequences of this increase include a greater cost to the community in road trauma. It is known that elderly drivers have the highest crash rates at intersections, are most likely to be at fault in a crash and have the highest mortality rate in accidents. The cost of crashes will therefore increase disproportionally to the increase in elderly drivers on the road. This research project identifies the likely ways that elderly drivers will cause increased road trauma, based on data from the Toowoomba area compared to that from the rest of Queensland. Toowoomba already has a higher than average proportion of elderly drivers on the road in Queensland, and so it provides an indicator of likely future trends for the rest of the state.

The dissertation quantifies historical trends in intersection crash rates for elderly drivers in Toowoomba and shows how these trends compare to the rest of Queensland and a comparable overseas country (Canada). The causes of accidents in which elderly drivers feature are discussed and include issues such as physical frailty, skill levels and road hazards. The road hazards investigated include traffic control, intersection types, traffic flow, weather conditions, available lighting, pre collision actions and the affects of common driver behaviours. The project concludes that roundabouts are a major frustration for elderly drivers, and one of the most common features in crashes. Our senior drivers also feature prominently in crashes at unsignalised cross intersections.

A major conclusion is that the State should attempt to make unsignalised road intersections friendlier for drivers over sixty, and that this could be done by reducing the number of decision points required when navigating the intersection. For heavily trafficked intersections the use of traffic signals remains the safest design feature for such drivers. It is also argued that there is a need for increased education for older drivers on the need to maintain driving skills and to adapt to their changing

physical capabilities. These programs would best be delivered through workshops and seminars at retirement villages and supermarkets where elderly people tend to be concentrated. Modern communication technologies, based on internet delivery, are not likely to be widely used by the target audience.

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ENG4111 Research Project Part 1 & ENG4112 Research Project Part 2

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I further certify that the work is original and has not been previously submitted for assessment in any other course or institution, except where specifically stated.

Hannah Porter

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Signature

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1. Introduction

1.1 Aims of Project

This project intends to determine if there are differences in the rates of involvement of older drives in crashes at unsignalised and signalised intersections in Toowoomba and to compare these rates with other regions of Queensland. The project also aims to quantify the effects of other influencing factors on crashes (eg. traffic flow, weather) and to identify possible solutions to make intersections safer for older drivers.

As the Australian population ages the risks involved with elderly drivers will increase. There will therefore be a growing need for studies into elderly driver behaviours and crash statistics.

In an analysis of crash rates in New Brunswick Canada, Hildebrand (2000) reported that

> "*There is considerable evidence that elderly drivers perform poorly at intersections particularly rural, unsignalised intersections. Depending on the type of intersection, drivers over 75 years of age are three to five times more apt to be at fault than 30 to50 year old drivers".*

1.2 Objectives of Project

The initial objectives for the project were as follows:

1. Research background information on older drivers, the risks associated with older drivers, crash involvement of older drivers and current Australian laws regarding older drivers.
2. Examine the crash database maintained by Queensland Transport and determine from a preliminary analysis of the data if, from a holistic viewpoint, there appears to be a significant difference between the crash involvement rate for older drivers for different intersection types (unsignalised and signalised) in the Darling Downs region.
3. If, as expected, the crash rates are significantly different, more thoroughly analyse the data to consider the effect of other factors (e.g. time of day, driver age, intersection location, gender of driver, etc) on crash rates.
4. Compare crash rates for the Darling Downs region with other Queensland regional data (e.g. Bundaberg region) to determine regional variations.
5. Compare intersection DCA codes across the Toowoomba region to determine the most common pre action of older drivers in intersections.
6. Report findings in the required oral and written formats.

If time permits:

7. Determine common behaviors of older drivers, (either through a survey of Toowoomba drivers or past research) and determine possible solutions to reduce the crashes due to these behaviours.

1.2 Dissertation Overview

The second chapter of this dissertation is a literature review into the predicted population trends in Australia, some physical and mental characteristics of older drivers, current Australian laws regarding older drivers, techniques to reduce crash rates for older drivers and general crash statistics and driving patterns for elderly drivers.

The third chapter of this dissertation discusses the methodology used when conducting a survey of older driver behaviours and when using the Queensland Transport crash database Webcrash2.

The fourth chapter of this dissertation reports on the results obtained from the driver behaviour survey and WEBCRASH2.

The fifth chapter of this dissertation includes conclusions and areas into which future research could be conducted.

2. Literature Review

2.1 The Ageing Population of Australia

The Australian population, like the population of most of the western world, is ageing (Figure 2.1). *Ageing of the Australian Population* (Australian Government Productivity Commission (2005)) predicts that in a worst case scenario the Australian population aged over sixty-five years will rise from 13% (measured in 2001) to 28.9% by the year 2044. The best case scenario modeling predicts a rise from 13% to 21.4% by 2044 , which is still a double of the 2001 population.

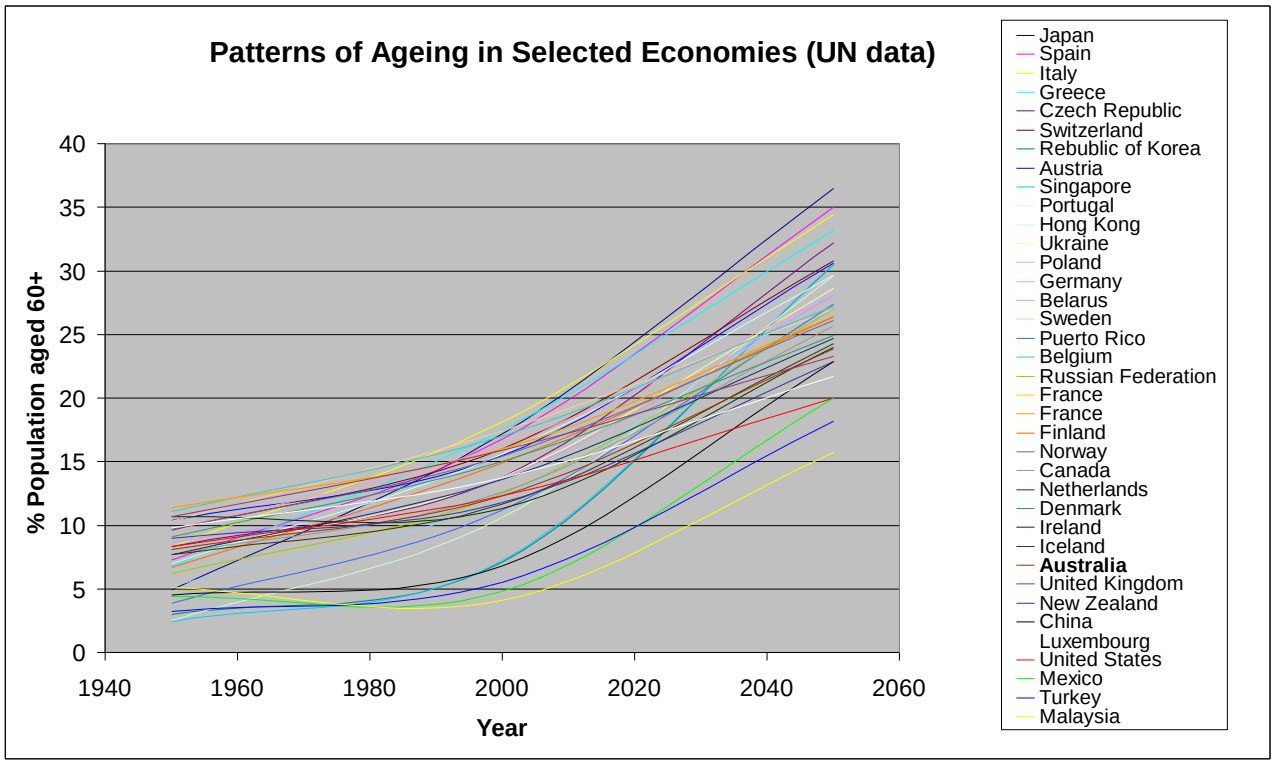

Figure 2.1- World Population Ageing 1950:2050 (United Nations Department of Economic and Social Affairs, 2002)

This increase of the percentage of elderly people in the population has a direct affect on the percentage of drivers aged 65 and above. Previous research has indicated that older drivers can be associated with a higher risk due to decreased physical and mental abilities. This population shift will therefore have an implication upon road safety and design. To ensure that crashes for this age group do not increase there needs to be an understanding into the challenges that older drivers face as well as common driver behaviours and areas in which older drivers are overrepresented in crash statistics.

2.2 Physical and Mental Characteristics of Older Drivers

A study conducted in Japan in 1994 (Characteristics *of Older Road Users and Their Effect on Road Safety*, Mori Y & Mizohata M) assessed various driver related abilities that declined with age. The study suggested that the following factors were the most critical and therefore the most likely to cause an increase in risk as a person aged;

- A loss in vision
    - A decrease in visual acuity, (the ability to resolve detail). Static visual acuity for drivers aged above sixty-five was found to be about 80% of that of a driver in their thirties. Dynamic visual acuity was less than 50% of that of a driver in their thirties. Drivers over sixty-five also had a decrease of 30% visual acuity at night and took a much longer time to recover from glare.
    - A decrease in contrast sensitivity (the ability to distinguish an object from its background).
    - A decrease in peripheral vision

- A loss in some mental abilities
    - A loss in the ability to process and act on information, therefore causing problems when judging and reacting to a hazardous situation.

The reaction time for a driver aged over sixty was found to be 30% longer than a driver in their thirties.

  - A decrease in vigilance while driving
  - A decrease in field dependence (disorientation while driving)

- A loss in physical strength, flexibility and coordination
  - This can cause difficulties when an elderly driver is trying to operate car gears and clutches. A decline in physical factors can also cause a slower reaction time.

2.3 Current Australian Laws Regarding Older Drivers

Currently under Australian law a driver over seventy-five years of age must carry a valid medical certificate stating that they are fit to drive at all times. In 2008 the *Transport Operations (Road Use Management) Act 1995* was amended to include Jets Law. This law makes it compulsory to immediately report any long-term medical condition that may influence a persons driving ability to Queensland Transport rather than on their next license renewal. Upon reporting a medical condition a license may be suspended, cancelled or restricted. People with a restricted license must also carry medical certificates on them at all times.

Penalties for failure to report a medical condition immediately include a maximum fine of $6000 or the suspension of a license. Failure to carry a valid medical certificate can incur penalties of up to $2000.

The introduction of Jet's Law has helped to monitor and reduce the risks involved with older drivers.

To help promote self-regulation in older drivers the Queensland government has established a website informing older drivers of common problems that they may face when driving and information on licensing requirements.

Some of the advice on the Queensland Transport website included;

- Avoid difficult driving situations such as heavy traffic flow or bad weather.
- Avoid making a right hand turn across a busy intersection.
- Be aware that you may have a slower response time drive accordingly.
- Attend a course to keep driving skills current.
- To maintain movement:
    - Exercise, (yoga, Pilates)
    - Invest in power steering, automatic transmission and power brakes
    - Install extra mirrors
- To maintain vision:
    - Get regular two year check ups at the optometrist
    - Avoid driving at night and at twilight.
    - Keep the windscreen clean to avoid glare.

Although all the information on the Queensland Transport website is relevant to older drivers the internet is not the primary method for reaching the elderly population. Improvements could be made by distributing some of the above advice on radio, television or in retirement homes.

2.4 Techniques Implemented in America to Reduce Older Driver Crashes

America has implemented several voluntary workshops for older drivers to help renew their skills and identify areas in which they may have trouble. There are three types of workshops currently available these are:

- Involved Driver Workshops, e.g. *55ALIVE*, these workshops involve the participants to partake in group discussions about good driving practices and methods they can use to decrease risks.

- Self Assessment Workshops, e.g. *Drivers55PLUS*, self assessment workshops involve the driver completing a retraining course with the aim of increased self regulation upon completion.
- Wellness Workshops involve physicians discussing personal information with individual older drivers such as the effect of medication and declining physical abilities on driving.

Rosenbloom (2009) reported on the affects that various safety programs have on older drivers one year after the program has been completed. This paper found no significant trends relating to an improvement of safety however it is theorised that safety programs should significantly increase self regulation among the elderly.

2.5 General Crash Statistics from Canada

The following general crash statistics were obtained from a study conducted in Canada by Hildebrand (2000).

Figure 2.2 shows collision rates for different age groups in New Brunswick Canada. Older drivers (aged 65+) have the second highest overall crash rates. The age group 16-25 has the highest overall crash rates and this is attributed to lack of experience. The increased crashes rates for elderly drivers are attributed to decreased physical and mental abilities.

Drivers aged over 65 also have the highest mortality rate in crashes, (Figure 2.3). This is mostly attributed to the increased fragility of the elderly and is a cause for concern when considering the rate at which the Australian population is ageing.

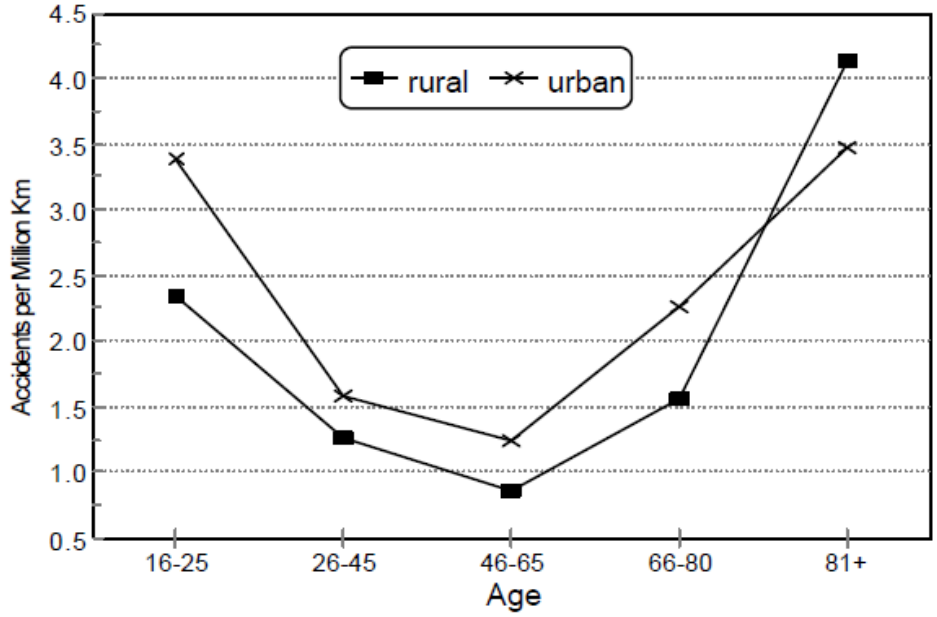

Figure 2.2 Collision Rates for Elderly Drivers, (Hildebrand E, Myrick B, 2001)

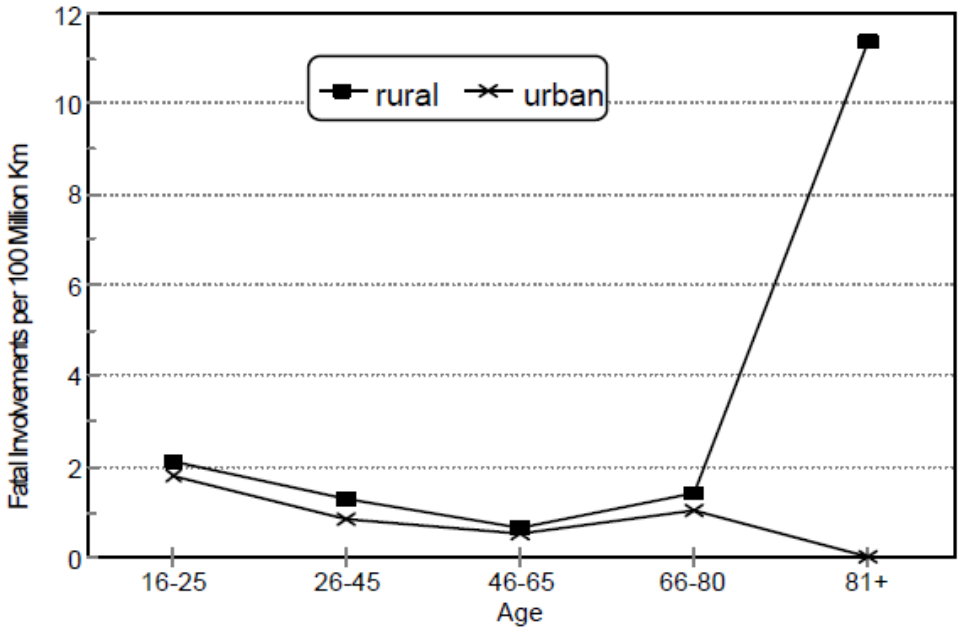

Figure 2.3 Mortality Rates in Crashes, (Hildebrand E, Myrick B, 2001)

Figure 2.4 shows that older drivers in Canada have the highest crash rates at intersections. Figure 2.5 shows the percentage time at which a driver is at fault in

crashes. The age groups 16-19 and 65+ are the most likely to be at fault in an accident.

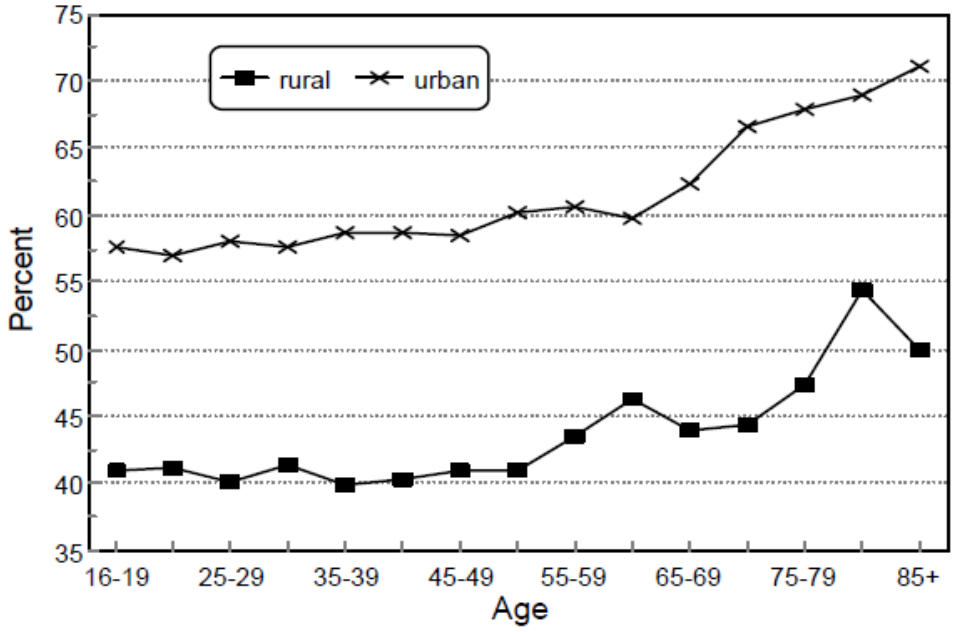

Figure 2.4 Crash Rates at Intersections (Hildebrand E, Myrick B, 2001)

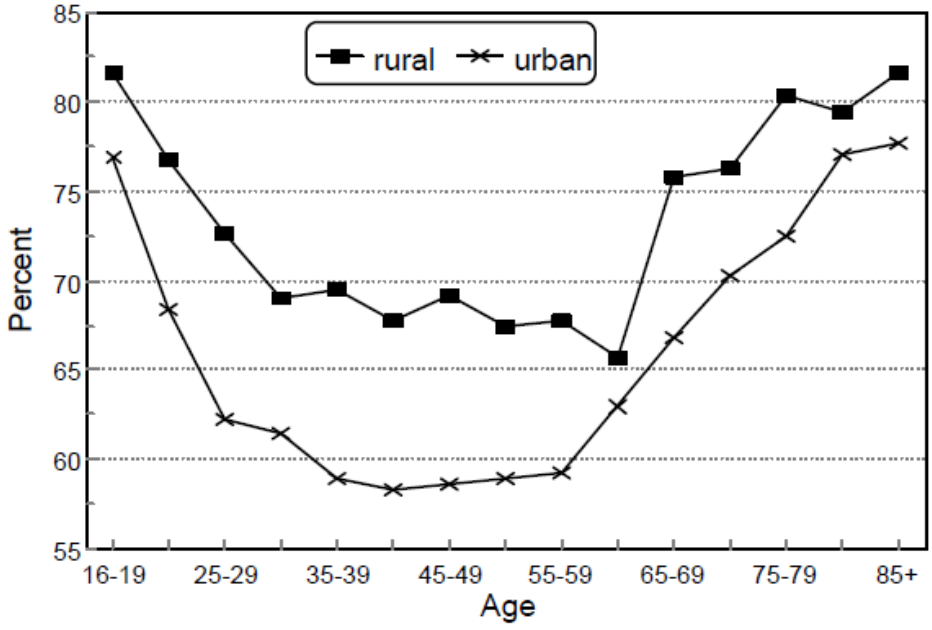

Figure 2.5 Percentage Time at Fault (Hildebrand E, Myrick B, 2001)

3. Methodology

3.1 Driver Behaviour Survey

To determine the affect of driver behaviours on crash statistics a survey on older drivers was conducted in Toowoomba. This survey was very similar to the University of New Brunswick Transportation Group Survey (conducted in 1988 and utilized by Hildebrand in 2001). Questions asked in the survey included:

- How often do you drive during peak traffic?
- How often do you drive at night?
- How confident do you feel driving during wet/ bad weather conditions?
- How many hours do you drive in a week?

A full list of the questions that were distributed can be seen in Appendix B. The full results from the survey are given in Appendix C.

The survey was distributed to the Toowoomba Senior Citizens Society as well as the 50+ group at Toowoomba Community Baptist Church. The majority of respondents were in the age group 60-69. Thirty of the respondents were male and twenty-five female. Any respondents under the age of sixty were not included in the results. Fifty-five surveys were completed in total, forty-three from the senior citizens club and twelve from the church.

The University of New Brunswick Transportation Group Survey included 1342 respondents across all age groups

3.2 WEBCRASH2

WEBCRASH2 is the database used by Queensland Transport to analyse road crashes. Most of the data in WEBCRASH2 is sourced from police reports. Crash characteristics are grouped into four categories; crash, unit, controller and casualty.

Within each of these categories there are various characteristics that will describe a crash. A full list of the defining characteristics can be seen in Appendix D. The WEBCRASH2 database has in excess of 540 defining categories. In the data reviewed for this project there was approximately 3654 records.

All the data obtained from the database was from the years 2004 to 2007 as data for recent years has not yet been completed. The Toowoomba region used in the crash statistics does not therefore include the amalgamated councils, (Figure 3.1).

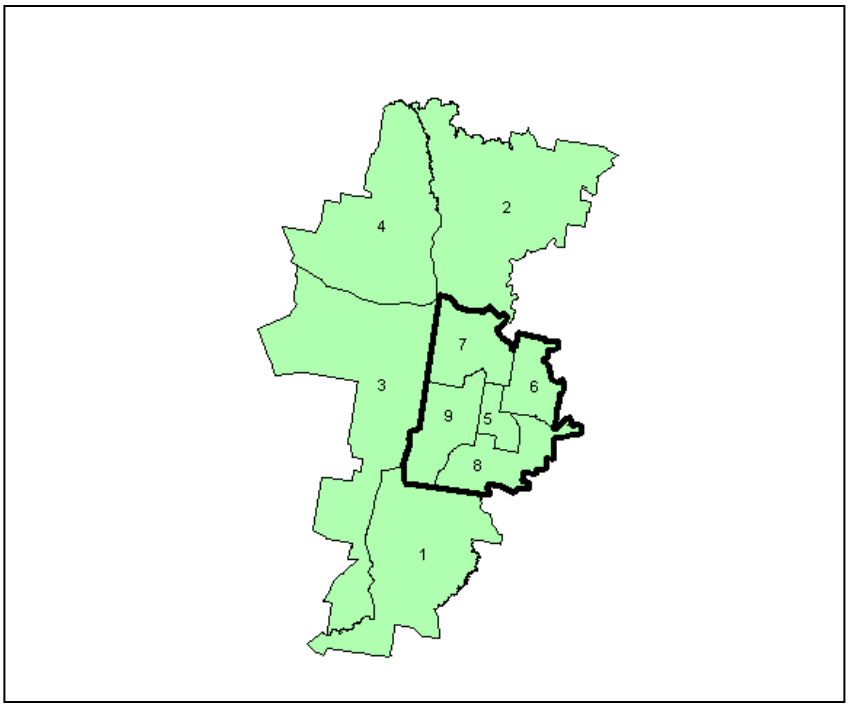

Figure 3.1- Toowoomba region used in results for WEBCRASH2

4. Discussion and Results

4.1 Driver Behaviour Survey Results

Data from the driver behaviour survey indicated that elderly Toowoomba drivers exhibited a lot more confidence than their Canadian counterparts. The majority of elderly Toowoomba drivers were not deterred by difficult driving conditions, (such as bad weather and poor lighting). Poor weather conditions are however significantly worse in Canada during winter. Figure 4.1 shows how often elderly people in Toowoomba drive after dark while Figure 4.2 shows how often the elderly in Canada drive after dark. 84% of respondents in Toowoomba indicated that they drove in the dark sometimes to often while only 50% of respondents in Canada indicated that they drove in the dark sometimes to often. The majority of Toowoomba respondents also indicated high confidence levels while driving at night, (Figure 4.3).

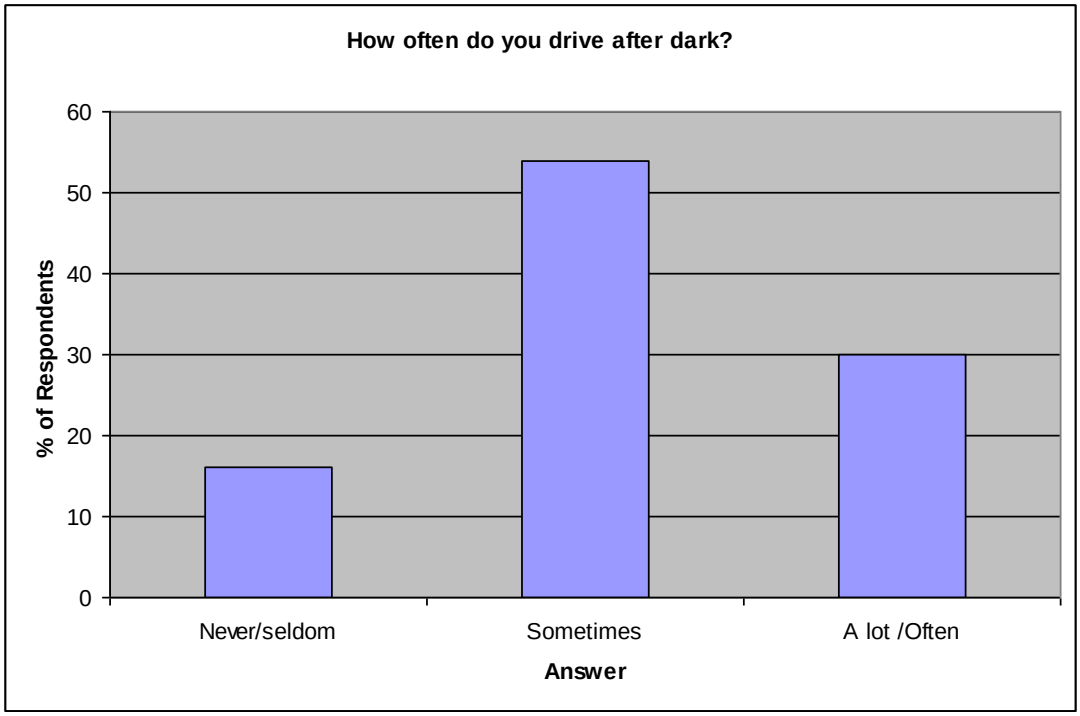

Figure 4.1 Percentages of Older Drivers Who Drive After Dark (Toowoomba)

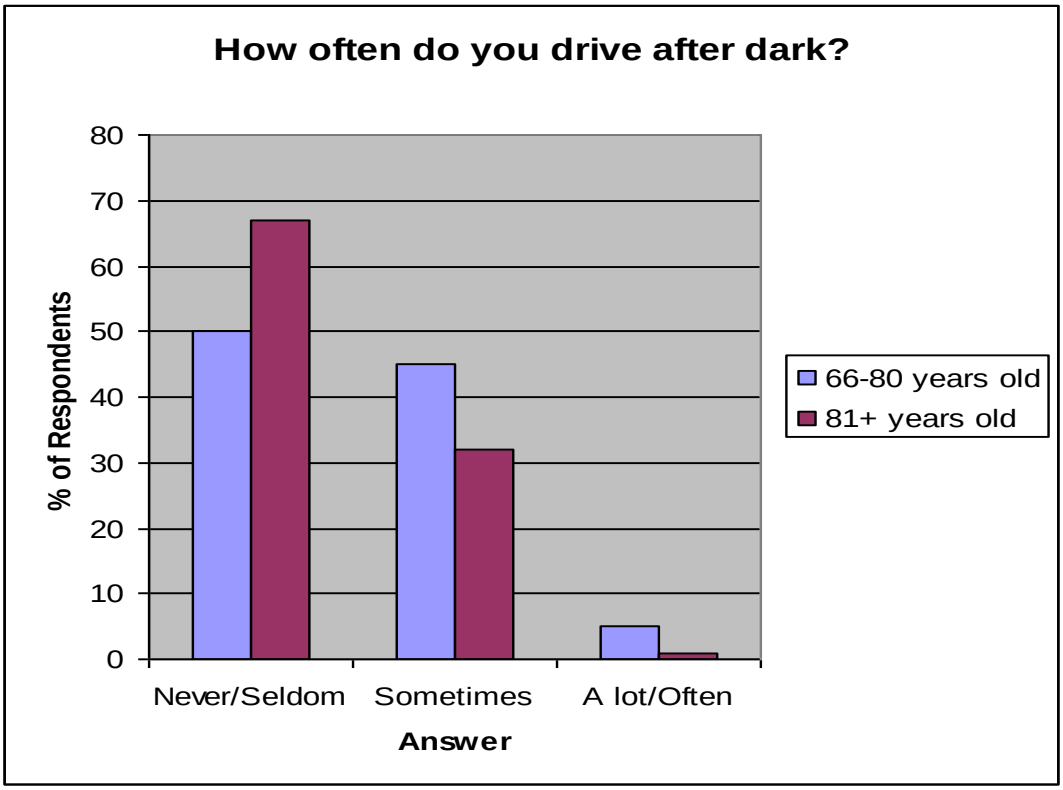

Figure 4.2 Percentages of Older Drivers Who Drive After Dark (Canada, New Brunswick)

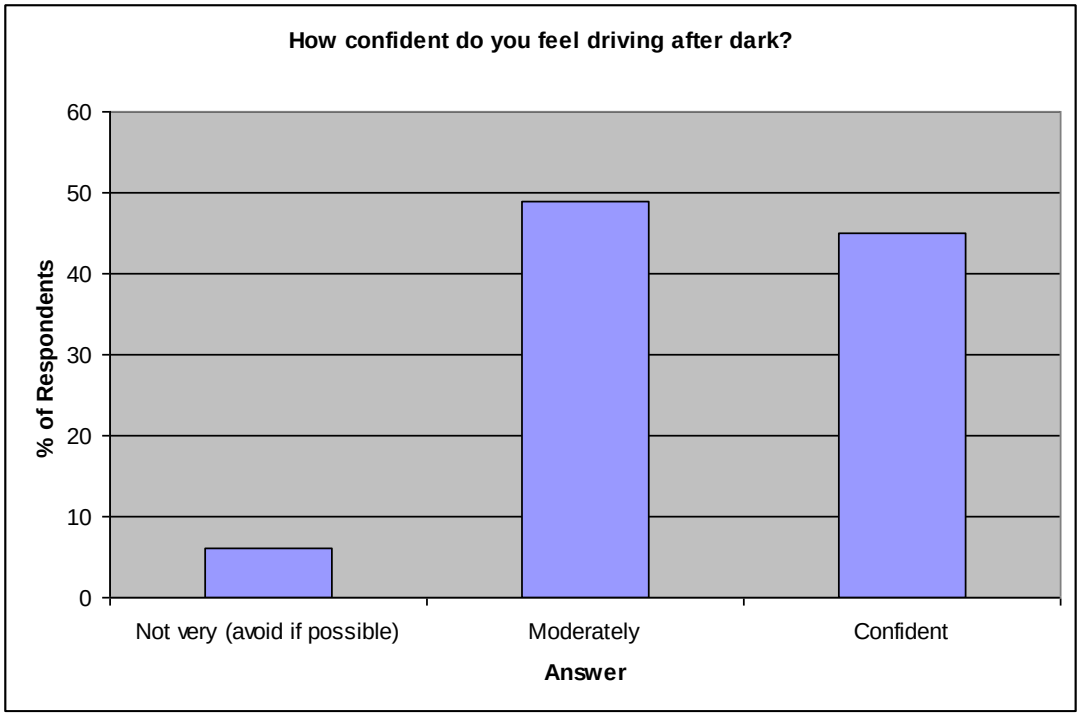

Figure 4.3- Confidence Levels While Driving at Night (Toowoomba)

Figure 4.4 shows how often elderly people in Toowoomba drive during peak traffic while Figure 4.5 shows how often the elderly in Canada drive during peak traffic. 95.9% of respondents in Toowoomba indicated that they drove in peak traffic sometimes to a lot while only 40% of respondents in Canada indicated that they drove during peak traffic hours. The Toowoomba respondents also indicated high levels of confidence when driving during peak traffic (Figure 4.6). 91.5% of respondents in Toowoomba indicated that they were moderately to very confident while driving during peak traffic.

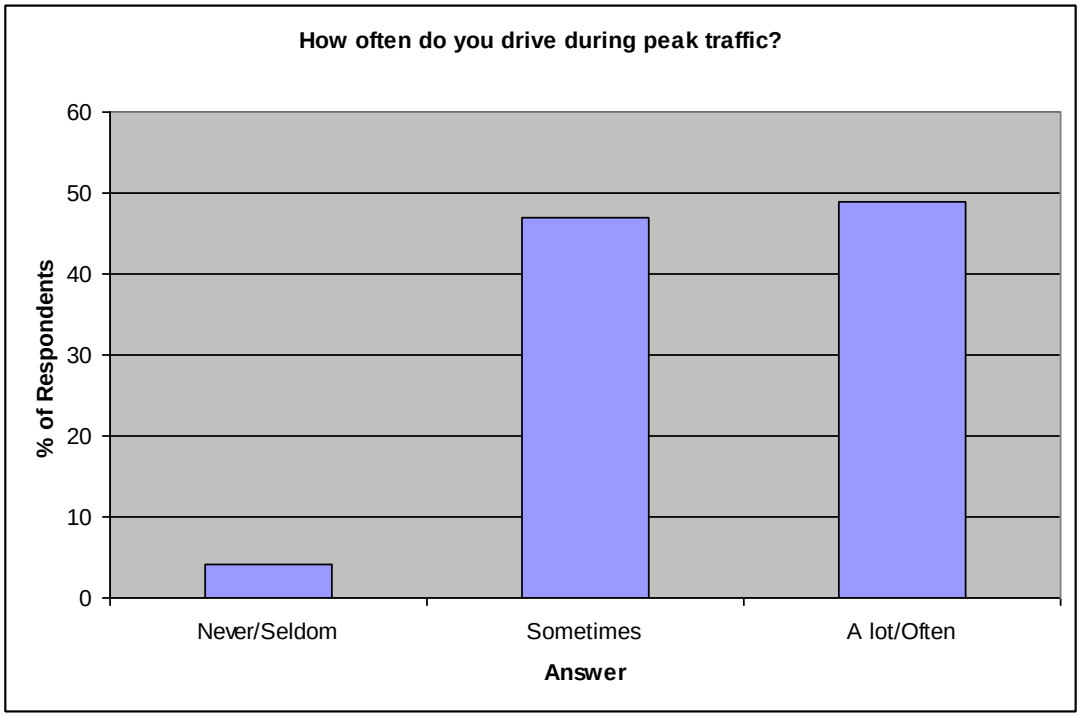

Figure 4.4- Percentages of Elderly Drivers Who Drive During Peak Traffic (Toowoomba)

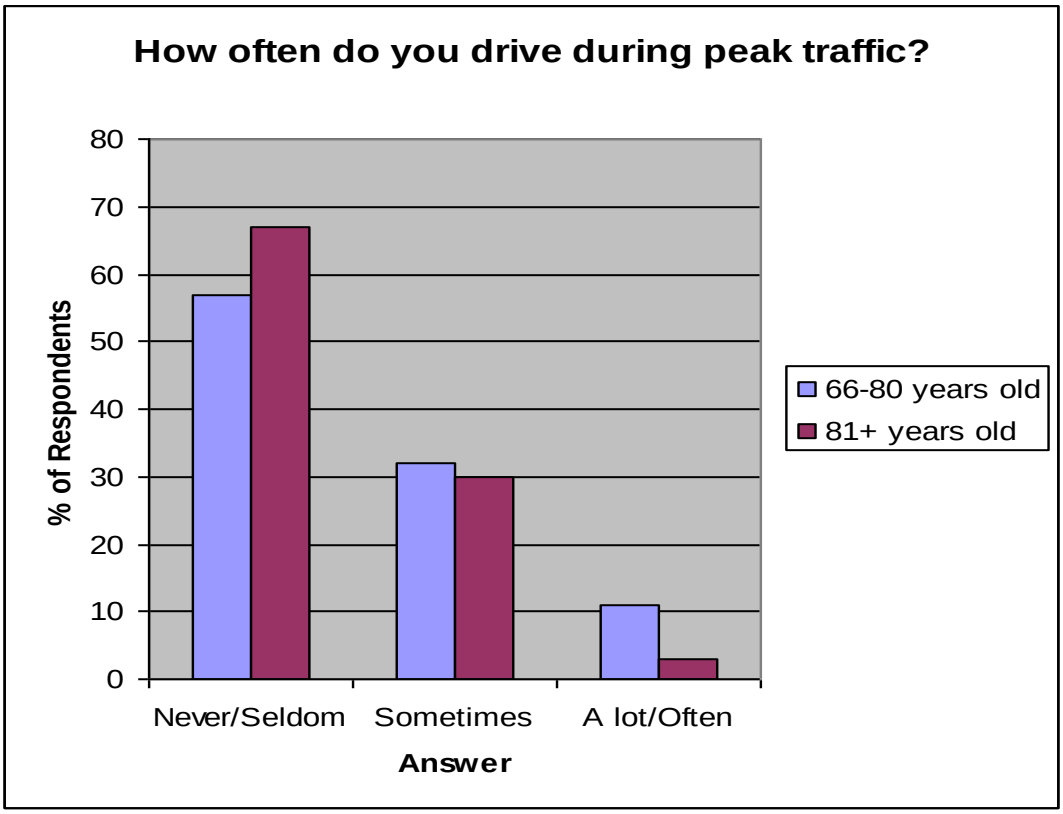

Figure 4.5- Percentages of Elderly Drivers who drive During Peak Traffic (Canada)

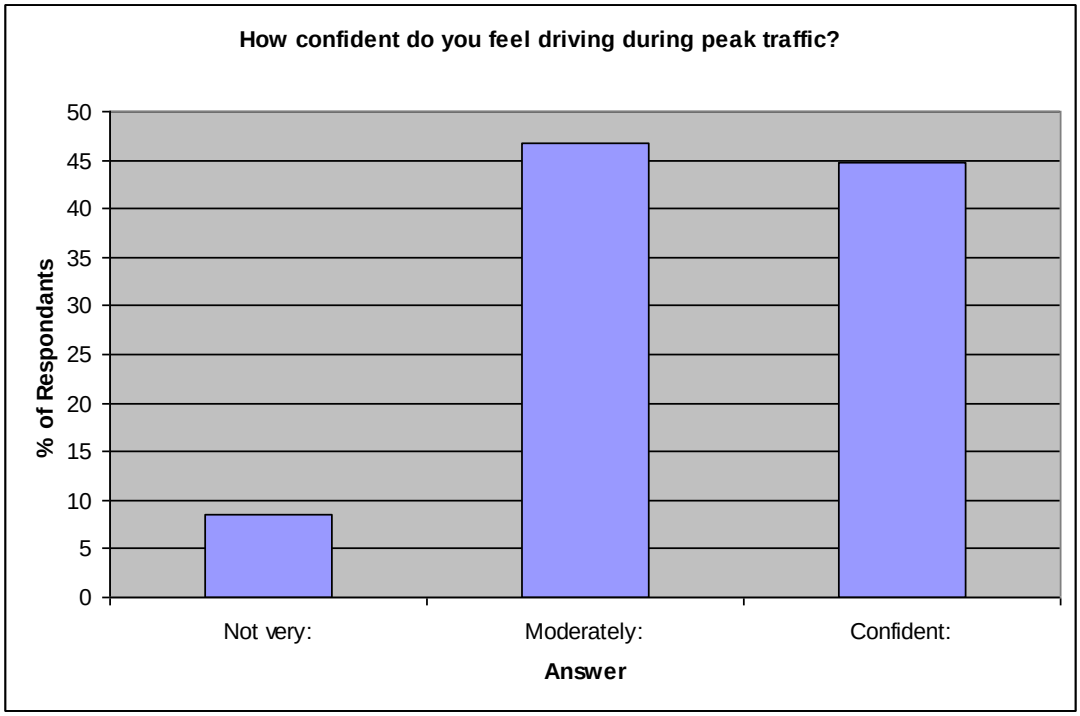

Figure 4.6- Confidence Levels When Driving in Peak Traffic (Toowoomba)

The elderly population in Toowoomba also indicated that they were reasonably confident when driving during difficult weather conditions (Figure 4.7).

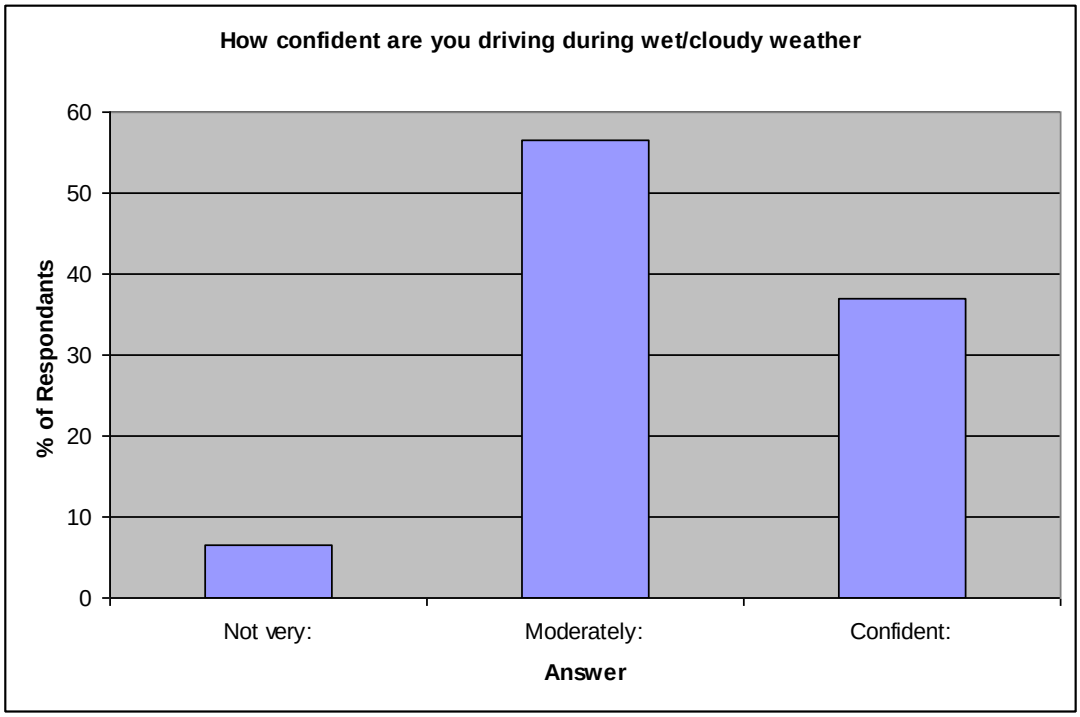

Figure 4.7- Confidence Levels in Adverse Weather Conditions

Toowoomba respondents spent a large amount of time driving in rural conditions (Figure 4.8) and in the city (Figure 4.9). The elderly population in Toowoomba also indicated that they spent a lot of time driving with the majority spending more than ten hours a week behind the wheel. (Figure 4.10)

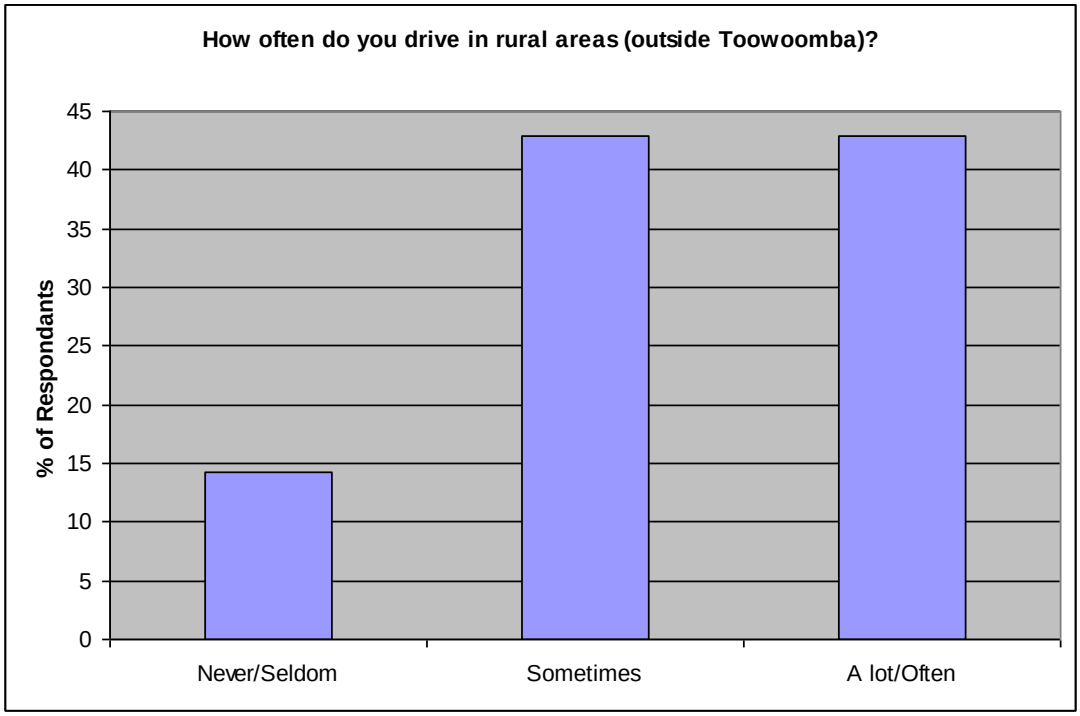

Figure 4.8- Rural Driving

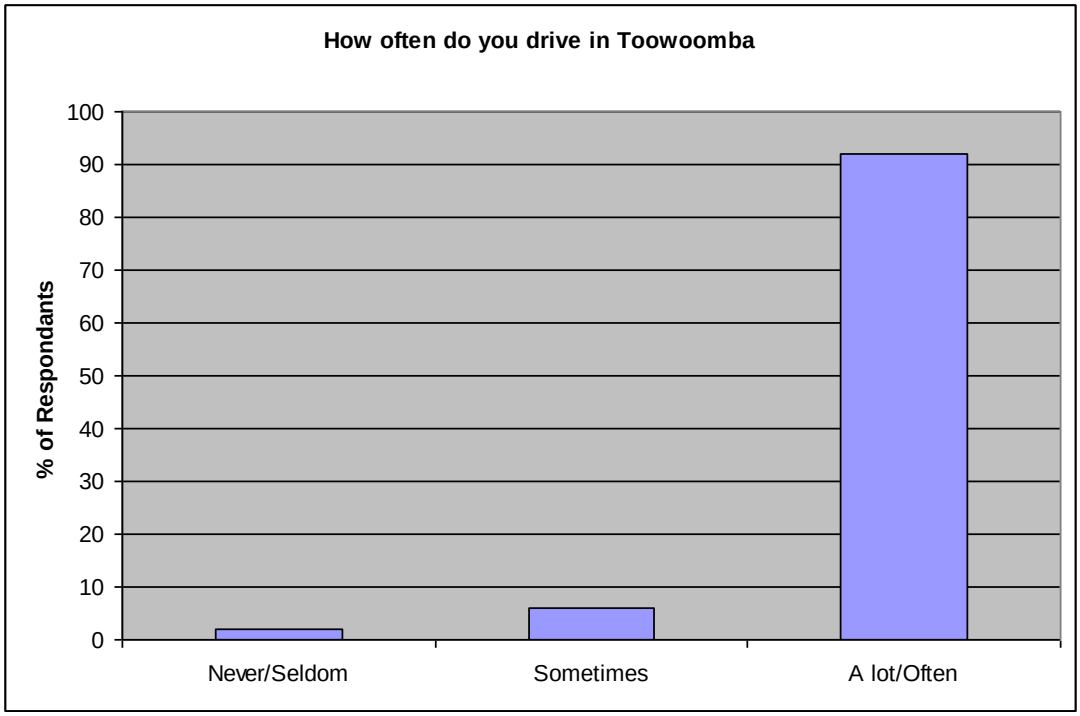

Figure 4.9- Urban Driving

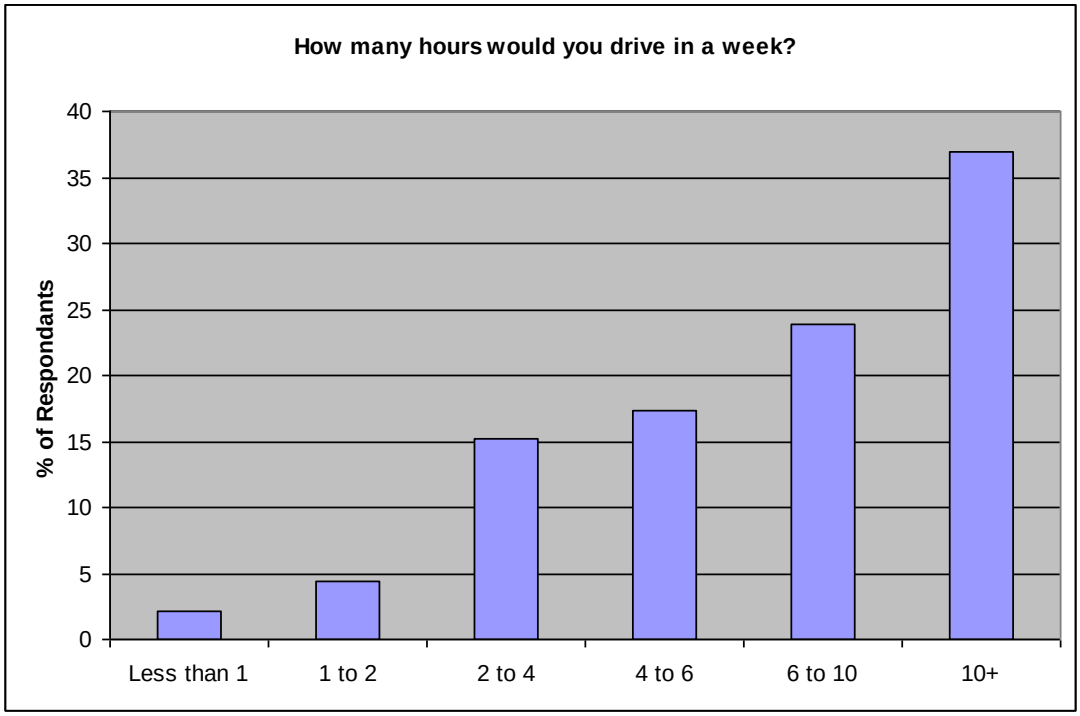

Figure 4.10- Hours Driven per Week

4.2 Unsignalised vs. Signalised Intersections

An analysis was initially conducted into the affect of signalised and unsignalised intersections on older drivers. To determine the types of traffic control to be included in each intersection type an investigation was conducted into crash rates depending on traffic control. Under signalised intersections the traffic controls with the highest crash rates included traffic lights, pedestrian operated traffic lights and flashing amber traffic lights. Under unsignalised intersections the traffic controls with the highest crash rates included stop signs give way signs and intersections with no traffic control, (Figure 4.11).

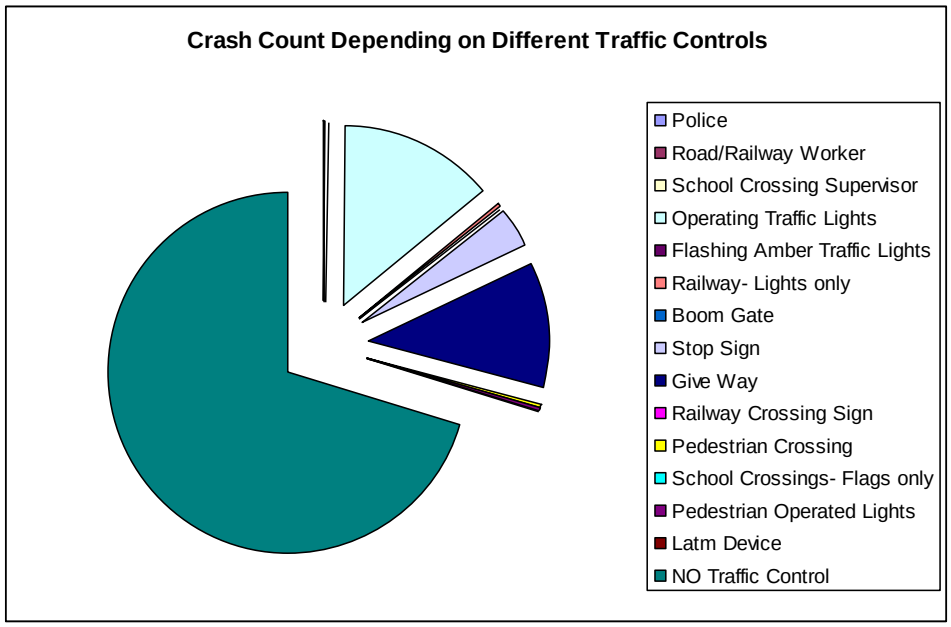

Figure 4.11- Crash Count Depending on Traffic Controls

The results on unsignalised and signalised intersection crash rates can be seen in Table 4.1. In Toowoomba 17.7% of overall intersection crashes at stop and give way signs are caused by drivers over sixty while 14.9% of crashes at signalised intersections are caused by drivers over sixty. There is a significant increase in crash rates from signalised intersections to stop and give way signs for older drivers. This trend is mirrored in Bundaberg, (24.2% of crashes at stop and give way signs, 17.67% at signalised intersections) and throughout Queensland. When intersections with no traffic control are included as part of the unsignalised data the crash percentages are approximately equal. This is attributed to the fact that intersections with no traffic control have a

lower traffic flow and therefore a lower percentage of elderly drivers passing through them.

Table 4.1- Signalised and Unsignalised Intersection Crash Statistics

		Stop + Give way + No traffic control	Stop + Give way ONLY	Signalised:
Toowoomba	% crashes 60+	14.92%	17.70%	14.90%
	% crashes 70+	7.88%	9.72%	7.54%
	% crashes 80+	2.33%	3.13%	1.78%
Bundaberg	% crashes 60+	19.90%	24.20%	17.67%
	% crashes 70+	11.70%	14.25%	6.04%
	% crashes 80+	3.88%	4.75%	2.33%
Queensland	% crashes 60+	12.71%	14.04%	11.57%
	% crashes 70+	6.73%	8.37%	4.97%
	% crashes 80+	2.08%	2.68%	1.53%

The percentages of the population aged over sixty were sourced from the Australian Bureau of Statistics and were as follows:

- Population over 60 in Toowoomba: 18.27%
- Population over 60 in Bundaberg: 24.93%
- Population over 60 in Queensland: 17.28%

The percentage of the population over sixty in Toowoomba is approximately the same as the population aged over sixty throughout Queensland. As such the crash rates for older drivers should be approximately the same with a slight increase in crashes in Toowoomba. Data indicated that there was a significant increase in crash rates in Toowoomba (Table 4.1). This could be due to the fact that Toowoomba does not have a very good public transport system and as such more people over the age of sixty actually drive in Toowoomba. It could equally be due to the possibility that the Toowoomba drivers are less skilled than city drivers (e.g. Brisbane drivers) and as such the crash rate in Toowoomba is higher than the overall Queensland crash rates of which a large percentage would occur in Brisbane.

Bundaberg also had significantly higher elderly driver crash rates than the overall Queensland statistics. Bundaberg however has a significantly higher population aged over sixty years of age and as such the higher crash rates were expected.

An analysis was completed over all age groups to determine whether the trend of higher crash rates at unsignalised intersections was present only for elderly drivers or for all age groups. The results of this investigation are displayed in Figure 4.12.

Figure 4.12 indicates that unsignalised intersection crash rates exceed signalised intersection crash rates from about the age of forty. This data confirms that not all age groups have a high crash rate at unsignalised intersections. In fact, the age group 17-20 has significantly more crashes at signalised intersections than at stop and give way signs. The increasing difference between signalised crash rates and stop and give way sign crash rates after the age of forty can be attributed to the declining mental and physical characteristics of older drivers.

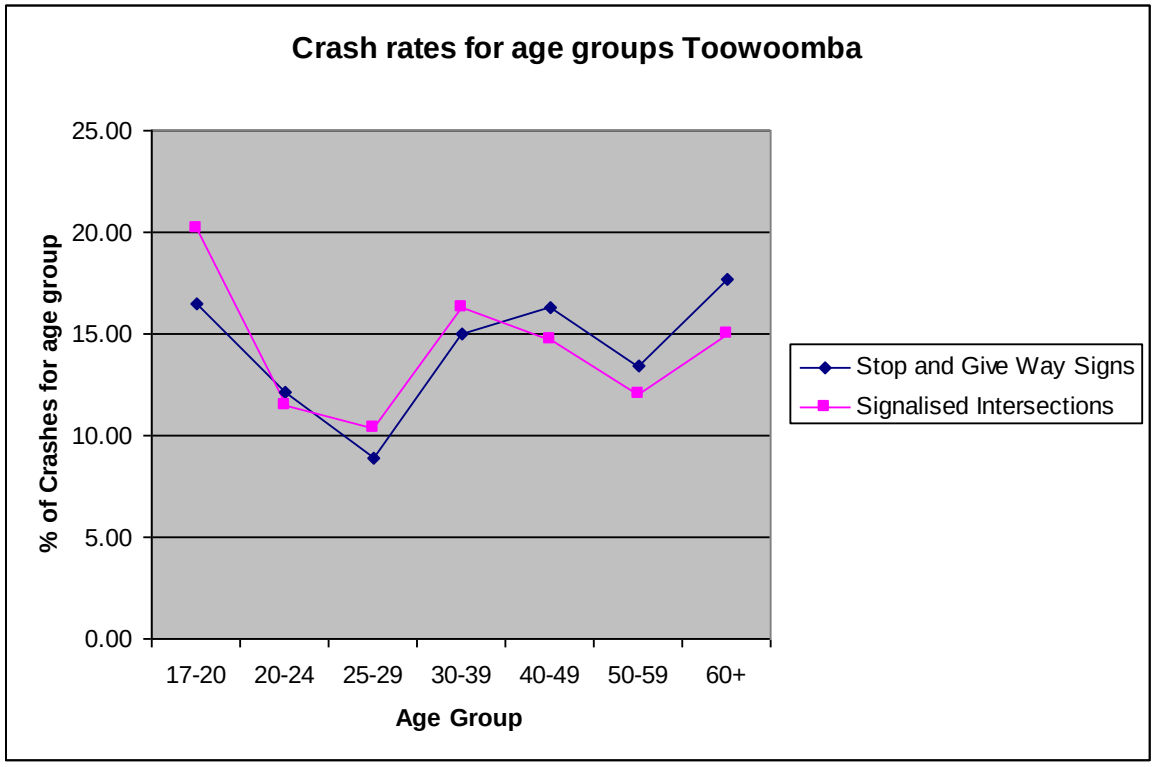

Figure 4.12- Crash Rates in Toowoomba across All Age Groups

4.3 Intersection Type

Five types of intersections were analysed in terms of the affect that intersection type has on elderly driver crash rates. These intersection types were;

- Cross intersections,
- T intersections,
- Y intersections,
- Multiple Leg intersections
- And Roundabouts.

The results for each intersection type can be seen in Tables 4.2 to 4.7. Table 4.7 provides a summary of the results across Queensland.

Table 4.2- Crash Results for Cross Intersections

		Unsignalised: Stop + Give way+ No traffic control	**Unsignalised: Stop + Give way ONLY**	**Signalised**
Toowoomba	% crashes 60+	17.85%	20.31%	14.74%
	% crashes 70+	9.41%	10.94%	7.33%
	% crashes 80+	2.77%	3.65%	1.81%
Bundaberg	% crashes 60+	20.78%	25.70%	17.67%
	% crashes 70+	12.80%	16.30%	8.37%
	% crashes 80+	4.42%	5.33%	2.33%
Queensland	% crashes 60+	15.19%	14.56%	12.00%
	% crashes 70+	9.93%	10.40%	5.16%
	% crashes 80+	3.25%	3.47%	1.55%

Table 4.3- Crash Results for T Intersections

		Unsignalised: Stop + Give way +No traffic control	**Unsignalised: Stop + Give way ONLY**	**Signalised**
Toowoomba	% crashes 60+	13.70%	12.84%	14.67%
	% crashes 70+	7.00%	6.87%	8.00%
	% crashes 80+	2.00%	1.79%	0.00%
Bundaberg	% crashes 60+	18.13%	18.80%	22.22%
	% crashes 70+	10.16%	8.27%	13.33%
	% crashes 80+	3.19%	3.00%	4.44%
Queensland	% crashes 60+	12.03%	13.16%	8.00%
	% crashes 70+	5.47%	6.01%	3.50%
	% crashes 80+	1.60%	1.80%	1.13%

Table 4.4- Crash Results for Y Intersections

		Unsignalised: Stop + Give way+ No traffic control	**Unsignalised: Stop + Give way ONLY**	**Signalised**
Toowoomba	% crashes 60+	18.18%	14.29%	0.00%
	% crashes 70+	9.09%	14.29%	0.00%
	% crashes 80+	0.00%	0.00%	0.00%
Bundaberg	% crashes 60+	0.00%	0.00%	0.00%
	% crashes 70+	0.00%	0.00%	0.00%
	% crashes 80+	0.00%	0.00%	0.00%
Queensland	% crashes 60+	11.34%	10.53%	14.28%
	% crashes 70+	5.14%	7.89%	4.70%
	% crashes 80+	0.00%	0.00%	0.00%

Table 4.5- Crash Results for Multiple Leg Intersections

		Unsignalised: Stop + Give way+ No traffic control	**Unsignalised: Stop + Give way ONLY**	**Signalised**
Toowoomba	% crashes 60+	0.00%	0.00%	23.08%
	% crashes 70+	0.00%	0.00%	7.69%
	% crashes 80+	0.00%	0.00%	0.00%
Bundaberg	% crashes 60+	0.00%	0.00%	0.00%
	% crashes 70+	0.00%	0.00%	0.00%
	% crashes 80+	0.00%	0.00%	0.00%
Queensland	% crashes 60+	15.96%	17.54%	9.23%
	% crashes 70+	5.88%	8.77%	1.53%
	% crashes 80+	2.25%	1.75%	0.50%

Table 4.6- Crash Results for Roundabouts

Toowoomba	% crashes 60+	20.29%
	% crashes 70+	10.63%
	% crashes 80+	2.42%
Bundaberg	% crashes 60+	19.77%
	% crashes 70+	9.30%
	% crashes 80+	1.16%
Queensland	% crashes 60+	11.60%
	% crashes 70+	4.88%
	% crashes 80+	1.23%

Table 4.7- Summary of Intersection Types

			CROSS	**T**	**Y**	**MULTILEG**	**ROUNDABOUT**
% Crashes where driver is 60+	**Toowoomba**	**Signalised**	14.74	14.67	0	23.08	20.29
		ST&GW	20.31	12.84	14.29	0	
	Queensland	**Signalised**	12	8	14.28	9.23	11.6
		ST&GW	14.56	13.16	10.53	17.54	
	Bundaberg	**Signalised**	17.67	22.22	8	0	19.77
		ST&GW	25.7	18.8	13.16	0	

Results indicated that in Queensland the majority of crashes involving older drivers occurred at unsignalised multiple leg intersections followed by stop and give way cross intersections and then signalised Y intersections. Past research has indicated that intersections with the most conflict points and which involve the highest amount of decision making cause the most accidents, Underwood R. (2006). It is therefore not surprising that unsignalised multiple leg intersections cause the highest amount of crashes for older drivers in Queensland. In Toowoomba there are not a lot of unsignalised multiple leg intersections. The intersections that caused the most crashes in Toowoomba were multiple leg signalised intersections followed by stop and give way cross intersections followed by roundabouts. The crash rate for older drivers at roundabouts in Toowoomba is significantly higher than in Queensland or

Bundaberg. In the driver behaviour survey a large percentage of the participants indicated that the number of roundabouts in Toowoomba was their biggest frustration when driving. Roundabouts require a large amount of decision making and have a high number of conflict points. As the population in Toowoomba ages and traffic flows increase it is therefore recommended that alternate methods of intersection control are investigated.

4.4 Available Lighting

An analysis was conducted into the time of day that caused the most crashes for older drivers. The results from this analysis can be seen in Figures 4.13 and 4.14.

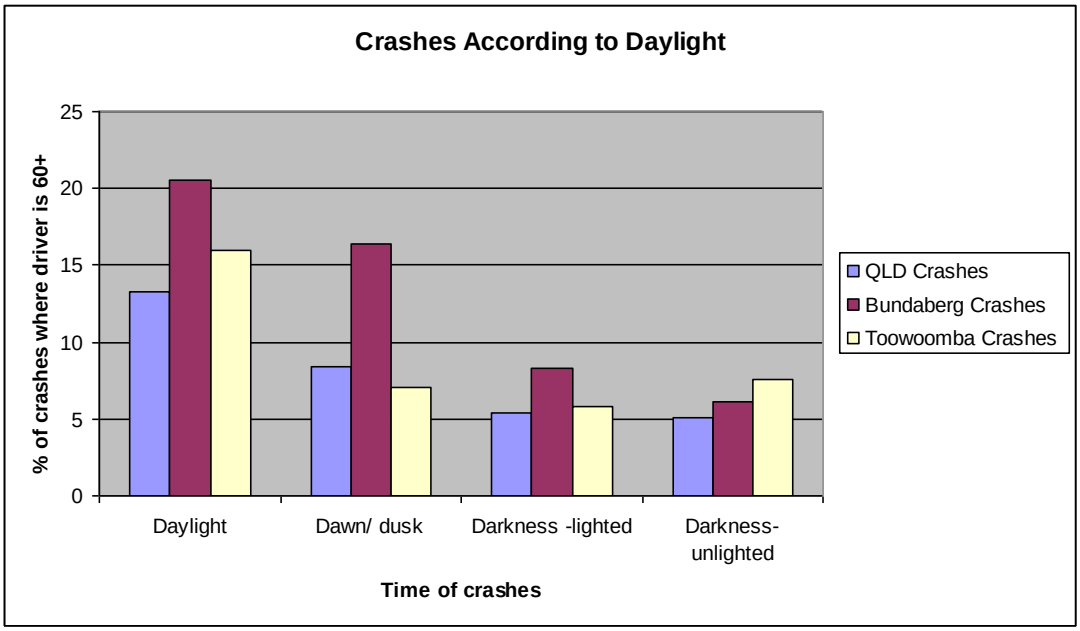

Figure 4.13- Crashes According to Lighting Conditions

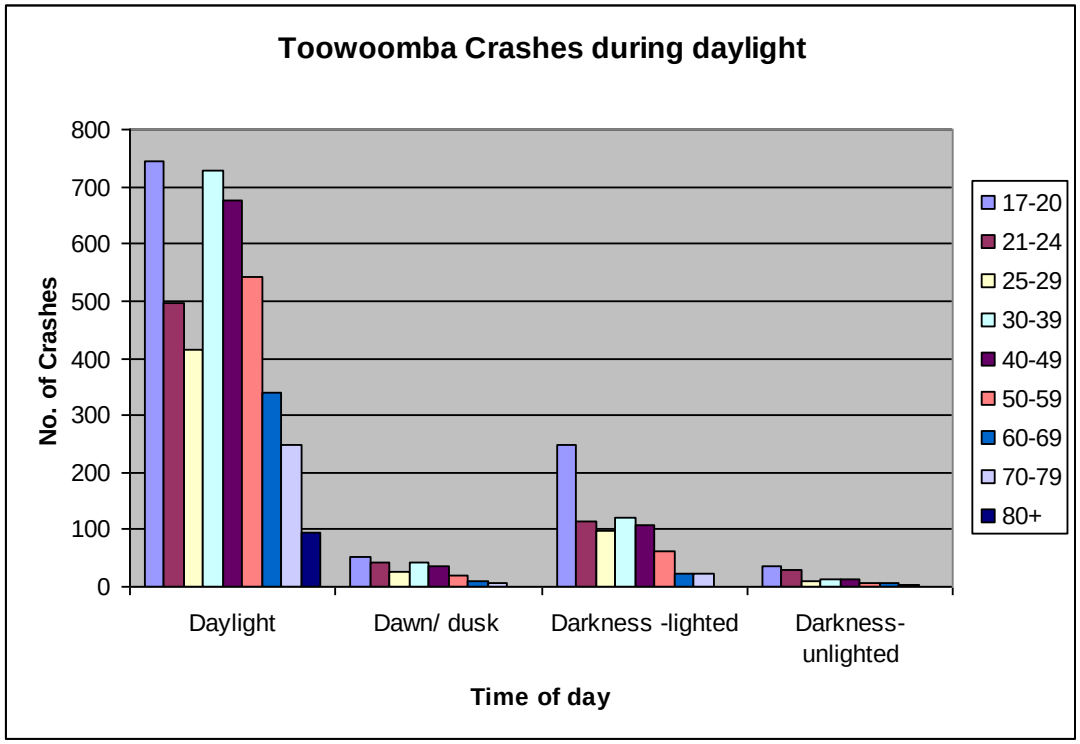

Figure 4.14- Toowoomba Crashes According to Lighting Conditions

Results indicated a general decrease in crash rates for all age groups after dark. Toowoomba results indicated a slight increase in crash rates in unlit dark areas which was not present in other locations or in other age groups. According to the survey conducted into driver behaviour 84% of respondents indicated that they drove in the dark sometimes to a lot. 94% of respondents indicated that they were moderately to very confident driving in the dark. As such the lower levels of crashes after dark, (Figure 4.13) are not attributed to an avoidance of driving during these times.

The increase in crashes in unlit dark areas of Toowoomba indicates that perhaps older driver in Toowoomba are not as aware of the problems decreasing vision can cause when driving at night. Workshops discussing night driving and problems older drivers face at night might therefore be beneficial to older drivers in the Toowoomba region. The implementation and effectiveness of work shops in the Toowoomba region is an area for future research.

4.5 Weather Conditions

According to the behavioural survey conducted 93% of respondents felt moderately to very confident driving in difficult weather conditions (rain, fog and smoke). Any abnormalities in crash statistics during bad weather have therefore not been attributed to an avoidance of driving in these conditions.

Statistically the crash rates for drivers aged 60+ in adverse weather conditions is approximately the same for Toowoomba and Queensland (Figures 4.15 & 4.16). Throughout Queensland about 9% of crashes in bad weather are caused by drivers over sixty while in Toowoomba 11% of crashes in wet weather are caused by drivers over sixty. Taking into account the fact that Toowoomba does have a slightly higher population aged over sixty than the overall Queensland region, weather conditions are not considered to have a significant affect on elderly driver crash rates. While the majority of older Toowoomba drivers indicated that they were confident driving in bad weather conditions, crash statistics indicated that the high confidence levels did not necessarily cause a decrease in vigilance when driving in these conditions.

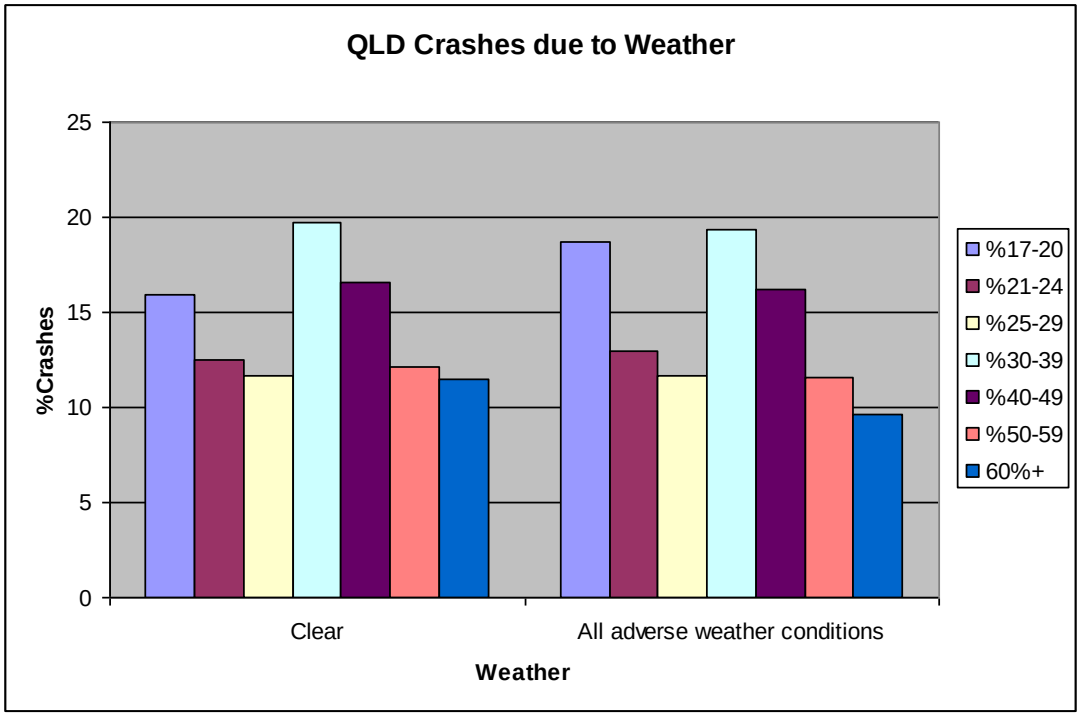

Figure 4.15- QLD Crashes due to Weather Conditions

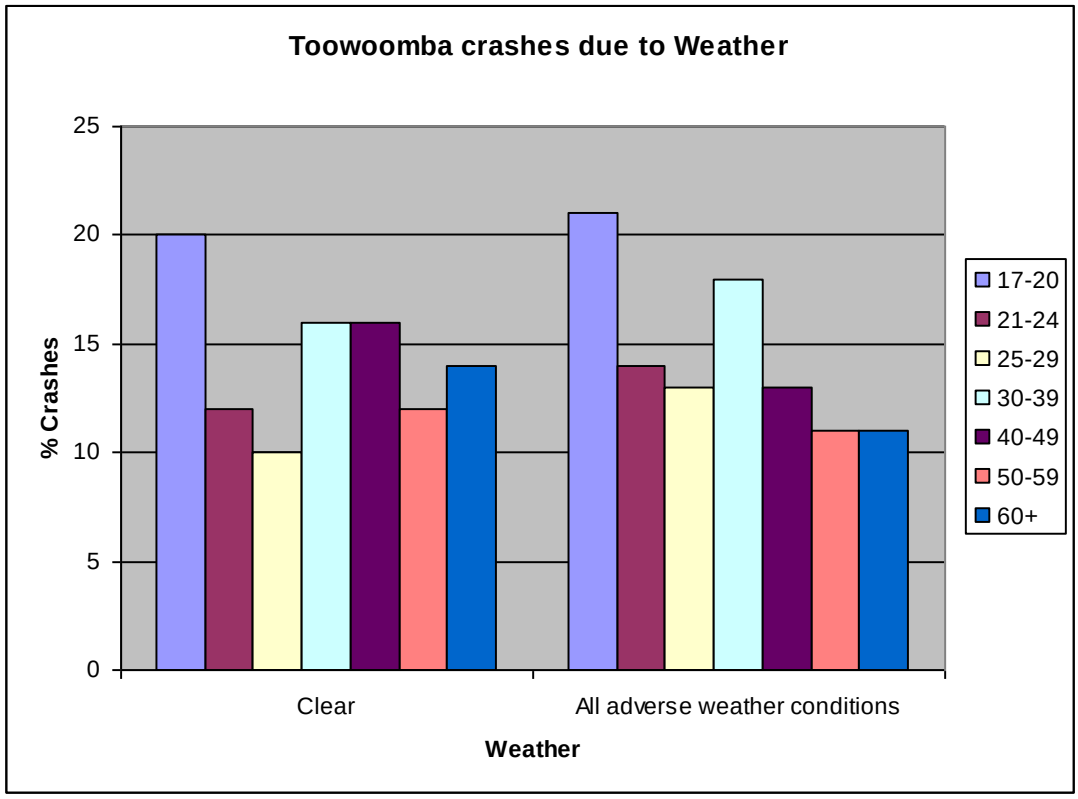

Figure 4.16- Toowoomba Crashes due to Weather Conditions

4.6 Traffic Flow

The highest number of crashes occur during the peak hours of the day. The peak hours of traffic in Toowoomba are from 7- 10am and 3-6pm. Older drivers also have a third peak during the hours 10:30am until 11am (Figure 4.17). This is attributed to the fact that a large amount of drivers over sixty are retired and as such they are more likely to be on the road at this time of day. 48.9% of the participants from the driver behaviour survey indicated that they drove during peak traffic a lot while 44.6% of respondents indicated that they were very confident while driving during peak traffic (Section 4.1). The number of crashes that any one age group contributed at a particular time of day (Figure 4.17) was examined and compared to the population distribution in Toowoomba (Figure 4.18). it The data indicated that apart from at 11:00am (when the majority of drivers are elderly) the number of crashes that elderly drivers contribute to peak time crashes is significantly less than the age

group 17-20, 30-39 and 40-49. Taking into account the fact that the majority of participants surveyed indicated that they did not avoid driving during peak traffic the results indicated that driving during peak hours of the day is not a large contributing factor to crash rates of the elderly in Toowoomba.

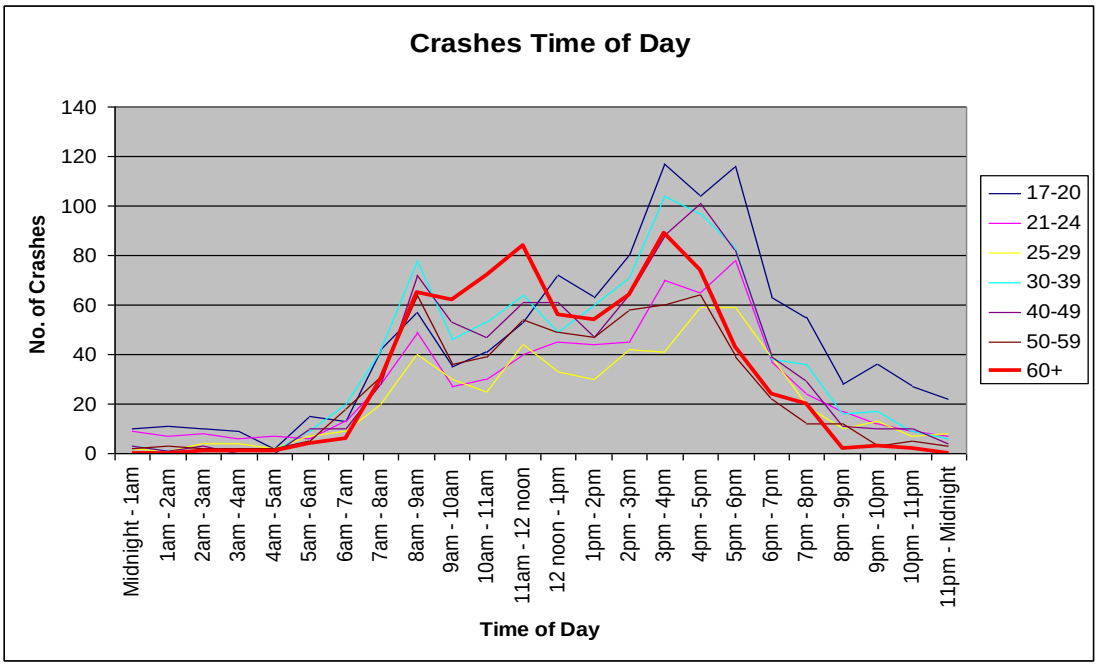

Figure 4.17- Crashes Depending on Time of Day

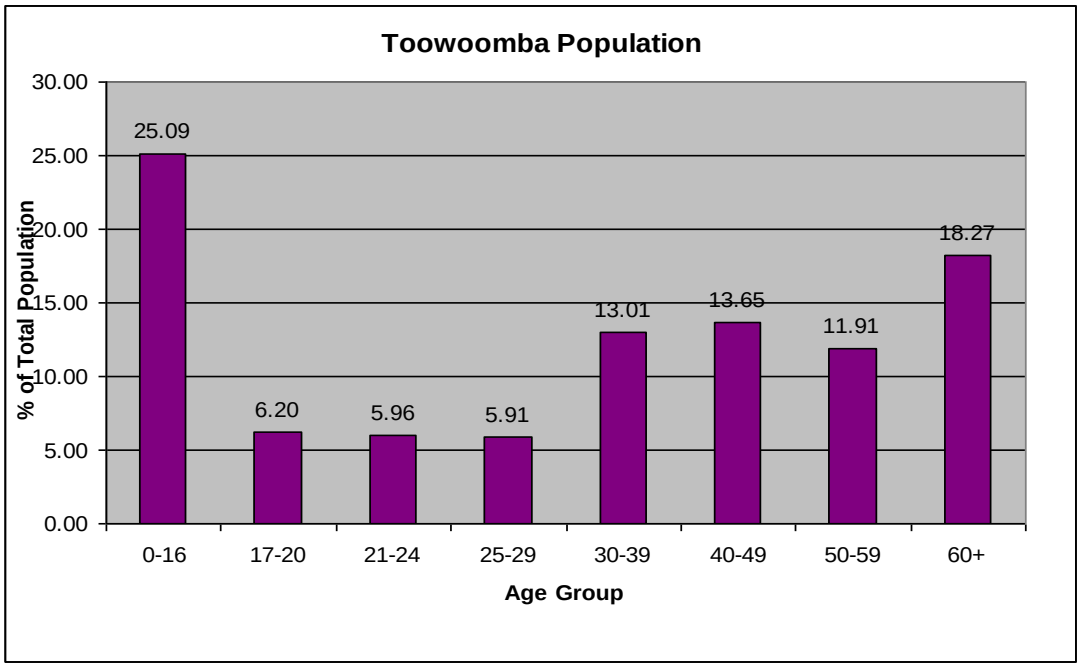

Figure 4.18- Population Distribution in Toowoomba

4.7 DCA Codes

DCA codes are used throughout Queensland to classify road accidents and stands for the Definitions for Coding of Accidents. Figure 4.19 shows the DCA codes relating to intersection crashes while the full list of DCA codes can be seen in Appendix E.

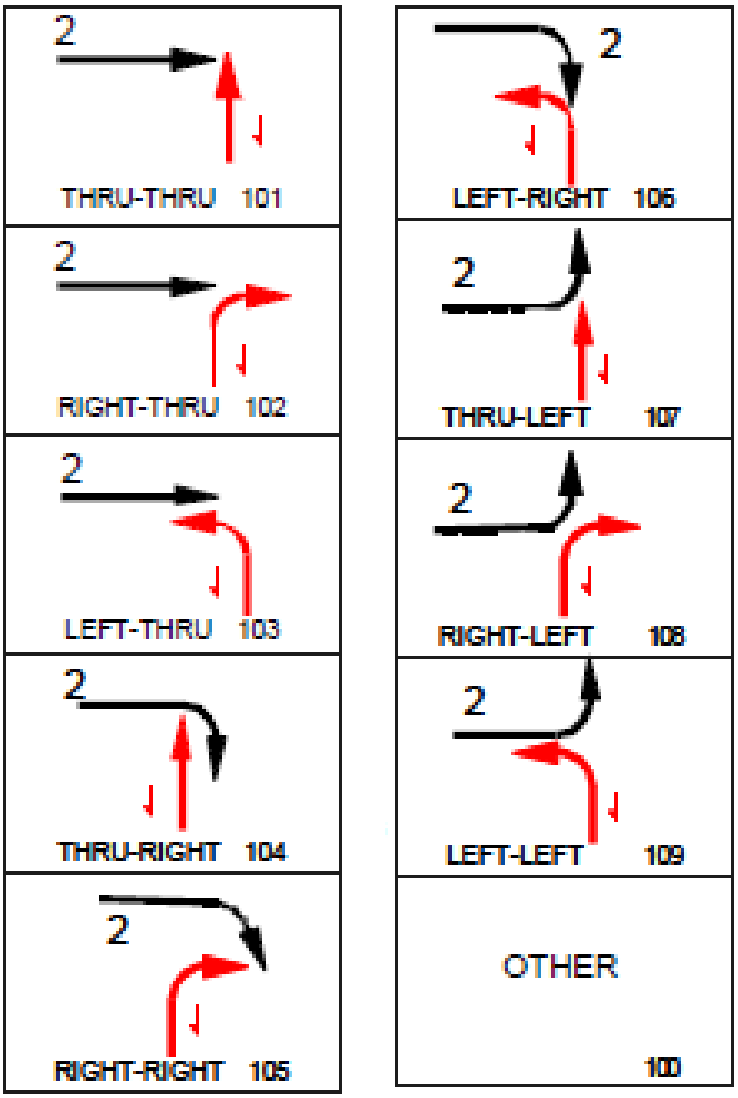

Figure 4.19- DCA Codes for Intersections

In order to determine the most common pre collision action for the elderly DCA codes were examined for different areas within Toowoomba. The areas analysed are displayed in Figure 4.20.

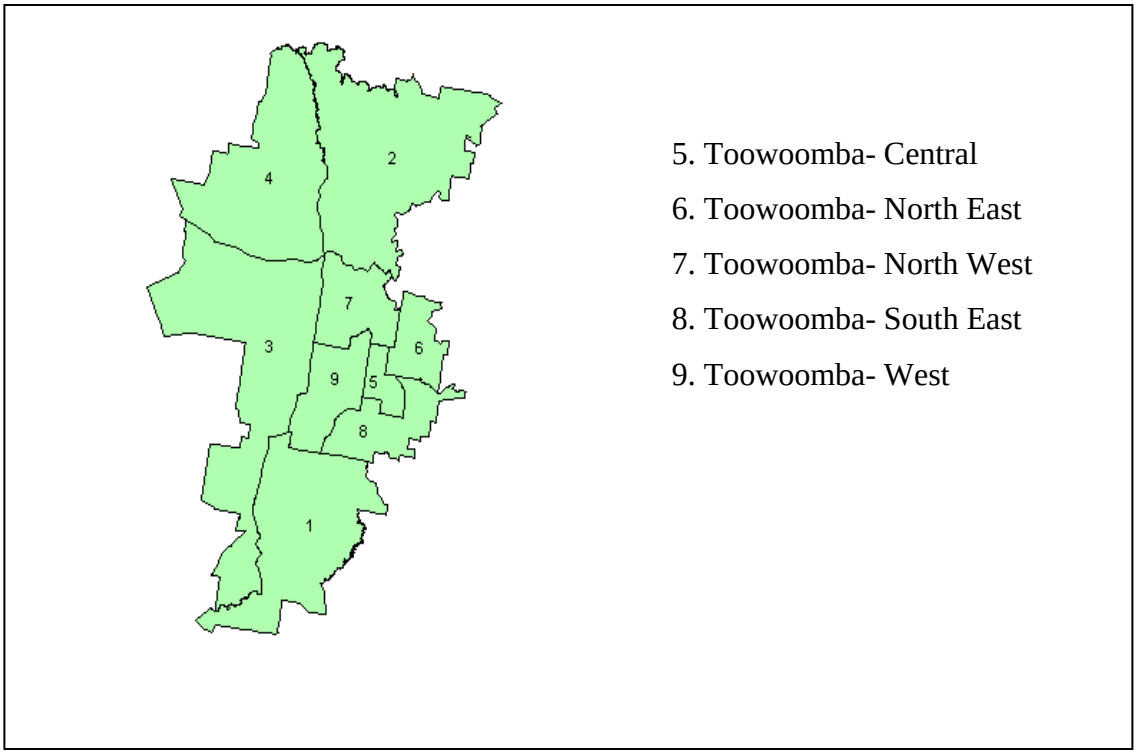

Figure 4.20- Areas Analysed for DCA Codes

The results for each area are displayed in Figures 4.21 to 4.25

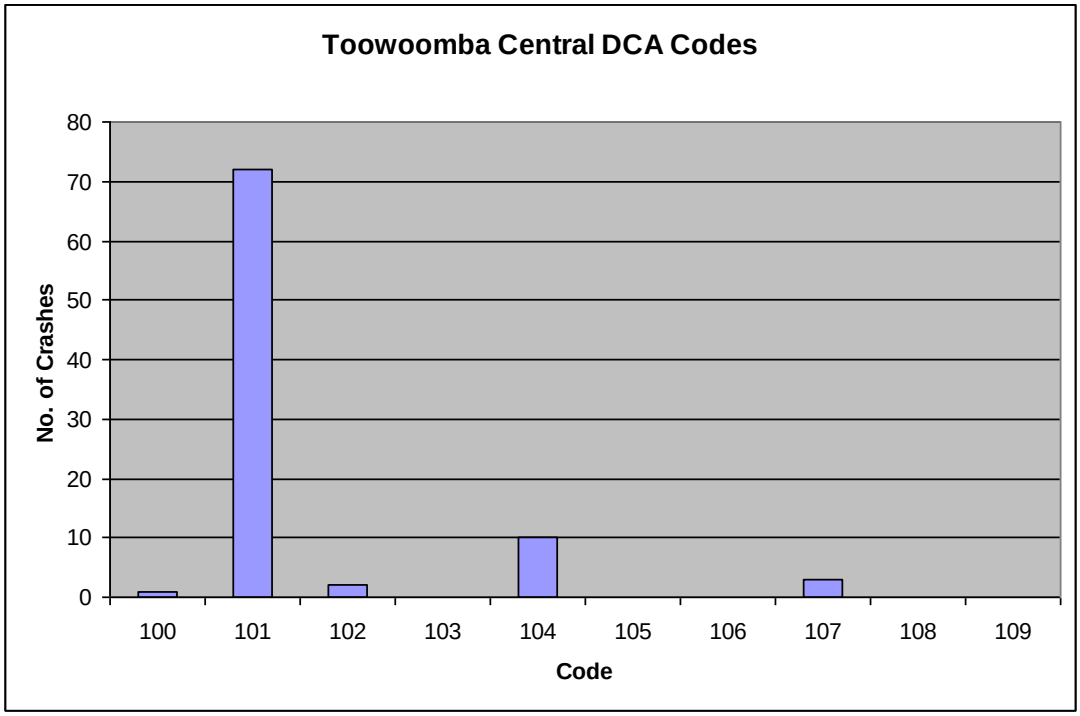

Figure 4.21- Toowoomba Central DCA Codes

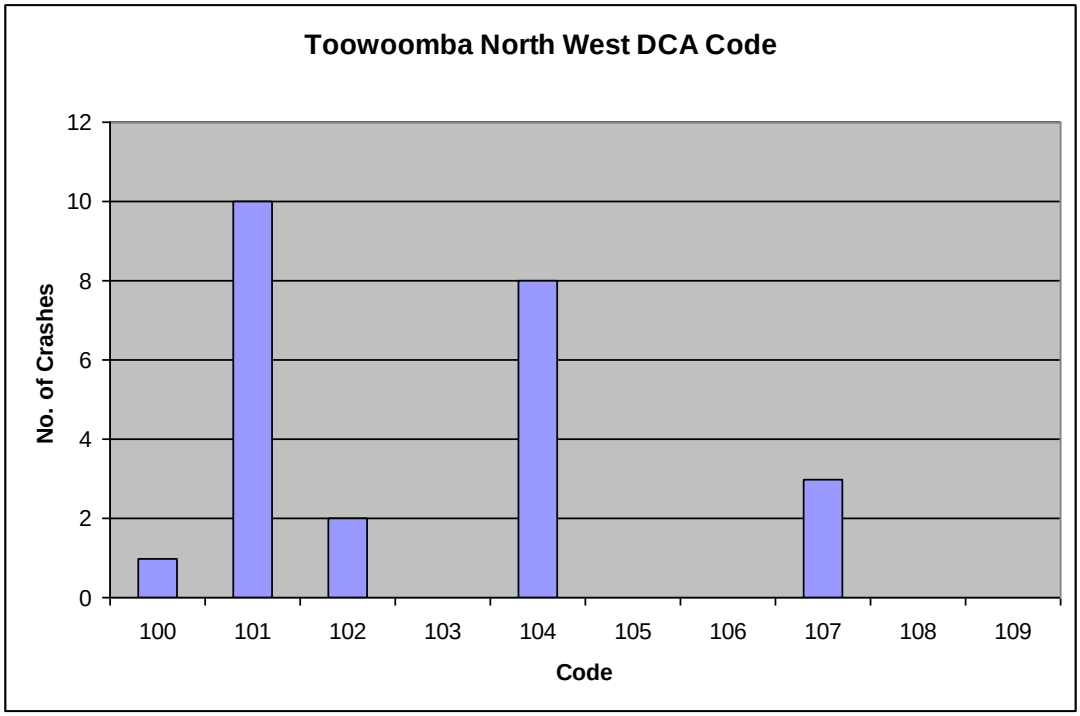

Figure 4.22- Toowoomba North West DCA Codes

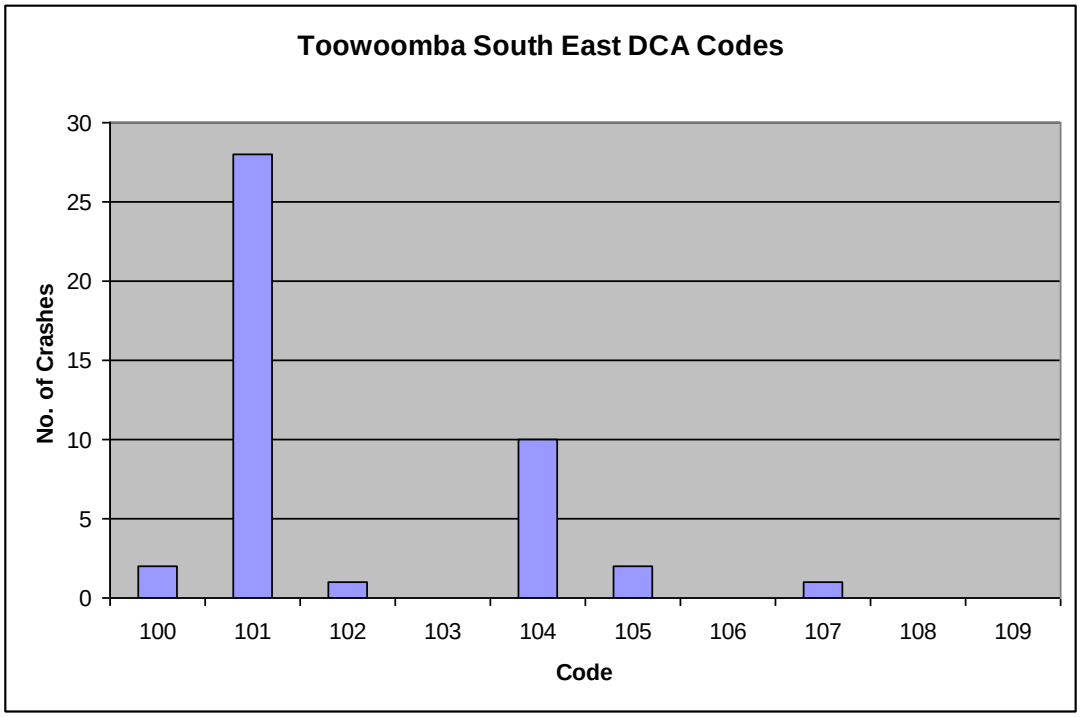

Figure 4.23- Toowoomba South East DCA Codes

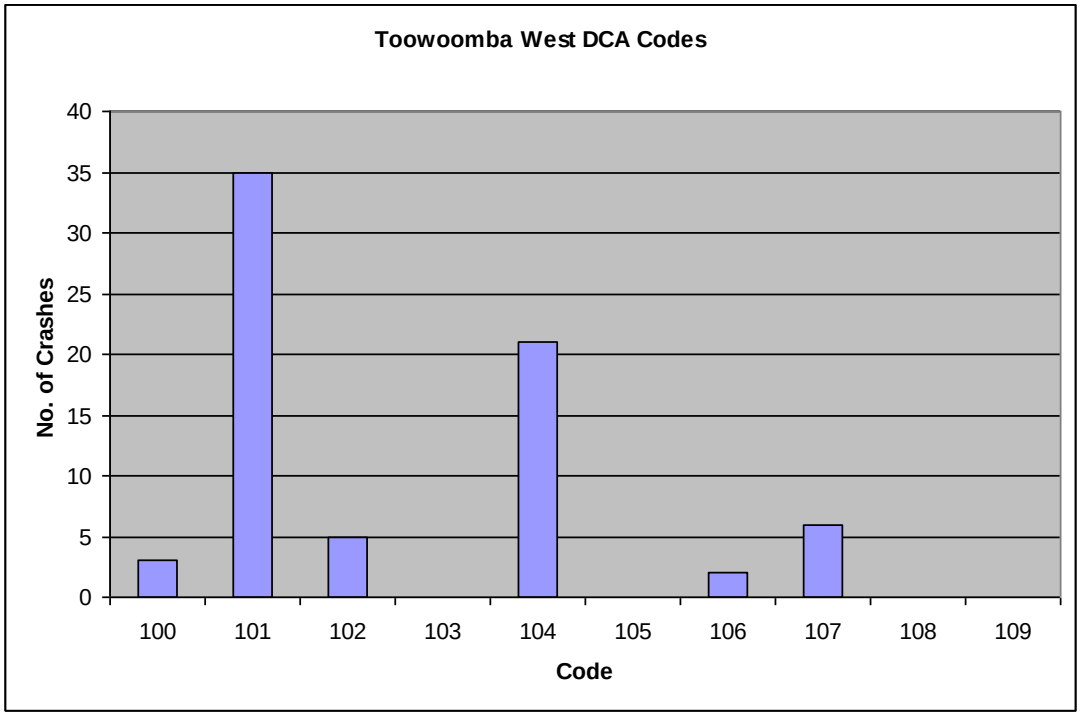

Figure 4.24- Toowoomba West DCA Codes

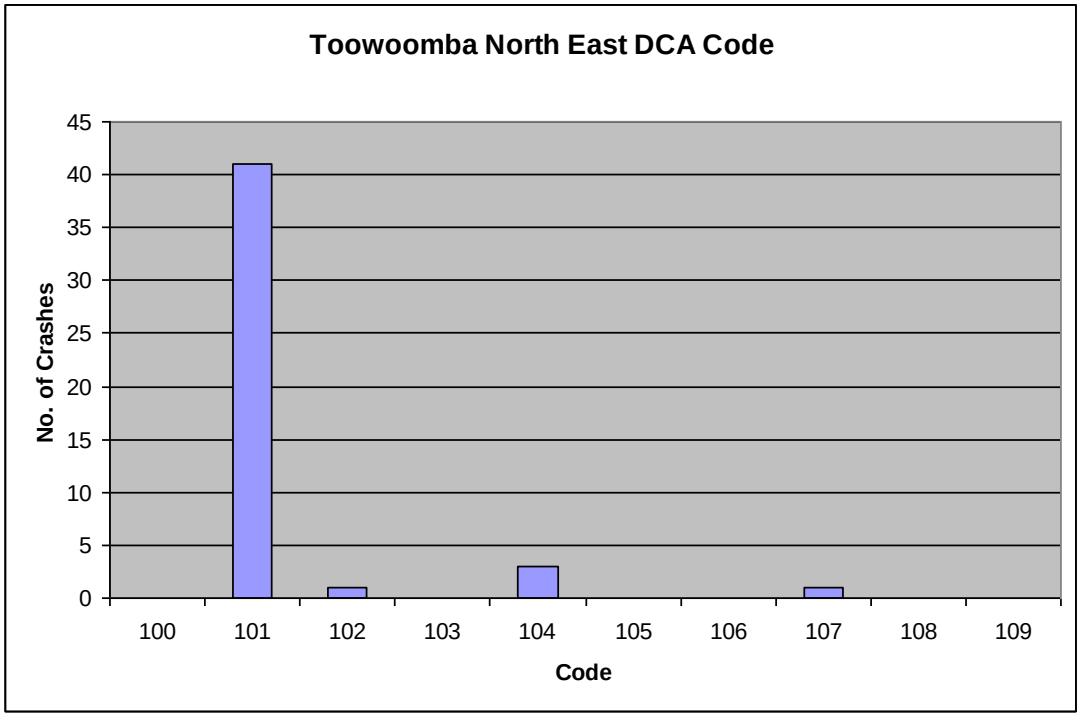

Figure 4.25- Toowoomba North East DCA Codes

According to the QLD crash database Code 101 (THRU-THRU) crash was the most common in every area of Toowoomba followed by Code 104 (THRU-RIGHT) crash and Code 107 (THRU-LEFT) crash. These results agree with the analysis conducted by Hildebrand (2000). Hildebrand's analysis indicated that going straight was the most common pre collision action for all age groups. For elderly age groups the second and third most common pre collision actions were turning left (equivalent to turning right in Australia) and then turning right. Data from the DCA code analysis therefore showed no significant anomalies from previous research.

5. Conclusions

The project determined that unsignalised intersections do have a significantly higher crash rate than signalised intersections for older drivers. This trend is present in Toowoomba (2.8% increase), Bundaberg (6.53% increase) and throughout Queensland (2.47% increase). The most dangerous intersections for older drivers in Toowoomba are signalised multiple leg intersections which cause 23.08% of intersection crashes. The second most dangerous intersection type is unsignalised cross intersections, (20.31% of crashes) followed by roundabouts, (20.29% of crashes).

The roundabout crash rate in Toowoomba is significantly higher than in Bundaberg or throughout Queensland indicating that Toowoomba has a larger number of roundabouts than the average city in Queensland. A number of respondents in the driver behaviour survey indicated that the number of roundabouts was their biggest frustration when driving in Toowoomba.

Toowoomba does have a lot higher intersection crash rates than the overall Queensland statistics. This could just be due to the fact that the public transport system in Toowoomba is very poor it is however also the case in Bundaberg and could be a function of skill and experience, (i.e. drivers in large cities have a higher level of skill than drivers in smaller towns.)

Older Toowoomba drivers are extremely confident and drive a lot however this confidence does not seem to cause a decrease in vigilance. Data indicated that older driver crash statistics are not largely affected by night time driving, traffic flow and weather conditions. Older Toowoomba drivers therefore seem to compensate well for difficult driving conditions.

There is a slight increase in crash rates for unlit areas in Toowoomba that is not present in other age groups. Older drivers in Toowoomba may therefore benefit from

workshops that involve discussion on hazards during night time driving and the affects of decreasing vision on night time driving.

The most common pre collision action for older drivers in Toowoomba is the Code101 or THRU-THRU crash. This agrees with previous research conducted into pre collision actions for older drivers.

Toowoomba has a higher population of elderly people and as such can be used as an indicator for conditions in Queensland in the future. This project has clarified that the State does need to attempt to make unsignalised intersection safer for older drivers. This can be done by reducing the number of conflict points in an intersection and installing traffic signals for heavily trafficked intersections or intersections located near retirement homes. There is also a need for increased education for older drivers which should be delivered in an appropriate media for the elderly. Future research that could be completed in this area includes the implementation and effectiveness of workshops for older drivers in Toowoomba and the differences between crash rates for rural vs. urban intersections and pre collision actions for rural vs. urban intersection crashes.

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7 Appendices

APPENDIX A- PROJECT SPECIFICATION

University of Southern Queensland

ENG4111/4112 Research Project
PROJECT SPECIFICATION

FOR: *HANNAH PORTER*

TOPIC: INVOLVEMENT OF OLDER DRIVERS IN CRASHES AT UNSIGNALISED AND SIGNALISED INTERSECTIONS

SUPERVISOR: Assoc. Prof Ron Ayers
Senior Advisor QLD Transport Mal McIlwraith

SPONSORHSIP: University of Southern Queensland

PROJECT AIM: This project will aim to determine if there are differences in the rates of involvement of older drivers in crashes at unsignalised and signalized intersections in the Darling Downs region and to compare the rates with other regions of Queensland. The project also aim to determine the possible causes behind the different crash rates in the region and to identify possible solutions to make intersections safer for older drivers.

PROGRAMME: (*Issue A, 17 March 2009*)

1. Research background information on older drivers, the risks associated with older drivers, crash involvement of older drivers and current Australian laws regarding older drivers.
2. Examine the crash database maintained by Queensland Transport and determine from a preliminary analysis of the data if, from a holistic viewpoint, there appears to be a significant difference between the crash involvement rate for older drivers for different intersection types (unsignalized and signalised) in the Darling Downs region.
3. If, as expected, the crash rates are significantly different, more thoroughly analyse the data to consider the effect of other factors (e.g. time of day, driver age, intersection location, gender of driver, etc) on the crash rates.
4. Compare crash rates for the Darling Downs region with other Queensland regional data (e.g. Bundaberg region) to determine regional variations.
5. Review the design of selected Darling Downs region intersections with high crash rates to determine treatments which could be implemented to reduce the risk for older drivers.
6. Report findings in the required oral and written formats.

If time permits:

7. Determine common behaviors of older drivers, (either through a survey of Toowoomba drivers or past research) and determine possible solutions to reduce the crashes due to these behaviours.

AGREED A Porter (student) Date: 24 /03/2009 R Ayers (supervisor) Date: 25 / 3 /2009

Examiner/Co-examiner: _____

APPENDIX B- DRIVER BEHAVIOURAL SURVEY

SURVEY

BACKGROUND:

Hi
My name is Hannah Porter and I am currently studying civil engineering at USQ. As part of my final year I am required to complete a thesis. The subject of my thesis is intersection crash rates across varying age groups. I am examining contributing factors such as age group, weather conditions, gender, night time driving, rural vs urban etc.

Driver behaviours and opinions influence a lot of statistics. In order to take into account driver behaviour I have created a few surveys. As members of the 50+ group I would really appreciate your help with this survey.
It is completely anonymous and takes about 5 minutes to fill out.

1. Circle the age group you currently belong to?

50-60 60-69 70-79 80+

2. Circle your Gender.

Male Female

2. How often do you drive after dark?

Never/Seldom Sometimes A lot/Often

3. How confident do you feel driving after dark?

Not very- I avoid it if possible Moderately- I'm extra careful Confident- No worries

4. Do you often drive in Peak Traffic?

Never/Seldom Sometimes A lot/Often

5. How confident do you feel driving during peak traffic?

Not very- I avoid it if possible Moderately- I'm extra careful Confident- No worries

6. How confident are you driving during wet/ cloudy weather

Not very- I avoid it if possible Moderately- I'm extra careful Confident- No worries

7. How often do you drive in rural areas (outside Toowoomba)?

Never/Seldom Sometimes A lot/Often

8. How often do you drive in Toowoomba?

Never/Seldom Sometimes A lot/Often

9. Approximately how many hours do you think you would drive in a week?

Under 1 1-2 2-4 4-6 6-10 10+

10. Is there any particular areas within Toowoomba that you feel uncomfortable driving in? If so where? and why?

11. What is your main frustration or annoyance when driving within Toowoomba?

12. Are there any intersections that you avoid in Toowoomba? Which ones and Why?

APPENDIX C- SURVEY RESULTS

RESULTS OF SURVEY

QUESTION 1
No age 50-60: 5
No age 60-69: 23
No age 70-79: 16
No age 80+: 9
Unknown: 2
Total no of surveys: 55

QUESTION 2
Males: 30
Females: 25
Unknown: 0

QUESTION 3: How often do you drive after dark?
Never/seldom 8
Sometimes 27
A lot /Often 15
Total number of people who answered this question: 50

QUESTION 4: How confident do you feel driving after dark? .
Not very (avoid if possible) 3
Moderately 24
Confident 22
Total number of people who answered this question: 49

QUESTION 5: How often do you drive during peak traffic?
Never/Seldom 2
Sometimes 23
A lot/Often 24
Total number of people who answered this question: 49

QUESTION 6: How confident do you feel driving during peak traffic?
Not very: 4
Moderately: 22
Confident: 21
Total number of people who answered this question: 47

QUESTION 7: How confident are you driving during wet/ cloudy weather?
Not very: 3
Moderately: 26
Confident: 17
Total number of people who answered this question: 46

QUESTION 8: How often do you drive in rural areas? (Outside Toowoomba)
Never/Seldom 7
Sometimes 21
A lot/Often 21
Total number of people who answered this question: 49

QUESTION 9: How often do you drive in Toowoomba?
Never/Seldom 1
Sometimes 3
A lot/Often 45
Total number of people who answered this question: 49

QUESTION 10: How many hours would you drive in a week?
>1 1
1 to 2 2
2 to 4 7
4 to 6 8
6 to 10 11
10+ 17
Total number of people who answered this question: 46

APPENDIX D- WEBCRASH2 CATEGORY LIST

Appendix D has been sourced from Data Analysis Unit Road Crash Glossary, QLD Government June (2008)

Crash characteristics are grouped into four categories: they are ’Crash’, ’Unit’, ’Controller’, and ’Casualty’.
Within each category are several characteristics that describe various attributes of a crash.

Crash

CRASH –ATMOSPHERIC CONDITION

• Clear
• Fog
• Raining
• Smoke/ Dust
• Unknown

CRASH -CON TRIBUTIN G FACTORS

• Disobeyed traffic rules
• Alcohol/ drugs
• Inexperience
• Speed
• Other driver conditions
• Age
• Rain/ wet road
• Negligence
• Inattention
• Road conditions
• Other
• Vehicle defects
• Fatigue (QT Definition)
• No street lighting

CRASH -DAY OF WEEK

• Monday
• Tuesday
• Wednesday
• Thursday
• Friday
• Saturday
• Sunday

CRASH –DCA GROUP (DEFINITION FOR CODING ACCIDENTS)

• Intersection, from adjacent approaches
• Head-on
• Opposing vehicles, turning
• Rear-end
• Lane changes
•Parallel lanes, turning
•U-turn
• Vehicle leaving driveway
• Overtaking, same direction
• Hit parked vehicle
• Train
• Pedestrian
• Hit permanent obstruction on carriageway
• Hit animal
• Off carriageway, on straight
•Off carriageway, on straight, hit object
• Out of control, on straight
• Off carriageway, on curve
• Off carriageway, on curve, hit object
• Out of control, on curve
• Other

CRASH -DIVIDED ROAD

• Divided Road
• Not Divided Road
• Unknown

CRASH -HORIZONTALROADALIGNMENT

• Curved, view obscured
• Curved, view open
• Straight
• Unknown

CRASH -IMPACT LOCATION

• Off Road
• On Road
• On road-related area
• Unknown

CRASH –LIGHTING CONDITION

• Darkness -Lighted
• Darkness -Not Lighted
• Dawn/ Dusk
• Daylight
• Unknown

CRASH -MON TH

• January
• February
• March
• April
• May
• June
• July
• August
• September
• October
• November
• December

CRASH -NATURE

• Hit object
• Hit pedestrian
• Head-on
• Angle
• Overturned
• Rear-end
• Fall from vehicle
• Sideswipe
• Hit parked vehicle
• Hit animal
• Other

CRASH -ROAD SURFACE

• Sealed -dry
• Sealed -wet
• Unknown
• Unsealed -dry
• Unsealed -wet

CRASH -SEVERITY

• Fatal
• Hospitalisation
• Medical treatment
• Minor injury
• Property damage

CRASH -SPECIAL ROADWAY FEATURE

• Intersection -Cross
• Intersection -T Junction
• Intersection -Y Junction
• Intersection -Multiple Road
• Intersection -Interchange
• Intersection -Roundabout
• Bridge, Causeway
• Railway Crossing
• Median Opening
• Merge Lane
• Forestry/ National Park Road
• Bikeway
• Other
• Not applicable

CRASH -SPEED LIMIT

• 0, 5, 10, ...100, 105, 110 km/ h

CRASH -TIME

• Midnight -2am
• 2am -4am
• 4am -6am
• 6am -8am
• 8am -10am
• 10am -noon
• Noon -2pm
• 2pm -4pm
• 4pm -6pm
• 6pm -8pm
• 8pm -10pm
• 10pm -midnight

CRASH -TRAFFIC CONTROL

• Police
• Road/ Rail worker
• Supervised school crossing
• Operating traffic lights
• Flashing amber lights
• Railway -lights only
• Railway -lights and boom gate
• Stop sign
• Give way sign
• Railway crossing sign
• Pedestrian crossing sign
• School crossing -flags
• Pedestrian operated lights
• LATM device
• Miscellaneous
• Other
• No traffic control
• No traffic control

CRASH -VERTICAL ROAD ALIGN MEN T

• Crest
• Dip
• Grade
• Level
• Unknown

CRASH LOCATION -POLICE DISTRICT
• Brisbane Central
• North Brisbane
• South Brisbane
• Oxley
• Wynnum
• Logan
• Gold Coast
• Charleville
• Dalby
• Roma
• Toowoomba
• Warwick
• Ipswich
• Bundaberg
• Redcliffe
• Gympie
• Maryborough
• Sunshine Coast

• Gladstone
• Longreach
• Mackay
• Rockhampton
• Mt Isa
• Townsville
• Cairns
• Innisfail
• Mareeba
• Brisbane West
• Pine Rivers

CRASH LOCATION -POLICE REGION

• Metropolitan North
• Metropolitan South
• South Eastern
• Southern
• North Coast
• Central
• Northern
• Far Northern

CRASH LOCATION -RURAL URBAN

• Brisbane City
• Rest of BSD
• Provincial cities
• Rest of state

Unit
UN IT -BULLBAR

• Fitted
• Not Fitted
• Unknown
• Not applicable

UNIT -CARRYINGDANGEROUSGOODS

• Carrying Dangerous Goods
• Not Carrying Dangerous Goods
• Unknown
• Not Applicable

UNIT-COMMUNICATION DEVICE

- Hands free phone
- Hand-held phone
- 2-way/ CB radio
- Other
- No device fitted
- Unknown
- Not Applicable

UN IT -CRUISE CON TROL

- Fitted, in use
- Fitted, not in use
- Fitted, use unknown
- Not fitted
- Unknown
- Not applicable

UNIT -DEFECTIVE

- Car/ Station wagon
- Utility/ Panel van
- 4 Wheel Drive
- Rigid truck
- Articulated truck
- Road Train B-double/ triple
- Bus/ Coach
- Motor cycle
- Tractor
- Bicycle
- Towed device
- Other

UNIT -INTENDED ACTION

- Change lanes
- Cross carriageway
- Enter carriageway
- Go straight ahead
- Make U turn
- Make left turn
- Make right turn
- Not applicable
- Other
- Other working

• Overtake
• Playing
• Push or work on vehicle
• Remain parked
• Remain stationary
• Reverse
• Slow or stop
• Start from parked
• Start in lane
• Unknown/ not stated
• Walk against traffic
• Walk with traffic

UN IT -MAIN DAMAGE POIN T

• Front
• Back
• Right rear fender
• Right rear door
• Right drivers door
• Front right fender
• Front left fender
• Front left door
• Back left door
• Back left fender
• Turret
• Underneath vehicle
• Miscellaneous
• Not known
• Not applicable

UN IT -N UMBER OF OCCUPAN TS

UN IT -OVERALL DAMAGE

- Nil
- Minor
- Moderate -drivable vehicle
- Moderate -towed away
- Major -towed away
- Extensive, unrepairable
- Unknown
- Not applicable

UNIT -TYPE

- Car/ Station wagon
- Utility/ Panel van
- 4-wheel drive
- Rigid truck
- Articulated truck
- Road train/ B-double
- Bus/ Coach
- Motor cycle
- Tractor

Bicycle

- Towed device
- Pedestrian
- Animal -ridden
- Animal -stock
- Animal -other
- Railway stock
- Other

UN IT -TYPE OF BUSIN ESS

- Not Commercial Use
- Taxi
- Prepared Food Delivery
- Agriculture, forestry and fishing
- Mining
- Manufacturing
- Electricity, gas and water supply
- Construction
- Wholesale trade
- Retail trade

• Accommodation, cafes and restaurants
• Communication services (post, courier, telecommunication
• Finance and insurance
• Property and business services
• Other
• Transport and Storage
• Government administration and defence
• Education
• Health and community services
• Cultural and recreational services
• Personal and other services
• Unknown
• Not Applicable

UNIT -WINDOWSHEAVILYTINTED

• Yes
• No
• Unknown
• Not applicable

Controller
CON TROLLER -AGE GROUP

• 0-4
• 5-11
• 12-16
• 17-20
• 21-24
• 25-29
• 30-39
• 40-49
• 50-59
•60-69
• 70-79
• 80 and over
• Unknown

CON TROLLER -GEN DER

• Female
• Male
• Unknown

CONTROLLER-LICENCE TYPE

- Open
- Provisional
- Learner
- Unlicenced
- Restricted

CON TROLLER -RACIAL APPEARAN CE

- Aboriginal and Islander
- Asian
- Caucasian
- European
- Indian
- Middle East / Arab
- Pacific Islander
- South East Asian
- Unknown

CONTROLLER-STATE LICENCED IN

- ACT
- CAU
- FED
- INT
- N/ A
- NSW
- NT
- NZ
- O/ S
- QLD
- SA
- TAS
- UNK
- VIC
- WA

CON TROLLER -TYPE

- Driver
- Truck Driver
- Bus Driver
- Motorcycle Rider

• Bicycle Rider
• Pedestrian
• Other controller

DRIVER / RIDER -BAC

• 0.01 -0.04
• 0.05 -0.09
• 0.10 -0.14
• 0.15 -0.19
• 0.20 -0.24
• 0.25 and over
• Nil
• Not Required
• Refused Test
• Roadside test -Nil
• Roadside test -Under
• Untested

Casualty
CASUALTY -AGE GROUP

• 0-4
• 5-11
• 12-16
• 17-20
• 21-24
• 25-29
• 30-39
• 40-49
• 50-59
• 60-69
• 70-79
• 80 and over
• Unknown

CASUALTY -AIR BAGDEPLOYMENT

• Fitted -deployed
• Fitted -not deployed
• Fitted -unknown if deployed
• Not fitted
• Unknown
• Not applicable

CASUALTY -BICYCLIST HELMET USE

- Worn
- Not worn
- Unknown
- Not Applicable

CASUALTY -GENDER

- Female
- Male
- Unknown

CASUALTY -MOTORCYCLIST HELMET USE

- Worn
- Not worn
- Unknown
- Not Applicable

CASUALTY -RACIAL APPEARANCE

- Aboriginal and Islander
- Asian
- Caucasian
- European
- Indian
- Middle East / Arab
- Pacific Islander
- South East Asian
- Unknown

CASUALTY -RESTRAIN T USE

- Fitted -Worn
- Fitted -Not worn
- Not fitted
- Unknown
- Not Applicable

CASUALTY -SEVERITY

- Fatality
- Hospitalised
- Medically treated
- Minor injury

CASUALTY -USER TYPE UN IT

- Driver -Car, S/ wagon
- Driver -Ute/ P-Van
- Driver -4WD
- Driver -Rigid Truck
- Driver -Artic Truck
- Driver – B-double
- Driver -Bus
- Driver -Tractor
- Driver -Animal Conveyance
- Driver -Railway Unit
- Rider -Motorcycle
- Rider -Bicycle
- Pedestrian
- Pedestrian -Wheeled rec. device
- Other controller
- Passenger -Car, S/ wagon
- Passenger -Ute/ P-Van
- Passenger -4WD
- Passenger -Rigid Truck
- Passenger -Artic Truck
- Passenger – B-double
- Passenger -Bus
- Passenger -Tractor
- Passenger -Animal Conveyance
- Passenger -Railway Unit
- Pillion -Motorcycle
- Pillion -Bicycle
- Pedestrian

APPENDIX E- DCA CODES

DEFINITIONS FOR CODING ACCIDENTS

NOTE :- 1 = Key vehicle direction. ie; The direction in which the key vehicle was travelling as it approached the crash location.

	00..	10..	20..	30..	40..	50..	60..	70..	80..	90..
	PEDESTRIAN onfootorintoy/pram	**INTERSECTION** vehiclesfrom adjacentapproaches	**VEHICLES** from opposingdirections	**VEHICLES** from onedirection	**MANOEUVRING**	**OVERTAKING**	**ONPATH**	**OFFPATH ONSTRAIGHT**	**OFFPATH ONCURVE**	**PASSENGERS& MISCELLANEOUS**
1	NEARSIDE 001	THRU-THRU 101	HEAD-ON 201	REAREND 301	LEAVINGPARKING 401	HEAD-ON 501	PARKED 601	OFFCARRIAGEWAY TOLEFT 701	OFFCARRIAGEWAY RIGHTBEND 801	FELLIN/FROM VEHICLE 901
2	EMERGING 002	RIGHT-THRU 102	THRU-RIGHT 202	LEFTREAR 302	PARKING 402	OUTOFCONTROL 502	DOUBLEPARKED 602	OFFCARRIAGEWAY TORIGHT 702	OFFCARRIAGEWAY LEFTBEND 802	
3	FARSIDE 003	LEFT-THRU 103	RIGHT-LEFT 203	RIGHTREAR 303	PARKINGVEHICLES ONLY 403	PULLINGOUT 503		LEFTOFFCARRIAGEWAY INTOOBJECT 703	OFFRIGHTBEND INTOOBJECT 803	STRUCKTRAIN 903
4	PLAYING,WORKING, LYING,STANDING ONCARRIAGEWAY 004	THRU-RIGHT 104	RIGHT-RIGHT 204	U TURN 304	REVERSINGIN TRAFFIC 404	CUTTINGIN 504	CARDOOR 604	RIGHTOFFCARRIAGEWAY INTOOBJECT 704	OFFLEFTBEND INTOOBJECT 804	STRUCKRAILWAY X-INGFURNITURE 904
5	WALKING WITHTRAFFIC 005	RIGHT-RIGHT 105	THRU-LEFT 205	LANESIDESWIPE 305	REVERSINGINTO FIXEDOBJECT 405	PULLINGOUT REAREND 505	PERMANENT OBSTRUCTION 605	OUTOFCONTROL ONCARRIAGEWAY 705	OUTOFCONTROL ONCARRIAGEWAY 805	HITANIMALOFF CARRIAGEWAY 905
6	FACINGTRAFFIC 006	LEFT-RIGHT 106	LEFT-LEFT 206	LANECHANGERIGHT 306	LEAVINGDRIVEWAY 406	OVERTAKING RIGHTTURN 506	TEMPORARY ROADWORKS 606	LEFTTURN 706	LEFTTURN 806	PARKEDCAR RANAWAY 906
7	DRIVEWAY 007	THRU-LEFT 107	UTURN 207	LANECHANGELEFT 307	FROMLOADINGBAY 407		TEMPORARYOBJECT ONCARRIAGEWAY 607	RIGHTTURN 707	RIGHTTURN 807	VEHICLEMOVEMENTS NOTKNOWN 907
8	ONFOOTWAY 008	RIGHT-LEFT 108		RIGHTTURNSIDESWIPE308	FROMFOOTWAY 408		ACCIDENTOR BROKENDOWN 608	MOUNTS TRAFFICISLAND 708	MOUNTS TRAFFICISLAND 808	
9	STRUCKWHILEBOARDING ORALIGHTING 009	LEFT-LEFT 109		LEFTTURNSIDESWIPE309			ANIMAL 609			
0	OTHER 000	OTHER 100	OTHER 200	PULLINGOUT 310	OTHER 400	OTHER 500	LOADHITS VEHICLE 610	OTHER 700	OTHER 800	OTHER 900

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