MONASH University
Accident Research Centre

SAFETY ATTITUDES AND BEHAVIOURS IN WORK-RELATED DRIVING

STAGE 1: ANALYSIS OF CRASH DATA

by

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Safety attitudes and behaviours in work-related driving – Stage 1: Analyses of crash data

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Abstract:
The overall aim of the project was to examine safety-related attitudes and behaviours in work-related driving to assess their contribution to crashes and to identify potential approaches to improving the safety of work-related driving. Stage 1 analysed crash and registration data supplied by the NSW RTA to examine the role of risky driving behaviours (speeding, fatigue, drink driving and not wearing seat belts) in crashes of fleet and non-fleet vehicles.

Fleet vehicles had a higher crash rate per 10,000 registered vehicles per year than non-fleet vehicles. Crashed fleet drivers were less likely to be speeding, driving while fatigued, or driving with an illegal blood alcohol concentration (BAC) than crashed non-fleet drivers. Fleet drivers were less likely to wear seatbelts but this may reflect the lack of a requirement in NSW for taxi drivers to wear seatbelts and low seatbelt wearing rates by truck drivers.

The crash rate of emergency vehicles was double that of other fleet and non-fleet vehicles and speeding was twice as common in crashes of emergency vehicles. In contrast, fatigue and drink driving were less common in emergency vehicle crashes, than for all fleet crashes. Non-wearing of seatbelts was most common for drivers of fire brigade and tow truck vehicles where the vehicle is likely to be larger than a car.

For each type of vehicle, illegal blood alcohol levels were less common among drivers of fleet vehicles than among drivers of non-fleet vehicles in crashes. However, the prevalence varied as a function of type of vehicle, with the highest prevalence among drivers of (fleet and non-fleet) light commercial vehicles and the lowest among drivers of taxis and emergency vehicles.

More than half of all fleet vehicles belonged to a fleet of one or two vehicles and smaller fleets had older vehicles. There was no clear relationship between crash involvement and fleet size. Fleet vehicles were newer than non-fleet vehicles and relatively more fleet than non-fleet cars were large cars, commercials and 4WDs. However, differences in vehicle characteristics are insufficient to explain the differences in crash severity.

Potential higher levels of reporting of non-casualty crashes by fleets are unlikely to have markedly affected the results.

Key Words:
Fleet safety, work-related driving, emergency vehicles, couriers, taxis

Disclaimer

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Preface

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EXECUTIVE SUMMARY

The overall aim of the project was to examine safety-related attitudes and behaviours in work-related driving to assess their contribution to crashes and to identify potential approaches to improving the safety of work-related driving. This Stage 1 report presents the results of analyses of crash and registration data supplied by the New South Wales Roads and Traffic Authority (RTA).

The report seeks to answer a number of questions:

- How do fleet and non-fleet vehicles compare in terms of crash involvement?
- What roles do risky driving behaviours (speeding, fatigue, drink driving and not wearing seat belts) play in crashes of fleet vehicles?
- What are the specific characteristics of crashes of emergency vehicles and what role do speeding, fatigue and other risky driving behaviours play?
- Do crash patterns vary as a function of fleet size?
- What effects do differing vehicle characteristics have on the crash patterns of fleet and non-fleet vehicles?
- Are comparisons of the crash involvement of fleet and non-fleet vehicles affected by fleets being more likely to report non-casualty crashes?

In an attempt to learn more about the extent and nature of work-related crashes, the New South Wales Roads and Traffic Authority (RTA) created a dataset linking some variables from the NSW crash data covering the period 1996 to 2000 inclusive and NSW registration data for the period 31 December 1995 to 30 June 2000. This dataset allows crashed vehicles to be identified as either fleet or non-fleet vehicles. Fleet vehicles were defined as those registered to "fleet owners", which included organisations or individuals with one or more business registrations, and organisations with more than two private registrations. Vehicles registered to car dealers and rental companies were classed as non-fleet vehicles. The vehicle type variable allowed for the separate analyses of crashes involving emergency vehicles (ambulances, fire brigade vehicles, and police vehicles), fleet cars versus non-fleet cars, and taxis versus fleet cars and non-fleet cars. Courier vehicles could not be directly identified, but form a sub-set of light commercial vehicles (light truck, panel van or utility) that are registered as fleet vehicles.

The RTA dataset does not directly identify crashes in work-related driving. Rather, it allows crashes involving "fleet vehicles" (as defined earlier) to be identified. Many of these crashes will have occurred in work-related driving. Some "fleet vehicle" crashes will have occurred during commuting to and from work in fleet vehicles and some will have occurred during private use of these fleet vehicles. Some "non-fleet vehicle" crashes may have occurred during work-related use of private vehicles. Despite these limitations, the dataset is the largest and most comprehensive source of information currently available in Australia about crashes in work-related driving.

The RTA also supplied a spreadsheet summarising vehicle registrations data for NSW for the period 31 December 1995 to 30 June 2000. The registrations data contained fleet size operated by each fleet operator, and the type of each registered vehicle. Fleet sizes ranged from one vehicle up to 11,155 vehicles. Approximately 23-24% of all registered vehicles

were fleet vehicles, including 15% of all registered cars, 14% of motorcycles, just over half of the light trucks, and two-thirds of "non-public" buses. Almost all of the heavy trucks, articulated vehicles, public buses, emergency vehicles and taxis in NSW were registered as fleet vehicles. Just over half of all fleet vehicles and 87% of non-fleet vehicles were cars. The next most common type of vehicle – light trucks – made up 36% of fleet vehicles and 10% of the non-fleet vehicles.

The analyses showed that fleet vehicles have a higher rate of involvement in crashes per 10,000 registered vehicles per year than non-fleet vehicles. The data used for these analyses do not provide any information regarding the distances travelled by either fleet or non-fleet vehicles and so crash rates could not be calculated on the basis of distance travelled. The survey proposed for Stage 2 of the project would collect data on distance travelled by those who drive for work.

Drivers of fleet vehicles (overall and for each vehicle type) were less likely to be travelling at excessive speed, driving while fatigued, or driving with an illegal blood alcohol concentration (BAC) than drivers of non-fleet vehicles. Fleet drivers were less likely to wear seatbelts, but this is likely to be principally driven by the lack of a requirement in NSW for taxi drivers to wear a seatbelt and the higher proportion of larger vehicles, such as trucks (where seatbelt wearing compliance is known to be low), in the fleet categories. This proposition is supported by the identical seatbelt wearing rates of fleet and non-fleet car drivers.

The crash rate for emergency vehicles was almost double that for other fleet and non-fleet vehicles and more than three times that for fleet and non-fleet cars. Crashes involving emergency vehicles (particularly police and ambulance vehicles) were more severe than the average for all fleet vehicles. Speeding was twice as common in emergency vehicle crashes than in other fleet vehicle crashes and was most common for ambulances and police vehicles (particularly with young drivers). Fatigue and drink driving were less common in emergency vehicle crashes, than for all fleet vehicles. Non-wearing of seatbelts was most common for drivers of fire brigade and tow truck vehicles where the vehicle is likely to be larger than a car.

The crash rate per 10,000 registered vehicles per year for taxis was about ten times greater than for fleet or non-fleet cars. Taxi crashes were more likely to have occurred within the Sydney metropolitan area and to have occurred at night or on weekends than crashes of fleet or non-fleet cars.

For each type of vehicle, illegal blood alcohol levels were less common among drivers of fleet vehicles than among drivers of non-fleet vehicles in crashes. However, the prevalence varied as a function of type of vehicle, with the highest prevalence among drivers of (fleet and non-fleet) light commercial vehicles and the lowest among drivers of taxis and emergency vehicles. Currently the .02% special BAC limit applies to commercial vehicles only when their gross vehicle mass exceeds 13.9 tonnes. The findings presented here suggest that there may be a case for extending this restriction to include all light trucks to address the relatively high involvement of alcohol in drivers of light commercial vehicles.

A number of factors may potentially underlie the low prevalence of alcohol in taxi crashes. More than 90% of taxi crashes occurred in the capital city, so the contribution of rural drink driving was lower to this category of crashes than to others. It may reflect the success of the .02% limit that applies to taxi drivers and other drivers of public vehicles. It

may even be an indication that taxi drivers refrain from drinking because alcohol would make it harder to remain awake during long shifts.

More than half of all fleet vehicles belonged to a fleet of one or two vehicles and smaller fleets had older vehicles. There was no clear relationship between crash involvement and fleet size.

Fleet vehicles were newer than non-fleet vehicles and relatively more fleet than non-fleet cars were large cars, commercials and 4WDs. Differences in crash severity remained when the crashes of a group of relatively new, common cars were compared, suggesting that differences in vehicle characteristics are insufficient to explain the differences in crash severity.

There are a number of points that suggest that the potential for higher levels of reporting of non-casualty crashes by fleets would not have markedly affected the conclusions. First, any differential reporting probably would have the greatest effect on non-casualty crashes where the vehicle damage was sufficiently minor not to require towing (which are not included in the data). Second, the patterns and rates of fatality and injury crashes for fleet vehicles should be unaffected by any potential differential reporting. These data show higher crash rates for fleet vehicles.

1. INTRODUCTION

1.1 BACKGROUND

Road crashes are the most common form of work-related death in Australia and in many other countries (including the United States as noted in Janicak, 2003). In 1989-92, 23% of work-related deaths resulted from road crashes during work and 26% of work-related deaths resulted from road crashes while commuting to and from work (National Occupational Health and Safety Commission, 1998). From another perspective, road crashes while working and while commuting represented 6% and 7%, respectively, of road fatalities during that period (Federal Office of Road Safety, 1999). These figures do not count the other persons who were killed or injured as a result of these work-related road crashes.

Much of the published research concludes that fleet or company drivers have an increased crash risk relative to that of drivers of privately registered vehicles. For example, Lynn and Lockwood (1998) found that company drivers had an accident liability 29-50% higher than private drivers of similar age, gender and annual mileage. Bibbings (1997) found that workers required to drive 25,000 miles per year as part of their job have an almost comparable risk of being killed in a road accident to that faced by coal miners in their job (1 in 8,000).

One of the largest studies conducted to address the issue of fleet driver safety was performed by Broughton, Baughan, Pearce, Smith and Buckle (2003) in the United Kingdom. Their results were based on responses to a mail survey of 6,000 car drivers belonging to three groups – accident-involved drivers (sourced through police records), company drivers (from 57 companies), and drivers of privately registered vehicles contacted via the licensing organisation. Overall, 16.3% and 8.8% of the company and private driver samples respectively had been involved in a crash in the previous six months.

Broughton et al (2003) found that car drivers who drove for work had a higher risk of injury crashes than other drivers after controlling for gender, age, annual mileage and proportion of driving on motorways. Those who drove 80% of their annual mileage for work (about 23% of the work driving sample) had 53% more injury crashes than those with no annual work mileage. Those who drove 1-80% of their annual mileage for work purposes (drivers with less than 1% of the annual travel devoted to work-related purposes were classed as non-work drivers) had an average of 13% more crashes than matched non-work drivers.

In a Queensland study, Newnam, Watson and Murray (2002) administered a self-report questionnaire to 204 individuals who drove a vehicle for work purposes. They asked drivers about their crash history in their private vehicles compared to their work vehicles. Adjusted for driving exposure, work driving had a crash rate of 0.07 crashes per 1,000 kilometres, compared to 0.06 crashes per 1,000 kilometres for personal vehicles (although Broughton et al (2003) point out that self-reported crashes are inevitably dominated by damage-only accidents).

There are a number of principal reasons why fleet drivers may have an increased crash risk relative to non-fleet drivers. One of these reasons is related to exposure – fleet drivers are

likely to spend more time driving and travel longer distances in a given period, and are therefore more likely to be involved in a crash. For example, in the United Kingdom, individuals who drive for work-related reasons (not including commuting) drive more than 2½ times the annual distance of drivers of private cars (Broughton et al., 2003). Due to the longer periods in a vehicle, fleet drivers may also be at an increased risk of fatigue. Additionally, they may be more likely to make mistakes through complacency or lack of attention.

Another principal reason for an increased crash risk relates to the fact that the vehicle becomes a workplace for the driver. To make driving time more productive, fleet drivers are more likely to use devices such as mobile phones (Broughton et al., 2003), more likely to eat while driving and be distracted by work-related issues. They may also be more likely to travel at excessive speeds between appointments.

As many fleet drivers do not own the vehicle they are driving for work purposes they may be inclined to treat it with less care – driving faster and more recklessly than they might in their own vehicles. While Broughton et al (2003) did not find support for this proposition, they did find that company drivers are more likely to drive aggressively.

Speeding and fatigue appear to contribute to the higher crash involvement of company drivers. Interviews and focus groups with British company car drivers (Downs, Keigan, Maycock and Grayson, 1999) indicated that the driving culture within an organisation might stress business needs, such as delivery quotas, before safety. Another survey of British car drivers found that speeding was common for over half the sample, and excessive speeding was common for 13% of the sample (Adams-Guppy and Guppy, 1995). The most influential reason for speeding was a desire to arrive at meetings on time, even if this meant breaking the speed limit. This was combined with a reduced perception of excess speeding as an important accident risk factor. In addition, the overall deterrent of a crash may not be as high among this group, as the company will pay for costs such as repairs and lost time.

A MUARC study found that higher driving speeds were associated with business or work car use, driving a large, relatively new car owned by someone other than the driver, a relatively high level of driving exposure, being on a long trip and driving relatively little in built-up areas (Harrison, Fitzgerald, Pronk, and Fildes, 1998).

In addition to speeding, working and work-related travel also appear to play a significant role in driver fatigue. Fell and Black (1996) reported that in the Northern Region of NSW, over a third of driver fatigue crashes or near crashes occurred on trips related to work. When drivers in the Sydney Region were interviewed, 43% of respondents who had had a fatigue incident (a crash, near miss or moved out of their lane because of fatigue) stated that their trip was work-related. Among the respondents who said that they had had insufficient sleep, 55% attributed this to long working hours or overtime.

A large proportion of the published research on fleet driver and fleet vehicle safety relies on questionnaires and other surveys, where a relatively small number of organisations may be sampled. While such an approach is ideal for collecting information on the views and attitudes of drivers and organisations, unless the sample size is very large or the survey covers a long time frame, problems arise in collecting information regarding crashes – there may be too few crashes (particularly casualty crashes) to make meaningful comparisons. Additionally, drivers may not remember (or may not remember accurately) crash incidents, or they may not be truthful in their responses. The current study is

therefore somewhat unique in that it allows for objective analyses of a large number of crashes.

1.2 IMPETUS FOR THE CURRENT RESEARCH

The importance of work-related driving in road safety has been acknowledged in *arrive alive!* the Victorian Government Road Safety Strategy 2002-2007. The Strategy incorporates a new Corporate Road Safety Initiative to improve vehicle and driver safety. Part of this will be "the development of a 'safer driving' policy for government employees which will include recommended approaches to avoid speeding, drink driving, fatigue and drug-taking. The government will take this leadership role to encourage business and local government to implement similar policies". (p.22)

In the past, analyses of crash data have provided little insight into the factors affecting the safety of work-related driving. Crashes occurring during work-related driving (or involving business vehicles) cannot be identified in most crash databases, including the Victorian database. Queensland crash data include a business vehicle variable but it is acknowledged that this variable is less likely to be completed if the vehicle does not have obvious signage. The other source of information about fleet vehicle crashes has been vehicle insurance data where injury crashes are rare and often cannot be distinguished from property damage crashes.

The New South Wales Roads and Traffic Authority (RTA) has produced a dataset that allows business vehicles to be identified and includes variables that allow the involvement of speeding and fatigue to be identified. The dataset was created by linking the registration numbers for vehicles in crashes with a snapshot of the registration database to identify the vehicle's registered operator at the time of the crash. "Fleet vehicles" were defined as vehicles owned by a "fleet owner" (in regards to the type of registration, the terms "fleet" and "business" are used interchangeably in this report). Fleet owners belonged to two categories:

- Operators (organisations or individuals) with one or more business registrations
- Organisations with more than two private registrations.

The size of the fleet to which the crashed vehicle belongs is also included in the dataset.

The results of early analyses of this dataset may have been confounded by the different types of makes and models that comprise fleet and non-fleet vehicles, the differences in driver and driving characteristics and so on. The new analyses conducted as part of the current project aim to control for some of these factors and thus provide a clearer picture of crash patterns and potential contributory factors.

The dataset allows emergency vehicles (ambulances, fire brigade vehicles, and police vehicles), taxis and fleet cars to be distinguished from non-fleet cars. While courier vehicles cannot be directly identified, they form a sub-set of light commercial vehicles (light truck, panel van or utility) that are registered as fleet vehicles (see Chapter 7 for further discussion).

In this project, analyses of the data will be undertaken to examine the patterns of crashes of each of these types of vehicles, and to compare the extent of involvement of speeding, fatigue, alcohol and other factors in these crashes.

The analyses will seek to deal with another confounding factor in fleet crash data, the tendency of fleets to be more likely to report crashes of a low severity level because of insurance claims for vehicle repair (that private motorists might not get repaired) and therefore reducing the average severity of fleet crashes.

The analyses will examine crash patterns as a function of fleet size to see whether the crash patterns of large fleets and small fleets differ. This will help to establish whether different messages and approaches need to be developed for small fleets – traditionally a difficult segment to target with safety measures.

1.3 AIM OF THE REPORT

This project aims to examine safety-related attitudes and behaviours in work-related driving to identify their contribution to crashes and potential approaches to improving the safety of work-related driving.

1.4 PROJECT STRUCTURE

The proposed project has three stages:

1. Analysis of crash data
2. Survey of drivers
3. Development of targeted countermeasures

Funding was received to undertake Stage 1 and this is reported here. A brief outline of the proposed later Stages follows.

Stage 2: Survey of people who drive for work

It is proposed to conduct a survey of people who drive for work to assess whether the findings regarding speeding from British studies are applicable in Victoria and to find out more about the role of work pressures in both speeding and fatigue in work-related driving. The survey will aim to compare different types of driving for work (e.g. police, couriers, sales representatives, taxi drivers). It is likely that the analysis of the crash data will suggest other hypotheses to be further investigated in the survey.

Stage 3: Development of targeted countermeasures

This Stage will build on the results of Stages 1 and 2 and develop countermeasures to address the safety-related attitudes and behaviours in work-related driving. It will assess the extent to which general road safety measures are relevant and effective in work-related driving and identify potential improvements. It will examine fleet safety approaches to improving safety-related attitudes and behaviours in work-related driving and the extent to which they are effective. It will propose a series of targeted countermeasures and suggest how the effectiveness of these measures could be evaluated.

1.5 REPORT STRUCTURE

This document addresses Stage 1 of the project and reports the results of analyses of two sets of data supplied by the RTA. The registrations data provides information about the

numbers of vehicles registered in NSW as fleet or non-fleet vehicles. The crash data describes crashes that occurred in NSW involving NSW-registered fleet and non-fleet vehicles. Chapter 2 of this report describes these data sets and defines the terms used throughout the report, such as fleet and non-fleet vehicles.

Chapter 3 presents an analysis of the registrations data. The numbers of fleet and non-fleet vehicles of various types are compared. The fleet data are also examined as a function of the number of vehicles in the fleet. The remaining chapters focus primarily on the crash data.

Chapter 4 compares crashes involving fleet vehicles with crashes involving non-fleet vehicles, examining crash, driver and vehicle characteristics. Differences in crash severity, crash rates, and involvement of fatigue, speeding, illegal blood alcohol concentration (BAC) and non-wearing of seatbelts are compared between fleet and non-fleet vehicles in crashes.

Chapters 5-9 focus primarily on the involvement of specific types of fleet vehicle crashes. Chapter 5 describes the analysis of crashes involving fleet cars (where the definition of "car" does not include taxis, utilities or panel vans), Chapter 6 examines crashes involving emergency vehicles, Chapter 7 focuses on light commercial vehicles (where the definition of "light commercial" includes utilities, panel vans and light trucks), and Chapter 8 deals specifically with taxis.

Unless otherwise noted (such as when referring to vehicles in the registration database), all of the vehicles and drivers described in this report have been involved in crashes (the main dataset is a crashed vehicle file), however they may be simply referred to as 'vehicles' and 'drivers' rather than 'crashed vehicles' and 'crashed drivers', for brevity.

2. METHOD

The RTA supplied data from two sources for use in this project – one set of data had been extracted from the NSW registrations database (i.e. vehicles that had been registered in NSW) and the other from the RTA's crash statistics database (i.e. vehicles that had crashed in NSW). Both sets of data had been assembled by the RTA for their own purposes and then made available to MUARC for this project. These data files are discussed in more detail below.

2.1 DEFINITION OF FLEET VEHICLE

Throughout this report the term "fleet vehicle" is used to indicate that the vehicle was registered to a "fleet owner". The RTA defined a fleet owner as a registered operator (either an organisation or an individual) with one or more business registrations, or an organisation with more than two private registrations.

Thus, fleet vehicles include:

- All vehicles with business registration
- Those vehicles with private registration where the registered operator is an organisation with more than two private registrations

Non-fleet vehicles include:

- All vehicles with private registration where the registered operator is an individual
- All vehicles with private registration where the registered operator is an organisation with only one private registration
- Vehicles registered to motor dealers
- Vehicles registered to rental vehicle companies

According the RTA's website, business registration costs about $100 more than private registration, with increases in the discrepancy according to increasing mass. The only exception is motorcycles, which cost the same for private and business registrations. Private registration applies where vehicles are used substantially for social, pleasure or domestic purposes. It also applies to vehicles owned by ministers of religion, public servants, employees of statutory authorities and local Government bodies that are also used at work.

Most vehicles used for business are required to have business registration. The RTA has advised that the only specific benefit to registering a vehicle for business use rather than a private registration is the ability to have a common expiry date for all vehicles owned by the organisation. However, it is likely that taxation reasons may encourage business registration of vehicles.

2.2 REGISTRATIONS DATA

The registrations data was supplied as a Microsoft Excel spreadsheet containing two types of data: fleet size and vehicle type. All vehicles registered in NSW within the period 31 December 1995 to 30 June 2000 were included. In the "fleet size" data, fleet operators were classified according to the number of vehicles registered in their name (although the operators were not individually identified). Fleet sizes ranged from one vehicle up to 11,155 vehicles. No other information regarding the fleet operator was included.

The "vehicle type" data classified all of the vehicles in the registration database into type of vehicle. Whether the vehicle was fleet registered or non-fleet registered was also indicated. No other vehicle- or fleet-based information was provided in this data. The vehicle types were as follows:

- Cars
- Motorcycles
- Articulated vehicles
- Heavy trucks
- Light trucks
- Buses (public)
- Buses (non-public)
- Taxis
- Stand-by taxis
- Emergency vehicles
- Other

A particular vehicle in the database could have been registered to a number of different holders throughout its lifespan. This especially applies to fleet vehicles which are often bought new, held for up to three years and then sold to private individuals. To account for this, the registrations data were taken as registration database "snapshots". A snapshot indicated the status of a vehicle in the registration database at a particular point in time. The snapshots were taken at 31 December 1995 and then 30 June and 31 December for 1996, 1997, 1998, and 1999, and finally at 30 June 2000. Individual vehicles (or fleets) could not be traced across snapshots, so it was not possible to determine whether a vehicle had changed from fleet to private ownership at any time, or indeed if a vehicle was still in the database at all from one snapshot to the next. However, a particular vehicle could crash more than once in the data period and so be counted more than once. Taking snapshots of the registration database enables the fleet status (which can change) of the vehicle to be recorded for each crash.

2.3 CRASH DATA

The crash data supplied by the RTA was a subset of the full crash database and covered the period 1996 to 2000 inclusive. It did not include all of the variables present in the full database. In order for a crash to be included in the database, it had to occur in NSW. Additionally, the following criteria had to be satisfied:

1. The accident was reported to the police
2. The accident occurred on a road open to the public
3. The accident involved at least one moving road vehicle
4. The accident involved at least one person being killed or injured or at least one motor vehicle being towed away.

Prior to 2000, road crashes occurring in New South Wales were to be reported to the police when any person was killed or injured or there was property damage to the value of at least $500. Since that time, crashes must be reported to police when any person is killed or injured, when drivers involved do not exchange particulars, or when an involved vehicle is towed away.

After attending a crash, police officers directly enter the crash details into an electronic system – COPS (Computerised Operational Policing System). On a weekly basis COPS files are sent to the RTA where they are loaded into the RTA's Traffic Accident Database System (TADS) for enhancement and validation.

The data provided for this project were supplied as SPSS data files and differed to that held in the larger crash database in several ways. Data from 1996-2000 only were included and not all database variables were present. Additionally, each crashed vehicle had been matched to the NSW registrations database so that a crashed vehicle could be identified as a fleet-registered vehicle or a non-fleet-registered vehicle on the day of the crash. The data was supplied post-matched, and a number of extra variables were created as part of the matching process.

One of the additional variables indicated the outcome of matching the crashed vehicle to the registration database. For example, a crashed vehicle will not appear in the registration database if it was registered outside NSW at the time of the crash (as would be the case for an interstate tourist). A number of other vehicles were not successfully matched to the registration data for a variety of reasons, such as "an outstanding transfer" or because the vehicle was unregistered at the time of the crash. Only instances where the crashed vehicle was successfully matched to the registration database within the snapshot prior to the crash (i.e. in the preceeding 6 months) or subsequent snapshot period were used in the analyses conducted for this report. According to information supplied with the data, non matches comprised 5.8% of the total dataset, and consisted of:

- 6.8% of vehicles involved in fatal crashes
- 6.1% of vehicles involved in injury crashes
- 5.6% of vehicles involved in towaway crashes.

Another additional variable indicated the "fleet status" of the crashed vehicle. Vehicles were indicated as registered to a fleet operator, a dealer (e.g. a car yard), a rental company, or all other vehicles (i.e. non-fleet registrations). Of the total of 396,899 crashed vehicles contained in the database as supplied, there were 6,314 crashed dealer vehicles in the file (1.6% of the total), 2,804 rental vehicles (0.7%), 98,851 fleet vehicles (24.9%) and 288,930 crashed non-fleet vehicles. Crashed vehicles registered to dealers and rental companies have been included as non-fleet vehicles for the analyses contained in this report because it is likely that while registered to a dealer or a rental company, a vehicle will probably spend a substantial proportion of its time out of use (if a dealer vehicle is sold and crashes it should show up as a fleet or non-fleet crashed vehicle – depending on the purchaser).

A further extra variable provided the total number of vehicles registered to the crashed vehicle's operator (the "fleet size").

The original database as held by the RTA is person-based – each record relates to a person involved in the crash. Where there are multiple individuals in an involved vehicle they will share the vehicle's details. Additionally, each of the vehicles involved in a particular crash will share a set of details related to the crash. While a number of crash-based variables were included, the data as provided for this project was essentially vehicle-based – i.e. each crashed vehicle was entered as a new line of data. This means that while it is known how many individuals were injured or killed in the crash, including the total number of occupants of the crashed vehicles, data is not provided for each of them unless they were driving the vehicle that crashed (i.e. it is not a person-based file, and so there is, for example, no pedestrian or pillion-rider data). Accordingly, there are no details regarding the gender, age, etc of crashed vehicle passengers.

Other crash-based variables included the time of the crash (day, month, year and a one-hour interval – exact time was not provided), degree of severity (the most serious level of injury suffered in the crash: fatal, injury, and no injury (towaway)), and the total number of people killed and injured in the crash. Another group of variables relate to each vehicle in the crash, including the type of vehicle, the make and year.

The crash database as supplied contains two separate variables that indicate the vehicle type (car, articulated truck, motorcycle, etc.). One of these variables was added to the crash data from the registration database by the RTA (called "Type_RS" in the SPSS dataset), and the other was already present in the crash file (i.e. the classification was made by the police officer attending the crash – called "Traffic Unit Type" or "Tutype"). The total number of crashed vehicles is identical in each of the variables, however, none of the vehicle type categories matches exactly. For example, the crash variable indicates that 346,076 cars crashed while the registration variable identifies 322,292 crashed cars.

Table 2.1 displays the numbers of each type of vehicle according to the crash and registration-based variables along with the difference between these numbers (a cross-tabulation of the two variables is provided in Appendix 1). For each of the vehicle type categories except light trucks, the registration variable indicates fewer vehicles, ranging from a difference of 0.4% for motorcycles up to 75.4% for 'other motor vehicles'. For light trucks, the crash variable codes 7.7% more units than the registration variable. As the vehicle type variable already present in the crash data is likely to correspond with the other variables in the crash data, it was used for the analyses presented in this report. Had the registration variable been chosen rather than the crash variable, it is reasonable to assume that while the actual numbers provided by the following analyses would have changed, the relative relationships between fleet and non-fleet groups and between vehicle types within each is likely to have been similar between the approaches. Accordingly, the interpretations and conclusions are likely to have been the same.

Two vehicle-based variables included in the file relate to whether the vehicle was thought to be speeding at the time of the crash and whether the driver of a crashed vehicle was considered to be fatigued, where the factor contributed to the crash.

According to RTA guidelines, speeding is judged to have contributed to the crash if:

- the vehicle's controller (the driver or rider) was charged with a speeding offence, or
- the vehicle was described by police as travelling at an excessive speed, or
- the stated speed of the vehicle was in excess of the speed limit.

Table 2.1 Numbers of each type of crashed vehicle according to crash and registration variables in the crash file.

Vehicle type	Vehicle type		Difference	
	Crash variable	Registration variable	No.	%
Car	346,076	322,292	23,784	6.9%
Motorcycle	8,687	8,648	39	0.4%
Light truck	24,428	50,725	26,297	107.7%
Heavy Rigid truck	6,061	4,881	1,180	19.5%
Articulated truck	4,343	5,125	782	18.0%
Bus	3,272	2,803	469	14.3%
Emergency vehicle	1,471	1,796	325	22.1%
Other motor vehicle	2,561	629	1,932	75.4%
Total	396,899	396,899	0	0.0%

Additionally, if the vehicle jack-knifed, skidded, slid, went out of control or ran off the road on a bend, then speed was considered to be a factor. Thus, speeding refers to an excessive speed for the prevailing conditions, not necessarily exceeding the posted speed limit.

According to RTA guidelines, fatigue is judged to have contributed to the crash if the vehicle's controller was described by police as being asleep, drowsy or fatigued. Fatigue was also a factor if the vehicle was involved in a head-on crash while travelling on the wrong side of the road (but was not overtaking and there were no other relevant mitigating circumstances), or the vehicle ran off the road (a straight section or the outside of a curve) but the vehicle was not considered to be travelling at an excessive speed.

2.3.1 Augmentation of the crash data file

The crash data file originally supplied to MUARC did not contain information about crash type (e.g. single or multi-vehicle, rear-end or overtaking), speed limit at the crash site or model of the vehicle. Thus, these factors could not be analysed in the interim report. The RTA subsequently agreed to augment the original data with these variables. However, this required re-matching of the crash and registration data files.

In the intervening period, a number of crash records in the original run had been "cleaned up" such that their details had changed for the second run. For example, the first dataset contained 396,899 crashes – 98,851 crashed fleet vehicles and 298,048 crashed non-fleet vehicles; while the second dataset included 396,677 crashed vehicles made up of 98,743 fleet vehicles and 297,934 non-fleet vehicles (108 fewer fleet vehicles and 114 fewer non-fleet vehicles in the second dataset – relatively minor changes). Most of the analyses in this report were based on the first dataset. Analyses of crash types (RUM codes), speed zone, and make and model of vehicle were performed using the second dataset.

Subsequent to the first set of analyses, RTA advised that the numbers of people killed and injured in each crash were inaccurate. This was corrected in the second dataset. Accordingly, the analyses of these variables were redone using the second dataset.

2.3.2 Vehicle make and model

The original dataset contained a variable describing the vehicle make ("tu_make" – traffic unit make). The augmented dataset contained another variable that coded vehicle make ("make_ des" – make description) as well as a variable that coded vehicle model

("family_v"). It is assumed that both of the latter variables were imported from the registration database as their naming does not seem to match the convention used in the crash database. These two variables were used to determine make/model combinations ("tu_make" and "make_ des" did not precisely coincide).

There were a total of 281 different entries in the make variable. In order to reduce the number of entries, only makes that corresponded to traffic unit group vehicle types 1, 2 or 6 (car, light truck and emergency vehicle respectively) were used, and then only entries with a minimum presence of 100 crashed vehicles were kept. This reduced the list to 45 different vehicle makes. The vehicle model types were then examined for these 45 makes. In a number of instances, a series of make/model combinations were pooled (e.g., Ford F100, F150, F250, F350 and F700 were all aggregated into "Ford F series"). A minimum of 100 vehicles for each make/model combination was again used to reduce the number of entries.

At this stage the data was checked and a number of errors recoded. All of these errors related to Mitsubishis incorrectly entered as Chryslers or Nissans entered as Datsuns (where Datsuns contained a model common with Nissans the latter was the larger group and so "Nissan" was treated as the "correct" make). A total of 92 make/model combinations remained. For any make where a make/model combination was retained, all other models listed for that make were also retained as either "unknowns" (where they were present in the original database as "unknowns") or "unclassified" others (i.e. make/model combinations that did not represent a minimum of 100 crashed units).

The 92 make/model combinations of interest were then categorised as luxury cars, large cars, medium-sized cars, small cars, sports cars, vans, and commercial vehicles or vans. These classifications were made on the basis of other published research (Haworth, Senserrick, Watson and Symmons, 2004).

3. CHARACTERISTICS OF FLEETS

Overall, 23.7% of vehicles (803,244 vehicles) registered in NSW at 30 June 2000 were classified as fleet vehicles using the definition outlined in the previous chapter. Over the ten six-monthly snapshots of the registration database between 31 December 1995 and 30 June 2000, this percentage varied between 23.3% and 23.8% (a maximum difference of 1,559 vehicles).

The registration data coded the type of vehicle belonging to a fleet or non-fleet. The distribution of vehicle types at the 30 June 2000 snapshot is displayed in Table 3.1. Approximately 15% of cars registered in NSW were registered to fleets, along with 14% of motorcycles. Just over half of the light trucks are registered to fleet owners, as well as two-thirds of "non-public" buses. Almost all heavy trucks, articulated vehicles, public buses, emergency vehicles and taxis in NSW are registered as fleet vehicles.

For most vehicle types, the figures in Table 3.1 were quite consistent across the ten snapshots (i.e. between 31 December 1995 and 30 June 2000). For example, fleets accounted for between 15.1% and 15.6% of cars registered in NSW, a maximum variation of 0.5 percentage points. The proportions of each of the vehicle types listed in Table 3.1 accounted for by fleets did not vary across the years by more than 2.5 percentage points, except for non-public buses (which fluctuated between 47.3% and 66.3% held by fleets) and the category "other" (with 4.2 percentage points variation)[1].

Table 3.1 Numbers of non-fleet and fleet vehicles registered by vehicle type, and percentage of vehicles of that type that were fleet vehicles at 30 June 2000.

Vehicle Type	Non-Fleet	Fleet	% Fleet
Car	2,438,883	446,983	15.5%
Motorcycles	72,403	12,134	14.4%
Light Trucks	282,290	311,164	52.4%
Heavy Trucks	963	33,976	97.2%
Articulated Vehicles	250	19,107	98.7%
Buses (public)	96	8,882	98.9%
Buses (non-public)	1,388	2,726	66.3%
Emergency Vehicles	118	6,897	98.3%
Taxis	14	5,653	99.8%
Stand-by Taxis	0	116	100.0%
Other	646	19,458	96.8%
Total	2,797,051	867,096	23.7%

Table 3.2 displays the makeup of fleet versus non-fleet vehicles in terms of vehicle type at the 30 June 2000 snapshot. Just over half of all fleet vehicles were cars, while cars made up 87% of the non-fleet total. The next most common type of vehicle – light trucks – made up 36% of fleet vehicles and 10% of the non-fleet vehicles.

The most common fleet size was one vehicle – 237,639 separate fleets with one vehicle each accounted for 29% of all fleet vehicles (see Table 3.3). In addition, a quarter of all

[1] Note that 'cars' in Table 3.1 includes utilities, panel vans and 4WDs. However in later chapters – as specified – 'cars' will only include sedans, stationwagons, etc.

fleet vehicles were held by operators with only two vehicles. Almost two-thirds of all fleet vehicles were accounted for by fleets with three vehicles or less, and more than three-quarters of all fleet vehicles were contained in by fleets of seven or fewer vehicles. The data did not allow an analysis of fleet size as a function of vehicle type (or vehicle size), or vehicle age.

Table 3.2 Numbers of fleet and non-fleet vehicles registered at 30 June 2000 by vehicle type.

Vehicle Type	Fleet		Non-Fleet	
	Number	% of total	Number	% of total
Car	446,983	51.5%	2,438,883	87.2%
Motorcycles	12,134	1.4%	72,403	2.6%
Light Trucks	311,164	35.9%	282,290	10.1%
Heavy Trucks	33,976	3.9%	963	0.0%
Articulated Vehicles	19,107	2.2%	250	0.0%
Buses (public)	8,882	1.0%	96	0.0%
Buses (non-public)	2,726	0.3%	1,388	0.0%
Emergency Vehicles	6,897	0.8%	118	0.0%
Taxis	5,653	0.7%	14	0.0%
Stand-by Taxis	116	0.0%	0	0.0%
Other	19,458	2.2%	646	0.0%
Total	867,096	100%	2,797,051	100%

Table 3.3 Numbers of fleet vehicles by fleet size – averaged across the ten snapshots of the registration data.

Fleet Size	Average number of fleets	Average total number of vehicles	% of vehicles belong to fleet of this size
1	237,639	237,639	29%
2	102,069	204,139	25%
3	30,754	92,263	11%
4	10,572	42,286	5%
5	4,577	22,886	3%
6	2,474	14,846	2%
7	1,543	10,802	1%
8	1,026	8,206	1%
9	700	6,303	1%
10	542	5,422	1%
11-15	1,445	18,219	2%
16-20	643	11,429	1%
21-30	572	14,161	2%
31-40	274	9,606	1%
41-50	166	7,530	1%
51-100	383	26,407	3%
101-500	284	54,581	7%
501-1,000	16	10,680	1%
1,001 +	12	27,772	3%
Total	395,691	825,178	100%

4. CRASHES INVOLVING FLEET AND NON-FLEET VEHICLES

This chapter describes the crashes that occurred in the period 1996 to 2000 (inclusive) involving fleet and non-fleet vehicles. All vehicle types are included – subsequent chapters of this report will examine crashes involving specific types of vehicles.

4.1 NUMBERS AND SEVERITIES OF CRASHES

During the period 1996 to 2000 (inclusive), a total of 396,899 NSW-registered vehicles were involved in crashes where the vehicle could be classified as either a fleet or non-fleet vehicle (as defined in Chapter 2). Overall, one-quarter of the crashed vehicles were fleet vehicles. Less than 1% of the crashed vehicles were involved in a fatal crash, and of those that were, 29% were fleet vehicles and 71% were non-fleet vehicles (see Table 4.1). About 35% of all crashed vehicles were involved in an injury crash, where one-quarter of these vehicles were fleet vehicles. Non-casualty (towaway) crashes were the largest category, involving approximately 64% of all crashed vehicles, and again 25% of these were fleet vehicles.

The severities of crashes involving fleet and non-fleet vehicles were statistically significantly different ($\chi^2(2)=51.8$; $p<0.001$). However, the differences were not large in percentage terms (see Table 4.1). Fleet vehicle crashes were slightly more likely to be fatal (0.9% versus 0.7%), but less likely to result in injury (34% versus 35%).

Table 4.1 Numbers of fleet and non-fleet vehicles in crashes by crash severity.

	Fatal		Injury		Non-casualty		Total
	No.	%	No.	%	No.	%	No.
Fleet	904	0.9	33,822	34.2	64,125	64.9	98,851
Non-fleet	2,172	0.7	104,370	35.0	191,506	64.3	298,048
Total	3,076	0.8	138,192	34.8	255,631	64.4	396,899

Table 4.2 shows the composition in terms of vehicle type of the fleet and non-fleet vehicles involved in crashes. Almost all of the crashed non-fleet vehicles were cars while almost two-thirds of the crashed fleet vehicles were cars. The next largest vehicle group for both fleet and non-fleet were light trucks (16% and 3% of the totals respectively).

As noted earlier, the merged dataset is vehicle-based, with the result that a crash involving multiple vehicles is counted more than once. The full crash database includes an identifier unique to each crash so that the total number of crashes can be ascertained, along with the number of single-vehicle versus multi-vehicle crashes, etc. This variable was not supplied and so it is not possible to eradicate the double counting of crashed vehicles. Accordingly, all analyses are in terms of the number of crashed vehicles rather than the number of crashes.[2]

[2] As a means of comparison, the RTA Statistical Statement series indicates that there were 52,914 vehicular crashes in NSW in 2000, 52,866 in 1999, 52,575 in 1998, 50,120 in 1997 and 52,383 in 1996.

The dataset contains two variables that indicate the total number of people killed and injured (respectively) in the crash, regardless of whether they were in the particular vehicle of interest or not (i.e. a fatality may have been in another vehicle, a pedestrian, or any other type of road user). These variables are crash-based, which means that each vehicle involved in the crash will have the same value and there is double-counting of the total number of fatalities or injuries.

Table 4.2 Numbers of fleet and non-fleet vehicles involved in crashes by vehicle type.

Vehicle type	Fleet		Non-fleet		Total
	No.	%	No.	%	
Car	67,075	68%	279,001	94%	346,076
Light truck	15,407	16%	9,021	3%	24,428
Heavy Rigid truck	5,821	6%	240	0%	6,061
Articulated truck	4,235	4%	108	0%	4,343
Bus	2,880	3%	392	0%	3,272
Emergency vehicle	1,409	1%	62	0%	1,471
Motorcycle	781	1%	7,906	0%	8,687
Other motor vehicle	1,243	0%	1,318	3%	2,561
Total	98,851	100%	298,048	100%	396,899

Almost 90% of all fatalities (fleet, non-fleet and overall) occurred in single-fatality crashes (see Table 4.3). Relatively more fleet than non-fleet vehicle fatal crashes involved a double fatality (8.5% versus 7.9% respectively). The mean number of people killed per fatal crash was the same for fleet and non-fleet vehicles (M=1.13, SD=0.40 for fleet fatal crashes, SD=0.44 for non-fleet fatal crashes; $t(3,071)=0.65$; $p>0.05$). It should be noted that the totals in this table do not precisely correspond with those in Table 4.1, as the former are derived from the second version of the dataset and the latter arise from the first version of the dataset (see Section 2.3.1).

Table 4.3 Total numbers of people killed in crashes of fleet and non-fleet vehicles. Numbers are over-estimates because of double counting.

Number killed	Fleet			Non-fleet			Total		
	No.	%	cumul %	No.	%	cumul %	No.	%	cumul %
1	807	89.6%	89.6%	1,949	89.7%	89.7%	2,756	89.7%	89.7%
2	77	8.5%	98.1%	171	7.9%	97.6%	248	8.1%	97.8%
3	15	1.7%	99.8%	41	1.9%	99.5%	56	1.8%	99.6%
4	2	0.2%	100.0%	8	0.4%	99.9%	10	0.3%	99.9%
5	-	0.0%	100.0%	3	0.1%	100.0%	3	0.1%	100.0%
Total*	901	100%		2,172	100%		3,073	100%	

In about three-quarters of injury crashes involving fleet or non-fleet vehicles, there was a single injured person. Fleet vehicle injury crashes were slightly more likely to involve a single injured person (76.6% of fleet vehicle crashes were single-injury crashes, versus 74.6% single-injury crashes for non-fleet vehicles), whereas non-fleet crashed vehicles are more likely to account for two or more injured people (see Table 4.4). The mean number of people injured in non-fleet injury crashes was higher (non-fleet: M=1.39, SD=0.83; fleet: M=1.37, SD=0.96), a difference that was statistically significant ($t(139,782)=3.85$; $p>0.001$).

Table 4.4 Total numbers of people injured in injury crashes involving fleet and non-fleet vehicles. Numbers are over-estimates because of double counting.

Number injured	Fleet			Non-fleet			Total		
	No.	%	cumul %	No.	%	cumul %	No.	%	cumul %
1	26,208	76.6%	76.6%	78,737	74.6%	74.6%	104,945	75.1%	75.1%
2	5,501	16.1%	92.6%	18,272	17.3%	91.9%	23,773	17.0%	92.1%
3	1,578	4.6%	97.2%	5,314	5.0%	96.9%	6,892	4.9%	97.0%
4	572	1.7%	98.9%	2,009	1.9%	98.8%	2,581	1.8%	98.9%
5	194	0.6%	99.5%	714	0.7%	99.5%	908	0.6%	99.5%
6	80	0.2%	99.7%	295	0.3%	99.8%	375	0.3%	99.8%
7	40	0.1%	99.8%	109	0.1%	99.9%	149	0.1%	99.9%
8	15	0.0%	99.9%	49	0.0%	99.9%	64	0.0%	99.9%
9	7	0.0%	99.9%	30	0.0%	100.0%	37	0.0%	100.0%
10	5	0.0%	99.9%	8	0.0%	100.0%	13	0.0%	100.0%
11-38	29	0.1%	100.0%	18	0.0%	100.0%	47	0.0%	100.0%
Total	34,229	100%		105,555	100%		139,784	100%	

4.1.1 Vehicle crash rates

Table 4.1 summarises the numbers of fleet and non-fleet vehicles in crashes. As there are substantially more non-fleet vehicles registered than there are fleet vehicles registered, this does not allow for a direct comparison between the two groups. To account for this, crash rates (crashes per 10,000 registered vehicles per year) were calculated. Fleet vehicles had a higher crash rate overall (240 crashes per 10,000 registered vehicles per year compared to 222) and at each level of severity (see Table 4.5).

Table 4.5 Vehicle crash rates (per 10,000 registered vehicles per year) for fleet and non-fleet vehicles by crash severity.

	Fatal	Injury	Non-casualty	Total
Fleet	2.19	81.98	155.42	239.59
Non-fleet	1.62	77.86	142.87	222.35
Total	1.75	78.83	145.82	226.41

Crash rates for fleets were also calculated as a function of fleet size. Figure 4.1 shows the overall crash rates as a function of fleet size, while Figure 4.2 presents these rates separately for each level of crash severity. Fleet sizes of one and 100+ vehicles demonstrated the highest crash rates overall and across crash severities, with fleets of 3 and 51-100 vehicles demonstrating the lowest crash rates.

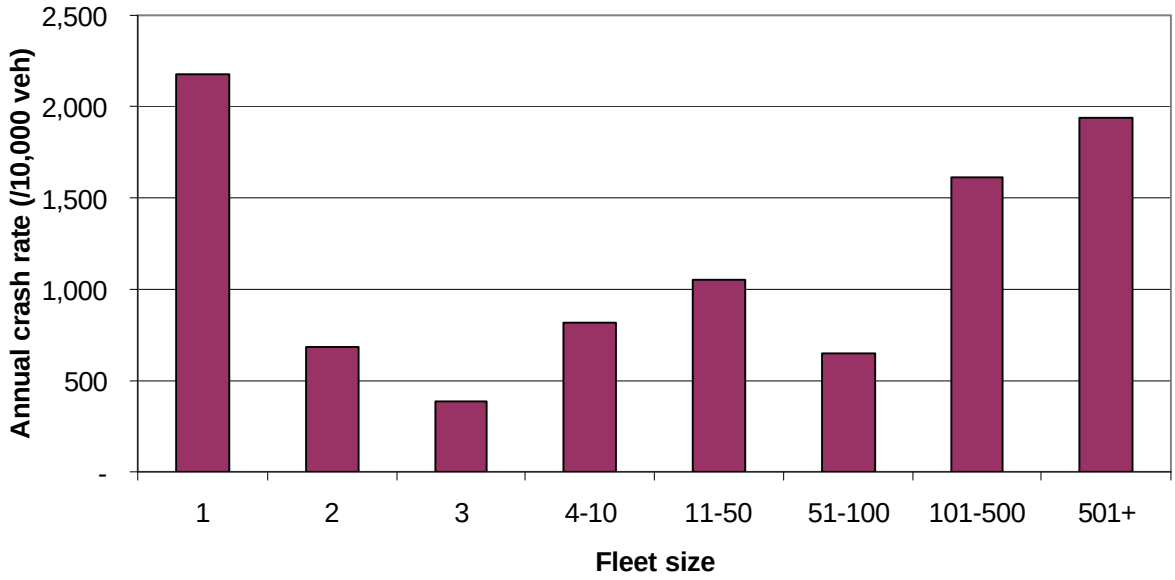

Figure 4.1 Fleet vehicle crash rates (per 10,000 registered vehicles per year) by fleet size.

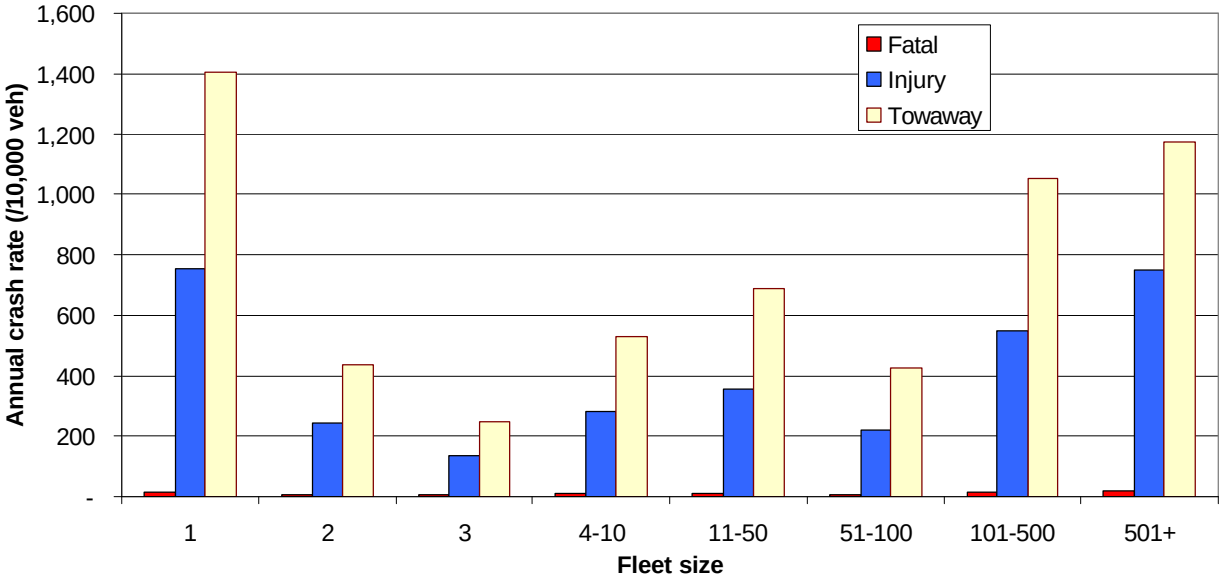

Figure 4.2 Fleet vehicle crash rates (per 10,000 registered vehicles per year) by fleet size and crash severity.

4.2 CRASH CHARACTERISTICS

4.2.1 Location of the crash

The RTA region of the location of the crash was coded in the crash file, and was converted into the Sydney metropolitan area versus outside Sydney (the variable did not allow a finer distinction to be made). The Sydney metropolitan area accounted for 73.6% of the fleet crashes and 68% of the non-fleet crashes (see Table 4.6). From another perspective, 26.4% of vehicles in crashes in the Sydney metropolitan area were fleet vehicles, compared with 21.5% of vehicles in crashes outside Sydney.

Crashes outside the Sydney metropolitan area tended to be more severe than those within Sydney (see Table 4.17), with fatalities comprising about three times the percentage of crashes outside Sydney than in Sydney. In Sydney and outside Sydney, the severity distribution of crashes differed significantly between fleet and non-fleet crashes (Sydney: $\chi^2(2)=9.8$; $p<0.01$, outside Sydney: $\chi^2(2)=60.1$; $p<0.01$), with relatively more fleet crashes than non-fleet crashes resulting in fatalities. This difference was most marked outside Sydney, where 1.9% of fleet crashes resulted in fatalities, compared with 1.2% of non-fleet crashes.

Table 4.6 Numbers of fleet and non-fleet vehicles in crashes by location.

Area	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
Sydney	72,788	73.6%	202,694	68.0%	275,482	69.4%
Outside Sydney	26,063	26.4%	95,354	32.0%	121,417	30.6%
Total	98,851	100.0%	298,048	100.0%	396,899	100.0%

Table 4.7 Numbers of fleet and non-fleet vehicles in crashes by location and crash severity.

Crash severity	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
			Sydney			
Fatal	417	0.6%	985	0.5%	1,402	0.5%
Injury	23,604	32.4%	66,341	32.7%	89,945	32.7%
Towaway	48,767	67.0%	135,368	66.8%	184,135	66.8%
Total	72,788	100.0%	202,694	100.0%	275,482	100.0%
			Outside Sydney			
Fatal	487	1.9%	1,187	1.2%	1,674	1.4%
Injury	10,218	39.2%	38,029	39.9%	48,247	39.7%
Towaway	15,358	58.9%	56,138	58.9%	71,496	58.9%
Total	26,063	100.0%	95,354	100.0%	121,417	100.0%

4.2.2 Speed limit

The augmented crash dataset included the speed limit at the location of the crash. The speed limits that appeared in the dataset were 20km/h, 30km/h, 40km/h, 50km/h, 60km/h, 70km/h, 80km/h, 90km/h, 100km/h, 110km/h, and unknown speed limit. These values were reclassified as 60km/h and below, 70-90km/h, 100 or 110km/h, and unknown speed zones.

Almost three-quarters of both fleet and non-fleet crashes occurred in speed zones of 60km/h or less. Fleet vehicles were somewhat more likely to be involved in crashes in high speed zones (100 and 110km/h) and somewhat less likely to be involved in crashes in speed zones of 60km/h or less (see Table 4.8). The difference is statistically significant, but not marked ($\chi^2(3)=383$; $p<0.001$).

Table 4.8 Numbers and proportion of fleet and non-fleet vehicles in crashes by speed zone.

Speed limit	Fleet		Non-fleet		Total	
(km/h)	No.	%	No.	%	No.	%
60 and below	70,628	72%	221,660	74%	292,288	74%
70-90	17,499	18%	49,499	17%	66,998	17%
100 and 110	9,684	10%	24,307	8%	33,991	9%
Unknown	932	1%	2,468	1%	3,400	1%
Total	98,743	100%	297,934	100%	396,677	100%

The data in Table 4.8 was further broken down by crash severity and whether the crash occurred within the Sydney metropolitan area or outside Sydney. The results of the analyses are presented in Appendix 2. Figure 4.3 shows that in each speed zone group, fleet vehicles were involved in relatively more fatal crashes than crashes of lower severity (60 and below: ($\chi^2(2)=23.3$; $p<0.001$), 70-90: ($\chi^2(2)=11$; $p<0.005$), 100 and 110: ($\chi^2(2)=13.5$; $p<0.005$)).

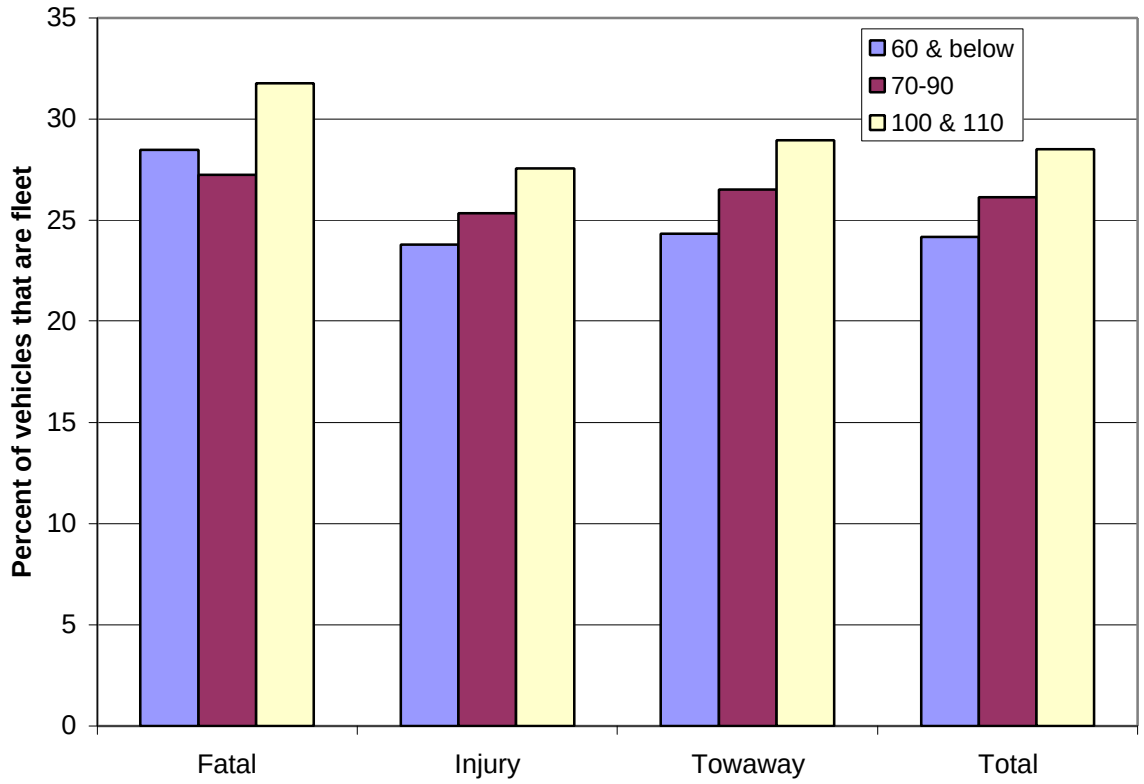

Figure 4.3 Percent of vehicles in crashes that are fleet vehicles by speed zone and crash severity.

Figure 4.4 summarises the percentage of vehicles in crashes that were fleet vehicles in each speed zone as a function of location (Sydney versus outside Sydney). Fewer of the crashes in 60km/h and below and 70-90km/h involved fleet vehicles outside Sydney compared to within the Sydney metropolitan area. Fleet vehicles were involved in about 28% of crashes in 100-110km/h zones in both Sydney and outside Sydney.

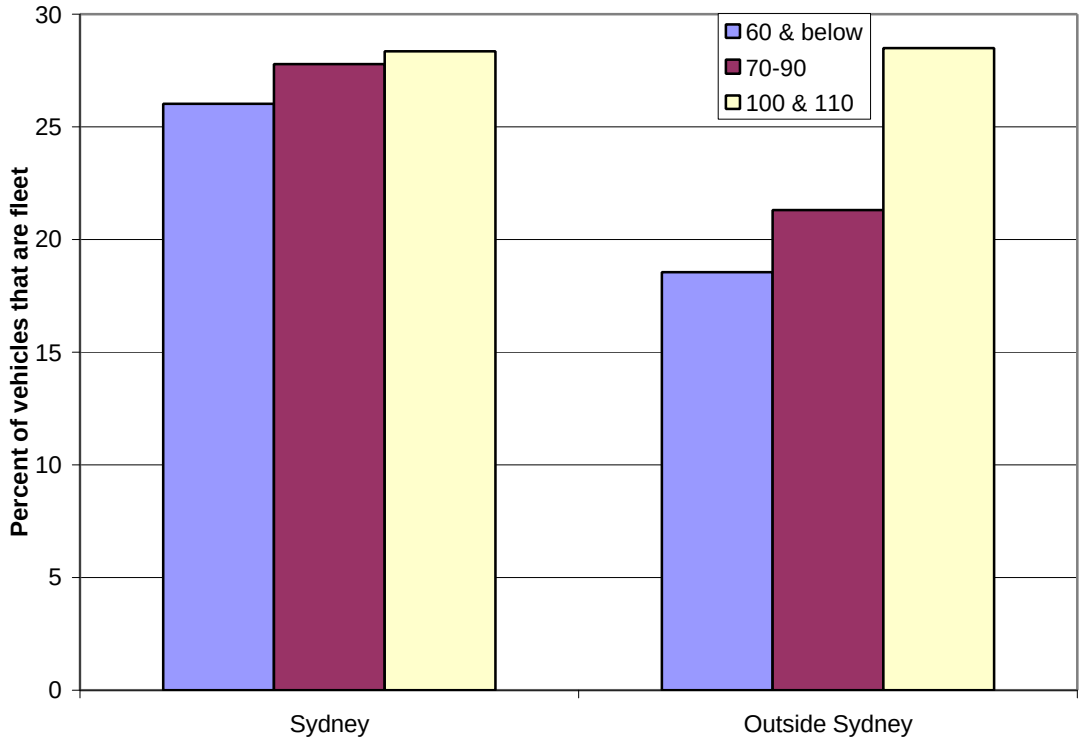

Figure 4.4 Percent of vehicles in crashes that are fleet vehicles by speed zone and location of the crash.

4.2.3 Crash type

The augmented data included a variable that describes the type of crash – the Road User Movement (RUM) code. The RUM code for a particular crash provides an indication of the movements of up to two traffic units involved in the initial crash, where a traffic unit can be another vehicle or a pedestrian. There are 86 different RUM codes grouped into ten categories:

- Pedestrian: where the crash involved a pedestrian (9 RUM codes)
- Vehicles from adjacent directions (intersections only): two vehicles crash at an intersection – this group includes all intersection crashes (10 RUM codes)
- Vehicles from opposing directions: two vehicles travelling in opposite directions crash (7 RUM codes)
- Vehicles from same direction: a crash between two vehicles travelling in the same direction (9 RUM codes)
- Manoeuvring: a vehicle crashes while performing a manoeuvre; may involve another vehicle (e.g., a crash between two vehicles while one of them was performing a u-turn) or not (e.g., a vehicle reverses into a fixed object, such as a power pole) (10 RUM codes)
- Overtaking: a crash occurs as one vehicle is overtaking another; the crash may or may not involve a second vehicle (7 RUM codes)
- On path: a vehicle crashes into a stationary obstruction in its path (includes crashing into an unridden animal) (9 RUM codes)
- Off path, on straight: a driver loses control of a vehicle while travelling along a straight section of road (and may or may not run off the road) (7 RUM codes)
- Off path, on curve or turning: a driver loses control of a vehicle while travelling along a curved section of road (and may or may not run off the road) (10 RUM codes)
- Passengers or miscellaneous: other, otherwise unclassified crashes (8 RUM codes)

Table 4.9 displays the number of fleet and non-fleet vehicles in crashes of each RUM code group. Crashes between two vehicles travelling in the same direction (such as rear-end crashes) were the most common type of crash, accounting for more than a third of all crashes. The rank order of RUM code groups was the same for fleet and non-fleet vehicles but their distributions differed in a statistically significant way ($\chi^2(9)=1{,}963$; $p<0.001$). There appeared to be relatively more "same direction" crashes involving fleet vehicles than non-fleet vehicles, but fewer off path crashes.

Table 4.9 Numbers of fleet and non-fleet vehicles in crashes by RUM code group.

RUM group	Fleet		Non-fleet		Total	
	No. crashes	% of total	No. crashes	% of total	No. crashes	% of total
Pedestrian	3,635	3.7%	8,355	2.8%	11,990	3.0%
Intersection	17,827	18.1%	59,596	20.0%	77,423	19.5%
Opposing	15,817	16.0%	52,365	17.6%	68,182	17.2%
Same direction	39,377	39.9%	101,558	34.1%	140,935	35.5%
Manoeuvring	5,868	5.9%	18,116	6.1%	23,984	6.0%
Overtaking	881	0.9%	2,344	0.8%	3,225	0.8%
On-path	2,712	2.7%	7,612	2.6%	10,324	2.6%
Off-path straight	6,299	6.4%	24,933	8.4%	31,232	7.9%
Off-path curve	5,880	6.0%	22,444	7.5%	28,324	7.1%
Miscellaneous	447	0.5%	611	0.2%	1,058	0.3%
Total	98,743	100.0%	297,934	100.0%	396,677	100.0%

Table 4.10 shows the proportions of crashes that occurred for each RUM code group for the various fleet vehicle types. The most common RUM code group for each vehicle type was same direction crashes, ranging from 19% of motorcycle crashes up to 47% of large truck crashes. A relatively high proportion of motorcycle crashes were off-path (i.e. lost control without crashing into another vehicle) compared with the proportions for these crash types for the other vehicle types (15%-17% versus 2-9% respectively).

The individual RUM codes were analysed to determine the most common crash types for fleet and non-fleet vehicles. The 12 most common crash types account for 76% of all fleet crashes, 79% of all non-fleet crashes, and 78% of all vehicle crashes (see Table 4.11). There was a statistically significant difference between the crash types ($\chi^2(84)=4{,}170$; $p<0.001$). The most common type of crash for both fleet and non-fleet vehicles was a rear-end collision (part of the same direction RUM code group), and this crash type was relatively more common for fleet vehicle crashes. Other than head-on and lane change left crash types, all other crash types were relatively less common for fleet vehicle crashes than non-fleet vehicle crashes, particularly right through crashes.

Table 4.10 Percentages of crashes by RUM code group for fleet vehicle types.

RUM group	Car	Light com-mercial	Taxi	Emergency	Motorcycle	Large truck	Bus	Other	Total
Pedestrian	3%	3%	8%	3%	3%	2%	12%	4%	4%
Intersection	19%	17%	23%	21%	14%	11%	19%	15%	18%
Opposing	17%	16%	16%	13%	12%	13%	14%	14%	16%
Same direction	40%	39%	37%	29%	19%	47%	37%	44%	40%
Manoeuvring	5%	6%	7%	9%	13%	6%	5%	8%	6%
Overtaking	1%	1%	0%	1%	1%	1%	1%	2%	1%
On-path	2%	3%	2%	4%	6%	3%	6%	3%	3%
Off-path straight	6%	8%	3%	9%	15%	7%	3%	6%	6%
Off-path curve	6%	6%	2%	9%	17%	8%	2%	3%	6%
Miscellaneous	0%	0%	1%	1%	0%	1%	2%	1%	0%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 4.11 Percentage of crashes in each of 12 most frequent RUM codes for fleet and non-fleet vehicles.

RUM code	Fleet		Non-fleet		Total	
	% of total	Rank	% of total	Rank	% of total	Rank
Rear end	28.0%	1	24.3%	1	25.2%	1
Right through	10.7%	3	13.0%	2	12.4%	2
Cross traffic	10.7%	2	11.5%	3	11.3%	3
Right near	5.3%	4	6.3%	4	6.0%	4
Head on	5.3%	5	4.5%	5	4.7%	5
Right rear	3.7%	6	4.4%	7	4.3%	6
Off rd left into object	3.3%	7	4.5%	6	4.2%	7
Off left/rt bnd into object	2.0%	9	2.8%	8	2.6%	8
Emerging from drive	1.9%	10	2.2%	9	2.2%	9
U turn	1.8%	11	2.1%	11	2.0%	10
Off rd right into object	1.4%	12	2.1%	10	2.0%	11
Lane change left	2.1%	8	1.3%	12	1.5%	12

4.3 DRIVER CHARACTERISTICS

On average, fleet drivers were older than non-fleet drivers (see Table 4.12), and the difference was statistically significant ($t(370{,}017)=37.1$; $p<0.001$). The largest age group for both fleet and non-fleet drivers was 30-39 years old, with almost a quarter of fleet drivers and a fifth of non-fleet drivers in this age group (see Table 4.13). Table 4.14 indicates that 79% of fleet drivers were male, compared with 61.3% of non-fleet drivers.

Table 4.12 Numbers and ages of fleet and non-fleet vehicle drivers in crashes.

Vehicle category	No. drivers	Age statistic		
		Mean	Std Dev	Median
Fleet	91,676	38.0	13.0	37
Non-fleet	278,343	35.8	16.3	31
Overall	370,019	36.3	15.6	33

Table 4.13 Age distributions of drivers of fleet and non-fleet vehicles in crashes.

Age group	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
0-16	226	0.2%	1,381	0.5%	1,607	0.4%
17-20	7,876	8.0%	49,291	16.5%	57,167	14.4%
21-25	10,113	10.2%	47,959	16.1%	58,072	14.6%
26-29	9,456	9.6%	28,957	9.7%	38,413	9.7%
30-39	24,332	24.6%	55,519	18.6%	79,851	20.1%
40-49	21,025	21.3%	40,584	13.6%	61,609	15.5%
50-59	13,455	13.6%	24,801	8.3%	38,256	9.6%
60-69	4,131	4.2%	15,295	5.1%	19,426	4.9%
70-79	892	0.9%	11,265	3.8%	12,157	3.1%
80-89	161	0.2%	3,179	1.1%	3,340	0.8%
90+	9	0.0%	112	0.0%	121	0.0%
Unknown	7,175	7.3%	19,705	6.6%	26,880	6.8%
Total	98,851	100.0%	298,048	100.0%	396,899	100.0%

Table 4.14 Numbers of fleet and non-fleet vehicle drivers in crashes by gender.

Gender	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
Male	78,077	79.0%	182,690	61.3%	260,767	65.7%
Female	19,111	19.3%	109,507	36.7%	128,618	32.4%
Unknown	1,663	1.7%	5,851	2.0%	7,514	1.9%
Total	98,851	100.0%	298,048	100.0%	396,899	100.0%

4.4 RISKY DRIVING BEHAVIOURS

4.4.1 Speeding

The RTA crash data includes variables that code, for each vehicle, whether speeding, alcohol or fatigue on the part of the controller of that vehicle was judged to have contributed to the crash. For both speeding and fatigue, "no" and "unknown" were grouped together in the data, although it is expected that "unknown" is likely to be the biggest component of this category.

Overall, 8% of vehicles were coded as travelling at excessive speed (this may be inappropriate speed rather than exceeding the posted speed limit). As a percentage, fewer fleet vehicles were involved in speed-related crashes compared with non-fleet vehicles (6.4% versus 8.5% respectively; see Table 4.15). This difference was statistically significant ($\chi^2(1)=460.4$; $p<0.001$). From another viewpoint, of those crashed vehicles

where excessive speed was noted as a crash factor, 20% were fleet-registered vehicles and 80% were non-fleet vehicles.

Table 4.15 Numbers of drivers of fleet and non-fleet vehicles in crashes where speeding was involved.

Speeding	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
Yes	6,281	6.4	25,289	8.5	31,570	8.0
No or Unknown	92,570	93.6	272,759	91.5	365,329	92.0
Total	98,851	100.0	298,048	100.0	396,899	100.0

The involvement of speeding in fleet and non-fleet vehicles in crashes varied significantly as a function of crash severity ($\chi^2(2)=6$; $p<0.05$). The percentage of speeding crashes that involved fleet vehicles decreased as severity increased, from 20.1% of towaway crashes to 19.7% of injury crashes to 16.7% of fatal crashes.

The percentages of both fleet and non-fleet vehicles that were judged to be speeding were higher at 100-110km/h speed zones than at lower speed zones (see 4.5 Panel (a) and Table A2.3 in Appendix 2). Fleet vehicles were less likely to be judged to be speeding than non-fleet vehicles at each speed zone group (60 and below: ($\chi^2(1)=442$; $p<0.001$), 70-90: ($\chi^2(1)=120$; $p<0.001$), 100 and 110: ($\chi^2(1)=73$; $p<0.01$)).

Figure 4.6 (a) compares the involvement of excessive speed in crashes involving different types of vehicles. Emergency vehicles were most likely to be involved in crashes where excessive speed was noted as a crash factor, with taxis least likely. Fleet cars and fleet commercial vehicles were relatively less likely to be speeding than their non-fleet counterparts.

Both gender and age are generally considered to be factors in relation to risky driving practices such as speeding. Of the crashes where excessive speed was noted as a factor, 77% of the crashed fleet drivers were male, compared with 68% for the non-fleet group (overall 70% of crashed speeding drivers were male); a statistically significance ($\chi^2(2)=190.9$; $p<0.001$).

As demonstrated in Table 4.16, the age group 25 and under was most represented in speed-crashes, with involvement decreasing with increasing age. However, there are differences between the fleet and non-fleet groups. The differences in involvement across the three younger age groups was less marked for fleet crashes than that for non-fleet crashes – one-third of crashed fleet drivers was aged 25 or less, compared with almost half of the non-fleet crashed drivers. The fleet versus non-fleet differences were statistically significant across age groups ($\chi^2(4)=783$; $p<0.001$ & $\chi^2(4)=290$; $p<0.001$ respectively).

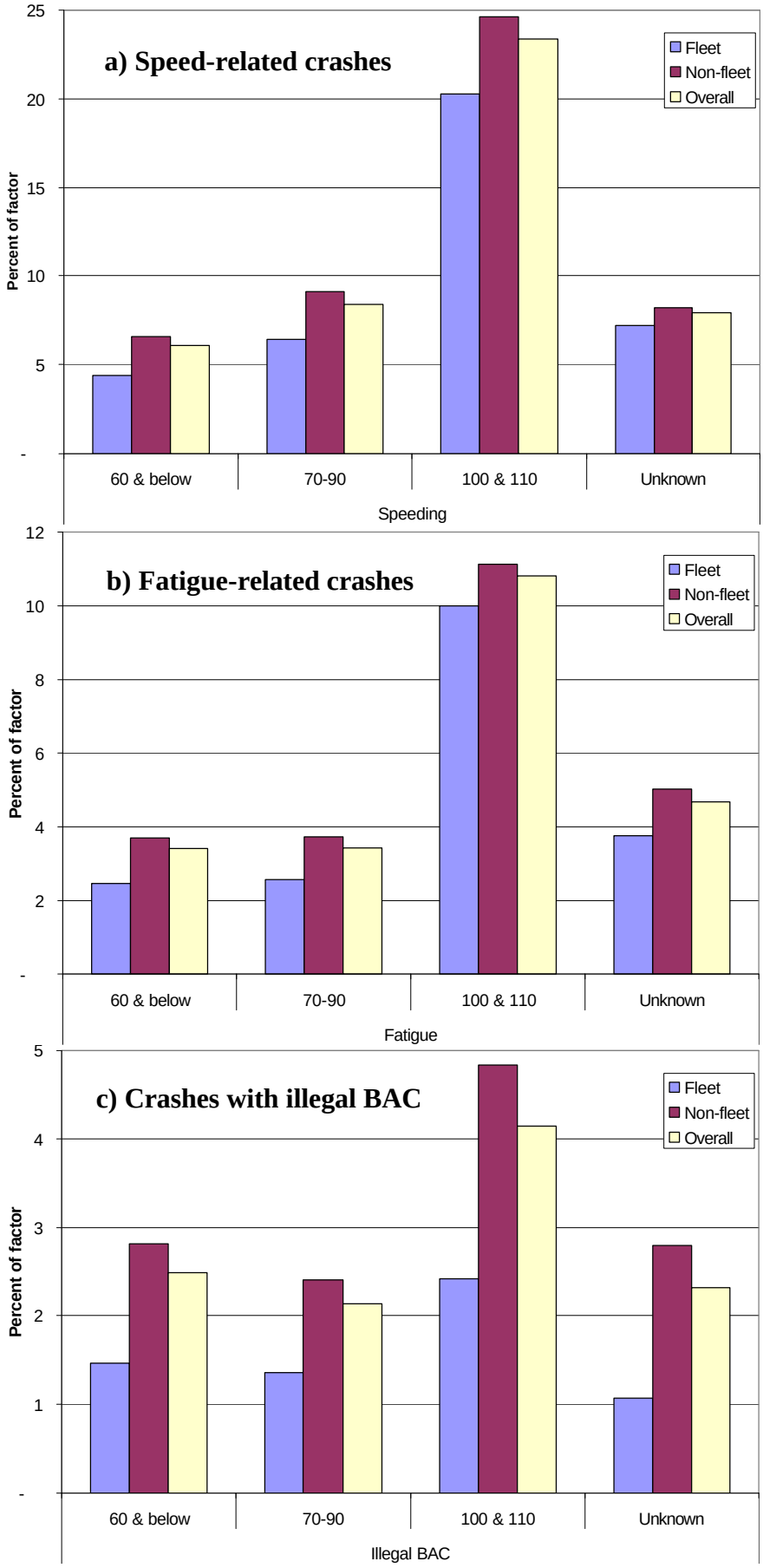

Figure 4.5 Percent of fleet and non-fleet vehicles in crashes where (a) speed, (b) fatigue and (c) illegal levels of alcohol were involved by crash location speed limit.

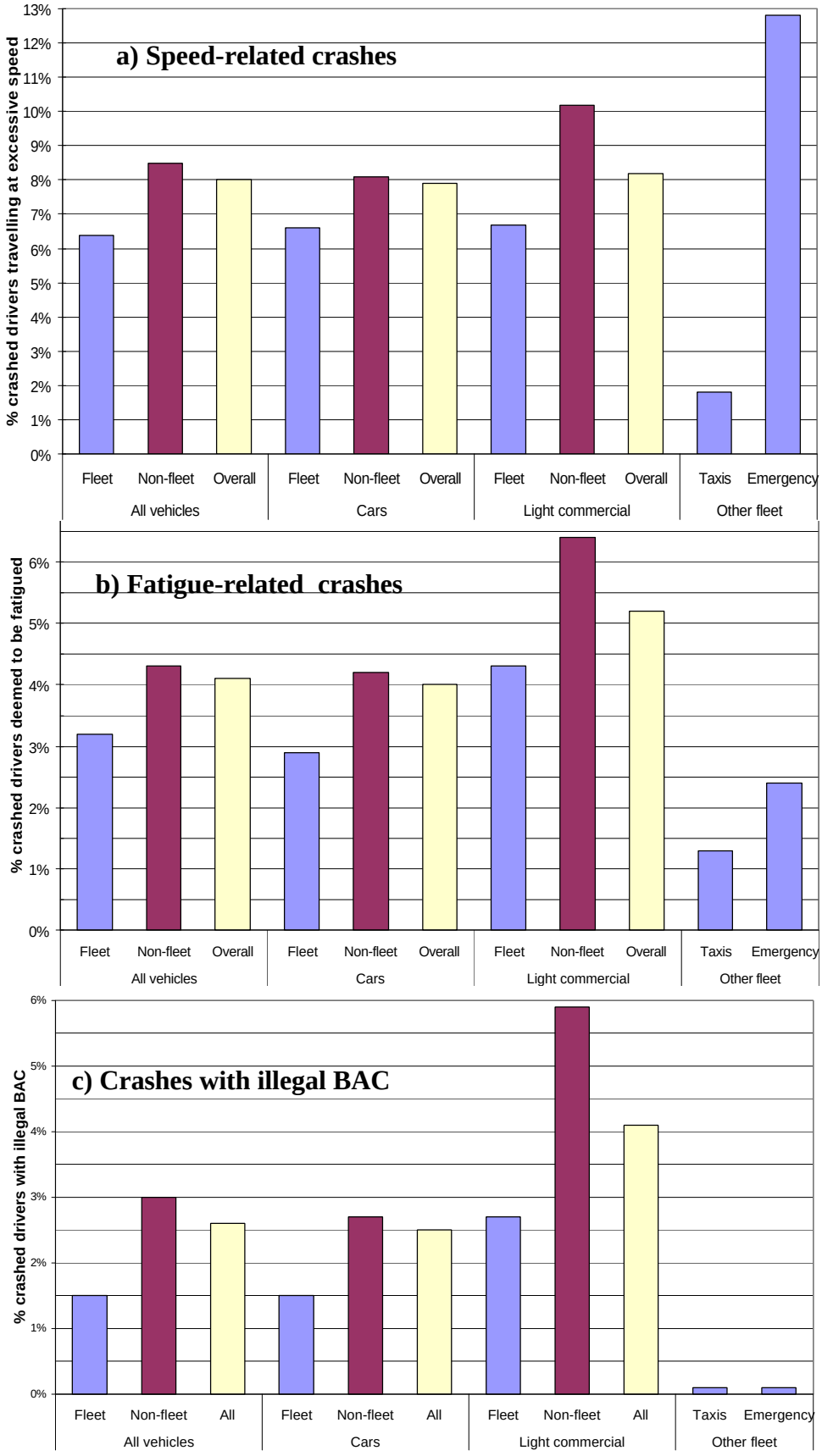

Figure 4.6 Percentages of crashed drivers in various fleet and non-fleet groups where (a) speed, (b) fatigue an (c) illegal alcohol levels were involved as a crash factor.

Table 4.16 Age groups of crashed drivers of fleet and non-fleet vehicles in crashes where speeding was involved.

Age group	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
25 & under	2,079	33.1	12,388	49.0	14,467	45.8
26-39	1,927	30.7	6,158	24.4	8,085	25.6
40-59	1,550	24.7	3,395	13.4	4,945	15.7
60+	243	3.9	1,330	5.3	1,573	5.0
unknown	482	7.7	2,018	8.0	2,500	7.9
Total	6,281	100	25,289	100	31,570	100

The data does not indicate whether a vehicle was being used for work purposes at the time of the crash, only whether it was registered as a fleet or private vehicle. Accordingly, the crash patterns were examined as a function of the time of the day and day of the week at which the crash occurred. This "time category" was classified into commuting hours (7-9am and 4-6pm Monday to Friday), work hours (9am-4pm Monday to Friday), and non-work hours (all other hours – including weekends). Table 4.17 demonstrates the distribution of speed-related crashes as a function of this time category.

Table 4.17 Time category of fleet and non-fleet crashes where speeding was involved.

Time category	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
Commuting	987	15.7	3,467	13.7	4,454	14.1
Work	1,743	27.8	5,210	20.6	6,953	22.0
Non-work	3,549	56.5	16,608	65.7	20,157	63.8
Unknown	2	0	4	0	6	0
Total	6,281	100	25,289	100	31,570	100

The most common time for speeding-related crashes for both fleet and fleet vehicles was during non-work hours (early mornings, evenings and weekends), although fleet speed-related crashes were relatively more likely to occur during commuting or working hours compared with non-fleet speeding-related crashes (see Table 4.17). The prevalence of crashes during non-work hours might be expected simply because non-work time encompasses a greater number of hours. The difference between fleet and non-fleet car crashes in terms of time category for speed-related crashes was statistically significant ($\chi^2(3)=76$; $p<0.001$).

4.4.2 Fatigue

Overall, fatigue was deemed to be a factor in 4.1% of vehicle crashes. Fatigue was less likely to be noted for fleet vehicles than non-fleet vehicles (3.2% compared with 4.3% respectively – see Table 4.18). The difference between fleet and non-fleet vehicles for the involvement of fatigue in crashes was statistically significant ($\chi^2(1)=231.3$; $p<0.001$). Fleet-registered vehicles accounted for 20% of crashed vehicles where fatigue was a crash factor (and 80% were non-fleet vehicles).

Table 4.18 Numbers of drivers of fleet and non-fleet vehicles in crashes where fatigue was involved.

Fatigue	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
Yes	3,193	3.2	12,910	4.3	16,103	4.1
No or Unknown	95,658	96.8	285,138	95.7	380,796	95.9
Total	98,851	100.0	298,048	100.0	396,899	100.0

The involvement of fatigue in fleet and non-fleet vehicles in crashes did not differ significantly as a function of crash severity ($\chi^2(2)=1.6$; $p>0.05$).

The percentages of both fleet and non-fleet vehicles where the drivers were judged to have been fatigued were higher at 100-110km/h speed zones than at lower speed zones (see Figure 4.5 Panel (b) and Table A2.3 in Appendix 2). Fleet vehicle drivers were less likely to be judged to be fatigued than non-fleet vehicle drivers at each speed zone group (60 & below: ($\chi^2(1)=254$; $p<0.001$), 70-90: ($\chi^2(1)=53$; $p<0.001$), 100-110: ($\chi^2(1)=9$; $p<0.005$)).

Figure 4.6 (b) shows the relative involvement of fatigue in crashes involving different types of vehicles. Fleet vehicle crashes were less likely to involve fatigue than non-fleet vehicle crashes. In fatigue-related crashes, 77% of the fleet drivers were male compared with 65% of non-fleet drivers (67% overall); a significant difference ($\chi^2(2)=176$; $p<0.001$).

As demonstrated in Table 4.19, the age group 25 years and under was most represented in fatigue-related crashes, with involvement decreasing with increasing age. However, there are differences between the fleet and non-fleet groups. The age group represented most in the fleet fatigue-related crashes were the 26-39 year-olds (30% of the crashed fleet drivers), whereas for non-fleet crashes it was the 25 and under age group. The fleet versus non-fleet differences were statistically significant across age groups ($\chi^2(4)=290$; $p<0.001$).

Table 4.19 Age groups of crashed drivers of fleet and non-fleet vehicles in crashes where fatigue was involved.

Age group	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
25 & under	885	27.7	4,836	37.5	5,721	35.5
26-39	971	30.4	3,091	23.9	4,062	25.2
40-59	768	24.1	1,903	14.7	2,671	16.6
60+	168	5.3	1,053	8.2	1,221	7.6
unknown	401	12.6	2,027	15.7	2,428	15.1
Total	3,193	100	12,910	100	16,103	100

The most common time for fatigue-related crashes for both fleet and fleet vehicles was during non-work hours (early mornings, evenings and weekends) – see Table 4.20. The difference between fleet and non-fleet crashes in terms of time category for fatigue-related crashes was statistically significant ($\chi^2(3)=76$; $p<0.001$).

Table 4.20 Time category of fleet and non-fleet crashes where speeding or fatigue was involved.

Time category	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
Commuting	417	13.1	1,420	11.0	1,837	11.4
Work	708	22.2	2,139	16.6	2,847	17.7
Non-work	2,067	64.7	9,347	72.4	11,414	70.9
Unknown	1	0	4	0	5	0
Total	3,193	100	12,910	100	16,103	100

4.4.3 Drink driving

The BACs of crashed drivers were mostly legal or unknown for both fleet and non-fleet vehicles in crashes (see Table 4.21). Overall, 1.5% of fleet drivers and 2.9% of non-fleet drivers had an illegal BAC. Non-fleet drivers were twice as likely have a BAC reading of 0.08-0.149 or greater than 0.15 than fleet drivers (1.2% vs. 0.6% and 1.4% vs. 0.7% respectively). The difference in BACs between fleet and non-fleet vehicles was statistically significant ($\chi^2(5)=584.8$; $p<0.001$).

Table 4.21 Driver BACs for fleet and non-fleet vehicles in crashes.

BAC	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
Legal	77,337	78.2	231,852	77.8	309,189	77.9
.020-.049 (special range)	44	0.0	233	0.1	277	0.1
.050-.079	183	0.2	958	0.3	1,141	0.3
.080-.149	615	0.6	3,456	1.2	4,071	1.0
.150 +	676	0.7	4,036	1.4	4,712	1.2
Unknown	19,996	20.2	57,513	19.3	77,509	19.5
Total	98,851	100.0	298,048	100.0	396,899	100.0

The data in Table 4.21 was reanalysed in two ways: considering only crashes that resulted in a casualty, and removing those where the BAC was unknown (see Table 4.22). When the analysis was repeated for vehicles in fatality or injury crashes only (i.e. towaway crashes excluded), 2.1% of fleet drivers and 4.3% of non-fleet drivers had an illegal BAC, a statistically significant difference ($\chi^2(2)=361$; $p<0.001$). When crashes where BACs were unknown were excluded, 1.9% of fleet drivers and 3.6% of non-fleet drivers had illegal BAC levels, a statistically significant difference ($\chi^2(1)=545$; $p<0.001$).

Table 4.22 Illegal & legal BAC levels (% of total) of drivers in all crashes, in casualty crashes only, & after crashes with unknown BAC removed.

		All	Casualty only	Without unknown BACs
Illegal	Fleet	1.5%	2.1%	1.9%
	Non-fleet	3.0%	4.3%	3.6%
	All	2.6%	3.7%	3.2%
Legal	Fleet	78.2%	77.0%	98.1%
	Non-fleet	77.8%	75.6%	96.4%
	All	77.9%	75.9%	96.8%

The involvement of illegal BACs in fleet and non-fleet vehicles in crashes varied significantly as a function of crash severity ($\chi^2(2)=15$; $p<0.005$). Drivers of fleet vehicles appeared to comprise a larger proportion of towaway crashes with illegal BACs (16.2%) than of injury or fatal crashes with illegal BACs (14.4% and 13.5%, respectively).

The percentages of drivers in crashes with illegal blood alcohol levels differed according to the type of vehicle driven, as well as between fleet and non-fleet drivers. Figure 4.6 (c) shows that the highest prevalence of illegal alcohol levels among both fleet and non-fleet drivers was found for drivers of light commercial vehicles. The lowest prevalence of alcohol in crashes was found among taxi drivers and drivers of fleet emergency vehicles (in this group, those with an illegal BAC were mainly tow truck drivers).

The data also allowed for analyses of a number of factors that may influence the prevalence of alcohol in fleet crashes, such as gender. In the crashed fleet vehicle group, 79.0% of the drivers were male (and 19.3% were female), compared with 61.3% of the non-fleet group being male (36.7% female). For those crashed drivers with an illegal BAC, in the fleet group 90.4% were male and in the non-fleet group 81.8% were male.

Crashed fleet drivers were older, on average, than crashed non-fleet drivers (38.0 vs. 35.8 years). Overall, only 18.4% of fleet drivers in crashes were aged 25 and under, compared with 33.1% of non-fleet drivers in crashes. Published RTA data show that male drivers aged under 40, and particularly those aged 25 and under, are strongly involved in drink driving crashes (RTA, 2000). For those crashed drivers with an illegal BAC level, the mean age for the fleet group was 36.6 years old (with 95% confidence intervals of 35.7 and 37.5 years), compared with 34.6 years old (with 95% confidence intervals of 34.2 and 35 years) for non-fleet drivers.

There was little difference in the average ages of male and female fleet drivers who had crashed with an illegal BAC (36.3 vs. 36.9 years old respectively). The difference was more marked, although still small, for non-fleet drivers – 34.0 years for male non-fleet drivers versus an average age of 35.8 years for females.

Fewer fleet crashes occurred at night and on weekends, when alcohol-related crashes traditionally cluster. Only 42.0% of fleet car crashes occurred in "non-work periods" (outside 7am-6pm Monday-Friday), compared to 48.4% of non-fleet car crashes. Taxis were the only exception to this general finding: 61.1% of taxi crashes occurred in "non-work periods". When analysing only those crashes where the driver had an illegal BAC level (see Table 4.23), compared to non-fleet crashes, fleet crashes were relatively more likely to occur during commuting hours (7-9am and 4-6pm Monday to Friday) and less likely to occur during work hours.

Table 4.23 Fleet and non-fleet crashed vehicles with illegal BAC as a function of day and time of crash.

Time category	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
Commuting (7-9am & 4-6pm M-F)	114	7.5%	587	6.8%	701	6.9%
Work hours (9am-4pm M-F)	63	4.2%	482	5.6%	545	5.3%
Non-work (all other times)	1,341	88.3%	7,614	87.7%	8,955	87.8%
Total	1,518	100.0%	8,693	100.0%	10,201	100.0%

Overall, relatively fewer fleet crashes than non-fleet crashes occurred outside the capital city. Crashes outside the capital city, particularly those in rural areas, are generally associated with a higher involvement of alcohol (RTA, 2000). For crashes of light commercial vehicles, where alcohol was most prevalent, relatively more fleet and non-fleet crashes occurred outside the capital city (33.4% and 48.2%) than for fleet and non-fleet cars (24.5% and 30.8%). When only crashes with an illegal BAC were considered, 61.9% of fleet crashes occurred within the Sydney metropolitan area compared with 52.3% of non-fleet crashes.

4.4.4 Not wearing a seatbelt

Table 4.24 indicates that fleet drivers were substantially less likely to have been wearing a seatbelt than non-fleet drivers when their vehicle crashed (5.1% versus 0.6% respectively). If only the options "belt worn" and "belt not worn" are analysed, then 5.9% of fleet drivers were not wearing a seatbelt at the time of the crash, compared with 0.7% of non-fleet drivers.

Table 4.25 includes only those crashed vehicles where a fatality or injury resulted from the crash. As might be expected, the number of crashed vehicles where a seatbelt had not been worn increased for both fleet and non-fleet vehicles, although fleet drivers were still more likely to have not been wearing a seatbelt.

Table 4.24 Seatbelt wearing in fleet and non-fleet vehicles.

Seatbelt use	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
Belt worn	79,585	81.1%	267,029	91.8%	346,614	89.1%
Belt not worn	4,994	5.1%	1,828	0.6%	6,822	1.8%
Belt not fitted	2,874	2.9%	216	0.1%	3,090	0.8%
Unknown	10,694	10.9%	21,779	7.5%	32,473	8.3%
Total	98,147	100%	290,852	100%	388,999	100%

Table 4.25 Seatbelt wearing in fleet and non-fleet vehicles – fatality and injury crashes only

Seatbelt use	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
Belt worn	26,413	77.5%	91,348	91.2%	117,761	87.8%
Belt not worn	2,171	6.4%	1,098	1.1%	3,269	2.4%
Belt not fitted	1,341	3.9%	94	0.1%	1,435	1.1%
Unknown	4,142	12.2%	7,569	7.6%	11,711	8.7%
Total	34,067	100%	100,109	100%	134,176	100%

4.5 VEHICLE CHARACTERISTICS

Earlier research suggests that crash severity is likely to be greater for older and smaller vehicles, because of their generally lower levels of crashworthiness (Newstead, Cameron, Watson and Delaney, 2003). Since fleet vehicles are often thought to be newer and larger than non-fleet vehicles, these vehicle characteristics may be contributing to better performance of fleet vehicles.

4.5.1 Vehicle age

The registration data provided did not allow a comparison of the age distributions of the fleet and non-fleet vehicles registered in NSW. However, the crash data included year of vehicle manufacture of the crashed vehicle, which was subtracted from the year of the crash to calculate the approximate age of the vehicle in years.

The mean age of crashed fleet vehicles was 6.0 years, considerably younger than crashed non-fleet vehicles, which had a mean age of 10.0 years (for those vehicles where year of manufacture was known). This difference was statistically significant ($t(38,1649)=172$; $p<0.001$).

The most common age of crashed fleet vehicles was one year old – 14% of the crashed fleet vehicles were one year old (see Table 4.26). In comparison, only 5% of crashed non-fleet vehicles were one year old. Almost a third of the crashed fleet vehicles were two years old or younger, compared with only 12.5% of crashed non-fleet vehicles. Fifty percent of crashed fleet vehicles were four years old and younger, while 50% of the crashed non-fleet vehicles were nine to ten years old or younger.

At first glance, this data may suggest that older fleet-registered vehicles (aged 16 years and over) are the safest – that these vehicles are less likely to crash. However, this may simply be due to the smaller number of fleet-registered vehicles of this age – as previously mentioned, larger fleets are less likely to own older vehicles. A more definitive answer would require a crash rate calculation. However, the registrations data used to calculate crash rates as a function of number of registered vehicles used elsewhere in this report does not include the age of the vehicle (only the crash data includes vehicle age). As such, a vehicle age-based crash rate cannot be calculated. However, Table 4.21 shows that the number of crashed non-fleet-registered vehicles is more consistent across vehicle age, and that these older vehicles are not particularly over-represented in crashes.

Table 4.26 Ages of fleet and non-fleet vehicles involved in crashes.

Vehicle age	Fleet			Non-fleet			Total
(years)	No.	%	cumulative %	No.	%	cumulative %	
0	5,518	5.6	5.6	6,290	2.1	2.1	11,808
1	13,927	14.1	19.7	15,305	5.1	7.2	29,232
2	12,521	12.7	32.3	15,587	5.2	12.5	28,108
3	10,247	10.4	42.7	15,211	5.1	17.6	25,458
4	8,540	8.6	51.3	15,037	5.0	22.6	23,577
5	6,807	6.9	58.2	15,342	5.1	27.8	22,149
6-10	19,671	19.9	78.1	77,031	25.8	53.6	96,702
11-15	10,719	10.8	89.0	72,088	24.2	77.8	82,807
16-20	4,889	4.9	93.9	38,755	13.0	90.8	43,644
21+	2,195	2.2	96.1	15,971	5.4	96.2	18,166
unknown	3,817	3.9	100.0	11,431	3.8	100.0	15,248
Total	98,851	100		298,048	100.0		396,899

At each level of crash severity, fleet vehicles were, on average, newer than non-fleet vehicles (see Table 4.27). Both fleet and non-fleet vehicles in fatal crashes appeared to be older than the vehicles in injury and towaway crashes. Fleet vehicles involved in fatal crashes were over three years newer than non-fleet vehicles involved in fatal crashes; while for both injury and towaway crashes, fleet vehicles were around four years newer than non-fleet crashed vehicles.

Table 4.27 Mean ages (in years) of crashed fleet and non-fleet vehicles by crash severity.

Crash severity	Fleet	Non-fleet	Overall
Fatal	7.1	10.3	9.4
Injury	6.1	10.0	9.0
Towaway	5.9	9.9	8.9
Total	6.0	10.0	9.0

4.5.2 Fleet size

Table A2.4 in Appendix 2 lists the number of vehicles registered in NSW at each fleet size and age. Table 4.28 summarises the mean vehicle ages for each fleet size. As a general trend, the vehicles in larger fleets are younger on average, with the oldest vehicles belonging to fleets of one vehicle (mean age=9.7 years) and the youngest vehicles belonging to the fleets with more than 1,000 vehicles (mean age=3.3 years).

Table 4.28 Mean and standard deviation of vehicle age by fleet size.

Fleet size	Vehicle age (years)	
	Mean	Std. Deviation
1	9.7	6.3
2	9.0	6.4
3	8.5	6.6
4	7.4	6.4
5	6.5	6.0
6	6.0	5.4
7	5.9	5.6
8	5.4	5.1
9	5.5	5.2
10	5.3	5.2
11-15	5.6	5.3
16-20	5.5	5.2
21-30	5.5	5.3
31-40	5.6	5.4
41-50	5.6	5.7
51-100	4.9	5.2
101-500	3.8	4.4
501-1000	3.8	5.1
1001 +	3.3	4.6
Total	9.0	6.4

4.6 SUMMARY

A number of the comparisons of fleet and non-fleet vehicles in crashes yielded statistically significant results despite the very small percentage differences. In summarising the results, only those differences considered to be meaningful have been included.

About a quarter of the vehicles involved in crashes at each level of severity are fleet vehicles.

Fleet vehicles had a higher overall crash rate (crashes per 10,000 registered vehicles per year) than non-fleet vehicles (240 compared to 222) and a higher crash rate at each level of severity. Fleet sizes of one and 100+ vehicles demonstrated the highest crash rates overall and across crash severities, with fleets of 3 and 51-100 vehicles demonstrating the lowest crash rates.

About two-thirds of fleet vehicles in crashes were cars (and 16% were light trucks), while 94% of non-fleet vehicles in crashes were cars.

Relatively more fleet vehicles than non-fleet vehicles were involved in crashes in the Sydney metropolitan area. Fleet vehicles comprised just over a quarter of vehicles in crashes in the metropolitan area and just over a fifth of vehicles in crashes outside Sydney.

In Sydney and outside Sydney, relatively more fleet crashes than non-fleet crashes resulted in fatalities. This difference was most marked outside Sydney, where 1.9% of fleet crashes resulted in fatality, compared with 1.2% of non-fleet crashes.

Almost three-quarters of both fleet and non-fleet crashes occurred in speed zones of 60km/h or less. Fleet vehicles were somewhat more likely to be involved in crashes in high speed zones (100 and 110km/h) and somewhat less likely to be involved in crashes in speed zones of 60km/h or less. In each speed zone group, fleet vehicles were involved in relatively more fatal crashes than crashes of lower severity. The percentages of vehicles in crashes in 60km/h and 70-90km/h zones that were fleet vehicles were higher in the Sydney metropolitan area than outside Sydney.

In general, the types of crashes in which fleet and non-fleet vehicles were involved were similar. Crashes of fleet vehicles were more likely to be "same direction" crashes and less likely to be off-path crashes (compared to crashes of non-fleet vehicles). The percentage of fleet crashes that were "same direction" was lowest for motorcycle crashes and highest for truck crashes.

Fleet drivers tended to be older than non-fleet drivers and more likely to be male.

Compared to crashes of non-fleet vehicles, fleet vehicle crashes were less likely to involve excessive speed, fatigue or an illegal BAC. For both fleet and non-fleet crashes, the involvement of each of these factors was greater for crashes in 100 and 110km/h speed zones than for crashes in lower speed zones.

Fleet drivers were less likely to be wearing a seatbelt at the time of the crash than non-fleet drivers.

On average, crashed fleet vehicles were newer (mean age=6 years) than crashed non-fleet vehicles (mean age=10 years). In addition, both fleet and non-fleet vehicles in fatal crashes appeared to be older than the vehicles in injury and towaway crashes. In general, larger fleets have newer vehicles.

5. CRASHES INVOLVING FLEET AND NON-FLEET CARS

"Cars" are the most common type of fleet and non-fleet vehicle. Accordingly, this chapter compares the crash involvement of fleet and non-fleet cars.

The crash database includes a "traffic unit type" variable with 49 possible values. The "traffic unit group" variable combines the first seven types of traffic unit into the category "car/car derivatives". Based on shape and use, six traffic unit types can be considered to be cars – "car (sedan/hatch), "station wagon", "utility", "panel van", "passenger van", and "four-wheel drive". The proportion of each "car" type is shown in Table 5.1.

Table 5.1 Types of crashed traffic units that could be considered to be cars.

Traffic unit type	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
Car (sedan/hatch)	37,391	62.8%	232,645	83.4%	270,036	79.8%
Station wagon	8,329	14.0%	24,988	9.0%	33,317	9.8%
Utility	4,757	8.0%	5,631	2.0%	10,388	3.1%
Panel van	1,293	2.2%	1,341	0.5%	2,634	0.8%
Passenger van	4,013	6.7%	6,512	2.3%	10,525	3.1%
4 Wheel drive	3,743	6.3%	7,726	2.8%	11,469	3.4%
Total	59,526	100.0%	278,843	100.0%	338,369	100.0%

Some cars are included among other traffic unit types (e.g. "police" includes police cars), but it is not possible to determine the numbers of such cars from the variables supplied in the crash dataset. Police and other emergency vehicles are considered in a separate chapter in this report, as are taxis (listed as a separate traffic unit type). Courier vehicles are another vehicle type (or more correctly, vehicle use) of interest, but they are not readily identifiable in the crash or registration data. In terms of the data used for this project, courier vehicles are a sub-set of light commercial vehicles (light truck, panel van or utility) that are registered as fleet vehicles (see Chapter 7 for further discussion). These vehicles are considered in a later chapter and so they are not included as "cars" for the remaining analyses of this chapter – the term car in the remainder of this chapter includes only "car (sedan/hatch), "station wagon", "passenger van", and "four-wheel drive".

As described earlier, crashed vehicles were matched to the registration database in six-month snapshots. Figure 5.1 plots the number of cars in the registrations database across these snapshots along with the crashes that occurred within the same time periods. As neither registrations nor crashes fluctuated substantially across these time periods they will be averaged for further analyses (see Table 5.2). On average, fleet cars made up 15% of registrations, and accounted for 16% of the crashes.

In order to make a valid comparison of fleet and non-fleet car crash numbers, a rate of crashes per 10,000 registered vehicles per year was calculated. The fleet car crash rate (136.3 crashes per 10,000 registrations per year) was somewhat higher than the non-fleet crash rate (116.6; total crash rate 118.1).

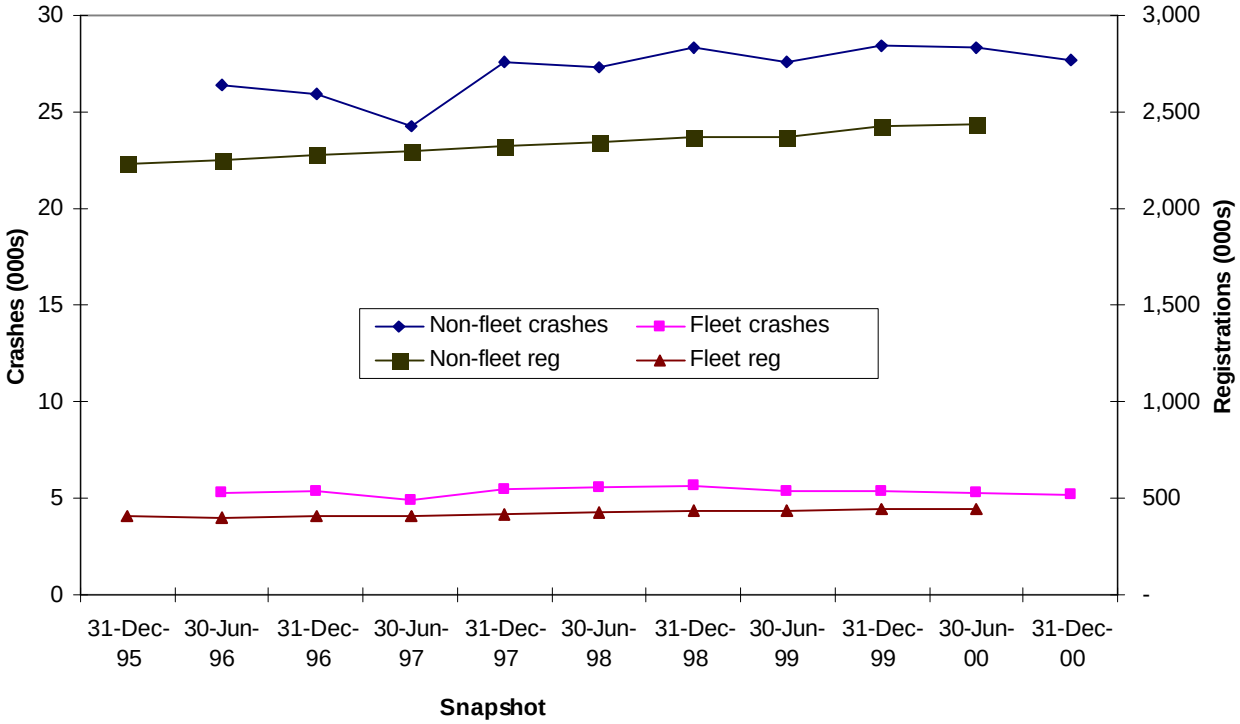

Figure 5.1Numbers of fleet and non-fleet cars in crashes and fleet and non-fleet cars registered at each snapshot.

Table 5.2 Yearly numbers of cars registered and cars in crashes (averaged across snapshots).

	Fleet		Non-fleet		Total
	No.	%	No.	%	
Crashes	10,695	16%	54,374	84%	65,069
Registrations	846,781	15%	4,663,922	85%	5,510,703

Approximately two-thirds of fleet and non-fleet car crashes were towaway crashes (see Table 5.3). Fleet car crashes were slightly less severe than non-fleet crashes, with a lower proportion of fatal and injury crashes. The difference in severity between fleet and non-fleet crashes was statistically significant ($\chi^2(2)=100.8$; $p<0.001$).

Table 5.3 Numbers of fleet and non-fleet cars in crashes by crash severity.

Crash severity	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
Fatal	268	0.5%	1,793	0.7%	2,061	0.6%
Injury	16,854	31.5%	91,048	33.5%	107,902	33.2%
Towaway	36,354	68.0%	179,030	65.9%	215,384	66.2%
Total	53,476	100.0%	271,871	100.0%	325,347	100.0%

5.1 CRASH CHARACTERISTICS

5.1.1 Location of the crash

The RTA region of the crash location was coded in the crash file, and was converted into Sydney versus outside Sydney (the variable did not allow a finer distinction to be made). The Sydney metropolitan area accounted for 76% of the fleet crashes and 69% of the non-fleet crashes (see Table 5.4).

Table 5.4 Numbers of fleet and non-fleet cars in crashes by location.

Location	Fleet		Non-fleet		Total
	No.	%	No.	%	
Sydney	40,393	75.5%	188,191	69.2%	228,584
Outside Sydney	13,083	24.5%	83,680	30.8%	96,763
Total	53,476	100.0%	271,871	100.0%	325,347

Crashes outside the Sydney metropolitan area tended to be more severe than those within Sydney (see Table 5.5), with fatalities comprising about three times the percentage of crashes outside Sydney than in Sydney. In Sydney and outside Sydney, fleet crashes were slightly less severe than non-fleet crashes, with a lower proportion of fatal and injury crashes but a higher proportion of towaway crashes (Sydney: $\chi^2(2)=42.5$; $p<0.001$, outside Sydney: $\chi^2(2)=22.3$; $p<0.001$). This difference was in the opposite direction to that observed for all types of fleet and non-fleet vehicles in crashes.

Table 5.5 Numbers of fleet and non-fleet cars in crashes by location and crash severity.

Crash severity	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
			Sydney			
Fatal	132	0.3%	829	0.4%	961	0.4%
Injury	12,150	30.1%	59,254	31.5%	71,404	31.2%
Towaway	28,111	69.6%	128,108	68.1%	156,219	68.3%
Total	40,393	100.0%	188,191	100.0%	228,584	100.0%
			Outside Sydney			
Fatal	136	1.0%	964	1.2%	1,100	1.1%
Injury	4,704	36.0%	31,794	38.0%	36,498	37.7%
Towaway	8,243	63.0%	50,922	60.9%	59,165	61.1%
Total	13,083	100.0%	83,680	100.0%	96,763	100.0%

5.1.2 Speed limit

About three-quarters of fleet and non-fleet car crashes occurred in speed zones of 60km/h or less (see Table 5.6). The difference between fleet and non-fleet crashes as a function of speed limit was statistically significant ($\chi^2(3)=116$; $p>0.001$), but the underlying percentages varied only slightly. Fleet cars were slightly more likely to crash in speed zones greater than 60km/h, and less likely to crash in zones of 60km/h and less.

Table 5.6 Numbers of fleet and non-fleet cars in crashes by speed limit.

Speed limit	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
60 and below	38,901	73%	203,590	75%	242,491	75%
70-90	9,450	18%	45,167	17%	54,617	17%
100 and 110	4,637	9%	20,820	8%	25,457	8%
Unknown	443	1%	2,189	1%	2,632	1%
Total	53,431	100%	271,766	100%	325,197	100%

Figure 5.2 shows the percentages of cars in crashes that were fleet cars as a function of speed zone and crash severity (see Table A3.1 in the 3 for additional data). It suggests that, in each speed zone, the involvement of fleet cars was relatively less in fatal crashes than in injury or towaway crashes. The differences were statistically significant (60 and below: ($\chi^2(2)=55$; $p<0.001$), 70-90: ($\chi^2(2)=31$; $p<0.001$), 100 and 110: ($\chi^2(2)=36$; $p<0.001$)).

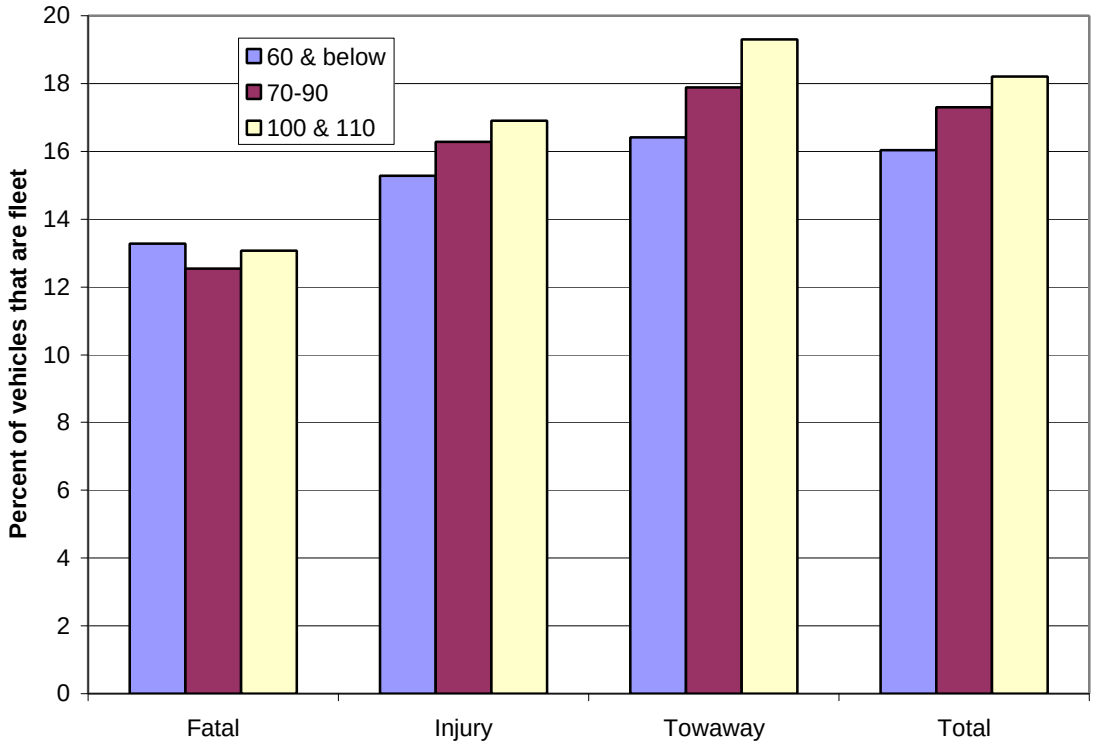

Figure 5.2 Percentages of cars in crashes that were fleet cars by speed zone and crash severity.

Figure 5.3 shows the percentages of cars in crashes that were fleet cars as a function of speed zone and whether the crash occurred in the Sydney metropolitan area or outside Sydney (see Table A3.2 in Appendix 3 for additional data). It suggests that fleet car crashes are relatively more common within the Sydney metropolitan area than outside Sydney, regardless of speed zone. The differences were statistically significant (Sydney: ($\chi^2(3)=44$; $p<0.001$), outside Sydney: ($\chi^2(3)=523$; $p<0.001$)).

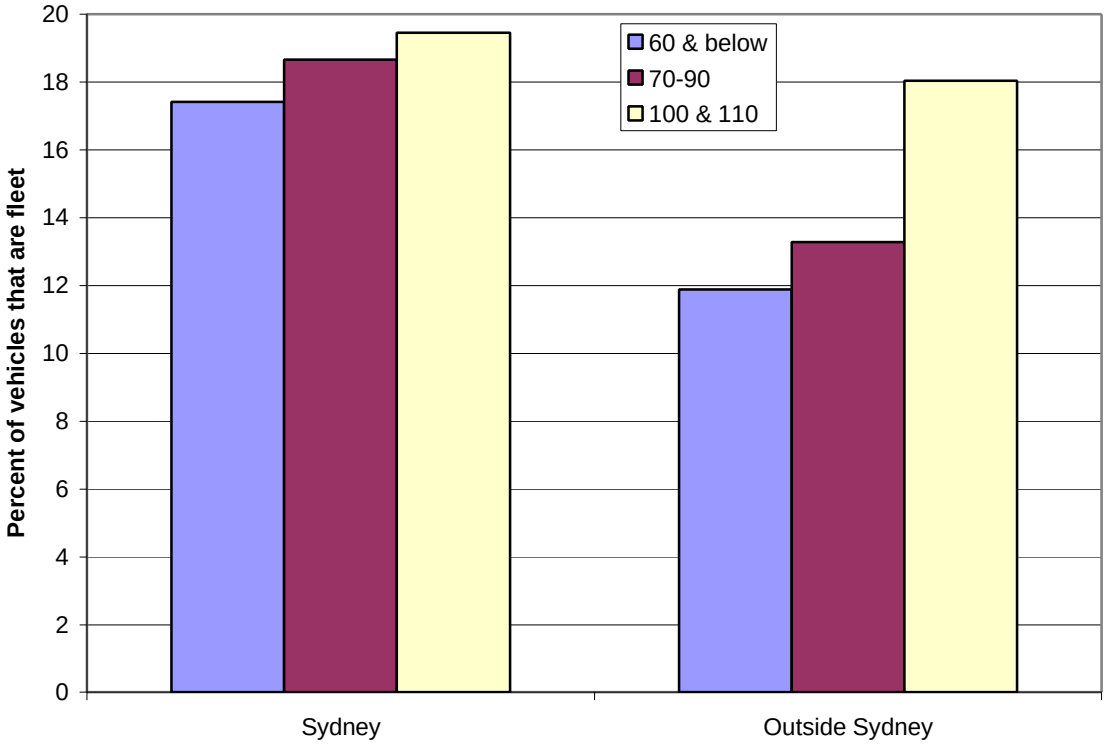

Figure 5.3 Percentages of cars in crashes that were fleet cars by speed zone and crash location.

5.1.3 Time of the crash

Figures 5.4 and 5.5 display the time of the day and day of the week, respectively, of the crash. The time of the crash was provided in one-hour intervals (the exact time of the crash was not supplied). Fleet crashes appear slightly more likely than non-fleet crashes to have occurred between 7am and 4pm, and on weekdays.

Time of day and day of week were combined to form a new variable – "time category". This variable was classified into commuting hours (7-9am and 4-6pm Monday to Friday), work hours (9am-4pm Monday to Friday) and non-work hours (all other hours – including weekends). Most crashes occurred during non-work hours, followed by work hours (see Table 5.7). This might be expected simply because non-work time encompasses more hours. The difference between fleet and non-fleet car crashes in terms of time category was statistically significant ($\chi^2(3)=748.6$; $p<0.001$). Relatively more fleet than non-fleet car crashes occurred during work hours (33.1% versus 28.7%) with the opposite pattern for non-work hours (42.0% versus 48.4%).

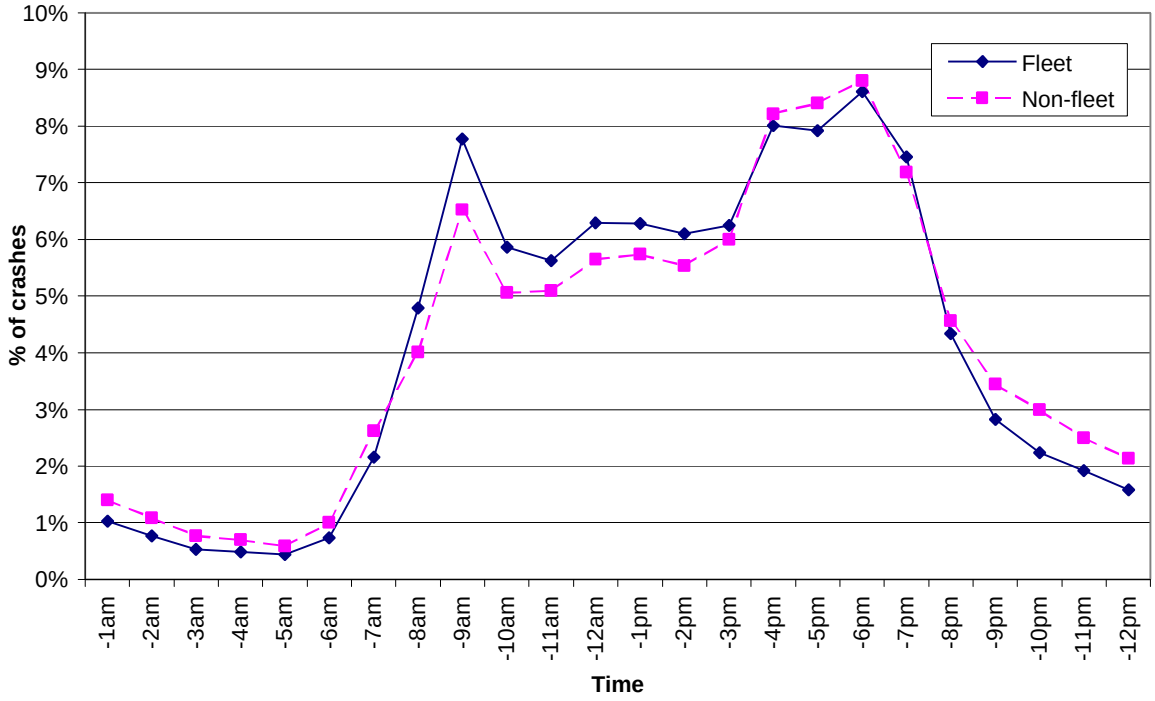

Figure 5.4 Percent of fleet and non-fleet cars in crashes by time of day.

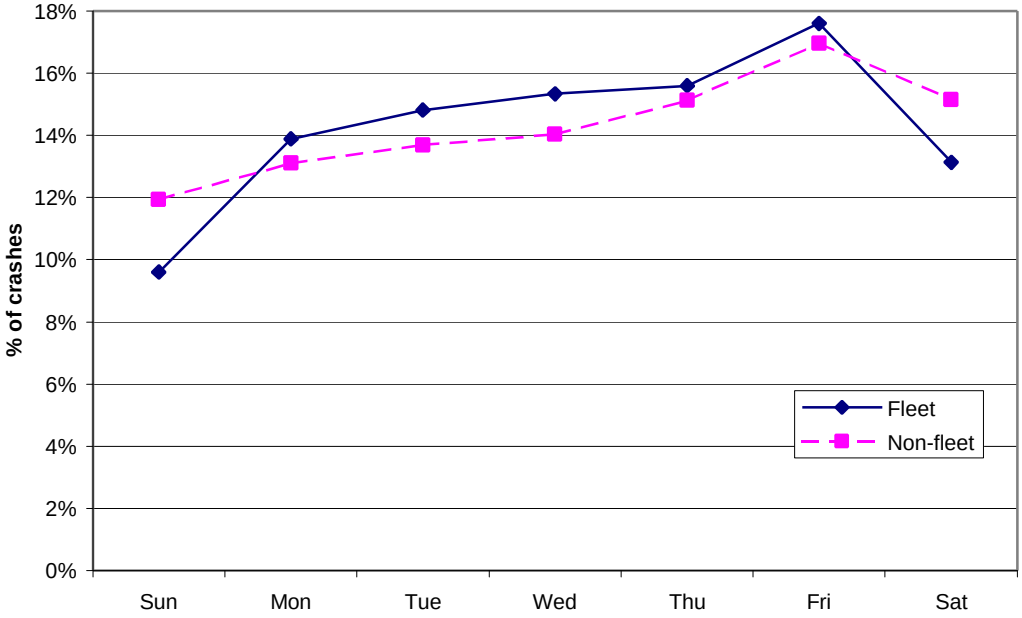

Figure 5.5 Percent of fleet and non-fleet cars in crashes by day of the week.

Table 5.7 Number of fleet and non-fleet cars in crashes by time category.

Time category	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
Commuting	13,279	24.8%	62,228	22.9%	75,507	23.2%
Work	17,709	33.1%	78,058	28.7%	95,767	29.4%
Non-work	22,484	42.0%	131,573	48.4%	154,057	47.4%
Unknown	4	0.0%	12	0.0%	16	0.0%
Total	53,476	100.0%	271,871	100.0%	325,347	100.0%

5.1.4 Crash types for cars

Table 5.8 displays the number of fleet and non-fleet cars in crashes of each RUM code group. Crashes between two vehicles travelling in the same direction (such as rear-end crashes) were the most common type of crash, accounting for more than a third of all crashes. The rank order of RUM code groups was the same for fleet and non-fleet vehicles but their distributions differed in a statistically significant way ($\chi^2(9)=694$; $p<0.001$). There appeared to be relatively more "same direction" crashes involving fleet cars than non-fleet cars, but fewer off path crashes.

Table 5.8 Numbers of fleet and non-fleet cars in crashes by RUM code group.

RUM group	Fleet		Non-fleet		Total	
	No. crashes	% of total	No. crashes	% of total	No. crashes	% of total
Pedestrian	1,648	3.1%	7,639	2.8%	9,287	2.9%
Intersection	10,159	19.0%	55,262	20.3%	65,421	20.1%
Opposing	8,979	16.8%	48,076	17.7%	57,055	17.5%
Same direction	21,317	39.9%	94,042	34.6%	115,359	35.5%
Manoeuvring	2,922	5.5%	16,399	6.0%	19,321	5.9%
Overtaking	390	0.7%	1,963	0.7%	2,353	0.7%
On-path	1,299	2.4%	6,675	2.5%	7,974	2.5%
Off-path straight	3,359	6.3%	21,908	8.1%	25,267	7.8%
Off-path curve	3,260	6.1%	19,320	7.1%	22,580	6.9%
Miscellaneous	98	0.2%	482	0.2%	580	0.2%
Total	53,431	100.0%	271,766	100.0%	325,197	100.0%

The individual RUM codes were analysed to determine the most common crash types for fleet and non-fleet cars. The 12 most common crash types account for 80% of all crashes in each group – fleet and non-fleet (and total) (see Table 5.9). There was a statistically significant difference between the crash types ($\chi^2(84)=1{,}230$; $p<0.001$). The most common type of crash for both fleet and non-fleet vehicles was a rear-end collision (part of the same direction RUM code group), and this crash type was relatively more common for fleet car crashes. Other than head-on and pedestrian near-side crash types, all other crash types were relatively less common for fleet car crashes than non-fleet car crashes, particularly right through crashes.

5.2 DRIVER CHARACTERISTICS

Crashed fleet drivers were, on average, two years older than crashed non-fleet drivers (see Table 5.10, $t(325{,}345)=17.8$, $p<.001$). The age distributions of fleet and non-fleet car drivers differed significantly ($\chi^2(11)=7207$; $p<0.001$). For both crashed fleet and non-fleet cars, the largest driver age group was 30-39 years old (23% and 18%, respectively). However, the next two largest age groups for fleet drivers were 40-49 and 50-59, while the next largest groups of non-fleet drivers were younger – 17-20 and 21-25 years old (see Figure 5.6).

Table 5.9 Percentage of crashes in each of 12 most frequent RUM codes for fleet and non-fleet cars.

RUM	Fleet		Non-fleet		Total	
	% of fleet	Rank	% of non-fleet	Rank	% of total	Rank
Rear end	30.4%	1	24.9%	1	25.8%	1
Right through	12.0%	2	13.2%	2	13.0%	2
Cross traffic	11.3%	3	11.7%	3	11.6%	3
Right near	5.8%	4	6.4%	4	6.3%	4
Head on	4.7%	5	4.4%	7	4.5%	5
Right rear	3.8%	6	4.5%	6	4.4%	6
Off rd left => obj	3.4%	7	4.5%	5	4.3%	7
Off left/rt bnd=>obj	2.3%	8	2.8%	8	2.7%	8
Emerging from drive	1.9%	9	2.2%	9	2.2%	9
U turn	1.8%	10	2.0%	11	2.0%	11
Off rd rght => obj	1.6%	11	2.1%	10	2.0%	10
Ped nearside	1.5%	12	1.3%	12	1.3%	12

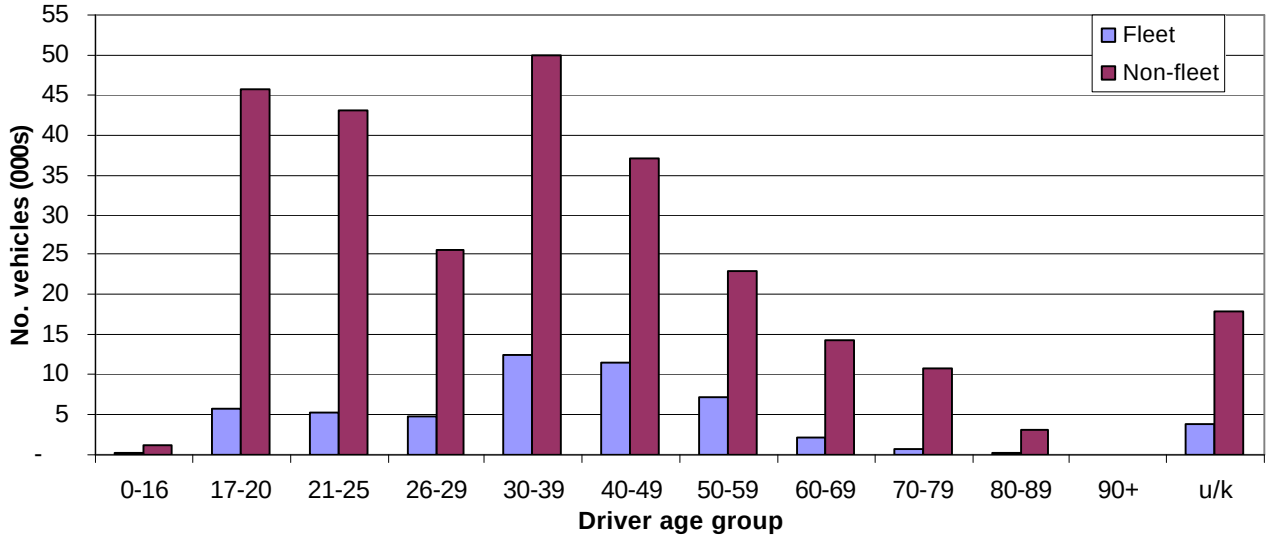

Figure 5.6 Numbers of fleet and non-fleet cars in crashes by driver age group.

Table 5.10 Numbers and ages of fleet and non-fleet car drivers in crashes.

Vehicle category	No. drivers	Age statistic		
		Mean	Std Dev	Median
Fleet	53,476	42.0	20.3	38
Non-fleet	271,871	40.1	22.4	33
Overall	325,347	40.4	22.1	34

Table 5.11 shows that fleet car drivers were more likely to be male than non-fleet car drivers (66% versus 59%, $\chi^2(2)=1106$; $p<0.001$).

Table 5.11 Numbers of fleet and non-fleet car drivers in crashes by gender.

Gender	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
Male	35,523	66.4%	159,656	58.7%	195,179	60.0%
Female	17,060	31.9%	106,893	39.3%	123,953	38.1%
Unknown	893	1.7%	5,322	2.0%	6,215	1.9%
Total	53,476	100.0%	271,871	100.0%	325,347	100.0%

5.3 RISKY DRIVING BEHAVIOURS

5.3.1 Speeding

Fleet drivers were less likely to be coded as speeding than non-fleet drivers (6.6% versus 8.1%, see Table 5.12). Both fleet and non-fleet drivers aged 25 and under were about twice as likely to be coded as speeding than older drivers (see Table 5.13). Speeding was more common among fleet than non-fleet drivers only for drivers aged 60+ years.

Table 5.12 Numbers of fleet and non-fleet cars in crashes where speeding, fatigue, illegal BAC or no seatbelt were involved.

Crash factor	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
Speeding	3,551	6.6%	21,982	8.1%	26,680	7.9%
Fatigue	1,569	2.9%	11,441	4.2%	13,010	4.0%
Illegal BAC	824	1.5%	7,314	2.7%	8,138	2.5%
No seatbelt	311	0.6%	1,531	0.6%	1,842	0.6%

Table 5.13 Numbers of fleet and non-fleet cars in crashes where speeding was involved by driver age group.

Age group	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
25 and under	1,371	12.4%	11,004	12.2%	12,375	12.3%
26-39	925	5.4%	5,058	6.7%	5,983	6.5%
40-59	788	4.2%	2,877	4.8%	3,665	4.7%
60+	148	4.9%	1,225	4.3%	1,373	4.4%
unknown	319	8.6%	1,818	10.1%	2,137	9.9%
Total	3,551	6.6%	21,982	8.1%	25,533	7.8%

Figure 5.7 summarises the involvement of excessive speed, fatigue and illegal BACs as a function of the speed limit at the crash site. A tabular version of the data is provided in Appendix 3. For each speed limit category, fleet cars were significantly less likely than non-fleet cars to be involved in crashes where excessive speed was noted as a crash factor (60 and below: ($\chi^2(1)=142$; $p<0.001$), 70-90: ($\chi^2(1)=43$; $p<0.001$), 100 and 110: ($\chi^2(1)=6$; $p<0.01$). For both fleet and non-fleet cars, speeding was more commonly cited as a factor in crashes occurring in 100 or 110km/h zones than in lower speed zones.

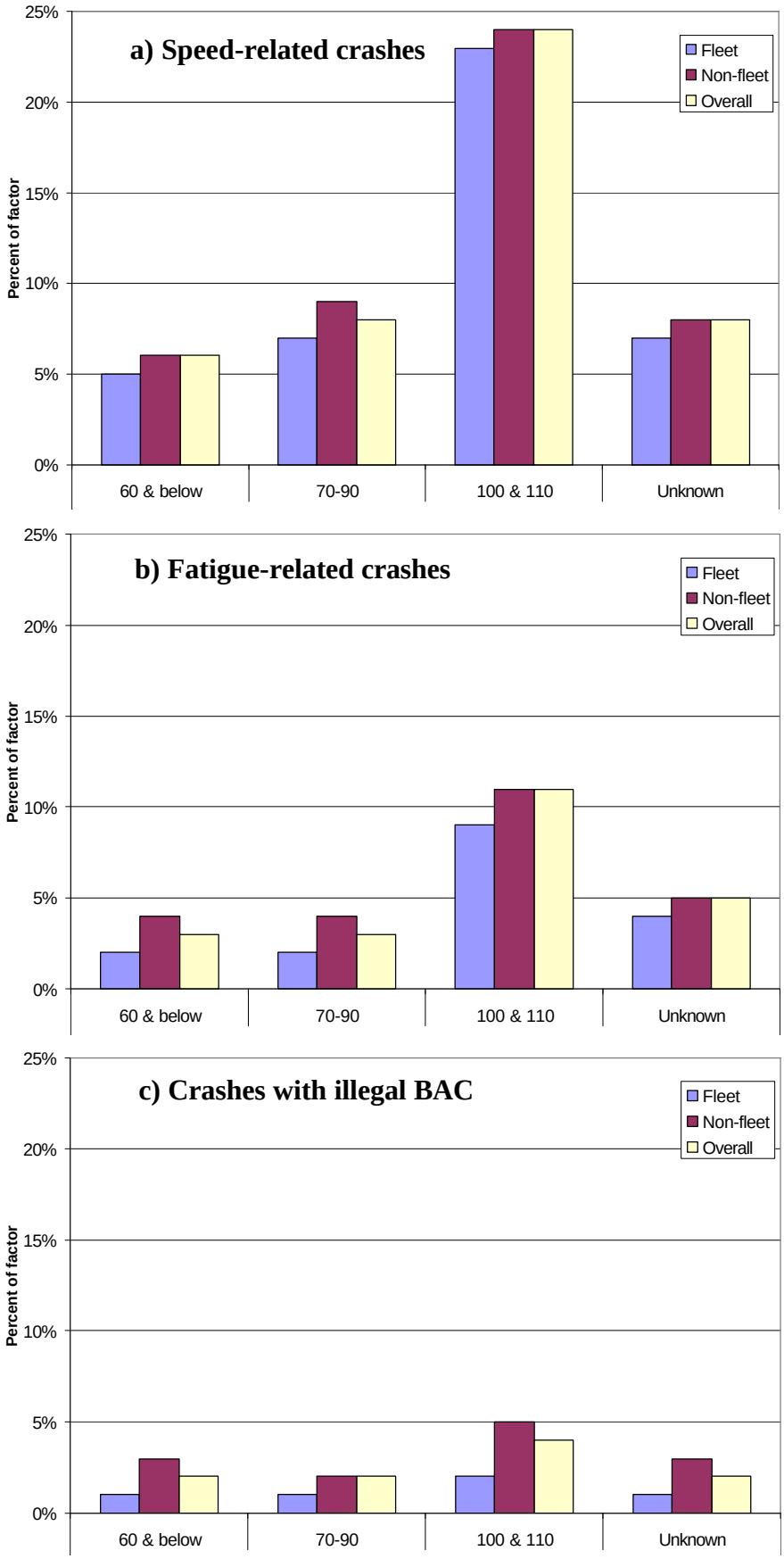

Figure 5.7 Percent of fleet and non-fleet cars in crashes where speed (a), fatigue (b) and illegal levels of alcohol (c) were involved by speed zone.

5.3.2 Fatigue

Fleet drivers were less likely to be fatigued at the time of the crash than non-fleet drivers (2.9% versus 4.2%, see Table 5.14). Both fleet and non-fleet drivers aged 25 and under were more likely to be coded as fatigued than older drivers. Fatigue was coded equally commonly among fleet than non-fleet drivers only for drivers aged 60+ years.

Table 5.14 Numbers of fleet and non-fleet cars in crashes where fatigue was involved by driver age group.

Age group	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
25 and under	482	4.4%	4,239	4.7%	4,721	4.7%
26-39	394	2.3%	2,658	3.5%	3,052	3.3%
40-59	352	1.9%	1,683	2.8%	2,035	2.6%
60+	108	3.6%	984	3.5%	1,092	3.5%
unknown	233	6.3%	1,877	10.5%	2,110	9.7%
Total	1,569	2.9%	11,441	4.2%	13,010	4.0%

For each speed limit category, fleet cars were significantly less likely than non-fleet cars to be involved in crashes where fatigue was noted as a crash factor (60 and below: ($\chi^2(1)=156$; $p<0.001$), 70-90: ($\chi^2(1)=41$; $p<0.001$), 100 and 110: ($\chi^2(1)=19$; $p<0.001$)). Fatigue was more commonly coded as a factor in crashes occurring in 100-110km/h zones than in lower speed zones.

5.3.3 Drink driving

Overall, illegal Blood Alcohol Concentration (BAC) was coded for 1.5% of drivers of fleet cars in crashes and 2.7% of drivers of non-fleet cars in crashes. Illegal BAC was less common among fleet car drivers than non-fleet car drivers at each age group (see Table 5.15).

Figure 5.7 shows that illegal BAC was less common among fleet car drivers than non-fleet car drivers at each speed zone group (60 and below: ($\chi^2(2)=456$; $p<0.001$), 70-90: ($\chi^2(2)=67$; $p<0.001$), 100 and 110: ($\chi^2(2)=116$; $p<0.001$). Illegal BAC was more common in crashes in 100-110 km/h speed zones than at lower speed zones.

Table 5.15 Numbers of fleet and non-fleet cars in crashes where illegal BAC was involved by driver age group.

Age group	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
25 and under	256	2.3%	2,870	3.2%	3,126	3.1%
26-39	291	1.7%	2,489	3.3%	2,780	3.0%
40-59	216	1.2%	1,298	2.2%	1,514	1.9%
60+	16	0.5%	286	1.0%	302	1.0%
unknown	45	1.2%	371	2.1%	416	1.9%
Total	824	1.5%	7,314	2.7%	8,138	2.5%

5.3.4 Not wearing a seatbelt

Table 5.16 shows that drivers of fleet and non-fleet cars were equally likely to be not wearing a seatbelt at the time of the crash (0.6% and 0.6%, respectively). The percentage of drivers not wearing a seatbelt did not appear to differ according to age group of the driver.

Table 5.16 Numbers of fleet and non-fleet cars in crashes where non-wearing of seatbelts by driver was involved by driver age group.

Age group	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
25 and under	51	0.5%	523	0.6%	574	0.6%
26-39	119	0.7%	491	0.6%	610	0.7%
40-59	108	0.6%	297	0.5%	405	0.5%
60+	21	0.7%	161	0.6%	182	0.6%
unknown	12	0.3%	59	0.3%	71	0.3%
Total	311	0.6%	1,531	0.6%	1,842	0.6%

5.4 VEHICLE CHARACTERISTICS

As noted in Section 2.3.2 (Vehicle make and model in the Method chapter), the 92 most common combinations of crashed vehicle make and model were categorised as large cars, medium-sized cars, small cars, commercial vehicles, four-wheel drives, luxury cars, sports cars, and vans. Other cars were categorised as unknown make and/or model or "unclassified" (vehicles where the make/model combination comprised less than 100 crashed vehicles).

The numbers of fleet and non-fleet cars that fell into each category are shown in Table 5.17. The differences in distributions between fleet and non-fleet vehicles were significant ($\chi^2(9)=47{,}039$; $p<0.001$). Relatively more fleet than non-fleet vehicles were large cars, commercials and 4WDs. This may confer a safety advantage for the fleet drivers (and other fleet vehicle occupants). Generally, larger vehicles have more and/or larger crumple zone areas designed to absorb impact forces, and the distance between occupants and rigid surfaces such as doors is greater. Additionally, larger vehicles may be more likely to be equipped with safety devices such as dual airbags. However, the increased mass of larger vehicles means that if they are involved in a crash with a lighter vehicle, the latter will absorb more of the impact energy, causing more damage to the smaller vehicle and increasing both the likelihood and severity of the lighter vehicle's occupants.

The makes and models contributing to each vehicle shape classification are shown in Tables in Appendix 3 (Tables A3.4 to A3.11). These tables show that among luxury cars, relatively more Holden Statemans in crashes were fleet vehicles and relatively fewer Toyota Cressidas were fleet vehicles. In the large car category there were relatively more fleet Ford Falcons and relatively fewer Holden Commodores. For medium cars, the fleet group contained relatively more crashed Toyota Camrys. The fleet group also contained relatively fewer Ford Lasers in the small car class, and relatively more Subaru Imprezas but fewer Toyota Celicas in the sports car class. There were relatively more crashed Mitsubishi Starwagons and fewer Toyota Taragos in the fleet vans class compared to the non-fleet vans class; and the fleet category contained relatively more Toyota Hiluxes.

5.4.1 Vehicle age

Table 5.18 summarises the ages of crashed fleet and non-fleet cars as a function of vehicle shape. Overall and at each classification of vehicle shape, crashed fleet cars were significantly younger than crashed non-fleet cars (all differences bore statistically significant t-statistics at the 0.001 level). Additionally, each fleet vehicle shape classification had less variability (in terms of a standard deviation) than their matching non-fleet vehicles – i.e., fleet vehicle ages are more clustered around each mean.

Table 5.17 Number of each vehicle "shape" for fleet and non-fleet vehicles in crashes.

Vehicle shape	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
Large car	32,862	40%	80,898	29%	113,760	32%
Medium car	5,450	7%	42,055	15%	47,505	13%
Small car	7,711	9%	78,258	28%	85,969	24%
Commercial	13,728	17%	6,236	2%	19,964	6%
4WD	7,797	10%	9,038	3%	16,835	5%
Luxury car	2,812	3%	5,377	2%	8,189	2%
Sports car	765	1%	5,273	2%	6,038	2%
Van	515	1%	1,314	0%	1,829	1%
Unknown	4,962	6%	18,749	7%	23,711	7%
Unclassified	4,641	6%	28,596	10%	33,237	9%
Total	81,243	100%	275,794	100%	357,037	100%

Table 5.18 Ages of fleet and non-fleet vehicles by vehicle shape.

Vehicle shape	Mean age (years)			Age Std. Deviation			t-statistic
	Fleet	Non-fleet	Total	Fleet	Non-fleet	Total	
Large car	4.2	9.8	8.2	4.2	5.7	5.9	160
Medium car	5.6	10.9	10.3	4.9	5.2	5.4	70
Small car	4.9	7.5	7.3	4.5	5.3	5.3	42
Commercial	5.3	8.0	6.1	4.1	5.2	4.6	41
4WD	4.4	6.7	5.6	3.6	4.8	4.4	34
Luxury car	4.4	7.8	6.6	3.7	5.4	5.1	29
Sports car	5.2	10.5	9.9	4.8	6.5	6.6	21
Van	4.5	7.8	6.9	3.4	4.2	4.3	16
Unknown	14.3	15.8	15.3	5.3	6.0	5.8	21
Unclassified	6.9	11.7	10.5	6.4	8.2	8.1	64
Total	6.0	10.0	9.0	5.6	6.4	6.4	172

5.4.2 Crashes of common fleet cars

The Holden Commodore group (Executive, Acclaim, Berlina and Calais) and the Ford Falcon group (Falcon, Futura, Fairmont) are common fleet cars. Given that these cars are also common non-fleet purchases, the opportunity was taken to compare the crash characteristics of the same makes and models registered as fleet and non-fleet vehicles.

Commodores and Falcons two years old and newer were chosen, producing a sample of 17,433 cars – 8,883 Falcons and 8,550 Commodores (51% and 49% respectively). Seventy percent of these cars (12,124 cars) were registered as fleet vehicles. Overall, the

Falcons were slightly older than the Commodores (Falcon: mean age = 1.28, SD = 0.72 vs Commodore: mean age = 1.23, SD = 0.72: $\chi^2(2)=555$; $p<0.001$); and the fleet vehicles were newer than the non-fleet vehicles (fleet: mean age = 1.21, SD = 0.72 vs non-fleet: mean age = 1.36, SD = 0.71: $\chi^2(2)=175$; $p<0.001$).

Table 5.19 shows that more than half of the fatalities and more than two-thirds of the reported injury crashes involving Falcons/Commodores less than two years old relate to driving fleet vehicles.

The distributions of crash severity for fleet and non-fleet Falcons/Commodores differed in a statistically significant manner ($\chi^2(2)=15$; $p<0.001$). However, Table 5.19 shows that the differences in percentage terms were not large, with crashes of fleet Falcons/Commodores being somewhat less likely to result in fatality or injury than crashes of non-fleet Falcons/Commodores. The data are potentially influenced by both true differences in the severity of crashes involving these vehicles and possible higher levels of reporting of towaway crashes for fleet (compared to non-fleet) vehicles.

Table 5.19 Numbers of fleet and non-fleet Commodores and Falcons in crashes by crash severity.

	Fatal		Injury		Towaway		Total
	No.	%	No.	%	No.	%	No.
Fleet	51	0.4	3,878	32.0	8,195	67.6	12,124
Non-fleet	48	0.9	1,707	32.2	3,554	66.9	5,309
Total	99	0.6	5,585	32.0	11,749	67.4	17,433

Compared with non-fleet Falcon/Commodores, fleet cars were relatively more likely to be involved in the following crash types:

- Crashes involving a pedestrian (3.6% fleet vs 2.4% non-fleet)
- Same-direction crashes (41.5% fleet vs 36.5% non-fleet)
- Manoeuvring (5.6% fleet vs 4.7% non-fleet)
- Crashes into objects in the path of travel (2.4% fleet vs 2.0% non-fleet)

and less likely to be involved in the following crash types:

- Run-off road on a straight (6.0% fleet vs 9.6% non-fleet)
- Run-off road on a curve (6.2% fleet vs 9.2% non-fleet)

The difference in distributions of crash types was statistically significant ($\chi^2(9)=163$; $p<0.001$).

5.5 SUMMARY

Cars were defined as sedans/hatches, station wagons, passenger vans and four-wheel drives.

Fleet cars comprised 16% of cars in crashes. Fleet cars had a higher crash rate than non-fleet vehicles (136 versus 117 crashes per 10,000 registered cars per year). There was a small but statistically significant difference in the crash severity profiles of fleet and non-fleet cars, with fleet cars less likely to be involved in fatal or injury crashes, but more likely to be involved in towaway crashes.

A greater proportion of fleet cars crashed within the Sydney area compared with outside the Sydney area. Crashes outside the Sydney area were more severe for both fleet and non-fleet cars.

Fleet cars were slightly more likely to be involved in crashes in speed zones of greater than 60km/h than non-fleet cars.

Fleet cars were slightly more likely to crash between 7am and 4pm and on weekdays compared with non-fleet cars.

Crashes between two vehicles travelling in the same direction (such as rear-end crashes) were the most common type of crash, accounting for more than a third of all fleet and non-fleet crashes. There were relatively more "same direction" crashes involving fleet cars than non-fleet cars, but fewer off path crashes. The most common type of crash for both fleet and non-fleet vehicles was a rear-end collision (part of the same direction RUM code group), and this crash type was relatively more common for fleet car crashes. Other than head-on and pedestrian near-side crash types, all other crash types were relatively less common for fleet car crashes than non-fleet car crashes, particularly right through crashes.

On average fleet car drivers were older than non-fleet car drivers and were more likely to be male.

Compared to crashes of non-fleet cars, fleet car crashes were less likely to involve excessive speed, fatigue or an illegal BAC. Non-wearing of seatbelts was equally likely for both groups of car drivers. Generally, for both fleet and non-fleet cars, drivers aged 25 years old and younger were more likely than older drivers to be involved in crashes where excessive speed and fatigue were noted as factors in the crash. Fleet car drivers with an illegal BAC were also more likely to be younger, but non-fleet car drivers with an illegal BAC were equally likely to be aged 26-39 as to be aged 25 and under.

Relatively more fleet than non-fleet cars were large cars, commercials and 4WDs. Crashed fleet cars were, on average, four years younger than crashed non-fleet cars and the variability of age was less for fleet cars.

Among the Holden Commodore group (Executive, Acclaim, Berlina and Calais) and the Ford Falcon group (Falcon, Futura, Fairmont), 70% of crashed cars aged two years old and less were fleet cars. Crashes of fleet Falcons/Commodores were somewhat less likely to result in fatality or injury then crashes of non-fleet Falcons/Commodores. The data are potentially influenced by both true differences in the severity of crashes involving these vehicles and possible higher levels of reporting of towaway crashes for fleet (compared to non-fleet) vehicles. Compared with non-fleet Falcon/Commodore cars, fleet cars were

relatively more likely to be involved in same-direction crashes and less likely to be involved in run-off road crashes.

6. CRASHES INVOLVING POLICE AND OTHER EMERGENCY VEHICLES

In the 2000 registration data, 7,015 (0.19%) of the vehicles were registered as "emergency vehicles". Of these, 6,897 were coded as fleet vehicles. The registration data supplied did not identify the types of vehicles (e.g. car or truck) or specific emergency services to which these vehicles belonged.

In the crash data, the "traffic unit type" variable includes the categories "ambulance", "fire brigade", "police", "tow truck", "police motor cycle" and "other emergency vehicle". The number of crashed vehicles in each of these classifications is shown in Table 6.1. Overall, 1,425 (0.4%) of the 396,899 crashed vehicles in the dataset were fleet emergency vehicles. A further 63 vehicles were non-fleet emergency vehicles, mostly made up of tow trucks (54%) followed by vehicles registered to the police (20 vehicles, or 32% of the non-fleet emergency vehicles). The remainder of these analyses will focus on the fleet emergency vehicles only. Among these vehicles, more than half were police vehicles and more than a quarter were tow trucks.

Table 6.1 Numbers of fleet and non-fleet emergency vehicles in crashes.

Emergency vehicle	Fleet		Non-fleet		Total	
type	No.	%	No.	%	No.	%
Ambulance	156	10.9	6	9.5	162	10.9
Fire brigade	70	4.9	1	1.6	71	4.8
Police	785	55.1	20	31.7	805	54.1
Police motorcycle	16	1.1	1	1.6	17	1.1
Tow truck	394	27.6	34	54.0	428	28.8
Other emergency veh	4	0.3	1	1.6	5	0.3
Total	1,425	100	63	100	1,488	100.0

The relatively small numbers of fatal crashes constrains the discussion of the severity of emergency vehicle crashes. Overall, 1.1% of fleet emergency vehicle crashes were fatal and 46.5% resulted in injury. Of the emergency vehicles, police motorcycle crashes were most likely to result in fatality or injury (probably to the rider). As the crash file is not person based, it is not possible to reliably determine whether it was the emergency service officer who was killed. Where the vehicles were most likely to be "cars" or van-sized vehicles (ambulance and police) the proportions of crashes that were injury or towaway were similar (see Table 6.2). Where the vehicles were likely to be trucks (fire brigade and tow truck), the crashes were mostly towaway.

Table 6.2 Numbers of fleet emergency vehicles in crashes by crash severity.

Emergency	Fatal		Injury		Towaway		Total	
veh type	No.	% sev	No.	% sev	No.	% sev	No.	% sev
Ambulance	3	1.9%	74	47.4%	79	50.6%	156	100%
Fire brigade	1	1.4%	25	35.7%	44	62.9%	70	100%
Police	5	0.6%	411	52.4%	369	47.0%	785	100%
Police MC	1	6.3%	14	87.5%	1	6.3%	16	100%
Tow truck	5	1.3%	136	34.5%	253	64.2%	394	100%
Other	0	0.0%	3	75.0%	1	25.0%	4	100%
Total	15	1.1%	663	46.5%	747	52.4%	1425	100%

6.1 CRASH CHARACTERISTICS

6.1.1 Location of the crash

Overall, almost three-quarters of all emergency vehicle crashes occurred in the Sydney metropolitan area (see Table 6.3). Of the types of emergency vehicle, ambulances were most likely to crash outside of the Sydney area.

Table 6.3 Numbers of fleet emergency vehicles in crashes by location.

Area	Ambulance	Fire brigade	Police	Police MC	Tow truck	Other	Total
Sydney	101	51	579	13	308	4	1,056
	64.7%	*72.9%*	*73.8%*	*81.3%*	*78.2%*	*100%*	*74.1%*
Outside Sydney	55	19	206	3	86%	-	369
	35.3%	*27.1%*	*26.2%*	*18.8%*	*21.8*	-	*25.9%*
Total	156	70	785	16	394	4	1,425
	100%	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*

6.1.2 Time of the crash

Figures 6.1 and 6.2 display the time of the day of emergency vehicle crashes overall and for each emergency vehicle type respectively. Police motorcycle and "other" emergency vehicle crashes are not shown in Figure 6.2 because of the small number of crashes. There is substantial variability in the crash distributions (at least partly due to small crash numbers in some cases), but crashes are generally more likely to occur from around 8am to 7pm. Figure 6.2 suggests that there are relatively more police crashes in the early hours of the morning than crashes of other types of emergency vehicles.

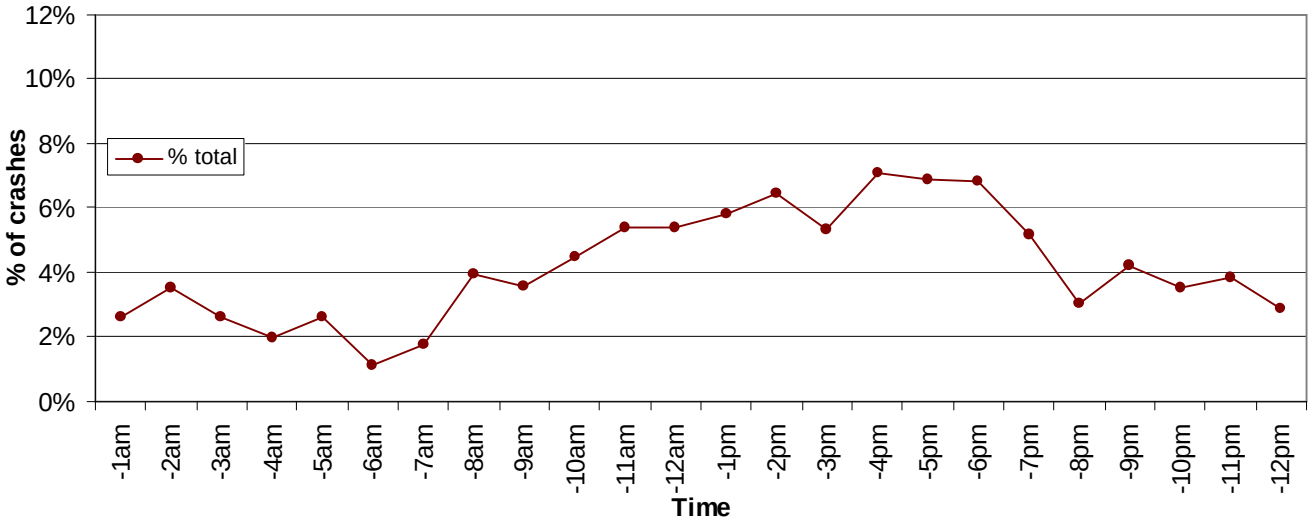

Figure 6.1 Percent of fleet emergency vehicles in crashes by time of day.

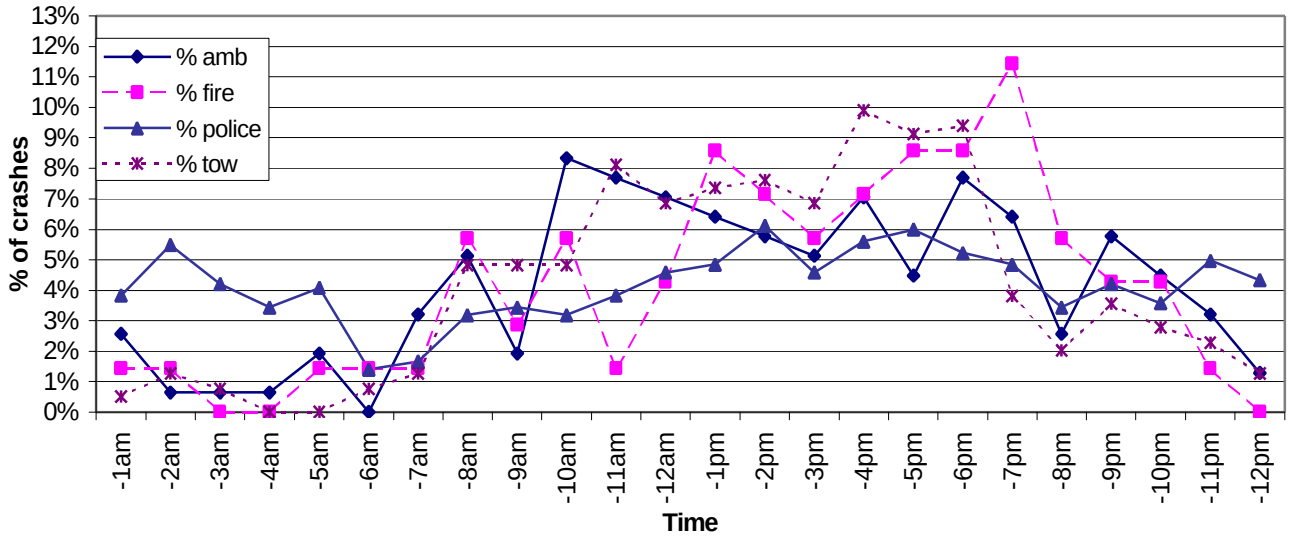

Figure 6.2 Percent of fleet emergency vehicles of each type in crashes by time of day.

Figures 6.3 and 6.4 show the day of the week of the emergency vehicle crashes, overall and for each emergency vehicle type respectively. Most of the emergency vehicle types are approximately equally likely to crash on any day of the week, except for ambulances where there is a trend for Monday to be the day least likely to record a crash and then a steady increase in crashes to the highest number of crashes occurring on Saturdays.

Overall, half of the emergency vehicle crashes occurred during non-work times, 17% occurred during commuting times and 32% occurred during work times (see Table 6.4). Compared to other types of emergency vehicles, police vehicles were somewhat more likely to be involved in crashes in non-work times and tow trucks were somewhat less likely to be involved in crashes in non-work times.

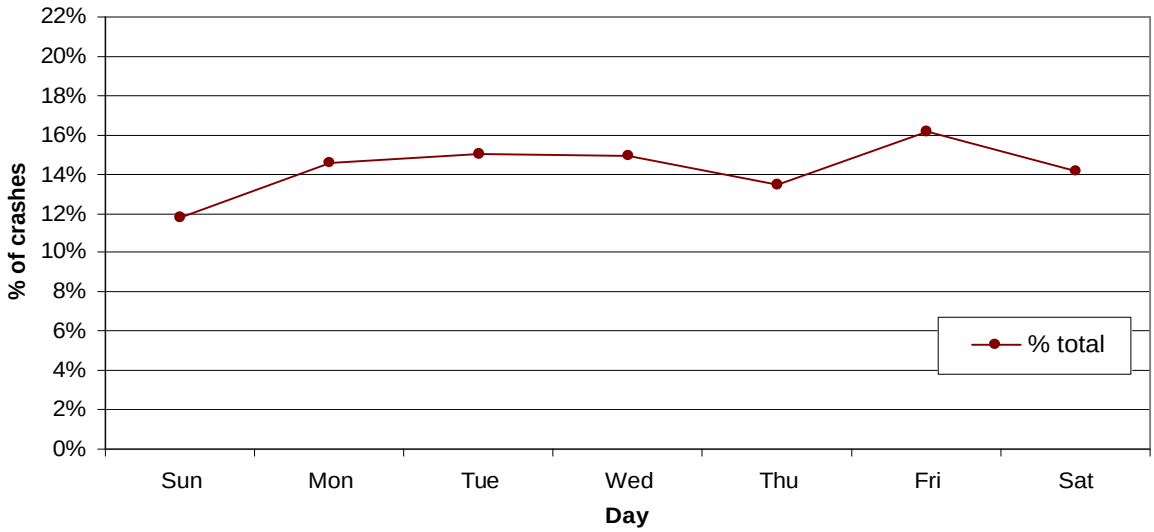

Figure 6.3 Percent of fleet emergency vehicles in crashes by day of the week.

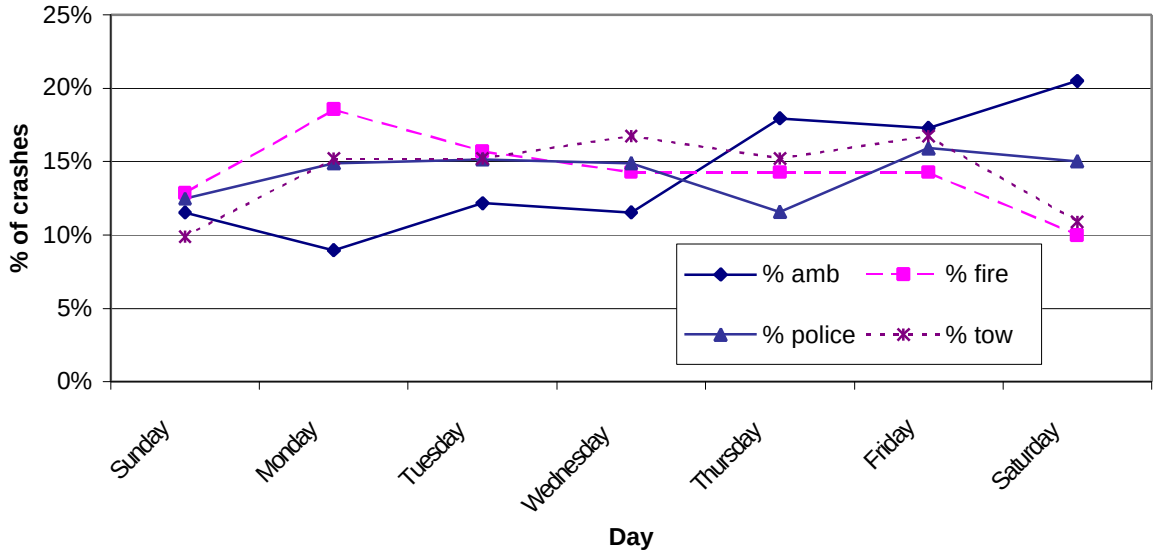

Figure 6.4 Percent of fleet emergency vehicles of each type in crashes by day of the week.

Table 6.4 Numbers of fleet emergency vehicles in crashes by time category.

Time category	Ambulance	Fire brigade	Police	Police MC	Tow truck	Other	Total
Commuting	25	15	107	1	99	1	248
	16%	*21%*	*14%*	*6%*	*25%*	*25%*	*17%*
Work	53	25	223	5	156	0	462
	34%	*36%*	*28%*	*31%*	*40%*	*0%*	*32%*
Non-work	78	30	455	10	139	3	715
	50%	*43%*	*58%*	*63%*	*35%*	*75%*	*50%*
Total	156	70	785	16	394	4	1425
	100%	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*

6.2 DRIVER CHARACTERISTICS

The mean age of the emergency vehicle drivers (where the age was known) was 32.6 years (see Table 6.5). Police vehicle drivers were younger on average and fire brigade vehicle drivers older on average than other drivers of emergency vehicles. The differences in mean age across the emergency services were statistically significant ($F(5,1,271)=17.2$; $p<0.001$). For each of the emergency services, the most common driver age group was 30-39 years old (see Table 6.6), except for fire brigade (40-49 years old) and other (where the ages were spread across several groups). The percentage of drivers aged 25 and under was highest for police (25%) and tow trucks (24%).

Overall, 9% of crashed emergency vehicle drivers were female (with 2% unknown). The emergency vehicle category with the highest proportion of crashed female drivers was ambulance (18% of crashed drivers), followed by police vehicles (12% of crashed drivers) and fire brigade vehicles (6% of crashed drivers).

Table 6.5 Numbers and ages of drivers of fleet emergency service vehicles in crashes.

Emergency service	No. drivers	Age statistic		
		Mean	Std Dev	Median
Ambulance	145	34.8	9.1	33
Fire brigade	62	39.9	10.0	39
Police	691	30.8	7.7	29
Police MC	16	34.7	6.0	33
Tow truck	359	33.5	10.7	31
Other	4	43.3	18.4	43.5
Overall	1,277	32.6	9.2	30

Table 6.6 Numbers of fleet emergency vehicle drivers in crashes by age group.

Age group	Ambulance	Fire brigade	Police	Police MC	Tow truck	Other	Total
17-20	4	0	10	0	14	0	28
	3%	*0%*	*1%*	*0%*	*4%*	*0%*	*2%*
21-25	15	3	185	0	77	1	281
	10%	*4%*	*24%*	*0%*	*20%*	*25%*	*20%*
26-29	25	9	175	4	73	0	286
	16%	*13%*	*22%*	*25%*	*19%*	*0%*	*20%*
30-39	66	20	217	8	105	1	417
	42%	*29%*	*28%*	*50%*	*27%*	*25%*	*29%*
40-49	23	21	79	4	55	0	182
	15%	*30%*	*10%*	*25%*	*14%*	*0%*	*13%*
50-59	11	7	25	0	25	1	69
	7%	*10%*	*3%*	*0%*	*6%*	*25%*	*5%*
60-69	1	2	0	0	8	1	12
	1%	*3%*	*0%*	*0%*	*2%*	*25%*	*1%*
70-79	0	0	0	0	2	0	2
	0%	*0%*	*0%*	*0%*	*1%*	*0%*	*0%*
u/k	11	8	94	0	35	0	148
	7%	*11%*	*12%*	*0%*	*9%*	*0%*	*10%*
Total	156	70	785	16	394	4	1425
	100%	*100%*	*100%*	*100%*	*100%*	*100%*	*100%*

6.3 RISKY DRIVING BEHAVIOURS

6.3.1 Speeding

Table 6.7 shows speeding was involved in 12.8% of fleet emergency vehicle crashes, double that found for fleet vehicle crashes as a whole (6.4%). Speeding was most commonly involved in crashes of ambulances (21.2%) and police vehicles (16.3%). The

lower involvement of speeding in crashes of fire brigade vehicles may have reflected the larger size of these vehicles.

Table 6.7 Numbers of fleet emergency vehicles in crashes where speeding, fatigue, illegal BAC and no seatbelt were involved.

Crash factor	Ambulance	Fire brigade	Police	Police MC	Tow truck	Other	Total
Speeding	33	4	128	2	15	0	182
	21.2%	*5.7%*	*16.3%*	*12.5%*	*3.8%*	*0%*	*12.8%*
Fatigue	2	1	20	0	11	0	34
	1.3%	*1.4%*	*2.5%*	*0%*	*2.8%*	*0%*	*2.4%*
Illegal BAC	0	0	0	0	1	0	1
	0%	*0%*	*0%*	*0%*	*0.3%*	*0%*	*0.1%*
No Seatbelt	1	10	13	N/A	42	0	66
	0.6%	*14.3%*	*1.7%*	*N/A*	*10.7%*	*0%*	*4.7%*

In terms of the percentage of drivers of each age group, younger drivers (25 years and under) were the most likely to have been travelling at excessive speed at the time of the crash, with a decreasing involvement with increasing age (see Table 6.8). This pattern is also evident for police and tow truck drivers.

Table 6.8 Numbers of fleet emergency vehicles in crashes where speeding was involved by driver age group.

Age group	Ambulance		Fire brigade		Police		Tow truck		Police MC		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
25 and under	3	15.8%	0	0.0%	45	23.1%	6	6.6%	0	0.0%	54	17.5%
26-39	21	23.1%	1	3.4%	60	15.3%	5	2.8%	1	8.3%	88	12.5%
40-59	6	17.6%	2	7.1%	12	11.5%	3	3.8%	1	25.0%	24	9.6%
60+	0	0.0%	1	50.0%	0	0.0%	0	0.0%	0	0.0%	1	7.1%
unknown	3	27.3%	0	0.0%	11	11.7%	1	2.9%	0	0.0%	15	10.1%
Total	33	21.2%	4	5.7%	128	16.3%	15	3.8%	2	12.5%	182	12.8%

6.3.2 Fatigue

Overall, fatigue was implicated in 2.4% of emergency vehicle crashes, compared with 3.2% overall for all fleet vehicles. The numbers of crashes involving fatigue was too small to analyse as a function of type of emergency service or driver age.

6.3.3 Drink driving

Only one crash involved an illegal BAC – a tow truck.

6.3.4 Non-wearing of seatbelts

In the majority of crashes involving emergency vehicles, the driver was wearing a seatbelt. The rate of non-compliance was greatest for fire brigade drivers and tow truck drivers – 14.3% and 10.7% respectively – where the vehicle is more likely to be larger than a car.

Emergency vehicle drivers aged 26-39 years were least likely to be wearing a seatbelt at the time of the crash (see Table 6.9).

All crashed police motorcycle riders were wearing a helmet at the time of their crashes.

Table 6.9 Numbers of drivers of fleet emergency vehicles not wearing a seatbelt by age group.

Age group	Ambulance		Fire brigade		Police		Tow truck		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
25 and under	0	0.0%	0	0.0%	2	1.0%	10	11.0%	12	3.9%
26-39	1	1.1%	6	20.7%	9	2.3%	25	14.0%	41	5.8%
40-59	0	0.0%	3	10.7%	2	1.9%	5	6.3%	10	4.0%
60+	0	0.0%	0	0.0%	0	0.0%	1	10.0%	1	7.1%
unknown	0	0.0%	1	12.5%	0	0.0%	1	2.9%	2	1.4%
Total	1	0.6%	10	14.3%	13	1.7%	42	10.7%	66	4.6%

6.4 VEHICLE CHARACTERISTICS

Two variables in the crash database classify the type of vehicle into categories that include the name "car (sedan/hatch)", "utility", etc. Both of these variables were discussed earlier. One of them was imported from the registration database – called "Type_RS" in the SPSS dataset – and the other was already present in the crash database – called "Traffic Unit Type" or "Tutype" – the vehicle type as noted by the police officer attending the crash

The Traffic Unit Type variable included each of the emergency service vehicles listed previously (ambulance, fire brigade, etc.) as vehicle types alongside "car (sedan/ hatch)", "utility", etc. Accordingly, it was not possible to directly determine whether an "ambulance" vehicle was a car, a van, etc. The registration database vehicle type variable was categorised in a similar way, except that it only includes the classification "emergency vehicle" – emergency vehicles were not categorised to the same degree as they were in the crash database.

The augmented dataset with the matching make and model variables allowed for the crashed emergency vehicles to be classified according to vehicle "shape" (as described earlier). Most crashed ambulances and tow trucks were commercial vehicles (see Table 6.10), most police vehicles were large cars, and most fire brigade vehicles were "unknown" or "unclassified" (truck makes and models were categorised as "unclassified" due to the small number of each make and model).

Using the vehicle shape variable, fleet emergency vehicles that were large or medium cars, 4WDs, sports cars and vans were reclassified as "emergency cars" (to match the definition of "cars" as used earlier). It should be noted that not all cars registered as emergency vehicle will be included. For example, a proportion of the "unclassified shape" vehicles will be cars, where there was an insufficient number within particular make/model combinations (see earlier). Emergency cars can then be compared to fleet and non-fleet cars (without emergency vehicles).

Table 6.10 Number of each vehicle shape for fleet emergency vehicles in crashes.

Vehicle shape	Ambulance		Fire brigade		Police		Tow truck		Police MC		Other		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Large car	13	8%	12	17%	516	66%	43	11%	0	0%	0	0%	584	41%
Medium car	1	1%	0	0%	9	1%	0	0%	0	0%	0	0%	10	1%
Commercial	79	51%	8	11%	201	26%	168	43%	0	0%	1	25%	457	32%
4WD	2	1%	3	4%	47	6%	2	1%	0	0%	1	25%	55	4%
Sports car	0	0%	0	0%	2	0%	0	0%	0	0%	0	0%	2	0%
Van	9	6%	0	0%	1	0%	0	0%	0	0%	0	0%	10	1%
Unknown	16	10%	25	36%	0	0%	90	23%	0	0%	2	50%	133	9%
Unclassified	36	23%	22	31%	9	1%	89	23%	16	100%	0	0%	172	12%
Total	156	100%	70	100%	785	100%	392	100%	16	100%	4	100%	1,423	100%

Fleet emergency cars represented a relatively higher proportion of fatal and injury crashes, but a lower proportion of towaway crashes (see Table 6.11). There was a significant difference in crash severity between the car categories ($\chi^2(4)=168$; $p<0.001$) (note that the numbers and percentages used for fleet and non-fleet cars here are derived from the updated data, and so will not match some other sections in this report).

Table 6.11 Numbers of fleet cars, non-fleet cars and fleet emergency cars in crashes by crash severity.

Severity	Fleet cars		Non-fleet cars		Fleet emergency cars		Total	
	No.	%	No.	%	No.	%	No.	%
Fatal	268	0.5%	1,793	0.7%	8	1.2%	2,069	0.6%
Injury	16,837	31.5%	91,021	33.5%	314	47.5%	108,172	33.2%
Towaway	36,326	68.0%	178,952	65.8%	339	51.3%	215,617	66.2%
Total	53,431	100.0%	271,766	100.0%	661	100.0%	325,858	100.0%

There was also a significant difference between the car categories in terms of where the crashes occurred – within metropolitan Sydney versus outside Sydney ($\chi^2(2)=854$; $p<0.001$). Fleet cars were relatively most likely to crash within Sydney, followed by emergency cars and then non-fleet cars (see Table 6.12).

Table 6.12 Numbers of fleet cars, non-fleet cars and fleet emergency cars in crashes by location.

Location	Fleet cars		Non-fleet cars		Fleet emergency cars		Total	
	No.	%	No.	%	No.	%	No.	%
Sydney	40,358	75.5%	188,113	69.2%	479	72.5%	228,950	70.3%
Outside Sydney	13,073	24.5%	83,653	30.8%	182	27.5%	96,908	29.7%
Total	53,431	100.0%	271,766	100.0%	661	100.0%	325,858	100.0%

Fleet emergency car crashes were more likely to involve a fatality or an injury than fleet or non-fleet cars both within and outside Sydney, followed by non-fleet cars and then fleet cars (see Table 6.13). There was a significant difference between the car categories in terms of where the crash severity and where the crashes occurred (within Sydney: $\chi^2(4)=109$; $p<0.001$; outside Sydney: $\chi^2(4)=30$; $p<0.001$).

Table 6.13 Numbers of fleet cars, non-fleet cars and fleet emergency cars in crashes by crash severity and location.

Severity	Fleet cars		Non-fleet cars		Fleet emergency cars		Total	
	No.	%	No.	%	No.	%	No.	%
				Sydney				
Fatal	132	0.3%	829	0.4%	4	0.8%	965	0.4%
Injury	12,136	30.1%	59,236	31.5%	230	48.0%	71,602	31.3%
Towaway	28,090	69.6%	128,048	68.1%	245	51.1%	156,383	68.3%
Total	40,358	100.0%	188,113	100.0%	479	100.0%	228,950	100.0%
				Outside Sydney				
Fatal	136	1.0%	964	1.2%	4	2.2%	1,104	1.1%
Injury	4,701	36.0%	31,785	38.0%	84	46.2%	36,570	37.7%
Towaway	8,236	63.0%	50,904	60.9%	94	51.6%	59,234	61.1%
Total	13,073	100.0%	83,653	100.0%	182	100.0%	96,908	100.0%

6.5 SUMMARY

Emergency vehicles comprised 0.2% of registered vehicles and 0.4% of crashed vehicles. Among the crashed emergency vehicles, more than half were police vehicles and more than a quarter were tow trucks. While a small number of emergency vehicles were coded as non-fleet, the analyses only considered fleet emergency vehicles.

Overall, 1.1% of fleet emergency vehicle crashes were fatal and 46.5% resulted in injury. Police motorcycle crashes were the most severe, and crashes where the emergency vehicle was likely to be a car or a van (e.g. police or ambulance) were more severe than those crashes where the vehicle was more likely to be a truck (e.g. tow trucks or fire brigade vehicles).

Crashes of each type of emergency vehicle were more likely to occur within rather than outside the Sydney area, ranging from 65% of ambulance crashes to 81% of police motorcycle crashes.

There is substantial variability in the crash distributions (at least partly due to small crash numbers in some cases), but crashes are generally more likely to occur from around 8am to 7pm. There were relatively more police crashes in the early hours of the morning than crashes of other types of emergency vehicles. Most of the emergency vehicle types are approximately equally likely to crash on any day of the week, except for ambulances

where there is a trend for Monday to be the day least likely to record a crash and then a steady increase in crashes to the highest number of crashes occurring on Saturdays.

Overall, half of the emergency vehicle crashes occurred during non-work times, 17% occurred during commuting times and 32% occurred during work times. Compared to other types of emergency vehicles, police vehicles were somewhat more likely to be involved in crashes in non-work times and tow trucks were somewhat less likely to be involved in crashes in non-work times.

The mean age of the emergency vehicle drivers (where the age was known) was 32.6 years. Police vehicle drivers were younger on average and fire brigade vehicle drivers older on average than other drivers of emergency vehicles. The percentage of drivers aged 25 and under was highest for police and tow trucks.

Overall, 9% of crashed emergency vehicle drivers were female (with 2% unknown). The emergency vehicle category with the highest proportion of crashed female drivers was ambulance (18% of crashed drivers), followed by police vehicles (12% of crashed drivers) and fire brigade vehicles (6% of crashed drivers).

Speeding was involved in 12.8% of fleet emergency vehicle crashes, double that found for fleet vehicle crashes as a whole (6.4%) and was most common for ambulances (21.2%) and police vehicles (16.3%). The lower involvement of speeding in crashes of fire brigade vehicles may have reflected the larger size of these vehicles.

Fatigue was implicated in 2.4% of emergency vehicle crashes, compared with 3.2% overall for all fleet vehicles. The numbers of crashes involving fatigue was too small to analyse as a function of type of emergency service or driver age.

Only one driver had an illegal BAC (a tow truck driver).

Non-wearing of seatbelts was most common for fire brigade drivers and tow truck drivers where the vehicle is more likely to be larger than a car. Emergency vehicle drivers aged 26-39 years were least likely to be wearing a seatbelt at the time of the crash.

Most crashed ambulances and tow trucks were commercial vehicles, most police vehicles were large cars, and most fire brigade vehicles were “unknown” or “unclassified” (truck makes and models were categorised as “unclassified” due to the small number of each make and model). Fleet emergency vehicles that were cars had a relatively higher proportion of fatal and injury crashes than other fleet cars and than other non-fleet cars. Fleet emergency cars were less likely to crash within Sydney than other fleet cars but more likely to do so than non-fleet cars.

7. CRASHES INVOLVING FLEET AND NON-FLEET LIGHT COMMERCIAL VEHICLES

A road user group of interest due to the likely high number of kilometres travelled in a work capacity and/or large number of hours spent on the road for work purposes are those drivers employed as couriers. Neither the crash database nor the registrations database directly identifies vehicles used for courier work. In terms of the data used for this project, courier vehicles are a sub-set of light commercial vehicles (light truck, panel van or utility) that are registered as fleet vehicles. Drivers of fleet light commercial vehicles also include some trades people and service technicians.

In the June 2000 snapshot of the registration database, 593,454 light trucks were registered in NSW (16% of all registered vehicles). Around 52% of these light trucks (311,164 vehicles) were registered as fleet vehicles. Across the period 1996 to 2000 (inclusive) a total of 37,432 utilities, panel vans and light trucks were involved in crashes – 9.4% of all crashed vehicles in the database; and 21.7% and 5.4% of the crashed fleet and non-fleet vehicles respectively.

Fleet light commercial vehicles accounted for 57% (or 21,452 vehicles) of the light commercial vehicles (see Table 7.1). Light trucks made up the majority of crashed light commercial vehicles in both the fleet and non-fleet categories, accounting for more than half of each group. Substantially more crashed light trucks belonged to fleets than to non-fleets, but there were similar numbers of utilities and panel vans in each group. For the remainder of the analyses in this chapter the category of light commercial vehicles will not be divided into its constituent vehicle types.

Table 7.1 Numbers and types of fleet and non-fleet light commercial vehicles in crashes.

Vehicle type	Fleet	Non-fleet	Total
Utility	4,757	5,631	10,388
Panel van	1,293	1,341	2,634
Light truck	15,402	9,008	24,410
Total	21,452	15,980	37,432

There was a statistically significant difference in severity between crashes of fleet and non-fleet light commercial vehicles (see Table 7.2, $\chi^2(2)=51.8$; $p<0.001$) but the percentage differences were very small. Just over 1% of both fleet and non-fleet crashed light commercial vehicles involved a fatality, just over a third was an injury crash, and slightly less than two-thirds were towaway crashes for both fleet and non-fleet vehicles.

Table 7.2 Numbers of fleet and non-fleet light commercial vehicles in crashes by crash severity.

Crash severity	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
Fatal	241	1.1	191	1.2	432	1.2
Injury	7,408	34.5	5,629	35.2	13,037	34.8
Towaway	13,803	64.3	10,160	63.6	23,963	64.0
Total	21,452	100	15,980	100	37,432	100

7.1 CRASH CHARACTERISTICS

7.1.1 Location of the crash

Fleet light commercial vehicles were more likely to crash in metropolitan Sydney (67% of the total) than non-fleet light commercial vehicles (52%) – see Table 7.3.

Table 7.3 Numbers of fleet and non-fleet light commercial vehicles in crashes by location.

Location	Fleet		Non-fleet		Total	
	No	%	No	%	No	%
Sydney	14,288	67%	8,276	52%	22,564	60%
Outside Sydney	7,164	33%	7,704	48%	14,868	40%
Total	21,452	100%	15,980	100%	37,432	100%

7.1.2 Time of the crash

The profiles of fleet and non-fleet light commercial vehicle crashes in terms of time of day and the day of the week were similar (see Figures 7.1 and 7.2 respectively). Fleet light commercial vehicles had relatively more crashes between the hours of 7am to 7pm than 7pm to 7am. Both fleet and non-fleet light commercial vehicles were much less likely to crash on the weekend than during the week. Table 7.4 shows that fleet light commercial vehicles are more likely to crash during work hours (9am to 4pm weekdays) and less likely to crash during non-work hours than non-fleet light commercial vehicles ($\chi^2(3)=755.7$; $p<0.001$).

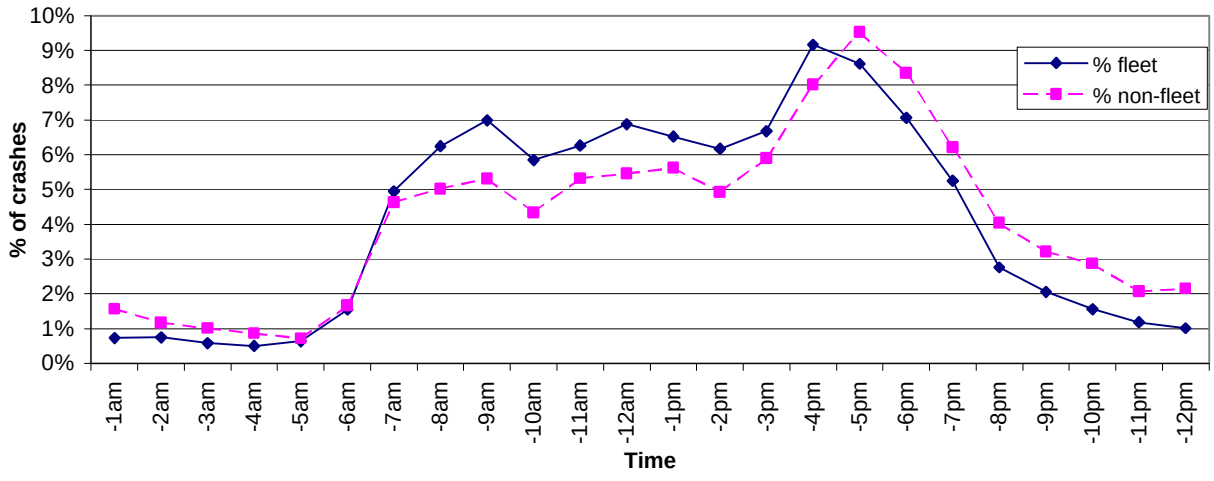

Figure 7.1 Percent of fleet and non-fleet light commercial vehicles in crashes by time of day.

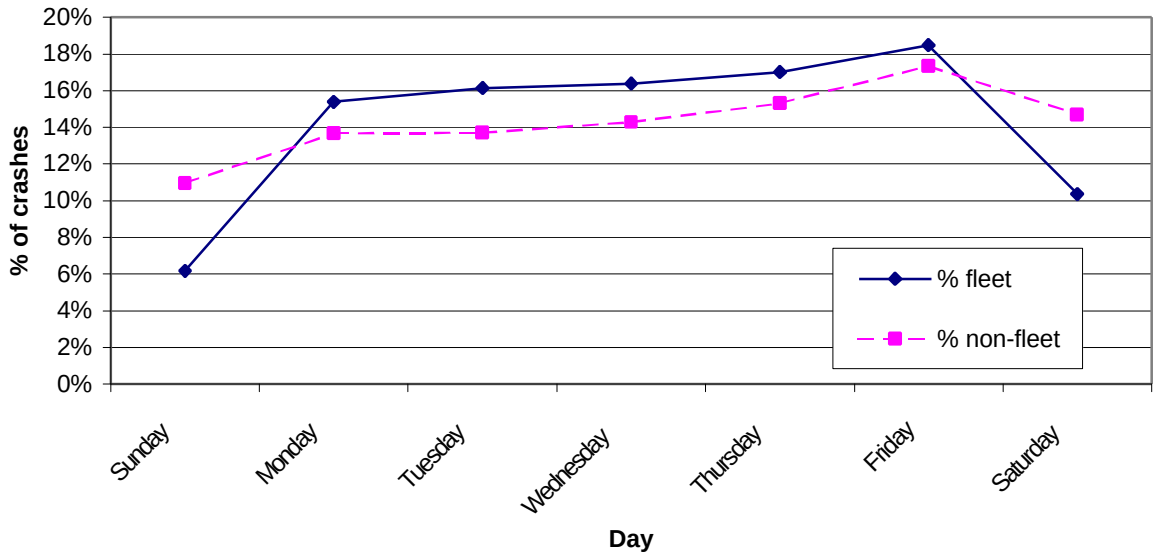

Figure 7.2 Percent of fleet and non-fleet light commercial vehicles in crashes by day of the week.

Table 7.4 Numbers of fleet and non-fleet light commercial vehicles in crashes by time category.

Time category	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
Commuting	5,509	25.7%	3,745	23.4%	9,254	24.7%
Work	8,541	39.8%	4,576	28.6%	13,117	35.0%
Non-work	7,401	34.5%	7,657	47.9%	15,058	40.2%
Unknown	1	0.0%	2	0.0%	3	0.0%
Total	21,452	100.0%	15,980	100.0%	37,432	100.0%

7.2 DRIVER CHARACTERISTICS

Drivers of fleet light commercial vehicles were about two years older, on average, than drivers of non-fleet light commercial vehicles ($t(37{,}430)=10.7$; $p<0.001$) (see Table 7.5). As shown in Table 7.6, the largest age group for both fleet and non-fleet drivers of light commercial vehicles was 30-39 years old, followed by 40-49 for fleet drivers and 21-25 for non-fleet drivers.

Drivers of fleet light commercial vehicles were also more likely to be male than non-fleet drivers (92% compared with 88%).

Table 7.5 Numbers and ages of drivers of fleet and non-fleet light commercial vehicles in crashes.

Vehicle category	No. drivers	Age statistic		
		Mean	Std Dev	Median
Fleet	19,932	36.3	13.1	34
Non-fleet	14,933	34.2	14.5	30
Overall	34,865	35.4	13.8	32

Table 7.6 Age distribution of drivers of fleet and non-fleet light commercial vehicles in crashes.

Age group	Fleet		Non-fleet		Total	
	No	%	No	%	No	%
0-16	41	0%	50	0%	91	0%
17-20	1,946	9%	2,394	15%	4,340	12%
21-25	3,030	14%	2,940	18%	5,970	16%
26-29	2,446	11%	1,908	12%	4,354	12%
30-39	5,024	23%	3,158	20%	8,182	22%
40-49	3,822	18%	2,085	13%	5,907	16%
50-59	2,546	12%	1,330	8%	3,876	10%
60-69	894	4%	675	4%	1,569	4%
70-79	155	1%	321	2%	476	1%
80-89	27	0%	67	0%	94	0%
90+	1	0%	5	0%	6	0%
unknown	1,520	7%	1,047	7%	2,567	7%
Total	21,452	100%	15,980	100%	37,432	100%

7.3 RISKY DRIVING BEHAVIOURS

7.3.1 Speeding

Drivers of fleet light commercial vehicles were less likely to have been speeding at the time of the crash than non-fleet drivers (see Table 7.7). For both fleet and non-fleet light commercial vehicles, excessive speed was most likely to be noted for drivers aged 25 years and under, becoming less likely as driver age increased (see Table 7.8). In terms of absolute numbers, the age group 40-59 years old was the only instance where there were more crashes involving excessive speed for fleet drivers than non-fleet drivers in absolute terms, although the non-fleet driver percentage was higher than that for fleet drivers.

Table 7.7 Numbers of fleet and non-fleet light commercial vehicles in crashes where speeding, fatigue and illegal BAC and non-wearing of seatbelts were involved.

Crash factor	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
Speeding	1,432	6.7%	1,634	10.2%	3,066	8.2%
Fatigue	920	4.3%	1,018	6.4%	1,938	5.2%
Illegal BAC	584	2.7%	950	5.9%	1,534	4.1%
Belt not worn	438	2.0%	187	1.2%	625	1.7%

Table 7.8 Numbers of drivers of fleet and non-fleet light commercial vehicles in crashes where speeding was involved by age group.

Age group	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
25 and under	530	10.6%	733	13.6%	1,263	12.1%
26-39	431	5.8%	480	9.5%	911	7.3%
40-59	322	5.1%	233	6.8%	555	5.7%
60+	48	4.5%	60	5.6%	108	5.0%
unknown	101	6.6%	128	12.2%	229	8.9%
Total	1,432	6.7%	1,634	10.2%	3,066	8.2%

7.3.2 Fatigue

Drivers of fleet light commercial vehicles were less likely to have been fatigued at the time of the crash than non-fleet drivers (see Table 7.9). Fatigue was most prevalent for drivers aged 25 and under for both fleet and non-fleet drivers.

Table 7.9 Numbers of drivers of fleet and non-fleet light commercial vehicles in crashes where fatigue was involved by age group.

Age group	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
25 and under	300	6.0%	426	7.9%	726	7.0%
26-39	294	3.9%	284	5.6%	578	4.6%
40-59	182	2.9%	138	4.0%	320	3.3%
60+	36	3.3%	53	5.0%	89	4.1%
unknown	108	7.1%	117	11.2%	225	8.8%
Total	920	4.3%	1,018	6.4%	1,938	5.2%

7.3.3 Drink driving

Drivers of fleet light commercial vehicles were less likely to have an illegal BAC than drivers of non-fleet light commercial vehicles (2.7% versus 5.9%, see Table 7.10). Table 7.10 shows that, as a percentage of their age groups, drivers aged 25 and under in both fleet and non-fleet groups were most likely to have an illegal BAC, with a decreasing degree of involvement with increasing age.

Table 7.10 Numbers of drivers of fleet and non-fleet light commercial vehicles in crashes with an illegal BAC by age group.

Age group	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
25 and under	177	3.5%	407	7.6%	584	5.6%
26-39	230	3.1%	350	6.9%	580	4.6%
40-59	140	2.2%	134	3.9%	274	2.8%
60+	13	1.2%	26	2.4%	39	1.8%
unknown	24	1.6%	33	3.2%	57	2.2%
Total	584	2.7%	950	5.9%	1,534	4.1%

7.3.4 Non-wearing of seatbelts

Fleet drivers were more likely to have been not wearing a seatbelt at the time of the crash than non-fleet drivers of light commercial vehicles (2.0% versus 1.2%, see Table 7.11). For fleet drivers, the prevalence of not wearing a seatbelt at the time of the crash was similar across age groups, while it decreased somewhat with age for non-fleet drivers.

Table 7.11 Numbers of drivers of fleet and non-fleet light commercial vehicles in crashes who were not wearing seatbelts by age group.

Age group	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
25 and under	111	2.2%	70	1.3%	181	1.7%
26-39	148	2.0%	64	1.3%	212	1.7%
40-59	141	2.2%	35	1.0%	176	1.8%
60+	22	2.0%	10	0.9%	32	1.5%
unknown	16	1.1%	8	0.8%	24	0.9%
Total	438	2.0%	187	1.2%	625	1.7%

7.4 SUMMARY

Fleet light commercial vehicles (light trucks, utilities and panel vans) are likely to be used for courier work, or by trades people or service technicians. Almost 60% of light commercial vehicles in crashes were fleet vehicles and about three-quarters of these were light trucks (somewhat more than in non-fleet light commercial vehicles).

Fleet light commercial vehicles were involved in relatively more crashes within the Sydney area (compared with outside the Sydney area) than non-fleet light commercial vehicles. Fleet light commercial vehicles were more likely to crash between 7am and around 4pm compared with non-fleet light commercial vehicles, and more likely to crash on weekdays than non-fleet light commercial vehicles.

On average, drivers of fleet light commercial vehicles were older than non-fleet drivers (36 and 34 years respectively) and were more likely to be male. Compared to crashes of non-fleet light commercial vehicles, fleet light commercial vehicle crashes were less likely to involve excessive speed, fatigue or an illegal BAC. However, drivers of fleet light commercial vehicles were more likely to not be wearing a seatbelt at the time of the crash. Generally, for both fleet and non-fleet light commercial vehicles, younger drivers (those aged 25 years old and younger) were more likely than older drivers to be involved in crashes where excessive speed, fatigue or an illegal BAC were noted as crash factors.

8. CRASHES INVOLVING TAXIS

Taxis are identifiable as a unique vehicle type in both the registrations database and the crash database. In the June 2000 snapshot of the registration database, 5,783 vehicles were classed as taxis. This number comprised 5,653 fleet taxis (0.7% of all registered fleet vehicles at this time), 14 non-fleet taxis, and 116 fleet stand-by taxis (there were no non-fleet standby taxis). According to the crash database, in the period 1996 to 2000 (inclusive), a total of 7,707 taxis were involved in crashes – 7,549 (98% of all taxis) were coded as fleet vehicles (with 158 non-fleet taxis).

The very small number of non-fleet taxis makes comparisons between these and fleet taxis problematic. Additionally, the concept of a "non-fleet taxi" is questionable. Accordingly, the remaining analyses in this section of the report compare fleet taxis only with both fleet and non-fleet cars.

The severity of crashes involving taxis, fleet cars and non-fleet cars differed significantly ($\chi^2(4)=161.9$; $p<0.001$). Taxis were involved in relatively fewer fatalities, more injury and fewer towaway crashes than fleet and non-fleet cars (see Table 8.1).

Table 8.1 Numbers of taxis, fleet cars and non-fleet cars in crashes by crash severity.

Crash severity	Taxi		Fleet car		Non-fleet car		Total	
	No.	%	No.	%	No.	%	No.	%
Fatal	21	0.3%	268	0.5%	1,793	0.7%	2,082	0.6%
Injury	2,793	37.0%	16,854	31.5%	91,048	33.5%	110,695	33.3%
Towaway	4,735	62.7%	36,354	68.0%	179,030	65.9%	220,119	66.1%
Total	7,549	100%	53,476	100%	271,871	100%	332,896	100%

Table 8.2 contains the crash rates per 10,000 registered vehicles per year for each level of severity for the three vehicle categories. The overall crash rate for taxis is more than ten times that of fleet and non-fleet cars. The rates for injury and towaway crashes are about ten times higher for taxis than fleet and non-fleet cars. However, the lower average severity of taxi crashes means that the fatal crash rate for taxis is only five times that for fleet and non-fleet cars.

Table 8.2 Crash rates per 10,000 registered vehicles per year for taxis and fleet and non-fleet cars by crash severity.

Crash severity	Taxi	Fleet car	Non-fleet car	Total
Fatal	7.50	1.27	1.54	1.51
Injury	996.97	79.61	78.09	80.19
Towaway	1,690.17	171.73	153.54	159.45
Total	2,694.63	252.61	233.17	241.15

8.1 CRASH CHARACTERISTICS

8.1.1 Location of the crash

Most (91%) of the taxi crashes occurred in the Sydney metropolitan area, compared with around three-quarters of fleet car crashes and 69% of non-fleet car crashes (see Table 8.3). Table 8.4 shows the crash severity patterns separately for Sydney and the non-metropolitan area. Taxi crashes are more severe outside Sydney, evidenced by a greater percentage of fatal and injury crashes outside Sydney, with a higher proportion of towaway crashes within Sydney. This pattern is repeated for non-fleet car crashes and all crashes overall, but is less clear for fleet car crashes.

Table 8.3 Numbers of taxis, fleet cars and non-fleet cars in crashes by location.

Area	Taxi		Fleet car		Non-fleet car		Total	
	No.	%	No.	%	No.	%	No.	%
Sydney	6,872	91%	40,393	76%	188191	69%	235,456	71%
Outside Sydney	677	9%	13,083	24%	83680	31%	97,440	29%
Total	7,549	100%	53,476	100%	271871	100%	332,896	100%

Table 8.4 Numbers of taxis, fleet cars and non-fleet cars in crashes by crash severity and location.

Crash severity	Taxi		Fleet car		Non-fleet car		Total	
	No.	%	No.	%	No.	%	No.	%
Sydney								
Fatal	16	0.2%	132	0.3%	829	0.4%	977	0.4%
Injury	2,463	35.8%	12,150	30.1%	59,254	31.5%	73,867	31.4%
Towaway	4,393	63.9%	28,111	69.6%	128,108	68.1%	160,612	68.2%
Total	6,872	100.0%	40,393	100.0%	188,191	100.0%	235,456	100.0%
Outside Sydney								
Fatal	5	0.7%	136	1.0%	964	1.2%	1,105	1.1%
Injury	330	48.7%	4,704	36.0%	31,794	38.0%	36,828	37.8%
Towaway	342	50.5%	8,243	63.0%	50,922	60.9%	59,507	61.1%
Total	677	100.0%	13,083	100.0%	83,680	100.0%	97,440	100.0%

8.1.2 Time of the crash

Taxi crashes were more evenly spread across the day with relatively more crashes at night and fewer during the day than fleet or non-fleet car crashes (see Figure 8.1). Taxis were also more likely to crash on weekends than either fleet or non-fleet cars (see Figure 8.2). Consequently, taxis were involved in relatively fewer crashes during commuting and work hours and relatively more crashes during non-work hours than fleet and non-fleet cars (Table 8.5).

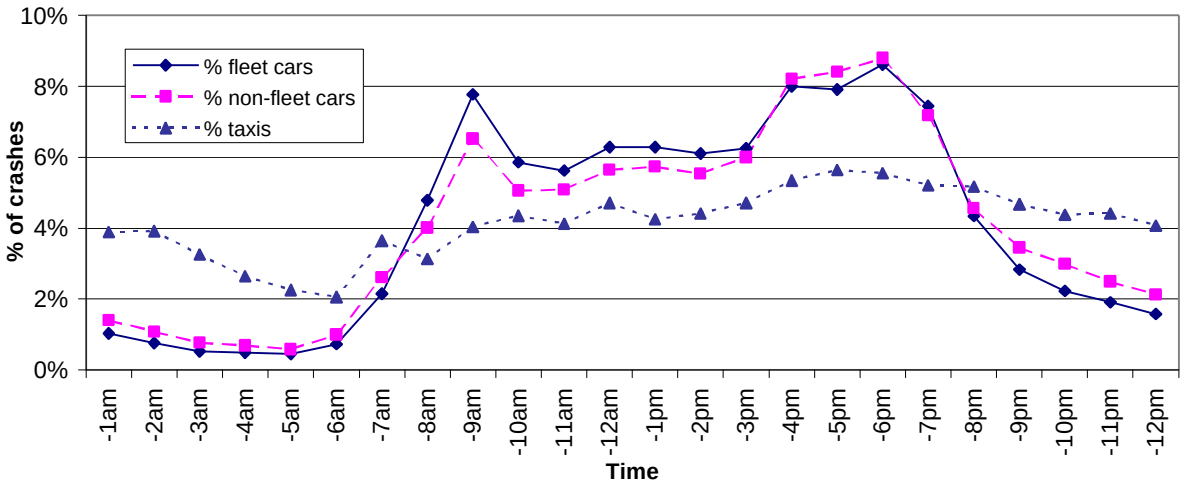

Figure 8.1 Percent of taxis, fleet cars and non-fleet cars in crashes by time of day.

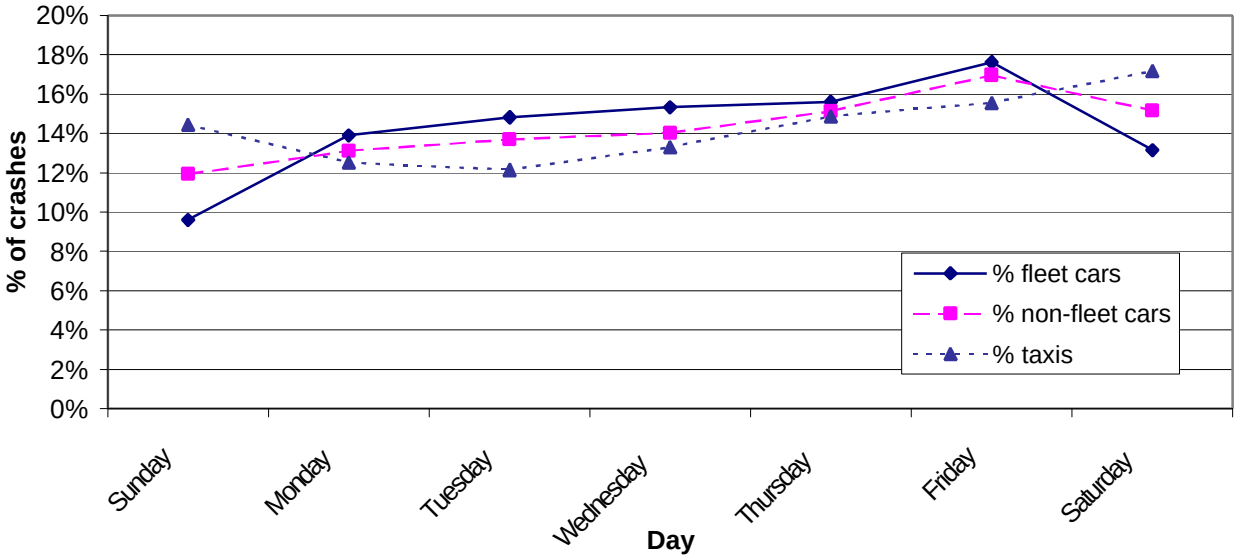

Figure 8.2 Percent of taxis, fleet cars and non-fleet cars in crashes by day of the week.

Table 8.5 Numbers of taxis, fleet cars and non-fleet cars in crashes by time category.

Time category	Taxi		Fleet car		Non-fleet car		Total	
	No.	%	No.	%	No.	%	No.	%
Commuting	1,102	14.6%	13,279	24.8%	62,228	22.9%	76,609	23.0%
Work	1,833	24.3%	17,709	33.1%	78,058	28.7%	97,600	29.3%
Non-work	4,614	61.1%	22,484	42.0%	131,573	48.4%	158,671	47.7%
Unknown	-	0.0%	4	0.0%	12	0.0%	16	0.0%
Total	7,549	100%	53,476	100%	271,871	100%	332,896	100%

8.2 DRIVER CHARACTERISTICS

Table 8.6 shows that taxi drivers in crashes were older than fleet or non-fleet car drivers. About 57% of taxi drivers were aged between 30 and 49, compared with only 45% of fleet car drivers and 32% of non-fleet car drivers (see Table 8.7). Only about 6% of crashed taxi drivers were aged 25 years or less, compared with 21% of fleet car drivers and 33% of non-fleet drivers.

Almost all drivers of taxis were male (96%), while two-thirds of fleet car drivers and just under 60% of non-fleet car drivers were male (see Table 8.8).

Table 8.6 Numbers and ages of drivers of taxis, fleet cars and non-fleet cars in crashes.

Vehicle category	No. drivers	Age statistic		
		Mean	Std Dev	Median
Taxi	6,851	41.4	11.1	40
Fleet car	49,752	37.7	13.5	37
Non-fleet car	253,929	36.0	16.5	32
Overall	310,532	36.4	16.0	33

Table 8.7 Numbers of taxis, fleet cars and non-fleet cars in crashes by driver age group.

Age group	Taxi		Fleet car		Non-fleet car		Total	
	No.	%	No.	%	No.	%	No.	%
0-16	2	0.0%	171	0.3%	1,245	0.5%	1,418	0.4%
17-20	48	0.6%	5,629	10.5%	45,647	16.8%	51,324	15.4%
21-25	375	5.0%	5,235	9.8%	42,959	15.8%	48,569	14.6%
26-29	513	6.8%	4,734	8.9%	25,650	9.4%	30,897	9.3%
30-39	2,292	30.4%	12,405	23.2%	49,955	18.4%	64,652	19.4%
40-49	2,019	26.7%	11,433	21.4%	37,118	13.7%	50,570	15.2%
50-59	1,156	15.3%	7,120	13.3%	22,880	8.4%	31,156	9.4%
60-69	388	5.1%	2,250	4.2%	14,423	5.3%	17,061	5.1%
70-79	58	0.8%	638	1.2%	10,851	4.0%	11,547	3.5%
80-89	-	0.0%	129	0.2%	3,094	1.1%	3,223	1.0%
90+	-	0.0%	8	0.0%	107	0.0%	115	0.0%
unknown	698	9.2%	3,724	7.0%	17,942	6.6%	22,364	6.7%
Total	7,549	100.0%	53,476	100.0%	271,871	100.0%	332,896	100.0%

Table 8.8 Numbers of taxis, fleet cars and non-fleet cars in crashes by gender.

Gender	Taxi		Fleet car		Non-fleet car		Total	
	No.	%	No.	%	No.	%	No.	%
Male	7,254	96.1%	35,523	66.4%	159,656	58.7%	202,433	60.8%
Female	112	1.5%	17,060	31.9%	106,893	39.3%	124,065	37.3%
Unknown	183	2.4%	893	1.7%	5,322	2.0%	6,398	1.9%
Total	7,549	100.0%	53,476	100.0%	271,871	100.0%	332,896	100.0%

8.3 RISKY DRIVING BEHAVIOURS

8.3.1 Speeding

Crashed fleet taxi drivers were substantially less likely to be speeding than either fleet or non-fleet car drivers (see Table 8.9). For each vehicle type, excessive speed was most likely to be noted for drivers aged 25 years and under (see Table 8.10).

Table 8.9 Numbers of taxis, fleet cars and non-fleet cars in crashes where speeding, fatigue, illegal BAC and non-wearing of seatbelts was involved.

Crash factor	Taxi		Fleet car		Non-fleet car		Total	
	No.	%	No.	%	No.	%	No.	%
Speeding	134	1.8%	3,551	6.6%	21,982	8.1%	25,667	7.7%
Fatigue	96	1.3%	1,569	2.9%	11,441	4.2%	13,106	3.9%
Illegal BAC	8	0.1%	824	1.5%	7,314	2.7%	8,146	2.4%
Belt not worn	2,242	29.7%	311	0.6%	1,531	0.6%	4,084	1.2%

Table 8.10 Numbers of taxis, fleet cars and non-fleet cars in crashes where speeding was involved by driver age group.

Age group	Taxi		Fleet car		Non-fleet car		Total	
	No.	%	No.	%	No.	%	No.	%
25 and under	21	4.9%	1,371	12.4%	11,004	12.2%	12,396	12.2%
26-39	51	1.8%	925	5.4%	5,058	6.7%	6,034	6.3%
40-59	44	1.4%	788	4.2%	2,877	4.8%	3,709	4.5%
60+	8	1.8%	148	4.9%	1,225	4.3%	1,381	4.3%
unknown	10	1.4%	319	8.6%	1,818	10.1%	2,147	9.6%
Total	134	1.8%	3,551	6.6%	21,982	8.1%	25,667	7.7%

Given that taxi crashes were much more likely to occur in the Sydney metropolitan area than Outside Sydney, compared with fleet and non-fleet car crashes, the involvement of the risky driving behaviours was analysed by location.

Table 8.11 shows that the lower involvement of speeding in taxi crashes was not a consequence merely of the location of taxi crashes. Whether the crashes occurred in Sydney or Outside Sydney, the involvement of speeding in taxi crashes was lower than for crashes of fleet or non-fleet cars.

Table 8.11 Numbers of taxis, fleet cars and non-fleet cars in crashes where speeding was involved by location.

Location	Taxi		Fleet car		Non-fleet car		Total	
	No.	%	No.	%	No.	%	No.	%
Sydney	115	1.7%	1,694	4.2%	10,246	5.4%	12,055	5.1%
Outside Sydney	19	2.8%	1,857	14.2%	11,736	14.0%	13,612	14.0%
Total	134	1.8%	3,551	6.6%	21,982	8.1%	25,667	7.7%

8.3.2 Fatigue

Crashed fleet taxi drivers were substantially less likely to be fatigued than either fleet or non-fleet car drivers (see Table 8.9). Fatigue was most common in drivers aged 25 and under (see Table 8.12). Table 8.13 shows that whether the crashes occurred in Sydney or Outside Sydney, the involvement of fatigue in taxi crashes was lower than for crashes of fleet or non-fleet cars.

Table 8.12 Numbers of taxis, fleet cars and non-fleet cars in crashes where fatigue was involved by driver age group.

Age group	Taxi		Fleet car		Non-fleet car		Total	
	No.	%	No.	%	No.	%	No.	%
25 and under	11	2.6%	482	4.4%	4,239	4.7%	4,732	4.7%
26-39	27	1.0%	394	2.3%	2,658	3.5%	3,079	3.2%
40-59	37	1.2%	352	1.9%	1,683	2.8%	2,072	2.5%
60+	6	1.3%	108	3.6%	984	3.5%	1,098	3.4%
unknown	15	2.1%	233	6.3%	1,877	10.5%	2,125	9.5%
Total	96	1.3%	1,569	2.9%	11,441	4.2%	13,106	3.9%

Table 8.13 Numbers of taxis, fleet cars and non-fleet cars in crashes where fatigue was involved by location.

Location	Taxi		Fleet car		Non-fleet car		Total	
	No.	%	No.	%	No.	%	No.	%
Sydney	86	1.3%	891	2.2%	6,408	3.4%	7,385	3.1%
Outside Sydney	10	1.5%	678	5.2%	5,033	6.0%	5,721	5.9%
Total	96	1.3%	1,569	2.9%	11,441	4.2%	13,106	3.9%

8.3.3 Drink driving

Crashed fleet taxi drivers were substantially less likely to have an illegal BAC than either fleet or non-fleet car drivers (see Table 8.9). The number of taxi drivers with illegal BAC was too small to analyse as a function of age group of the driver or location of the crash.

8.3.4 Non-wearing of seatbelts

Table 8.9 shows that taxi drivers were significantly more likely to be **not wearing** a seatbelt at the time of the crash than fleet or non-fleet car drivers. (Taxi drivers are not required to wear a seatbelt in NSW.) The data suggest that both younger taxi drivers (Table 8.14) and taxi drivers Outside Sydney (Table 8.15) were more likely to have been wearing seatbelts at the time of the crash than other taxi drivers.

Table 8.14 Numbers of drivers of taxis, fleet cars and non-fleet cars in crashes who who were not wearing seatbelts by age group.

Age group	Taxi		Fleet car		Non-fleet car		Total	
	No.	%	No.	%	No.	%	No.	%
25 and under	111	26.1%	51	0.5%	523	0.6%	685	0.7%
26-39	869	31.0%	119	0.7%	491	0.6%	1,479	1.5%
40-59	956	30.1%	108	0.6%	297	0.5%	1,361	1.7%
60+	146	32.7%	21	0.7%	161	0.6%	328	1.0%
unknown	160	22.9%	12	0.3%	59	0.3%	231	1.0%
Total	2,242	29.7%	311	0.6%	1,531	0.6%	4,084	1.2%

Table 8.15 Numbers of drivers of taxis, fleet cars and non-fleet cars in crashes who were not wearing seatbelts by location.

Location	Taxi		Fleet car		Non-fleet car		Total	
	No.	%	No.	%	No.	%	No.	%
Sydney	2,082	30.3%	237	0.6%	905	0.5%	3,224	1.4%
Outside Sydney	160	23.6%	74	0.6%	626	0.7%	860	0.9%
Total	2,242	29.7%	311	0.6%	1,531	0.6%	4,084	1.2%

8.4 SUMMARY

Fleet taxi crashes were compared to those involving fleet cars and non-fleet cars.

Taxis were involved in relatively fewer fatalities, more injury and fewer towaway crashes than fleet and non-fleet cars. The overall crash rate for taxis is more than ten times that of fleet and non-fleet cars. The rates for injury and towaway crashes are about ten times higher for taxis than fleet and non-fleet cars. However, the lower average severity of taxi crashes means that the fatal crash rate for taxis is only five times that for fleet and non-fleet cars.

A larger proportion of taxi crashes occurred within the Sydney area compared with fleet and non-fleet car crashes (91%, 76% and 69%, respectively).

Taxi crashes were more evenly spread across the day and across the days of the week than fleet or non-fleet car crashes. Consequently, taxis were involved in relatively fewer crashes during commuting and work hours and relatively more crashes during non-work hours than fleet and non-fleet cars.

Taxi drivers in crashes were older than fleet or non-fleet car drivers, with relatively fewer young drivers (aged 25 years or less). Almost all drivers of taxis were male, with a larger percentage than for fleet and non-fleet car drivers (96%, 66% and 59%, respectively).

Taxi drivers were less likely to have been speeding, fatigued or drink driving than fleet or non-fleet car drivers in crashes. For taxi drivers as well as fleet and non-fleet car drivers, speeding and fatigue were most common among young drivers (aged 25 and under). Whether the crashes occurred in Sydney or Outside Sydney, the involvement of speeding and fatigue in taxi crashes was lower than for crashes of fleet or non-fleet cars.

However, almost 30% of taxi drivers were **not wearing** a seatbelt at the time of the crash, compared with less than 1% for fleet and non-fleet car drivers. Younger taxi drivers and taxi drivers Outside Sydney were more likely to have been **wearing** seatbelts at the time of the crash than other taxi drivers.

9. DISCUSSION AND CONCLUSIONS

The overall aim of this project was to examine safety-related attitudes and behaviours in work-related driving to assess their contribution to crashes and to identify potential approaches to improving the safety of work-related driving. This Stage 1 report presents the results of analyses of crash and registration data supplied by the RTA, while it is proposed that Stage 2 of the project would use survey methods to collect data on attitudes and behaviours of fleet drivers.

The report seeks to answer a number of questions:

- How do fleet and non-fleet vehicles compare in terms of crash involvement?
- What roles do risky driving behaviours play in crashes of fleet vehicles?
- What are the specific characteristics of crashes of emergency vehicles and what role do speeding, fatigue and other risky driving behaviours play?
- Do crash patterns vary as a function of fleet size?
- What effects do differing vehicle characteristics have on the crash patterns of fleet and non-fleet vehicles?
- Are comparisons of the crash involvement of fleet and non-fleet vehicles affected by fleets being more likely to report non-casualty crashes?

9.1 CRASH INVOLVEMENT OF FLEET AND NON-FLEET VEHICLES

Overall comparisons of the crash involvement of fleet and non-fleet vehicles are complicated by the greater representation of light and heavy trucks among fleet vehicles. For this reason, comparisons of fleet and non-fleet cars can reach different conclusions than comparisons of all fleet and non-fleet vehicles.

Fleet vehicles comprised about a quarter of the vehicles involved in crashes at each level of severity but only 16% of cars in crashes. All fleet vehicles and fleet cars both had higher overall crash rates (crashed vehicles per 10,000 registered vehicles per year) than their non-fleet equivalents.

In the current study, crashes of fleet vehicles were slightly more likely to result in a fatality than crashes of non-fleet vehicles (particularly for crashes occurring outside the Sydney metropolitan area). However, the pattern differed when the analysis was restricted to cars. Fleet cars were less likely to be involved in fatal or injury crashes, but more likely to be involved in towaway crashes.

The analyses reported here found that the rate of involvement (per 10,000 registered vehicles per year) of fleet cars in fatal and injury crashes was similar to that of non-fleet cars. This appears to conflict with earlier studies that have demonstrated an increased risk for fleet drivers (e.g. Broughton et al., 2003). Broughton et al considered only injury crashes where the car was a maximum of three years old (for each of their three groups). Reanalysing the RTA crash data with these characteristics did not alter the findings. There was also little difference in the mean ages of the samples between Broughton et al's study and the current analysis – in both cases each group's mean age was in the group 40-50 years old. The reasons for this discrepancy are unclear.

Relatively more fleet vehicles than non-fleet vehicles were involved in crashes in the Sydney metropolitan area. This was also true for cars.

Almost three-quarters of both fleet and non-fleet crashes (all vehicles or cars only) occurred in speed zones of 60km/h or less. Fleet cars were slightly more likely to be involved in crashes in speed zones of greater than 60km/h than non-fleet cars.

The time of occurrence of the crash was examined in order to draw inferences about the purpose of the trip (which was not recorded). Time of day and day of week were combined to form a new variable – "time category". This variable was classified into commuting hours (7-9am and 4-6pm Monday to Friday), work hours (9am-4pm Monday to Friday) and non-work hours (all other hours – including weekends). Non-work hours encompasses more hours of the week, so it is not surprising that most fleet and non-fleet car crashes occurred during this time category. Relatively more fleet than non-fleet car crashes occurred during work hours (33% versus 29%) with the opposite pattern for non-work hours (42% versus 48%). Thus, while fleet car crashes are more likely to occur during work hours than non-fleet car crashes, the majority of fleet car crashes still occur outside of what are traditionally considered to be work hours.

Crashes between two vehicles travelling in the same direction were the most common type of crash, accounting for more than a third of all fleet and non-fleet crashes. There were relatively more "same direction" crashes involving fleet cars than non-fleet cars, but fewer off path crashes. The most common type of crash for both fleet and non-fleet vehicles was a rear-end collision (a type of same direction crash), and this crash type was relatively more common for fleet car crashes. Other than head-on and pedestrian near-side crash types, all other crash types were relatively less common for fleet car crashes than non-fleet car crashes, particularly right through crashes.

Drivers of fleet vehicles were more likely to be male than non-fleet drivers. Most drivers were male, ranging from 59% for non-fleet cars up to 96% for taxis and 97% for tow trucks. The gender imbalance is likely to primarily reflect the gender imbalance within each of the driving groups. The only category where the gender ratio of the number of actual drivers (rather than crashed drivers) may approach parity is non-fleet cars.

Crashed fleet drivers tended to be older than crashed non-fleet drivers. There were relatively few young drivers (aged 25 and under) and older drivers (aged 60 and over) among fleet drivers.

These results are consistent with those of Pratt (2003), who found that a majority of fatal work-related highway crashes occurred within urban areas, that the greatest number of work-related fatality crashes occurred between the hours of 7am and 4pm, and that 35-44 was the most highly represented age group.

9.2 RISKY DRIVING BEHAVIOURS

The crash data file identified four risky driving behaviours: driving at an excessive speed for the conditions (though not necessarily exceeding the prevailing speed limit), driving while fatigued, driving with an illegal blood alcohol concentration (BAC), and not wearing a seatbelt while driving.

Drivers of fleet vehicles (overall and for each vehicle type) were less likely to be travelling at excessive speed, driving while fatigued, or driving with an illegal BAC than drivers of

non-fleet vehicles (see Table 9.1). Not surprisingly, the vehicles most likely to be travelling at excessive speed at the time of the crash were emergency vehicles. The crash data did not indicate whether the emergency vehicle was travelling to or from an emergency. Non-fleet light commercial vehicle drivers were the next most likely category to be travelling at excessive speed. Non-fleet light commercial vehicle drivers were also the category most likely to have fatigue noted as a crash factor and most likely to be driving with an illegal BAC.

These results are consistent with those of Newnam et al. (2003) who found that drivers were more likely to exceed the speed limit in their personal vehicle than in a work vehicle.

Fleet drivers were less likely to wear seatbelts, but this is likely to be principally driven by the lack of a requirement in NSW for taxi drivers to wear a seatbelt and the higher proportion of larger vehicles, such as trucks (where seatbelt wearing compliance is known to be low), in the fleet categories. This proposition is supported by the identical seatbelt wearing rates of fleet and non-fleet car drivers.

Table 9.1 Percentages of fleet and non-fleet vehicles in crashes where speeding, fatigue, illegal BAC and non-wearing of seatbelts were involved.

Vehicle type	% Speeding	% Fatigue	% Illegal BAC*	% Belt not worn
All vehicles	8.0	4.1	3.7	2.4
All fleet	6.4	3.2	2.1	6.4
All non-fleet	8.5	4.3	4.3	1.1
All cars	7.9	4.0	2.5	0.6
Fleet cars	6.6	2.9	1.5	0.6
Non-fleet cars	8.1	4.2	2.7	0.6
All fleet emergency vehs	12.8	2.4	0.1	4.7
Police	16.3	2.5	0.0	1.7
Ambulance	21.2	1.3	0.0	0.6
Fire brigade	5.7	1.4	0.0	14.3
Tow truck	3.8	2.8	0.3	10.7
All light commercial vehicle	8.2	5.2	4.1	1.7
Fleet light commercial vehicle	6.7	4.3	2.7	2.0
Non-fleet light commercial vehicle	10.2	6.4	5.9	1.2
Taxi	1.8	1.3	0.1	29.7

* casualty crashes only

Alternatively, it may be useful to examine the contribution of fleet vehicles to the problems of speeding, fatigue, drink driving and non-wearing of seatbelts. While about 25% of vehicles in crashes were fleet vehicles, Table 9.2 shows that fleet vehicles contributed about 20% of speeding and fatigued controllers, about 15% of drink driving and 73% of drivers not wearing seatbelts. Fleet cars represented between 10 and 17% of cars in crashes involving these risky driving behaviours. A large proportion of light commercial vehicles in crashes were fleet vehicles and thus, the representation of fleet vehicles among risky driving behaviours is consequently higher.

Table 9.2 Percentages of vehicles in crashes where speeding, fatigue, illegal BAC and non-wearing of seatbelts were involved that were fleet vehicles.

Vehicle type	% Speeding	% Fatigue	% Illegal BAC	% Belt not worn
All vehicles	19.9	19.8	14.9	73.2
Cars	13.3	12.1	10.1	16.9
Light commercial vehicles	46.7	47.5	38.1	70.1

A number of factors likely to decrease the prevalence of alcohol in fleet crashes were identified. For each vehicle type, crashed fleet drivers were older, on average, than crashed non-fleet drivers. Overall, only 18% of fleet drivers in crashes were aged 25 and under, compared with 33% of non-fleet drivers in crashes. Published RTA data show that male drivers aged under 40, and particularly those aged 25 and under, are strongly involved in drink driving crashes (RTA, 2000).

Fewer fleet crashes occurred at night and on weekends, when alcohol-related crashes traditionally cluster. Only 42% of fleet car crashes occurred in "non-work periods" (outside 7am-6pm Monday-Friday), compared to 48% of non-fleet car crashes. Taxis were the only exception to this general finding: 61% of taxi crashes occurred in "non-work periods".

Overall, relatively fewer fleet crashes than non-fleet crashes occurred outside the capital city. Crashes outside the capital city, particularly those in rural areas, are associated with a higher involvement of alcohol (RTA, 2000). For crashes of light commercial vehicles, where alcohol was most prevalent, relatively more fleet and non-fleet crashes occurred outside the capital city (33% and 48%) than for fleet and non-fleet cars (25% and 31%).

The increased prevalence of alcohol in crashes of light commercial vehicles may reflect the demographic characteristics of drivers of such vehicles. A number of studies have demonstrated a relationship between socioeconomic variables and the propensity to drink and drive. Baum (1999) found higher rates of drink driving offences in postcode areas characterised by low socioeconomic status, low residential stability, low utilisation or access to public transport, and disadvantage associated with being unemployed. Interestingly, Harrison (1998) identified two groups of occupations that accounted for 58% of male drink drivers. The first occupational category included carpenters, electricians, chefs, mechanics, gardeners and labourers and accounted for 42% of male drink drivers. This category may contain many drivers of light commercial vehicles. A second category included occupations such as business manager, company director, public servant and sales representative and accounted for 16% of male drink drivers. This category potentially contains many of the drivers of fleet cars.

Currently the .02% special BAC limit applies to commercial vehicles only when their gross vehicle mass exceeds 13.9 tonnes. The findings presented here suggest that there may be a case for extending this restriction to include all light trucks to address the relatively high involvement of alcohol in drivers of light commercial vehicles.

A number of factors may potentially underlie the low prevalence of alcohol in taxi crashes. More than 90% of taxi crashes occurred in the capital city, so the contribution of rural drink driving was lower to this category of crashes than to others. It may reflect the success of the .02% limit that applies to taxi drivers and other drivers of public vehicles. It

may even be an indication that taxi drivers refrain from drinking because alcohol would make it harder to remain awake during long shifts.

9.3 CRASHES OF EMERGENCY VEHICLES

The crash data allowed emergency vehicles (ambulances, fire brigade vehicles, and police vehicles) to be identified. Analyses of the data were undertaken to examine the patterns of crashes of these types of vehicles, and to compare the extent of involvement of speeding, fatigue, alcohol and other factors in these crashes.

Emergency vehicles comprised a diverse range of vehicles from police motorcycles to tow trucks and fire engines. Among the crashed emergency vehicles, more than half were police vehicles and more than a quarter were tow trucks. While a small number of emergency vehicles were coded as non-fleet, the analyses only considered fleet emergency vehicles.

The crash rate for emergency vehicles was almost double that for other fleet and non-fleet vehicles and more than three times that for fleet and non-fleet cars. Crashes involving emergency vehicles were somewhat more likely to be fatal (1.1% versus 0.9%) and more likely to result in injury (47% versus 34%) than the average for all fleet vehicles. Police motorcycle crashes were the most severe, and crashes where the emergency vehicle was likely to be a car or a van (e.g. police or ambulance) were more severe than those crashes where the vehicle was more likely to be a truck (e.g. tow trucks or fire brigade vehicles). Fleet emergency vehicles that were cars had a relatively higher proportion of fatal and injury crashes than other fleet cars and than other non-fleet cars.

Most emergency vehicle crashes occurred within the Sydney metropolitan area, ranging from 65% of ambulance crashes to 81% of police motorcycle crashes.

Overall, half of the emergency vehicle crashes occurred during non-work times, 17% occurred during commuting times and 32% occurred during work times. Compared to other types of emergency vehicles, police vehicles were somewhat more likely to be involved in crashes in non-work times and tow trucks were somewhat less likely to be involved in crashes in non-work times.

Police vehicle drivers were younger on average and fire brigade vehicle drivers older on average than other drivers of emergency vehicles. The percentage of drivers aged 25 and under was highest for police and tow trucks.

Few crashed emergency vehicle drivers were female (9%), with relatively more female drivers of ambulances (18%) and police vehicles (12%).

Speeding was involved in 13% of fleet emergency vehicle crashes, double that found for fleet vehicle crashes as a whole and was most common for ambulances (21%) and police vehicles (16%). The lower involvement of speeding in crashes of fire brigade vehicles may have reflected the larger size of these vehicles. Almost a quarter of the police vehicles in crashes with drivers aged 25 and under were speeding.

Fatigue and drink driving were less common in emergency vehicle crashes, than for all fleet vehicles. Only one driver had an illegal BAC (a tow truck driver). Non-wearing of seatbelts was most common for drivers of fire brigade and tow truck vehicles where the

vehicle is likely to be larger than a car. Emergency vehicle drivers aged 26-39 years were least likely to be wearing a seatbelt at the time of the crash.

9.4 THE EFFECTS OF VEHICLE CHARACTERISTICS ON THE CRASH PATTERNS OF FLEET AND NON-FLEET VEHICLES

While the focus of this research is on safety related attitudes and behaviours and their effects on the crash involvement of fleet vehicles, the comparisons of crash outcomes for fleet and non-fleet vehicles may be influenced by the different types of makes and models that comprise fleet and non-fleet vehicles. Earlier research suggests that crash severity is likely to be greater for older and smaller vehicles, because of their generally lower levels of crashworthiness (Newstead, Cameron, Watson and Delaney, 2003). Since fleet vehicles are often thought to be newer and larger than non-fleet vehicles, these vehicle characteristics may be contributing to better crash outcomes for fleet vehicles.

The crash data confirm that fleet vehicles were newer (mean age=6 years) than non-fleet vehicles (mean age=10 years), with vehicles in fatal crashes being older than those in injury and towaway crashes. The registration data provided did not allow a comparison of the age distributions of the fleet and non-fleet vehicles registered in NSW.

Relatively more fleet than non-fleet cars were large cars, commercials and 4WDs.

In an attempt to control for vehicle differences, the crashes of a group of relatively new, common cars were compared. Among the Holden Commodore variants (Executive, Acclaim, Berlina and Calais) and the Ford Falcon variants (Falcon, Futura, Fairmont), 70% of crashed cars aged two years old and less were fleet cars. Among these cars, fleet vehicle crashes were somewhat less likely to result in fatality or injury then non-fleet crashes. This finding is consistent with at least part of the difference in outcomes being related to driver behaviour factors.

However, possible higher levels of reporting of towaway crashes for fleet (compared to non-fleet) vehicles (discussed in Section 9.6) may also be at least partly responsible for the finding. Compared with non-fleet cars in this group, fleet cars were relatively more likely to be involved in same-direction crashes and less likely to be involved in run-off road crashes.

9.5 CRASH PATTERNS AS A FUNCTION OF FLEET SIZE

The analyses examined whether the crash patterns of large fleets and small fleets differ. This will help to establish whether different messages and approaches need to be developed for small fleets – traditionally a difficult segment to target with safety measures.

The findings contrasted with the traditional view of fleets being composed of large numbers of vehicles that are mostly less than two years old.

The registration data showed that the most common fleet size was one, and that more than half of all fleet vehicles belonged to a fleet of one or two vehicles. More than three-quarters of all fleet vehicles belonged to fleets with seven or fewer vehicles.

Smaller fleets had older vehicles. The vehicles belonging to fleets of one vehicle had a mean age of almost 10 years, while the vehicles belonging to the fleets with more than 1,000 vehicles had a mean age of just over 3 years.

Yet crash involvement was not clearly related to fleet size. Fleets of one and 100+ vehicles had the highest crash rates, while fleets of 3 and 51-100 vehicles had the lowest crash rates.

The analyses of the effects of fleet size were constrained by the way in which fleet size was measured. The fleet size represented all of the vehicles owned by the registered operator, rather than being specific to the type of vehicle. Thus, it was not possible to analyse the effects of fleet size for particular types of vehicles.

9.6 POTENTIAL REPORTING BIAS – ARE FLEETS REPORTING MORE TOWAWAY CRASHES?

The analyses sought to address another potential confounding factor in fleet crash data, the expected tendency of fleets to be more likely to report non-casualty crashes because of insurance claims for vehicle repair (that private motorists might not get repaired). This would have the effect of reducing the average severity of fleet crashes. This issue is difficult to resolve because there is no independent evidence regarding reporting rates for non-casualty crashes of fleet and non-fleet vehicles.

The percentages of crashes that were towaway crashes were greater for fleet cars than non-fleet cars (also true for cars only). However, it is difficult to assess whether increased reporting of towaway crashes for fleet vehicles contributed to this finding or whether it is a true reflection of a difference in severity between the crashes.

Yet there are a number of points that suggest that any potential higher level of reporting of non-casualty crashes by fleets did not markedly affect the data. First, any differential reporting probably would have a larger effect on non-casualty crashes where the vehicle damage was sufficiently minor not to require towing (which are not included in the data) than towaway crashes. Second, the patterns and rates of fatality and injury crashes for fleet vehicles should be unaffected by any potential differential reporting. These data show higher crash rates for fleet vehicles.

9.7 LIMITATIONS OF THE ANALYSES

The data analysed here has a number of limitations that should be considered in conjunction with any conclusions.

The data relate to crashes involving fleet vehicles, rather than crashes involving work-related travel per se. While the finding that fleet crashes are more likely to occur during work hours provides some confidence for using vehicles as a proxy for work travel, the fact that there is still a reasonable level of fleet-involved crashes after hours suggests that these vehicles are being driven for commuting and leisure purposes. Alternatively, the definition of a fleet vehicle can be altered to more reflect likely work use.

There are no details regarding the crashed driver's exposure, in terms of either the amount of time spent driving for work purposes or the distance travelled for work. The data also

does not specify if the driver has any financial stake in the vehicle, such as through a novated lease.

The BAC can be objectively assessed at the accident scene or at the hospital, and the police officer attending the crash should be able to readily determine whether the driver was wearing a seatbelt. However, the crash factors excessive speed and fatigue require a more subjective judgement from the attending officer.

Given the exemption from wearing seatbelts for taxi drivers in NSW, analyses of the non-wearing of seatbelts that include this group should not be generalised beyond NSW.

9.8 CONCLUSIONS

The research found that fleet vehicles have a higher rate of involvement in crashes per 10,000 registered vehicles per year than non-fleet vehicles. The extent to which this finding translates to greater risk of crash involvement per kilometre driven will be assessed in Stage 2 of the project as part of the proposed survey of drivers who drive for work.

Drivers of fleet vehicles (overall and for each vehicle type) were less likely to be travelling at excessive speed, driving while fatigued, or driving with an illegal BAC than drivers of non-fleet vehicles. Fleet drivers were less likely to wear seatbelts, but this is likely to be principally driven by the lack of a requirement in NSW for taxi drivers to wear a seatbelt and the higher proportion of larger vehicles, such as trucks (where seatbelt wearing compliance is known to be low), in the fleet categories. This proposition is supported by the identical seatbelt wearing rates of fleet and non-fleet car drivers.

The crash rate for emergency vehicles was almost double that for other fleet and non-fleet vehicles and more than three times that for fleet and non-fleet cars. Crashes involving emergency vehicles (particularly police and ambulance vehicles) were more severe than the average for all fleet vehicles. Speeding was twice as common in emergency vehicle crashes than in other fleet vehicle crashes and was most common for ambulances and police vehicles (particularly with young drivers). Fatigue and drink driving were less common in emergency vehicle crashes, than for all fleet vehicles. Non-wearing of seatbelts was most common for drivers of fire brigade and tow truck vehicles where the vehicle is likely to be larger than a car.

For each type of vehicle, illegal blood alcohol levels were less common among drivers of fleet vehicles than among drivers of non-fleet vehicles in crashes. However, the prevalence varied as a function of type of vehicle, with the highest prevalence among drivers of (fleet and non-fleet) light commercial vehicles and the lowest among drivers of taxis and emergency vehicles. Currently the .02% special BAC limit applies to commercial vehicles only when their gross vehicle mass exceeds 13.9 tonnes. The findings presented here suggest that there may be a case for extending this restriction to include all light trucks to address the relatively high involvement of alcohol in drivers of light commercial vehicles.

More than half of all fleet vehicles belonged to a fleet of one or two vehicles and smaller fleets had older vehicles. There was no clear relationship between crash involvement and fleet size.

Fleet vehicles were newer than non-fleet vehicles and relatively more fleet than non-fleet cars were large cars, commercials and 4WDs. Differences in crash severity remained

when the crashes of a group of relatively new, common cars were compared, suggesting that differences in vehicle characteristics are insufficient to explain the differences in crash severity.

There are a number of points that suggest that any increased reporting of towaway crashes by fleet crashes has not markedly affected the data. First, any differential reporting probably would have a larger effect on non-casualty crashes where the vehicle damage was sufficiently minor not to require towing (which are not included in the data) than towaway crashes. Second, the patterns and rates of fatality and injury crashes for fleet vehicles should be unaffected by any potential differential reporting. These data show higher crash rates for fleet vehicles.

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APPENDIX 1. ADDITIONAL CHAPTER 2 MATERIAL

Table A1.1 Comparison between vehicle type variables from crash database and registration database

Crash vble \ Reg vble	Car	Mcycle	Light truck	Heavy truck	Artic truck	Bus	Emer-gency	Public bus	Taxi	Other	Total
Car	311,568		26,133	73	24	104	341	24	7,754	55	346,076
Motorcycle	1	8,648	-	-	-	-	37	1	-	-	8,687
Light truck	1,160	-	22,857	265	47	11	43	10	-	35	24,428
Heavy Rigid truck	38	-	694	3,961	1,113	2	9	1	-	243	6,061
Articulated truck	38	-	37	317	3,851	-	1	1	-	98	4,343
Bus	405	-	199	10	1	145	13	2,497	1	1	3,272
Emergency vehicle	41	-	50	26	2	-	1,349	-	-	3	1,471
Other motor vehicle	1,286	-	755	229	87	1	3	6	-	194	2,561
Total	314,537	8,648	50,725	4,881	5,125	263	1,796	2,540	7,755	629	396,899

APPENDIX 2. ADDITIONAL CHAPTER 4 MATERIAL

Table A2.1 Fleet and non-fleet crashes by crash severity and speed zone.

Crash severity	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
			60 km/h and below			
Fatal	344	28%	865	72%	1,209	100%
Injury	23,788	24%	76,240	76%	100,028	100%
Towaway	46,496	24%	144,555	65%	191,051	100%
Total	70,628	24%	221,660	76%	292,288	100%
			70-90 km/h			
Fatal	213	27%	569	73%	782	100%
Injury	5,874	25%	17,296	75%	23,170	100%
Towaway	11,412	27%	31,634	73%	43,046	100%
Total	17,499	26%	49,499	74%	66,998	100%
			100 and 110 km/h			
Fatal	343	32%	737	68%	1,080	100%
Injury	3,777	28%	9,923	72%	13,700	100%
Towaway	5,564	29%	13,647	71%	19,211	100%
Total	9,684	28%	4,307	72%	33,991	100%
			Unknown speed limit			
Fatal	1	50%	1	50%	2	100%
Injury	343	28%	880	72%	1,223	100%
Towaway	588	27%	1,587	73%	2,175	100%
Total	932	27%	2,468	73%	3,400	100%

Table A2.2 Fleet and non-fleet crashes by crash location and speed zone.

Speed limit	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
			Sydney			
60 and below	57,038	78%	162,044	80%	219,082	80%
70-90	13,823	19%	35,936	18%	49,759	18%
100 and 110	1,129	2%	2,850	1%	3,979	1%
Unknown	710	1%	1,781	1%	2,491	1%
Total	72,700	100%	202,611	100%	275,311	100%
			Outside Sydney			
60 and below	13,590	52%	59,616	63%	73,206	60%
70-90	3,676	14%	13,563	14%	17,239	14%
100 and 110	8,555	33%	21,457	23%	30,012	25%
Unknown	222	1%	687	1%	909	1%
Total	26,043	100%	95,323	100%	121,366	100%

Table A2.3 Fleet and non-fleet crashed vehicles by crash factor and crash speed zone.

Crash factor	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
			60 km/h and below			
Speed-related	3,118	4	14,592	7	17,710	6
Fatigue-related	1,738	2	8,223	4	9,961	3
Illegal BAC	1,031	1	6,247	3	7,278	2
			70-90 km/h			
Speed-related	1,125	6	4,506	9	5,631	8
Fatigue-related	450	3	1,852	4	2,302	3
Illegal BAC	239	1	1,192	2	1,431	2
			100 and 110 km/h			
Speed-related	1,962	20	5,981	25	7,943	23
Fatigue-related	968	10	2,706	11	3,674	11
Illegal BAC	234	2	1,174	5	1,408	4
			Unknown			
Speed-related	67	7	203	8	270	8
Fatigue-related	35	4	124	5	159	5
Illegal BAC	10	1	69	3	79	2

Table A2.4Fleet size versus vehicle age in years.

fleet size	Vehicle age (years)											Total
	0	1	2	3	4	5	6-10	11-15	16-20	21+	u/k	
1	5,617	13,858	14,452	14,040	13,648	13,714	67,310	60,660	32,046	13,052	10,051	258,448
2	1,598	4,565	4,911	4,611	4,402	4,301	17,669	14,381	7,491	3,347	2,550	69,826
3	518	1,445	1,495	1,331	1,307	1,104	4,069	3,280	1,720	876	628	17,773
4	236	687	621	609	526	434	1,346	912	485	243	206	6,305
5	136	398	410	356	315	253	661	377	210	109	156	3,381
6	113	272	306	254	229	172	462	264	99	46	86	2,303
7	87	239	231	172	155	142	319	174	85	34	60	1,698
8	78	194	200	165	160	106	245	136	54	25	57	1,420
9	66	180	149	148	94	78	208	117	48	21	45	1,154
10	59	141	156	126	98	67	188	90	35	19	34	1,013
11-15	193	502	480	408	359	256	581	312	182	60	121	3,454
16-20	140	329	320	270	227	174	399	219	132	28	100	2,338
21-30	170	407	432	381	242	202	508	303	128	51	113	2,937
31-40	135	316	275	204	140	117	294	229	104	22	100	1,936
41-50	99	242	197	163	118	74	197	150	86	28	51	1,405
51-100	418	938	698	522	429	293	680	397	206	70	189	4,840
101-500	897	2,099	1,477	969	683	442	1,038	419	245	67	368	8,704
501-1000	182	356	253	128	76	35	104	73	44	22	59	1,332
1001 +	1,066	2,064	1,045	601	369	185	424	314	244	46	274	6,632
Total	11,808	29,232	28,108	25,458	23,577	22,149	96,702	82,807	43,644	18,166	15,248	396,899

APPENDIX 3. ADDITIONAL CHAPTER 5 MATERIAL

Table A3.1 Fleet and non-fleet crashed cars by crash severity and crash speed zone.

Crash severity	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
			60 and below			
Fatal	109	0%	712	0%	821	0%
Injury	12,096	31%	67,003	33%	79,099	33%
Towaway	26,696	69%	135,875	67%	162,571	67%
Total	38,901	100%	203,590	100%	242,491	100%
			70-90			
Fatal	69	1%	481	1%	550	1%
Injury	2,948	31%	15,163	34%	18,111	33%
Towaway	6,433	68%	29,523	65%	35,956	66%
Total	9,450	100%	45,167	100%	54,617	100%
			100 and 110			
Fatal	90	2%	599	3%	689	3%
Injury	1,649	36%	8,109	39%	9,758	38%
Towaway	2,898	62%	12,112	58%	15,010	59%
Total	4,637	100%	20,820	100%	25,457	100%
			Unknown			
Fatal	-	0%	1	0%	1	0%
Injury	144	33%	746	34%	890	34%
Towaway	299	67%	1,442	66%	1,741	66%
Total	443	100%	2,189	100%	2,632	100%

Table A3.2 Fleet and non-fleet crashed cars by crash location (Sydney versus outside Sydney) and crash speed zone.

Speed limit	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
			Sydney			
60 and below	31,760	79%	150,704	80%	182,464	80%
70-90	7,616	19%	33,187	18%	40,803	18%
100 and 110	632	2%	2,617	1%	3,249	1%
Unknown	350	1%	1,605	1%	1,955	1%
Total	40,358	100%	188,113	100%	228,471	100%
			Outside Sydney			
60 and below	7,141	55%	52,886	63%	60,027	62%
70-90	1,834	14%	11,980	14%	13,814	14%
100 and 110	4,005	31%	18,203	22%	22,208	23%
Unknown	93	1%	584	1%	677	1%
Total	13,073	100%	83,653	100%	96,726	100%

Table A3.3 Fleet and non-fleet crashed cars by crash factor and crash speed zone.

Crash factor	Fleet		Non-fleet		Total	
	No.	%	No.	%	No.	%
			60 km/h and below			
Speed-related	1,846	5%	12,865	6%	14,711	6%
Fatigue-related	923	2%	7,391	4%	8,314	3%
Illegal BAC	1,031	1%	6,247	3%	7,278	2%
			70-90 km/h			
Speed-related	619	7%	3,878	9%	4,497	8%
Fatigue-related	219	2%	1,636	4%	1,855	3%
Illegal BAC	239	1%	1,192	2%	1,431	2%
			100 and 110 km/h			
Speed-related	1,051	23%	5,065	24%	6,116	24%
Fatigue-related	412	9%	2,302	11%	2,714	11%
Illegal BAC	234	2%	1,174	5%	1,408	4%
			Unknown			
Speed-related	32	7%	168	8%	200	8%
Fatigue-related	16	4%	108	5%	124	5%
Illegal BAC	10	1%	69	3%	79	2%

Table A3.4 Makes and models classified as large cars.

Make	Model	Fleet		Non-fleet		Total	
		No.	%	No.	%	No.	%
Ford	Falcon	17,903	54%	29,738	37%	47,641	42%
Holden	Commodore	10,304	31%	31,933	39%	42,237	37%
	Hz Series	261	1%	1,342	2%	1,603	1%
	Wb Series	256	1%	614	1%	870	1%
	Hq Series	135	0%	992	1%	1,127	1%
Toyota	Lexcen	385	1%	1,217	2%	1,602	1%
Mitsubishi	Magna	2,608	8%	8,758	11%	11,366	10%
	Verada	289	1%	534	1%	823	1%
Nissan	Skyline	147	0%	1,709	2%	1,856	2%
Mazda	929	101	0%	1,034	1%	1,135	1%
Honda	Accord	364	1%	2,298	3%	2,662	2%
Hyundai	Sonata	109	0%	729	1%	838	1%
Total		32,862	100%	80,898	100%	113,760	100%

Table A3.5 Makes and models classified as medium cars.

Make	Model	Fleet		Non-fleet		Total	
		No.	%	No.	%	No.	%
Ford	Telstar	286	5%	3,793	9%	4,079	9%
Holden	Apollo	159	3%	989	2%	1,148	2%
	Vectra	122	2%	222	1%	344	1%
	Camira	121	2%	2,716	6%	2,837	6%
Toyota	Camry	2,928	54%	11,645	28%	14,573	31%
	Corona	237	4%	6,191	15%	6,428	14%
Mitsubishi	Sigma	254	5%	5,349	13%	5,603	12%
Nissan	Bluebird	195	4%	3,461	8%	3,656	8%
	Pintara	143	3%	2,270	5%	2,413	5%
Mazda	626	568	10%	4,126	10%	4,694	10%
Subaru	Liberty	437	8%	1,293	3%	1,730	4%
Total		5,450	100%	42,055	100%	47,505	100%

Table A3.6 Makes and models classified as small cars.

Make	Model	Fleet		Non-fleet		Total	
		No.	%	No.	%	No.	%
Ford	Laser	939	12%	13,810	18%	14,749	17%
	Festiva	425	6%	2,661	3%	3,086	4%
Holden	Barina	267	3%	3,575	5%	3,842	4%
	Astra	104	1%	1,444	2%	1,548	2%
Toyota	Corolla	1,926	25%	17,652	23%	19,578	23%
	Starlet	123	2%	816	1%	939	1%
Mitsubishi	Lancer	439	6%	3,594	5%	4,033	5%
	Mirage	100	1%	911	1%	1,011	1%
Nissan	Pulsar	595	8%	7,769	10%	8,364	10%
Mazda	323	485	6%	4,429	6%	4,914	6%
	121	197	3%	2,033	3%	2,230	3%
Honda	Civic	432	6%	4,232	5%	4,664	5%
Hyundai	Excel	593	8%	7,201	9%	7,794	9%
	Lantra	163	2%	1,229	2%	1,392	2%
Daihatsu	Delta	323	4%	49	0%	372	0%
	Charade	320	4%	3,965	5%	4,285	5%
Suzuki	Swift	143	2%	2,325	3%	2,468	3%
Volkswagen	Golf	137	2%	563	1%	700	1%
Total		7,711	100%	78,258	100%	85,969	100%

Table A3.7 Makes and models classified as sports cars.

Make	Model	Fleet		Non-fleet		Total	
		No.	%	No.	%	No.	%
Toyota	Celica	267	35%	2,806	53%	3,073	51%
Honda	Prelude	196	26%	1,228	23%	1,424	24%
	Integra	106	14%	574	11%	680	11%
Subaru	Impreza	196	26%	665	13%	861	14%
Total		765	100%	5,273	100%	6,038	100%

Table A3.8 Makes and models classified as luxury cars.

Make	Model	Fleet		Non-fleet		Total	
		No.	%	No.	%	No.	%
Holden	Statesman	485	17%	492	9%	977	12%
Toyota	Cressida	222	8%	1,468	27%	1,690	21%
Nissan	Maxima	128	5%	264	5%	392	5%
BMW	3 Series	762	27%	1,426	27%	2,188	27%
	5 Series	195	7%	248	5%	443	5%
Volvo	800 Series	179	6%	226	4%	405	5%
Mercedes	3 Series	177	6%	239	4%	416	5%
	C-Class	163	6%	221	4%	384	5%
Saab	9000	292	10%	484	9%	776	9%
Audi	80	107	4%	206	4%	313	4%
	A4	102	4%	103	2%	205	3%
Total		2,812	100%	5,377	100%	8,189	100%

Table A3.9 Makes and models classified as vans.

Make	Model	Fleet		Non-fleet		Total	
		No.	%	No.	%	No.	%
Toyota	Tarago	379	74%	1,077	82%	1,456	80%
Mitsubishi	Starwagon	136	26%	237	18%	373	20%
Total		515	100%	1,314	100%	1,829	100%

Table A3.10 Makes and models classified as commercial vehicles.

Make	Model	Fleet		Non-fleet		Total	
		No.	%	No.	%	No.	%
Ford	Econovan	1,115	8%	639	10%	1,754	9%
	Courier	677	5%	414	7%	1,091	5%
	F Series	327	2%	252	4%	579	3%
	Trader	306	2%	28	0%	334	2%
	Transit	270	2%	35	1%	305	2%
Holden	Rodeo	2,232	16%	1,097	18%	3,329	17%
	Combo	140	1%	23	0%	163	1%
Toyota	Hiace	1,783	13%	741	12%	2,524	13%
	Dyna	551	4%	114	2%	665	3%
	Townace	394	3%	96	2%	490	2%
	Liteace	121	1%	220	4%	341	2%
Mitsubishi	Express	1,313	10%	690	11%	2,003	10%
	Triton	745	5%	378	6%	1,123	6%
	Canter	404	3%	51	1%	455	2%
Nissan	Navara	734	5%	492	8%	1,226	6%
	Urvan	103	1%	84	1%	187	1%
Mazda	B Series	438	3%	218	3%	656	3%
	E Series	376	3%	193	3%	569	3%
	T Series	225	2%	27	0%	252	1%
Subaru	Brumby	132	1%	214	3%	346	2%
Volkswagen	Transporter	361	3%	167	3%	528	3%
Isuzu	N Series	744	5%	54	1%	798	4%
	F Series	237	2%	9	0%	246	1%
Total		13,728	100%	6,236	100%	19,964	100%

Table A3.11 Makes and models classified as 4WDs.

Make	Model	Fleet		Non-fleet		Total	
		No.	%	No.	%	No.	%
Holden	Jackaroo	137	2%	270	3%	407	2%
Toyota	Hilux	3,503	45%	2,399	27%	5,902	35%
	Landcruiser	1,797	23%	1,822	20%	3,619	21%
	Rav4	232	3%	529	6%	761	5%
	4-Runner	152	2%	525	6%	677	4%
Mitsubishi	Pajero	642	8%	1,176	13%	1,818	11%
Nissan	Patrol	557	7%	850	9%	1,407	8%
Suzuki	Vitara	149	2%	828	9%	977	6%
Land Rover	Discovery	277	4%	275	3%	552	3%
	Rangerover	106	1%	88	1%	194	1%
Jeep	Cherokee	245	3%	276	3%	521	3%
Total		7,797	100%	9,038	100%	16,835	100%