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**TRAFFIC ACCIDENT
RESEARCH UNIT**



**DEATHS ON MOTORCYCLES
A STUDY OF 120 FATALITIES**

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The Traffic Accident Research Unit was established within the Department of Motor Transport, New South Wales, in May 1969 to provide a scientific approach into traffic accident prevention.

The Unit brings together a team of medical practitioners, scientists, statisticians, psychologists, sociologists and engineers engaged full time on research into all facets of road accident causation.

This paper is one of a number which report on their research and is published for the information of all those interested in the prevention of traffic accidents.

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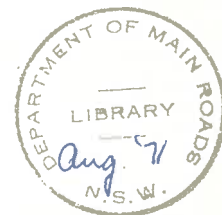


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ABSTRACT

Report forms concerning the deaths of 120 motorcycle riders in traffic crashes in New South Wales have been studied. Most of those killed were young men. Deaths were particularly common after 6.00 p.m. and at the weekend.

In many cases a colliding vehicle had not been aware of the motorcyclist's presence. Any measure which would make motorcycles more easily visible, such as the constant burning of headlights, should have a beneficial effect.

Head injury was very common. If 100% of motorcyclists in New South Wales wore crash helmets, rather than the 75% as at present, the death rate would be cut by about 35%.

INTRODUCTION

The modern motorcycle provides convenient, quick transport at low cost to thousands of people, and adds very little to the congestion or pollution of our cities. Australia's generally sunny climate is ideally suited to the needs of the motorcyclist.

But his chance of death or injury in an accident is extremely high. The casualty rate per 10,000 motorcycles registered in N.S.W. is already high, and climbing steadily, contrary to the trend for other vehicles (Figure 1). This is related to the changing population of motorcyclists, many of whom would not have been interested in the heavy, large capacity old-style machine, but are now attracted by the lightweight cycles which are joining the traffic stream in enormous numbers.

An examination has been made of N.S.W. police accident reports for all crashes in which a motorcyclist was killed during 1969 and during the period January 1 to April 30, 1970.

RESULTS

There was a total of 120 motorcyclists (of whom nine were pillion passengers) killed in New South Wales in the 16-month period under review (75 in 1969, and 45 in January-April, 1970). The vast majority (94, or 78%) died on roads within 35 m.p.h. speed limit zones, and only 15 (12.5%) on roads subject only to the N.S.W. 50 m.p.h. "prima facie" speed limit.

Friday was the worst day of the week for deaths to motorcyclists (see Figure 2), and the early evening was the part of the day during which most deaths occurred (Figure 3).

Only five females were killed. The problem is largely one of young men, the group of the population which the community can least afford to lose. The under 25-year-olds suffered 93 (77.5%) of the deaths (Figure 4). No change in the general pattern was discernible over the 16-month period.

It was not possible to glean accurate information on injuries, but in 87 cases (72.5%) head and/or neck injury was incriminated as a major cause of death.

In 82 crashes (68%) the motorcycle collided with another vehicle, and in 38 cases the accident was a single-vehicle one. In 48 (58%) of the collisions, the other vehicle was subjectively assessed (by the author, on the basis of reported evidence - a method the limitations of which are fully recognised) to carry the greater measure of blame. Easily the commonest single form of collision occurred as a result of a car turning right at an intersection across the path of an oncoming motorcyclist (19 cases, 23% of collisions, 16% of all deaths of motorcycle riders).

Unfortunately, no data were available as to whether motorcyclists involved in accidents were wearing crash helmets. However, a survey was conducted in the Sydney area during April, 1970, to determine wearing rates under a variety of conditions at several selected locations (see Table 1). In order to obtain a reasonable cross section of traffic conditions, these locations were sampled at differing times of the day and on differing days of the week. From this survey it was estimated that the proportion of riders and pillion passengers currently wearing helmets was 75%. The estimated overall wearing rate for solo riders was 80%, but only just over half (55%) of those riding two up were wearing head protection. Wearing

rates were found to differ widely under various conditions, but the rate for solo riders was consistently higher than that for rider-pillion combinations; for the latter, helmet wearing was distributed evenly between riders and their pillion passengers.

DISCUSSION

The gain in popularity of the motorcycle as a mode of personal transport has been rapid in recent years, and no doubt this popularity will continue to increase. Therefore, the absolute number of motorcyclists will also increase. It is important that motorcycle operation be made as safe as possible as soon as possible.

Many motorcyclists choose two wheels because they cannot afford the capital or running costs of four. These people are almost all young. The weight of evidence indicates that young road users as a group run a higher risk of accident than their older counterparts, and this study confirms other reported work which has shown that the relative involvement of young and inexperienced riders in fatal motorcycle accidents is high.^{1, 2}

The high incidence of fatal accidents on Friday and Saturday, and during the evening hours, reflects the involvement of motorcycle use in social activities. The bulk of deaths occurred after 6.00 p.m., when one would expect that most motorcyclists using their machines solely for commuting to and from work were safely home. There were only a handful of deaths during the morning commuting hours, between 6.00 and 10.00 a.m., and it is likely that the motorcycle fatal accident rate per mile travelled is a great deal higher after, say, 6.00 p.m.

The very great majority of motorcyclists killed in New South Wales are travelling on roads subject to an absolute speed limit, in most cases 35 m.p.h. This fact means that any countermeasure which relies for

its effect on the limitation of the speed at which motorcyclists choose to travel will have little, if any, effect on their death rate.

About one-third (32%) of all deaths were as a result of single-vehicle crashes, in which no other vehicle was concerned. In virtually all of these cases the rider appeared simply to have lost control of the machine. The burden of fault in collision cases could be apportioned to the driver of the other vehicle in over half the crashes. In no less than 19 of the collision accidents, the driver of a four-wheeled vehicle had turned right at an intersection across the path of an oncoming motorcyclist. Robertson and his colleagues³ in Adelaide also found this to be an extremely common pre-crash event, which occurred, indeed, in one-third of all the motorcycle accidents they investigated. As they commented, this type of accident is particularly alarming because there is practically nothing the motorcyclist can do to avoid the resulting collision.

In some other collisions too, there was non-conclusive evidence that the driver of the other vehicle simply did not see the motorcycle, or, if he did, chose consciously or unconsciously to ignore its existence.

In any crash involving a motorcyclist, the rider or riders are likely to be thrown from the machine and suffer severe injuries as they strike the ground, roadside furniture, or other vehicles. Every study of motorcycle injuries, including this one, has confirmed that the incidence of head injury in fatal accidents is very high.^{3, 4, 5} Protection for the head is afforded by the wearing of a crash helmet. A law making the wearing of helmets by all motorcyclists compulsory in Victoria came into effect in 1961, and Foldvary and Lane⁶ concluded that this countermeasure had reduced the risk of death to a motorcyclist wearing a helmet in a crash to about one-third of the risk without a helmet, and that the 50% reduction in the overall motorcycle fatality rate in Victoria for the years 1961 and 1962 was directly attributable to the compulsory use of helmets.

The proportion of motorcyclists wearing crash helmets in Victoria before the legislation became effective was estimated to be 56%.

If the present trend in New South Wales continues unchecked, about 110 motorcyclists will be killed during 1970. If the present wearing rate is taken as an average of 75% and it is assumed that making helmet-wearing compulsory takes the rate to 100% (as has been indicated by experience in Victoria), and if Foldvary and Lane's estimate that wearing a helmet in a crash cuts the risk of death by two-thirds is correct, then only about 70 motorcyclists would have died (a reduction of 35%) if crash helmet wearing had been made mandatory at the beginning of the year. This would have meant a saving of the lives of 40 people, almost all young males.

In New York State, the introduction of legislation making helmet wearing compulsory was associated with a 40% reduction in the number of motorcyclists who were fatally injured.⁵ Many other States in the U.S.A. have enacted legislation to make helmet wearing compulsory at all times, and Fisher's review of the current situation provides a useful guide to legal pitfalls which may become apparent.^{7, 8} The majority of legal opinion in the U.S.A. has held that to make helmet wearing compulsory does not infringe the rights of the individual; on the other hand, however, a few cases have been successfully fought on appeal on the basis that, as long as the safety of other members of the public is not in question, an individual has the right to choose or reject measures which affect only his own safety. Furthermore, it has been argued that a law which makes the wearing of a helmet compulsory is exactly the same, in principle, as one which makes mandatory the wearing of seat belts. This is probably true, but a weak argument. Society has already taken upon itself the duty of protecting some of its individuals from their own folly, and it has never been seriously claimed that such "protective" law-making should necessarily be applied to all sections of society at the one time in order that nobody be "unfairly" affected.



A great many motorcyclists were killed in 1969 and 1970 through no fault of their own. However careful a rider may be, he cannot avoid being driven into by a motorist who has not seen him. In view of the fact that, in this series and in the Adelaide survey, a large number of drivers turned across oncoming motorcyclists, it would seem that any measures which make the motorcycle-rider combination more easily visible are worth consideration. The constant burning of motorcycle headlights during daylight hours, or the wearing of bright clothing by riders, would be examples of such simple protective measures.

CONCLUSIONS

Most motorcyclists are young and inexperienced road users, and all are extremely vulnerable to death and injury in a crash. The fatality rate for motorcyclists is rising, a fact which is a reflection of the changing, "new", motorcyclist population.

Those killed on motorcycles are mostly young males. The great majority are killed on roads already subject to a 35 m.p.h. speed limit, and no countermeasure which relies on further speed limitation of the motorcycling population has much chance of success.

The days and times on which these deaths commonly occur suggest that the social use of motorcycles is an important factor.

The motorcyclist death rate could be cut by about 35% if the wearing of crash helmets was made compulsory. Motorcyclists should take steps to make themselves more visible to other road users, and the constant use of headlights would be a sensible initial move.

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	Motorcycle riders	Number of individuals observed	Percentage wearing helmets
Princes Highway, 20 miles south of Sydney G.P.O.	Solo	202	81%
	Solo and pillion	142	54%
Pacific Highway, 20 miles north of Sydney G.P.O.	Solo	102	71%
	Solo and pillion	54	69%
General Holmes Drive, 6 miles south of Sydney G.P.O.	Solo	166	73%
	Solo and pillion	60	38%
Warringah Expressway 3 miles north of Sydney G.P.O.	Solo	594	92%
	Solo and pillion	70	60%

Table 1. Proportions of motorcyclists wearing crash helmets,
Sydney area, 1970.

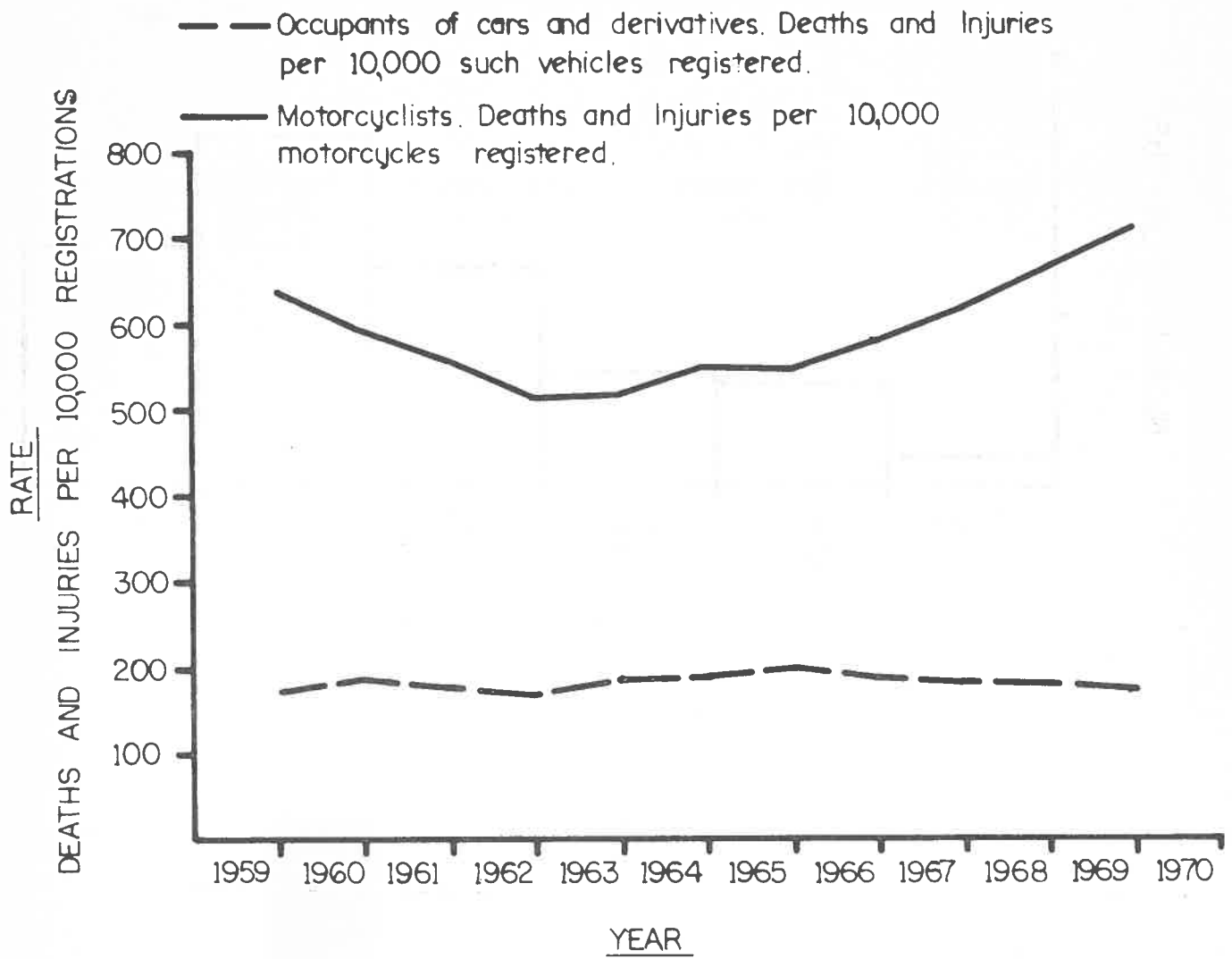


FIGURE 1

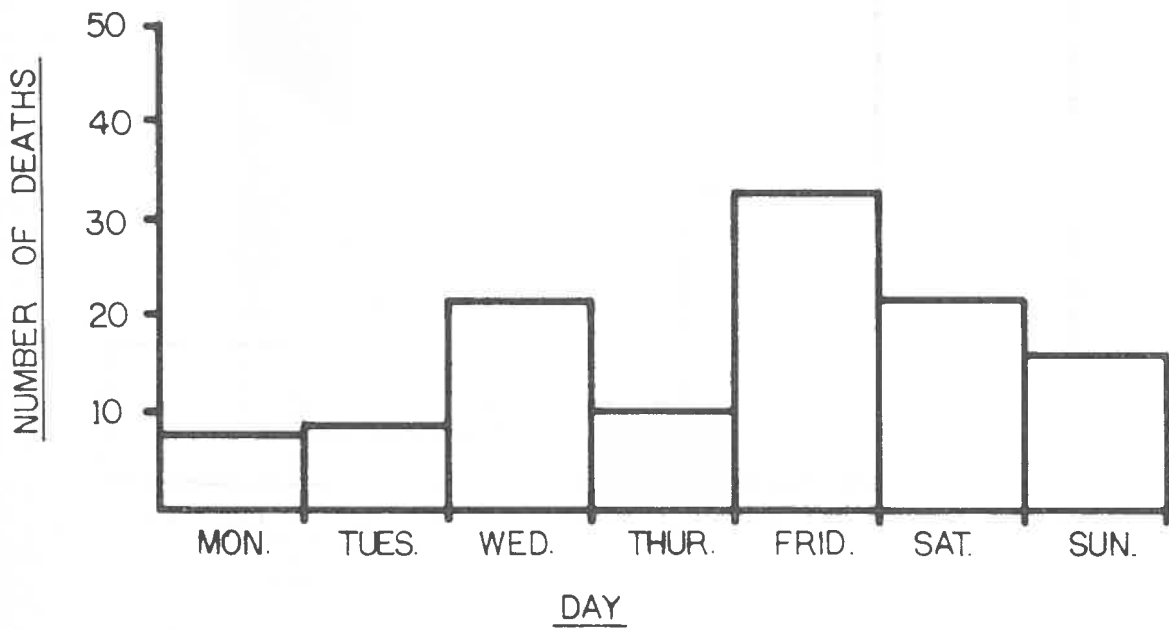


FIGURE 2

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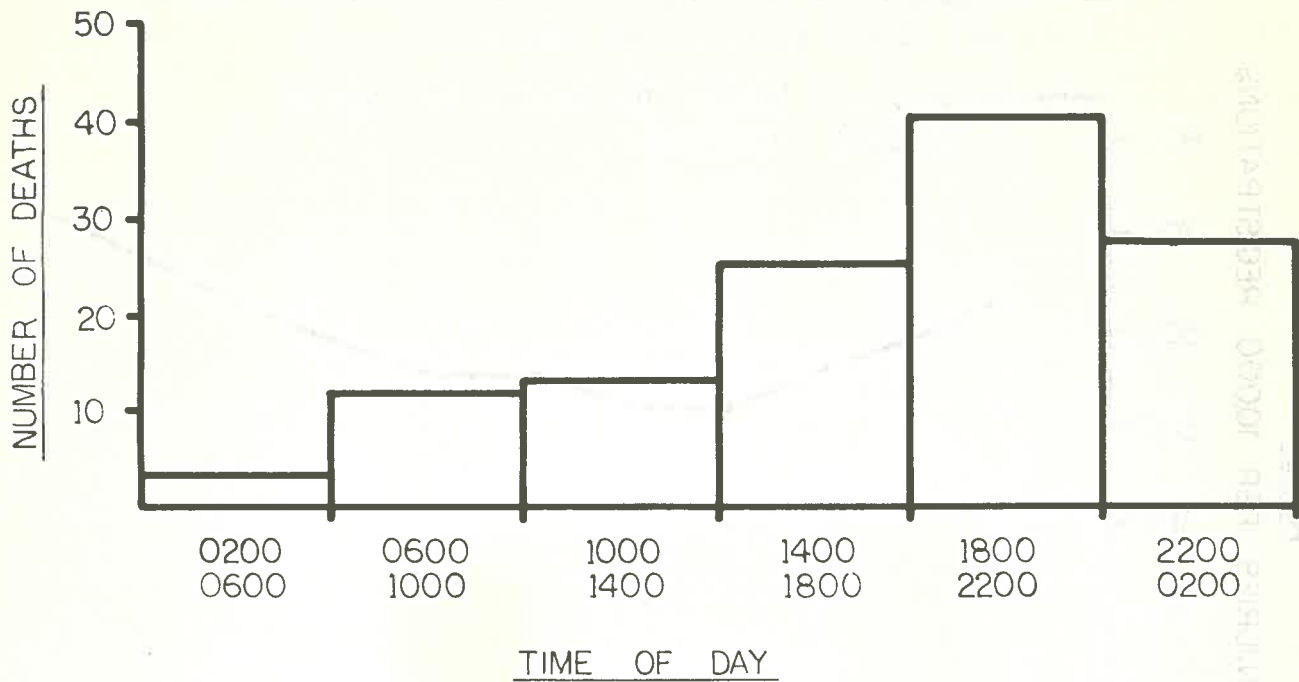


FIGURE 3

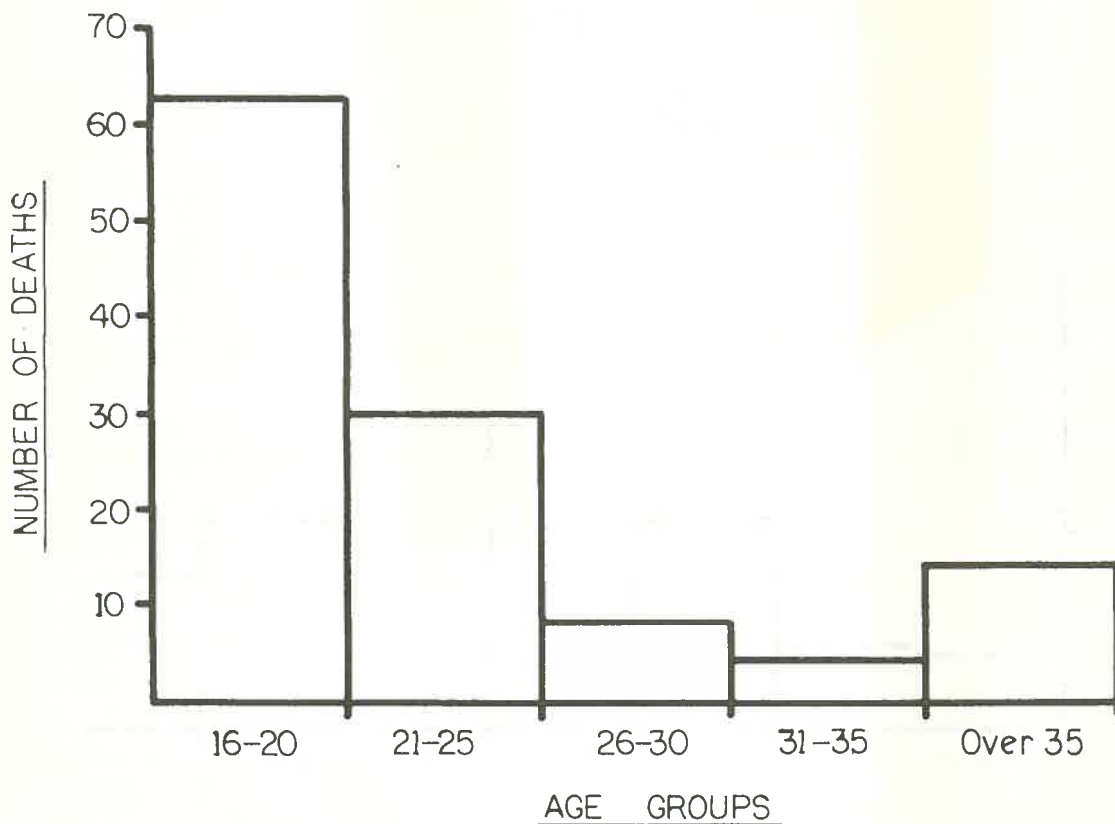


FIGURE 4