

MOTORCYCLE SAFETY IN NSW

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Transport for NSW

in response to

The Parliamentary Joint Standing Committee
on Road Safety
(Staysafe)

Inquiry into Motorcycle Safety in NSW

September 2015

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Terms of Reference

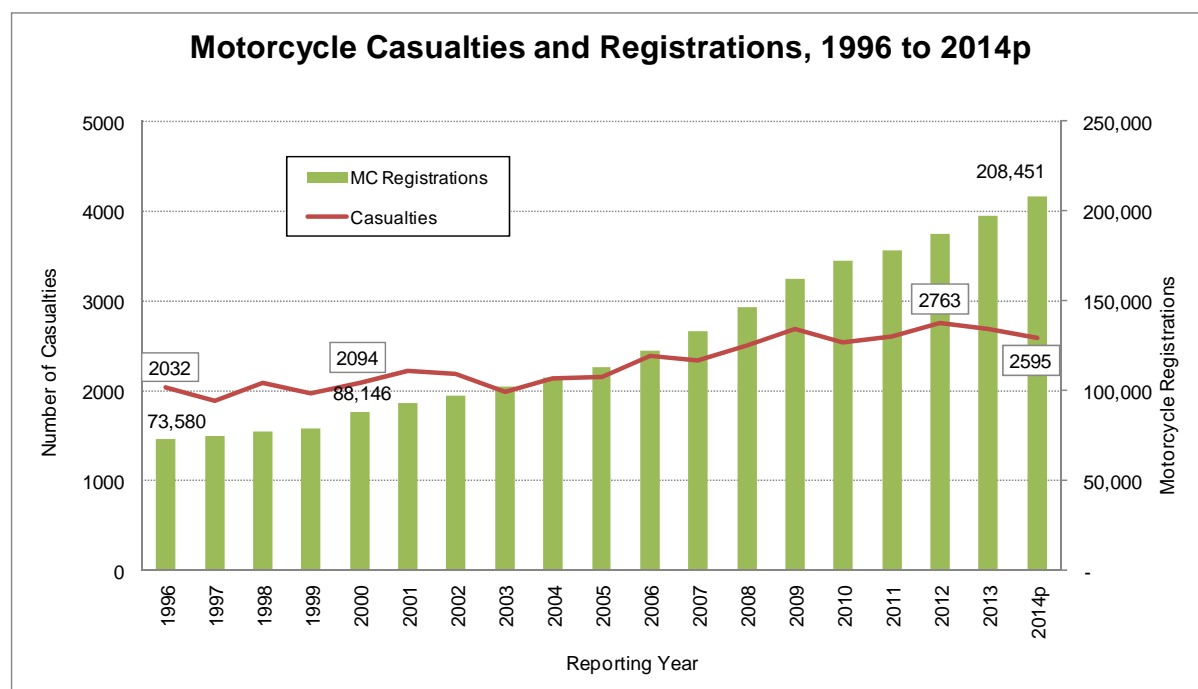
On 12 August 2015, the Parliamentary Joint Standing Committee on Road Safety (Staysafe) issued its terms of reference in relation to its Inquiry into Motorcycle Safety in NSW. They are:

That the Committee inquire into and report on motorcycle safety in New South Wales with particular reference to:

- A. Trends of motorcycle usage, injury and fatality in NSW;
- B. Crash and injury risk factors including rider (and driver) behaviour, conspicuity and vehicle instability;
- C. The effectiveness of the current action plan to enhance motorcycle safety including communications and education campaigns, road environment improvements, regulation of safety equipment and gear;
- D. Strategies of other jurisdictions to improve motorcycle safety;
- E. Licensing and rider training; and
- F. Any other related matters.

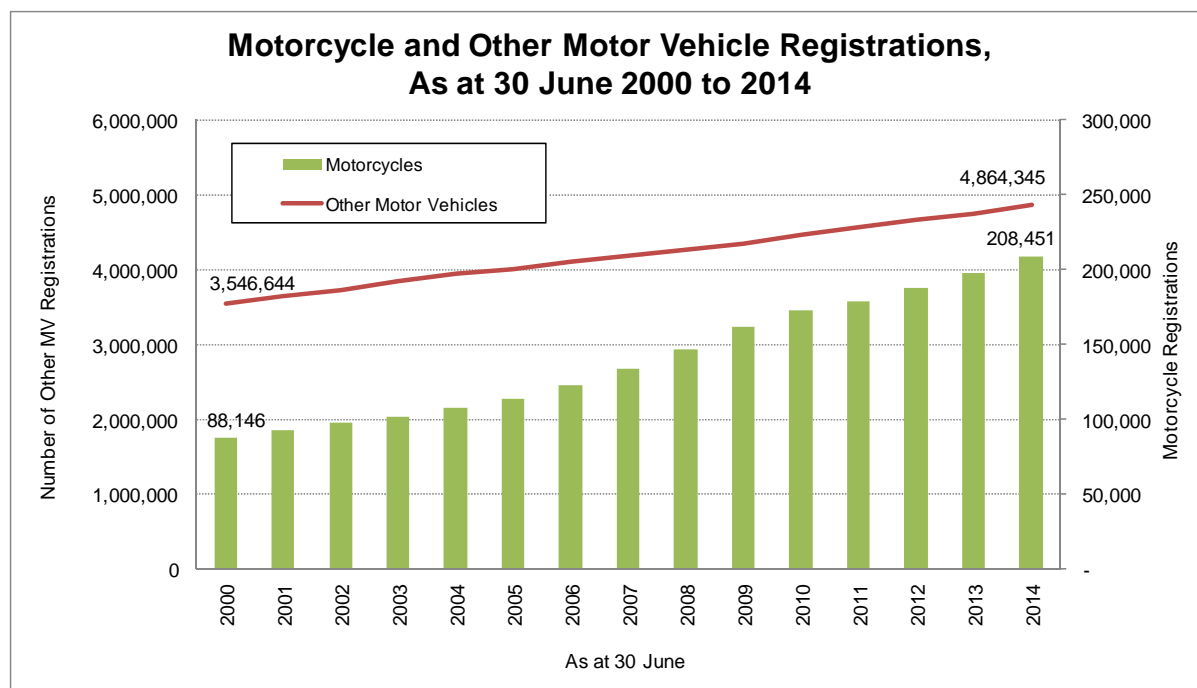
A. TRENDS OF MOTORCYCLE USAGE, INJURY AND FATALITY IN NSW

The increase in motorcycle casualties¹, particularly since the turn of the century, has coincided with the increased popularity of motorcycling as reflected in motorcycle registrations. Since the turn of the century motorcycle registrations have increased by 136 per cent, from 88,146 in 2000 to 208,451 in 2014.

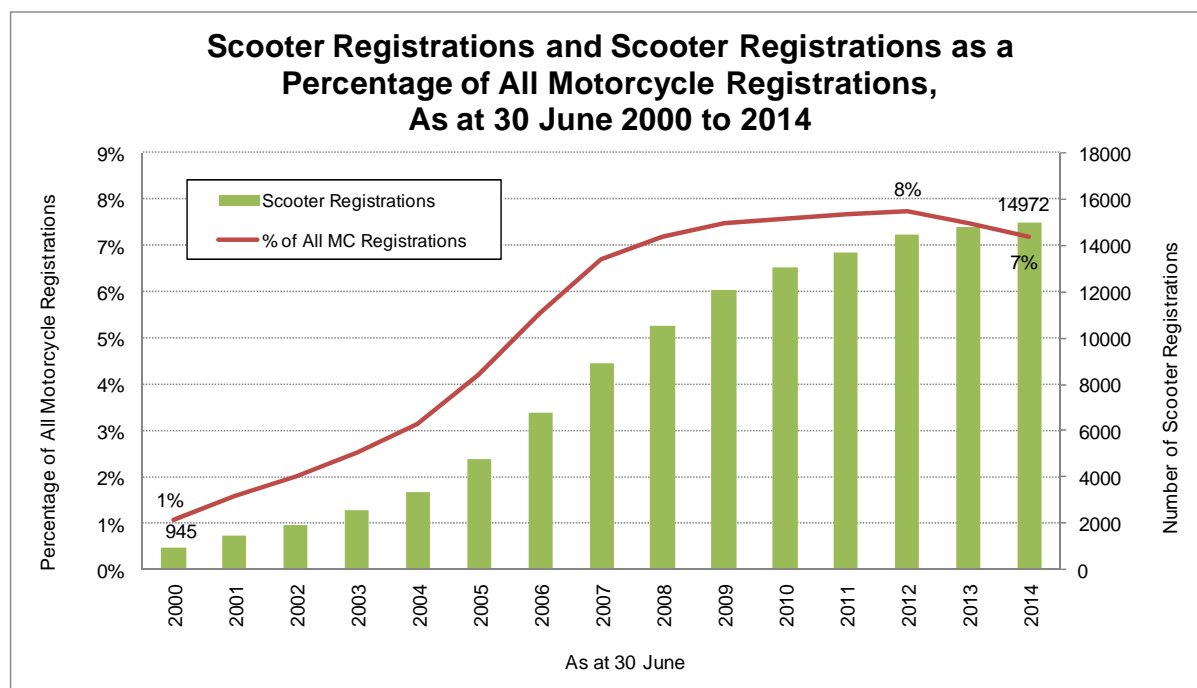


¹ Casualty is defined as a person killed or injured as a result of a road traffic crash

In contrast there has been a much lower rate of increase for other motor vehicle registrations. Since the turn of the century the registrations of other motor vehicles have increased by only 37 per cent, from 3.55 million in 2000 to 4.86 million in 2014.

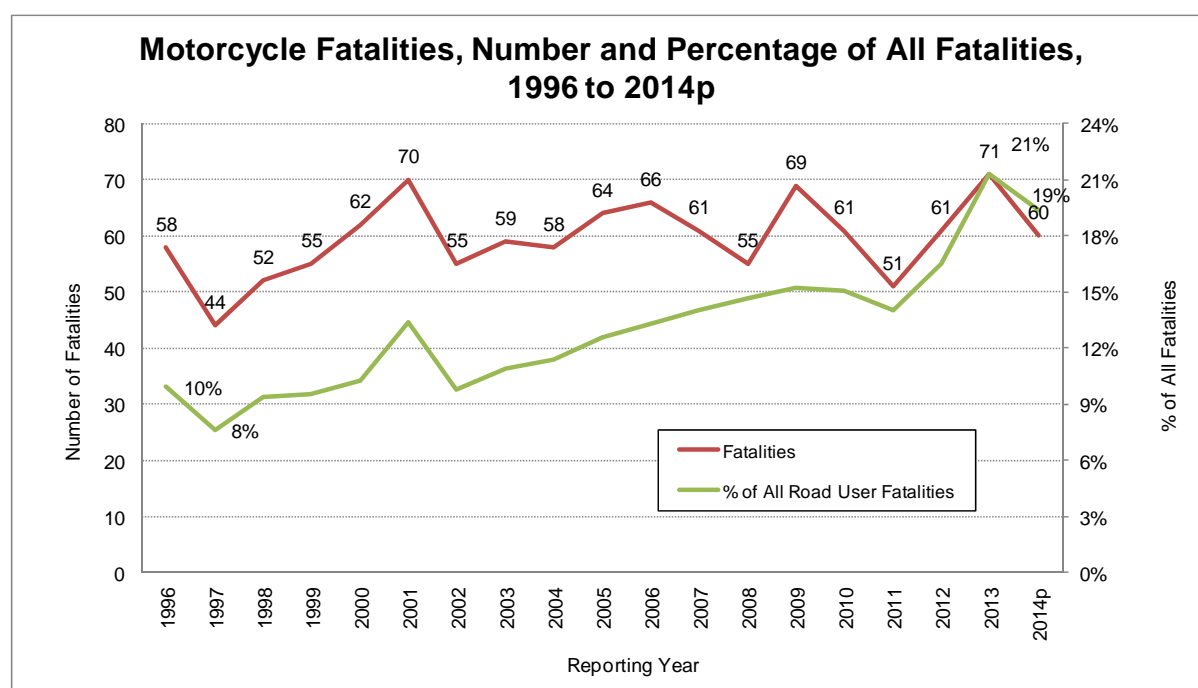


Over this period there was also an increase in the popularity of scooters, increasing from 945 registrations in 2000 to 14,972 registrations in 2014. As a proportion of all motorcycle registrations it appears that relative popularity of scooters may have peaked – rising from 1 per cent of all motorcycle registrations in 2000 to 8 per cent in 2012 before falling back to 7 per cent in 2014.



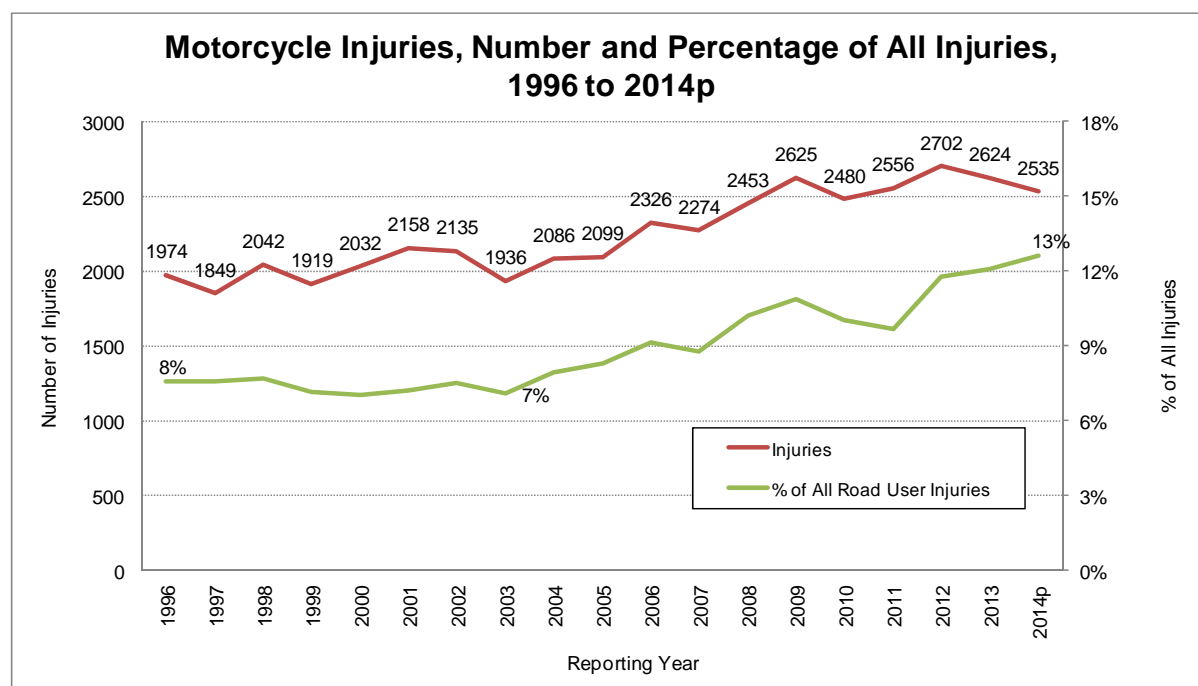
The provisional results for 2014 highlight the over representation of motorcyclists in NSW road trauma. With 60 deaths in 2014, motorcyclists account for almost 20 per cent of all road fatalities². However, motorcycles represented only 4 per cent of all motor vehicle registrations (as at 30 June 2014) and around 0.8 per cent of all motor vehicle travel in NSW (ABS Survey of Motor Vehicle Usage 2012).

Since the turn of the century the number of motorcyclist fatalities has remained relatively level at between 51 and 71 fatalities a year. However, this result contrasts with the trend for the overall number of fatalities which has declined over this period. Consequently, the percentage of the road toll comprising motorcyclists has been increasing – from 8 per cent in 1997 to 21 per cent in 2013.



² A fatality is a person who dies within 30 days of a crash as a result of injuries received in that crash.

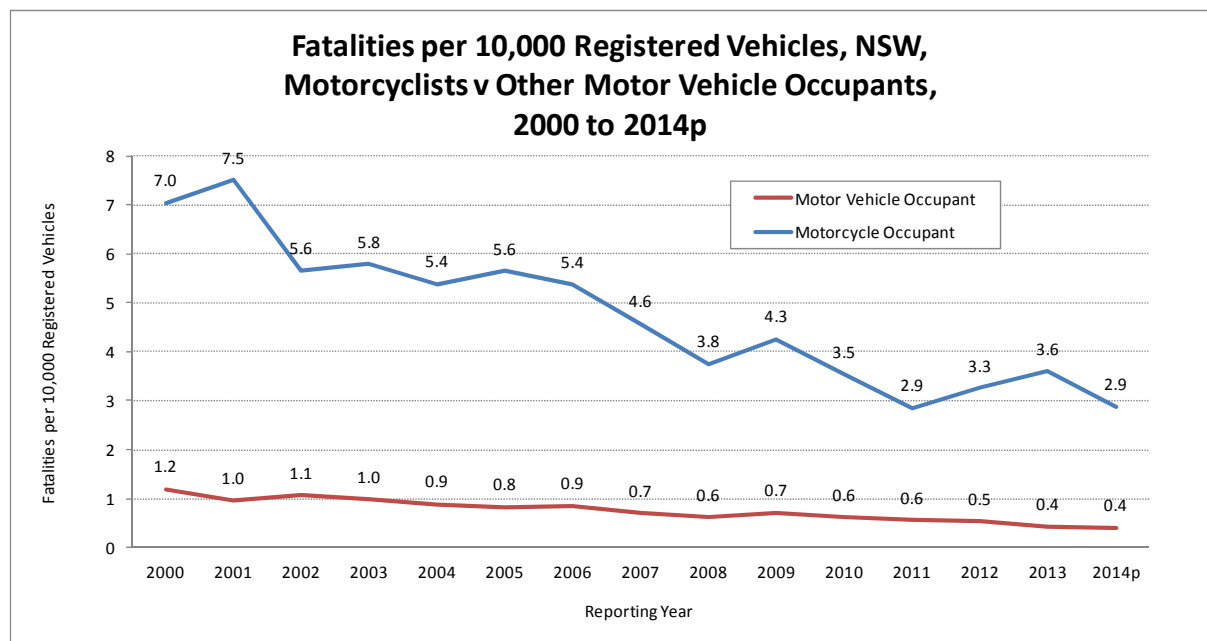
Motorcycle injuries³ were level until around 2003 but then steadily increased from 1,936 in 2003 to 2,702 in 2012. This trend also contrast with the decreases in overall injury numbers experienced over the same period. Consequently, the percentage of total injuries who were motorcyclists increased from 7 per cent in 2003 to 13 per cent in 2014p⁴.



³ An injury is a person who is injured as a result of a crash, and who does not die as a result of those injuries within 30 days of the crash.

⁴ 'p' - provisional

The following chart shows the occupant fatality rate trends for motorcycles and other motor vehicles since the turn of the century. Whilst the fatality rate is considerably higher for a motorcycle occupant compared with other motor vehicles, there has been a decreasing trend for motorcycles which is similar in magnitude to that for other motor vehicles. Nevertheless, the fatality risk per registered vehicle for a motorcyclist is around seven times that for an occupant of a motor vehicle. The increased fatality risk for motorcyclists is principally due to the vulnerability of motorcyclists when they are involved in crash, as well as other contributing factors, and these are further explored throughout this submission.

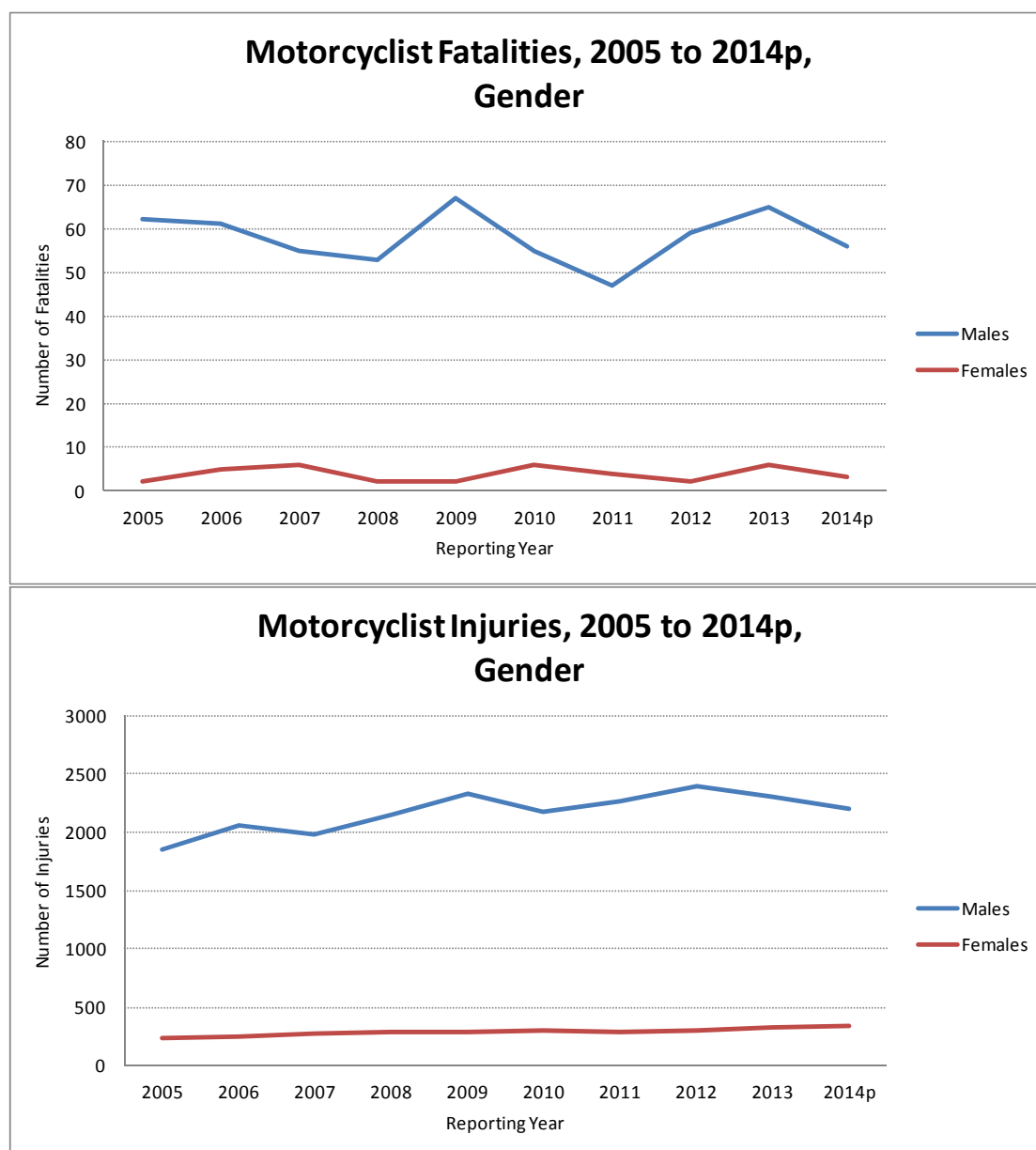


Trends in Casualties⁵ 2005 to 2014p

The following section details the demographic, regional and vehicle type trends for motorcycle casualties over the most recent decade, from 2005 to 2014p. It details the trends for motorcycle casualties by gender, age group and urbanisation.

Gender

The majority of motorcycle fatalities and injuries are males. Over the ten year period 94 per cent of fatalities and 88 per cent of injuries were males. The number of female fatalities is too small to identify any particular trend, but there appears to be a small increase in the percentage of injuries who are female – from 11.1 per cent of injuries in 2005 to 13.2 per cent in 2014p.

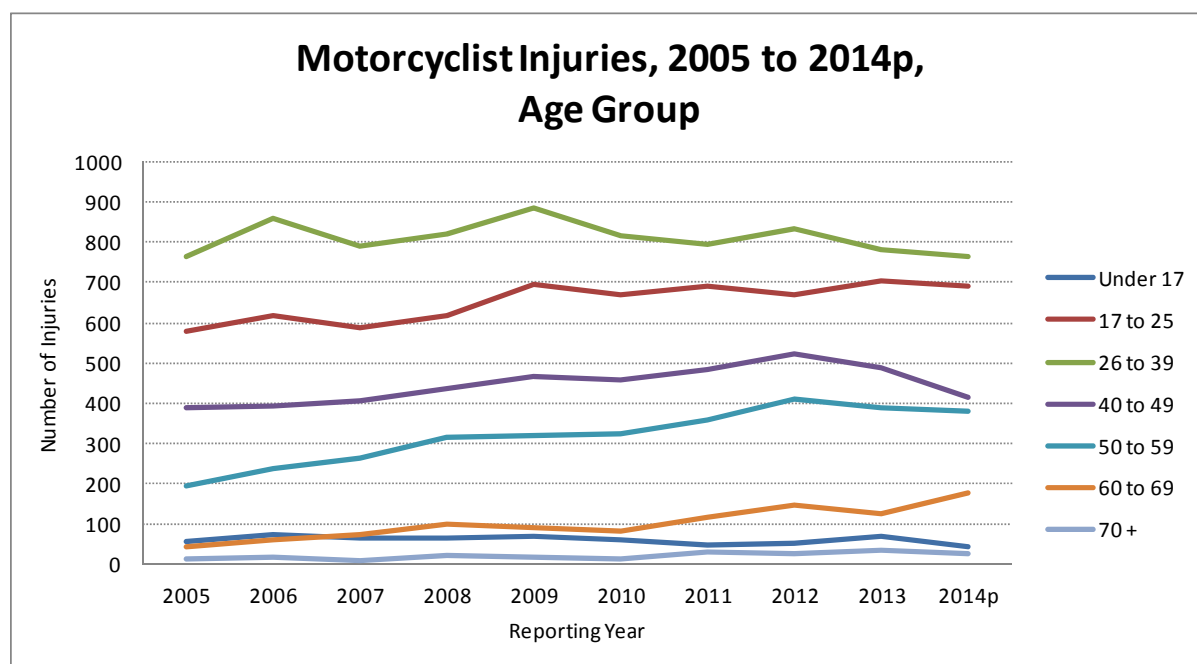
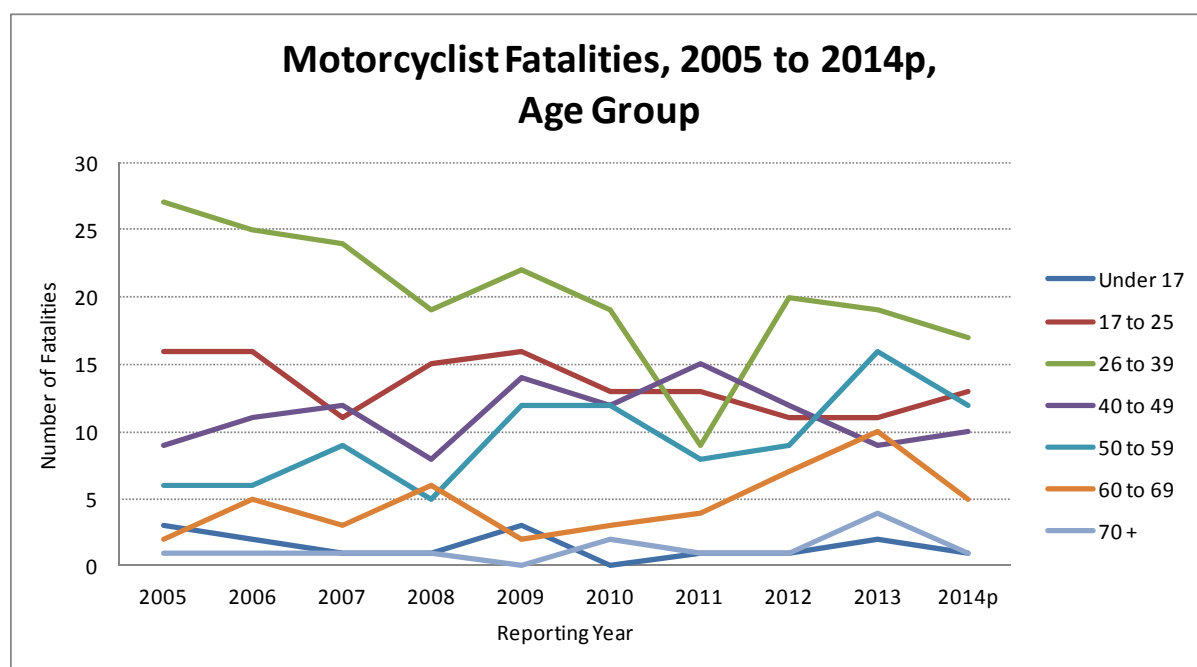


⁵ A casualty is a fatality or person injured from a road traffic crash. A fatality is a person who dies within 30 days of a crash from injuries received in a crash.

Age Group

The trends for casualties by age group are variable. Amongst motorcycle fatalities there has been a decreasing trend for the 26 to 39 year age group whilst there has been an increasing trend for 50 to 59 year olds.

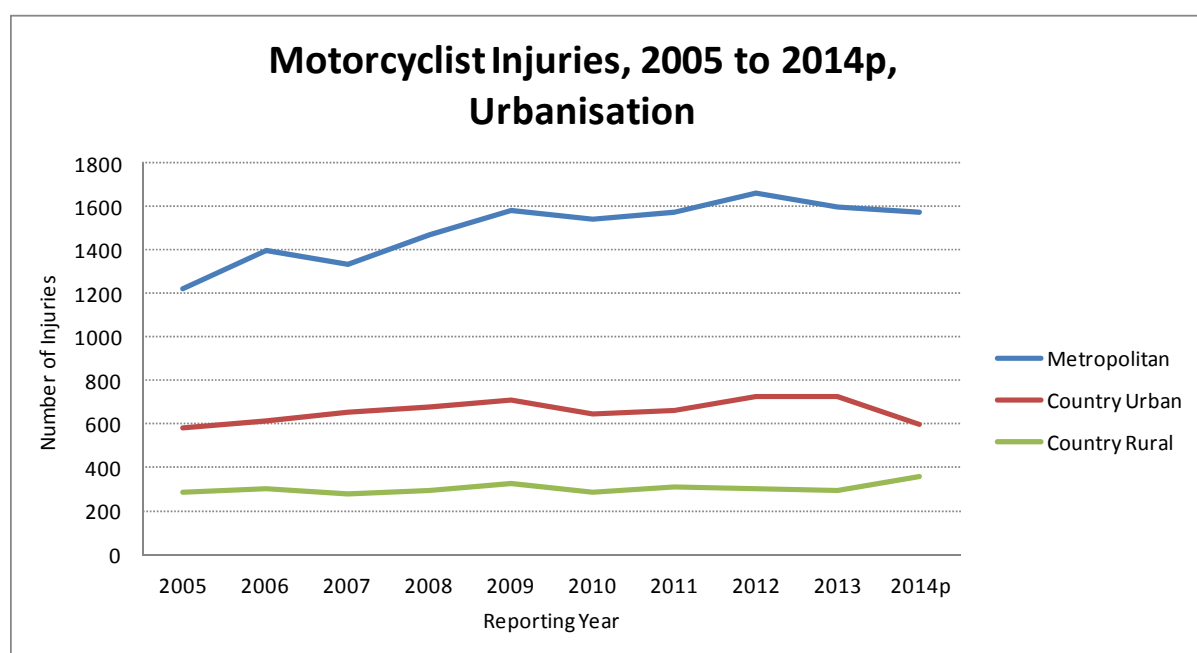
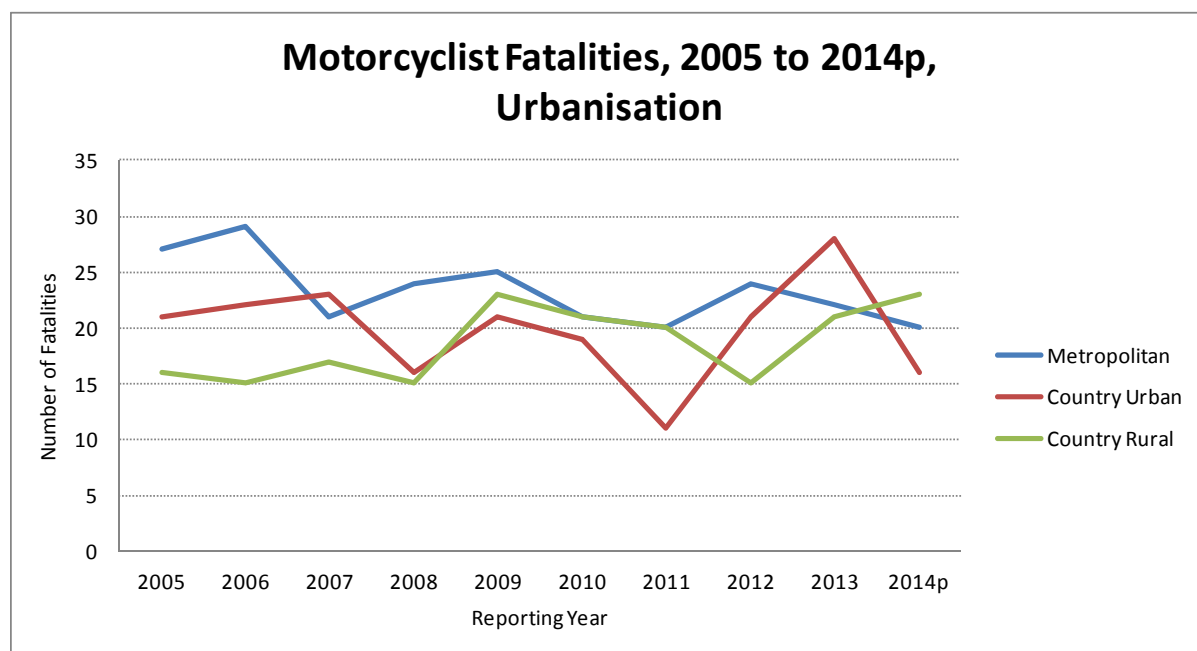
With the higher injury numbers, the injury trends for each age group are clearer. There were increases amongst the 17 to 25, 50 to 59 and 60 to 69 year age groups. Interestingly the increasing trend apparent for the 40 to 49 year age group was reversed in 2012 and 2013. The trend line for injuries in the under 17 and 26 to 39 year age groups have both been relatively level over the past decade.



Urbanisation

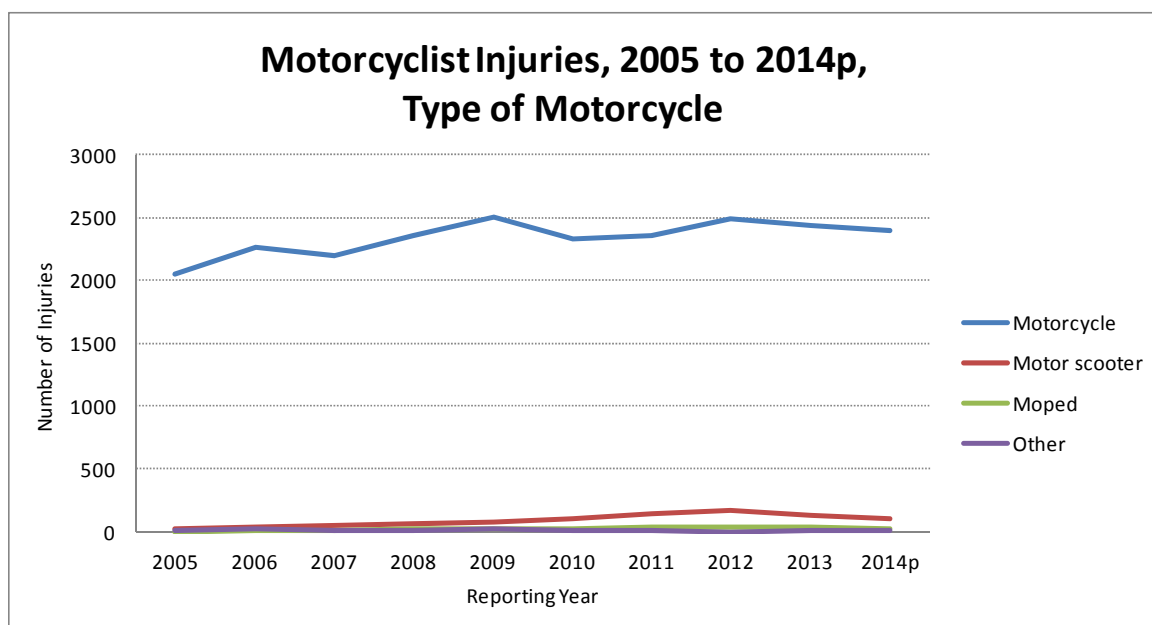
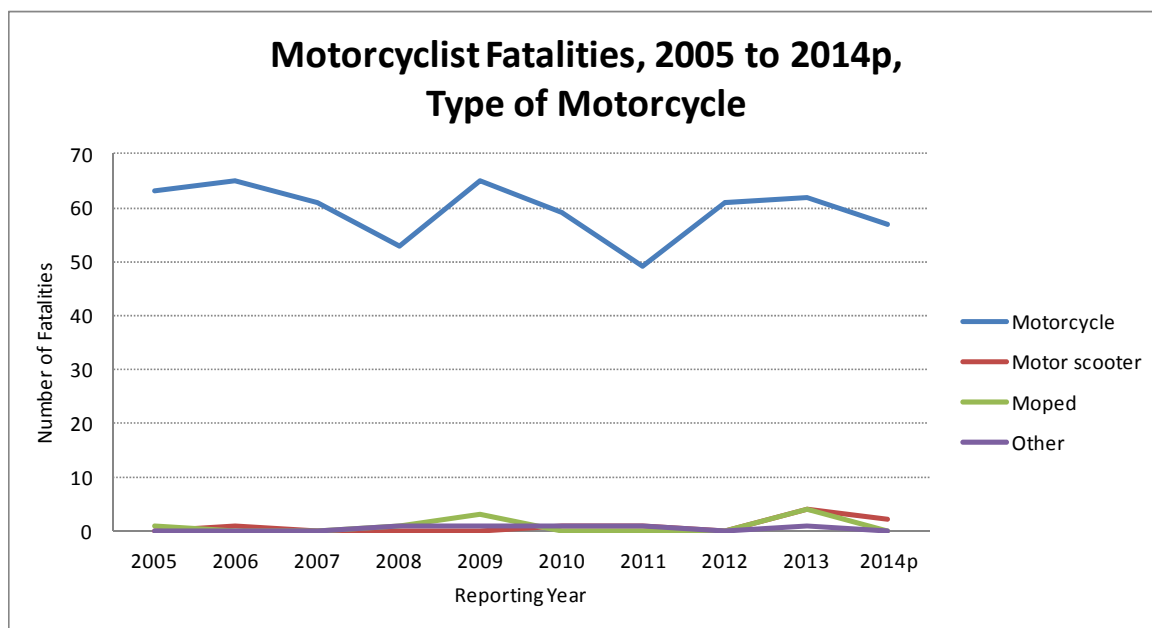
Motorcycle fatalities are relatively evenly distributed across the metropolitan, country urban and country rural areas of the State, with the slight downward trend for metropolitan fatalities largely offset by a slight upward trend for country rural fatalities.

The metropolitan area comprised the majority of motorcycle injuries, with this area also generating the increases in motorcycle injuries over the past decade, up by 29 per cent between 2005 to 2014p. Injury numbers in the country rural area had been stable until 2013 but there was a 22 per cent increase from 2013 to 2014p.



Type of Motorcycle

Relatively few motorcyclists are killed or injured on motorcycle vehicle types⁶ other than “motorcycles”. Of the 618 motorcyclists killed over the past decade only 9 were on scooters, 9 were on mopeds (bicycles fitted with an engine) and a further 5 were on other motorcycle variants (mini bikes, side cars etc). Similarly, amongst motorcycle injuries there were relatively few injuries on motorcycle vehicle types other than “motorcycle”. Of the 24,674 injuries 918 were on scooters (4 per cent), 250 were on mopeds (1 per cent). Scooter injuries rose during the early part of the decade, peaking in 2012, but they decreased in both 2013 and 2014p.



⁶ Motorcycle vehicle types are defined as any mechanically or electrically propelled two or three-wheeled machine with or without side-car. The types are categorised as solo motorcycle (referred to as ‘motorcycles’), motorcycle with sidecar, motor scooter, mini bike, three-wheeled special mobility vehicle and moped (motorised ‘pedal cycle’).

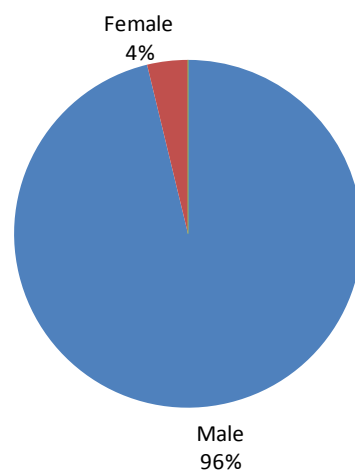
Characteristics of Motorcycle Riders Involved in Casualty Crashes⁷, 2010 to 2014p

The next section investigates some of the characteristics of motorcycle rider involvements in casualty crashes over the most recent five year period, 2010 to 2014p. The issues covered include demographics, location type, crash types, time of day and risk factors. A casualty crash is a crash which involves at least one person killed or injured.

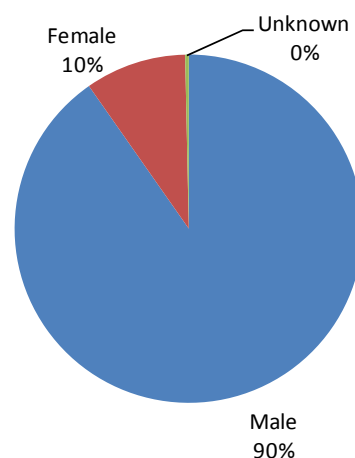
Gender

Males comprise the majority of motorcycle riders involved in fatal and an injury crashes – 96 per cent of fatal crash involvements and 90 per cent of injury crash involvements.

Motorcycle Riders Involved in Fatal Crashes, 2010 to 2014p, Gender



Motorcycle Riders Involved in Injury Crashes, 2010 to 2014p, Gender

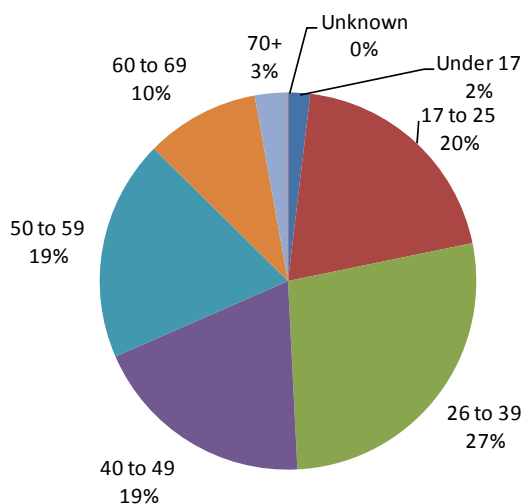


⁷ A casualty crash is a crash which involves at least one fatality or at least one person injured. A fatality is a person who dies within 30 days of a crash from injuries received in that crash.

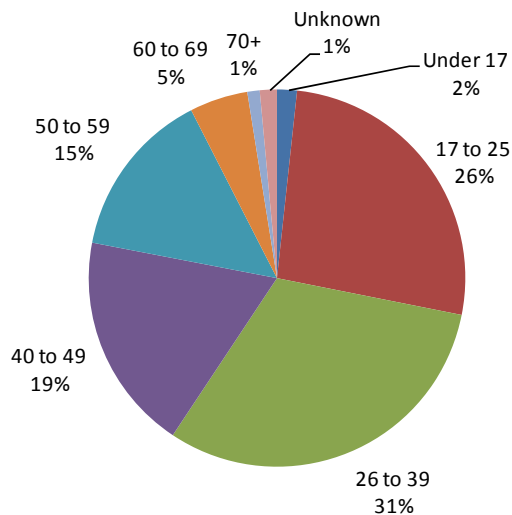
Age Group

Around half of all fatal crash involvements are aged 40 years or more but this age group accounts for only 40 per cent of all injury crash involvements.

**Motorcycle Riders Involved in Fatal Crashes,
2010 to 2014p, Age Group**



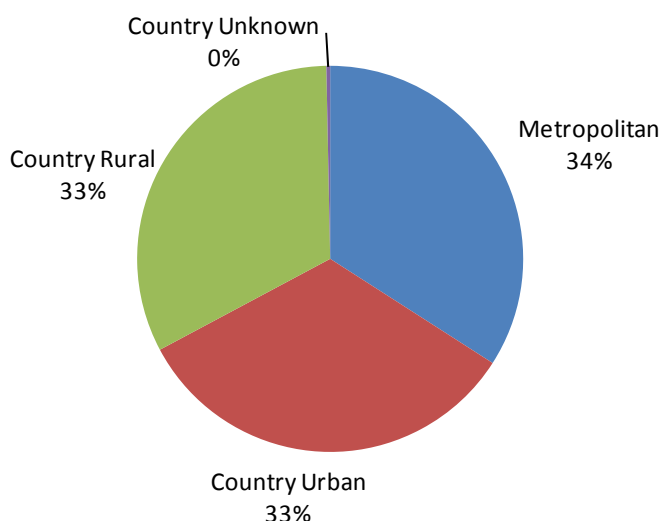
**Motorcycle Riders Involved in Injury Crashes,
2010 to 2014p, Age Group**



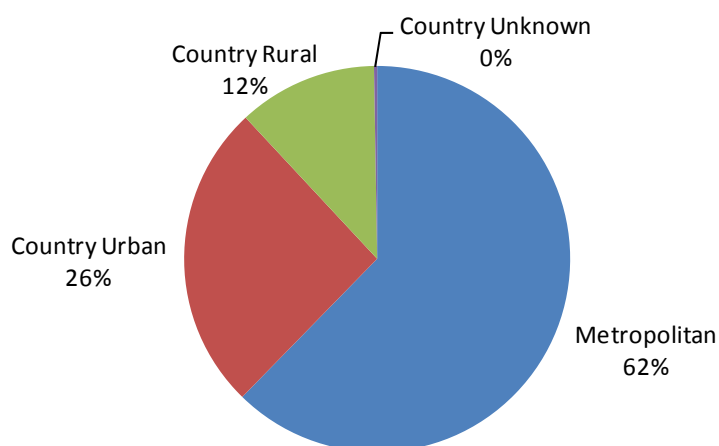
Urbanisation

Fatal crash involvements are evenly split amongst the metropolitan (34 per cent), country urban (33 per cent) and country rural (33 per cent) areas. In contrast, the metropolitan area accounts for almost two-thirds (62 per cent) of all injury crash involvements.

Motorcycle Riders Involved in Fatal Crashes, 2010 to 2014p, Urbanisation



Motorcycle Riders Involved in Injury Crashes, 2010 to 2014p, Urbanisation

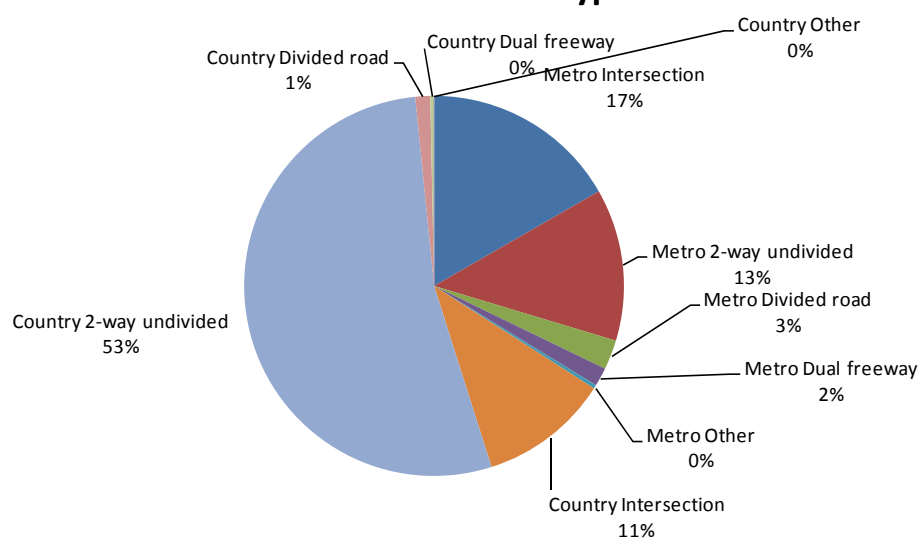


Location Type

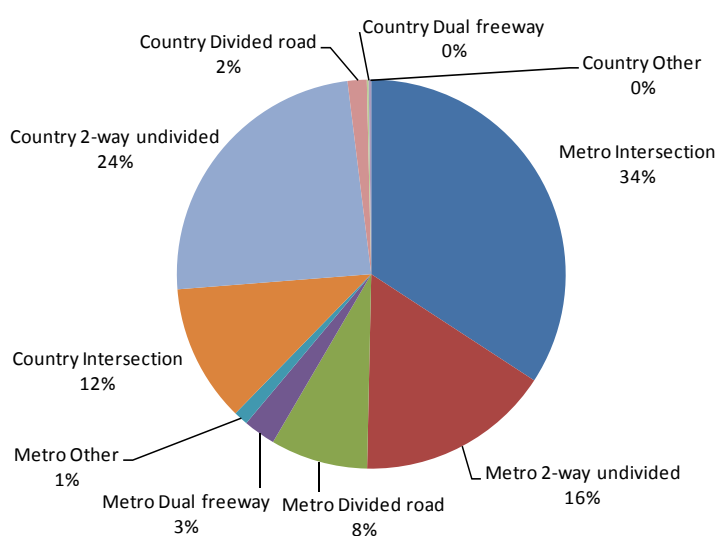
More than half (53 per cent) of all fatal crash involvements occur on two-way undivided single carriageways in the country areas of NSW. Intersections across the State account for a further 28 per cent of fatal crash involvements.

In contrast, almost half (46 per cent) of all injury crash involvements occur at intersections, with metropolitan intersections accounting for 34 per cent. Two-way undivided single carriageways in the country areas of NSW still account for almost one quarter (24 per cent) of injury crash involvements.

**Motorcycle Riders Involved in Fatal Crashes, 2010 to 2014p,
Urbanisation x Location Type**



**Motorcycle Riders Involved in Injury Crashes, 2010 to 2014p,
Urbanisation x Location Type**

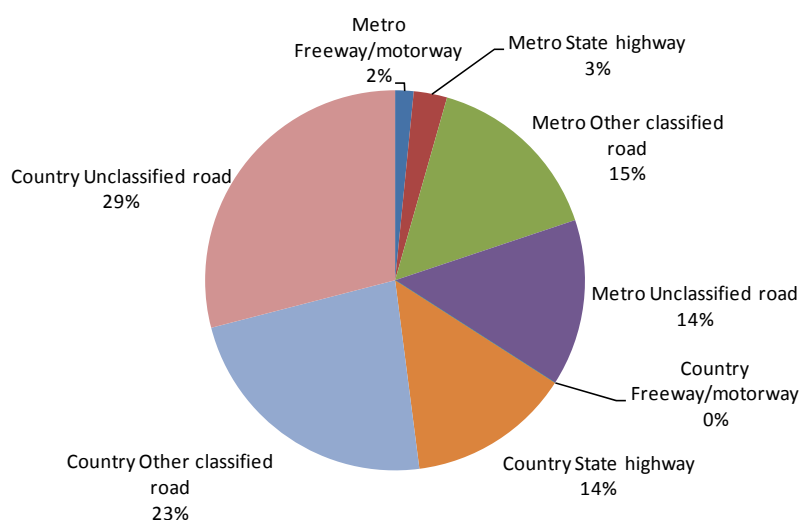


Road Classification

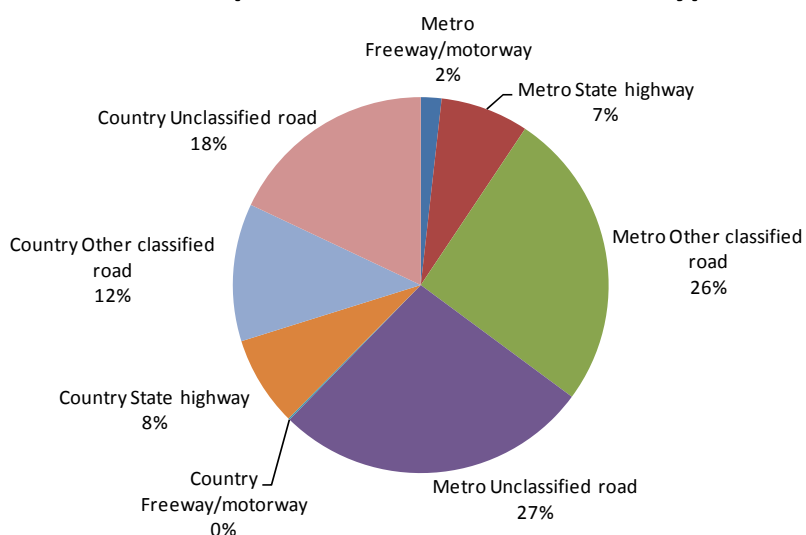
Unclassified (local) and lower order classified roads⁸ accounted for more than half (52 per cent) of all fatal crash involvements. In contrast, these roads in the metropolitan area accounted for more than half (53 per cent) of all injury crash involvements.

The State highways accounted for only 17 per cent of fatal crash involvements and 15 per cent of all injury crash involvements.

**Motorcycle Riders Involved in Fatal Crashes, 2010 to 2014p,
Urbanisation x Road Classification**



**Motorcycle Riders Involved in Injury Crashes,
2010 to 2014p, Urbanisation x Location Type**



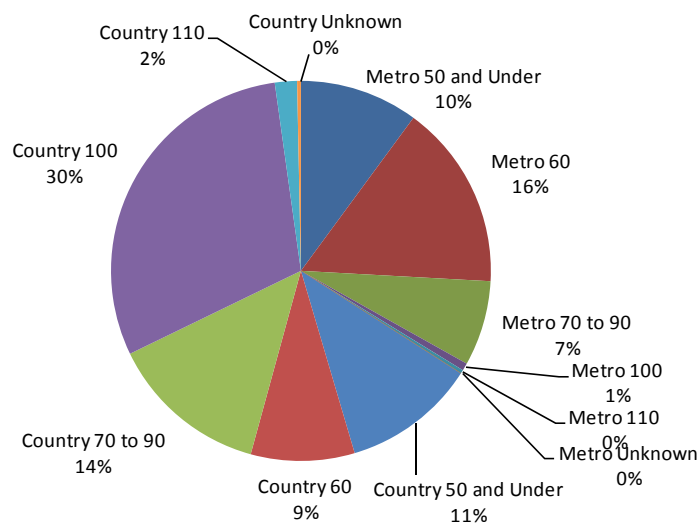
⁸ Lower order classified roads include RMS classified roads other than State Highways, Freeways and Motorways.

Speed Limit

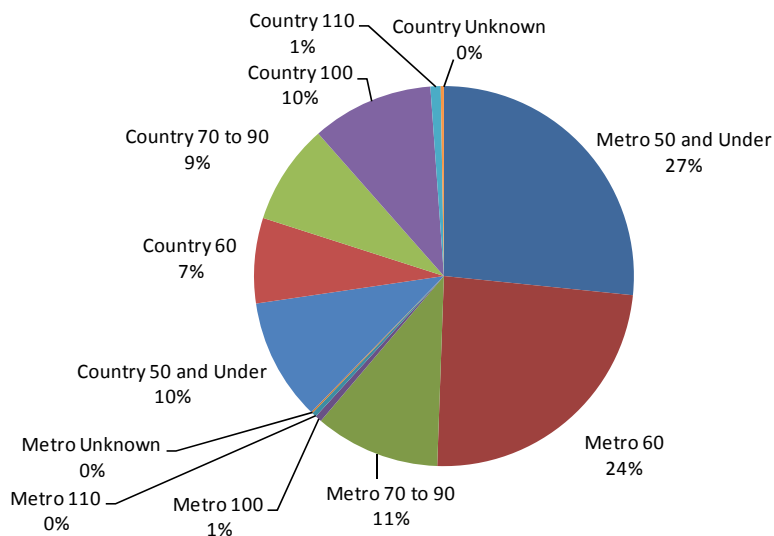
High speed roads in the country areas (100 km/h plus) accounted for one third (32 per cent) of all fatal crash involvements. However, almost half (49 per cent) of all fatal crash involvements occurred in low speed zones of 60 km/h or less – 26 per cent on metropolitan roads and 23 per cent on country roads.

Low speed roads dominate injury crash involvements – half (51 per cent) occurred on metropolitan roads and a further one-fifth (20 per cent) on country roads.

**Motorcycle Riders Involved in Fatal Crashes, 2010 to 2014p,
Urbanisation x Speed Limit**



**Motorcycle Riders Involved in Injury Crashes,
2010 to 2014p, Urbanisation x Speed Limit**

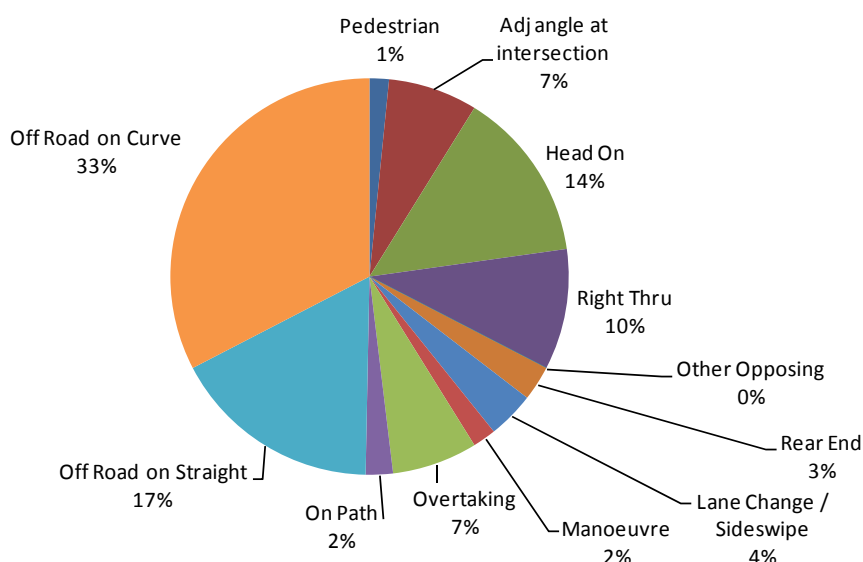


Road User Movement

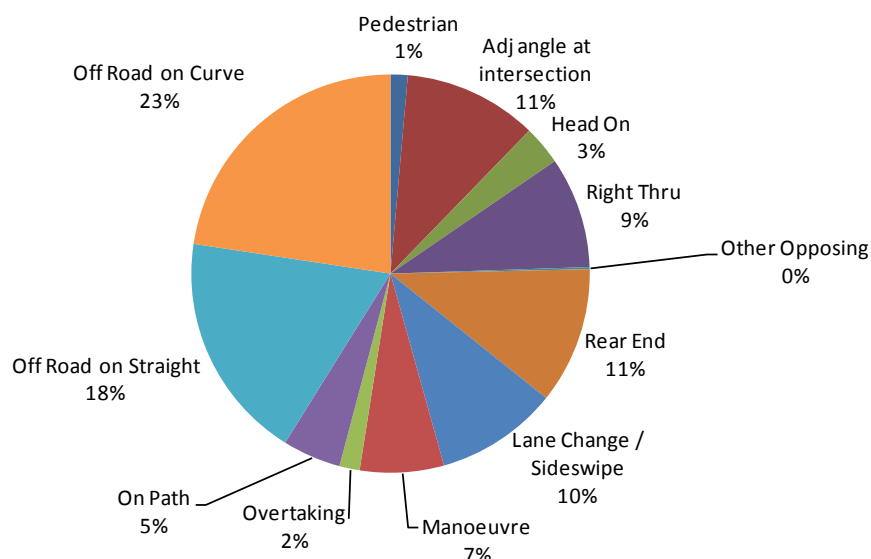
Half of all fatal crash involvements involve an off road crash impact – off path on a curve accounting for 33 per cent and off path on a straight a further 17 per cent. The next highest crash types were head on (not overtaking) crashes with 14 per cent and right thru crashes with 10 per cent.

Amongst injury crash involvements the off path crash impact remains the largest contributor – off path on curve (23 per cent) and off path on straight (18 per cent). The next four crash types were all similar in magnitude - adjacent angle crashes at intersections (11 per cent), rear end crashes (11 per cent), lane change / sideswipe crashes (10 per cent) and right thru crashes (9 per cent).

Motorcycle Riders Involved in Fatal Crashes, 2010 to 2014p, Road User Movement



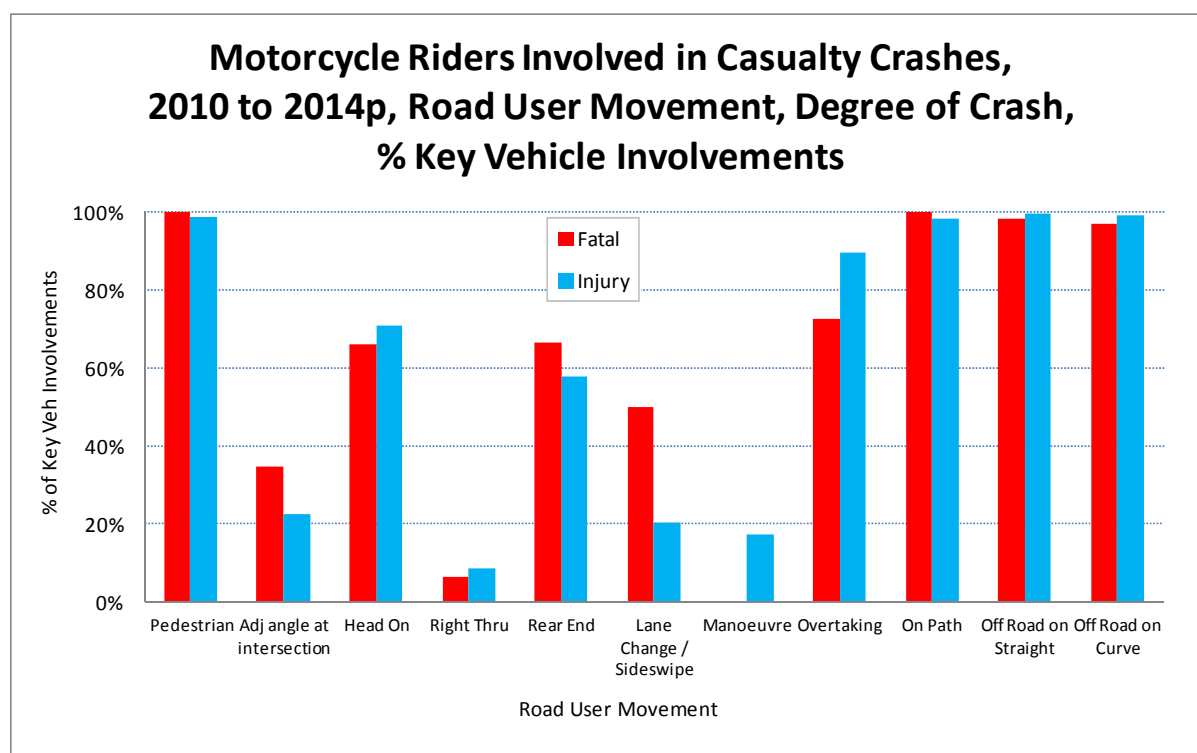
Motorcycle Riders Involved in Injury Crashes, 2010 to 2014p, Road User Movement



Key Vehicle Status by Road User Movement

A road traffic crash is any unpremeditated event reported to the police attributed to the movement of a road vehicle on the road. Road vehicles (motor vehicles, motorcycles, pedal cycles etc) and pedestrians involved in a crash are collectively referred to as the traffic units involved in the crash. Key vehicle status is coded for the traffic units involved in crashes and generally indicates the traffic unit manoeuvre which initiates the crash sequence. For example, in a right thru crash the traffic unit that turns across the path of the oncoming vehicle would be considered the key vehicle for that crash. It does not necessarily mean that vehicle was legally at fault. In the right thru crash example above the turning vehicle may have had a green turn arrow and the oncoming vehicle a red traffic light– the turning vehicle is clearly not at fault but is still considered the key vehicle for the crash. Nevertheless, it is a useful variable to identify contributing roles for a crash, particularly crashes involving multiple vehicles. Also note that in pedestrian crashes the key vehicle is always the traffic unit that collides with the pedestrian in the first impact. Any traffic unit involved in a single vehicle impact will also be the key vehicle by default.

The chart below shows the breakdown of motorcycle crash involvements in fatal and injury crashes by road user movement and the percentage that were considered key vehicles.



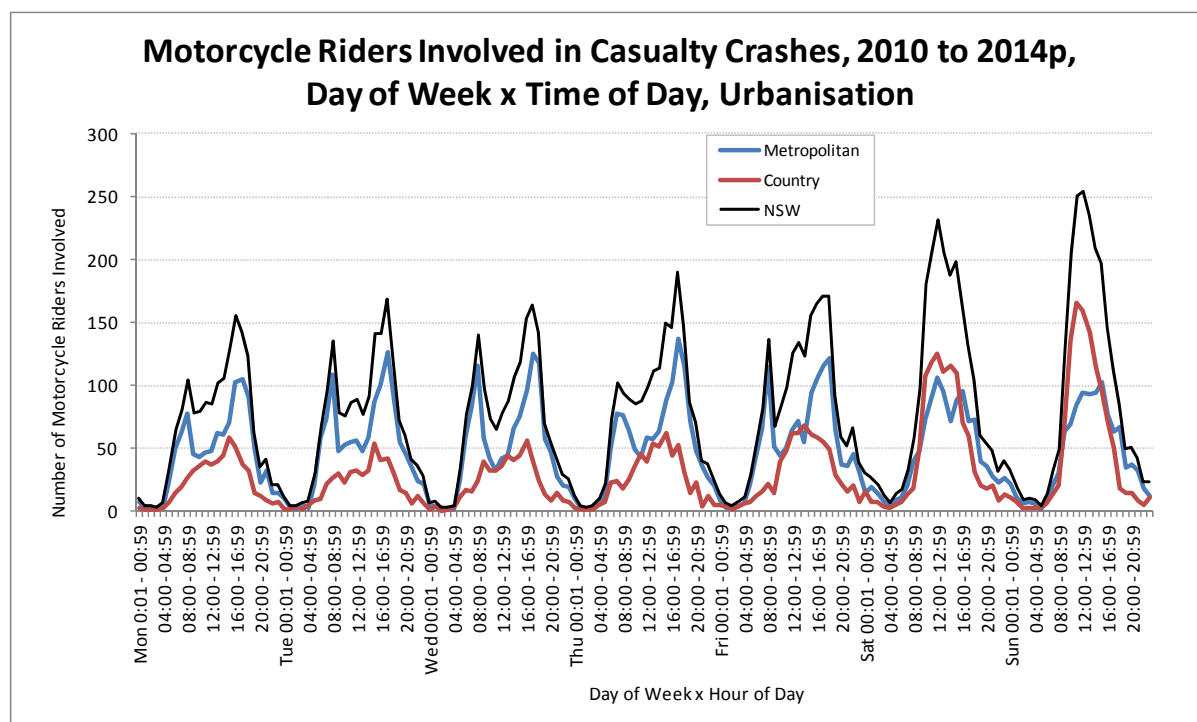
For a majority of fatal and injury head on crash involvements the motorcycle was the key vehicle (the vehicle likely to have been on the incorrect side of the road). Similarly motorcycle riders comprised more than half of all rear end fatal and injury crash involvements (the vehicle likely to have run into the rear of another vehicle). Motorcyclists accounted for half of the key vehicles in fatal crash involving a lane change / sideswipe, but

only 10 per cent of the injury crashes. For the majority of adjacent angle at intersection crashes and right thru crashes the motorcycle rider was not the key vehicle.

Day of Week by Time of Day

The following chart shows motorcycle rider casualty crash involvements by day of week, time of day and urbanisation.

The chart highlights that motorcycle crash involvements peak on week days during the morning and afternoon peak hours in the metropolitan area as well as across the day from around 10am to 5pm on weekends on country roads.

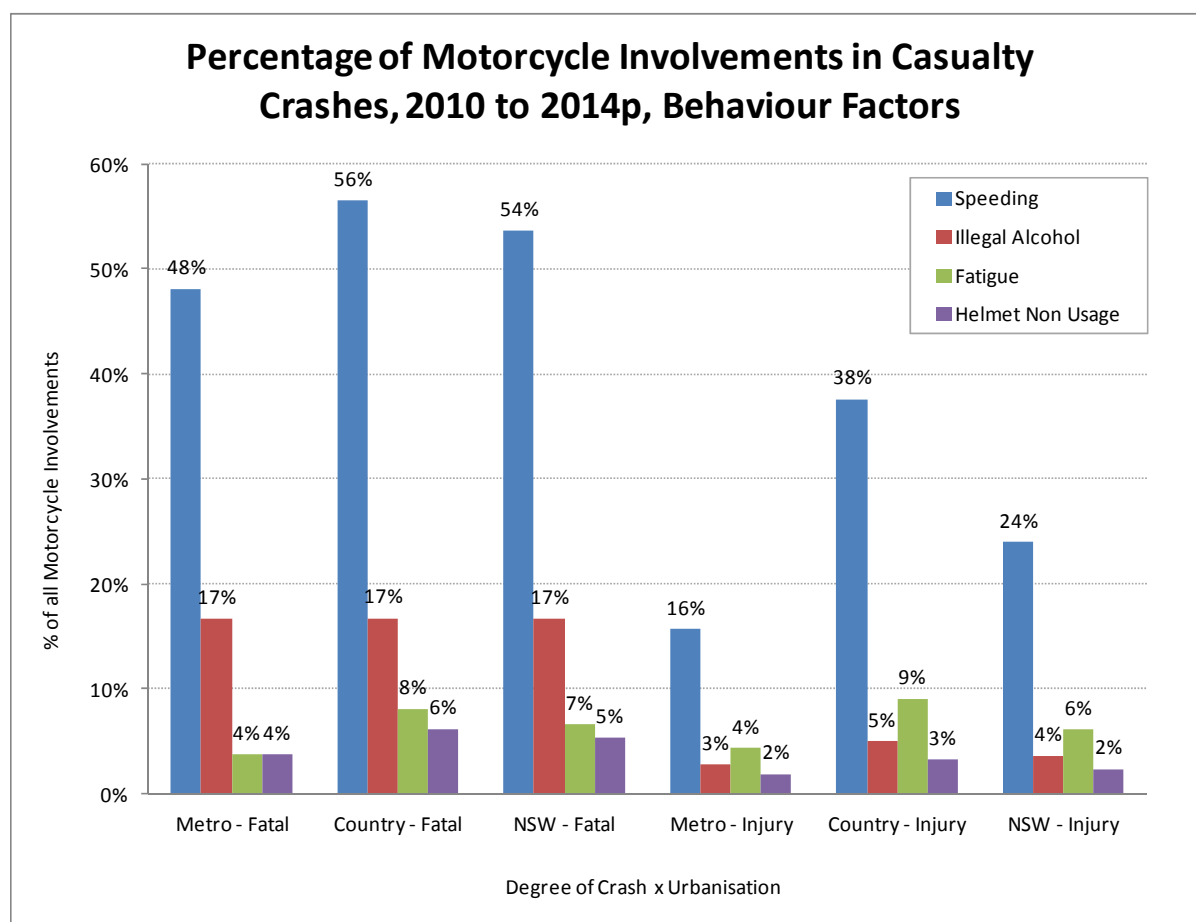


Behavioural Factors

Generally the risk behaviours (speed, fatigue, illegal alcohol and helmet non usage) are more likely to be involved in more serious crash involvements (fatal versus injury) and by urbanisation (country versus metropolitan).

Excessive or inappropriate speed for the motorcycle rider is the dominant risk factor present – implicated in more than half of all fatal crash involvements and around one quarter of all injury crash involvements. Speed is also more prevalent in the country areas of the State. However, it should be noted that the criteria used to identify speed involvement may over estimate the involvement of speed for motorcycles, certainly compared with other vehicle types. For example, speed is flagged when a vehicle skids, slides or loses control (excluding certain triggering conditions) – a two wheeled motorcycle is more likely to experience this than a vehicle with four wheels and more stability.

Illegal alcohol is implicated in around one-sixth of fatal crash involvements and around four per cent of injury crash involvements. For fatal crash involvements this result was consistent for metropolitan and country areas. Around 7 per cent of fatal crash involvements and 6 per cent of injury crash involvements involved fatigue, with the country areas experiencing slightly higher levels of fatigue involvement.

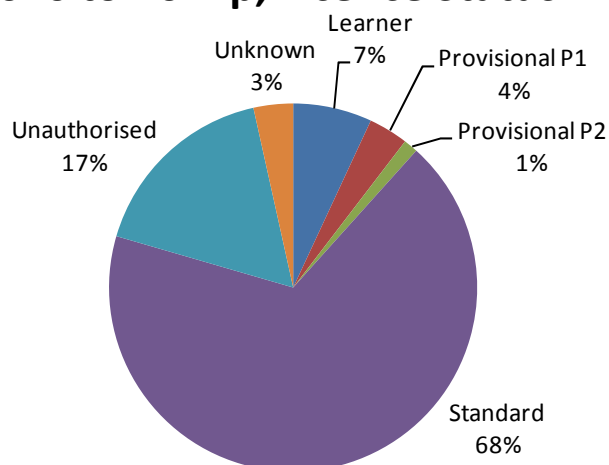


Typically these risk factors are also more prevalent amongst younger motorcycle riders, particularly for those who were unauthorised to ride a motorcycle on a public road.

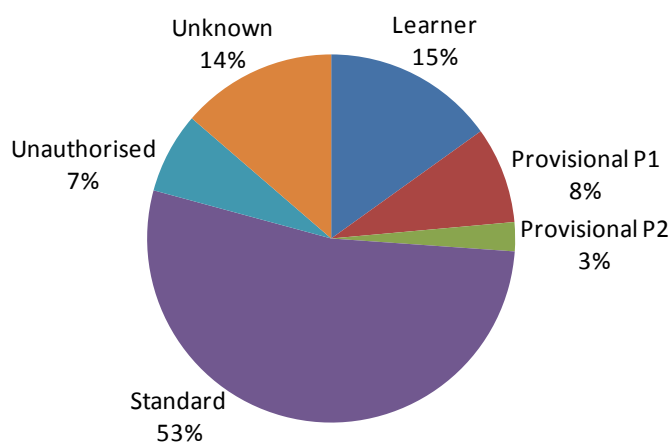
Licence Status

The majority of motorcycle riders involved in fatal and injury crashes hold a standard licence. However, a significant proportion of riders involved in fatal crashes are not authorised (17 per cent) whilst a significant proportion of riders involved in injury crashes are learners (15 per cent).

**Motorcycle Riders Involved in Fatal Crashes,
2010 to 2014p, Licence Status**



**Motorcycle Riders Involved in Injury Crashes,
2010 to 2014p, Licence Status**



Serious Injury Data 2005 to 2013

Since 2013 the Centre for Road Safety has undertaken a project to link police reported crash data with NSW health data. The project attempts to link casualty and controller records from the Police crash reports with hospital admissions and emergency department presentations as derived from the NSW health datasets.

Total serious injuries comprise of two groups of hospital admissions (matched and unmatched) where:

- Matched serious injuries are those persons from a police crash report who were linked with a hospital admission record and include people who were hospitalised as a result of a crash (on the same day or next), and did not die as a result of those injuries within 30 days of the crash.
- Unmatched serious injuries are people with a road related hospital admission record, did not die according to the hospital separation details and which were not linked to a person record from police crash report.

Preliminary results for motorcyclists over nine year period are detailed below.

Motorcyclists Serious Injuries (all hospital injuries), 2005 to 2013

	Serious injuries matched to Police Reports	Serious injuries unmatched to Police reports	Total serious injuries (all hospitalised injuries)	% Total serious injuries for all road users (all hospitalised injuries)
Motorcyclist	9,995	10,571	20,566	20%

Of the 104,105 serious injuries over the nine year period, more than 20,000 were motorcyclists (20 per cent).

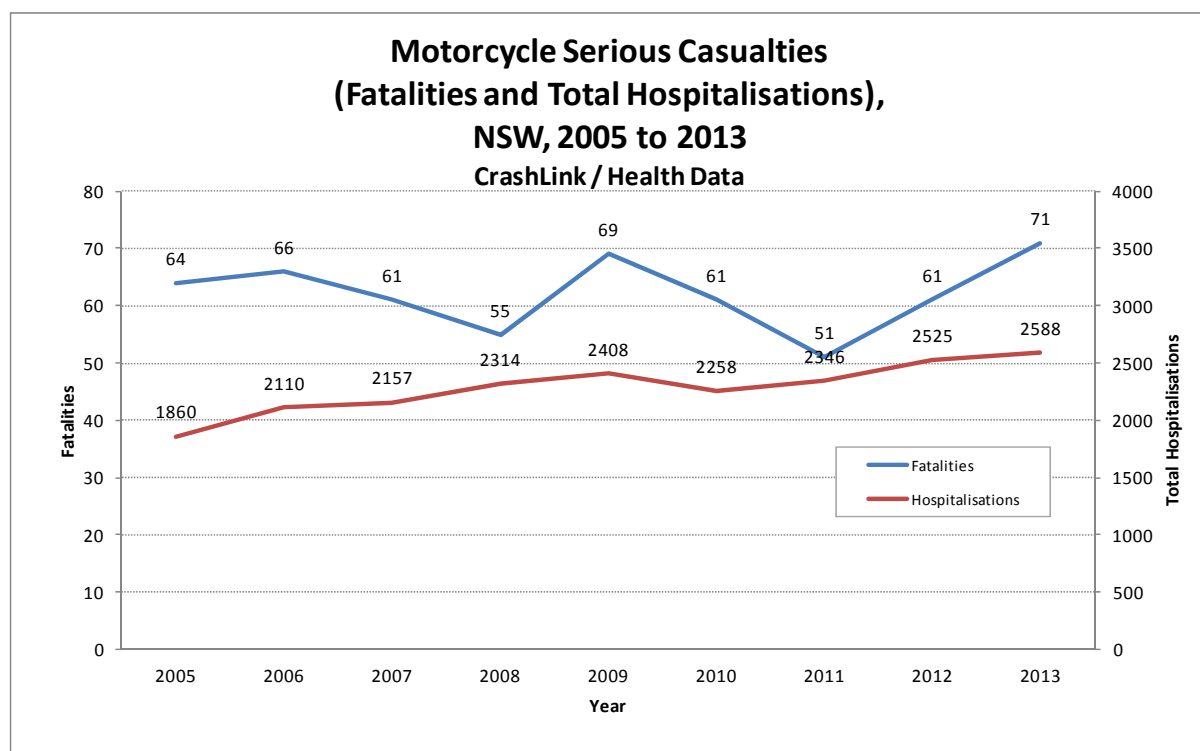
Trends for Motorcycle Casualties Derived From Data Linkage Project

The following chart displays the trends for motorcycle casualties as derived from the data linkage project. Casualty severities are defined as follows:

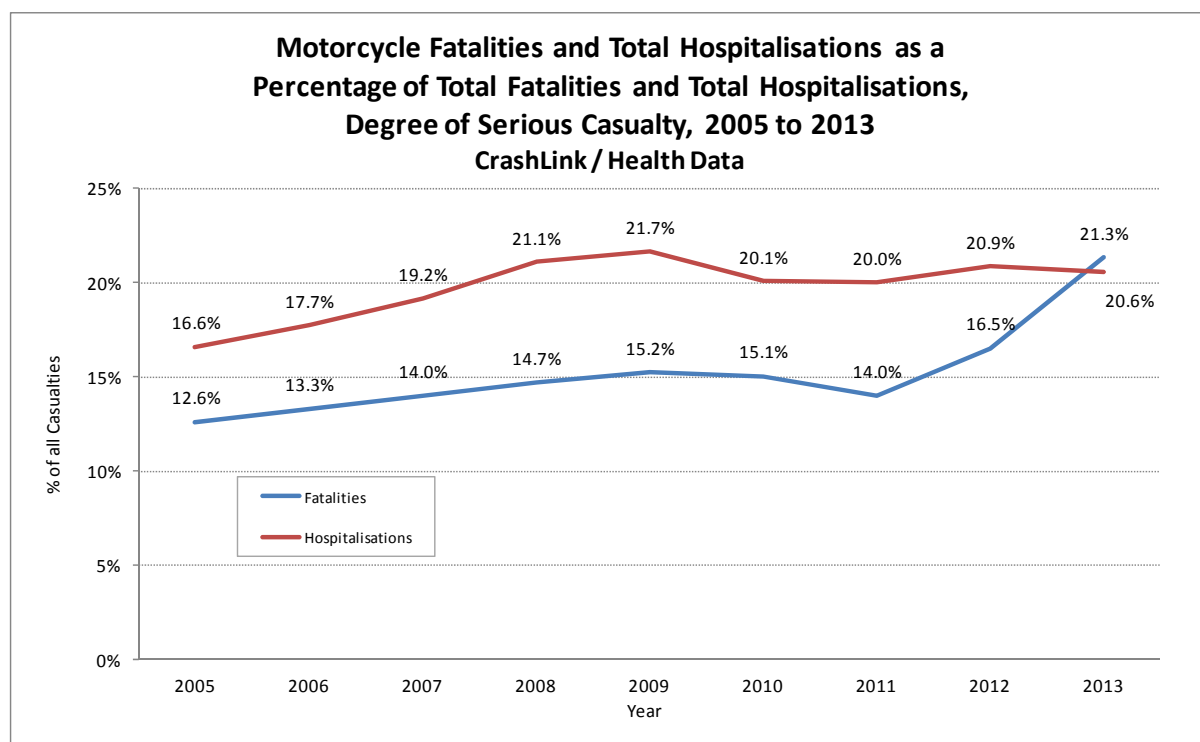
- A fatality is a person who dies within 30 days as a result of injuries received in a road traffic crash.
- A serious injury is a person who has been admitted to hospital on the day or day after a road traffic crash, who is either
 - matched to a controller or injury record from a Police crash report and does not die within thirty days of the crash (matched serious injury), or
 - not matched to a controller or injury record from a Police crash report and does not die within thirty days of the crash (unmatched serious injury).
- A moderate injury is a person who presents to an emergency department on the day or day after a road traffic crash, who is matched to a controller or injury record from a Police crash report and does not die within thirty days of the crash or has been admitted to a hospital as a result of the injuries received in the crash.
- A minor / other injury is a person identified as an injury in a Police crash report but is not matched with a hospital admission or emergency department presentation. This could mean that they had only minor injuries or their details could not be matched to a health record. Reason for non matching could include non reporting of the crash to the Police, the crash occurred in the border regions of the State with the patient being transferred to an interstate hospital, or miscoding of the critical identifying details used in the data linkage process.

As mentioned previously there were a total of 20,566 motorcycle serious injuries identified from the hospital admission on NSW roads over the nine year period 2005 to 2013.

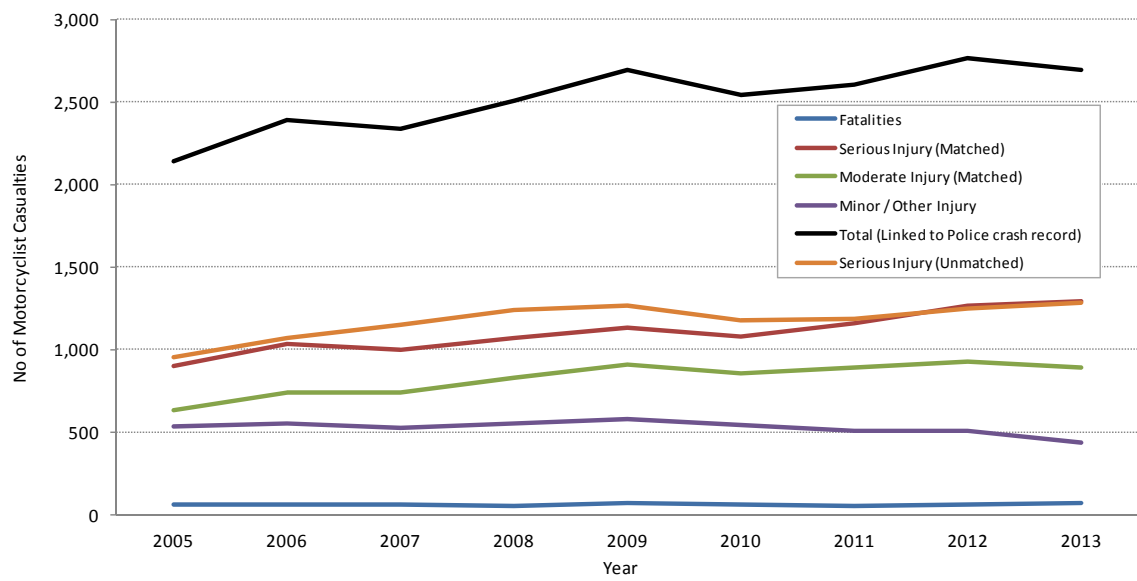
The following chart shows the trends for motorcycle serious casualties [fatalities and serious injuries (total hospitalisations)] between 2005 and 2013.



As identified previously the trends for motorcyclist fatalities have been relatively stable over the last nine years but the 2013 result of 71 fatalities was the highest recorded since 1990 (with 90 fatalities). However, motorcyclist total hospitalisations have been steadily increasing, up by 39 per cent between 2005 and 2013. Consequently, motorcyclists increased as a proportion of the overall number of serious casualties over the nine year period 2005 to 2013.



Motorcycle Casualties, Degree of Casualty, 2005 to 2013 CrashLink / Health Data Linkage



Characteristics of Motorcycle Fatalities and Serious Injuries

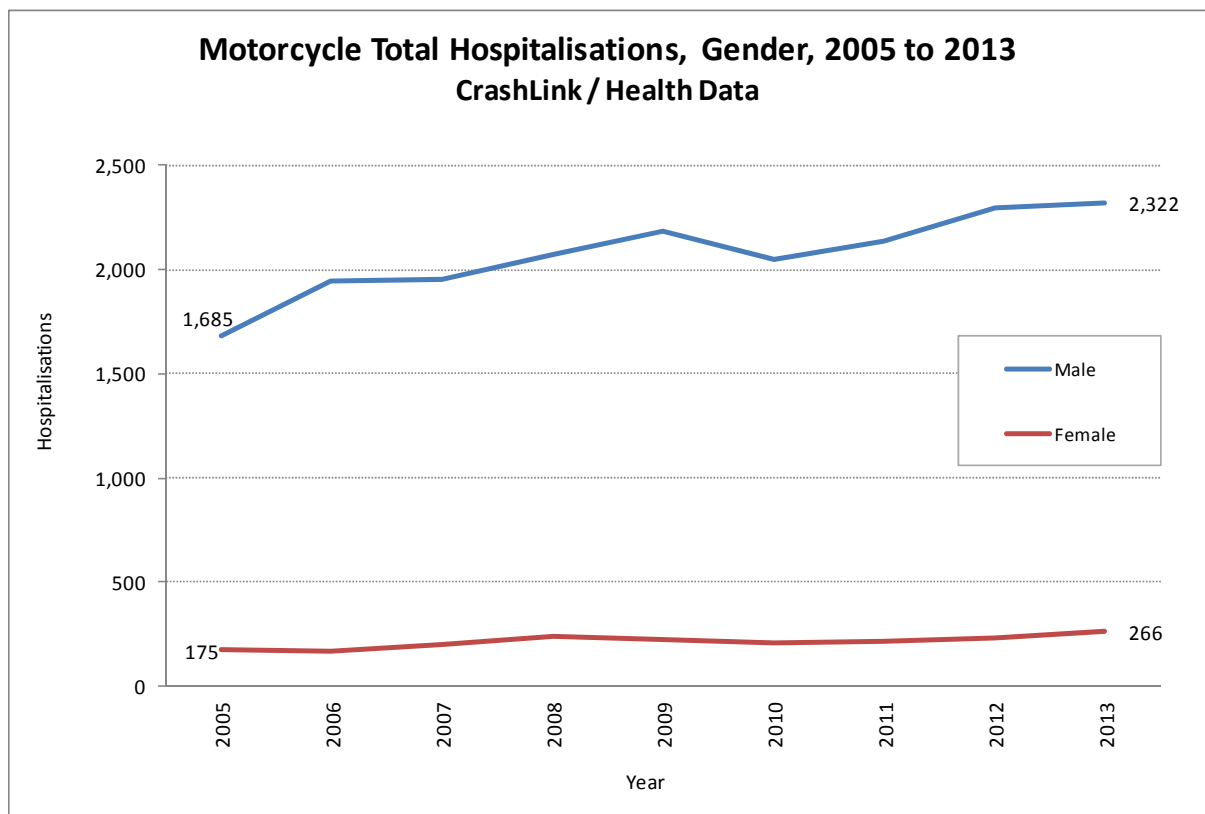
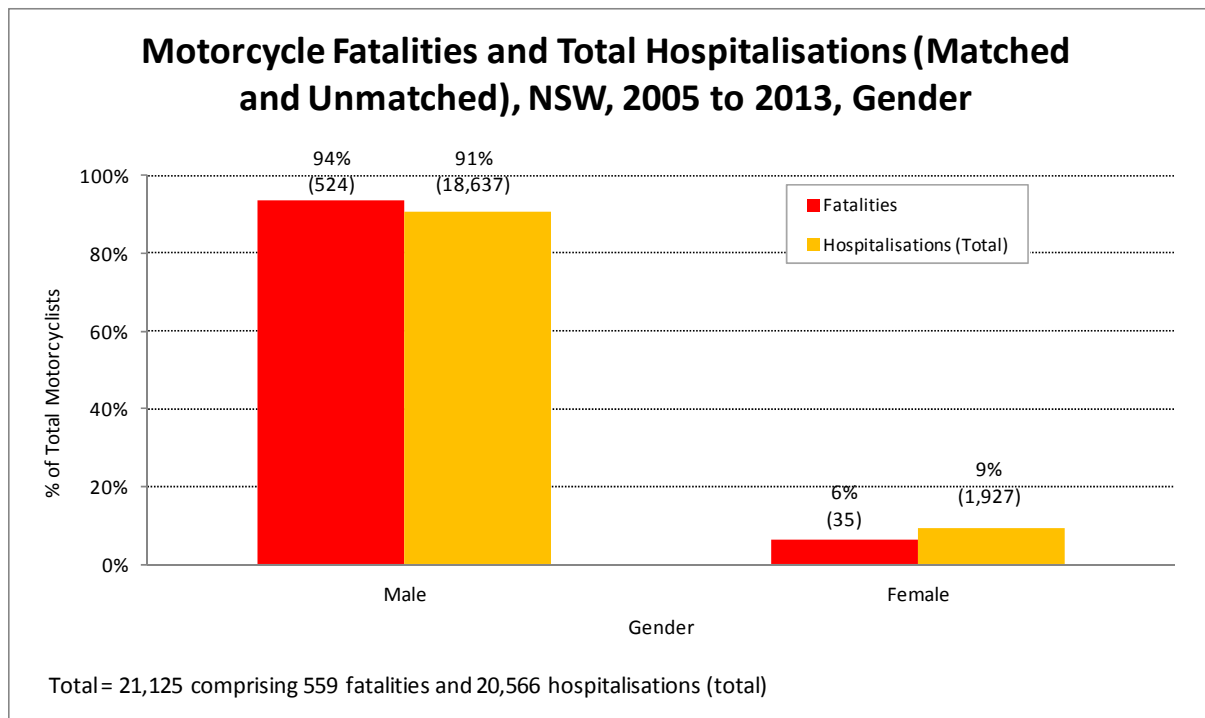
The following section compares the characteristics of motorcycle fatalities and motorcycle serious injuries (total hospitalisations).

The characteristics that have been investigated are limited to demographics because age and gender are only available for total hospitalisations. Other characteristics are only available from the matched hospitalised data set and are detailed in a later section.

Gender

The overwhelming majority of motorcycle serious injuries are male – 94 per cent of fatalities and 91 per cent of total hospitalisations.

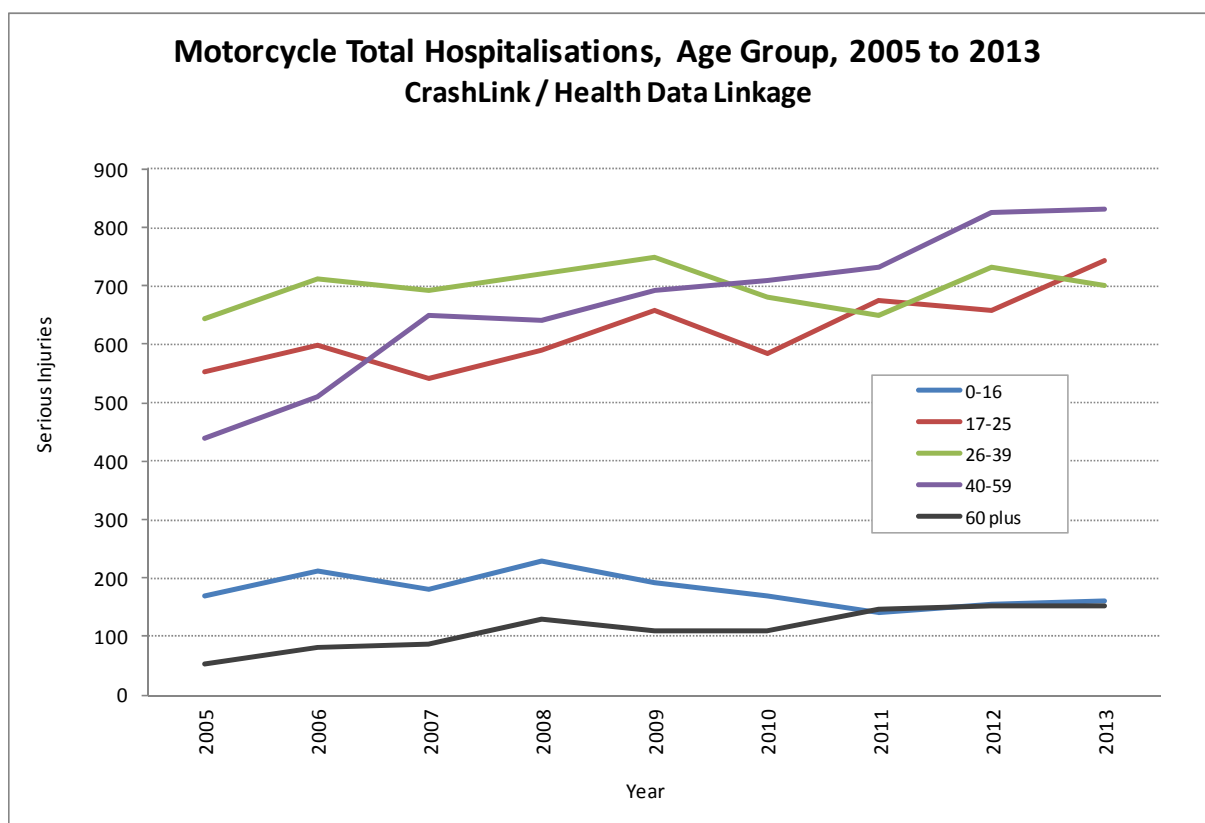
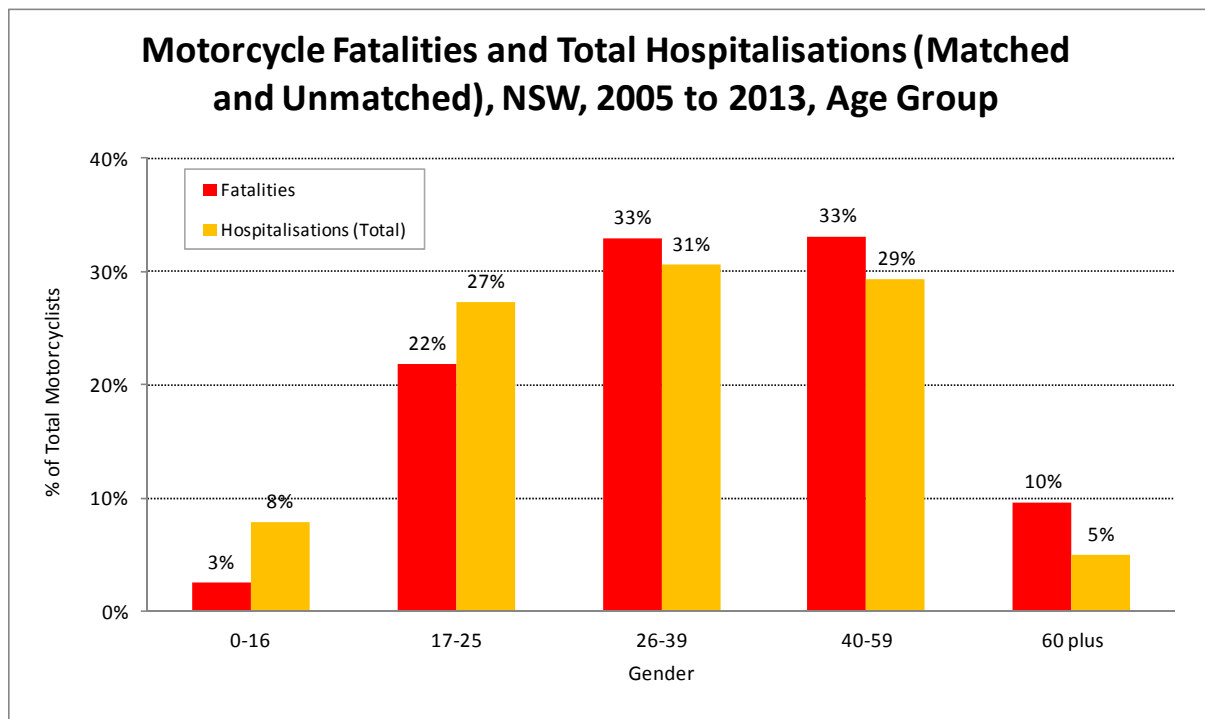
Hospitalisations have been increasing for both genders over the nine year period with females (up by 52 per cent) increasing slightly faster than males (up by 38 per cent).



Age Group

Compared with motorcycle fatalities, the age distribution for total hospitalisations is skewed towards younger age groups – 35 per cent of total hospitalisations are aged under 26 years compared with 25 per cent of fatalities.

The strongest increases in total hospitalisations over the nine year period were experienced by the 40 to 59 year old age group (up by 90 per cent) and the 60 years or more age group (up by 185 per cent).



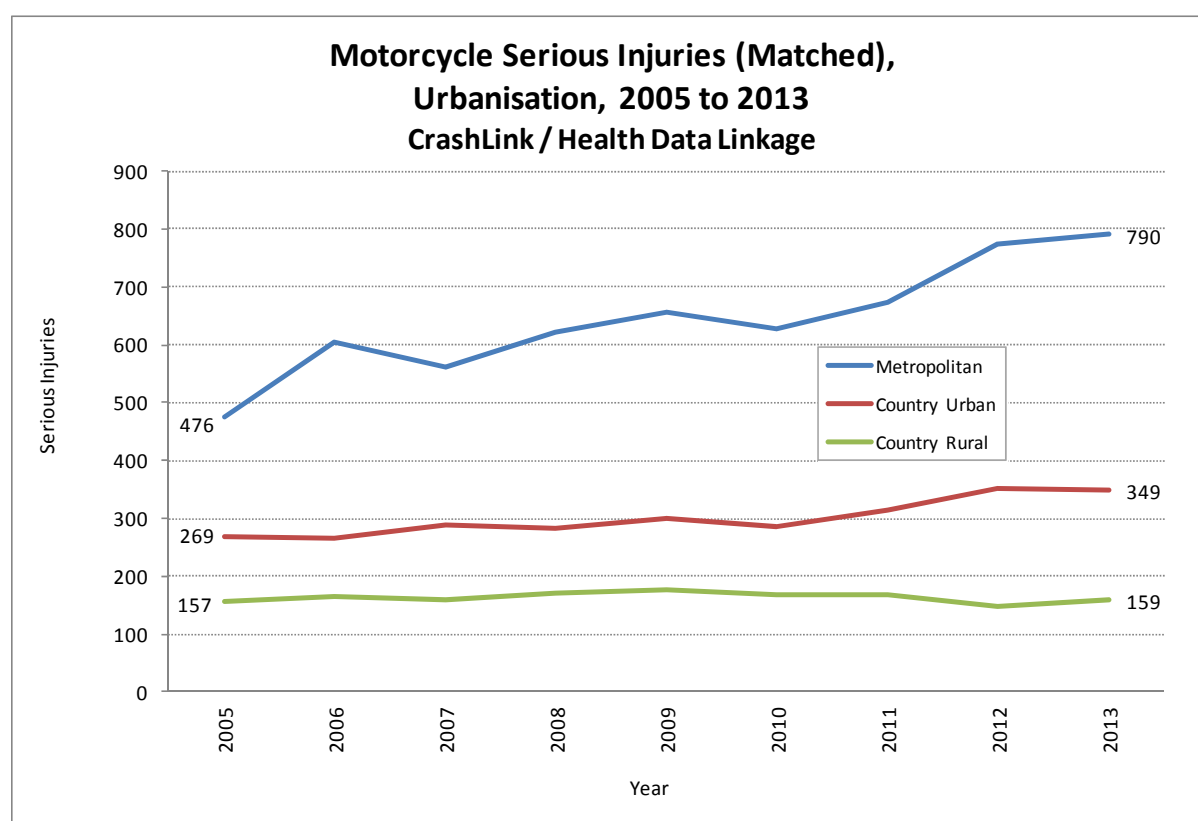
Trends for Matched Motorcycle Hospitalisations

The characteristics that have been investigated for the matched motorcycle hospitalisations include location, day of week, time of day, road user movements and behavioural factors.

Urbanisation

Over the nine year period 2005 to 2013, almost 60 per cent of motorcycle hospitalisations (matched) occurred in the metropolitan areas. In contrast the majority of motorcycle fatalities occurred on country roads and only 38 per cent of fatalities occurred in the metropolitan areas.

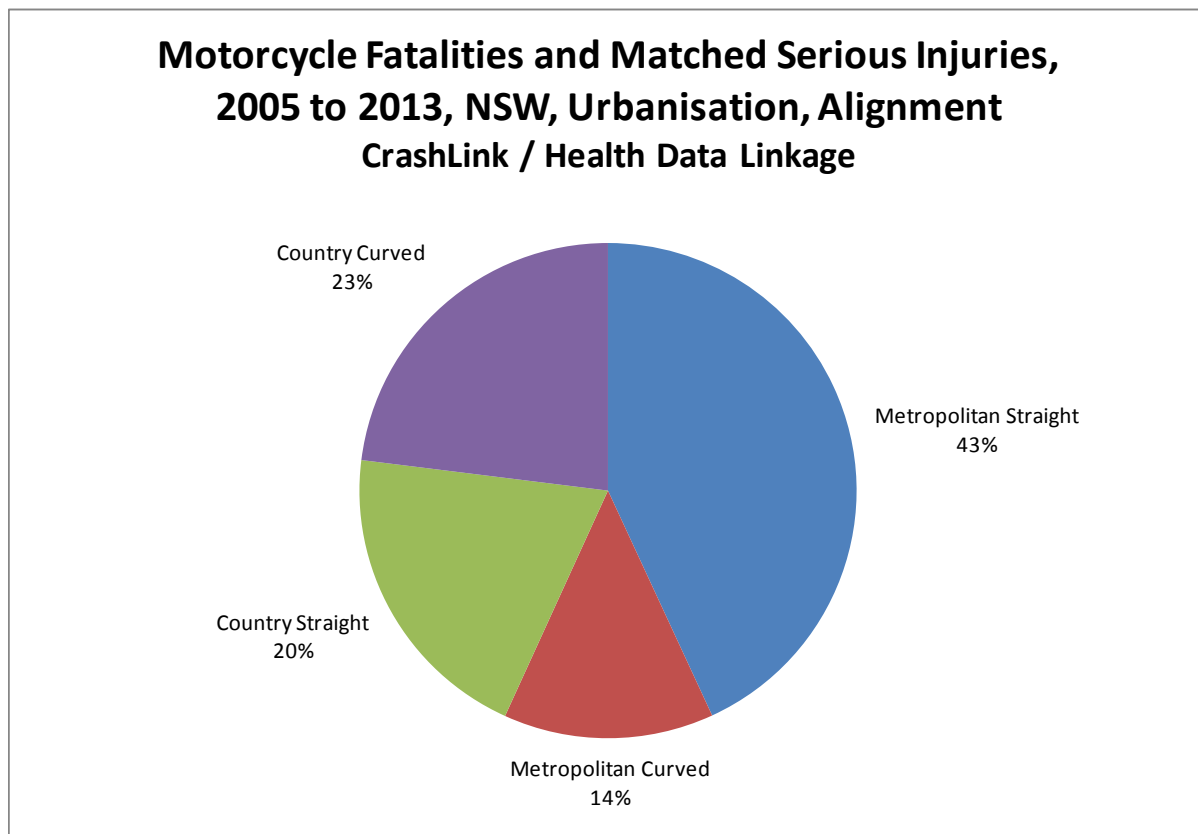
The largest increase in matched motorcycle hospitalisations has also been experienced in the metropolitan areas, up by 66 per cent over the nine year period.



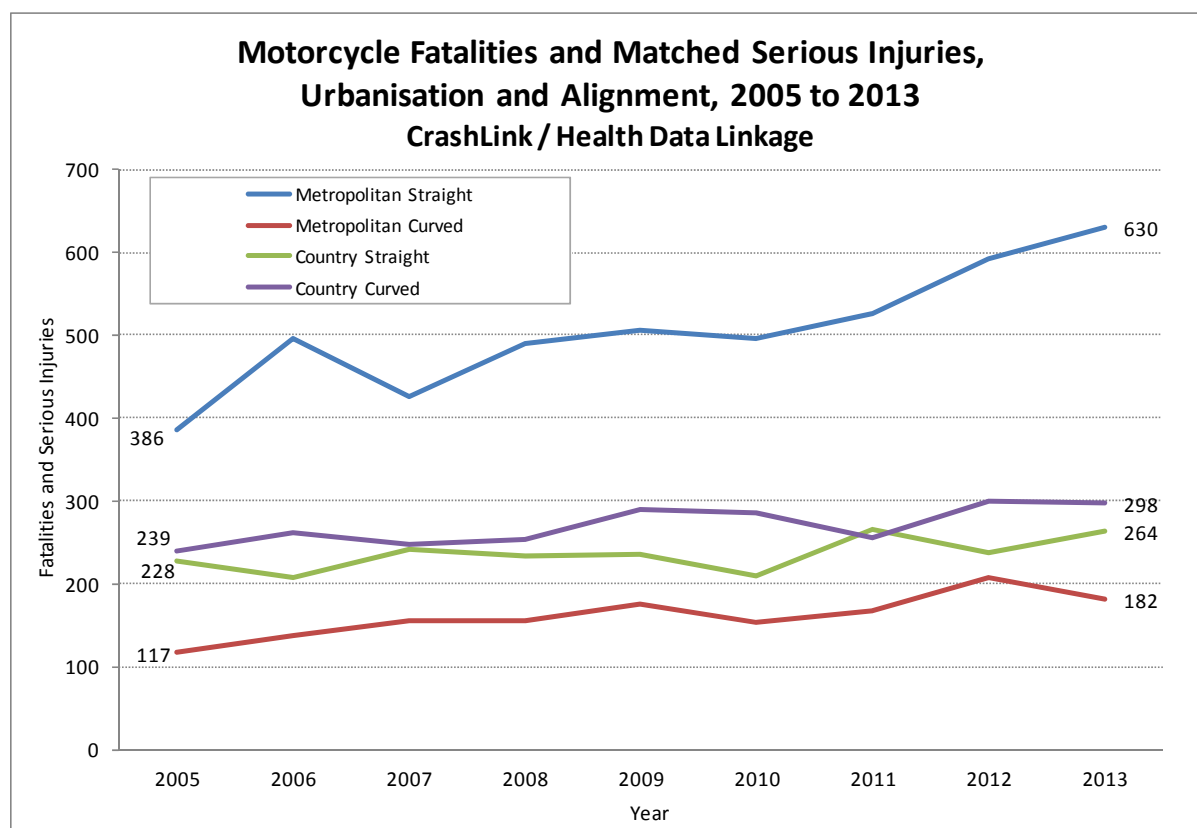
Road Alignment

Nearly half (43 per cent) of all motorcycle fatalities and matched serious injuries occur on straight metropolitan roads, whilst another 14 per cent occurred on metropolitan roads with curves.

Forty-three per cent of motorcycle fatalities and serious injuries occurred on country roads, however more than half of these occurred on curves.



Over the nine year period the largest percentage increases occurred on metropolitan straight roads (up 63 per cent) and metropolitan curved roads (up by 56 per cent).

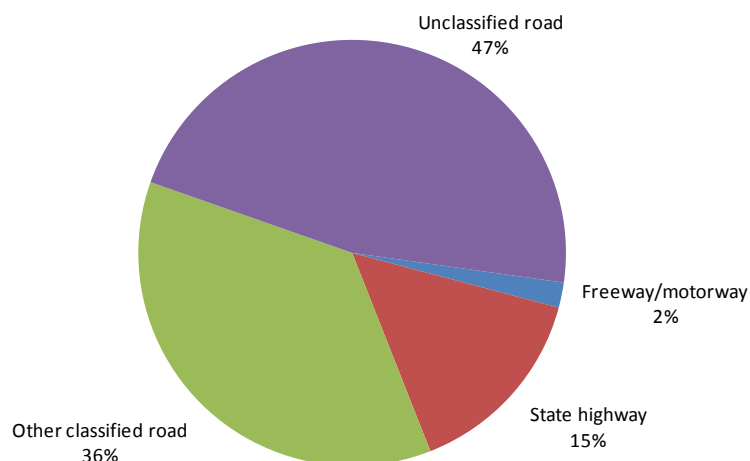


Location Features

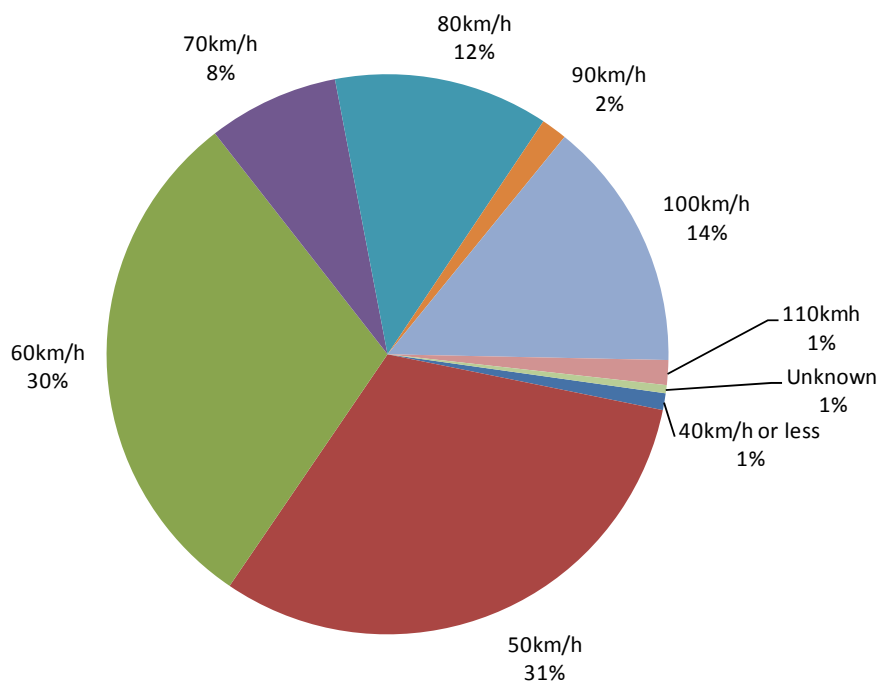
Nearly half of all motorcycle fatalities and matched serious injuries occurred on unclassified roads and around two-thirds occurring on roads with a posted speed limit of 60km/h or less.

However, motorcycle fatalities are slightly more prevalent on high speed roads.

**Motorcycle Fatalities and Matched Serious Injuries,
2005 to 2013, NSW, Road Classification**
CrashLink / Health Data Linkage



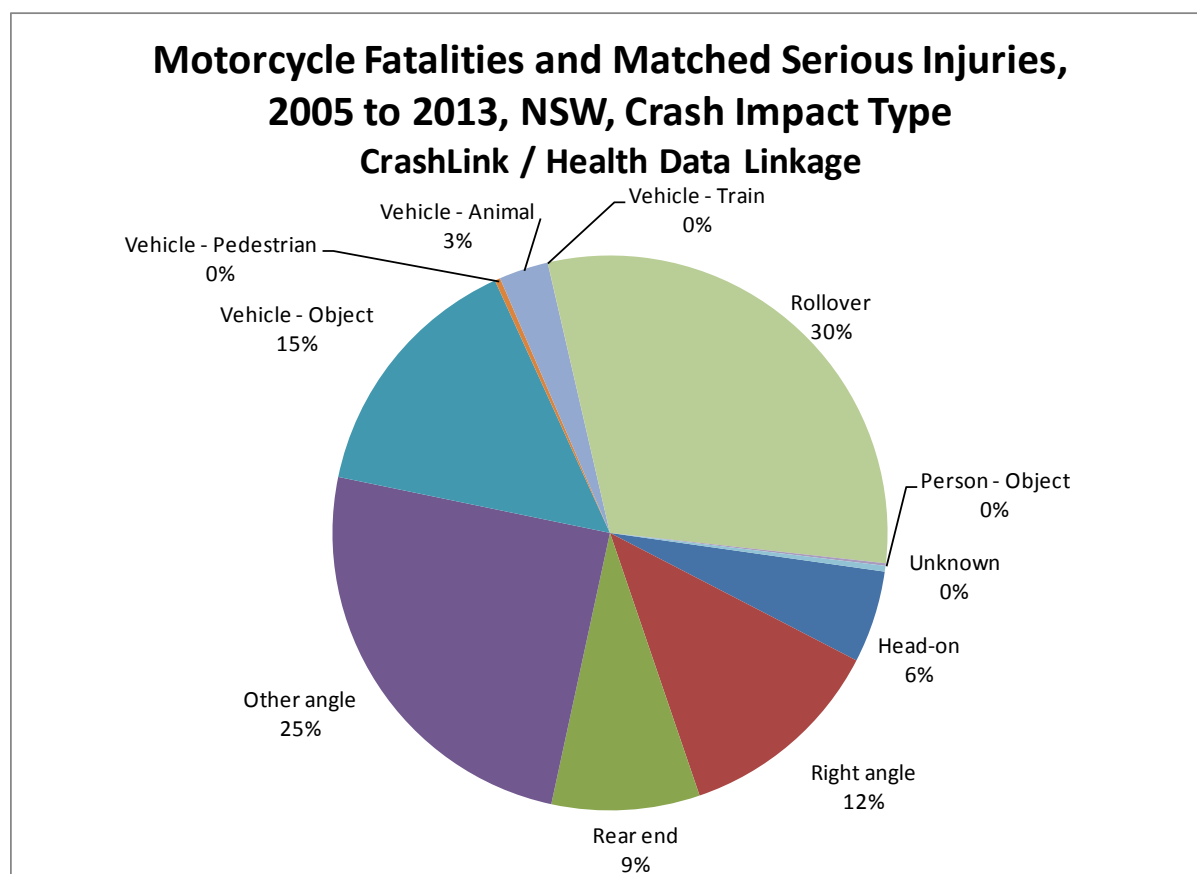
**Motorcycle Fatalities and Matched Serious Injuries,
2005 to 2013, NSW, Speed Limit**
CrashLink / Health Data Linkage



Crash Impact Type

Just over half of all motorcycle fatalities and matched serious injuries involve a vehicle to vehicle first impact, with the majority of these involving same direction or turning type crashes.

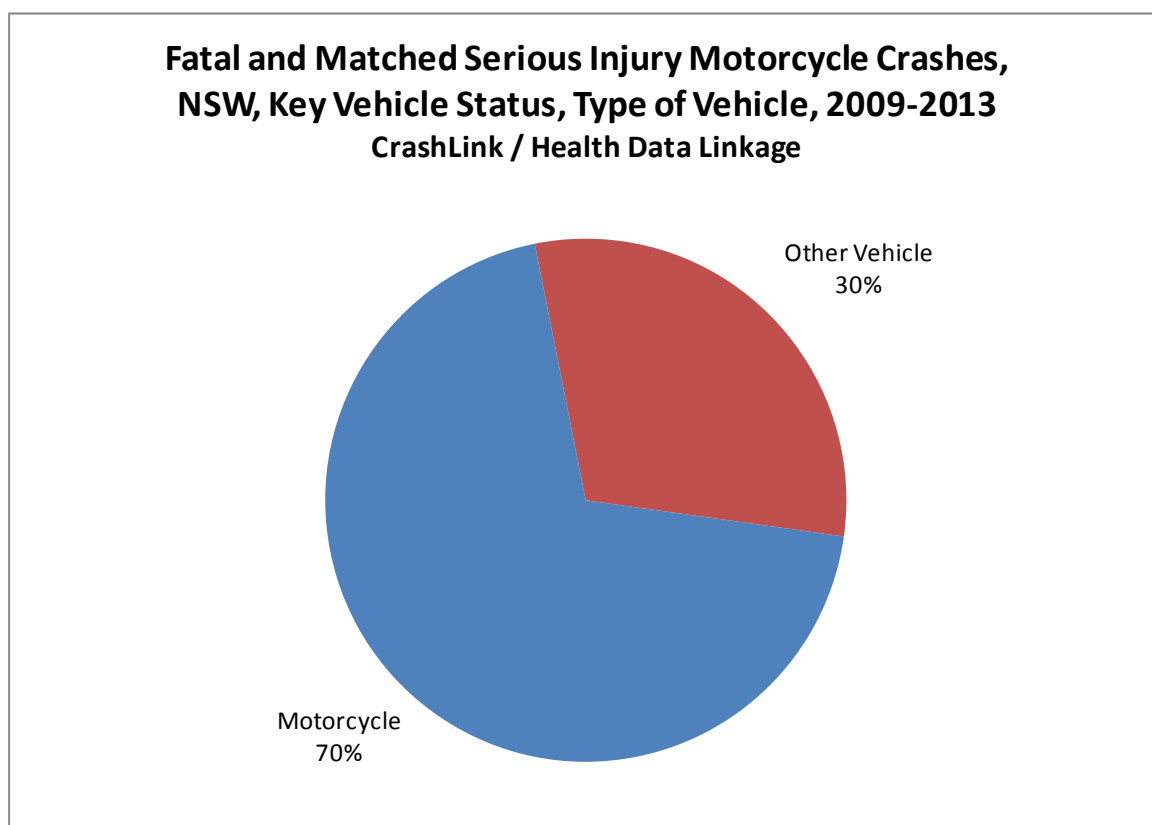
Almost one third involve a rollover (including slide along the roadway), and 15 per cent involved a vehicle into object crash with trees/bushes and guardrails the most common object impacted.



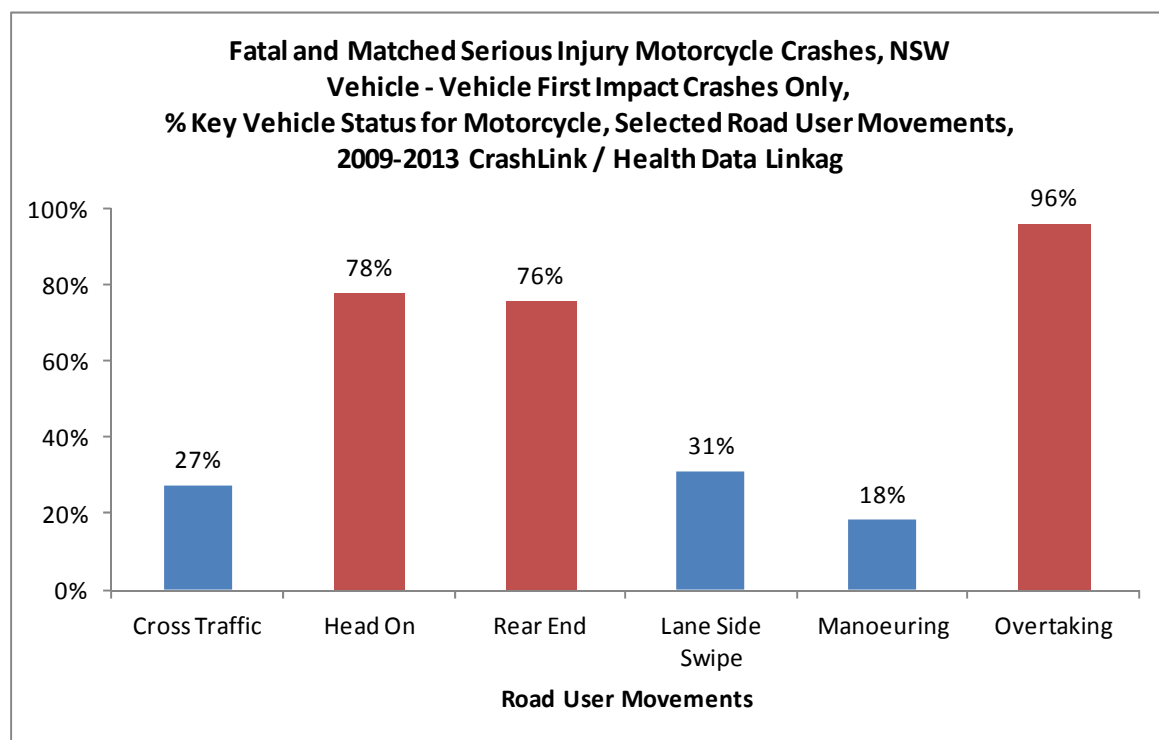
On metropolitan roads vehicle to vehicle impacts account for almost two-thirds of all motorcycle fatalities and matched serious injuries, but on country roads single vehicle crashes account for two-thirds of all motorcycle fatalities and matched serious injuries.

International and domestic studies have shown that crashes are multi-factorial in nature and therefore the crash database does not assign fault in crashes. However, key vehicle status in the road user movements of coding of crashes can suggest the traffic unit largely responsible for the crash occurring.

Motorcycles were found to be the key vehicle in 70 per cent of all motorcycle fatal and matched serious injury crashes.

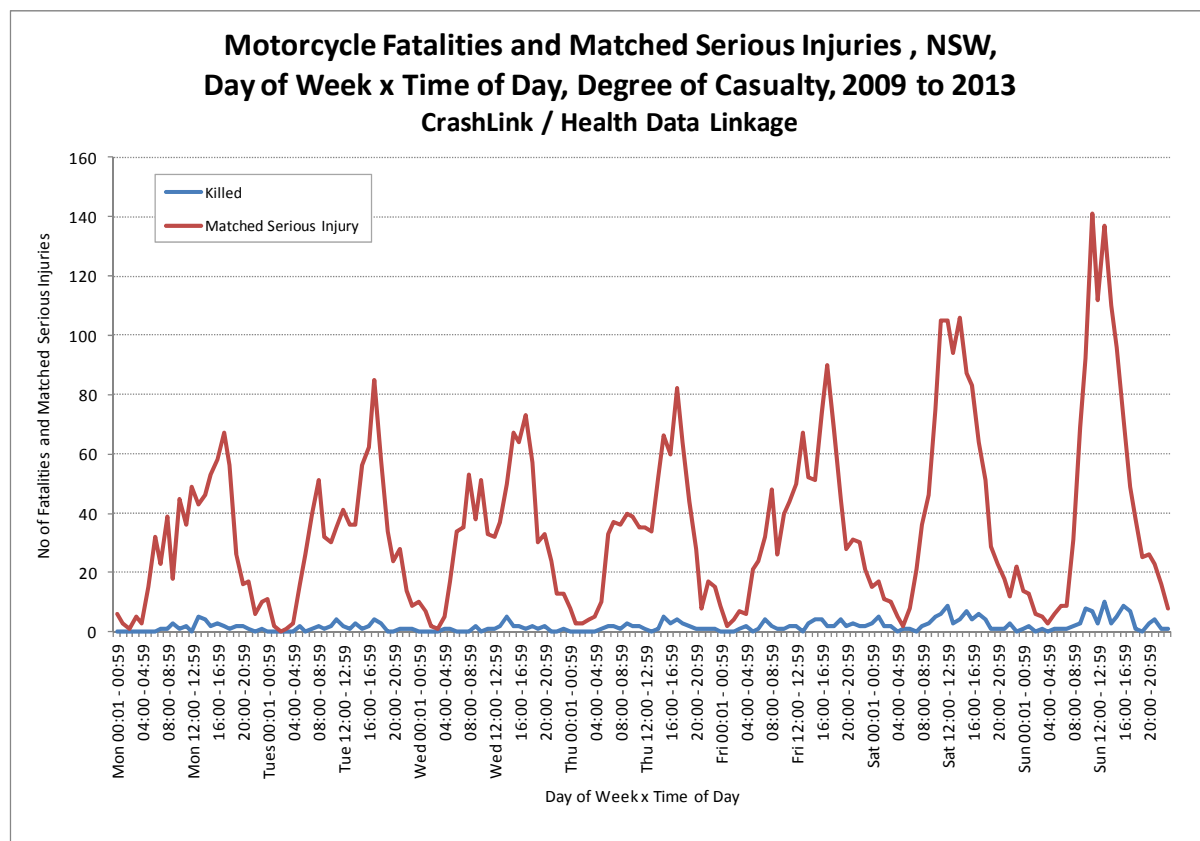


However, in motorcycle fatal and matched serious injury crashes with a vehicle to vehicle first impact, the other vehicle was the key vehicle in the majority (60 per cent) of crashes. This figure is not experienced for all types of vehicle to vehicle crashes. For some vehicle to vehicle serious crashes involving a motorcyclist, such as head on (not overtaking), rear enders and overtaking, motorcyclists account for majority of key vehicles in these impacts. For other vehicle to vehicle crashes, such as cross traffic at intersections, lane change / sideswipe and manoeuvring crashes, motorcyclists are in the minority as the key vehicle.



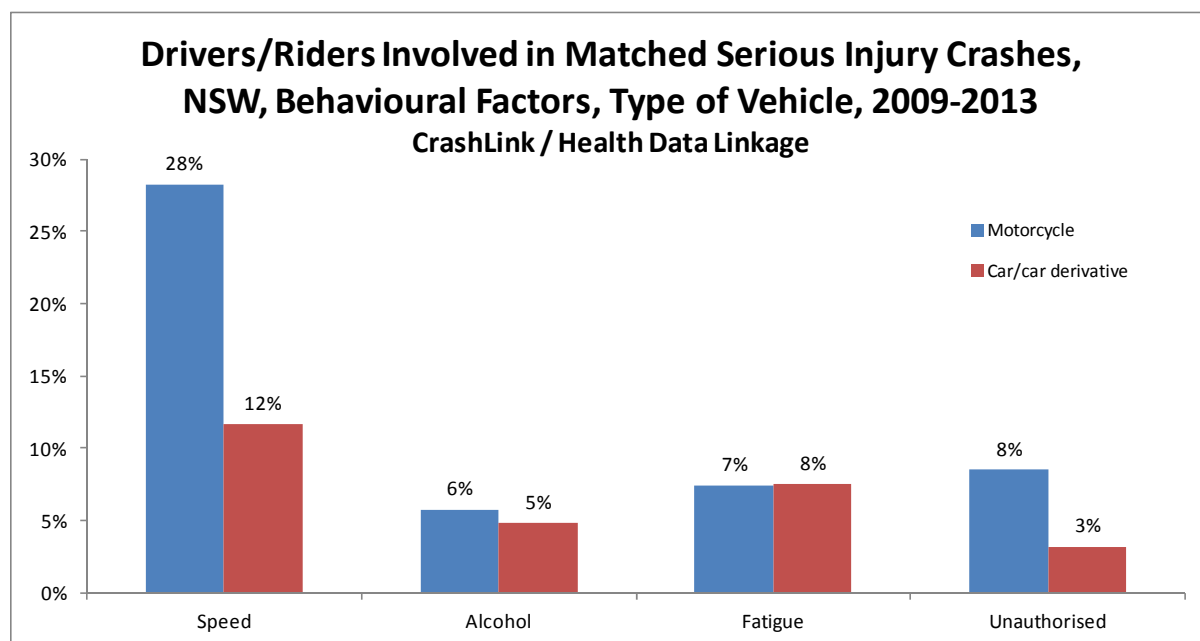
Day of Week x Time of Day

Fatality and matched serious injury patterns aggregated over the five year period 2009 to 2013 are similar during the weekdays with trauma peaking during afternoon commuting hours across NSW. Greater volumes of fatalities and matched serious injuries occur on the weekend days, in particular between 10am and 6pm.



Behavioural Factors

During the five year period 2009 to 2013 motorcycle riders experienced significantly higher incidences of speed (excessive or inappropriate) and unauthorised licence status in matched serious injury crashes compared with car drivers.

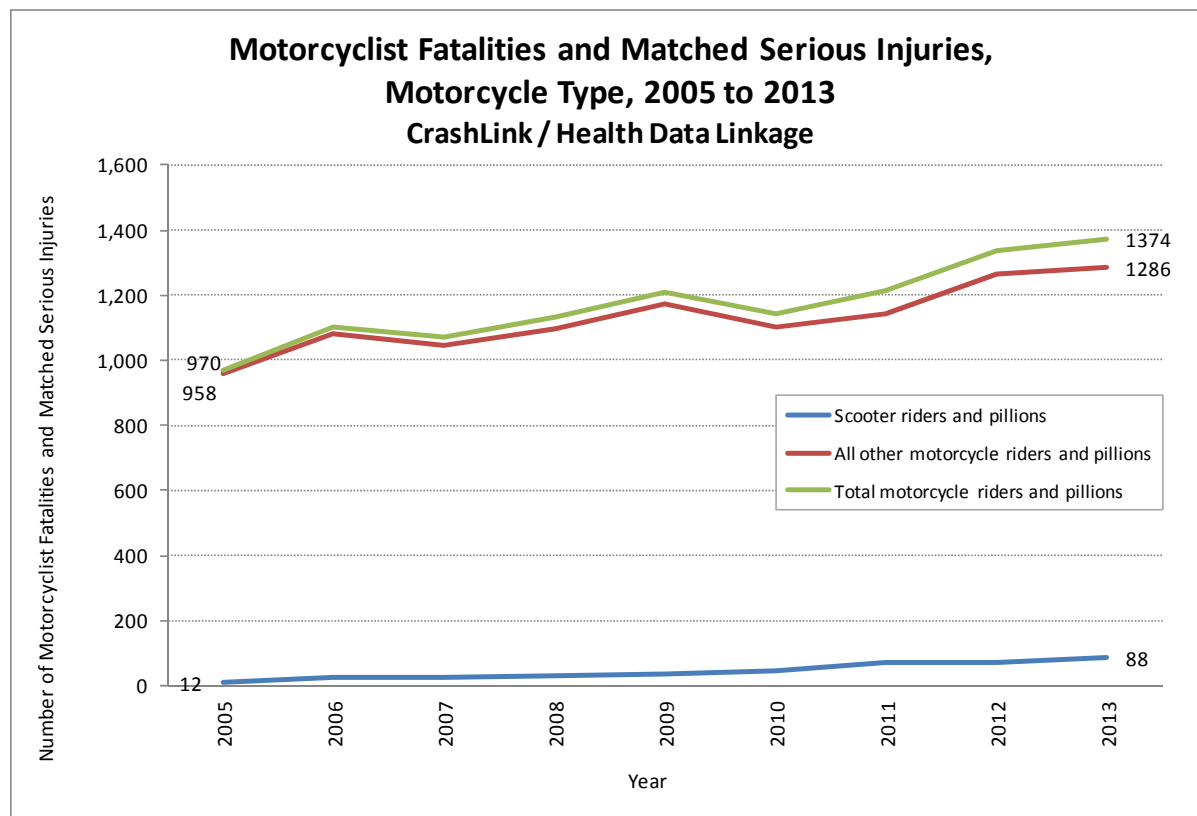


Motorcycle riders involved in matched serious injury crashes are 2.5 times as likely to have a low but legal level of alcohol, compared with car drivers. Unauthorised riders involved in serious injury crashes also have raised levels of speed (34 per cent), alcohol (59 per cent) and fatigue (13 per cent) involvement.

Compared with fatal crash involvements, motorcyclists involved in matched serious injury crashes have around half the levels of speed (28 per cent versus 53 per cent), illegal alcohol (6 per cent versus 17 per cent) and unauthorised riding (8 per cent versus 19 per cent).

Fatality and Matched Serious Injury Trends for Scooter Riders and Pillion

Since the turn of the century there has been a significant growth in motorcycle registrations, particularly motor scooter registrations. Reflecting this growth in exposure levels the scooter fatalities and serious injuries make up a growing proportion of all motorcyclist fatalities and serious injuries, rising from 1 per cent in 2005 to 6 per cent in 2013. This reflects the rise in scooters registrations over this period, though scooter registrations have levelled off over the past couple of years.



The key characteristics of scooter fatalities and matched serious injuries during the nine year period 2005 to 2013 which differ from motorcyclist fatalities and matched serious injuries were:

- Almost a quarter are females
- Around two thirds are aged between 21 and 49 years
- The majority occur in the metropolitan areas (83%) with much of the growth over the last nine years generated from crashes in metropolitan areas.
- Scooter casualty numbers are slightly higher on a weekday compared to a weekend day.

Discussion

Whilst NSW continues to experience an increase in the popularity of motorcycling as a mode of travel, there will be potential for increased trauma for this road user group.

Whilst the overall numbers of casualties have been increasing over the past decade, the rate of fatalities per 10,000 motorcycles has actually been declining in line with the rate for occupants of other motor vehicles. However, the fatality rate per vehicle for motorcyclists continues to be around seven times that for other motor vehicle occupants.

Motorcycle casualty severities can be seen to be driven by the dynamics of age group, gender, urbanisation, speed zone, location type, crash type and behavioural risk factors. There are also notable differences between these characteristics for fatalities when compared with those for serious injuries.

In the context of the NSW Road Safety Strategy objective of reducing serious road trauma by 30 per cent by 2021, the flat lining trend for motorcycle fatalities and an increasing trend for motorcycle injuries represent a significant challenge.

In light of this challenge the Government is progressing targeted initiatives through the NSW Motorcycle Safety Strategy 2012 – 2021 and three year action plans. The initiatives include, improving rider behaviour (including speeding, impairment due to alcohol, drugs and fatigue, riding manoeuvres), visibility, protective clothing, vehicle stability and improving the road environment.

State Insurance Regulatory Authority

The State Insurance Regulatory Authority provides the following information regarding various claims under the NSW Compulsory Third Party (CTP) scheme.

Overview of the NSW Compulsory Third Party (CTP) scheme

CTP insurance is compulsory in all Australian States and Territories and is designed to ensure that compensation is available to those who are injured in motor vehicle accidents. In NSW, motor vehicle owners are required to purchase a CTP insurance policy or 'Green Slip' before Roads and Maritime Services (RMS) can register the vehicle or renew its registration. The Green Slip covers the driver of a motor vehicle against personal injury claims from third parties – other road users (including pedestrians) who are injured in an accident involving the vehicle.

The NSW CTP scheme is a modified common law, primarily fault-based scheme operating under the Motor Accidents Compensation Act 1999 (MAC Act). A person injured, but not at fault, in an accident can make a claim for a range of benefits under the CTP scheme, including medical and related costs, past and future economic loss, and for those with permanent injuries, payments for non-economic loss or 'pain and suffering'.

The NSW CTP scheme also provides some benefits irrespective of fault: it covers the first \$5,000 of treatment costs and lost income under an Accident Notification Form (ANF). An ANF scheme allows for early notification and quick payment of treatment expenses and lost income incurred within the first six months of an accident. An injured person who is not at fault in the accident may still lodge a full personal injury claim if they reach the \$5,000 limit under the ANF and have ongoing medical treatment or rehabilitation needs, or require further time off work.

The Green Slip also provides access to the Lifetime Care and Support scheme (LTCS scheme) for the severely injured. The LTCS scheme is separately funded and administered by Insurance and Care NSW (which has assumed the functions of the Lifetime Care and Support Authority).

The CTP Scheme is privately underwritten and Green Slip insurance policies are only available from private insurers licensed by the State Insurance Regulatory Authority (which has assumed the functions of the Motor Accidents Authority). There are currently seven insurers in the market managed by five insurance companies – NRMA, QBE, Allianz (Allianz and CIC-Allianz), Zurich and Suncorp (AAMI and GIO). Prices vary between insurers and the SIRA offers a complimentary price comparison service and encourages motorists to 'shop around' for their Green Slip.

The NSW CTP Scheme also incorporates a Nominal Defendant Scheme, which provides compensation for injuries that result from motor vehicle accidents caused by the fault of an owner or driver of a vehicle that is uninsured or unidentified.

State Insurance Regulatory Authority (SIRA)

The State Insurance Regulatory Authority (SIRA) is a statutory body that was established by Parliament on 1 September 2015 under the State Insurance and Care Governance Act 2015. The SIRA brings together the regulatory functions of the WorkCover Authority and the Motor Accidents Authority, both of which were abolished by the Act.

The SIRA continues to perform the functions of the former MAA in monitoring and regulating the CTP personal injury insurance scheme for motor vehicles registered in NSW.

Role of the SIRA in promoting injury prevention and road safety

In addition to regulating the motor accidents scheme, a key objective of the SIRA is to provide funding for measures for preventing or minimising injuries from motor accidents and safety education. To this end, the SIRA has established a partnership with the Centre for Road Safety (CRS) within Transport for NSW, which is the Government's lead agency for road safety.

The SIRA contributes to the development and funding of work being delivered under the NSW Road Safety Strategy, and specifically the NSW Motorcycle Safety Strategy 2012-2021, through an MOU with Transport for NSW called the Road Safety Partnership. The SIRA is also a member of the Motorcycle Safety Implementation Working Group, which oversees delivery of the Strategy. Through this arrangement, the SIRA has contributed to a range of initiatives designed to promote and improve motorcycle safety. A brief outline of the projects supported in recent years is set out below.

Motorcycle Road Safety Audits

In 2012, the former MAA provided funds of over \$66,000 to the CRS to undertake safety reviews of four popular motorcycle routes. The results of the audits were then used to inform and prioritise road and roadside works and well as educate motorcyclists about the risks on those routes. This funding enabled CRS to expand their audit and the four routes were selected due to the frequency of injury crashes occurring on those routes.

Ride to Live Motorcycle Safety Campaign

In 2013-14 and 2014-15, the former MAA provided over \$2 million in funding to the CRS to contribute to the development and delivery of the Ride to Live motorcycle safety campaign. Ride to Live was developed using evidence from motorcycle crashes and with input from motorcycle rider groups and safety experts. The campaign included multi-media advertisements and a dedicated website with information and a range of hazard perception tests aimed at both motorcycle riders and vehicle drivers.

Improving Consumer Information about Motorcycle Protective Clothing

In 2010, the former MAA, under the auspices of the Australian Heads of CTP, commissioned a study of the potential options for increasing the availability of credible consumer information for motorcycle safety clothing in Australia and New Zealand. The project was coordinated by The George Institute for Global Health and found that motorcycle riders sought information on both the injury prevention and thermal qualities of protective clothing.

The report on the study confirmed the benefits of motorcyclists wearing protective gear. Wearing any boots, rather than joggers or shoes, halved the chance of a foot injury in a crash. The wearing of protective pants, jackets and gloves all reduced the likelihood of hospital admission in the event of a crash. Body armour was shown to reduce the risk of injury even further. However in over a quarter of cases, protective gear (gloves, pants or jackets) failed to protect riders, indicating inadequate performance of the clothing.

The report on the study recommended the establishment of independent stakeholder funded tests based on established standards that are then reported through publicly available networks. This approach is similar to existing programs such as ANCAP, CREP and CRASH. The results of the study have been used in investigating the feasibility of a national protective clothing consumer program being led by the Transport Accident Commission in Victoria and supported by SIRA.

Rider Risk DVD

In 2010, the former MAA provided the Motorcycle Council of NSW with funds to produce a DVD about rider safety. The Rider Risk DVD has been made widely available, including to learner rider programs, through the consumer magazine 2wheels and on YouTube.

The DVD received international acclaim including being adopted as part of the training program for specialist motorcycle programs in Ireland and the USA.

The Good Gear Guide

The former MAA provided funds to the NSW Motorcycle Alliance to deliver the Good Gear Guide to motorcycle and scooter riders. The Alliance used funds to host rider reviver stands on popular recreational motorcycle rider routes and distribute the guides to patrons. They also distributed guides at popular scooter and motorcycle parking lots in the Sydney CBD.

Trends in Compulsory Third Party (CTP) claims in NSW

The following statistics are based on CTP claims data from the SIRA's Personal Injury Register, as at 30 June 2015.

Although claims by injured motorcycle riders and pillion passengers are only a small percentage of total claims (currently 8.4% of 2013-14 claims), the annual increase in CTP claims by this road user class has been significant. Prior to 2008-09, the total number of CTP claims by motorcycle riders and pillion passenger was less than 550 per year. Since then, the number of CTP claims by motorcycle riders and pillion passengers has increased significantly and currently stands at 1,192 in 2013-14. In other words, CTP claims from motorcycle riders and pillion passengers have effectively doubled over the past six years. Claims by other road users have increased by just over 30% in the same period.

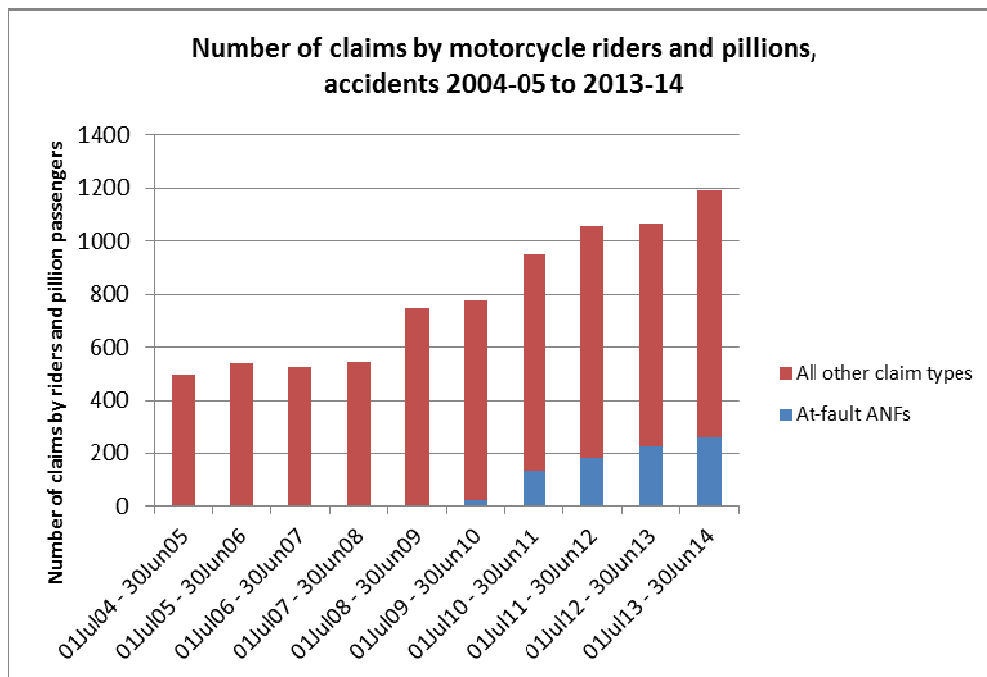
The significant increase in motorcyclist claim numbers appears to have been driven by an increase in the number of motorcycles on the road, an increase in the number of injured motorcyclists and a higher propensity to claim under the CTP scheme.⁹

Total number of claims by road user class (includes all ANFs and full claims), accidents 1 July 2004 to 30 June 2014, data as at 30 June 2015

Accident year	Road user class of claimant								Total motorcyclists (riders & pillions)	% motorcyclists (riders & pillions)	Pillions as % of all motorcyclists
	Driver	Passenger	Rider	Pillion	Pedestrian	Cyclist	Other/Unknown	Total CTP claims			
01Jul04 - 30Jun05	6,283	3,593	450	48	1,097	327	168	11,966	498	4.2%	9.6%
01Jul05 - 30Jun06	5,720	3,295	482	59	1,093	284	214	11,147	541	4.9%	10.9%
01Jul06 - 30Jun07	5,658	3,082	487	41	1,076	313	251	10,908	528	4.8%	7.8%
01Jul07 - 30Jun08	5,344	2,932	488	57	1,082	349	166	10,418	545	5.2%	10.5%
01Jul08 - 30Jun09	5,728	2,977	689	58	1,093	405	223	11,173	747	6.7%	7.8%
01Jul09 - 30Jun10	6,162	3,180	727	50	1,137	473	333	12,062	777	6.4%	6.4%
01Jul10 - 30Jun11	6,707	3,291	889	60	1,106	456	276	12,785	949	7.4%	6.3%
01Jul11 - 30Jun12	7,300	3,403	985	70	1,257	447	362	13,824	1,055	7.6%	6.6%
01Jul12 - 30Jun13	6,842	3,456	999	68	1,182	509	265	13,321	1,067	8.0%	6.4%
01Jul13 - 30Jun14	7,292	3,780	1,123	69	1,152	478	323	14,217	1,192	8.4%	5.8%
Total	63,036	32,989	7,319	580	11,275	4,041	2,581	121,821	7,899	6.5%	7.3%

All notifications (ANFs, at-fault ANFs and full claims)

⁹ Propensity to claim [the number of full CTP claim notifications per 10,000 road casualties (hospital admissions resulting from motor vehicle road accidents)] has increased significantly since 2008. The overall propensity to claim (all CTP claims – ANF and full claims) has increased on average by 4% every year between 2008 and 2014.



From 1 April 2010, the ANF was expanded to cover all persons injured as a result of a motor vehicle accident in NSW, regardless of fault. The introduction of the at-fault ANF has contributed to the increase in claims by motorcyclists by allowing more riders at fault to claim, although this type of claim is capped at \$5,000.

The increases in motorcyclist claims have been driven by riders, rather than increases in claims from pillion passengers, who currently account for only about 6% of motorcyclist claims.

Up until 2008-09, less than 100 claims per year were made against motorcycles. That figure has now more than tripled to over 350 per year. Much of the increase in claims against motorcycles is due to riders claiming against their own CTP policy by lodging an at-fault ANF claim. Claims against motorcycles accounted for between 2% and 3% of claims in the three years up to 2013-14.

If at-fault ANFs are excluded, approximately 140 claims each year are made against a motorcycle (2011-12 onwards) and claims against motorcycles account for about 1% of CTP claims. If at-fault ANFs are included, about 70% of claims against motorcycles are made by the rider at fault.

Number of claims against motorcycles, road user class, accidents 1 July 2004 to 30 June 2014, data as at 30 June 2015

Accident year	Claims against motor car	Claims against motorcycle	Claims against other vehicle type	Total	% of claims that are against a motorcycle
01Jul04 - 30Jun05	8,790	83	3,093	11,966	0.7%
01Jul05 - 30Jun06	8,260	71	2,816	11,147	0.6%
01Jul06 - 30Jun07	8,161	58	2,689	10,908	0.5%
01Jul07 - 30Jun08	7,589	71	2,758	10,418	0.7%
01Jul08 - 30Jun09	8,178	99	2,896	11,173	0.9%
01Jul09 - 30Jun10	8,471	145	3,446	12,062	1.2%
01Jul10 - 30Jun11	9,053	248	3,484	12,785	1.9%
01Jul11 - 30Jun12	9,793	285	3,746	13,824	2.1%
01Jul12 - 30Jun13	9,520	310	3,491	13,321	2.3%
01Jul13 - 30Jun14	10,252	361	3,604	14,217	2.5%
Total	88,067	1,731	32,023	121,821	1.4%

EXCLUDES At-fault ANFs - Number of claims against motorcycles, road user class, accidents 1 July 2004 to 30 June 2014, data as at 30 June 2015

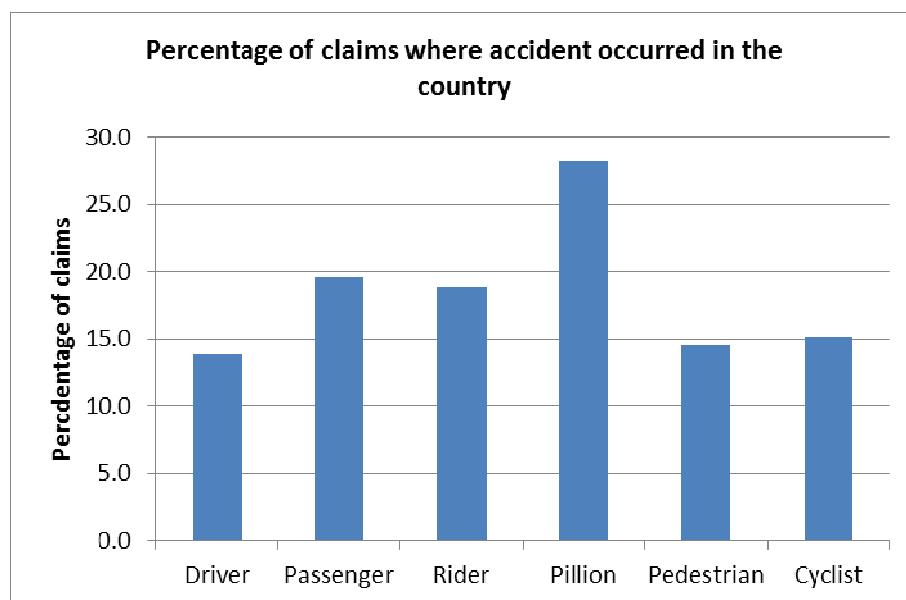
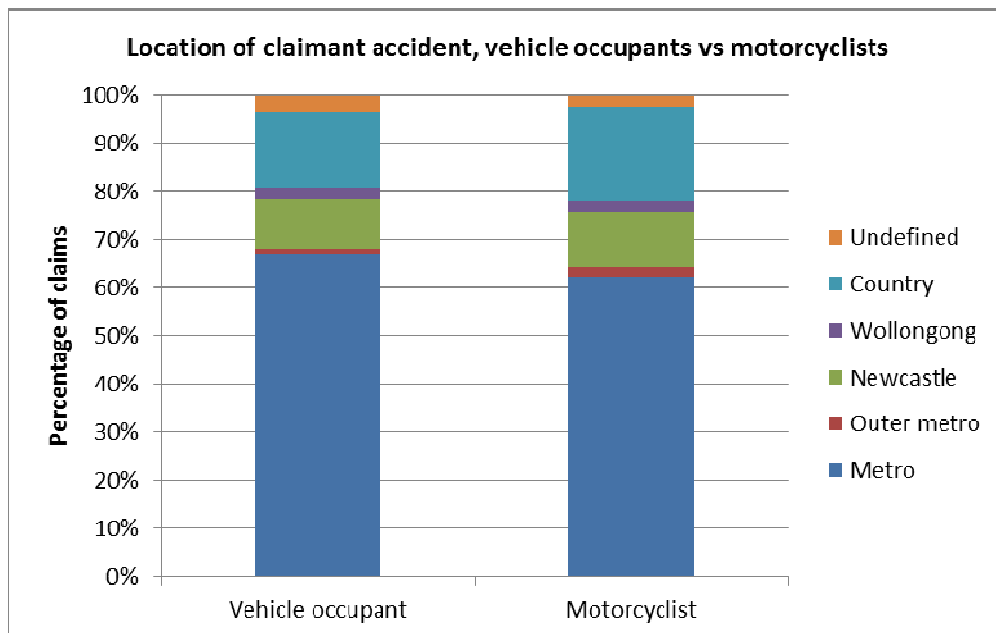
Accident year	Claims against motor car	Claims against motorcycle	Claims against other vehicle type	Total	% of claims that are against a motorcycle
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01Jul06 - 30Jun07	8,161	58	2,689	10,908	0.5%
01Jul07 - 30Jun08	7,589	71	2,758	10,418	0.7%
01Jul08 - 30Jun09	8,178	99	2,896	11,173	0.9%
01Jul09 - 30Jun10	8,375	122	3,437	11,934	1.0%
01Jul10 - 30Jun11	8,626	121	3,403	12,150	1.0%
01Jul11 - 30Jun12	9,203	138	3,641	12,982	1.1%
01Jul12 - 30Jun13	8,875	113	3,378	12,366	0.9%
01Jul13 - 30Jun14	9,589	136	3,484	13,209	1.0%
Total	85,646	1,012	31,595	118,253	0.9%

Of all the motorcyclists who have entered the Lifetime Care scheme as interim or lifetime participants, 92% were male. Of all the motorcyclists that have entered the Lifetime Care scheme as interim or lifetime participants, 37% were under 30 years of age. 39% were between 30 and 49 years of age, and 21% were 50 years or over.

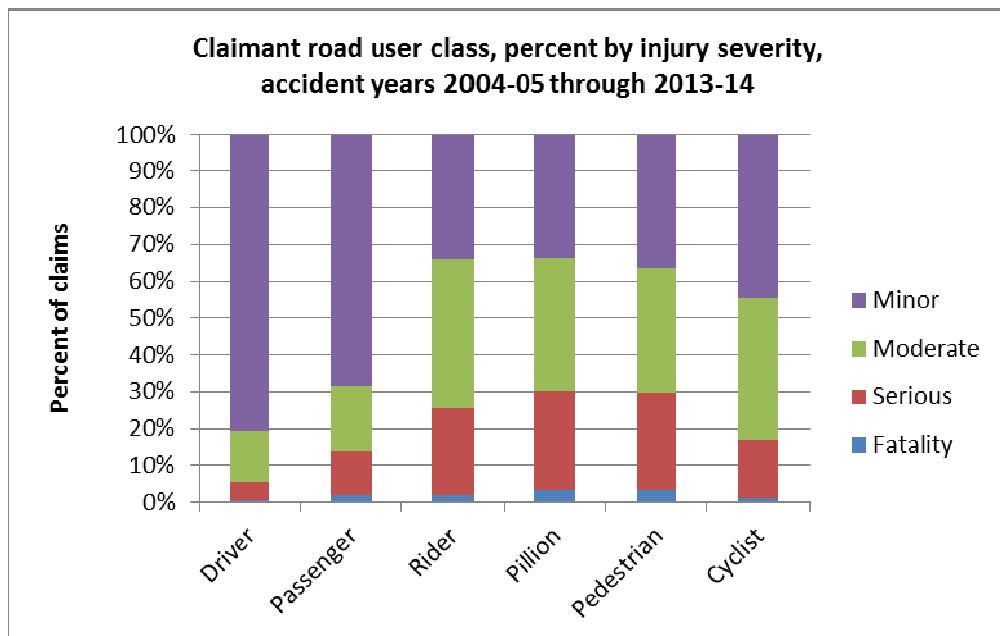
The majority of CTP motorcyclist claims are due to accidents in metropolitan regions (more than 60%). However, in comparison to other vehicle occupant claimants, motorcyclists are somewhat more likely to have been injured in country regions. In particular, claimants who were injured as pillion passengers were more likely to have been in country areas.

Number and % of claims by road user class and accident location, accidents 1 July 2004 to 30 June 2014, data as at 30 June 2015

Road user class	Accident location						Total
	Metro	Outer metro	Newcastle	Wollongong	Country	Undefined	
Vehicle occupant	64,126	1,411	9,764	2,175	15,236	3,313	96,025
Motorcyclist	4,925	158	898	191	1,537	190	7,899
Vehicle occupant %	66.8%	1.5%	10.2%	2.3%	15.9%	3.5%	100.0%
Motorcyclist %	62.3%	2.0%	11.4%	2.4%	19.5%	2.4%	100.0%



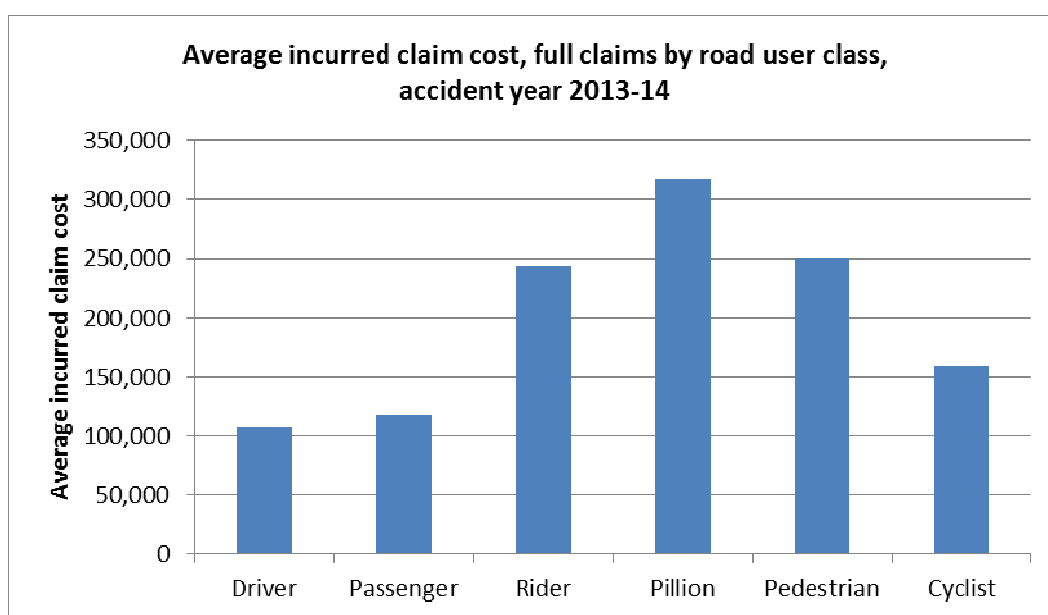
Over the ten year period 2004-05 to 2013-14, of all road user classes, motorcyclist claimants were the most likely to be seriously injured, closely followed by pedestrians. More than one-quarter of injured motorcycle riders and pillion passengers were fatally or seriously injured over the period.



Excludes unknown injury severity

Motorcyclists have more costly CTP claims¹⁰. The relatively more severe injuries sustained by motorcyclists in motor accidents results in much more costly CTP claims. The average incurred cost of claims made by motorcycle riders is higher than that of any other road user class. Motorcycle riders have an average incurred cost of about \$250,000 and pillion passengers have an incurred claim cost of about \$300,000. In contrast, the average incurred cost for vehicle drivers and passengers is just over \$100,000. This means that the average incurred cost of claims by motorcycle riders is more than double that of vehicle occupants.

In 2013-14, full claims by riders and pillion passengers accounted for about 7% of CTP claims however represented 13% of claims costs in the scheme.



¹⁰ The cost information presented here relates to full CTP claims only (direct full claims and converted ANFs).

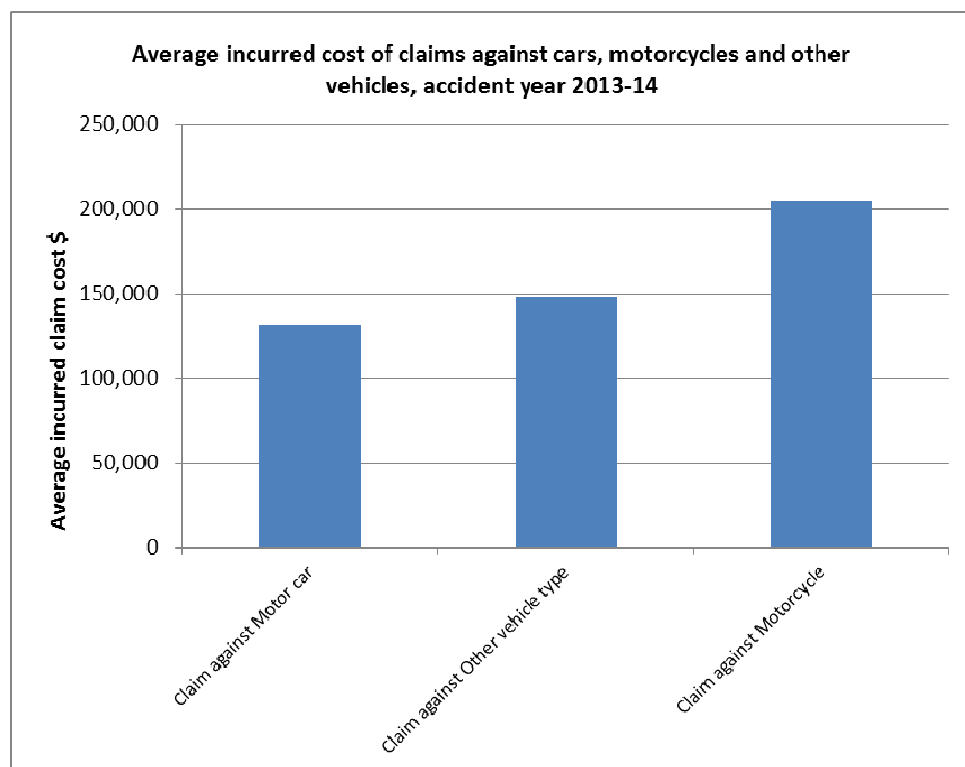
Other road users have more serious injuries when a motorcycle is at fault in an accident¹¹. Although the frequency of claims against motorcycles is low, the injuries sustained (which are often by pillion passengers, other riders or pedestrians) are sometimes very severe. The average incurred cost of claims made against motorcycles is higher than that of claims against motor cars (over \$200,000 compared to under \$150,000).

Claims against motorcycles account for about 1% of full CTP claims but represent 1.4% of full claim costs in the scheme.

Percent of claims vs percent incurred cost of claims by at fault vehicle type, accidents 1 July 2004 to 30 June 2014, data as at 30 June 2015

Accident year	Vehicle class being claimed against						Total	
	Motor car		Other vehicle type		Motorcycle			
	% Claims	% Incurred Cost	% Claims	% Incurred Cost	% Claims	% Incurred Cost	% Claims	% Incurred Cost
01Jul04 - 30Jun05	72.7	69.6	26.5	29.1	0.8	1.3	100	100
01Jul05 - 30Jun06	73.5	72.1	25.8	26.8	0.7	1.1	100	100
01Jul06 - 30Jun07	74	73.8	25.5	25.3	0.6	0.9	100	100
01Jul07 - 30Jun08	72.5	70.1	26.7	28.5	0.8	1.3	100	100
01Jul08 - 30Jun09	72	71.4	27	27.3	0.9	1.3	100	100
01Jul09 - 30Jun10	69.1	67.3	29.9	31.5	1	1.2	100	100
01Jul10 - 30Jun11	69.7	69.9	29.2	28.4	1.1	1.7	100	100
01Jul11 - 30Jun12	70	69.1	28.8	28.8	1.2	2.1	100	100
01Jul12 - 30Jun13	71	71.2	28	27.3	1	1.5	100	100
01Jul13 - 30Jun14	71.9	69.1	27	29.2	1.1	1.7	100	100
Total	71.6	70.3	27.5	28.3	0.9	1.4	100	100

Full claims only



Note: The 'Other vehicle type category' includes a wide variety of vehicle classes with varying average incurred claim sizes. The main comparison to be drawn here is that motorcycles have a higher average claim cost against them than ordinary motor cars.

¹¹ The cost information presented here relates to full CTP claims only (direct full claims and converted ANFs).

Motorcyclists have a higher risk of serious injury and disability following road crashes. There are approximately 200 to 240 applications made to the Lifetime Care and Support scheme per year. Of the people accepted into the scheme, approximately 20% are motorcycle riders or pillion passengers.

Of all the motorcyclists who have entered the Lifetime Care scheme as interim or lifetime participants, 92% were male. Of all the motorcyclists that have entered the Lifetime Care scheme as interim or lifetime participants, 37% were under 30 years of age. 39% were between 30 and 49 years of age, and 21% were 50 years or over.

Interim and Lifetime Participants in Lifetime Care, percentage by age group and road user class, data as at 30 June 2015

Age group	Road user class						Total*
	Driver	Passenger	Rider	Pillion	Pedestrian	Cyclist	
Unknown	4.3	4.3	3.3		4.5	8.3	4.7
0 <=4		10.1			6.6		3.6
05 to 16	2.1	20.8	3.3		16.1	19.4	10.2
17 to 20	16.3	18.8	9.5		7.4	8.3	13.0
21 to 25	12.3	16.9	17.6		5.0		12.0
26 to 29	7.4	4.8	6.7	20.0	5.0	5.6	6.1
30 to 39	16.0	6.3	21.0	20.0	8.3	22.2	13.3
40 to 49	14.4	5.3	18.1	40.0	6.2	8.3	11.3
50 to 59	10.7	3.4	14.8	20.0	11.6	13.9	10.3
60 to 69	7.7	3.9	4.8		9.9	5.6	6.6
70+	8.9	5.3	1.0		19.4	8.3	8.9
Total	100	100	100	100	100	100	100

* Includes other and unknown

B. CRASH AND INJURY RISK FACTORS INCLUDING RIDER (AND DRIVER) BEHAVIOUR, CONSPICUITY AND VEHICLE INSTABILITY

Background

The NSW Motorcycle Safety Strategy 2012-2021 included several road safety initiatives to be implemented over the decade to improve motorcycle safety and reduce motorcyclist casualties. CRS has already implemented several of these initiatives and continues to work with stakeholders to implement the Strategy.

The Strategy's safety initiatives are underpinned by both research evidence and consultation with motorcycling community stakeholders. Attitudinal and behavioural research are integral to building a body of evidence to inform strategies to improve motorcyclist safety, and enables investigation of motorcyclist crash and injury risk, patterns and trends in motorcyclist behaviour and attitudes and also the review of policy and programs.

Key Research

Below are some of the key research initiatives undertaken by CRS regarding motorcycle safety:

- The in-depth crash study² aimed to examine the causal factors in serious motorcycle crashes and the nature and pattern of injuries sustained by riders. The intention was to inform the development of targeted road safety policies and programs to reduce crashes and road trauma. The study, which was conducted by Neuroscience Research Australia (NeuRA) on behalf of the Austroads research board, compared the characteristics of 102 riders involved in serious crashes against a case-control sample of 336 riders who used the same road location over a two-year period ending in 2014. The control group was drawn from motorcyclists who travelled the same stretch of road on which a case crash had occurred. To provide in depth analysis to the quantitative findings, an expert panel was convened to review the findings and reach consensus on key issues and countermeasures.
- The NSW point prevalence study⁸ was designed to produce a profile of the characteristics of the motorcyclist population in NSW. The aim was to establish the prevalence of key rider characteristics and known risk factors, in addition to measures of rider exposure across NSW. The survey was conducted in 2012 at motor registry offices in NSW with a representative sample of 506 registered owners of motorcycles or scooters. Riders were canvassed on their training and licensing history, protective equipment use, motorcycle ownership, riding exposure, experience

crash and violation history was collected. A key strength of this study is that it has provided a robust baseline of motorcyclist behavioural factors from which to establish priorities for motorcycle crash counter-measures.

- CRS commissioned motorcyclist attitudinal research in 2002 and most recently in 2012 - including a follow-up comparative study of findings from these same surveys. The studies sought to glean up to date information on the knowledge, attitudes and self-reported behaviours of NSW motorcyclists. They also sought to provide information about drivers' attitudes towards motorcycle safety and motorcyclist behaviour. The most recent survey⁴ involved 948 motorcyclists and 997 drivers surveyed from a population representative internet panel and 1036 motorcyclists surveyed via a link placed on motorcycle club and association websites. The comparative study's findings should be considered as indicative, rather than conclusive, due to sampling differences between the 2002 and 2012 surveys.
- In 2013 CRS commissioned literature reviews on motorcyclist fatigue and returning riders to investigate these motorcycle behavioural issues as part of the first three year action items from the Motorcycle Safety Strategy. Both reviews were undertaken by an external academic research organisation including experts in motorcycle safety as part of the project team.

Findings from the research studies noted above were broadly consistent with the existing body of evidence. The combined literature flagged the following key risk factors that apply to motorcyclists. Risk taking behaviours by riders, the relatively low conspicuity of motorcycles, the inherent instability of motorcycles, the lack of protection from injury, and roadside objects or impact with road surface can all elevate both the risk of crash and severity of injury for motorcyclists¹.

Speeding

Higher rates of speed-related motorcyclist fatalities, relative to motor vehicle fatalities are observed in NSW and many other jurisdictions. Speed contributes to increased risk of crashing and injury severity. Particularly with motorcycles, their handling characteristics and less contact with the road mean that loss of control and inappropriate speed can have severe consequences. Speed has been associated with loss of control on bends or corners and single vehicle collisions¹. The NSW point prevalence study⁸ found that after statistically accounting for factors, such as age, experience and exposure, self-reported speeding more than doubled the odds of having crashed in the past 12 months.

Recent NSW attitudinal research⁴ on a representative sample of motorcyclists found that of those who thought rider behaviour was chiefly responsible for crashes, speeding was identified as the key factor. In addition, 40% of riders reported they ride faster than the speed limit on the open road and when they have good visibility. Also, nearly two thirds of riders

(61%) admitted to exceeding the speed limit at least some of the time when they ride. Riders were less likely than drivers to believe that there was “no such thing as safe speeding” (61% vs. 73%). Almost all riders (91%) stated that they reduced their speed on wet roads. It should be noted that for motorcyclists, speeding may not necessarily refer to riding above the posted speed limit, as motorcycles are less forgiving on bends where many crashes are attributed to inappropriate speed. Recreational and inexperienced riders are more prone to misjudging appropriate speed to different road conditions.

Promising findings from the NSW attitudinal comparative study⁵ were suggestive of increased rider recognition of risk behaviours in crash causation over time, including riding too fast for conditions and riding erratically and aggressively. Speed can also lead to other factors, such as braking and cornering errors, which were identified in the in-depth crash study² as common contributors to serious crashes. These findings were a key reason for the focus on rider risk management in the current ‘Ride to Live’ campaign.

Alcohol and other drug use

According to NSW crash data, after speeding, riding with an illegal level of alcohol is the next most common contributor to motorcyclist fatalities (17%). High blood alcohol levels are more likely to be associated with single motorcycle crashes. Motorcyclists are potentially more vulnerable to alcohol and drugs use than car drivers due to effects on balance, coordination, judgement and vehicle control⁷. The large majority (88%) of NSW riders in the NSW point prevalence study⁸ reported that they never ride when they suspect they are over the legal limit for alcohol. The NSW attitudinal survey⁴ showed that while 60% of riders disagreed with drink riding, a significant minority agreed that “as long as I don’t go over the legal limit, I can have alcoholic drink(s) before or during a ride” (25%). Conversely, riding under the influence of alcohol and riding while fatigued were rated by motorcyclists as having the greatest crash risk.

Riding manoeuvres

The in-depth crash study’s² expert panel identified a range of rider factors that were common contributors to serious crashes including; inappropriate speed; braking errors, cornering errors, inexperience, travelling too close, braking errors, rider fatigue and poor technique.

In the recent NSW attitudinal survey⁴, one in five riders (20%) agreed that motorcyclists ride beyond their ability. However, motorcyclists most commonly saw the behaviour of other motorists as the key cause of crashes involving motorcyclists (37%).

The attitudinal survey showed that around two fifths of motorcyclists agreed that they “tend to ride on, past queuing traffic” (39%) and over a quarter agreed that they “weave in and out of lanes in order to overtake slower traffic” (27%). A third said that they “do on occasion borrow someone else’s motorcycle or lend mine to someone else” (33%). More than half

(53%) of motorcyclists had experienced a near miss with another vehicle and almost a third of drivers had experienced a near miss with a motorcyclist.

The survey's methodology also identified two distinct behavioural groups of riders; one sample who were representative of NSW licensed riders, and another sample who were more likely to ride on a frequent basis, own their bikes and to be involved in clubs or associations. This group was more likely than the representative sample to demonstrate a low perception of risk; that is, they showed greater risk taking propensity⁴.

While the attitudinal survey found that most motorcyclists and drivers thought riders and drivers shared equal responsibility for the safety of motorcycle riders, motorcyclists were less likely than drivers to report this (73% vs. 82%). The majority of drivers (61%) reported negative perceptions of riders⁴.

The NSW attitudinal comparative study⁵ reported that NSW drivers have remained more likely to perceive rider behaviour as being responsible for crashes, than driver behaviour. It concluded that riders still perceive drivers as responsible, and drivers perceive riders as responsible. The study further concluded that drivers may have become more opinionated about certain motorcyclist behaviours, with more drivers having an opinion about riders weaving in and out of traffic, and about law enforcement targeted at motorcyclists, than in 2002.

Fatigue

The CRS literature review found the existing research was focused on understanding driver fatigue, but little was known about the specific nature of rider fatigue. The literature suggests that the physical demands of riding a motorcycle (e.g. holding a fixed position for extended periods, and riding through tight curves) differ from those of driving cars and other vehicles. Riding is believed to require greater cognitive/perceptual demands than driving, although there is no clear scientific evidence. Further research is warranted to investigate the relationship between physical and cognitive contributors to the development of fatigue among riders, specific differences/similarities between rider fatigue and driver fatigue and the extent to which approaches developed for identifying/addressing fatigue among drivers are relevant for riders.

In NSW, strategies to manage fatigue are also addressed on the 'Ride to Live' website as part of the current motorcycle safety campaign. The website encourages riders to watch for the early warning signs of rider fatigue including slow reactions, running wide on a corner, rough gear changes, and stiff joints (neck, knees and wrists), as well as the importance of being well rested before going on rides and avoiding alcohol if riding.

Unlicensed riding

Unlicensed riding (including never licensed, licence suspended, cancelled or not renewed) has been flagged as a risk factor in the literature. Unlicensed motorcycle riding appears to be more prevalent than unlicensed driving. According to research the crash risk has been estimated as three times greater for unlicensed riders when compared with licensed riders³.

Visibility

The low conspicuity of motorcycles relative to other motor vehicles, places riders at greater risk of crash involvement. A recent Australian study observed that around a quarter of drivers claimed not to see the motorcycle with which they collided⁶.

The in-depth crash study² showed that crash contributors could be grouped into three key behavioural categories of which 'failed to see' (36%), was the most common contributor. This was followed by 'rider made a cornering error' (35%) and rider 'did not stop in time' (13 %). Rider inexperience was noted as a factor in a number of crashes contributing to riding errors when cornering and braking.

Similarly, the recent NSW attitudinal survey⁴ found that drivers who had been involved in a crash with a motorcyclist were most likely to consider that their crash was due to not seeing the motorcycle (30%) and the inattention of the motorcyclist (28%). Motorcyclists were most likely to attribute their crashes to the inattention of other road users (38%) and the rider not being seen by the other vehicle operator. Further, the greatest concerns of motorcyclists were the inattention of other drivers and other road users not seeing motorcyclists. The greatest concerns of drivers also related to rider conspicuity, including riders being more difficult to see (25%) and riders weaving in and out of traffic or squeezing between cars (34%).

The NSW point prevalence study⁸ found the large majority of riders believed accidents were commonly caused by drivers not seeing motorcyclists (93%).

Lack of protection from injury

Motorcyclists are often described as vulnerable road users and more prone to injury, given their vehicle offers markedly less protection from force of impact than cars. Among motorcyclist crashes, there is a common pattern of multiple injuries to the head, chest and legs together with abrasion injuries from contact with the road surface⁷. Further, these injuries are more likely to be serious and require hospitalisation and rehabilitation. Head injury remains a leading cause of injury or death, even with helmeted riders. This is because, even with a helmet, riders can be exposed to risks in the broader road environment if ejected from their motorcycle in the event of a crash.

In the NSW point prevalence study⁸, 100% of riders reported helmet use, with 70% wearing a full-face helmet. Around half the NSW riders reported they frequently wore protective pants and boots, and impact protection for their upper limbs. Impact protection for backs (37%) and knees (21%) was less common.

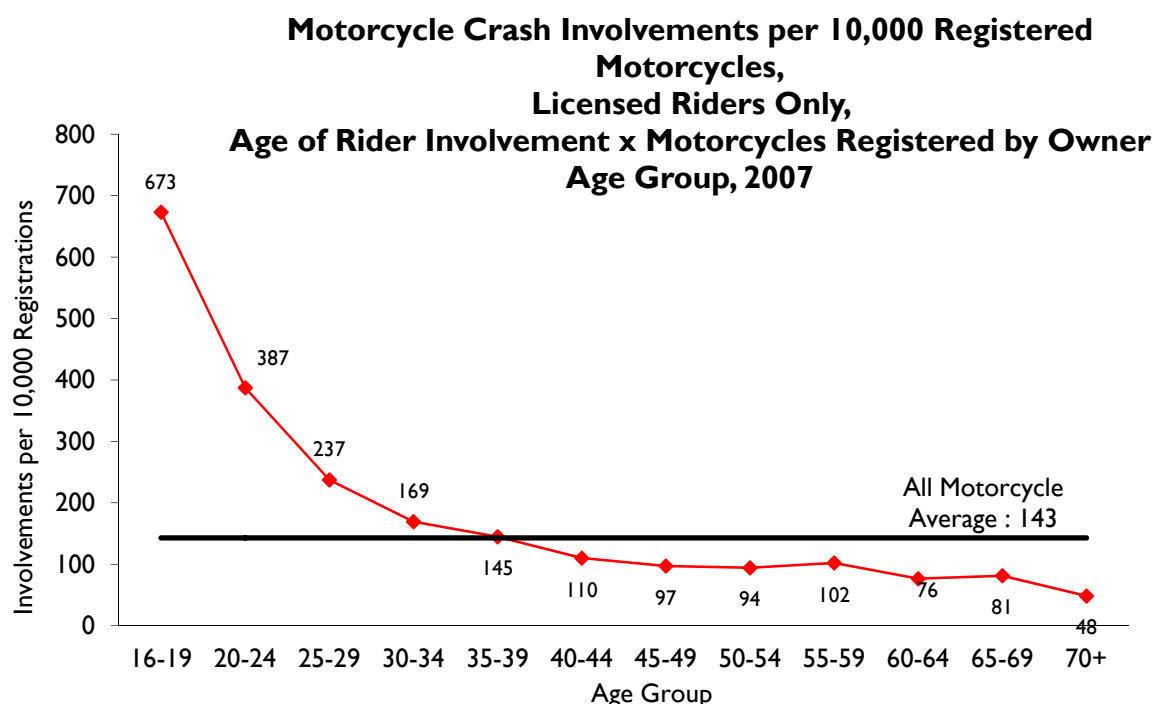
The in-depth crash study's² expert panel concluded the most common injury sources were the roadway, another vehicle and contact with the rider's own motorcycle. Minor injury mainly involved the extremities and moderate to severe injury mainly involved the torso (thorax, abdomen and pelvis). Not surprisingly, full-faced helmets were found to provide better protection than open face helmets.

The wearing of protective clothing was identified as a protective factor for crash risk in the in-depth crash study, after statistically controlling for other factors. Protective clothing was also statistically predictive of a reduction in minor injuries².

The in-depth crash² study review panel put forward a number of discrete technological countermeasures as possible lines of future investigation. These included quality and standards for protective clothing, such as improving impact protection capacity through well-designed leg protectors and the possibility of airbag technology within clothing.

Rider age and experience

Younger age and inexperience increases the crash risk among drivers and motorcyclists. Importantly, these risk factors appear to be more significant for riders. According to international research on motorcyclists, youth is a more significant crash contributor than inexperience¹. NSW statistics support this finding as outlined in the graph below.



The in-depth crash study² found that, in addition to the type of motorcycle being ridden, younger age, lack of familiarity with the bike being ridden, greater familiarity with the crash location and recreational rather than commuter riding were statistically predictive of involvement in serious injury crashes, after controlling for other risk factors. Riders who wore protective clothing and those travelling in heavy-traffic and freeway-type conditions prior to the crash location were less likely to be involved in these crashes. The researchers posited that the protective clothing results could be associated with attitudes to riding and/or risk that may also be associated with reduced odds of crashing. Notably, the relationship between the type of motorcycle and crash involvement differed across age groups, with the elevated crash risk associated with sports bikes more prominent among older riders. Older riders involved in crashes also had significantly longer stays in hospital compared with younger riders². Familiarity with the location of the crash suggested that familiarity may lead to automated behaviour and reduced attention. However, the expert panel noted that lack of experience with route location may also be a crash risk, suggesting a non-linear relationship exists between location familiarity and crash risk.

The CRS literature review into returning riders was designed to inform further research in NSW. While a considerable body of research about older motorcycle riders was available, conclusions about the crash risk were hindered due to discrepancies in definitions used and the inability to identify returning riders in official crash databases.

The research was clear in identifying that returning riders are a significant group in terms of their size and the number of self-reported crashes in which they are involved. However, findings were inconclusive in terms of whether returning riders were disproportionately involved in crashes compared with other riders of the same age who have continued to ride without taking an extended break.

According to the review, two types of factors potentially contribute to a greater crash risk among returning riders: deterioration in motorcycle handling skills resulting from lack of practice, and unfamiliarity with the motorcycle resulting from changes in motorcycle design and performance over time. Given that infrequent riders potentially face these same risks, the general issue of unfamiliarity may be more important than whether a rider is a 'returning rider'.

Vehicle Instability

Motorcycles are inherently unstable and rely on a combination of friction (generated by travel speed) and rider competency to remain upright during all manoeuvres encountered while travelling. When compared with cars, they have an extremely small contact point with the road. In addition, there are a number of related variables that affect a motorcycle's propensity to become unstable, in particular the road being travelled – frequency and tightness of corners and bends; its camber; its condition; its gradient; and its coefficient of

friction (which can be affected by weather or debris) – and the travel speed used to deal with these factors. For any one journey, the motorcycle rider is responsible for appropriate travel speed and manoeuvring skills to safely negotiate these hazards.

The in-depth crash study² identified the inherent small size of motorcycles and complex braking systems as the key vehicle crash risk factors. No vehicle maintenance issues were identified in this study. However, inexperience and unfamiliarity with the bike being ridden were raised as contributing crash factors by the expert panel. As already noted, this latter factor was consistent with the quantitative findings, which identified riding an unfamiliar motorcycle as a statistically significant predictor of crash risk.

Until recently, the only factors a motorcycle contributed to improving stability were its design profile that dictated its centre of gravity, and the condition of its tyres. Today there are a number of systems that can be incorporated into a motorcycle that can aid the rider and enhance its stability. Two of these in particular have shown to help increase stability:

- The first of these is anti-lock braking systems (ABS). Although some motorcycling enthusiasts attempt to disparage the benefits of ABS, there is significant evidence from a number of research projects across the world that clearly shows ABS helps increase stability by preventing skidding and providing maximum braking efficiency on a range of road surfaces. It does this by detecting changes in the motorcycle's wheel speed – either through excessive braking pressure or a change in surface grip – and automatically adjusts braking force to prevent the wheels from locking.

Research indicates that the average rider may only use about half of the available braking capacity in an emergency³. As few motorcycles have ABS brakes or the technological equivalent, current braking systems are a crash risk factor¹.

The benefits of ABS are so compelling that the Commonwealth Department of Infrastructure and Regional Development are preparing a Regulation Impact Statement seeking support for mandating ABS on motorcycles supplied to the Australian market for use in road transport. This will follow Europe's lead, where ABS will be required on all motorcycles from 2016. A number of motorcycle manufacturers (such as BMW) already provide ABS as a standard on their entire range.

- The second system that has been shown to help increase stability is traction control. This is an electronic system that optimises the motorcycle's grip and increases its stability by stopping wheel spin, even on slippery surfaces. Currently, this is only offered as an option on some motorcycles (e.g. BMW, Ducati) and there are no immediate plans to mandate it.

Overall, these and other stability enhancing features should only be seen as an assistance to motorcycle riders; retaining motorcycle stability is largely due to the competence of the

rider to handle and manoeuvre the motorcycle and ride at the appropriate speed for the road and conditions.

In relation to motorcycle size, the larger and more powerful bikes are reportedly overrepresented in crashes both in Australia and internationally^{3,7}. This finding was upheld in the in-depth crash study², which showed that riders using sports motorcycles had greater odds of being involved in serious crashes, after statistically accounting for other risk factors.

The in-depth crash study² review panel put forward a number of discrete technological countermeasures as possible lines of future investigation. These included improved fuel tank design and investigating the shape and characteristics of fuel tanks in terms of capacity to provide restraint and energy absorption. The in-depth crash study² had observed that abdominal injuries commonly occurred subsequent to impact between the rider and the fuel tank.

Scooter rider registrations show an increasing trend both in NSW and Australia-wide. Notably, research has shown that scooter riders are distinct from other motorcyclists in their patterns of behaviour and attitudes. Scooter crashes are more likely to occur in urban than non-urban areas and to occur at intersections and scooter riders have been shown to wear less protective clothing than other riders¹. Although scooter riders fall within the 'commuter motorcycle rider' category from a riding and crash pattern perspective, scooter riders do not commonly identify themselves as motorcycle riders. Similarly, scooter riders are viewed as a distinct group by motorcycle riders.

Road Environment Factors

The quality of the road surface and road side barriers are features of the road environment with which riders may collide. Hence, they influence crash and injury risk among riders. Motorcyclist crashes are known to involve impact with road side features, including barriers and poles³. The in-depth crash study's² expert panel identified the following as common road environment risk factors; intersections, left hand turns, parked cars blocking the roadway, lane terminations & high frequency lane changing areas, lack of shoulder or shoulder width, curves, road surface and road treatments.

The in-depth crash study² review panel put forward a number of discrete engineering countermeasures as possible lines of future investigation. One such measure was road safety audits and remediation treatments completed on routes frequented by recreational motorcyclists, such as the Royal National Park, Old Pacific Highway and Kangaroo Valley. Recreational riders and these locations were both associated with crash risk in the study.

Enforcement trends

Legal Actions

The NSW Police Force (NSWPF) proactively conducts operations targeting motorcyclist's aberrant behaviour. The NSWPF had commenced in excess of 62,900 legal actions against motorcycle riders since 2012 (financial year 2012/13 to end 2014/15) since the launch of the NSW Motorcycle Safety Strategy. Annual total legal actions involving the use of motorcycles has remained largely constant over the three year period.

	2012 - 13	2013 - 14	2014 - 15
Total Legal Actions – Motorcycles	21,232	21,894	19,856

Source: NSW Police Force Computerised Operational Policing System (COPS) accessed 26 August 2015

Legal Actions for motorcycles by strategy group by financial year

The enforcement operations employed by Traffic and Highway Patrol Command serve to meet the objectives set out in the motorcycle safety strategies. Legal actions that address offending motorcycle riders behaviours including: speeding, vehicle standards, unlicensed riding, and alcohol and drug offences, are set out in the table below. These figures have remained largely consistent over the three financial years.

	2012 - 13	2013 - 14	2014 - 15
Speed	5,601	5,958	5,425
Alcohol	850	793	777
Unlicensed	954	904	775
Vehicle Standards	461	492	453

Source: NSW Police Force Computerised Operational Policing System (COPS) accessed 26 August 2015

When these figures are considered in the context of the creation and expansion of Traffic and Highway Patrol Command that became operational in 2012, with an increase in Highway Patrol resources and focused operations, it suggests reduced detection of aberrant rider behaviour. This suggests that overall, aberrant or high risk rider behaviour has improved. While this is the case, we are still seeing an increase in serious injuries, which may be attributable to the increase in exposure due to increases in registrations and license holders.

Operations specifically targeting aberrant riding behaviour of motorcyclists supplement the existing range of state wide enforcement operations that look at these same issues across all road users.

C. The effectiveness of the current action plan to enhance motorcycle safety including communications and education campaigns, road environment improvements, regulation of safety equipment and gear.

Motorcycle Safety Strategy 2012-2021

Following an increase in motorcycle fatalities, in 2010 the NSW Government requested the Centre for Road Safety to develop a Motorcycle Safety Strategy in consultation with key industry stakeholders. Stakeholders included representatives from the Australian Motorcycle Council, NSW Motorcycle Council, NSW Motorcycle Alliance, Motor Accidents Authority, NRMA Motoring and Services, the NSW Police Force, Federal Chamber of Automotive Industries, Local Government and Shires Association and Roads and Maritime Services. In the lead up to the Government's request, there had been a significant increase in motorcycle fatalities. During the period 1997 to 2009 there was a 57% increase in motorcycle fatalities (69 fatalities). However over the same period the overall road toll decreased by 21%.

During the period 2002 – 2009 there had also been a considerable rise in the popularity of motorcycling, with a 66% increase in motorcycle registrations during this time.

In March 2013 the Government announced the release of the NSW Motorcycle Safety Strategy 2012-2021 (the Strategy) to assist the reduction in death and injury among motorcyclists. A copy is attached as Annexure A.

The Strategy confirms the Government's ten year direction for making motorcycle riding safer on NSW roads. It aligns with other key documents including the National Road Safety Strategy 2011-2020 and the NSW Road Safety Strategy 2012-2021.

There are specific road safety risks that only apply to motorcyclists and through the Strategy the Government acknowledges these unique safety needs, in addition to the general road safety needs of all road users.

When developing the Strategy, the Centre for Road Safety applied the Safe System approach to road safety. This approach is applied globally and provides an overarching framework for road safety and the development of appropriate countermeasures.

The Safe System approach recognises there is a limit to the forces humans can withstand in a crash, while accepting human error is inevitable on our roads. It endorses the importance of travelling at speeds more forgiving of human error, designing roads and vehicles which reduce harm in the event of a crash and responsible road user behaviour.

At the time of the Strategy's development, the Government had many key programs and initiatives in place to help increase motorcycle safety. The Strategy builds on those programs in conjunction with new research and development to establish and deliver on new initiatives during the period 2012-2021.

Prior to the release of the Strategy, a suite of early initiatives were announced in June 2011. Delivery of the early initiatives included:

- Motorcycle safety information distributed to Roads and Maritime and Local Government road engineers, designers and maintainers, and the sharing of best practices at relevant practice forums.
- Expanded the "Check Twice for Bikes" campaign to further educate drivers on the need to check for motorcyclists in the road environment.
- Developed and published "Making Roads Motorcycle Friendly" – a guide for road design, construction and maintenance. (Annexure B)
- Mass distribution of the Good Gear Guide (safer clothing publication) to motorcycle training centres and the motorcycle community. (Annexure C)
- Clarified and documented the clear-zone policy and circulated to relevant agencies.
- Distributed road safety CDs to local government, which included topics and messages such as cornering, buffering, checking twice for bikes and drinking and riding don't mix.

When developing the Strategy, 20 safety initiatives were identified to guide the actions and their delivery over the ensuing ten years. The safety initiatives are based on the safe systems approach, and include the following:

Safe Roads

1. Research road safety engineering treatments to improve motorcycle safety.
2. Ensure Safe Roads principles are understood and applied by people looking after the assets – designers, maintainers and engineers.
3. Contribute to the National Road Safety Strategy by introducing a motorcycle blackspot/length program.
4. Investigate ways to improve post-crash emergency response.

Safe People

5. Further research on motorcycle road crashes, including collaboration with other jurisdictions and research bodies.
6. Continue to investigate enforcement strategies to deter risk-taking behaviours.

7. Ongoing communication campaigns to target risk taking behaviours and increase motorcycle safety awareness and risk management.
8. Research the impacts of fatigue on motorcycling with a view to developing appropriate countermeasures.
9. Continue research into motorcycle licensing and training.
10. Develop campaign and other information material promoting the safe interaction between motorcyclists and other motor vehicles on the road.

Safe Speeds

11. Research speed countermeasures such as speed advisory signs and speed management communication messages.
12. Identify high motorcycle crash locations for road safety treatment including road engineering improvement and review of speed zones.
13. Target enforcement on popular motorcycle routes to ensure safe motoring for all road users.

Safe Vehicles

14. Research, develop and promote accurate and reliable motorcycle safety information on motorcycle features, helmet standards and protective clothing.
15. Monitor developments in Intelligent Transport Systems.
16. Research applicable motorcycle safety features.
17. Investigate safety rating for motorcycles
18. Contribute to the National Road Safety Strategy:
 - (a) Investigate scope for regulatory action to further improve stability, traction and braking standards on motorcycles supplied to the Australian market.
 - (b) Monitor the National Road Safety's Strategy's investigation of automatic crash notification similar to the European eCall system.
19. Monitor and promote car design which does not obstruct visibility of motorcycles.
20. Monitor ITS that alerts drivers to the presence of a motorcycle (vehicle-vehicle communication).

Strategy - first 3 year Action Plan

To underpin and commence delivery of the Safety Initiatives, the Strategy identified a series of actions to be developed and delivered during the first three years.

An Implementation Working Group was established to assist with the implementation of the Strategy's safety actions. The Working Group includes the Motorcycle Council of NSW, Australian Motorcycle Alliance, Australian Motorcycle Council, Roads and Maritime Services, the NSW Police Force, Motor Accidents Authority, NRMA Motoring and Services, Local Government and Shires Association and the Federal Chamber of Automotive Industries.

The first three years of the Strategy's actions are nearing completion and there has been significant progress in delivering on those actions to increase safety for all motorcyclists on NSW roads.

The following programs and initiatives have been developed and delivered over the past three years, in consultation with the Motorcycle Safety Strategy Implementation Working Group:

Safe Roads and Speed

- In 2013, the Centre for Road Safety, in partnership with Roads and Maritime Services (RMS), commenced an evaluation of motorcycle crash barrier systems which attach to existing steel W-beam safety barriers. The evaluation involved field trials and crash testing and continued throughout the 2014/15 financial year to inform the Austroads and RMS barrier assessment panels on the possible benefits of the crash barrier systems.

In the 2014/15 financial year, 13 full scale crash tests were undertaken to evaluate the ability of the motorcycle barrier systems to reduce the injury risk, when installed. All crash tests were carried out on safety barriers which were installed in accordance with AS/NZ 3845:1999 (Road Safety Barrier Systems) and involved mid-span and post centred tests at 60 and 70km/h using an Anthropomorphic Test Device (crash dummy) with an in-built data acquisition system to obtain data for analysis. Analysis of the data obtained from each crash test has now been completed and the Centre for Road Safety is finalising a draft research report.

- The Making Roads Motorcycle Friendly Guide continues to guide practitioners at Roads and Maritime Services and in local government, to consider the safety of motorcyclists when roads are designed, constructed, maintained and operated. Additionally, the Centre for Road Safety provides ongoing input into a number of Austroads guides including advice on how to make the road environment safer for motorcyclists.

- The NSW Centre for Road Safety's research vehicle has been testing a system which has the ability to automatically call for help in the event of a crash. However it has been identified that the system being tested is unlikely to be suitable for use on a motorcycle. The Centre for Road Safety will continue to monitor developments in automatic crash notification technology, for cars and motorcycles.
- Expediting emergency services to motorcycle crash victims is critical to the recovery of motorcycle riders and their passengers. As many of the popular motorcycle routes in NSW are in remote locations, access to telephones is very limited and often there is poor or no mobile phone coverage. The Centre for Road Safety is targeting the installation of satellite emergency telephones along popular motorcycle routes with high crash rates.

In June 2014 the Centre for Road Safety funded the installation of six emergency phones along Putty Road, which connects Sydney's west to the Hunter region. During 2015 similar phones will be installed along the Oxley Highway, which connects Walcha to Wauchope in the north coast region of NSW.- The Broke-Wollombi Road in the Hunter region will be targeted in 2016. It is anticipated that further emergency phone installations along other popular motorcycle routes will continue into the future.

- The Motorcycle Strategy outlines a number of actions for implementation over the next three years and the development of longer-term initiatives over the life of the strategy, within all four key pillars of the Safe System approach to road safety. The Motorcycle Safety Infrastructure program was formed to address the following Safer Roads 'Actions for the first 3 years' recommendations from the Strategy:
 - Use Road Safety Audits to review and improve motorcycle routes and safety features.
 - Contribute to National Road Safety Strategy: Safety improvements on popular motorcycle routes.

In 2015/16 financial year the Motorcycle Safety Infrastructure Program will receive \$3 million in funding to implement Safe Roads initiatives outlined in the NSW Motorcycle Safety Strategy 2012-2021. Priority will be given to roads and roadsides with a history of crashes involving motorcycle riders, or where the risk of crashes is high and the outcomes of treatment works delivers a significant benefit. As a guide, funding will prioritised as follows:

- \$2million for route treatments and black spots within identified popular routes.
- \$1million for motorcycle black spots outside identified popular routes.

This \$3 million investment in the 2015/16 Motorcycle Safety Infrastructure program is funding eight safety projects which are due for completion this financial year include:

- 3 projects in Hunter Region \$2.1m;
- 3 projects in South West Region \$180k;
- 2 projects in Sydney Region \$850k.

The 2014/15 Motorcycle Safety Infrastructure program funded 12 Safety improvement projects to the value of \$3.3m (10 were complete 2 was carried into 15/16)

The 2013/14 Motorcycle Safety Infrastructure program funded 12 Safety improvement projects to the value of \$2.9m (11 were complete 1 was carried into 14/15)

This is an ongoing program of safety works targeted at locations and treatments that best reduce the occurrence, severity and risk of motorcycle crashes on NSW roads.

- The NSW Police Force continues to examine fatality and serious injury data to determine crash risk profiles in their Local Area Command. The Centre for Road Safety also continues to partner with NSW Police Force in enhanced enforcement operations to target speeding and other risk taking behaviour by motorcyclists.
- Further information on speed related behavioural issues are covered in the response to Terms of Reference item 'B'.

Safer People

'Ride to Live'

Transport for NSW launched the 'Ride to Live' motorcycle risk management campaign in November 2014, the first large-scale campaign in NSW aimed at increasing awareness of motorcycle safety and assisting riders to better manage risks on the road. The campaign also targets drivers and their role in improving the safety of motorcyclists on our roads. The development of a targeted communications campaign to address motorcycle crash risks is a key action in the NSW Motorcycle Safety Strategy.

Findings from the crash data and attitudinal research were instrumental in developing an evidence-based campaign, along with strong collaboration with key stakeholder groups including NSW Motorcycle Alliance and Motorcycle Council of NSW.

The previous 'Cornering' motorcycle rider campaign in NSW encouraged riders to undertake safe riding techniques at corners and tight bends. While the 'Cornering' campaign was well received, the limitation of this campaign was that it only focussed on one element of the

overall riding experience (particularly for recreational riders) and did not acknowledge the key risks for commuter motorcycle riders or the role of drivers in motorcycle crashes.

The role of the new motorcycle risk management campaign 'Ride to Live' is to encompass both motorcycle riders and drivers in the one campaign across a number of hazardous situations relevant to each target group.

Research

Motorcycle riders can be divided into two groups based on the main purpose of their journey, commuter riding (for work or education) and recreational riding. An analysis of NSW crash data revealed distinct crash patterns for these two rider groups. Commuter riders are more commonly involved in lower speed crashes and crashes with other vehicles, particularly at intersections or in rear-end and lane change collisions. Recreational riders have a higher incidence of high speed, single vehicle crashes due to loss of control on both straight and curved roads.

Attitudinal research was undertaken in 2012 to understand the knowledge, attitudes and behaviours of NSW riders and drivers in relation to motorcycle safety. The research revealed that riders place a high degree of importance on skills and their own riding abilities, as well as externalise blame for crashes. A key challenge was to develop campaign messaging that was relevant and credible to riders without reinforcing stereotypes that suggest riders are non-compliant, risk-taking road users.

Visibility and inattention were key concerns for both motorcycle riders and drivers. Both groups also thought that drivers and riders shared equal responsibility for the safety of motorcycle riders. The research reinforced the importance of acknowledging both motorcycle rider and driver responsibility, without imparting blame on any one party. This would help to overcome some of the negative perceptions held by drivers and motorcycle riders towards one another and the tendency of both groups to externalise blame.

Campaign overview

The 'Ride to Live' campaign was subsequently designed around acknowledging motorcyclists' passion for riding, whilst challenging riders to better manage their risks on the road. Campaign executions highlight common scenarios for commuter and recreational riders and illustrate the consequences of different choices riders can make in response to each hazard.

The 30 second television advertisements show a motorcycle rider approaching a hazard, and then splitting into three versions of itself. Each 'clone' rider takes a different approach in responding to the hazard – for example, one 'clone' rider makes the safer choice and successfully navigates through the hazard whereas the other two 'clones' make higher-risk choices and are unsuccessful in continuing their ride.

It aims to encourage riders to make the safer choice – by anticipating the hazard and preparing early through good lane positioning, buffering and setting up brakes – without being too prescriptive and authoritarian.

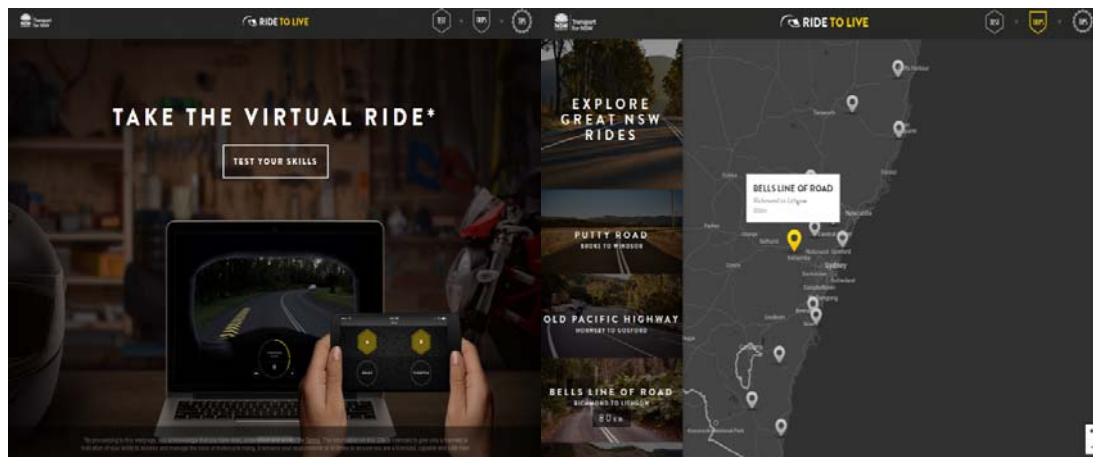


A tailored driver execution was also developed to challenge drivers to think about how closely they look for motorcyclists and to remind drivers to check blind spots and look out for motorcyclists at all times. It links to the rider creative through the tagline 'help motorcyclists ride to live' which is relevant to them.



The television campaign is fully integrated and supported with a website (ridetolive.com.au), which includes online hazard tests based on key crash types for commuter and recreational riders (using real footage), safety tips, and a trip planner of popular recreational riding routes in NSW featuring hazard information, recent crashes, weather, traffic and places to stop. This provides a strong call to action, particularly to drive riders to the digital and social environment to access further information on hazards and risk management strategies, which is a significant element of the campaign.

In addition, radio, Youtube, digital and outdoor advertising have also been used for this campaign.



Stakeholder consultation

Extensive stakeholder consultation was used to inform the development of the new 'Ride to Live' campaign. The two key stakeholders involved were the NSW Motorcycle Alliance and Motorcycle Council of NSW. Both organisations represent the needs of motorcycle riders across the state and were involved in all phases of the campaign development, from the concept stage through to filming and production. A motorcycle rider trainer was also engaged during the filming process to ensure that the riding techniques used by the motorcycle riders in the campaign were accurate and safe. These relationships enabled stakeholder channels to be leveraged ensuring effective promotion, support and credibility of the campaign within the motorcycle community.

Campaign evaluation

It is too early to fully evaluate the effectiveness of the 'Ride to Live' campaign due to its recent launch date in November 2014.

As part of the campaign tracking process, online surveys were conducted before and after the campaign launch, with key findings relating to riders including:

- Recognition of the campaign was very high across all media channels.
- Majority of riders thought the 30 second television commercials (TVC) relevant to them communicated the need to be aware of potential hazards on the road when riding.
- Majority of riders thought the relevant 30 second TVC made them think about the consequences of different choices motorcyclists can make when riding.
- Message take-out was strong and successfully related to hazard perceptions (although there were various interpretations of the hazards message because of the various scenarios depicted across the TVCs).
- It is unlikely that riders will self report a change in behaviour as 80-90+% of riders already self-report riding in a safe manner.

Key findings relating to drivers included:

- Overall the campaign achieved strong levels of recall amongst drivers, but the rider targeted executions were also highly visible to drivers.
- There was strong agreement among drivers that the driver execution communicated the need for drivers to 'look for motorcyclists' and for drivers to 'be aware of the risks they pose to motorcyclists' when driving.
- When looking at change in behaviour due to campaign exposure, those exposed to the campaign indicated that they specifically looked out for motorcyclists on the roads around them compared to those who were not exposed to the campaign.

In addition, the response to ridetolive.com.au website has been extremely positive. Since its launch in October 2014, there have been more than 99,000 users, spending an average of more than 3 minutes on the site (as at 14 July 2015). More than 70,000 tests have also been completed, sharing the benefit of providing relevant and useful information in an interactive and engaging format. Further, there have been more than 277,000 YouTube views of the TVCs.

Further evolution of the campaign will be considered in the future to ensure continued awareness, relevance and effectiveness for riders in the target audience.

Lane filtering

Motorcyclists also believed lane filtering improved their travel time by moving through congested traffic. The trial did not show a reduction in congestion for all traffic, as the motorcyclists in the trial represented only 4% of the total traffic. The lane filtering trial is covered in detail in the next section.

On 1 July 2014 NSW became the first Australian jurisdiction to make motorcycle lane filtering legal under strict safety conditions.

"Motorcycle lane filtering" - when a motorcycle rider moves between lanes of stationary or slow moving vehicles travelling in the same direction at low speed - was an illegal practice in all Australian jurisdictions prior to the NSW laws. However, despite this restriction lane filtering was widely practised by motorcycle riders, especially in congested urban areas or where traffic queues occur.

The NSW lane filtering laws were developed following a 2013 trial of lane filtering in the Sydney CBD. The trial sought to investigate the safety and congestion impacts of allowing motorcycle riders to lane filter.

Since the new laws commenced, other Australian jurisdictions, such as Victoria and Queensland have followed the lead of NSW by investigating similar lane filtering regulations in 2015.

NSW Lane filtering trial

On 18 October 2012, the Minister for Roads and Ports announced that there would be a trial of motorcycle lane filtering in the Sydney CBD. TfNSW led the trial, which was held between 1 March and 30 April 2013. It was developed in consultation with:

- NSW Police Force
- City of Sydney Council
- Motorcycle Council of NSW
- NSW Motorcycle Alliance
- Roads and Maritime Services.

An independent consultant, ARRB Group, was engaged to manage monitoring of traffic movement and road user behaviour during the trial, and to independently evaluate the impact of motorcycle lane filtering on traffic congestion, road safety risk and behaviour, for all road users.

The lane filtering trial allowed the practice within a designated area of the Sydney CBD over a two-month period.

The purpose of the trial was to investigate the impact on traffic congestion and road safety when allowing motorcyclists to legally lane filter. Some questions which needed to be looked at included:

- Does lane filtering affect travel time for motorcyclists and general traffic?
- Does lane filtering affect the overall level of congestion?
- Does lane filtering affect road safety for all road users?

A range of technological and survey methods were used to measure these objectives.

The final report for the trial was received by TfNSW in November 2013. TfNSW analysed the findings and considered appropriate policy responses, in close consultation with the NSW Police Force.

The trial and Transport for NSW's other work in this area did provide a range of useful information and observations about lane filtering and its possible effects including:

- Despite being illegal, lane filtering was still often practised on NSW roads.
- Lane filtering was found to be a relatively low risk riding activity for motorcyclists under the conditions of the trial.

- However, when lane filtering is done at higher speeds (faster than 30km/h –‘lane splitting’), crash risks increase for motorcycle riders and other road users, particularly pedestrians and cyclists.
- Motorcyclists observed to be lane filtering demonstrated a good level of appropriate and compliant action.
- Almost half (48%) of the motorcyclists surveyed indicated they felt safer when lane filtering, believing that lane filtering improved their safety by having greater control over their exposure to traffic, particularly vehicles following behind.
- The trial showed that lane filtering improved travel times for motorcyclists over short sections of the Sydney CBD. However, while motorcycles are increasing in popularity, they still only make up a relatively small proportion of overall traffic. For this reason, the trial did not show a reduction in congestion for all traffic.
- However, common sense says that removing some motorcycles from traffic queues may help to minimise queuing at busy intersections. As the number of motorcycles increases, it is more likely that overall congestion would be improved over time.

The trial also found that the following potential risks need to be addressed to help ensure safe lane filtering:

- Pedestrian safety risks, particularly for pedestrians who cross the road through stationary traffic. This is caused by the lack of predictability of riders who are lane filtering.
 - Pedestrians should, however, usually be safe if they cross at signalised or marked crossings.
 - To ensure this, motorcyclists must ensure that they do not cross the pedestrian stop line at traffic signals.
 - Motorcyclists are not allowed to lane filter on the left in the kerb-side lane next to a footpath.
- Inexperienced riders may be at an increased crash risk
- Unpredictable filtering behaviour may increase safety risks for all road users.
- Risks for motorcycle riders when filtering past buses and heavy vehicles where motorcycles may not be easily visible.

A full summary of the motorcycle lane filtering trial results has been prepared by Transport for NSW and is available for public download on the Centre for Road Safety website at the

following link (<http://roadsafety.transport.nsw.gov.au/downloads/motorcyclists/lane-filtering-results.pdf>).

Lane filtering laws

Following the motorcycle lane filtering trial, the NSW Government reviewed the findings of the report, NSW crash analysis and the approach taken in other jurisdictions, and proposed a new approach for lane filtering in NSW.

Based on TfNSW's recommendation, the Government on 1 July 2014 commenced:

- a new rule in Rule 313-1 of the Road Rules 2014 that allows motorcycle riders to lane filter when done safely at a speed 30km/h or under.
- a new offence in Rule 151-1 of the Road Rules 2014 for 'lane splitting' to outlaw dangerous behaviour where a motorcycle rider moves past vehicles unsafely at a speed faster than 30km/h.

The new lane filtering rule allows riders to lane filter under the following conditions, designed to minimise safety risks (identified above):

- Only allowed when safe to do so
- Not allowed at a speed greater than 30km/h
- Only allowed by fully licensed riders (i.e. riders on their L or P plates will not be allowed to lane filter)
- Not allowed in a school zone during school zone hours
- Not allowed next to the kerb or parked vehicles.

To help riders identify when it is safe to do so, riders are warned not to lane filter near heavy vehicles or buses. Motorcyclists are also reminded to always look out for pedestrians and cyclists.

The new lane splitting offence is designed to deter motorcyclists from moving between traffic at unsafe speeds of more than 30 km/h. Lane splitting involves higher speeds, which increases the unpredictability of motorcyclist movements for other road users. This increases the crash risk for motorcyclists and other road users, especially pedestrians and cyclists. The higher speeds involved in lane splitting will result in higher impact speeds for motorcycle/vehicle crashes. In these crashes, there is a higher risk of casualties, especially for motorcyclists.

Under the new lane splitting offence, motorcycle riders who are caught engaging in this unsafe behaviour face heavy penalties (currently \$637 and 3 demerit points).

The 'lane splitting' offence is important because it provides a safety net for legalising lane filtering, helping to minimise any possible safety risks. The 'lane splitting' offence also makes it easier for police, who no longer need to issue a number of road rule offences for the same manoeuvre.

Transport for NSW is monitoring the impact of the new lane filtering laws on the safety of all road users, including motorcycle riders and pedestrians, in consultation with NSW Police.

The initial response to the new laws from the motorcycling community has been generally positive, with many riders believing that lane filtering can also help reduce rear end crashes involving motorcycle riders. Feedback from NSW Police to date has not suggested any major safety concerns with the new laws

Lane-filtering communications

The new laws have been accompanied by a community awareness and education campaign to explain the law and to remind all road users to check twice for bikes. Motorcyclists are also reminded to take extra care when filtering, particularly when near pedestrians and cyclists and at intersections. The integrated campaign informs all NSW road users, including drivers and motorcycle riders, about:

- the new laws
- what lane filtering involves
- how to lane filter safely
- the increased importance of checking twice for motorcycles.

The aim of the campaign was to ensure safer interactions between motorcycle riders and other road users through increased awareness of potential risks on the road. The campaign reminded drivers and other road users to be more vigilant in looking out for filtering motorcycle riders.

The campaign was delivered in two phases. The main aim of Phase 1 of the campaign (23 June – 26 July 2014) was to inform the community about the commencement of the new lane filtering legislation on 1 July 2014. Phase 1 was a more limited media campaign, aimed at both motorcycle riders and drivers.

Phase 2 of the campaign (28 July – 11 October 2014) focused on communicating more detailed safety messaging, with an emphasis on promoting safe interactions between motorcycle riders and other road users. This included guidance to help motorcycle riders filter as safely as possible, and to highlight the risks of illegal lane splitting.

To support the campaign, an animated video was created which clearly explained the new lane filtering laws and how to lane filter safely. The video is on YouTube as well as the

Centre for Road Safety's lane filtering webpage. As at 20 August 2015, the video had received over 56,000 views.

The video was also shared through stakeholder social media channels such as the NSW Police, NSW Motorcycle Alliance, the Motorcycle Council of NSW and the NRMA. This generated a significant amount of comments, shares and likes. For example, the NSW Police Facebook post promoting the start of lane filtering reached over 388,000 people, received over 1,200 comments and was shared about 4,000 times.

The Centre for Road Safety's lane filtering webpage also contained more detailed information about what lane filtering is and how it can be done safely, including some Frequently Asked Questions. An easy-to-remember URL (lanefiltering.nsw.gov.au) was created to direct road users to this lane filtering information page. As at 20 August 2015, the lane filtering section of the website has received over 83,000 unique page views since the campaign was launched.

The creative developed for Phase 2 focused on awareness and education by showing lane filtering situations on the road featuring different road user groups (e.g. motorcyclists; drivers; cyclists; pedestrians).

The campaign channels included:

- radio (e.g. live reads)
- digital (e.g. website banners; search)
- outdoor advertising (e.g. taxi backs; bus backs)
- promotion through government announcements, event appearances and media announcements
- variable message signs by Roads and Maritime Services regions at strategic locations.

These channels were chosen to engage road users in the environment when lane filtering is most likely to occur. TV advertising was not chosen for this short-term information campaign, for which the high production cost was not justified. The 'Ride to Live' motorcycle safety campaign, which launched later in October 2014, incorporated television advertising.

The lane filtering campaign was run state-wide, but with a focus on metropolitan areas where lane filtering is more likely to occur.

Lane filtering messages are also currently promoted through the 'Ride to Live' campaign website, and this will continue into the future.

Motorcycle Awareness Week and other stakeholder initiatives

A critical part of the Centre for Road Safety's approach to implementing the NSW Motorcycle Safety Strategy is to work very closely with motorcycle stakeholder groups.

One example of this is the Centre for Road Safety's sponsorship of the Motorcycle Council of NSW's annual Motorcycle Awareness Week public awareness initiative.

Motorcycle Awareness Week is one of the biggest motorcycle-specific awareness events on the road safety calendar, timed to coincide with the start of the summer motorcycle riding season (around mid-October).

Motorcycle Awareness Week aims to ensure that all road users are aware of the issues surrounding motorcycle riders and their safety.

The week usually starts with a launch in the Sydney CBD, followed by other promotional / educational events in regional centres such as Albury, Lithgow, Lismore, and others.

The education and awareness aims of Motorcycle Awareness Week have a lot in common with the objectives of Transport for NSW's Motorcycle Safety Strategy. Motorcycle Awareness Week provides the Centre for Road Safety with a good opportunity to raise awareness of the issues surrounding motorcycle riders and their safety in all road users.

For these reasons, the Centre for Road Safety has sponsored and supported Motorcycle Awareness Week, both financially and non-financially, for a number of years.

The Centre also provides other in-kind assistance such as:

- providing road safety promotional material
- providing safety information and advice
- attending launches and other events.

NSW Police will also support the week, with the Motorcycle Response Team attending the launch event.

The Centre for Road Safety also considers supporting other motorcycle stakeholder events and initiatives on a case-by-case basis.

Safe Vehicles and Equipment

- The Centre for Road Safety's research vehicle is testing a system which has the ability to automatically call for help in the event of a crash.
- In accordance with the NSW Road Rule 2014, motorcyclists on NSW roads must wear an approved helmet. In NSW, an "approved motorbike helmet" is detailed in

the Government Gazette and includes a helmet that complies with Australian/New Zealand Standard AS/NZS 1698.

Given the demand from the motorcycling community for a wider choice of helmets, in 2013 a helmet subgroup was established to investigate and provide advice about alternative helmet standards that are at least as safe as the current Australian Standard. The motorcycling community was well represented on the subgroup. The current standard restricts consumer choice in style, size and mode of purchase.

Following extensive consultation the Centre for Road Safety is currently considering expanding the definition of “approved motorbike helmet” to include the United Nations Economic Commission for Europe (UNECE) 22.05 Standard.

While Queensland expanded its definition of ‘approved motorbike helmet’ in February 2015, to include UNECE 22.05, NSW will undertake a more comprehensive approach to ensure that the helmets can not only be legally used but also legally supplied in NSW. Currently Australian Consumer Law only allows the sale of helmets that comply with the Australian Standard.

The Centre for Road Safety considers that helmets that comply with a standard (whether the Australian Standard or the UNECE standard), should bear a compliance marking to make it readily identifiable and to enable enforcement of the correct helmets by Police.

NSW has been in discussions with JAS-ANZ and the Australian Competition and Consumer Commission (ACCC) to ensure its proposed model to expand the motorcycle helmet standard is robust; increasing compliance, safety and enforceability.

- The Consumer Rating and Assessment of Safety Helmets (CRASH) was established in 2010. CRASH is co-ordinated by the NSW Centre for Road Safety, with additional funding from the NRMA and the Transport Accident Commission (TAC). CRASH provides independent and consistent information on the protection from injury in a crash and the level of comfort provided by motorcycle helmets. Approximately 120 helmets have been rated to date.
- At the national level the Traffic Accident Commission (TAC) is leading a project to investigate test methodologies and also conduct a pilot test program to assess motorcycle protective clothing, such as jackets and pants. Transport for NSW and NeuRA are represented on the project group and it is anticipated that the initial work may provide the basis for a consumer ratings program for clothing.
- ‘Ride to Live’ website, covered earlier in this submission, includes sections on motorcycle riding gear and helmet safety.

- Transport for NSW is contributing to work being undertaken at a national level, to propose mandating ABS on motorcycles. Mandating ABS is expected to increase safety for riders at intersection crashes and will also greatly assist novice and older motorcycle riders. Further information is provided in the response to Terms of Reference item 'B'.

As outlined above, significant progress has been made in the first three years of the Strategy. The Centre for Road Safety has recently commenced consultation with its stakeholders to develop the actions for the next three years, to continue to deliver on the Strategy's safety initiatives. This is discussed in further detail the response to Terms of Reference item 'F'.

Regulation of safety equipment and gear

The only motorcycle protective equipment that is mandated in NSW is helmets, where the Road Rules 2014 require motorcycle riders and passengers to wear an approved helmet. Currently, approved helmets are limited to those that comply with the applicable Australian Standard, but Transport for NSW is looking to extend this definition to allow helmets manufactured to an equivalent international standard.

Other protective equipment and gear are currently not mandated, such as jackets, pants, boots and gloves due to:

- The lack of a suitable standard that can establish minimum performance specifications that can be applied to the different materials used in the equipment and gear.
- The lack of a suitable standard to establish the safety performance and comfort for the equipment and gear themselves, manufactured from the different materials.
- Unless the Commonwealth Consumer Law is amended, there is no instrument to prevent consumers purchasing equipment and gear that do not comply with the standards. Whereas this should not affect the ability of the Road Rules 2014 to mandate specific types of equipment and gear, ensuring that only equipment and gear that comply with the applicable standards can be bought will reduce the incidence of non-compliance, and better enhance the safety of motorcyclists.

With respect to the items above, there are some international standards that have set performance requirements, and associated tests, for motorcycle protective equipment. However, these have not been adopted in Australia as there is some debate on their suitability for the Australian climate. To address this, Transport for NSW is involved in two projects looking at establishing standards that are more appropriate for local conditions. It is expected that the findings from these projects will inform policy in this area.

It is recognised that it can be quite a laborious process in establishing and maintaining the regulatory regime for motorcycle safety equipment and gear. Instead, an option being looked

at by one of the projects is establishing a consumer awareness program incorporating a rating system – similar to the Australasian New Car Assessment Program for new car safety and the child restraint evaluation program for child seats – that will inform consumers of the comparative benefits of different products available to them.

D. STRATEGIES OF OTHER JURISDICTIONS TO IMPROVE MOTORCYCLE SAFETY

In February 2015, following the release of a discussion paper and online survey, Queensland introduced a suite of changes to their road rules relating to motorcyclists.

The amendments to the Queensland road rules include the following:

- The introduction of lane filtering for motorcyclists
- Changes to allow motorcyclists to ride on the road shoulder/breakdown lane on high speed roads to move past slow moving traffic at a speed not greater than 30km/h.
- Motorcyclists now permitted to enter bicycle storage areas (the area of road close to an intersection with traffic lights that allows bicyclists to wait in front of vehicles stopped at an intersection). Queensland has advised this is to allow motorcyclists to move safely and quickly away from the traffic.
- Changes to allow motorcyclists to remove a foot from the footrests to stretch a leg or to raise themselves from the seat when riding on uneven road surfaces. These changes are being considered by the Australian Road Rules Maintenance Advisory Group in a suite of changes to the Australian Road Rules.
- Expansion of the definition of 'approved motorbike helmet' to include the United Nations Economic Commission for Europe (UNECE) 22.05 Standard, in addition to the existing Australian Standard. Under the amended road rule motorcyclists are now allowed to wear the UNECE helmets, however the Australian Consumer Law restricts the sale of motorcycle helmets to those that comply with the Australian Standard. Therefore motorcyclists will need to purchase on-line or when travelling overseas.

It should be noted that representatives from NSW motorcycling community do not support purchasing helmets on-line as buyers cannot try them on to ensure the right fit, to provide the maximum level of safety.

Victoria has expanded its definition of 'approved motorcycle helmet' to allow United Nations Economic Commission for Europe (UNECE) 22.05 Standard . Unlike Queensland this refers to the UNECE mark as an indication of compliance with the standard. However, like Queensland this does not address the conflict with the Australian Consumer Law.

Road safety and novice riders

As noted earlier, youth and inexperience appear to be more significant risk factors for riders than drivers. A key motorcycle safety initiative for many jurisdictions to address young and novice motorcycle trauma is graduated licensing and its associated conditions and restrictions. Graduated licensing Schemes (GLS) have been increasingly adopted by licensing jurisdictions in Australia and internationally as a risk management policy targeted at novice riders.

Relative to other Australian jurisdictions, the current NSW motorcycle GLS is one of the strongest motorcycle licensing systems in the country (see response to 'E' for an overview of the NSW motorcycle GLS).

Each jurisdiction in Australia is different, and hence specific licensing features differ across jurisdictions. Other jurisdictions have conditions that do not feature in the NSW GLS. Alternatively, South Australia has the additional condition of night riding restrictions, while the Victorian GLS includes reflective clothing and a headlight requirements at all times.

In summary the NSW Graduated Licensing Scheme, when compared to a number of Australian jurisdictions, has these key different elements:

- Mandatory pre-training course to qualify for a learner's riders licence;
- Speed limits (Learner-90kms, P1-90kms, P2-100kms);
- Two intermediate stages (P1 & P2) and longer minimum tenure (36 months);
- Graduated demerit point thresholds for novice riders (P1 < 4 points, P2 < 7 points).

Infrequent riders

As discussed previously, the literature review into returning riders commissioned by CRS identified risk factors that are likely to be faced by any infrequent riders of motorcycles, highlighting the general issue of unfamiliarity as a key risk factor for motorcycle riders.

Currently no jurisdiction has developed a specific training program targeting infrequent motorcycle riders. VicRoads specifically targets returning and mature aged riders through a webpage and the release of their brochure entitled 'Chasing the Dream'. The Brochure is aimed at riders aged 30 years and over, and riding for the first time or returning to riding after a number of years. The subjects covered in the brochure include the difference between driving and riding, selecting an appropriate motorcycle, protective gear, updating skills, carrying a pillion and vehicle maintenance.

South Australia also targets returning riders through a dedicated webpage that promotes the need for training and appropriate protective wear, and raises awareness of changes in bike design.

Queensland, Tasmania and Western Australia more generally target infrequent riders through their respective Motorcycling Rider Guide/Handbooks.

E: LICENSING AND RIDER TRAINING

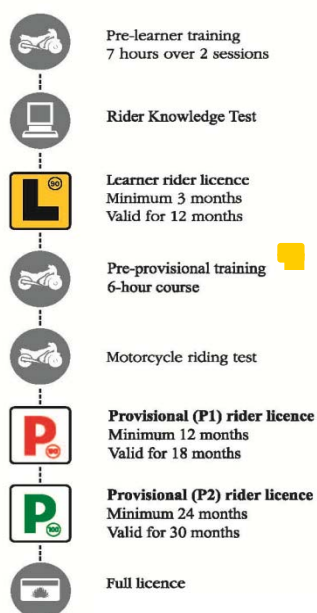
Overview of NSW motorcyclist licensing

To obtain a NSW rider licence, applicants must complete various stages of training and testing. The training covers the key skills required for riding on the road and is taught in two stages – pre-learner and pre-provisional.

New riders are required to pass through three licensing stages before obtaining a full rider licence:

- Learner rider licence
- Provisional rider licence, stage 1 (P1-red)
- Provisional rider licence, stage 2 (P2-green).

New riders have at least 36 months of experience before graduating to a full rider licence. The following flow chart shows how a new rider progresses through the licensing scheme:



Rider training - obtaining a motorcyclist licence in NSW

The Motorcycle Rider Training Scheme is compulsory in areas where it is available (**declared** areas). If the training scheme is not available in an area (an **undeclared** area), the licence applicant is required to pass the Motorcycle Operator Skill Test (MOST).

Declared area – Rider Training Scheme

If a licence applicant lives in an area where there is a training centre, the licence applicant **must** attend and satisfactorily complete rider training and testing, before they can be issued with a learner rider licence.

There are five steps to progress from a learner rider licence to a full rider licence in a declared area:

1. Successfully complete the pre-learner course
2. Pass the rider knowledge test to obtain a learner rider licence. The Rider Knowledge Test is a computer-based road rules knowledge test. The computer selects the questions at random from a bank of more than 600 questions.
3. Hold a learner rider licence for at least three months, and successfully complete the pre-provisional course to get a provisional P1 rider licence
4. Hold a P1 rider licence for at least 12 months before applying for a provisional P2 rider licence
5. Hold a P2 rider licence for at least two years before application for a full rider licence.

Undeclared area – tests

In areas where rider training courses are unavailable, which covers less than five per cent of the NSW population, the licence applicant needs to pass two tests before they are issued with a rider licence. A licence applicant has the option to attend a rider training course in a declared area, even if they live in an undeclared area.

There are four steps to progress from a learner rider licence to a full rider licence in an undeclared area:

1. Pass the Rider Knowledge Test to obtain a learner rider licence
2. Hold a learner rider licence for at least three months and then pass the riding test to get a provisional P1 rider licence
3. Hold a P1 rider licence for at least 12 months before applying for a provisional P2 rider licence
4. Hold a P2 rider licence for at least two years before application for a full rider licence.

Background information on the NSW Graduated Licensing Scheme

Graduated Licensing Scheme (GLS) concepts and proposals have featured in the road safety literature since the mid 1970s. Simply stated, graduated licensing is designed to maximise the development of safe driving/riding skills among novice vehicle operators, via staged training and practice over a longer time-span than required by traditional licensing schemes. Under a GLS, driving/riding privileges are gradually phased-in to allow early operator experience to be gained in lower-risk situations. In turn, drivers/riders experience more complex conditions over time as restrictions are gradually lifted to allow driving/riding experience under more challenging conditions before full licensure. Graduated licensing is consistent with best practice recommendations identified in the recent discussion paper on licensing for motorcyclists¹.

In NSW, a Graduated Licensing Scheme (GLS) for novice motorcyclists was introduced by Roads and Maritime Services on 1 June, 2009. This represented alignment with the existing GLS for car licensing and the associated road safety imperatives.

The Motorcycle Rider Training Scheme component of the GLS covers the key skills required for riding on the road and is delivered across two stages. It involves completing and passing pre-learner training, completing pre-provisional training and passing a riding test to qualify for a P1 provisional licence.

In addition to age and longer tenure requirements, other key elements of the NSW GLS include restrictions on speed and the motorcycle ridden (LAMS power to weight restriction of 150 kW/tonne & an engine capacity of 660 ml), a zero blood alcohol level and graduated demerit points.

Unlike some jurisdictions (including Queensland), it is not necessary to hold a car driver licence to be eligible for a learner rider licence in NSW. However, an individual must be at least 16 years and nine months of age to be issued with a learner rider licence. To gain a full open license, novice riders are required to accumulate at least 36 months of provisional experience before graduating to a full rider licence. This represents an extra two years on a provisional licence relative to the scheme that existed prior to the introduction of the GLS. This also means that speed, alcohol, motorbike and demerit point restrictions will apply for an extra two years.

On balance the NSW GLS is commensurate with GLS best practice on the criterion of minimising crash risk as identified in the literature. To summarise, NSW emphasises regulated training, graduated staging, a longer minimum threshold of riding experience and speeding restrictions.

There exists considerable crash-based research evidence to support GLS for novice car drivers. Crash risk factors, such as age and experience are common across vehicle types.

The NSW GLS for novice motorcycle riders draws on this evidence, with an emphasis on gaining experience under restrictions that address particular areas of risk. The GLS for motorcycle riders has yet to be evaluated in NSW due to its relatively recent introduction.

Post licence rider training

CRS literature review on returning riders included a brief summary of post licence rider training. In NSW, most refresher courses are run for an average of three hours (varying from two hours to four hours), with some providers also offering catered packages with the rider determining the skills that they need to develop. Refresher courses are generally conducted on an on-training range, with some followed by a supervised on-road component to put skills learnt into practice.

Refresher courses run across Australia generally cover:

- Principles of defensive riding
- Braking at various speeds and conditions
- Emergency braking
- Counter steering and curves
- Motorcycle Safety Inspection
- Hazard avoidance skills
- Acceleration
- Overtaking
- Road law refresher

The key elements of refresher riding training appear to closely align with those of pre-provisional training.

While the NSW pre-learner and pre-provisional rider training are subsidised, training outside of these parameters is not. High cost may act as a deterrent to riders pursuing additional training, such as refresher training. In NSW some independent driver and rider training providers offer refresher rider training courses for returning and other riders. The Motorcycle Council of NSW provides a list of some rider training providers in NSW, some of whom provide rider refresher training.

While a literature review into returning riders has been conducted, CRS will also undertake a review of available post-licensing rider training courses in NSW. The review would examine what courses have been offered in NSW, course components and their relevance to returning riders, and collection of information from course providers regarding the number

and characteristics of participants. The review should enable identification of appropriate risk-based post-licensing training courses that could be promoted among the motorcycle riding community, particularly for key target groups such as infrequent riders.

Licence Holders

Trends in motorcycle licence holders are shown in the table below. The table shows the number of motorcycle rider licences on issue from 2011 to 2015.

Licence class R by licence type as at 30 June 2011 to 30 June 2015

	2011	2012	2013	2014	2015
Learner	25,460	27,459	28,079	27,552	26,120
P1	19,371	19,053	20,506	20,855	20,652
P2	3,029	6,515	8,094	8,708	9,604
Unrestricted	461,252	471,975	483,321	497,469	512,932

Source: RMS Website - <http://www.rms.nsw.gov.au/cgi-bin/index.cgi?fuseaction=statstables.show&cat=Licensing>

The tables below show the number of motorcycle rider licences by age group on issue from 2011 to 2015.

2011

Age group	Learner	P1	P2	Unrestricted
16-19	4,027	1,685	620	409
20-24	6,140	3,718	1,939	8,474
25-29	4,975	3,949	265	23,114
30-34	3,374	3,149	111	35,807
35-39	2,368	2,412	56	49,383
40-44	1,682	1,803	19	54,297
45-49	1,311	1,298	9	63,053
50-54	879	782	5	67,463
55-59	394	348	2	60,324
60-64	195	142	2	46,320
65-69	74	49	1	25,791
70-74	26	26	0	15,456
75-79	12	5	0	7,880
80-84	2	2	0	3,420
85+	1	3	0	61
All	25,460	19,371	3,029	461,252

2012

Age group	Learner	P1	P2	Unrestricted
16-19	4,191	1,635	867	6
20-24	6,706	3,699	4,409	6,471
25-29	5,212	3,840	738	23,500
30-34	3,669	3,058	246	36,316
35-39	2,463	2,308	138	48,055
40-44	1,953	1,754	63	56,576
45-49	1,433	1,289	24	61,481

50-54	983	836	16	68,978
55-59	504	365	8	62,234
60-64	207	160	4	49,164
65-69	94	80	2	29,895
70-74	30	15	0	16,734
75-79	7	13	0	8,617
80-84	5	1	0	3,847
85+	2	0	0	101
All	27,459	19,053	6,515	471,975

2013

Age group	Learner	P1	P2	Unrestricted
16-19	4,086	1,762	800	2
20-24	7,029	4,080	5,601	5,418
25-29	5,355	4,053	1,024	23,574
30-34	3,656	3,237	325	37,264
35-39	2,457	2,303	171	47,124
40-44	2,052	1,912	75	58,316
45-49	1,491	1,446	46	59,763
50-54	1,081	960	24	69,777
55-59	512	460	17	63,945
60-64	222	176	8	52,606
65-69	113	90	3	33,778
70-74	19	17	0	17,955
75-79	3	7	0	9,448
80-84	3	2	0	4,184
85+	0	1	0	167
All	28,079	20,506	8,094	483,321

2014

Age group	Learner	P1	P2	Unrestricted
16-19	4,134	1,706	831	2
20-24	6,799	4,296	6,086	5,285
25-29	5,067	4,066	1,073	24,667
30-34	3,768	3,228	339	38,495
35-39	2,416	2,258	170	47,026
40-44	1,942	1,942	83	59,255
45-49	1,465	1,487	57	59,194
50-54	1,034	1,058	29	70,045
55-59	534	511	24	65,839
60-64	212	193	9	55,464
65-69	140	80	5	37,306
70-74	25	20	2	19,796
75-79	12	9	0	10,359
80-84	4	0	0	4,486
85+	0	1	0	250
All	27,552	20,855	8,708	497,469

2015

Age group	Learner	P1	P2	Unrestricted
16-19	3,805	1,681	828	5
20-24	6,361	4,315	6,596	5,305
25-29	4,944	4,010	1,224	25,660
30-34	3,410	3,222	453	39,916
35-39	2,333	2,190	224	47,562
40-44	1,879	1,931	127	60,049
45-49	1,451	1,433	70	59,788
50-54	1,045	1,025	31	69,565
55-59	528	509	26	67,755
60-64	229	208	16	57,933
65-69	101	94	7	41,165
70-74	24	29	2	21,678
75-79	8	4	0	11,373
80-84	2	1	0	4,852
85+	0	0	0	326
All	26,120	20,652	9,604	512,932

F. ANY OTHER RELATED MATTERS

Motorcycle Safety Strategy actions for 2015-2018 - External Key Stakeholder Workshop

A stakeholder workshop was hosted by Transport for NSW on 28 July 2015 to build on the achievements of the last three years and develop actions for the next three years (2015-2018). Workshop attendees included key partners from Motorcycle Council of NSW, Motorcycle Alliance of NSW, Australian Motorcycle Council, NSW Police Force, Motor Accidents Authority (MAA), VicRoads, NRMA Motoring & Services, Local Government NSW and Roads and Maritime Services.

In its presentation, Transport for NSW outlined new serious injury data and fatality trends for motorcycle related crashes from 2005 to 2013.

An update on achievements was also provided, including the 'Ride to Live' campaign, motorcycle lane filtering laws, testing of motorcycle barriers, helmet research, the Consumer Rating and Assessment of Safety Helmets (CRASH) program and key findings from the in-depth motorcycle crash study.

A Safe Systems presentation detailed key research in the last three years that will also inform the development of future actions. Additionally, a number of actions will be carried over from 2012-2015.

The NSW Motorcycle Council and the NSW Motorcycle Alliance presented on behalf of their members, outlining road safety issues for the motorcycling community. VicRoads also presented on strategies developed in Victoria to improve road safety for this at-risk road user group.

Motorcycle Green Slips Premiums

The NSW Government does not set Green Slip prices. Green Slip prices are set by the seven private CTP insurers based on an assessment of industry data and their claims experience, within Guidelines set by the SIRA. The prices for different types of vehicles reflect the cost and frequency of injury claims against a particular vehicle class (e.g. passenger vehicle, motorcycle, taxi cab) in one of five CTP rating districts.

Having set the base Green Slip price, CTP insurers use a variety of risk-rating factors to offer a discount to drivers considered to have a low risk profile or to impose a loading to those with a higher risk profile. The CTP insurers use the age of the owner or driver as the primary risk-rating factor. The insurers also use other factors such as the age of the vehicle and driver or rider safety record.

The SIRA regularly conducts a review of the claims experience or 'relativities' of each of the vehicle classes operating in the CTP scheme. Motorcycle relativities are derived from claims made against motorcycles at fault (e.g. claims from pillion passengers and pedestrians as well as other vehicle occupants in accidents where a motorcycle is at fault). As indicated above, the medical and compensation costs of motorcycle riders and pillion passengers can be very high as they are among the most severely injured of all road users.

The premium framework in NSW blends both risk-based and community-based approaches. Generally, Green Slip premiums reflect the underlying risk, plus or minus a subsidy, so that 'good risks' subsidise the 'poor risks' within a particular vehicle class and zone and within imposed limits to keep Green Slip premiums affordable. If this cross-subsidy did not exist, the cost of CTP insurance for some motorists (e.g. under 25 year old drivers) would be unaffordable and the community would run the risk of these motorists driving their vehicles uninsured and unregistered.

In response to enquiries from motorcycle groups, the MAA (now SIRA) commissioned a report by actuarial firm Finity Consulting on the premiums paid and benefits received by motorcyclists in the CTP scheme. The report by Finity demonstrated that motorcyclists were paying their own way in the CTP scheme, although they were not paying sufficient levy in the Lifetime Care and Support scheme and were subsequently being subsidised in that scheme. The report also showed that Green Slip premiums for motorcyclists had increased at a much lower rate than for passenger vehicles in NSW – motorcycle premiums increased by 10% from 2006-2013, compared to a 67% increase for Sydney passenger vehicles.

The new premium relativities that commenced from 1 February 2015 resulted in a 5% reduction in all motorcycle relativities except for one class, which had an 8% increase. The average Green Slip premium for all motorcyclists was \$319 (MCIS levy and GST inclusive) as at 30 June 2015, compared to \$343 (MCIS levy and GST inclusive) as at 30 June 2014.

The average Green Slip premium for all motorcycles as at 30 June 2015 compared to 30 June 2014 is set out below.

Average Premium NSW Motorcycles

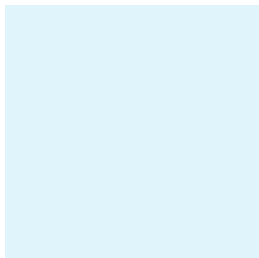
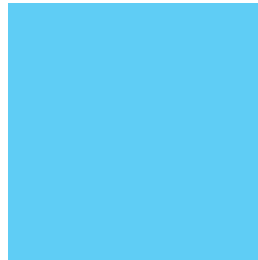
Class	Engine capacity (cc)	Average Premium (\$)		% change
		30-Jun-14	30-Jun-15	
10d	up to 225 cc or electric motorcycles	111	101	-9%
10e	226 to 725 cc	283	262	-7%
10f	726 to 1125 cc	427	386	-10%
10g	1126 to 1325 cc	615	561	-9%
10h	over 1325 cc	545	518	-5%
All Motorcycles		343	319	-7%

As a significant factor in the setting of Green Slip premiums for motorcyclists is the cost of claims when a motorcycle is at fault in an accident, any potential initiatives and measures to improve safety and reduce injury for motorcyclists may work to put downward pressure on Green Slip prices for this road user class.

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NSW Motorcycle Safety Strategy 2012 – 2021



Transport
for NSW



Foreword

The NSW Government is committed to improving road safety. The NSW Motorcycle Safety Strategy 2012-2021 (Strategy) will contribute to road safety by addressing the motorcycle road toll through targeted motorcycle safety initiatives and actions.

Road safety is a Government priority of NSW 2021: A Plan to Make NSW Number One. The Strategy will contribute to our goal to make NSW roads the safest in the country.

Motorcycle safety actions are already underway to reduce motorcycle crashes. Such actions include our current programs and the implementation of early initiatives throughout 2011 and 2012. We will continue to deliver these as well as driving new initiatives and actions such as:

- ▶ Developing targeted communication campaigns to address motorcycle crash risks
- ▶ Furthering our research and understanding of motorcycle crash risks

- ▶ Improving road environment safety features for motorcyclists
- ▶ Investigating safety equipment and gear

The Strategy was developed in consultation with key stakeholders, including the rider community. Our consultation with the motorcycle rider community brought broad and varied input in developing achievable and practical solutions.

We will continue to develop, implement, monitor and evaluate the Strategy in partnership with our stakeholders and the rider community through an Implementation Working Group to ensure our objectives are met and our actions remain relevant.

The Hon. Duncan Gay MLC
Minister for Roads and Ports



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1. Executive Summary

The NSW Motorcycle Safety Strategy 2012-2021 (the Strategy) establishes the ten year direction of the NSW Government to make motorcycle riding in NSW safer and to reduce the motorcycle road toll. The Strategy sets out a range of short-term actions and long-term initiatives to meet those aims.

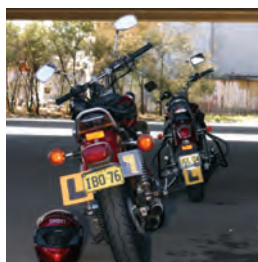
The Strategy will align with other key documents and actions that the NSW Government is implementing to improve road safety, including the UN Decade of Action 2011-2020, the National Road Safety Strategy 2011-2020, NSW 2021: A Plan to Make NSW Number One and the NSW Road Safety Strategy 2012-2021.

The Strategy represents the NSW Government's commitment to making NSW roads the safest roads in Australia. By developing a strategy specifically for motorcyclists, the NSW Government acknowledges motorcyclists have unique road safety needs, as well as the general road safety needs common to all road users.

The NSW Government is committed to making roads safe for all road users. Motorcyclists require a targeted safety improvement approach because motorcyclist fatalities are over-represented in the overall NSW road toll.

The Strategy comprises of early initiatives already being implemented, as well as actions from the National Road Safety Strategy 2011-2020, and new actions and initiatives over the next decade. The Strategy actions and initiatives will be developed and implemented within a Safe System framework. As such, the Strategy has been developed in collaboration with key stakeholders and is derived from and supported by safety research and motorcycle crash data analysis.

A detailed action and implementation plan for the Strategy will be developed with key stakeholders. This will be achieved by establishing and convening the Implementation Working Group, and by monitoring, evaluating and reporting on the initiatives. Adopting this process will allow the Strategy to remain relevant to motorcyclists, current to the issues of the time and effective in meeting the overall aims.



2. Why a NSW Motorcycle Safety Strategy?

Motorcyclists are over-represented in NSW road trauma, accounting for 15 per cent of road fatalities and 10 per cent of injuries. Importantly, motorcycles make up only 3.7 per cent of all NSW registered motor vehicles, and are increasing in number on the road network. This growth is more pronounced than the growth in other transport modes. There is also current evidence of very strong growth in the number of motorcycle licences on issue. The following motorcycling statistics highlight the increase in motorcycle riding popularity:

- ▶ There are about 500,000 motorcycle licences in NSW (about 10 per cent of all licences on issue) and about 173,000 registered motorcycles (2010).
- ▶ In the five years since 2006 the number of passenger vehicle registrations has grown 8 per cent while the number of motorcycle registrations has grown by 41 per cent.
- ▶ Over the same five year period, the number of motorcycle licences has increased by 17 per cent in NSW.

Figure 1 shows that since 2000 there has been an increase in motorcycle casualties on NSW roads. This figure also shows that NSW motorcycle registrations have increased at a considerably higher rate over the same period. There is a potential risk that motorcycle casualties may increase at a substantial rate commensurate with registrations in the future. A motorcycle-specific strategy is required to manage this risk and improve the safety of motorcyclists on NSW roads.

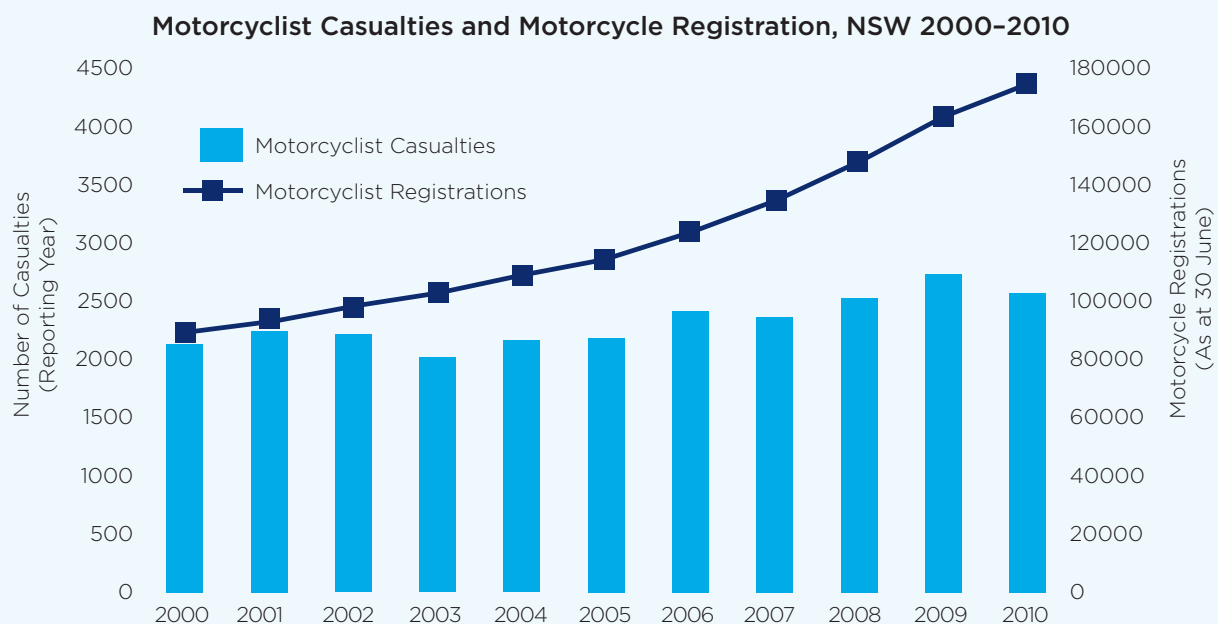


Figure 1: Motorcyclist Casualties and Motorcycle Registrations

¹ Unless otherwise stated, the NSW crash data in this document comprises data for the period 2006–2010. All assumptions and definitions are consistent with the TfNSW's Annual Statistical Statement 2010.

2 Why A NSW Motorcycle Safety Strategy? cont'd

Despite the increased popularity of riding, motorcycles are more at-risk in crashes compared to other passenger vehicles (even after accounting for vehicle registrations).

Figure 2 shows that a motorcycle is four times more likely to be involved in a fatal crash than another passenger vehicle.

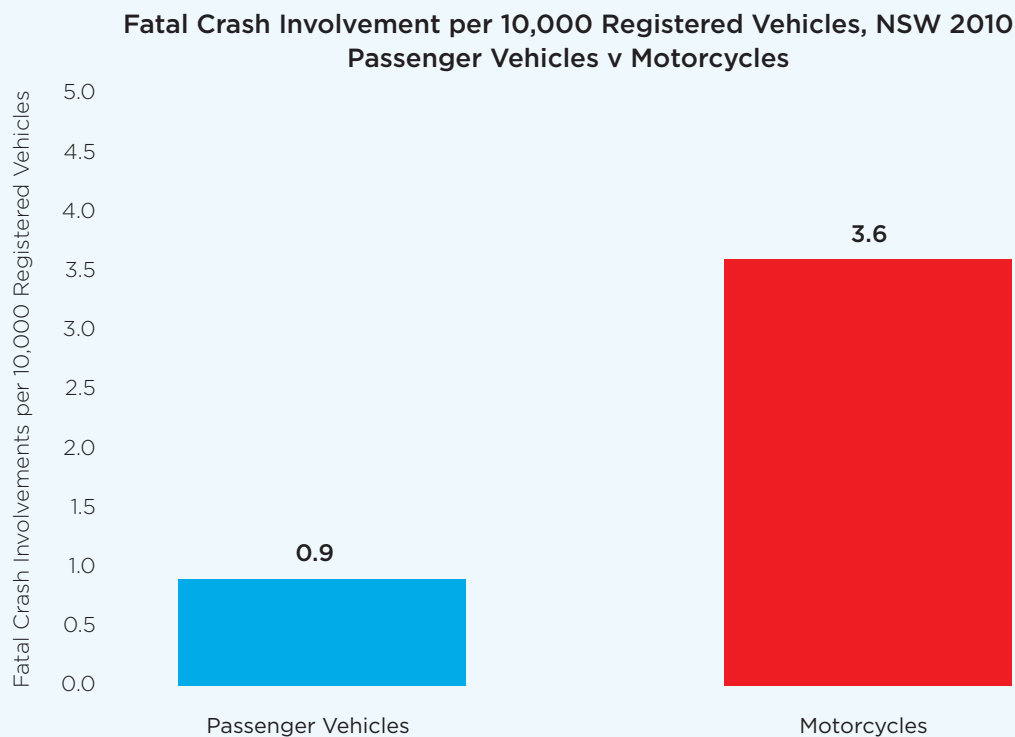


Figure 2: Fatal Crash Involvement of Motorcycles versus Passenger Vehicles



Not only are motorcyclists over-represented in the NSW road toll, but over recent years there is also a divergence between the motorcyclist casualty trend and the casualty trend for other road users. Since 2006, there has been a 6 per cent increase in motorcycle casualties while over the same period, all other road user casualties decreased by 4 per cent (Figure 3). Therefore, regardless of shifting trends in registrations and licences, the continuing increase in motorcycle casualties remains a primary road safety focus.

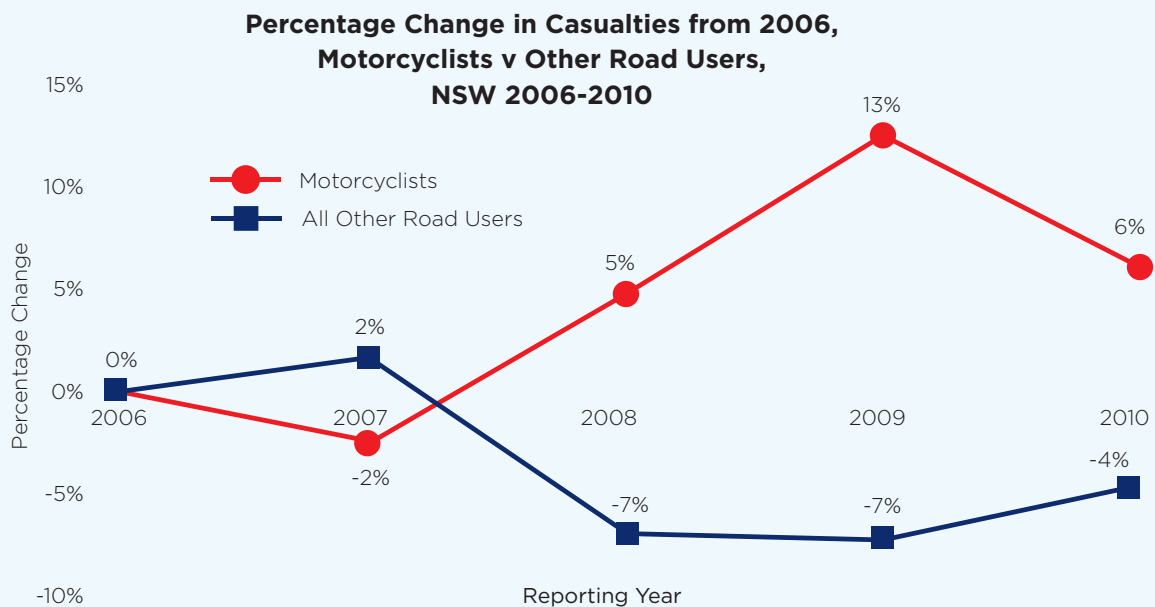


Figure 3: Percentage Change in Casualties from 2006, Motorcyclists v Other Road Users

There are risks associated with motorcycle riding that are the same for all road users but there are also specific risks that apply particularly to motorcycle riding.

Motorcycle riding can be different from other modes of transport in terms of patterns of travel, environmental influences and the greater physical and cognitive demands. Motorcycles can also be divided into a number of different types or categories, such as standard, touring, sport, on/off, cruiser, moped and scooter. The design of motorcycles and scooters means that they have unique characteristics when compared with other vehicles and are extremely sensitive to road and maintenance design features and impacts with objects. These elements along with the lack of

physical protection, makes riders and their passengers among the most at-risk road users.

The characteristics of motorcycle crashes show that countermeasures need to be designed to address the rider, the motorcycle, other road users, other vehicles, equipment, clothing and the road environment. The Strategy presents an opportunity for a coordinated approach to reduce motorcycle crashes incorporating the Safe System pillars of safe roads, safe vehicles, safe speeds and safe people.

In developing and implementing this Strategy, the NSW Government is committed to reducing the risk of fatality or injury and improving road safety for riders and their passengers.

3. Context

Road trauma costs the NSW community approximately \$4.8 billion per year.² Delivering services, policies and programs to reduce road trauma can result in significant economic savings to the community, while greatly improving quality of life for many people.

The 2009 road toll was 453, comprising 79 more deaths than in 2008. In response to this sharp rise in fatalities, the \$170 million Road Toll Response Package (2010/11 to 2014/15) was implemented to improve road safety. The Road Toll Response Package comprises of a wide range of programs including road safety improvements, research and strategy development, heavy vehicle initiatives and speed enforcement. The package also includes the development of the Strategy to reduce motorcyclist fatalities and injuries.

The NSW Government is strongly committed to improving road safety for all road users, having adopted the following key road safety approaches:

- ▶ Signing the UN Decade of Action for Road Safety which provides focus for the worldwide effort in improving road safety.
- ▶ Working alongside other jurisdictions to develop and

implement the National Road Safety Strategy.

- ▶ Providing overall strategic direction for road safety actions in NSW by implementing the NSW Road Safety Strategy 2012-2021.
- ▶ Driving the implementation of NSW 2021: A Plan to Make NSW Number One priorities of improving road safety across the State through the Government's Centre for Road Safety, with the help of our partners and the community.
- ▶ Adopting the nationally and internationally endorsed Safe System approach to improving road safety for all road users in NSW.

UN Decade of Action 2011-2020

The Decade of Action for Road Safety 2011-2020 is a United Nations initiative aimed at halving the projected global road traffic deaths over the next ten years.³ Australia was a signatory to the resolution, proclaimed by the UN General Assembly in March 2010.

According to a World Health Organisation report, road traffic injuries are predicted to become the fifth leading cause of death in the world by 2020 hence the need to take strong action globally. The report found more than 1.3 million people die every year due to road crashes with

a further 20-50 million injured. This is predicted to grow to 1.9 million deaths by 2020.

National Road Safety Strategy 2011-2020

The National Road Safety Strategy 2011-2020 aims to reduce the number of fatalities and serious injuries by at least 30 per cent by 2020.⁴ On average four people die and 90 people are seriously injured on Australian roads every day. The National Road Safety Strategy 2011-2020 aims to elevate Australia's road safety ambitions through the coming decade and beyond.

As part of the National Strategy, governments from all Australian states and territories have agreed to implement a number of actions using the Safe System approach. The initiatives specifically aimed at motorcycle safety measures include:

² NSW Department of Premier and Cabinet, NSW 2021: A Plan to Make NSW Number One, Sydney, September 2011.

³ For full report see: http://www.who.int/roadsafety/decade_of_action/plan/english.pdf

⁴ For full report see: http://www.atcouncil.gov.au/documents/files/NRSS_2011_2020_20May11.pdf

First three years actions:

- ▶ Target infrastructure treatments to address safety issues for vulnerable road users, for example: safety improvements on popular motorcycle routes.
- ▶ Examine options for improved enforcement of motorcycle speeding.
- ▶ Prepare Regulatory Impact Statements (RISs) to consider mandating of Anti-lock Braking Systems (ABS) for motorcycles.
- ▶ Review licensing arrangements for motorcycle riders. Elements for examination include graduated restrictions for novice riders (including minimum period with a car licence before motorcycle licensing) and education and training if proven to deliver road safety benefits.
- ▶ Investigate licensing options to improve the safety of returning motorcycle riders.
- ▶ Develop and implement a national helmet assessment and rating program to stimulate market demand for the safest motorcycle helmets, and examine options for other protective gear.

Future steps for consideration:

- ▶ Introducing motorcycle Black Spot / Black Length programs in all jurisdictions, potentially funded by a levy on compulsory third-party injury insurance for motorcyclists.
- ▶ Investigating the scope for regulatory action to further improve stability, traction and braking standards on motorcycles supplied to the Australian market.

NSW Road Safety Strategy 2012-2021

The NSW Government launched the NSW Road Safety Strategy 2012-2021 (the NSW Strategy) in 2012. The NSW Strategy aligns with the National Strategy, but will also include additional NSW-specific initiatives. Motorcyclists will benefit from many of the broader road safety initiatives under the NSW Strategy, like improved crash data capture and collection, capacity-building and safety programs.

NSW 2021: A Plan to Make NSW Number One

Around 400 deaths and 24,000 injuries occur in NSW each year. NSW 2021: A Plan to Make NSW Number One aims to reduce fatalities to 4.3 per 100,000 people by 2016 by identifying and upgrading Black Spots, promoting safety features in cars, enforcing speed limits and other road rules, and encouraging road users to drive responsibly.

Safe System

The Safe System approach is adopted globally as the overarching framework for understanding road safety and developing appropriate countermeasures. The Safe System approach provides a guiding set of principles for road safety, and is designed to identify the way different elements of the road transport system combine and interact with human behaviour to produce an overall effect on road trauma.

The Safe System approach recognises there is a limit to the forces humans can withstand in a crash, while accepting that human error on our roads is inevitable. The approach is also used to promote the importance of travelling at speeds more forgiving of human error, designing roads and vehicles which reduce harm in the event of a crash, and responsible road user behaviour.

The Strategy outlines the motorcycle riding safety risks in relation to these Safe System elements and the associated initiatives to manage these risks.



Current Programs

The NSW Government currently provides a number of key programs to ensure motorcycle safety. These programs are set out in the following table:

Programs	Description
Graduated Licensing Scheme (GLS)	A GLS for motorcycle riders was introduced in June 2009. Restrictions on alcohol, speed, demerit points and type of motorcycle apply.
Learner Approved Motorcycle Scheme (LAMS)	LAMS was implemented in late 2002. It allows learner and provisional riders to ride moderately powered motorcycles up to engine capacity of 660cc. Now adopted nationally.
Rider training scheme	<p>The rider training scheme has been operating in NSW since 1990 and is compulsory. It covers key riding skills and low risk riding strategies.</p> <p>Pre learning training Two sessions of 3.5 hours each. Competency based course, pass or fail. Driver knowledge test.</p> <p>Pre provisional training Competency based course, pass or fail criteria. One session of six hours plus one hour test.</p>
Motorcycle campaigns	<p>Outdoor safety messages on roadside banner sites, busbacks and taxibacks and regional initiatives and local campaigns:</p> <ul style="list-style-type: none"> ▶ Cornering ▶ Braking ▶ Drink riding ▶ Check twice for bikes.
Educational Brochures and Booklets	<p>Provision of road safety information and advice:</p> <ul style="list-style-type: none"> ▶ Road Users' Handbook ▶ Motorcycle Riders' Handbook ▶ 'Braking Habits' ▶ Safer Motorcycle Helmets ▶ Group riding in NSW – a guide for motorcyclists ▶ Group riding in NSW – a guide for organisers.
Enhanced Enforcement Program	Targeting high risk road safety behaviours such as speeding, drink riding and non-helmet use on identified motorcycle routes.
Double demerit periods	Targeting speeding and non-helmet use.
Road engineering, design and repairs	<ul style="list-style-type: none"> ▶ Curve widening on identified high motorcycle crash areas ▶ Highway safety route reviews including consideration of motorcycle safety treatments ▶ Auditing of recreational motorcycle routes ▶ Motorcycle friendly safety barrier terminals; guide posts that collapse when hit ▶ Improved line marking on roads frequented by motorcycles ▶ Speed limit reviews on known motorcycle routes ▶ Motorcycle specific advisory signs for motorcycles or warnings for motorcycles on motorcycle routes ▶ Research into roadside barriers and other motorcycle friendly road safety treatments.
CRASH	RMS research and reporting program designed to address relative safety performance of motorcycle helmets.

4. The Strategy

The Strategy is designed to reduce the risk, incidence and severity of a crash for all motorcyclists on NSW roads. The aim of the Strategy is to make riding motorcycles safer and reduce motorcycle fatalities and injuries in NSW. The Strategy will build on existing motorcycle safety programs and will set out research and development work to establish new initiatives over the next 10 years.

Early Initiatives

During the Strategy development phase, the Government started work on early initiatives to improve motorcycle safety. Such initiatives included: printing and distributing consumer information about safe gear, researching international helmet standards and comparing them to Australian standards, expanding existing motorcycle safety communications campaigns, and scoping an in-depth motorcycle crash study. These initiatives have been incorporated as part of the overall Strategy.

Framework

The NSW Government applies the Safe System approach to the development of countermeasures that reduce deaths and injuries, enabling safer travel on NSW roads. The Safe System approach comprises four key areas of road

safety intervention: Safe Roads, Safe Vehicles, Safe People and Safe Speeds.

The Strategy will incorporate the four pillars of the Safe System approach into its structure, outline safety objectives, identify risks and harms, and contain proposals for initiatives. It will also be supported by an evidence-based approach that includes research, data analysis, and consultation with stakeholders and the motorcycle rider community.

The extent and severity of motorcycle crashes are rarely attributable to one factor (as with all crashes), because there are often overlapping and multi-dimensional contributing factors. The Safe System approach helps to understand and address complex motorcycle safety issues.

Consultation

The Government is committed to consulting and working with our stakeholders and the motorcycle rider community. A series of consultation workshops were organised and attended by key stakeholders, including: the motorcycle rider community, the Motorcycle Council of NSW, Transport for NSW, NSW Police Force, Motor Accidents Authority, Australian Motorcycle Council, Local Government and Shires Association, Federal Chamber of Automotive Industries and NRMA Motoring and Services. During consultation, key rider and other road user behaviours were identified for targeted road safety messages.

Communication

A communication plan will be developed to underpin the Strategy. The plan will be developed in consultation with key stakeholders, and will support the delivery of motorcycle safety initiatives.





Safe Roads

Objective

Reduce the number of motorcycle crashes, the severity of injuries and the number of fatalities attributable to road design, maintenance and operational factors.

Safety risks

Road Surface and Hazards

The road surface and environment can pose a unique risk to motorcyclists. Motorcycle stability can be affected more by changes in the shape, texture, or the skid resistibility of the road surface than other vehicles. Aspects of the environment and road surfaces such as potholes, loose gravel and

impaired sightlines can be more hazardous for motorcyclists than for other road users.

Other road features that can be hazardous to motorcycles include insufficient shoulder and clear zone widths, rumble and median strips, road furniture placement and road marking visibility.

In view of the above, it is important that Safe Roads is incorporated as a key safety intervention area of the Strategy. Safe Roads interventions will mitigate or eliminate potential road environment risks contributing to motorcycle crashes and the injuries sustained in the event of a crash, while also managing potential risks for other road users.

Safety Initiatives

1. Research road safety engineering treatments to improve motorcycle safety.
2. Ensure Safe Roads principles are understood and applied by people looking after the assets – designers, maintainers and engineers.
3. Contribute to National Road Safety Strategy by introducing a motorcycle blackspot/length program.

Actions for First 3 Years

1. Investigate effective road environment incident reporting that is available for the motorcycling community.
2. Review traffic engineering specifications that increase motorcycle safety while balancing road safety requirements for other road users.
3. Educate road asset owners to consider motorcycle safety while roads are designed, constructed, maintained and operated.
4. Establish opportunities for road design, engineer and maintenance practitioners to share motorcycle safety expertise.

Road Alignment

Motorcycles are especially vulnerable to collisions on bends and curves. Loss of control is more likely where acceleration or deceleration occurs, or where the stability of the motorcycle is threatened. A high number of impacts happen on roads with a tight radius and on roundabouts. Other motorcycle-specific issues in connection with road geography include: shoulder width, curves, clear zone width, gravel, transverse lines, rumble strips, median strips, kerbs, visibility, barriers, road furniture, markings, and fencing.⁵

Roadside objects pose a high risk for motorcyclists when crashes involve departing the roadway. The greatest proportion of motorcyclists killed in NSW was in motorcycle-object crashes (35 per cent of all motorcyclist fatalities). This figure has been increasing since about 2003. Trees and other types of vegetation are the most frequent objects hit, followed by roadside barriers, kerbs/gutters, then utility poles, median strips and walls.

Urban and Rural roads

There are differences in motorcycle crash characteristics between rural and urban

roads. The treatments for such characteristics are different. In rural NSW, many motorcyclists were killed when they lost control of their motorcycle on a curved road at a high speed and hit an object. By contrast, many motorcyclists were killed in urban areas when they struck an object such as a tree or pole at a lower speed, or in a crash involving another vehicle at an intersection. Differences in rural and urban riding can include factors such as trip purpose (commuting versus recreational riding) and trip length. As such, these factors need to be considered in developing safe roads.

Actions for First 3 Years

5. Continue research into safety barriers and motorcycles.
6. Use Road Safety Audits to review and improve motorcycle routes and safety features.
7. Document the clear zone policy and continue to communicate about safe motorcycle roadside needs to other agencies and utility agencies.
8. Contribute to National Road Safety Strategy: Safety improvements on popular motorcycle routes.

Prompt medical interventions in emergency situations can often save lives and decrease injury severity; importantly, emergency responses to motorcycle crashes in rural locations may be delayed due to the relative isolation at the crash site. This may be attributed to poor mobile phone reception, inadequate emergency phones, lack of other road users in the event of a crash, and logistical access issues for emergency services.

Popular motorcycle routes are often found in isolated and rural areas. These routes have also been identified in crash data as presenting a high crash risk in terms of the number and rate of injury and fatality crashes.

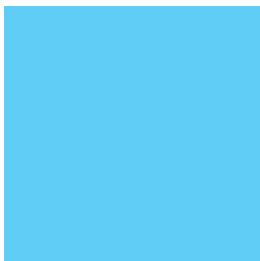
Safety Initiative

4. Investigate ways to improve post-crash emergency response.

Actions for First 3 Years

9. Explore emergency location detection for motorcyclists.
10. Investigate feasibility for safety phones along popular motorcycling routes.

⁵ Austroads, Guide to Traffic Engineering Practice, Motorcycle Safety, Part 15, 1999 and TfNSW consultation workshop, 2 July 2011.



Safe People

Objective

Reduce the number of motorcycle crash fatalities and the severity of injury by reducing distractions, improving awareness, training, education and regulatory measures (including motorcyclists and motor vehicle drivers).

Safety risks

Dangerous and risk-taking behaviours

Studies of motorcycle crashes caused by behavioural factors have found that when the motorcyclist was responsible for the crash, it was often due to a loss of control linked with speed, alcohol impairment and reckless or careless riding behaviour.⁶ An analysis of the NSW crash data also shows high crash risks associated with dangerous riding behaviours in NSW, for example:

- ▶ Illegal alcohol levels contributed to 17 per cent of motorcycle rider fatalities between 2006 and 2010 and is around 3 times more likely to be present among killed riders than among injured riders.
- ▶ In the same period, 51 per cent of motorcycle riders killed were speeding or riding at an inappropriate speed for the prevailing conditions.
- ▶ Fatigue is identified as a contributing factor to around 7 per cent of motorcycle crashes. Alcohol was present in the rider at levels of 0.05g/100ml and over in a larger proportion of fatigue-related crashes compared with non-fatigue-related motorcycle crashes (13.0 per cent versus 3.8 per cent).
- ▶ It is unclear if or how much of a role drugs may play in motorcycle crashes, however, initial studies have found that it may be an area in need of further investigation.⁷

⁶ Haworth, N., Smith, R., Brumen, I. & Pronk, N. Case-control study of motorcycle crashes, Federal Office of Road Safety, Dept. of Transport, Canberra, CR 174, 1997

⁷ Grzebieta, G., Jama, Hussein., Bambach, Mike., Friswell, Rena., McIntosh, Andrew., Favand, Jerome., Motorcycle Crashes into Roadside Barriers Stage 1: Crash Characteristics and Causal Factors, NSW Injury and Risk Management Research Centre, March 2010.

Safety Initiatives

5. Further research on motorcycle road crashes, including collaboration with other jurisdictions and research bodies.
6. Continue to investigate enforcement strategies to deter risk-taking behaviours.
7. Ongoing communication campaigns to target risk-taking behaviours and increase motorcycle safety awareness and risk management.
8. Research the impacts of fatigue on motorcycling with a view to developing appropriate countermeasures.

Actions for First 3 Years

11. Develop campaigns to assist riders to better manage risks that can lead to high-risk motorcycle crashes.
12. Undertake in-depth motorcycle crash study.
13. Promote crash care advice for motorcyclists.
14. Continue supporting Motorcycle Awareness Week.
15. Undertake literature review into fatigue as it relates to motorcycles.



Licensing

Motorcycle crash risk can also be influenced by the rider's level of experience and awareness of motorcycle safety. Inexperience has been identified as a major factor in motorcycle crashes worldwide.⁸

Young riders (under 30 years) and novice riders (learner and provisional licence-holders), are over-represented in crash statistics, accounting for 44 per cent of all rider casualties. In NSW, although older riders (30 years and over) make up the greater proportion of motorcycle riders in crashes, it is younger riders who (relative to the licences on issue), have the higher crash rate:

- ▶ Motorcycle rider casualties under the age of 30 years account for 40 per cent of all motorcycle rider casualties and represent only about 11 per cent of rider licences on issue.
- ▶ Motorcycle rider casualties aged 30-49 years account for 41 per cent of all motorcycle rider casualties and represent about 47 per cent of rider licences on issue.
- ▶ Motorcycle rider casualties aged 50 years and older account for 16 per cent of all motorcycle rider casualties and represent about 42 per cent of rider licences on issue.

Motorcycle crashes involving speed, alcohol and fatigue is a concern, particularly for young and novice riders. For example, when compared to older riders, fatal crashes involving young and novice riders are:

- ▶ 5 times more likely to involve speed as a factor
- ▶ 4 times more likely to involve alcohol as a factor
- ▶ 3 times more likely to involve fatigue as a factor.

Another licensing issue that arises from the NSW crash data is the level of unauthorised riding. One in every five riders killed and one in every 14 riders injured was unauthorised to ride a motorcycle (which includes unlicensed, suspended, disqualified, cancelled or expired).

During the Strategy consultation and development stage, the motorcycle rider community expressed concerns about riders who have “dormant licences” or who have no recent motorcycle riding experience. These concerns related to a perceived link between a lack of recent riding experience and decreased safety risk for the rider. There is currently a lack of research evidence to support this hypothesis; however, in view of increasing motorcycle registrations and licence numbers in NSW, the issue should be investigated as a potential safety issue.

⁸ Haworth, N. Powered two wheelers in a changing world—Challenges and opportunities, Accident Analysis and Prevention, October 2010.

Safety Initiative

9. Continue research into motorcycle licensing and training.

Actions for First 3 Years

16. Investigate ways to enhance the motorcycle mentoring program.
17. Investigate the issue of returning riders.
18. Disseminate the Motorcycle Handbook to relevant road users.
19. Evaluate the NSW Graduated Licensing Scheme.
20. Contribute to National Road Safety Strategy:
 - a. Investigate licensing options to improve the safety of returning riders.
 - b. Review licensing arrangements for motorcyclists.

Interaction with other road users

In around two thirds of crashes involving a motorcycle and motor vehicle colliding, the motor vehicle was deemed the key vehicle, indicating a need to address how other road users interact with motorcyclists on the roads. The interaction between motorcycles and other road users was also identified in consultation with the motorcycle rider community as a key issue for road safety.

Safety Initiative

10. Develop campaign and other information material promoting the safe interaction between motorcyclists and other motor vehicles on the road.

Actions for First 3 Years

21. Use existing campaigns (for example, Check Twice for Bikes campaign) to build awareness of the presence of motorcyclists by other road users, especially drivers.
22. Investigate safety impacts of measures addressing congestion and motorcycle interactions with other road users (e.g. lane filtering).



Safe Speeds

Objective

Reduce speeding as a contributor to motorcycle fatalities and injuries.

Safety risks

Excessive or inappropriate speed

Speed is a significant factor in many motorcycle casualty crashes. Speeding includes riding at excessive speed and not riding at a speed suitable to the prevailing road conditions (for example on curves or wet roads). Higher travel speeds afford the rider less time to respond to a hazardous situation, and increase the likelihood of death or serious injury in a crash.

There is a higher risk of a casualty outcome for a motorcyclist involved in a speed-related crash. The higher risk is attributable to minimal protection and the chance of being thrown from the motorcycle. Speed was a factor in 51 per cent of motorcycle rider fatalities. Speeding is an issue both in rural and metropolitan NSW. While speed limits may vary between urban and rural locations, many motorcyclists involved in casualty crashes may not be adjusting their riding to the prevailing speed limits or road conditions. Many of the crashes on identified popular motorcycling routes involve speeding.

Safety Initiatives

11. Research speed countermeasures such as speed advisory signs and speed management communication messages.
12. Identify high motorcycle crash locations for road safety treatment including road engineering improvement and review of speed zones.
13. Target enforcement on popular motorcycle routes to ensure safe motoring for all road users.

Actions for First 3 Years

23. Develop a communication campaign that addresses:
 - ▶ motorcycle speed-related risks and behaviours
 - ▶ inappropriate speed
 - ▶ riding to conditions.
24. Continue Enhanced Enforcement Program with a focus on identified motorcycle crash risk locations.
25. Contribute to National Road Safety Strategy: Examine options for improved enforcement of motorcycle speeding.

Safe Vehicles

Objective

Reduce the number of motorcycle fatalities and the severity of injury in motorcycle crashes through protective clothing and safe motorcycle features, including design of other vehicles (visibility for drivers).

Safety risks

Lack of Rider Protection

One of the major contributors to rider injury and death is the design of the motorcycle itself. This is attributable to the lack of protection in the event of a crash, relative to other motorists. For example, compared to other motor vehicles, motorcycles lack vehicle and body physical crash protection, are more difficult to control as they have only two wheels, and are less visible to other road users.

The NSW crash data show that striking an object is a highly prevalent outcome in a motorcycle crash. While the rider may not always be at fault in these crashes, the rider is more exposed to injury and/or fatality due to the absence of a protective barrier. In addition, a motorcycle by its very design can lead to a high rate of 'secondary' impact forces. Often the motorcyclist may be avoiding a hazard or be thrown from the motorcycle and hit an object. Of the 108 motorcycle-object fatal crashes in the last five years, around a third involved hitting a second object in the crash.

In addition to object crashes, 32 per cent of casualty crashes are rollover crashes (where a motorcyclist and/or passenger is ejected from the bike or slides along the road on the bike). In

metropolitan and rural locations, there are a high proportion of cases in which riders are ejected from their motorcycles and slide or tumble on the road surface, regardless of crash type. The benefits of riders wearing protective clothing, particularly in low-impact and low speed crashes, are well established. Evidence from research studies indicates effective protective clothing can prevent injury in most low impact and low speed crashes.⁹ There is also evidence that those who ride unprotected are less likely to seek out information about protective clothing indicating a need to improve the quality and delivery of safety information.¹⁰ In particular, information about motorcycling crash risks, the benefits of protective clothing, and motorcycle safety features should be promoted to riders.



⁹ Baldock MRJ, Grigo JAL, Raftery SJ. Protective clothing and motorcyclists in South Australia, March 2011

¹⁰ de Rome Liz, Ivers Rebecca, Haworth Narelle, Heritier Stephane, Du Wei, Fitzharris Michael. Novice riders and the predictors of riding without motorcycle protective clothing, 2010

Safety Initiative

14. Research, develop and promote accurate and reliable motorcycle safety information on motorcycle features, helmet standards and protective clothing.

Actions for First 3 Years

26. Continue to improve on helmet standards and helmet use, including expanding the CRASH program and researching international helmet standards.
27. Research use of helmets by motorcycle riders and passengers.
28. Disseminate evidence-based consumer information on protective gear and motorcycle safety features (distribution of the Good Gear Guide).
29. Contribute to National Road Safety Strategy: Develop and implement a national assessment and rating program to stimulate market demand for the safest motorcycle helmets – and examine options for other protective gear.
30. Seek input from stakeholders and motorcycle rider community to manage motorcycle safety and standards issues (e.g. motorcycle helmets).

Scooters/mopeds

Scooters and mopeds are classified as motorcycles in NSW road transport law. A motorcycle licence is required to ride a scooter or moped in NSW.

Scooters and mopeds are becoming increasingly popular. The number of scooter/moped registrations in NSW increased from 4 per cent of all motorcycle registrations in 2006 to 5 per cent in 2010. At the same time the proportion of scooter/moped casualties increased from 2 per cent to 5 per cent of all motorcyclist casualties. These data show scooters and mopeds are an increasing concern, possibly due to increased exposure on the road network.

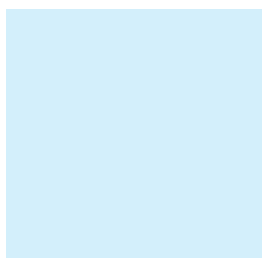
Scooter/moped riders face similar risks to motorcycle riders because they are just as vulnerable in the event of a crash. The NSW crash data reveals interesting similarities and differences in the crash patterns of scooter/moped riders.

The NSW crash data indicate these similarities:

- ▶ Most single-vehicle crashes involve a rollover and most multi-vehicle involve adjacent turning, right angle and rear end crashes.
- ▶ Under 30 and 30-49 years of age groups made up the majority of motorcycle and scooter/moped casualties.

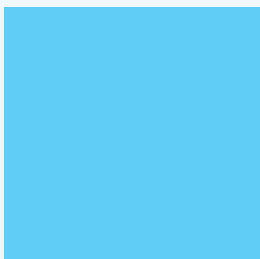
The NSW crash data indicate these differences:

- ▶ Over 70 per cent of scooter/moped casualties were involved in multi-vehicle crashes compared to 56 per cent for motorcyclists.
- ▶ About 30 per cent of scooter/moped casualties were females, compared with 11 per cent for motorcycle casualty crashes.
- ▶ About 82 per cent of scooter/moped casualties occur in an urban environment and 18 per cent in a rural area. For motorcyclists 59 per cent of casualties are urban and 41 per cent are rural.



Action for First 3 Years

31. Develop communication campaigns targeting specific risk issues for scooter/moped riders.



Stability and braking control

Intelligent Transport Systems have also been identified as a possible method of reducing the number and severity of motorcycle crashes, especially in relation to speeding, post-crash care and anti-lock braking. The effectiveness of these systems is still being researched. Intelligent Transport Systems technology in motorcycles lags behind other vehicles such as cars. In NSW crash data, running off-road crashes on both straight

and curved roads were the most commonly occurring types of single-vehicle crashes and crashes involving vehicles travelling in opposing directions or intersection crashes were the most commonly occurring multi-vehicle crashes. Therefore systems which address the stability and braking properties of a motorcycle are seen to have the highest priority potential to enhance motorcycle safety in many of these high crash situations.

Safety Initiatives

15. Monitor developments in Intelligent Transport Systems.
16. Research applicable motorcycle safety features.
17. Investigate safety rating for motorcycles.
18. Contribute to National Road Safety Strategy:
 - a. Investigate scope for regulatory action to further improve stability, traction and braking standards on motorcycles supplied to the Australian market.
 - b. Monitor the National Road Safety Strategy's investigation of automatic crash notification similar to the European eCall system.

Actions for First 3 Years

32. Monitor and report on voluntary uptake of ABS braking.
33. Investigate any motorcycle crash testing in other jurisdictions/internationally.
34. Contribute to National Road Safety Strategy: Prepare RISs to consider mandating of ABS for motorcycles.

Crashes with other vehicles

Motorcycle casualty crashes involved another motor vehicle in 53 per cent of cases. In many cases, the driver of the other motor vehicle either failed to detect the motorcyclist or was in some way obstructed from detecting the motorcyclist.

The common crash types for motorcycle-motor vehicle crashes are intersection crashes, including: adjacent approach crashes, rear end crashes, opposing vehicle/turning crashes and lane change crashes. Such crash types suggest the driver may have failed to

detect the motorcycle during the critical road user manoeuvre. Car drivers who collide with motorcycles often claim that they did not see an approaching motorcycle.¹¹ In crashes with another vehicle, the other motor vehicle was considered the key vehicle in more than half of the crashes involving a motorcycle.⁺ Less attention is currently given to developing Intelligent Transport System measures for car-motorcycle crashes when compared with the widespread measures under development for car-car/car-pedestrian crashes.¹²

Safety Initiatives

19. Monitor and promote car design which does not obstruct visibility of motorcycles.
20. Monitor ITS that can alert drivers to the presence of a motorcycle (vehicle-vehicle communication).

Actions for First 3 Years

35. Work with motorcycle manufacturers to improve motorcycle visibility to other road users.
36. Raise motorcyclists' awareness about how to make themselves visible to other road users on the road.

¹¹ Shahrar Amit, Clarke David, Crundall David Applying the motorcyclist's perspective to improve car drivers' attitudes towards motorcyclists, Accident Analysis and Prevention, April 2011

⁺ The 'key' traffic unit is generally that vehicle considered to have played the major role in the crash.

¹² Pai, Chih-Wei. Motorcycle right-of-way accidents—A literature review, Accident Analysis and Prevention, November 2010

5. Summary

The Strategy has been developed using an evidence-based approach. This approach included conducting motorcycle crash analysis, researching motorcycle crash risks and interventions, and carrying out extensive stakeholder and community consultation for ideas and feedback.

The consultative, evidence-based approach adopted during the Strategy development phase will continue to be applied to develop, implement and deliver the outcomes and objectives of the Strategy over the next ten years.

The Strategy is set within the context of increased motorcycling popularity, and commits the NSW Government to initiatives including: to continually conduct motorcycle safety research; to use the research findings to inform further development of policies and programs to address the identified risks; and to ultimately reduce motorcycle crashes.

The Strategy recommends specific actions for the next three years and broader initiatives that address longer term issues to be delivered over the next ten years. The table at the end of this document summarises the actions for the first 3 years and the longer term initiatives.

The progress and impact of the actions and initiatives will be subject to ongoing monitoring and evaluation against a range of measures, for example:

- ▶ Number of motorcycles on NSW roads
- ▶ Number of motorcycle crashes in NSW
- ▶ Number of motorcyclists killed and injured in NSW
- ▶ Stakeholder engagement and collaboration
- ▶ Communication campaign effectiveness
- ▶ Research into motorcycle safety to inform policies and programs.

To deliver the Strategy successfully and improve motorcycle safety, it will be necessary to develop reliable and strong partnerships with Federal, State and local governments, non-government agencies, and the motorcycle community and organisations.



Safety Initiatives and Actions Summary

Safe Roads

Safety Initiatives

1. Research road safety engineering treatments to improve motorcycle safety.
2. Ensure Safe Roads principles are understood and applied by people looking after the assets – designers, maintainers and engineers.
3. Contribute to National Road Safety Strategy:
 - a. Introducing a motorcycle blackspot/length program.
4. Investigate ways to improve post crash emergency response.

Actions for first 3 Years

1. Investigate effective road environment incident reporting that is available for the motorcycling community.
2. Review traffic engineering specifications that increase motorcycle safety while balancing road safety requirements for other road users.
3. Educate road asset owners to consider motorcycle safety while roads are designed, constructed, maintained and operated.
4. Establish opportunities for road design, engineer and maintenance practitioners to share motorcycle safety expertise.
5. Continue research into safety barriers and motorcycles.
6. Use Road Safety Audits to review and improve motorcycle routes and safety features.
7. Document the clear zone policy and continue to communicate about safe motorcycle roadside needs to other agencies and utility agencies.
8. Contribute to National Road Safety Strategy: Safety improvements on popular motorcycle routes.
9. Explore emergency location detection for motorcyclists.
10. Investigate feasibility for safety phones along popular motorcycling routes.

Safe People

Safety Initiatives

5. Further research on motorcycle road crashes, including collaboration with other jurisdictions and research bodies.
6. Continue to investigate enforcement strategies to deter risk-taking behaviours.
7. Ongoing communication campaigns to target risk-taking behaviours and increase motorcycle safety awareness and risk management.
8. Research the impacts of fatigue on motorcycling with a view to developing appropriate countermeasures.
9. Continue research into motorcycle licensing and training.
10. Develop campaign and other information material promoting the safe interaction between motorcyclists and other motor vehicles on the road.

Actions for first 3 Years

11. Develop campaigns to assist riders to better manage risks that can lead to high-risk motorcycle crashes.
12. Undertake in-depth motorcycle crash study.
13. Promote crash care advice for motorcyclists.
14. Continue supporting Motorcycle Awareness Week.
15. Undertake literature review into fatigue as it relates to motorcycles.
16. Investigate ways to enhance the motorcycle mentoring program.
17. Investigate the issue of returning riders.
18. Disseminate the Motorcycle Handbook to relevant road users.
19. Evaluate the NSW Graduated Licensing Scheme.
20. Contribute to National Road Safety Strategy:
 - a. Investigate licensing options to improve the safety of returning riders.
 - b. Review licensing arrangements for motorcyclists.
21. Use existing campaigns (for example, Check Twice for Bikes campaign) to build awareness of the presence of motorcyclists by other road users, especially drivers.
22. Investigate safety impacts of measures addressing congestion and motorcycle interactions with other road users (e.g. lane filtering).

Safe Speeds

Safety Initiatives

11. Research speed countermeasures such as speed advisory signs and speed management communication messages.
12. Identify high motorcycle crash locations for road safety treatment including road engineering improvement and review of speed zones.
13. Target enforcement on popular motorcycle routes to ensure safe motoring for all road users.

Actions for first 3 Years

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Safe Vehicles

Safety Initiatives

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19. Monitor and promote car design which does not obstruct visibility of bikes.
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26. Continue to improve on helmet standards and helmet use, including expanding the CRASH program and researching international helmet standards.
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30. Seek input from stakeholders and motorcycle rider community to manage motorcycle safety and standards issues (e.g. motorcycle helmets).
31. Develop communication campaigns targeting specific risk issues for scooter/moped riders.
32. Monitor and report on voluntary uptake of ABS braking.
33. Investigate any motorcycle crash testing in other jurisdictions/internationally.
34. Contribute to National Road Safety Strategy: Prepare RISs to consider mandating of ABS for motorcycles.
35. Work with motorcycle manufacturers to improve motorcycle visibility to other road users.
36. Raise motorcyclists' awareness about how to make themselves visible to other road users on the road.

For further enquiries
www.transport.nsw.gov.au

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Transport
for NSW



Making roads more **motorcycle friendly**

A guide for road design, construction
and maintenance

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The number of motorcycles and scooters on NSW roads is significantly increasing, and this growth is expected to continue.

Motorcycling is seen by many as a desirable recreational activity and by many others as an efficient means of transport, especially in response to higher fuel prices and increased traffic congestion.

In contrast with this continuing growth in motorcycling, it can be seen that motorcyclists are over-represented in the road toll. Preliminary figures for 2012* show, 60 motorcyclists were killed representing 16 per cent of the road toll, yet less than 4 per cent of motor vehicles registered in NSW are motorcycles or scooters. Significant numbers of motorcyclists are also injured each year on NSW roads (2,738 in 2012).

While many motorcycle crashes involve collisions with other vehicles, a significant number are single vehicle crashes. These crashes include:

- Losing control and running off the road.
- Hitting objects on the side of the road, such as a tree or pole.
- Being thrown from the motorcycle and hitting the road surface.

About half of all motorcycle casualties involve single vehicle crashes. All crashes are a result of multiple causal factors. These include the behaviour of the drivers of other vehicles, the riders themselves, whether excessive speed is involved and other factors such as the influence of fatigue, alcohol or other drugs. However, the design of the road, the design and condition of the road surface and the surrounding environment can have a significant impact on both the possibility of avoiding a crash, and on the severity of injury to a motorcyclist, should a crash occur. Motorcyclists, along with pedestrians and cyclists, are the most vulnerable of road users in the event of a crash.

This provides increasing challenges for those involved in designing, constructing and maintaining NSW's road network.

* Subject to change

Why are motorcyclists at risk?

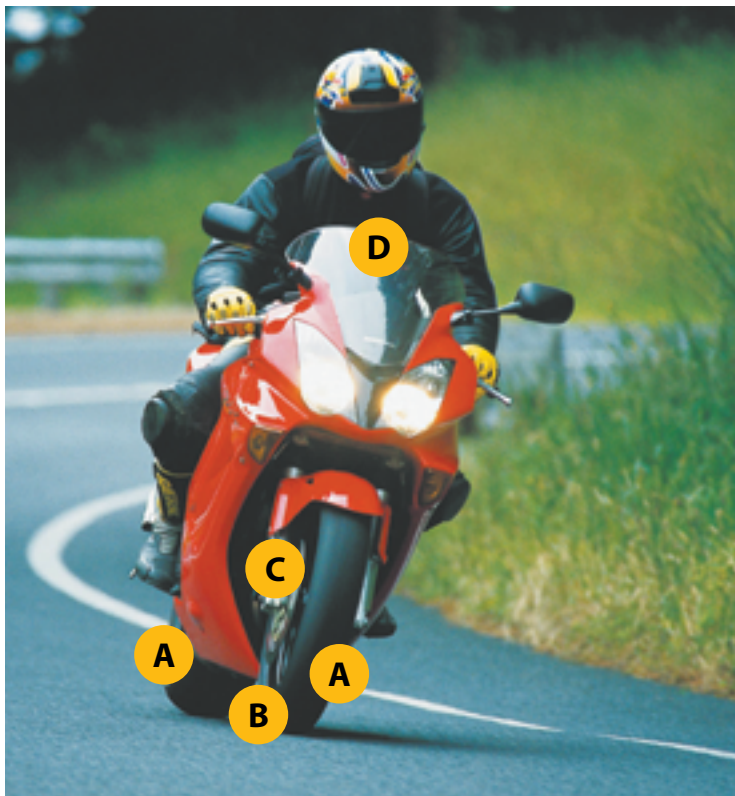
The unique features of a motorcycle that can put a rider at risk.

Road authorities are expected to establish reasonable standards for road construction, inspection, maintenance and repair that take into account a range of factors, such as risk, level and type of use, community expectation, affordability, resource availability and practicability. Utility providers should ensure that where works are carried out on the road, these are done in a manner that ensures the safety of all road users, and that the road surface is correctly reinstated.

Why are motorcyclists at risk?

The design of motorcycles and scooters means that they have dynamic stability characteristics that are unique, when compared with other vehicles on our roads. They are very sensitive to changes in the shape, texture or skid resistance of the road surface, including the presence of water or debris on the road.

Motorcyclists are vulnerable to injury in the event of a crash due to their lack of protection. Good protective riding gear helps, but the likelihood of injury in a crash is high. Injuries are usually caused by hitting another vehicle, objects on the side of the road or the road itself.



- A** Tyres provide only two small points of contact with the road surface.
- B** Motorcyclists rely on tyre grip.
- C** The majority of braking force is through the front tyre.
- D**
 - Motorcyclists lean into corners.
 - Motorcyclists tend to have higher power to mass ratio and greater acceleration than most other vehicles.
 - Because of their size, and limited frontal profile, motorcycles can be difficult for other road users to see.
 - Motorcyclists are vulnerable to injury in a crash.
 - Motorcyclists may travel anywhere in the traffic lane, and do not always follow car, truck or bus wheel paths.

Targeting popular motorcycle routes



Targeting popular motorcycle routes

It is important to consider motorcycle rider safety when assessing risk, identifying hazards and designing road treatments. Many inner city and suburban roads are popular commuting routes for motorcycles and scooters, including for business purposes such as courier and delivery services.

Popular weekend motorcycling routes in rural areas are often places with a mix of narrow winding mountain roads and scenery – such as the Macquarie Pass, Kangaroo Valley, and the Old Pacific Highway.



It is important to target popular motorcycle routes.



An example of a motorcycle specific warning sign.

At the design and construction stages it is essential that specific hazards for motorcyclists are avoided.

It is important to consider motorcyclists when examining the following design and construction issues:

- The road surface should provide adequate grip and be free from defects.
- There are clear sight lines on curves, corners and at intersections.
- Roadsides should have clearzones free from obstruction.
- Road shoulders should be designed to allow for a safe recovery.

Special attention needs to be given to the location of signage and other roadside furniture, to ensure that clear zones are provided for all road users in accordance with relevant specifications. Without adequate clear zones, what could be quite a minor incident can, instead, result in a serious crash.

Road surface

Motorcycles and scooters are particularly susceptible to a range of issues associated with the road surface that can lead to a crash. This is especially the case in locations where the rider may be braking and/or turning, such as at an intersection or on a curve in the road. The road needs to have uniform and predictable surface friction (skid resistance). Any change in surface that may reduce surface friction should be avoided where practical, and where this is not possible it should be clearly sign posted and made visible during all weather conditions and at night.



Sealed road shoulders can provide additional safety for motorcycles, scooters and other vehicles.



Pavement markings

Markings can pose a significant threat to motorcyclists who are especially at risk when cornering and braking, and when roads are wet. Skid resistant pavement markings should be used where possible to allow motorcycle tyres to have a better grip on the road. Pavement markings that take up a large area on the road surface should be avoided.

Loose surfaces

There may be loose surfaces on roads due to gravel and other material being deposited by vehicles or being washed across the road. This can come from unsealed road shoulders, roadside parking areas or at intersections with gravel roads and driveways. Consideration should be given during design and construction to sealing shoulders on curves and the approach to intersections, especially along popular motorcycle routes. Sealing road shoulders in rural areas has been shown to be effective in reducing the incidence of run-off-road crashes. Where sealing road shoulders is not practical, use of warning signs can improve motorcycle safety.

Traffic Treatments

A number of treatments that are used for traffic control involve creating a step in the road surface that can be hazardous for motorcycles and scooters, such as:

- Traffic control bars.
- Raised painted blocks to direct traffic.
- Cobblestone kerbs.

Such treatments may create specific hazards for motorcycles. For example, a small roundabout with a low profile can have edges that are difficult to detect and could cause a rider to lose control if they run over them; an issue that is not experienced by passenger and heavy vehicle drivers.

When designing and installing traffic control treatments, consideration should be given to all road users. Treatments should be carefully planned and the needs of motorcyclists considered, including where necessary the use of warning signs. Where barrier kerb may be a hazard to motorcycles, semi-mountable kerbing could be considered, particularly along popular motorcycle routes.

Metal surfaces

Light rail tracks and rail crossings can be hazardous for motorcycles and scooters. The road surface alongside and between the tracks should be level with the tracks, to avoid a rise or dip which may cause a loss of traction. Steel utility covers can present a very slippery surface to a motorcycle or scooter. The problem is often compounded by the cover sitting either above or below the road surface. Where practical such access points should be located off the road. Where they need to be located on the road, covers with textured surfaces or skid resistant coatings should be used.

Drainage

Drains need to be able to cope with storms to minimise the amount of water running across the road. It is also important to ensure that roadside drains and pits are maintained to ensure they are functioning adequately.



Steel utility covers can present a very slippery surface to a motorcycle or scooter.

Damp or frosty patches

Where possible and reasonable, warning signs could be placed on sections leading up to roads prone to snow and ice encouraging riders to slow down and prepare for potential problems ahead on popular motorcycle routes.

Roadsides

There are a number of factors which make the design and construction of roadsides critical for maximising safety for motorcyclists, including the placement of roadside objects, such as poles and signs. In particular:

- Motorcycles and scooters can be difficult for other road users to see and can be easily obscured by roadside objects at intersections and on corners in the road.
- As a motorcycle leans into a corner in order to change direction it can potentially position a rider close to roadside objects.
- A rider involved in a crash is at significant risk of serious injury from hitting objects on the roadside as they are thrown from the motorcycle.

Maximising visibility

Visibility is particularly important for motorcyclists. Unlike other larger vehicles on the road, motorcycles and scooters have a limited frontal profile and so can be more difficult to see, especially if obscured by obstructions, such as plantings, fencing, barriers or signage. Good design and traffic engineering can ensure that this is addressed by ensuring a clear view for road users at critical locations such as roundabouts, intersections and on bends.

A common issue can be vegetation, presenting a significant hazard for a rider by obstructing the view of them by other traffic. When designing such areas, it is important to consider using plants that grow to a limited height, and which do not require regular trimming and maintenance.

Creating safe clearances for motorcyclists

Because motorcycles can lean into corners at up to a 45 degree angle it can place the rider very close to roadside objects. Examples of objects that can be positioned too close to the road include signs, posts, guardrails and fencing.

Clear zones

Careful consideration should be given to the clear zone allowed for motorcycles in the event of a crash. Riders are often thrown from their motorcycle in a crash and then can slide into road side objects, such as barriers, poles or trees. Unlike car occupants who are protected to a significant extent inside the vehicle, a rider is far more vulnerable in a crash. Consideration should be given to using frangible poles and signs that are more forgiving if hit by a fallen rider or pillion, especially along popular motorcycle routes.



Use of motorcycle friendly (frangible when hit by a rider or pillion) guide posts can improve safety.



Kerbs

Kerbs can create a hazard for motorcycles, when immediately adjacent to the travel lane, as it creates a lip that can snag a footpeg and can cause a crash if ridden over. Semi-mountable kerbing should be considered for use in situations where the kerb is deemed hazardous, particularly along popular motorcycle routes.



Semi-mountable kerbing reduces the likelihood of a crash if ridden over by a motorcyclist.



Motorcycles and scooters travelling on roads require an even consistent road surface to ensure that they are able to maintain stability and not lose traction, particularly during braking and cornering.

Road repairs and maintenance should be carried out in a timely and effective manner to avoid creating hazards for motorcyclists. Adequate warning of hazards should be provided if repairs cannot be made immediately.

Road shoulders

Road shoulders provide a recovery area for vehicles that leave the travel lane. If road edges are broken or have unsealed shoulders this can create a hazard and make recovery more difficult, especially for motorcycles and scooters.

Line-marking of road edges is important and needs ongoing maintenance. Line-marking may reduce the likelihood of a motorcyclist running off the road, especially when visibility is poor such as at night, in rain or fog.

Potholes

Potholes can be a significant hazard for motorcyclists, and can cause a loss of stability and control. Regular inspections and prompt repairs should be undertaken according to road maintenance plans. It is also important to respond to public reports of potholes.

Ruts and corrugation

Deep wheel ruts and corrugations in the road surface can present difficulties for riders and lead to a loss of stability and control. Ruts and corrugations can collect water during rainfall. Appropriate warning signs should be used until repairs are carried out.

Crack sealing

Crack sealing is undertaken to minimise further pavement wear due to moisture ingress. The width of crack sealing treatment should be restricted to reduce the likelihood of a slippery surface for motorcyclists particularly on curves.

Bleeding bitumen/flushing seals

Excess bitumen on the road surface can provide a slippery hazard for motorcyclists in wet and dry conditions. In this situation resurfacing or removal of the excess bitumen should be carried out. Prior to this, signs warning of the slippery surface should be installed.

Gravel roads

Gravel roads are unsealed and so can often have a loose and variable surface. The risks to motorcyclists are minimised by following a regular grading cycle complemented by reactive work as problems arise.

Road maintenance and reinstatement considerations



Gravel and loose stones from unsealed side roads and shoulders can present a hazard to motorcyclists.

Pavement markings

When pavement markings are renewed, skid resistant markings should be used to allow motorcycle tyres to have adequate grip on the road.

Maintenance of roadside vegetation

Overhanging vegetation should be trimmed to ensure a clear view of all traffic, especially of motorcyclists.

Removal of debris, gravel and loose stones

Loose material from a variety of sources can collect on the road surface. Roadsides, shoulders and intersections should be swept periodically.

Clean up of liquid spills

Fuel, lubricant, paint and other liquid spills on the road can lead to a loss of traction and stability for a motorcycle or scooter. A rapid response to cleaning up any spills is vital and warning signs should be installed.

Build-up of grease and oil

In heavily trafficked areas, at locations such as roundabouts and intersections, a build-up of oil and grease deposits can occur on the road. This is generally in the centre of the lane, where motorcycles tend to travel, and requires ongoing maintenance.

Reinstatement of services trenches

Trenches across the road that have been overfilled or that subside over time can cause problems for motorcyclists. An uneven surface can cause a loss of stability and control for a motorcycle or scooter.

Temporary large steel plates

Large steel plates placed temporarily over trenches in the road can be slippery for a motorcycle or scooter and become even worse when wet. A skid resistant coating should be used on the metal surface and warning signs should be placed well before the hazard.

Maintenance of light rail tracks and rail crossings

Steel tracks can be very hazardous for motorcyclists. The tracks are slippery and narrow tyres can be caught in the grooves. It is important that the road surface and pavement around tracks is not broken and is well maintained.

Clean up during and after road works

Loose material on road surfaces should be cleaned up during and after road works. Loose gravel and other material can be scattered on the road surface, and mud and other debris can be dropped from construction vehicles onto the road. This loose material needs to be swept from the road as it can lead to a motorcycle or scooter losing traction.

Clean up and repairs after road crashes

When cleaning the road after a crash all debris should be removed from the road. This may consist of sharp objects and liquids that may be spread across the road surface, and present a serious hazard to motorcyclists and other road users.

Priority must be given to fixing damage to any barriers, fences, poles or signs on the roadside at a crash site to ensure that there are no protruding sharp edges and fittings.

Keeping road works safe for motorcyclists



Road works can present serious challenges for motorcyclists. Ensuring road works are carried out in a manner that maximises safety for motorcyclists can have benefits for all road users.

Road surface

- The road surface will need to be swept down and any loose gravel or debris which may be on the road cleared as required.
- 'Loose Stones' signs should be left in place after road sealing until loose material is removed.
- Temporary steel coverings over road trenches should provide adequate traction for motorcycles and scooters. Such hazards should have signs warning of a slippery surface.
- The road surface to be used by traffic during works should be free of bumps, potholes and uneven surfaces. Where a problem arises it should be treated as soon as possible.



Keeping road works safe for motorcyclists



- During road works there is often a step down from the road surface to the area which is being repaired. Appropriate signage should be placed to warn motorcyclists until all works are completed.
- Where road grooving has been carried out warning signs need to be used.
- Metal surfaces need to provide adequate traction for motorcycles and scooters.
- Any diesel or oil spills need to be cleaned up immediately and appropriate warning signs used.
- Adequate drainage needs to be provided during road works to ensure water doesn't collect on the road surface during heavy rainfall.

Signs

- Warning signs need to be erected in advance of the road works, to allow for all road users to make changes to their travel plans. In the case of motorcyclists this may be using an alternative route to avoid the road works altogether.
- To improve safety for motorcyclists, signage is needed to warn of the type of conditions they should expect, such as a loose surface or defects in the road.
- Any specific hazards on the road, such as steel plates on the road surface, should be sign posted and, if possible, lit at night.

- Temporary line marking may be required to ensure there is clear delineation of traffic lanes, including road edges, especially at night.
- Warning lights may be required at night, and these must be in good working order.
- Signs should be clearly seen at night. They need to be in good condition and clean, and may require ongoing maintenance during the works, such as washing at the end of each working day to remove dust and dirt build-up.

Roadside hazards

- Signs, barriers, fencing and bollards used need to be placed to ensure a clear view of intersections, around curves, and of approaching and turning traffic.
- Signs, barriers, fencing and bollards need to be placed well clear of traffic lanes, so as not to cause a traffic hazard.

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Transport for NSW

For further enquiries

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THE GOOD Gear GUIDE

for Motorcycle & Scooter Riders

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THE GOOD Gear GUIDE

for Motorcycle & Scooter Riders

No matter what you ride - from scooter to superbike - good gear is an investment too important to ignore. It could make the difference between a nasty tumble and injuries that prevent you from ever riding again.

The right gear can also improve your riding and your enjoyment by protecting you from the elements. Being too cold, too hot or soaked to the bone takes the fun out of a ride. It also affects your riding through distraction, fatigue and dehydration.

This is a guide to gear that will improve your riding comfort and could save you from preventable injuries.



TEN GOLDEN RULES



When you invest in riding gear, you want to make sure it is going to do its job. These 10 basic principles are a good place to start.

1 Cover your whole body.

2 Use impact protectors over your joints.

3 Protect your skin with abrasion-resistant material in vulnerable areas (see the injury risk zones in Figure 2).

4 Check the seams on your gear. There should be more than one line of stitching, and at least one line of concealed stitching on exposed seams.

5 Check that all fastenings are secure and protected from contact with the road or other surfaces in a crash.

6 Avoid external pockets or straps that could become tear points or snag on something in a crash.

7 Use insulated, waterproof and windproof materials to protect you from the cold.

8 Use reflective or light colours and ventilation to protect you from heat.

9 Check that all your gear fits you properly so that it will remain in place in a crash.

10 Don't carry anything in your pockets that could cause injury in a crash.

HOW CAN THE RIGHT GEAR IMPROVE YOUR RIDE?

Protection from the cold

Being cold is stressful and tiring; you become less alert and your reaction times slow. A drop in your body's core temperature can even affect your brain's function, impacting on decision-making and reactions. A cold rider can become anxious, irritable or detached from the task at hand.

Insulated and windproof gear will help maintain your core temperature and reduce cold stress. The insulation keeps a layer of warm air between your body and the outer shell of your gear. Avoid gear that is baggy or too big, as flapping and buffeting may force the warm air out. Close-fitting openings around your neck, wrists and waist, and covered zips will also reduce warm air leakage. Pay particular attention to keeping your neck, face, hands, feet and shins warm. A third of your body heat is lost from your neck and face, so a neck sock or balaclava is a good idea to stay warm.

Protection from moisture

Wet or damp clothes are uncomfortable and distracting. You will also get cold much more quickly if your clothes are wet, because water conducts heat away from your body. This is a particular safety issue for riders, as cooling is accelerated by the wind. Even in warm weather you can become chilled if your gear is damp from perspiration.

Waterproof, breathable clothing is the key to keeping comfortably dry. There is a big difference between waterproof and water-resistant clothing. While water cannot penetrate waterproof fabric, it will eventually soak through a water-resistant lining. Good waterproof gear should be breathable. This means that it lets your sweat out, while preventing rain from getting through. PVC or plasticised nylon oversuits are waterproof, and offer useful rain protection in an emergency, but are not breathable. The result will be damp clothes and rapid heat transfer.

Protection from heat

Heat is probably the most difficult comfort issue for riders to resolve. Many riders do not wear adequate protection in very hot weather. This may be one way to avoid overheating, but you risk dehydration, sunburn and windburn, in addition to substantial injuries if you crash.

Ventilation and reflection are the keys to improving riding comfort in hot weather. Good ventilation allows the wind to flow through the clothing and over your skin to evaporate sweat. Well-ventilated gear allows air to enter through vents or mesh panels (in 'zone 4' – see Figure 2). Air exit points are at the back.

The outer layer should also be designed to reflect rather than absorb heat from the sun and the road surface. Lighter colours reflect heat, while dark colours absorb it. There are a number of new materials on the market that are designed to improve comfort in hot weather.

When riding in hot weather, remember to drink lots of water to replace what you lose through sweating.



HOW CAN THE RIGHT GEAR REDUCE YOUR RISK OF INJURY?

No matter what you are wearing, your chance of surviving a direct impact with a solid object reduces as the speed of the impact increases. However, many motorcycle crashes do not involve direct impacts, nor do they occur at high speed. The right gear can prevent or reduce many of the most common rider injuries.

The outer layer, from head to foot, should:

- prevent most cuts, gravel rash and friction burns from sliding across a road
- protect you from sharp objects
- reduce the severity of contact burns from the engine and exhaust pipes
- save you from having skin and muscle stripped from your body
- avoid medical complications such as infections caused by road dirt.

In a fall or direct contact with another object, impact protectors should:

- prevent or reduce the severity of fractures
- prevent or reduce the severity of joint damage.

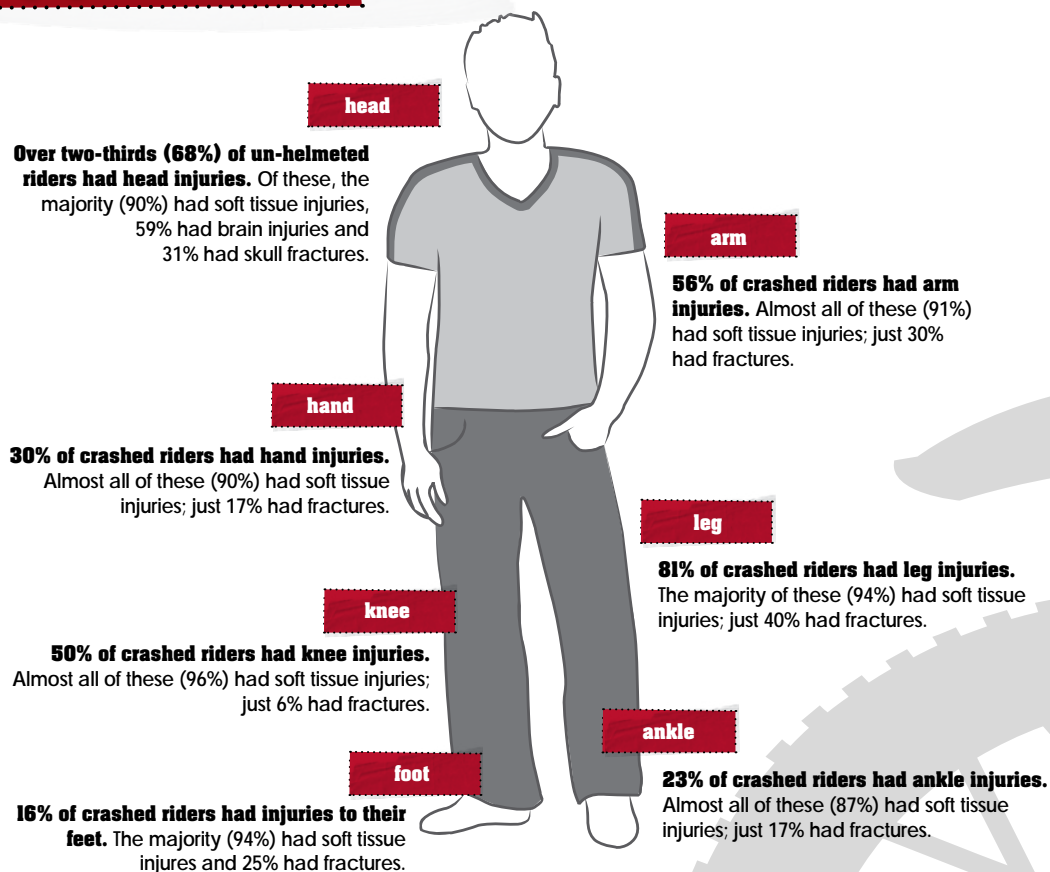
One study found that riders who wore protective clothing spent seven days less in hospital and were 40% less likely to have permanent physical injuries after a crash.

Of the riders who crash, 7 out of 10 have injuries that may have been reduced or even prevented by the right gear. Most riders wear a jacket and helmet but are less likely to protect their legs, although it is the legs that are most likely to be injured in a crash.

Protective clothing is not just about preventing injuries in crashes – it will also save you from minor harm caused by flying insects, and from stones and other debris thrown up by other vehicles.

Injury risks in a crash

Figure 1 . The types of injuries sustained by riders in crashes



NOTE: This is the typical pattern of injury in motorcycle crashes before specialised motorcycle protective clothing was widely available.

HOW TO CHOOSE PROTECTIVE GEAR

Design and construction

Unless protective gear has been tested in a crash simulation, it is impossible to tell how well it will perform in a crash. There are certain important design and construction features that will help you to recognise gear that is more likely to do the job of protecting you.

Abrasion resistance

If it has not been tested, it is almost impossible to tell how well a particular garment will perform when you are sliding across a road.

- If choosing a leather garment, look for thicker leather. Generally, thicker leather will give greater abrasion resistance, although this also depends on the type of leather and how it has been treated.
- If choosing a fabric garment, make sure it is constructed with a number of different layers. Textile products can give good abrasion resistance, but not in a single layer. Multiple-layered textile products – such as those with a separate water-resistant line, abrasion-resistant liner and external shell – can provide a similar level of protection to leather.

Figure 2 shows the levels of injury risk in different parts of the body, and the type of protection a rider requires in each 'injury risk zone'.

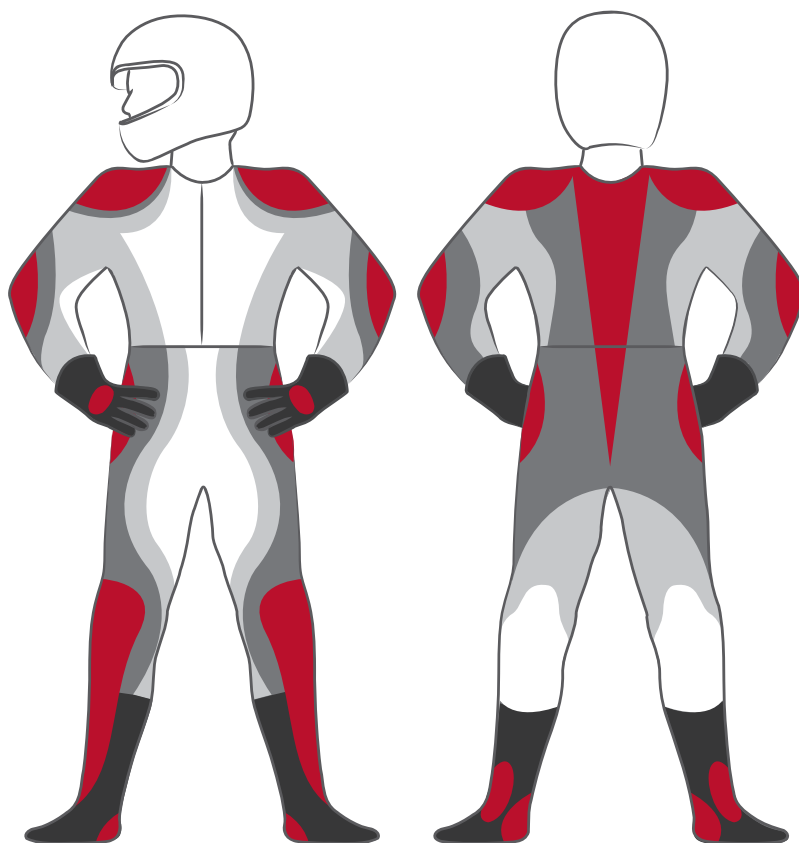


Figure 2. Injury risk zones

- **Zone 1** has the highest level of injury risk. These areas need impact protectors and highly abrasion-resistant material. The European standards for jackets and pants require a minimum of 4 seconds abrasion resistance: that is, 4 seconds of sliding across the road surface before your gear wears through.
- **Zone 2** also has a high injury risk and needs highly abrasion-resistant material but no impact protectors. Multiple layers are more likely to be effective than a single one.
- **Zone 3** has a lower injury risk and requires only moderately abrasion-resistant material (minimum 1.8 seconds).
- **Zone 4** has a relatively low injury risk. Material to provide ventilation and elasticity can be used in these areas, but they still need to provide a minimum of 1 second of abrasion resistance. Regular denim jeans have only half this resistance (0.6 seconds).



Shoulder protector

Impact protection

Impact protectors (also known as 'body armour') are shields worn inside your clothes to absorb and spread the impact of a direct blow. They reduce the risk of fractures and joint damage and should be worn over the shoulders, elbows, hips and knees (see Figure 2).

If possible, choose impact protectors that are marked CE EN 1621-1. These have been tested by dropping a 5 kilogram weight from 1 metre to simulate the impact of a fall from a motorcycle. Think of a sledgehammer dropping onto your knee: you will certainly feel it, but effective protection can minimise the damage.

- Check to ensure you cannot move impact protectors around when your jacket or suit is fully fastened. Impact protectors only work if they stay in place in a crash. Choose the type that fits your body best.
- A back protector can provide protection from direct impacts and may reduce soft tissue injuries. It will not protect you from the most serious spinal injuries, which are caused by twisting forces on other parts of the body rather than direct blows to the spine. If you do decide to buy a back protector, try to find one that is marked CE EN 1621-2.
- If you wear a kidney belt, make sure it is placed below your rib cage. Kidney belts can reduce fatigue on long trips by supporting vital organs from vibration.

Hip protector



Knee protector



HOW TO CHOOSE JACKETS, PANTS AND SUITS



Leather or textile? Riders used to prefer leather for its higher abrasion resistance, but that depends on the type and grade of leather. There are now many textiles that can also provide abrasion resistance and have the added benefits of being lightweight and providing insulation, ventilation and waterproofing.

There is no point in having the best materials if their construction fails in a crash. If the garment has been tested to the European standard, you can be confident it is well made, so look for the CE label and the number EN 13595 on jackets, pants and suits.

If you cannot find products with the CE label, the following points will help you choose the best gear you can.

Design

- **Avoid straps or external pockets.** These become tear or snag points which may catch on your motorcycle, another vehicle or objects on the road.
- **Look for garments made of large panels of fabric with few openings and joins.** Joins and seams are potential weak points; they can burst open on impact or when sliding along the road.
- **Avoid decorations and hard or sharp objects.** Metal buckles and other decorations can tear the garment and injure your body in a crash. They should not be used in impact zones, nor anywhere they might cause injury. Think about what you keep in your pockets: pens and keys can be forced into your skin, while phones and larger objects pressed against your body can damage nerves or break bones.
- **Make sure the lining is not attached to the outer shell in zones 1, 2 or 3 (see Figure 2).** Lining should be made of slippery material and able to move freely. This allows your body to slide within the external shell and reduces the risk of your skin being cut or penetrated by sharp objects.



Seams and construction

- Look for two or three rows of stitching with at least one row concealed for seams in zones 1, 2 and 3. Seams that split or burst are the most common reason for motorcycle gear failing the European standards tests. Concealed stitching is protected from the road surface in a slide.

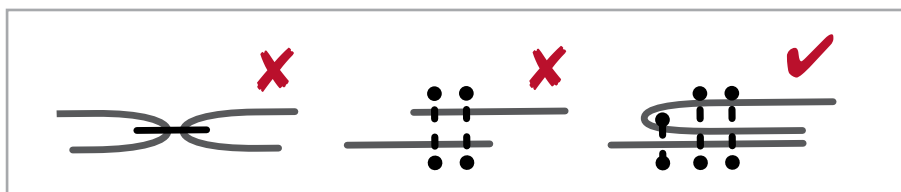


Figure 3. Concealed stitching

- Extra layers must be stitched on top of the main protective layer – not inserted as a separate double section. Check inside and feel through the material to ensure there is no gap in the main protective layer. Additional layers should be double-stitched. See Figure 4.

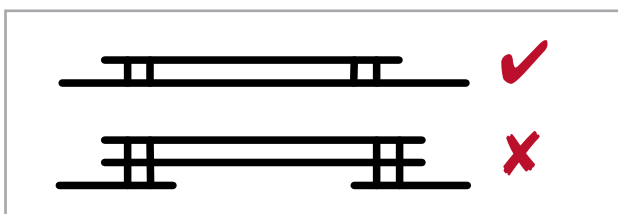


Figure 4. Construction of extra layers



- Check the number of stitches in the seams. As a rule, there should be 11–14 stitches for each 5 centimetres of leather. There should be 13–16 stitches for each 5 centimetres of fabric. Too few stitches means a weak seam; too many may weaken the material and cause it to tear.
- Check that the stitching is regular and continuous. Dropped or broken stitches may weaken the seam.

Fasteners

- Avoid garments that have zips in injury risk zones 1 or 2. Zips should not be used in these areas (see Figure 2).
- Make sure that zips in zones 3 and 4 are below the outer surface of the garment. They should also be covered with flaps on both sides to prevent contact with the road or the skin.
- Check for good-quality zips. They should be heavy-duty and securely stitched to the garment.
- Make sure all fasteners are protected to prevent them being ripped open on contact with the road or a vehicle.
- Ensure that there are fasteners for the wrists and ankles. These are essential to prevent garments riding up in a crash, and should be on the inside of the wrist or ankle to avoid being torn away in a crash.
- Always secure fasteners before riding. Fasteners are a necessary but weak point in the construction of a garment, so it is crucial to ensure they are done up tightly.



Comfort and fit

- **Try your gear on as realistically as possible.** Put it on over the sort of clothing you normally wear while riding.
- **Make sure it fits snugly and comfortably while you're in the riding position.** Clothes that are too tight will become uncomfortable and can restrict blood flow when you are riding. Clothes that are too loose can billow and flap, which can be distracting and fatiguing.
- **Avoid hipsters or pants that are loose-fitting around your waist.** Pants that ride low on your hips may be dragged down or off in a crash.
- **Make sure that any stretch and mesh panels are used only in zone 4.** Stretch panels for comfort and mesh panels for ventilation should not be in any other zones.
- **Check that you can walk, bend over, climb stairs and crouch in the gear.** Try picking up a small object, such as your keys, from the floor. Check for fabric bunching behind the knees and in your elbows, as this will cause pressure and discomfort when riding.
- **Check that you can move freely to get on and ride your motorcycle.** Can you use all controls, and turn to look behind you while wearing your helmet and holding both handlebars?

Fit is a particular problem for women riders and pillioners because most gear is designed for men. Jackets are often too wide in the shoulders, while pants are too narrow in the hips. Adjustable fasteners can help, and are particularly useful to hold impact protectors in place.

Use the internet to research brands designed for women, and their suppliers, or ring around a few stores before setting out on a shopping trip.



HOW TO CHOOSE BOOTS



Choosing the right motorcycle footwear can be a challenge, particularly if you want to be able to continue to wear it once you reach your destination. However, there are many good products available, including some that bear the CE symbol. Look for the CE mark and the number EN 13634.

If you cannot find CE-marked boots, here are some things to consider when choosing footwear.



Coverage

- **Look for boots that fully enclose the foot, ankle and lower shin.** Impact protection is recommended for the shins, instep (the top of your foot), ankles and heels. Beware of steel-capped boots which can cause friction burns or may cut into your toes in a crash.

Design

- **Check that leather boots are at least 2.5 millimetres thick.** Most motorcycle boots are made from leather, but there are also synthetic materials, such as Lorica, which are more lightweight and flexible while still being water-repellent and abrasion-resistant.
- **Check that the soles are fairly rigid and at least 4 millimetres thick.** One of the critical tests is the rigidity of the sole to protect your foot from being crushed sideways.
- **Look at how the sole is attached to the upper.** Stitched soles are stronger than glued or bonded soles, which may be torn off if your foot is dragged along the road.
- **Check that the boot uppers don't overhang the edge of the soles.**

Fastening

- **Choose boots that fasten on the inside of your leg.**
- **Avoid lace-up boots unless the laces are fully protected.** Laces can be worn away and the boots torn off when dragged against the road. The laces can also catch on footpegs, levers and even parts of another vehicle in a crash.
- **Try to pull the boots off your feet when they are properly fastened.** If they can be pulled off or unfastened accidentally, don't buy them – they could come off in a crash.

Comfort and fit

- **Choose boots with oil-resistant, waterproof, non-slip soles.** Wet feet quickly become cold feet, which can then become numb – this is dangerous.
- **Ensure that you can walk normally, climb stairs, bend over and crouch in the boots.** Try bending down to pick up your keys.
- **Make sure you can get on and ride your motorcycle while wearing your boots.**
- **Check that you can operate the gear lever and brake properly.** Do the boots let you feel what you are doing?

HOW TO CHOOSE GLOVES



Choosing the right motorcycle gloves can be a difficult decision, but it is an important one. Gloves need to protect your hands and wrists without reducing your ability to operate the controls. Those that have been tested against the European standard will be marked CE with the number EN 13594, but these may be difficult to find.

If you don't find any CE-marked gloves, here are a few features to consider when choosing them.

Abrasion protection

- **Check that leather is at least 0.9 mm thick.** This is the minimum to provide sufficient abrasion protection. Under the European standard, gloves must provide a minimum of 2.5 seconds of abrasion resistance.
- **Look for webbing between the little finger and the ring finger.** This may prevent the little finger from being twisted under your weight as it is often the first point of contact with the road in a fall.
- **Choose gloves with multiple layers over the base of your palm, and impact protection for knuckles and wrists.** These are very vulnerable areas, so extra padding is important.

Coverage

- **Check that gloves cover the whole hand and wrist.** They should extend at least 5 centimetres above the wrist joint.

Fastening

- **Make sure the gloves are easy to put on and take off.**
- **Try to pull the gloves off when they are properly fastened.** If they can be pulled off, don't buy them – they could come off in a crash.
- **Check that fasteners are on the inside of the wrists, where they are less likely to be worn off or torn open in a crash.**

Construction and seams

- **Look for seams with multiple rows of stitching.** At least one row of stitching should be concealed and protected.
- **Avoid gloves with hard seams or sharp edges.** Studs, staples or buckles can penetrate the protective layer of the glove and injure your hands.

Comfort and fit

- **Make sure the gloves fit snugly.** They should be neither too tight nor too loose.
- **Make a fist while wearing the gloves.** Material should not bunch against your palm or fingers when your hand is curved around the handlebar. There should be just enough room for the material to pinch together at the end of each finger while gripping the handlebar.
- **Can you feel and operate your motorcycle controls – throttle, clutch, brake levers and switches?** Can you adjust your visor while wearing the gloves?

Colour fastness

- **Check for the international standards number ISO 11642.** This ensures that the dye will not run and stain your hand when the gloves get wet, which is, unfortunately, a common failing in motorcycle gloves.

HOW TO CHOOSE A HELMET



By law, when riding in Australia, you must wear a motorcycle helmet that complies with the standard AS/NZS 1698 and is securely fastened. Helmets that also comply with other standards are not necessarily better, as they are often heavier and stiffer than those made to a single standard and may not perform as well in a crash.

Don't spend your whole safety budget on an expensive helmet. A helmet that complies with a recognised standard, fits well and is securely fastened should provide as much protection as you can expect in a crash. Cost is not always an indicator of better crash protection; the additional value may be in comfort, features, appearance and the quality of the finish. Comfort and fit are very important.

The decision to wear a full-face or an open-face helmet is a personal choice, but it is important to consider all the issues. The following points will help you choose the right helmet for you.

Design

- **Most crash impacts are to the front or sides of a helmet, with some 16% to the chin area.** A full-face helmet is the preferred option for safety. It will provide more comprehensive protection to the face and chin in a crash than an open-face helmet. It will also protect your face from flying stones and insects, and keep you warmer and drier in bad weather.
- **Consider the weight of the helmet.** Some riders fear that a full-face helmet may increase the risk of fractures to the base of the skull. However, recent studies have found that this type of injury is more likely to be related to the weight of the helmet (greater than 1.5 kilograms) than its design.
- **Consider the materials used in the helmet.** Composite helmets that include advanced materials such as Kevlar and carbon fibre are generally lighter and may absorb impacts better than polycarbonate or 100% fibreglass helmets.
- **Consider a flip-front helmet.** You might find this to be a good compromise between the convenience of an open-face and the protection and comfort of a full-face helmet. However, keep in mind that the hinge will add weight and may compromise the impact strength of the chin bar.
- **Make sure you have a visor or goggles.** Whichever style you choose, it is essential to protect your eyes with a visor or motorcycle goggles that comply with the standard AS 1609 - 1981.

Fit

- **Check that the helmet covers your forehead and brow.** Looking up, you should just be able to see the edge of the helmet. The helmet shouldn't move around on your head or put pressure on your forehead. Keep it on for 5 or 10 minutes to check that it is comfortable – correct fit is the most important factor in choosing your helmet.
- **Get someone to grip the helmet at the back of your neck and try to pull it up and forward.** If it comes off or slips over your eyes, adjust the position, tighten the straps and try again. If it still moves or comes off, you need a different helmet.
- **If you choose an open-face helmet, it is even more important to ensure that it fits correctly.** Crash studies have found that open-face helmets are more likely to be pulled off in a crash.
- **Correct fit is more important than the brand.** Shell and lining shapes vary between brands just as head shapes vary between riders, so try a range of different brands until you find a helmet that fits the shape of your head. Whilst it's important to buy a good quality helmet, it is more important that it fits correctly.

Vision

- **Check your peripheral vision.** Is the eye-port wide enough?
- **Turn your head.** How far behind you can you see?
- **If you wear glasses or sunglasses, check they don't cause pressure points.** Can you take them off while still wearing the helmet?
- **Make sure that replacement visors carry the AS 1609 - 1981 label.** Those that don't may distort or affect your vision.
- **If you are wearing a tinted visor, always carry a clear visor with you.** Never use a darkened visor in low light or at night; always carry the clear one as well, just in case you are caught out.

Comfort

- **Consider a vented helmet.** A lot of your body heat is released from your head, which can become very uncomfortable, particularly in hot weather. Vented helmets can substantially reduce the discomfort of a hot and sweaty head.
- **Look for fog shields and chin vents.** These help prevent your visor from misting.
- **Choose a helmet with removable comfort padding.** Padding that can be washed or replaced will preserve the condition of your helmet and help it last longer.
- **To protect your hearing, use earplugs.** Helmet noise is affected by the way air flows around the helmet, vents and visor, and by how close the padding is to your ears. Product reviews and other riders will help you compare noise levels. Helmet design is not the only factor with noise. The style of bike and wind movement around features like fairings and windscreens can also affect noise levels.¹¹ A helmet that is quiet on one bike may be noisy on another. Earplugs can substantially reduce noise levels. Take care not to block all sound, though, because you need to be alert to what is happening around you.



Age and condition

- **Do not buy or wear an old or second-hand helmet.** Comfort padding disintegrates after about seven years, and researchers do not know for certain how long the protective capabilities of a helmet will last. If you are returning to riding after many years, buy a new helmet.
- **Once you have consigned a helmet to history, cut off the straps to prevent anyone else using it.**
- **Never use a helmet that has been in a crash.** You might not be able to see any damage, but once a helmet has been in a crash it loses much of its ability to protect you. You can never be sure whether someone else's helmet has been in a crash, which is another reason not to buy second-hand.
- **Don't give a pillion passenger a poorly fitting or damaged helmet.** Remember, if it moves around on their head, it won't provide adequate protection in a crash.
- **If you drop your helmet and have dented or cracked the outer shell, definitely get a new one.** Remember that it is the energy-absorbing inner lining that protects you. If the outer shell shows any damage, that is a very good indicator that the inner lining will also be damaged.

If it drops a short distance, such as off your motorcycle when stationary, there would be only a small chance of damaging the outer or inner shell. But no one can ever guarantee that a helmet has not sustained any damage in a drop. A series of little drops may weaken the helmet's protective capacity as much as one bigger fall. Use common sense. Imagine how you would feel if it was your head that was dropped. If the 'drop' would have damaged your head, then it could well have damaged your helmet.

Looking after your helmet

- When you put your helmet on the ground, rest it on your gloves.
- Use the helmet hooks under the seat – these are provided on most motorcycles. This will secure it from falling as well as from theft. Don't sit it on the mirror because this may dent and damage the energy-absorbing lining, and don't rest it on the motorcycle seat where it can fall off.
- Invest in a helmet bag made of protective material (e.g. wetsuit material).
- Keep your visor clean and scratch-free. Protect it from scratches by keeping it in a soft cloth bag. Replace it if it is scratched.
- Clean your helmet and visor with dishwashing liquid and water and rinse well. Use only your hands when cleaning your helmet as even soft brushes can scratch the visor.
- Never wipe your visor with anything when it is dry – you will scratch the surface.
- Painting or adding decoration to your helmet is not a good idea. The strength of the helmet shell can be weakened by the solvents in paints and in some glues (e.g. stickers).

Standards

In Europe, there are standards for motorcycle jackets, pants, gloves and boots which are based on tests of their performance under crash conditions. There are no comparable standards for protective clothing in Australia nor anywhere else in the world.

Gear that has been independently tested and conforms to the European standards is CE marked. It should display the letters 'CE' (Conformité Européenne) with the number of the standard and this symbol of a rider:



There are different European Standards for each type of motorcycle clothing. The numbers are:

- impact protectors for limbs: EN 1621-1
- impact protectors for the back: EN 1621-2
- jackets, pants or suits: EN 13595
- boots: EN 13634
- gloves: EN 13594.

In Australia, there are standards only for helmets and visors/goggles:

- AS/NZS 1698:2006: Protective helmets for vehicle users
- AS 1609 - 1981: Eye protection for motorcyclists and racing car drivers.

Currently there is little CE-marked motorcycle gear available anywhere in the world, although the number of products is increasing. While CE certification is currently the best indicator of injury protection this does not mean that non-CE marked products are no good – you just have to know what to look for.

Product evaluations

Some European motorcycle magazines conduct regular product evaluations using the tests specified under the European standards. It is interesting to note that neither price nor brand name is a reliable indicator of performance. Some of the best known and expensive brands perform very poorly in these tests, while some cheaper products do very well. (For example, see the product tests undertaken by *RiDE* magazine: www.ride.co.uk)

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