

ACRS Policy Position Statement

Motorcycle Safety

Summary

Motorcyclists are among the most vulnerable road users, representing an increasing proportion of the vehicle fleet and associated road trauma in Australasia, and the majority in many low-to-middle-income countries (LMIC). Specific action plans to improve motorcyclist safety based on systems thinking are needed to contribute towards the global goal of a 50% reduction in road trauma by 2030. Ensuring road designs and maintenance are inclusive of safe motorcycle use is critical due to greater vulnerability to crashing on poorer roads and more severe injury in the event of a crash compared to other motorists. With modal shift to motorcycles a key component of sustainable travel, strong leadership, commitment and action is required.

Key policy positions

1. All levels of governments must prepare for an increased modal shift to motorcycles.
2. Motorcycle safety specific action plans must be developed and implemented, with ongoing monitoring and evaluation.
3. Improvements in motorcycle crash investigations, crash reports and data analysis relative to exposure by vehicle type are needed to increase data accuracy.
4. Road designs and maintenance must be inclusive of motorcycles as a key design vehicle.
5. The highest level of safety features for motorcycles and for other vehicles to detect and safely interact with motorcycles must be prioritised for new vehicle import/exports, with incentives when possible for public and private vehicle fleet purchases.
6. Motorcycle specific education, training and licensing systems must continue to be strengthened based on best evidence and not assume trade-offs from driver experience.
7. Global attention and investment is needed to address underage children riding motorcycles and as multiple passengers on single vehicles in LMIC.
8. Increased resources are needed to improve first responder knowledge and practices in assisting motorcyclists post-crash and accessing emergency services in rural areas.

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Policy problem

Motorcycles¹ are an increasingly important part of the private and commercial road transport fleet(1). Relative to other motorised passenger vehicles, they offer a relatively low-cost and more accessible and sustainable alternative. In high-income countries (HIC), motorcycles are often a transport choice for commuting convenience and recreation(2, 3). However, in LMIC, they can be the only form of affordable transport for a family, and a source of income by providing transport or delivery services(4).

Although no more likely to crash than other motorists, motorcyclists are more likely to be fatally or seriously injured(5). Globally, almost 30% of all reported crash fatalities involve motorcyclists(6). This is despite most crashes being predictable and preventable by proven interventions(6). A whole-of-government approach towards an integrated, decarbonised and safer transport network must plan for a modal shift to electric motorcycles in addition to more active travel and public transport(1).

Principles underpinning ACRS position

- Fatal or serious injury due to road travel is preventable and unacceptable.
- The road traffic system must be made safe for all road users, with motorcycles an important part of the transport mix, especially in LMIC.
- Safety and health outcomes of the road traffic system must be prioritised ahead of efficiency or cost.
- Road safety and climate change prevention must be aligned to maximise benefits.
- The differing characteristics of motorcycle and car users, the traffic mix, vehicle handling needs and common crash types differ in important ways that require shifts in policies and practices to be inclusive of motorcyclist safety.

Evidence base

Move to safer sustainable practices

While motorcycles are recognised as a dominant vehicle in LMICs, socioeconomic shifts, including the rise of the gig economy, have contributed to a marked increase in the relative proportion of motorcycles in HICs over recent decades. Relative to passenger cars, motorcycles result in less congestion and pollution, and are part of multi-modal mobility-as-a-service networks(1). Electric and hybrid motorcycles are now on the market and sales are expected to rise as part of the modal shift towards more sustainable travel, complementary to active travel, public transport and micromobility devices(1). Governments, public and private businesses must recognise these trends and ensure safety is prioritised in their policies and practices throughout their spheres of influence. This includes professionalisation of occupations involving motorcycle transport and deliveries to ensure safe working conditions, including provision of personal protective equipment (PPE), training, regulation of hours on-road, rest breaks and realistic delivery time/volume expectations(1).

For ongoing monitoring and data, careful attention is needed to motorcycle-related crash reports. Motorcycle crash investigation is a specialist science attuned to recognising the physics and human factor limitations involved in motorcycle crashes, requiring qualified motorcycle crash investigators and auditors

¹ For the purposes of this document, 'motorcycles' are defined as motor-operated two or three-wheeled vehicles powered by either combustion engine or rechargeable batteries and requiring registration for use on a public road or road-related area and an appropriate operator licence to use. 'Motorcyclist' refers to all riders inclusive of passengers.

for more accurate outcomes. Motorcycle crash data should be reported in terms of risk rates per 10,000 registered vehicles by class, for all serious crashes including serious property damage only. Single- and multi-vehicle crashes should be analysed separately, due to their different causal patterns, when determining priorities for countermeasures (7-9).

Redesign infrastructure and maintenance protocols

Road design standards and road environment features for safe motorcycle use differ from those for passenger cars, yet are often lacking in both design and maintenance policies and practices(7, 10). This particularly relates to factors including road surfaces, safety barriers, runoff areas and signage. Motorcycle tyres have smaller contact areas to grip the road, particularly when leaning into a turn, braking or attempting evasive action. Poor road surfaces increase the probability of a crash not due to rider error, as well as the severity of injury to riders, in addition to roadside fences, poles and furniture(7, 11). Motorcyclists are more likely than other motorists to be involved in single-vehicle crashes, particularly on curves which therefore require specific attention(7). Regular motorcycle-specific road safety audits by motorcycle-specific accredited and experienced road safety auditors must be undertaken, and audit recommendations actioned; especially on key motorcycling routes and with particular attention to safe system speed(12).

Multi-vehicle crashes involving motorcycles are common, with the 'look-but-fail-to-see' phenomenon ('inattentive blindness') a key contributing human factor(13). In high density urban areas, separation may be needed. In Asia, local traffic lanes primarily for motorcycles (e.g., Thailand)(14, 15) and exclusive lanes for motorcycles on main roads (e.g., Indonesia)(7) are associated with substantial reductions in road trauma (e.g., 600% fewer fatalities in Malaysia)(16). Roads designed for motorcyclist safety are shown to provide a higher standard of safety for other road users(10). Other infrastructure needs include safe parking areas that do not increase conflicts with pedestrians and cyclists, particularly at transport hubs, such as train stations, bus interchanges and ferry terminals(1).

Advances in motorcycle safety features and PPE

Safety features common to other motor vehicles are not always suitable or modifiable for motorcycles. There is robust evidence for antilock braking systems (ABS) to improve rider control and ability to avoid obstacles(17, 18). ABS has been mandatory in Europe since 2016 for motorcycles with engine displacement greater than 125cc and is a priority of the Second UN Decade of Action for Road Safety 2021-2030 plan(18). Under UNRSF, ASEAN countries are developing a roadmap to mandate ABS for motorcycles(19). Cornering ABS (C-ABS), which takes account of a motorcycle's lean angle, is an emerging technology but still to be evaluated(20). Other measures such as rear wheel traction control and autonomous emergency braking are yet to be proven for motorcycles(20). Motorcycle daytime running lights (DRL) were previously found to draw the attention of other motorists(6), but the benefits were lost as DRLs have become a standard feature on other motor vehicles(21). The potential for different coloured (e.g., yellow) headlights designated exclusively for motorcycles to enhance their day and night conspicuity also is still to be confirmed(22).

More promising are crash avoidance technologies for other motor vehicles to detect motorcycles such as blind spot warnings and mandatory front, rear and side underrun protection for heavy vehicles in the event of a collision. Efforts are needed to increase retrofitting vehicles without these protection systems, especially in LMICs. As fleet technology advances towards increasingly connected and automated vehicles, safe interactions by and with motorcycles must be a priority. With the ever-changing fleet, including electric and 3-wheeler motorcycles, Australia's Learner Approved Motorcycle Scheme (LAMS) and similar schemes elsewhere must be regularly reviewed and updated. Consideration should be given to establishing a

motorcycle safety assessment scheme similar to Euro New Car Assessment Programs (EURO NCAP) or Australian ANCAP.

The effectiveness of motorcycle helmets in reducing fatal and serious injuries is well established and usage enforced with mandatory helmet standards in most HIC and LMIC. PPE clothing (i.e., jackets, pants and gloves) can also substantially reduce the risk of serious injury(23-25); however, a high proportion is not fit for purpose, particularly in hot climates, and could fail to protect in a crash. Garments that lack effective thermal management can impair safety due to heat stress and dehydration(26-28). Mandating PPE usage is unenforceable in the absence of mandatory standards, whereas independent test-based ratings systems can provide reliable information to encourage use and make well-informed purchasing decisions. The Motorcycle Clothing Assessment Program (MotoCAP) is an example providing freely available test data to riders and enables the industry to compete in an open market(29). Additional options, such as tax incentives to improve supply and access to PPE of high safety and thermal quality, might also increase voluntary use.

Education and licensing: riders, post-crash

The different handling and braking characteristics of motorcycles compared to cars, as well as varying demographics and experiences of new and returning riders and drivers, demand that differing education, training and licensing systems apply for safer vehicle use. The two systems should not be considered interchangeable. There is mixed evidence on whether previous experience as a driver provides transferable baseline skills (such as hazard perception) to riding so trade-offs should not be adopted(30, 31). There is growing evidence for mandatory education and training at pre-learner and pre-provisional/full licence stages(32). Voluntary initiatives appear to over-inflate riders' view of their skills and result in less cautious riding. However, New Zealand attracts post-licence and returning riders, into training programs via financial incentives (registration cash back). The New Zealand programs and international guidelines mandate on-road riding components be included; increasingly required in Australian licensing curricula.

Key motorcyclist behaviours that contribute to crashes include alcohol and drug use (including prescription medications) and excessive speed, justifying a focus on these issues in graduated licensing systems(12, 32). All new riders should commence with a zero blood alcohol concentration requirement and be restricted from riding under the influence of recreational or medicinal drugs that impact riding safely. Appropriate penalties must be in place to deter these and excessive speeds, including when restrictions are eased for experienced riders. New riders should be subject to a minimum novice licence period that is restricted from riding high power-to-weight vehicles, particularly sports bike types (implemented as LAMS in Australia). When both learner and provisional restricted licence phases are mandated, a short maximum learner phase should apply so that further training and assessment is undertaken. Evaluations determining other best-practice licensing policies, particularly to address other common crash risk factors for novices, such as riding at night and phone use while riding, should be routinely monitored and implemented.

Other important behavioural risks in LMIC settings include overcrowding on private and public motorcycles, particularly resulting in unsafe seating of children, and underage children riding motorcycles as playthings(1). In HICs, potential parallels are off-road riding by underage children, including overcrowding of quad bikes and other farming vehicles(33).

Improved education is also needed in relation to post-crash care for motorcyclists. Whether and how to remove a helmet safely can be critical to survival and should be widespread knowledge, especially among motorcyclists who are commonly the first responder to other riders, both in HIC and LMIC. Ensuring phone connectivity or access to satellite phones on rural-remote roads will increase access to specialist post-crash care. Carrying personal location beacons could also be incentivised.

Recommended policy actions

1. Governing agencies must prepare for a modal shift towards increased proportions of motorcycles in the road networks and develop and implement action plans specific to motorcyclist safety across their value chain.
2. Improvements and consistency in specialised investigation of motorcycle-related crashes and crash data reporting (per 10,000 registered vehicles by class of vehicle) are needed.
3. Road designs and maintenance must be inclusive of motorcycles as key vehicles, noting that improved safety for motorcycles provides a higher standard for other road users.
4. Anti-lock braking systems (ABS) should be mandatory for all new motorcycles (including <125cc). Other advanced technologies for motorcycles and other vehicle detection and interaction with motorcycles must be monitored, with evidence-based safety features mandated and the safest vehicles prioritised for LAMS, public and private vehicle fleets.
5. CRASH and MotoCAP should continue to be updated and advocated in preference to mandatory protective clothing policies, with HIC and LMIC consideration of incentives to increase supply and access to the highest safety and thermal quality PPE.
6. Motorcycle specific education, training and licensing systems must continue to be strengthened based on best evidence specific to motorcycling safety, with specific attention to zero alcohol/drug use, excessive speed and phone use for novice riders.
7. Investment is needed to address overcrowding on motorcycles in LMIC.
8. Investment is needed to address use of motorcycles by underage children.
9. Increased awareness of best practices for first responders in post-crash care at motorcyclist crashes, particularly helmet removal, is needed to reduce injury severity.
10. Improved access to emergency services in rural areas without phone connectivity networks is needed, such as via access to satellite phones or personal location beacons.

ACRS actions

1. Raise awareness of the relationship between climate change and road safety among members. Advocate for the recommended policy actions, particularly in Australasia and LMICs.
2. Promote education for all road users regarding motorcyclist safety.
3. Promote awareness among all road users regarding the modal shift to motorcycles as an important element of sustainable travel.
4. Promote a shift to electric and hybrid motorcycles to improve sustainability of the mode.
5. Support increased research and development into safe motorcycling.

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