



Motorcycle Trauma in Asia- Pacific: **The burden of Child, Youth & Vulnerable persons**

Dr. Cuong Pham

Center for Injury Policy and Prevention Research
Hanoi University of Public Health, Viet Nam

Global scale

- **Global Road Fatalities Inequality**

- **Over 694,000 deaths in 2021:** Most of these losses are concentrated within rapidly motorizing regional economies
- **99%** of regional deaths occur in low- & middle-income countries (LMICs).
- **Staggering Burden Inequality:** LMICs achieved only a 4% reduction in deaths from 2010 to 2021, compared to a massive 46% reduction in high-income nations.

58%

ASIA-PACIFIC SHARE

Sources: The Burden of Child, Youth, and Vulnerable Person Motorcycle Trauma in the Asia-Pacific Region: An Epidemiological and Socioeconomic Analysis



The mortocycle epidemic

- **35% Regional Fatalities**
 - Of all traffic deaths within the Asia-Pacific region, more than a third are motorcycle riders.
- **70% Vehicles in SE Asia**
 - Two- and three-wheelers form the overwhelming majority (approx. 70%) of Southeast Asia's vehicle fleet.
- **12% Annual Growth Rate**
 - The annual growth rate of vehicles is outpacing safety infrastructure, creating a compounding crisis.



Motorbike dominate Vietnamese travel (Source: Dan Tri News)



Sources: The Burden of Child, Youth, and Vulnerable Person Motorcycle Trauma in the Asia-Pacific Region: An Epidemiological and Socioeconomic Analysis

Vulnerable Road Users

Lack of Physical Protection

Motorcyclists, pedestrians, and cyclists account for roughly 70% of all traffic fatalities in Southeast Asia.

These vulnerable users share congested traffic space with fast-moving heavy commercial vehicles and passenger cars while lacking physical protection.

An Inherent Exposure Gap

Vulnerability is greatest among children, the elderly, and informal gig-economy workers who have no choice but to ride.

The massive exposure gap between vehicle classes creates inherently fatal collision dynamics at any speed above 30 km/h.

Sources:

- The Burden of Child, Youth, and Vulnerable Person Motorcycle Trauma in the Asia-Pacific Region: An Epidemiological and Socioeconomic Analysis.
- Motorcycles & Motorized Three-Wheelers - IRF - Global Transport Knowledge Practice

A Fatal Toll

- ⚠️ Primary Global & Regional Threat:** Road traffic injuries are the leading cause of death globally for ages 5–29. In Asia, they represent the **#1 killer** for ages 15–29 and the #2 cause of death for children aged 5–14.
- 🚗 Late Adolescence & Underage Risks:** Motorbike crash fatalities peak at **92%** of transport deaths in late adolescence (Thailand/Bangladesh). In Malaysia, **62%** of child casualties involve underage drivers.
- 💀 Staggering Fatality Scale:** Child motorcycle deaths in Thailand are **14x higher** than dengue fever. In Vietnam, youth represent **47.6%** of provincial crashes, worsened by low child helmet compliance.

Sources:

- The Burden of Child, Youth, and Vulnerable Person Motorcycle Trauma in the Asia-Pacific Region: An Epidemiological and Socioeconomic Analysis..
- Road safety - World Health Organization (WHO)



Major Road Risk Factors



Speed

Driving or riding too fast. Speeding reduces a driver's reaction time and stopping distance, increasing crash severity.



Impediment

Alcohol, drugs, or physical/mental issues impair driving or riding. Substantially increases accident risk.



Distraction

Activities like phone usage while driving. Taking eyes off the road, even briefly, is dangerous.



No Protection

Failure to use safety gear like helmets (for motorcycles) and seatbelts (for cars).

Morbidity: Clinical Burden

Metric Group	Observed Severity	Data Source / Country Context
Children Under 15	5,200+ Severe Head Injuries Annually	Thailand estimate
Pediatric Casualties	43.9% with Head Injuries	Malaysia 2007–2011
Injured Children	52.4% Completely Unhelmeted	Malaysia data

Sources:

- The Burden of Child, Youth, and Vulnerable Person Motorcycle Trauma in the Asia-Pacific Region: An Epidemiological and Socioeconomic Analysis..
- Road safety - World Health Organization (WHO)

Underage driving hazard

Highly Exposed Children

In Malaysia, 62% of child casualties involved the child acting as the rider — not a pillion passenger.

Cognitive Constraints

Children lack the peripheral vision, auditory spatial processing, and physical mass to navigate complex traffic safely.

High Odds of Severe Injury

Underage riders (13–17 years) have significantly higher odds of sustaining severe, life-threatening injuries than older young adults.

Enforcement and Cultural Gaps

Enforcement gaps and cultural normalization of child riding create a self-reinforcing cycle of preventable harm.

Youth Gig economy

MFDR Exposure and Risk Dynamics

The rise of food delivery apps has created a new, highly exposed demographic: youth motorcycle food delivery riders (MFDRs).

18.9% Crash Incidence: A six-month study revealed that nearly 1 in 5 delivery riders crashed within half a year.

84.3% Risky Behaviors: Behavioral risks are extreme, including speeding, lane-weaving, or running red lights.

Commercial time pressure and algorithmic incentives systematically override personal safety judgment.



Sources:

- The Burden of Child, Youth, and Vulnerable Person Motorcycle Trauma in the Asia-Pacific Region: An Epidemiological and Socioeconomic Analysis..
- Road safety - World Health Organization (WHO)

Demographic extremes

Elderly Pedestrians

Fatalities among elderly pedestrians in Singapore more than doubled — from 11 in 2024 to 27 in 2025.

Senior citizens accounted for 75% of all pedestrian deaths in Singapore in 2025.

Many crashes occur at intersections involving young, high-speed motorcyclists.

Elderly Motorcyclists

Geriatric motorcyclists suffer high rates of severe chest trauma — 39.5% of cases involve flail chest or pulmonary contusions.

Lower cardiopulmonary reserves mean physiological reserve is minimal after high-velocity impact.

Head injuries cause acute death; secondary complications like pneumonia drive late mortality.

Sources:

- The Burden of Child, Youth, and Vulnerable Person Motorcycle Trauma in the Asia-Pacific Region: An Epidemiological and Socioeconomic Analysis..
- Road safety - World Health Organization (WHO)

Brain Injury

4.3M

HEAD INJURIES (EAST ASIA)

Traumatic Brain Injury (TBI)

#1 Cause of TBI globally: Motorcycle crashes represent the single most dominant cause of traumatic brain injury across developing countries.

69% Severe Scale: Out of 4.3M head injuries in East Asia in 2021, 69% are classified as moderate-to-severe TBI.

These statistics highlight an urgent need for preventive measures targeting head protection across all rider segments.

Sources:

- The Burden of Child, Youth, and Vulnerable Person Motorcycle Trauma in the Asia-Pacific Region: An Epidemiological and Socioeconomic Analysis..
- Road safety - World Health Organization (WHO)

Lifelong deficits

Cognitive & Physical Deficits

Moderate-to-severe TBI causes permanent memory loss, impaired decision-making, hemiparesis, spasticity, and coordination deficits.

Most survivors cannot return to competitive education or employment.

Deficits are lifelong and progressive, increasing care dependency across decades.

Psychological Morbidity

Clinical depression, Post-Traumatic Stress Disorder (PTSD), and severe travel anxiety affect the vast majority of crash survivors.

Mental health burden compounds physical disability, reducing rehabilitation outcomes.

Psychological morbidity is frequently undetected and untreated in low-resource settings.

Macroeconomic burden

Malaysia

8.0% of GDP

Lost to Road
Crashes

Lao PDR

5.4% of GDP

Lost to Road
Crashes

Philippines

4.1% of GDP

Lost to Road
Crashes

\$1.7 Trillion: Annual global cost of road crashes (World Bank estimate).

A **50% mortality reduction target** would unlock major macroeconomic gains across all high-burden nations.

Sources:

- The Burden of Child, Youth, and Vulnerable Person Motorcycle Trauma in the Asia-Pacific Region: An Epidemiological and Socioeconomic Analysis..
- Road safety - World Health Organization (WHO)
- UN Secretary-General's Special Envoy for Road Safety

Microeconomic

Unequal Burden of Cost

The financial shock of motorcycle trauma falls heaviest on low-income households lacking comprehensive health insurance.

Catastrophic Expenses in Vietnam

An average road injury hospitalization costs ~US\$363 — equivalent to six months of the average national salary.

Assets Depletion & Debt Cycle

Families exhaust savings, sell agricultural land, or take high-interest loans to finance neurosurgery and rehabilitation.

Double Productivity Loss

35% of casualties are aged 16–35, triggering a dual loss: the victim loses wages, and a caregiver must leave the workforce.

The Way Forward: **Saving Lives**

A Preventable Epidemic

The road traffic crisis in the Asia-Pacific region is a preventable epidemic disproportionately impacting children, youth, and the elderly.

Beyond physical trauma, motorcycle crashes act as a powerful driver of socioeconomic erosion, trapping vulnerable families in chronic poverty due to catastrophic medical costs and lost productivity.



Strict Enforcement

Enact universal helmet laws with punitive fines, eliminating age exemptions. Mandate active safety tech like Anti-lock Braking Systems (ABS).



Safe Infrastructure

Implement Exclusive Motorcycle Lanes (EMLs) to separate vehicle classes.



Protect Vulnerable

Establish Safe School Zones (speed limits below 30 km/h) with widened sidewalks, raised crosswalks, and certified child helmet access.



Data-Driven Governance

Strengthen national injury surveillance and road safety observatories to ensure accurate, integrated data collection for evidence-based policies.



THANK YOU!

