



Motorcycle Notes

No. 11 April 2004

Characteristics of Motorcycle Crashes

This is the eleventh in a series of VicRoads MOTORCYCLE NOTES. The purpose of MOTORCYCLE NOTES is to provide regular practical advice on motorcycle-specific aspects of road design, maintenance and safety for VicRoads, Local Government, Government Agency and Consultant engineers and planners. MOTORCYCLE NOTES should be read in conjunction with: 'Guide to Traffic Engineering Practice Part 15 – Motorcycle Safety', (GTEP Note 15) Austroads, Sydney 1999.

The Need

Between 1998 and 2002, motorcycles represented 3% of vehicle registrations in Victoria, yet accounted for 12% of all road deaths and serious injuries. Motorcycle rider vulnerability means that if an event occurs it is likely to be more severe to a motorcyclist than to a car occupant. There are a number of areas where special attention can minimise both the frequency and the severity of motorcycle crashes. Some of these are rider-related, some other vehicle-related and some road environment-related. Few crashes occur as a result of a single cause, and often the precipitating factor is not obvious at a crash scene. In the case of fatal crashes, the rider is not available to report on the events or circumstances that led up to the crash.

Motorcycles command significant attention in road safety, but as it is often difficult to identify measures that can help motorcyclists directly, much of this effort has been restricted to rider regulation, training and enforcement.

Informed and targeted analyses can be of assistance to planners and engineers seeking to improve the safety of motorcyclists and expand the range of effective measures that they can use. An excellent source is the Victorian Case Control Study (Haworth et al, 1997) who used case control methods to study 222 crashes in Victoria and the circumstances surrounding them.

Case Control means collecting data on traffic flow, road condition and many other factors at a site similar to a crash site and under similar conditions. This allows many more factors related to crashes to be collected and examined. Many different types of conclusions can be drawn from these comparisons.

Key Findings

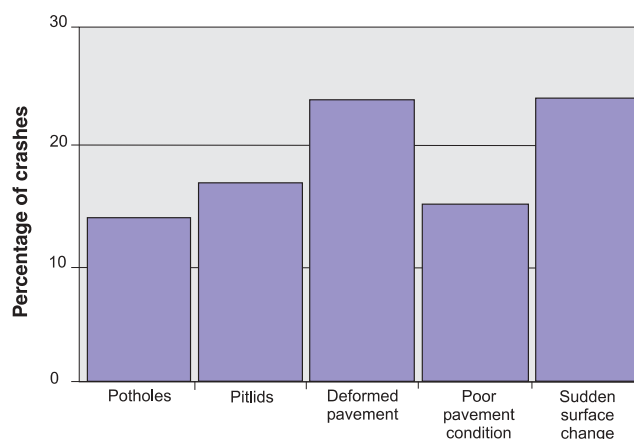
While motorcycle riding is a high risk mode of travel, the study found that 5% of crashed motorcycles were unregistered, compared to 1% of those on which riders stopped to be interviewed at the same locations afterwards - a 500% increase in risk.

The combination of unlicensed riders and unregistered and borrowed motorcycles raised this to 17% of the crashes - compared to only 6% of those who stopped for interview - a 280% increase in risk.

Haworth et al. found that most motorcycle crashes occur on primary arterial roads and that the motorcycle traffic component is 0.5% where such crashes occur.

The most recent Victorian exposure study (Arup, 1995) found that 60% of all motorcycle mileage was on rural highways, and motorcycles represented 0.9% of traffic on these highways, in broad agreement with the ABS (1996) value of 0.8% for Victoria as a whole. Motorcycles appear to be more numerous in the rural areas where most of their mileage is done, and more at risk on major highways.

Figure 1: Road Conditions at Crash Sites



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Road surface conditions affect motorcycles more than other classes of vehicles, and 27% of all crash sites had muddy, oily or loose gravel road surfaces. Seventy percent of the crashes occurred on curves. A combination of degraded surface and curves increases the likelihood of single vehicle motorcycle crashes.

Road Surfaces at Crash Sites

Motorcycles are very sensitive to road surface condition. Potholes and other irregularities place additional demands on riders if already in a potential crash situation. This is especially the case on corners. Road irregularities of different types at crash sites are shown in Figure 1. (NB, more than one type of problem may exist at each site.)

Crash Analysis

Thirty-two percent of crashes in the study involved only a motorcycle, whilst 68% involved one or more other vehicles. However, 31% of single vehicle crashes involved alcohol which was twice as often as multiple vehicle crashes (15%) and the alcohol levels were higher.

Excessive speed for the conditions was judged to have contributed to 35% of single vehicle crashes, but only 17% of multi-vehicle crashes. The presence of alcohol almost doubled the likelihood that excessive speed was involved from 25% to 48%.

Information resources:

Australian Bureau of Statistics (1995). *Survey of motor vehicle use*. AGPS Canberra.

Arup Transport Planning (1995). *The 1994 crash exposure survey*. For VicRoads, Melbourne.

Haworth, N., Smith, R., Brumn, I. and Pronk, N. (1997). *Case control study of motorcycle crashes*. Monash Accident Research Centre FORS CR174. <ftp://cook.dot.gov.au/pub/research/cr174.zip>

Mechanical faults were present in 12% of cases.

Motorcycle crashes often take place where rights-of-way are in conflict. If a crash occurs, the injury to the motorcyclist can be severe. Thirty percent of crashes took place at Stop or Give Way signs, a further 22% at traffic control signals, and 4% were at roundabouts, giving a total of 56% of all crashes.

Rider Contributions

An analysis of the rider contribution to all crashes (single vehicle and multi-vehicle) indicated that 17% of riders often failed to respond to the situation, 20% braked ineffectively, and 20% were deemed to have been in an inappropriate position by the study analyst.

Figure 2: Rider Contribution, Single Vehicle Crashes

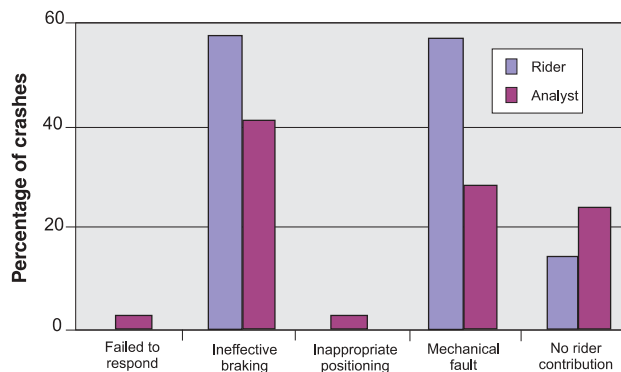
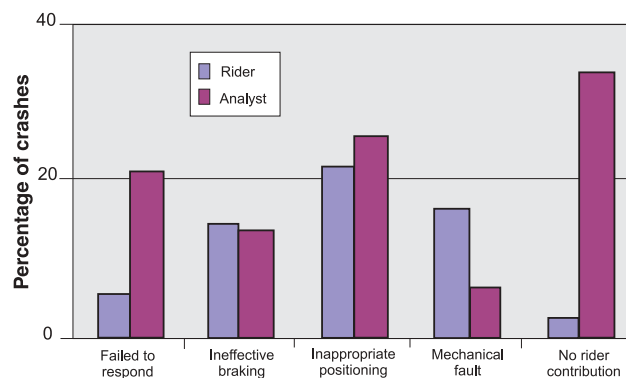


Figure 3: Rider Contribution : Multi-Vehicle Crashes



Figures 2 and 3, for single and multi-vehicle crashes respectively, show that motorcyclists were generally harder on themselves than the study analyst. They were less aware of their potential vulnerability either from their positioning on the road or from their inadequate response to the imminent event. They also overestimated the role of mechanical condition and ineffective braking - both

matters they saw as being under their own control. These values do not add up to exactly 100%, as several factors may apply.

Summary

The Victorian Case Control Study of motorcycle crashes offers many more useful insights relevant to traffic management, planning and road safety, and insights into how motorcyclists view their participation in crash events.

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