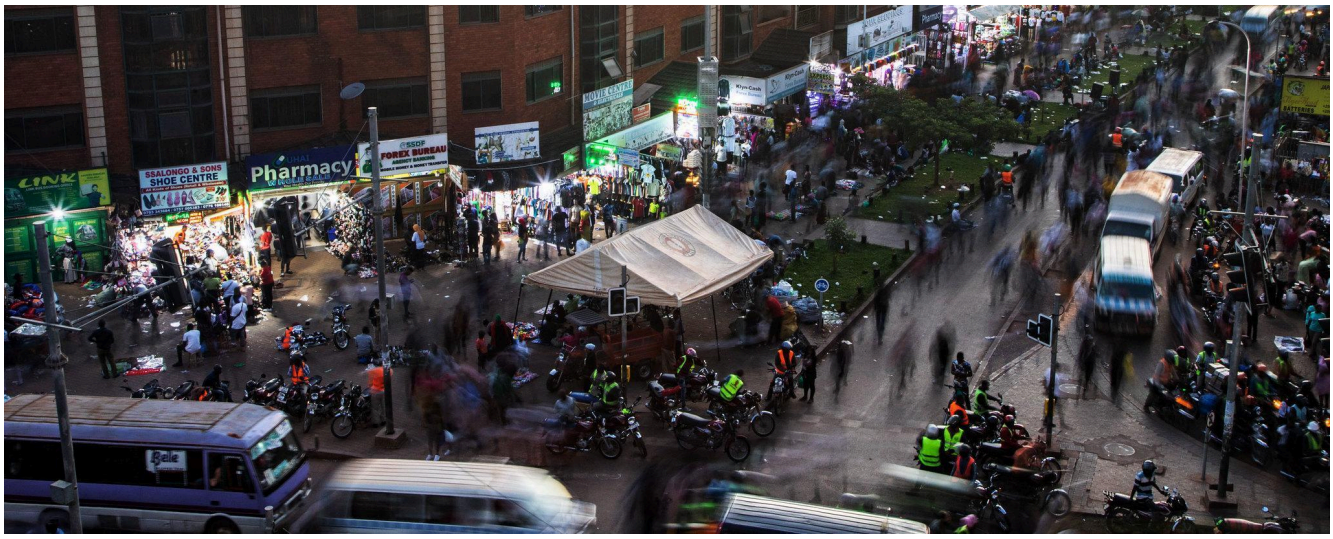
GlobalNetwork for PopularTransportation
A project of the Shared-Use Mobility Center

POPULAR TRANSPORT EXPLAINERS

Road safety & infrastructure for two- & three-wheelers



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Powered two- and three-wheelers (2&3W) have grown increasingly popular across many cities of the Global South, with fleets nearly tripling in size since 2011. They have created a more affordable, accessible way to get around cities and rural areas, as well as a critical livelihood for millions. However, the growing reliance on 2&3W for transport has coincided with a troubling rise in crash fatalities, with 2&3W accounting for 28% of global road deaths in 2022. Their inherent vulnerability—lacking the protective structure of larger vehicles—places drivers and riders at heightened risk of severe injuries in crashes, especially in mixed-traffic environments dominated by faster and heavier vehicles. Other factors that contribute to the high incidence of crashes and injuries involving 2&3W include unsafe driving practises, exceeding a vehicle's carrying capacity, a lack of roadway infrastructure, limited use of safety equipment such as helmets, and more. Ensuring safer roads for 2&3W users requires a tailored approach, including dedicated infrastructure like separate lanes, stricter enforcement of helmet laws, and safety-focused design standards. Crucially, the responsibility lies with policymakers and drivers of both 2&3W and of larger vehicles, whose actions significantly influence crash outcomes. Prioritising road safety for 2&3W saves lives and supports the millions relying on these vehicles for affordable and efficient mobility.

This explainer outlines the trends and challenges associated with improving road safety for 2&3W, offers policy recommendations to enhance conditions for these vehicles, and highlights specific cases of successful interventions that have positively impacted this field.

Photo Credit: Radio Tucumán

Key Trends

Several key trends impact road safety for drivers and passengers of 2&3W.

1. High Death Rate

Motorcyclists and their passengers are considered vulnerable road users (WHO, 2018), with young riders facing particularly high risks. Alarmingly, road traffic deaths involving motorcycle users increased by 5% between 2013 and 2016, while the number of road deaths on other modes decreased or remained stable. This trend is evident in low- and middle-income countries. Research highlights that younger individuals, especially those aged 21 and under, are more likely to engage in risky driving behaviours (Tripodi et al., 2020). A study by Mullin et al. (2000) in New Zealand further underscores the heightened vulnerability of younger riders, establishing a strong correlation between a motorcyclist's age, experience, and injury severity. Their findings revealed that riders aged 15 to 19 faced more than double the risk of moderate to fatal injuries compared to those over 25, who experienced a more than 50% lower injury risk.

2. Lack of High-Quality Helmet Use

Head and neck injuries remain the leading causes of death and severe disability among motorcycle riders and passengers. Despite the proven effectiveness of helmets in reducing the risk of fatal head injuries by up to 42% and the risk of head injuries by 69%, their use remains low in many regions. A survey conducted across 48 countries found that up to 47% of drivers and 71% of passengers did not wear protective helmets while riding two-wheelers. Compounding this issue, the quality of helmets is often inadequate, with many drivers using helmets that fail to meet safety standards or wearing them improperly. Additionally, affordability and access to high-quality helmets contribute to the disparities in helmet use, especially in low- and middle-income countries where motorcycle use is highest.

3. Safety Impact of Ride-Hailing Apps

Ride-hailing apps can enhance the safety of two- and three-wheeler transportation. By providing driver training and continuously monitoring performance and compliance, these platforms help improve road safety standards. They also enforce regular vehicle maintenance, reducing the risk of accidents caused by mechanical failures. Notably, drivers affiliated with ride-hailing services are more likely to wear helmets, motivated by workplace safety requirements, competitive pressures among service providers, and building trust and recognition with customers.

Key Challenges

The trends in 2&3W highlight significant progress and opportunities. However, they also bring to light several challenges that must be addressed. The following section examines the main obstacles to safer and more effective integration of 2&3W into transport systems.

1. Inadequate Regulation and Enforcement

Effective policy and regulatory responses have not matched the rapid rise in 2&3W globally. This regulatory gap contributes to poor risk management, as well as inadequate funding for safety programmes and initiatives. A key issue is the lack of high-quality, government-mandated driver education. Studies by CAF, WHO, and others reveal that many 2&3W drivers bypass formal training, lack essential driving skills, and sometimes illegally obtain their licences. This results in lower compliance with traffic laws and a higher likelihood of crashes, injuries, and fatalities.

Moreover, enforcement of critical road safety measures—such as driver licencing, speed limits, and protective equipment use—is frequently inadequate. Insufficient staffing, limited resources, and deficient technical training among enforcement officers undermine efforts to address these risk factors.

Compounding the problem is the prevalence of road traffic corruption. Enoch (2022) noted that bribery "seems to negate the seriousness of traffic enforcement activity," weakening the credibility and effectiveness of road safety initiatives. Addressing these systemic challenges is essential for creating safer environments for 2&3W users and all road users alike.

2. Need for Better Infrastructure

Road design plays a pivotal role in ensuring the safety of all road users, particularly vulnerable groups like 2&3W riders. However, global assessments reveal significant shortcomings in this regard. According to iRap Star Ratings, which evaluates the safety levels of streets for different users, only 21% of roads assessed globally have received a high safety rating for two-wheelers (three-wheelers are not currently evaluated using this methodology). Most roads fail to provide a safe experience for 2&3W drivers and riders, highlighting an urgent need for improved infrastructure.

Streets are typically designed to accommodate larger vehicles, featuring wider lanes, greater turning radii, and speeds suited for cars. This design approach often excludes the needs of smaller vehicles and alternative modes of transportation such as walking, cycling, and 2&3W. Mixed traffic conditions, in which there is no segregation of streets for 2&3Ws and other modes, increase the possibility of safety hazards.

Finally, poor road conditions, like potholes and cracks, are particularly hazardous for motorcyclists since the drivers of these vehicles need to maintain balance. These issues can cause them to fall or swerve unexpectedly. In contrast, car drivers are less affected by these hazards. There is an urgent need to integrate design elements tailored for smaller vehicles and to maintain road surfaces in good condition to ensure vehicle manoeuverability.

3. Need for More Effective Use of Technology

Although technological advancements, such as the driver assistance system, exist to improve vehicle safety, monitor usage, and provide users with vital information (such as geofenced speed limits, video recognition of dangerous driving behaviour, and dynamic information screens), these technologies have not been widely implemented in 2&3W.

4. Need for Greater Engagement from Key Stakeholders

According to de Rome (2006), there is a disconnect between drivers and road safety authorities regarding motorcycle safety. While users are actively working to reduce the risks associated with this mode of transport, authorities tend to frame motorcycling as a high-risk activity that should be discouraged. An IADB publication (2022) suggests that strategic planning for road safety involving two and three-wheel vehicles should include a variety of stakeholders. This includes 2&3W drivers and passengers, car drivers, manufacturers, national and local authorities, and representatives from the healthcare system, among others.

Policy Recommendations

Efforts to enhance road safety for 2&3W vehicles have primarily focused on imposing restrictions. This includes limiting the use of these vehicles on certain roads, as seen in various cities across China, Taiwan, and Nigeria, or even outright bans on related services, whether through apps or other means. However, such measures have created significant disadvantages regarding equity and accessibility, as many people depend on 2&3W to reach their jobs and access essential services. Moreover, these bans can lead individuals with access to cars to switch to driving, which results in an increase in car trips and exacerbates existing traffic problems.

Governments and industry must collaborate on effective measures to enhance road safety. Some initiatives that can boost safety for 2&3W include:

1. Developing Road Safety Plans for 2&3W

- Create safety plans that identify key issues, set priorities, and propose specific solutions.
- Include measures such as improved training programmes, enhanced infrastructure, and road safety campaigns.
- Learn from countries like Argentina, Australia (state-level), Chile, Spain, Ireland, and El Salvador, which have developed motorcycle-specific road safety strategies.

2. Building Infrastructure that Recognises 2&3W Safety Needs

- Implement motorcycle-specific solutions such as stop boxes at intersections, dedicated lanes, and parking facilities.
- Maintain and improve road surfaces to ensure safety, with features like clear signage and well-maintained paths.
- Adopt best practises, such as Taipei's motorcycle stop boxes and São Paulo's Faixa Azul (motorcycle-only lanes) in high-traffic corridors.

3. Mandating Better Helmets

- Enforce strict helmet-use regulations, ensuring helmets meet safety standards like the UNECE ECE-22 benchmark.
- Address issues of counterfeit helmets and inadequate quality control.
- Promote successful examples, such as Taiwan's national helmet law, which led to a significant reduction in injuries and fatalities.

4. Update Vehicle Regulations

- Require safety features such as anti-lock braking systems (ABS) and speed limiters.
- Align manufacturing standards with benchmarks like the European Commission's "Intelligent Speed Assist" regulations for larger vehicles.

5. Improving Conditions and Education for Drivers

- Establish training programmes emphasizing road safety, Vision Zero principles, and safe driving practices for 2&3W operators.
- Require ride-hailing and delivery platforms to ensure drivers use safe vehicles, have adequate insurance, and prioritise safety over speed.Implement stricter licensing requirements and rules for both 2&3W drivers and operators of larger vehicles.

6. Enforcing Safe Behaviours with Adequate Penalties

- Allocate sufficient resources to enforce compliance with road safety laws, vehicle standards, and helmet use.
- Strengthen enforcement capacity by addressing systemic issues such as road traffic corruption.

7. Utilising Technology for Road Safety

- Use advanced technologies such as geofencing for speed control, driver behaviour monitoring, and vehicle safety features.
- Integrate these technologies into broader safety policies to ensure consistent and effective implementation.

Policymakers, industry leaders, and communities must take concerted action to tackle these challenges. A shared commitment to these measures will help create safer roads, protecting lives while sustaining the essential role of 2&3W in everyday mobility. ◻

Photo credit: Carlos F. Pardo

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