Motorcycle Accident Causation
and
Identification of Countermeasures in Thailand
Summary of Findings - Bangkok

The data obtained from all 723-on scenes, in-depth accident investigation cases reveal several important findings related to accident causation, injury information and accident characteristics of motorcycle accidents. Summaries of these findings are as follows:

1. Human errors, by both the motorcycle and other vehicle drivers were the most frequent cause of the 723 Bangkok motorcycle accidents.

2. Alcohol was a key factor in the Bangkok accidents. Alcohol-involved riders were more likely to be the primary or sole cause of the accidents they got into and were more likely to crash by losing control of the motorcycle, usually by running off the road. They were less likely to be wearing a helmet and more likely to be hospitalized or killed.

3. Roadway design and maintenance problems were a contributing factor in at least 13% of these accidents.

4. Motorcycle problems were a negligible contributing factor, and the problems encountered in these accidents were predominantly due to poor maintenance, and not to poor design or manufacturing.

5. The most frequent motorcycle-related problem was riding at night without the headlamp illuminated, which was considered to actually be a rider failure. The lack of headlamp use greatly increased the risk of being involved in a right-of-way collision with another vehicle.

6. Adverse weather (i.e.–rain) was not a major cause factor because most riders stopped riding while it was raining. However, when rain was present in an accident, it contributed to causing the accident in about two thirds of rain cases (12 of 18 accidents).

7. Only one accident-involved rider and none of the exposure interviewees reported having any formal motorcycle training. This indicates that many riders lacked knowledge of defensive riding strategies to avoid potential collision situations.

8. The accident-involved riders also showed poor collision avoidance skills when faced with an imminent collision. About two-thirds of the riders took evasive action. Of those who took action, only 12% chose the best action and executed it skillfully.

9. The average (median) time from the precipitating event to impact was 1.9 seconds. In many cases, there was too little time for effective evasive action. While rider training should include collision avoidance skills, the 251 emphasis should be on defensive driving skills to minimize potential accident situations.

10. When riders used the helmet properly so that it remained on the head, helmets showed a great reduction in head injuries.

11. Many helmets in Thailand are used improperly or not used at all.

12. Many helmets seen in this study would fail if tested for compliance with the Thailand Industrial Standard. At present, no mechanism exists to require compliance with the standard. As a result, far too many helmets offered to consumers are substandard and inadequate, and consumers have no way of knowing if the helmet they purchase can actually protect them in an accident.

13. Helmet users too often defeat the protection offered by their helmet by wearing it poorly -- usually with the straps fastened loosely or not fastened at all. As a result, one-fourth of the helmets worn were ejected from the rider's head.

14. Unhelmeted riders were more likely to get into a crash than those wearing a helmet. About 15% of the riders passing exposure sites were not wearing a helmet, while 35% of the accident-involved riders had no head protection.

15. Three-fourths of the motorcycle accidents in Bangkok involved collisions with other vehicles, usually a passenger car. About one-fourth of 616 crashes reported (24%) here involved two motorcycles.

16. Accident rates nearly tripled at night compared to day. During daylight hours, there was one crash for every 155 motorcycles on the road. At night, the rate was 55 motorcycles per crash.

17. The most frequent accident configuration in the Bangkok series was the motorcycle impacting the rear of the OV. The next most common was a single vehicle crash in which the motorcycle fell or ran off the road, or struck some environmental object. Other vehicle turns across the path of an oncoming motorcycle were also very frequent.

18. Parked or abandoned trucks at the side of the road at night failed to provide proper warning to drivers approaching from the rear in every single night-rear-end collision in this study. This accident situation accounted for one-fourth of the rear-end collisions (25 of 104 cases); the other three-fourths were mainly the typical result of following too closely in traffic.

19. Most accidents occurred when traffic conditions were light or moderate.

20. Half of the accidents reported here occurred at intersections. Most intersection accidents involved a crossing-path collision with an OV.

21. Non-intersection accidents were more varied, with more pedestrians and single motorcycle crashes, but the majority still involved another vehicle.

22. Running over raised pavement reflectors caused several accidents in Bangkok. These large reflectors sometimes caused immediate loss of front tyre pressure and dented front rims, and consistently caused motorcycles to lose control and fall.

23. No accidents occurred as a result of stuck throttles, a side stand being left in the down position, or dynamically unstable oscillations such as weave, wobble or pitch-weave. Under-inflated tyres, a loose steering stem or swing arm pivot or unwieldy cargo can contribute to dynamic instability problems and while these factors were coded as being present for some accidents, they were never considered to contribute to accident causation.

24. No fires and no fuel burn injuries were seen in the Bangkok accidents. Although half of motorcycles leaked a few milliliters of fuel from the carburetor or filler cap while lying on their side at point of rest, and a few spilled larger quantities, this presented no particular problem. The few burn injuries that occurred resulted from direct contact with a hot exhaust pipe or muffler.

25. Almost half of the motorcycles in the Bangkok accidents were the stepthrough frame type. Sport-bikes (race replica design) models were overrepresented in Bangkok accidents, but this appears to reflect the characteristics of sport bike riders, who were more likely to be young males, to have been drinking and driving faster before the accident than riders of other motorcycles.

26. About half of the accident-involved motorcycles had no rear view mirror on either side. This was felt to be a factor when riders failed to detect another vehicle coming from behind.

27. Roadway design defects were considered to be the cause of the accident in about 5% of crashes. Beside the large pavement reflectors, other design problems included inadequate signing and guidance at curves, and view obstructions.

28. Accidents around construction zones were a significant problem in Bangkok, especially at night. This was due to view obstructions, poor signing and guidance, unmarked barriers and construction equipment left too close to the traffic flow, and poor pavement conditions. These problems occurred in the upcountry accidents as well, but were much less frequent.

29. Roadway maintenance defects (i.e. potholes, debris, etc.) were present in 119 cases but were the accident cause factor in only 16 cases (2%) of the accidents.

30. Traffic control malfunction was a contributing factor in 5 cases (1%) for the motorcycle and 2 cases for the other vehicle.

31. The rear position lamp and stop lamp were missing or inoperable in 31 cases. In three of those situations, the motorcycle was rear-ended by another vehicle at night.

32. In the Bangkok accident data set, the median pre-crash speed of the motorcycle was 39 kilometres per hour and the median crash speed was 31 kilometres per hour.

33. Crash speeds, on average, were higher in fatal accidents than in non-fatal crashes. The mean pre-crash and crash speeds for the fatal motorcycle accidents were 50 and 48 kilometres per hour.

34. About 20% of the Bangkok accidents involved motorcycle loss of control, usually running off the road or a braking slide-out during collision avoidance. Alcohol-involved riders were especially prone to loss of control (29% of alcohol-involved riders versus 13% of non-alcohol-involved riders).

35. For the Bangkok data, the median rider age was 27 years. Motorcycle riders under the age of 21 accounted for 20% of all accidents, while 72% fell into the 21 to 40 age bracket.

36. Female motorcycle riders were slightly over-represented in the Bangkok accident data set, accounting for 4% of accidents and 3% of exposure data cases.

37. Over 80% of accident-involved riders had no education beyond 12th grade, and only 5% were college graduates.

38. Unlicensed riders were over-represented in the Bangkok accident data. They were 11% of those interviewed in petrol stations, but made up 17% of the accident population.

39. Among physiological impairments, only fatigue appears to be overrepresented in accidents. Two riders had an epileptic seizure while riding.

40. Motorcycles with passengers (or even multiple passengers) were not overrepresented in accidents. Passengers did contribute to accident causation in six cases by distracting the rider or interfering with motorcycle balance.

41. None of the accident-involved drivers reported any formal training. This suggests that many drivers lacked knowledge of defensive driving strategies to avoid potential collision situation.

42. About half of other vehicle drivers committed an unsafe act that contributed to the accident causation.

43. When another vehicle was involved and the type of other vehicle was known, it was a motorcycle nearly one-fourth of the time.

44. If the other vehicle was a motorcycle, the collision was likely to be a same direction-sideswipe, head-on crash or perpendicular intersection collision. These three configurations accounted for 44% of motorcycle to motorcycle crashes but only 16% of collisions where the other vehicle was not a motorcycle. When the other vehicle driver error was the primary cause factor, again the most common accident configuration was a same direction-sideswipe collision.

45. When the other vehicle was not a motorcycle and other vehicle driver error was identified as the primary cause of the accident, three configurations predominated. All three configurations involved the other vehicle making a turn across the motorcycle path (i.e., a U-turn or a right turn - either in front of a motorcycle approaching from the opposite direction or from the perpendicular direction).

46. Pedestrians were involved in 26 collisions in the Bangkok data set and half of these accidents occurred during daylight hours. When the motorcycle struck a pedestrian at night, the motorcycle headlamp was off in two of thirteen cases. Only four of the pedestrians were in a crosswalk at the time of the accident.

47. Injuries to the upper and lower extremities were common. Together the two regions accounted for two-thirds of all rider injuries.

48. Most fatal injuries involved trauma to the chest, head and neck.