

# Motorcycle ABS to save lives



World Health  
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South-East Asia



## **Motorcycle ABS to Save Lives**

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## Motorcycle ABS to Save Lives



Photo credit: WHO Thailand

**Purpose:** This factsheet presents the situation of motorcycle-related deaths and injuries in WHO South-East Asia Region, with a focus on Thailand. It puts into perspective the possibility to introduce policies relating to the antilock-braking system (ABS) as a proven safety feature to reduce motorcycle-related crashes and injuries – the leading cause of death on the roads in Thailand. It will also address recommendations related to ABS affordability and opportunity in order to regulate motorcycle ABS.

## 1. Motorcycles: number one source of deaths on the road in SEA Region

### Road traffic injuries kill millions at a young age

According to the WHO Global Status Report on Road Safety 2018<sup>1</sup>, 1.35 million lives were lost in 2016 due to road traffic injuries globally. Road traffic injuries is the eighth leading cause of total deaths globally with a fatality rate of 18.2 per 100,000 population, and the number one cause of death for children and young adults of the age group 5–29 years. Road traffic deaths and injuries are unevenly distributed across the world, with 93% of deaths occurring in low- and middle-income countries which account for 41% of the world's vehicles.

Low- and middle-income countries have a three-times higher mortality rate than their high-income counterparts. Moreover, most low- and middle-income countries had a rise in road traffic mortality, while most high-income countries have stabilized and decreased road traffic mortality.

In the WHO South-East Asia (SEA) Region, 396,824 people were killed in 2016, with road traffic fatalities continuously rising since 2007. South-East Asia (SEA) Region has 8.5 % global population but account for 29.4% of global traffic accident death. With the WHO estimated road traffic death toll at 22, 491 in 2016, Thailand has the highest mortality rate in the Region at 32.7 per 100,000 population, and ranks number nine in the world.

**Table 1: Estimated road traffic deaths 2016, and trends in mortality in the SEA Region between 2007 and 2016**

	ROAD TRAFFIC MORTALITY RATES (PER 100 000 POPULATION)				ESTIMATED ROAD TRAFFIC DEATHS IN 2016
	2007	2010	2013	2016	
BANGLADESH	12.6	11.6	13.6	15.3	24 954
BHUTAN	14.4	13.2	15.1	17.4	139
INDIA	16.8	18.9	16.6	22.6	299 091
INDONESIA	16.2	17.7	15.3	12.2	31 726
MALDIVES	18.3*	1.9	3.5	0.9	4
MYANMAR	23.4	15	20.3	19.9	10 540
NEPAL	15.1	16	17	15.9	4 622
SRI LANKA	13.5	13.7	17.4	14.9	3 096
THAILAND	19.6	38.1	36.2	32.7	22 491
TIMOR-LESTE	16.1	19.5	16.6	12.7	161
<b>REGIONAL</b>	<b>16.6</b>	<b>18.5</b>	<b>19.8</b>	<b>20.7</b>	<b>396 824</b>

\* Note: a different methodology was used in the Maldives for the first report.

Source: WHO, Global status reports 2009, 2013, 2015, 2018

## Road safety: essential element for socioeconomic development

Road safety has been recognized as a core element of the Sustainable Development Agenda with two SDG targets related to it. Road traffic crashes pose a high cost to society; impacting property damage and public health cost, and affecting productivity of society. This is particularly so as the highest number of victims are young adults, a major labour workforce. Road traffic injuries cost countries between 3% and 5% of their gross domestic product (GDP) that includes costs of hospitalization, long-term care, material damage, police and rescue service, etc. Road traffic injuries and deaths leave families without their breadwinners because of loss of employment, productivity and disabilities.

Based on a study by the Thailand Development Research Institute, the loss from road traffic crashes, in 2011–2013, was 545 billion Baht per year or the equivalent to 6% of GDP<sup>2</sup>. Another study forecasts that Thailand can have 22% increase in GDP by 2038 (from 2014 baseline) if it can achieve the SDG target of reducing road traffic deaths by half in the next 24 years<sup>3</sup>.

Investment for road safety, therefore, is an effective means for sustainable socioeconomic development and is not just a public health agenda.

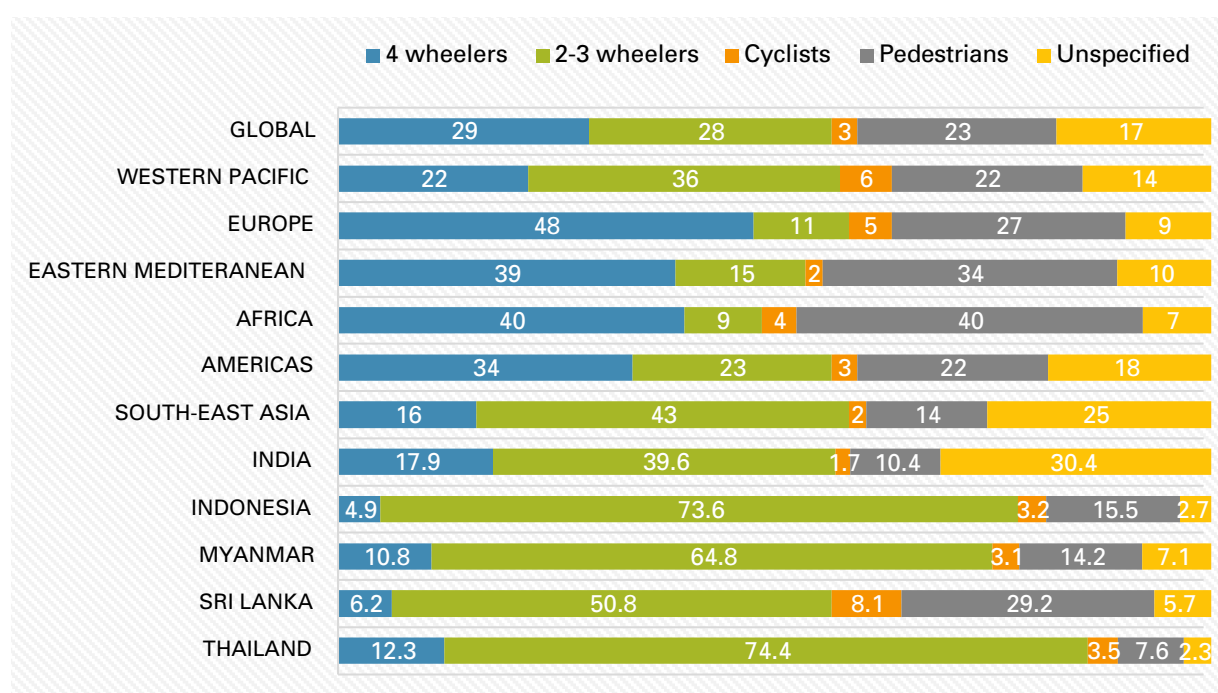
## South-East Asia Region: the global epicenter for motorcycle deaths

More than half of all global deaths are among vulnerable road users, including pedestrians, cyclists and users of powered two- and three-wheelers (PTWs).

Globally, WHO SEA has the highest share of deaths among PTWs, at 43%. The share of PTWs deaths is as high as 74.4% in Thailand, almost triple the global share (28%). The share of PTWs in road traffic deaths in Indonesia (73.6%) and Myanmar (64.8%) is also alarmingly high.

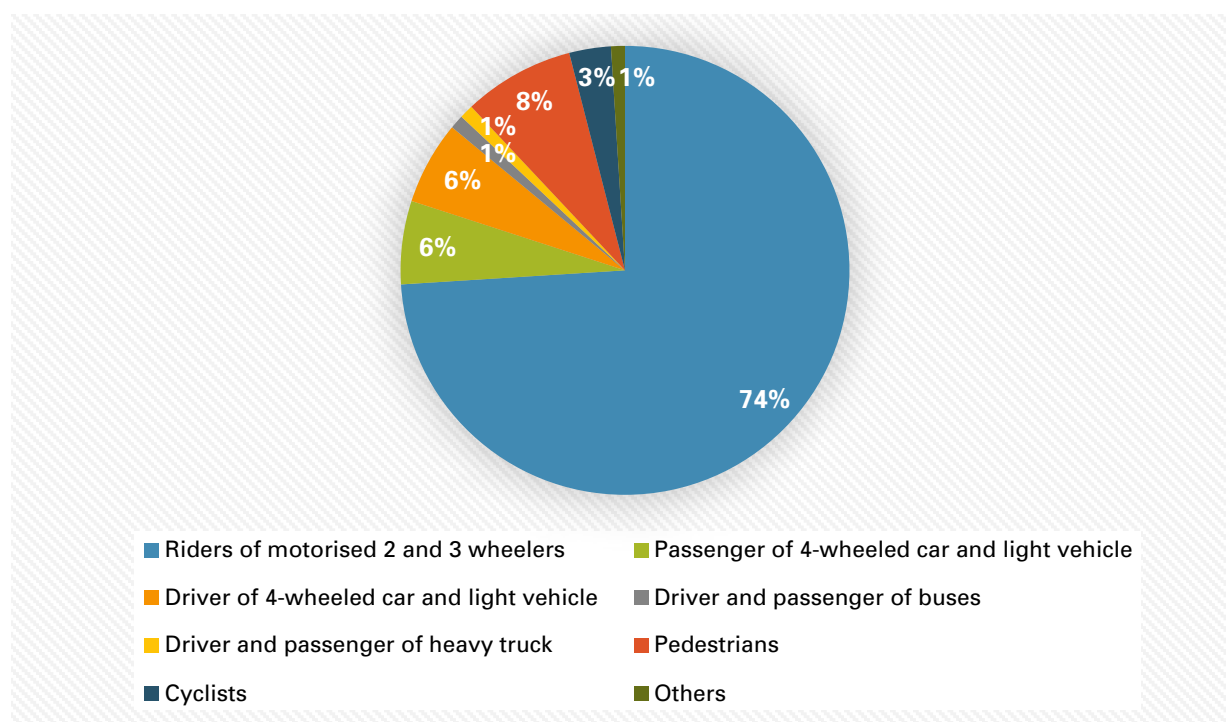
In the South-East Asia Region, deaths among young motorcyclists predominate. In Thailand, these young adults, 15–34 years old, accounted in 2016 for over 60% of all PTW-related deaths<sup>4</sup>.

**Figure 1: Distribution of deaths by road user types in WHO Regions and selected countries (2016)**



Source: WHO Global Status Report on Road Safety (2018)

**Figure 2: Road traffic deaths by road user type, Thailand, 2016**



Source: WHO Global Status Report on Road Safety (2018)

### ***Small-engine motorcycles: a key concern for road safety in SEA***

Low- and middle-income countries account for the majority of global motorcycle fleet. Motorized 2- and 3-wheelers had a 74.5% share of total registered vehicles in WHO SEA in 2013<sup>4</sup>.

With economic growth, the Asia-Pacific Region has been the main market, with continuous growth, for motorcycles manufacturers. In Viet Nam, motorized two- or three- wheelers represent 95% of all registered vehicles, and approximately 7,500 new motorcycles are registered each day<sup>5</sup>.

In Thailand, motorcycles have grown in popularity in recent decades due to their affordable mobility in areas where public transport is limited and in traffic congested cities. On average 1.6 million motorcycles were registered each year for the last decade; the number rose to 1.9 million in 2018, which makes the accumulated number of motorcycles registered with the Department of Land Transport reaching 21 million as of June 2019<sup>6</sup>.

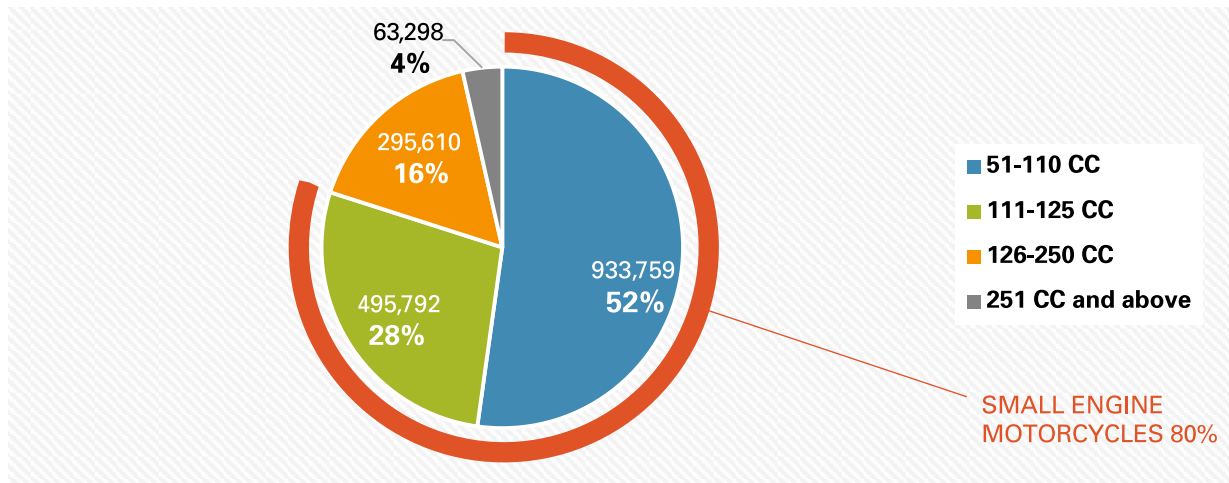
Anecdotal evidence suggested that 8 to 10 million additional motorcycles are unregistered while still being ridden on the roads of Thailand bringing the total number of motorcycles close to 30 million. Arguably these unregistered motorcycles pose an increased risk due to their old age and questionable safety. This situation is not unique to Thailand and presents formidable challenges for policy makers across the region.

Importantly, over 80% of motorcycles in Thailand, as well as in other countries in the Region, are under the category of “small engine capacity” of under 126 cc.<sup>7</sup> The number of motorcycles seems to have a positive association with the magnitude of road traffic deaths in societies as depicted in Figure 4.

Per vehicle mile traveled, motorcycle riders have a 34-fold higher risk of death in a crash than people driving other types of motor vehicles, and they also are eight times more likely to be injured<sup>8</sup>. The popularity and growth of motorcycles, especially small-engine motorcycles, poses two major public concerns for countries in SEA. Firstly, motorcycle usage shows a variety of patterns, some with higher risks. These include carrying multiple passengers and as public commercial vehicles (motorcycle-taxi and logistic business). The injury risk might be even higher among small-engine motorcyclists and passengers, taking into account its use patterns beyond what it is originally designed for, including high-speed and long-distance travel.

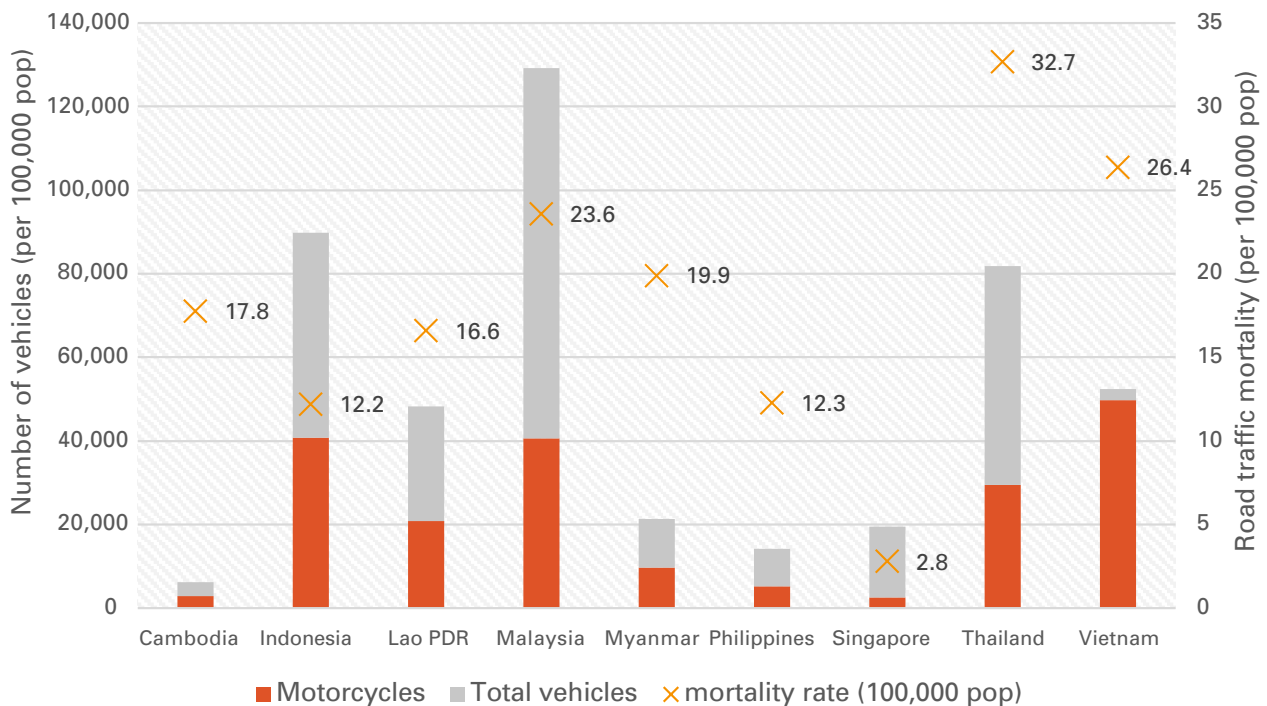
Secondly, the development of safety standards and regulation to protect users cannot keep pace with market growth. Therefore, addressing risks related to small-engine motorcycles is the inevitable essence of road safety promotion in the Region.

**Figure 3: Number and percentage of newly registered motorcycles by cylinder capacity registered in 2018, Thailand**



Source: Transport Statistics, Ministry of Transport, Thailand

**Figure 4: Number of registered motorcycles and total registered vehicles (per 100,000 population) and road traffic mortality rates (per 100,000 population), in selected ASEAN countries, 2016**



Sources: 1. number of registered vehicles from [www.data.aseanstats.org](http://www.data.aseanstats.org), accessed 4 December 2019 2. Road traffic mortality rates and population from WHO Global Status Report on Road Safety (2018)



## Risk factors for motorcycle: What do we know?

Modifiable risk factors for motorcycles are classified into three groups: safer road infrastructures, safer users and safer vehicles.

Among these, major identified risk factors for motorcycle safety, as well as intervention options, are in Table 2. Addressing motorcycle stability has been a relatively neglected policy agenda, this is despite the availability of technology and robust knowledge on technology effectiveness. It can address both probability and severity of motorcycle crashes, particularly when exposed to dangerous road conditions leading to loss of control<sup>9</sup>.

**Table 2: Key risk factors for motorcycle traffic injuries and fatalities and interventions effectiveness**

ROAD SAFETY PILLARS	KEY RISK FACTORS	INTERVENTIONS EFFECTIVENESS	
		PROVEN	PROMISING
<b>PILLAR 2:</b>  <b>SAFER ROADS AND MOBILITY</b>	<ul style="list-style-type: none"> <li>Mixed traffic conditions</li> </ul>	<ul style="list-style-type: none"> <li>Exclusive motorcycle lanes</li> </ul>	
	<ul style="list-style-type: none"> <li>Lack of safe infrastructure for motorcycles</li> </ul>		<ul style="list-style-type: none"> <li>Protected turn lanes and widened shoulders or lanes</li> <li>Speed limiters and traffic calming structures</li> </ul>
	<ul style="list-style-type: none"> <li>Road hazards (potholes, slippery road surface, poor lighting)</li> </ul>	<ul style="list-style-type: none"> <li>Removal of roadside hazards</li> <li>Improving road surface conditions</li> </ul>	
<b>PILLAR 3:</b>  <b>SAFER VEHICLES</b>	<ul style="list-style-type: none"> <li>Poor stability control</li> <li>Poor stopping in emergency</li> </ul>	<ul style="list-style-type: none"> <li>Antilock braking system (ABS)</li> </ul>	
	<ul style="list-style-type: none"> <li>Poor visibility in traffic</li> </ul>		<ul style="list-style-type: none"> <li>Headlights at night</li> <li>Daytime running headlights</li> </ul>
<b>PILLAR 4:</b>  <b>SAFER ROAD USERS</b>	<ul style="list-style-type: none"> <li>Non-use of helmets</li> <li>Excessive speeding</li> <li>Drink-driving</li> <li>Multiple passengers (overloading)</li> <li>Using mobile phone</li> </ul>	<ul style="list-style-type: none"> <li>Mandatory helmets</li> <li>Helmet standards</li> <li>Speed limits, especially in urban areas</li> <li>Legal blood alcohol concentration (BAC) and Random Breath Testing for BAC</li> <li>Strengthening penalties</li> <li>Mandatory registration of vehicles and licensing of PTW operators</li> <li>Compulsory skill test for motorcycle permit</li> </ul>	<ul style="list-style-type: none"> <li>Demerit point system</li> <li>Reflective clothing use</li> <li>Protective clothing use</li> <li>Graduated licensing system</li> </ul>

Source: adapted from 1) WHO (2011), Global Plan for the Decade of Action for Road Safety 2011-2020; 2) WHO (2017) Powered two and three-wheeler safety: a road safety manual for decision-makers and practitioners; 3) WHO (2019) SAFER Alcohol control initiative; and 4) WHO (2017) Save Live: Road safety technical package



## MOTORCYCLE SAFETY IN THAILAND: PROGRESS AND CHALLENGES

Adopting the global target on road safety, Thailand has put efforts to apply the Safe System Approach to address road traffic injuries and ensure healthy lives and promote well-being of people. The Safe System Approach recognizes that people make mistakes in traffic that can easily lead to injuries; thus combined road safety measures and shared responsibility between road users and designers must be taken into consideration to ensure safe transport systems.

Thailand has made some progress to reduce motorcycle-related injuries through legislative and administrative approaches, including 1) mandating new motorcycles to be fitted with headlights which come on automatically with ignition, effective in 2005 (Ministerial Regulation under the Vehicle Act), 2) mandatory helmet use for motorcycle drivers and passengers on all roads, effective in 2007 (Road Traffic Act amendment no. 7), and 3) setting up the Ad Hoc Working Group on Motorcycle Safety in 2018, led by the Ministry of Transport, to gain a better understanding of the situation on motorcycle-related crashes and suggest policy recommendations to the cabinet.

Challenges remain in the area of law enforcement, especially on helmet use, and fully applying the Safe System Approach to address motorcycle safety by taking into account all aspects, that is, safer roads and roadsides, safer vehicles, safer speeds.

## 2. Saving 33% of deaths with motorcycle antilock braking system

### *How ABS can save lives*

The “Safer vehicles” concept means activities that promote the universal deployment of improved vehicle safety technology through harmonization of relevant global vehicle safety standards and incentives to accelerate the uptake of new technologies (3). Motorcycle antilock braking system (ABS) prevents wheel locking, reduces braking distance and, most importantly, increases stability. It addresses both scenarios of braking too hard and failure to brake, both common factors in motorcycle crashes and injuries.

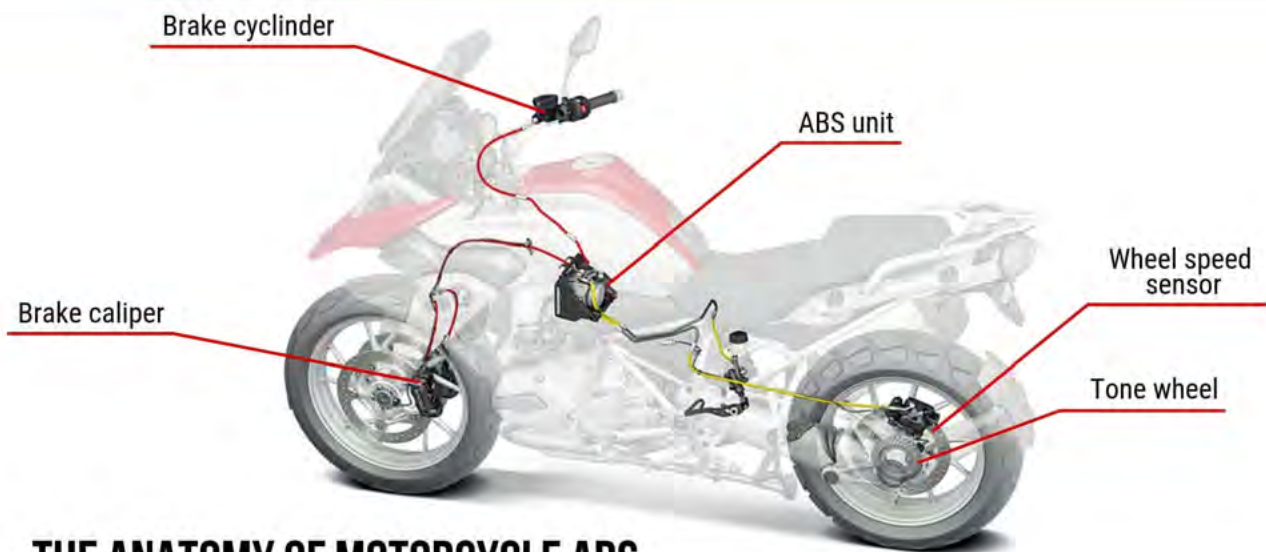
When ABS is applied, it can help mitigate injuries caused by human error and behaviour, particularly when riding on different road friction levels and in difficult riding condition (4). A study in Thailand confirms that motorcycles with ABS allow better control of the vehicles and have greater ability to avoid obstacles (7).

ABS is considered one of the proven solutions to protect the lives of motorcycle users. ABS is one of eight priority standards that all vehicles should meet according to the World Forum for Harmonization of Vehicle Regulations Working Party –WP.29. The UN Vehicles Regulation has recommended to apply existing ABS requirements to all vehicles of category 3 (a two-wheeled vehicle with an engine exceeding 50 cc, or with speed exceeding 50 km/hour). In 2016 the EU passed legislation for mandatory ABS installation on all motorcycles with an engine displacement greater than 125 cc. Other countries, including India, Japan, and Australia, have also implemented similar regulations.

### *How effective is motorcycle ABS?*

Motorcycle ABS is internationally recognized as a proven measure to reduce both crashes as well as their consequences, injuries and fatalities. Evidence in Germany, India and Indonesia shows that ABS helps prevent motorcycle crashes by 26, 33, and 26 per cent respectively<sup>10</sup>. For consequences, studies on the efficacy of ABS have found that ABS can theoretically cut motorcycle deaths by around one fourth to one third. The rate of fatal crashes among motorcycles equipped with ABS is 37 % lower than those with non-ABS brakes (4).

A major reason why motorcycle ABS is effective emerges from the fact that most motorcycle accidents allow only very short time for human pre-crash response. On average, riders have only 0.75 seconds of “thinking time” to make a decision<sup>11</sup>. Almost half of riders did not respond at all; while among those who had a chance, most of them applied the brake wrongly (for example 41.2% used only rear brake, and 36.6% decided only to deviate the direction without applying the brakes (recalculated from<sup>12</sup>).



## THE ANATOMY OF MOTORCYCLE ABS

\* Image courtesy of RideApart

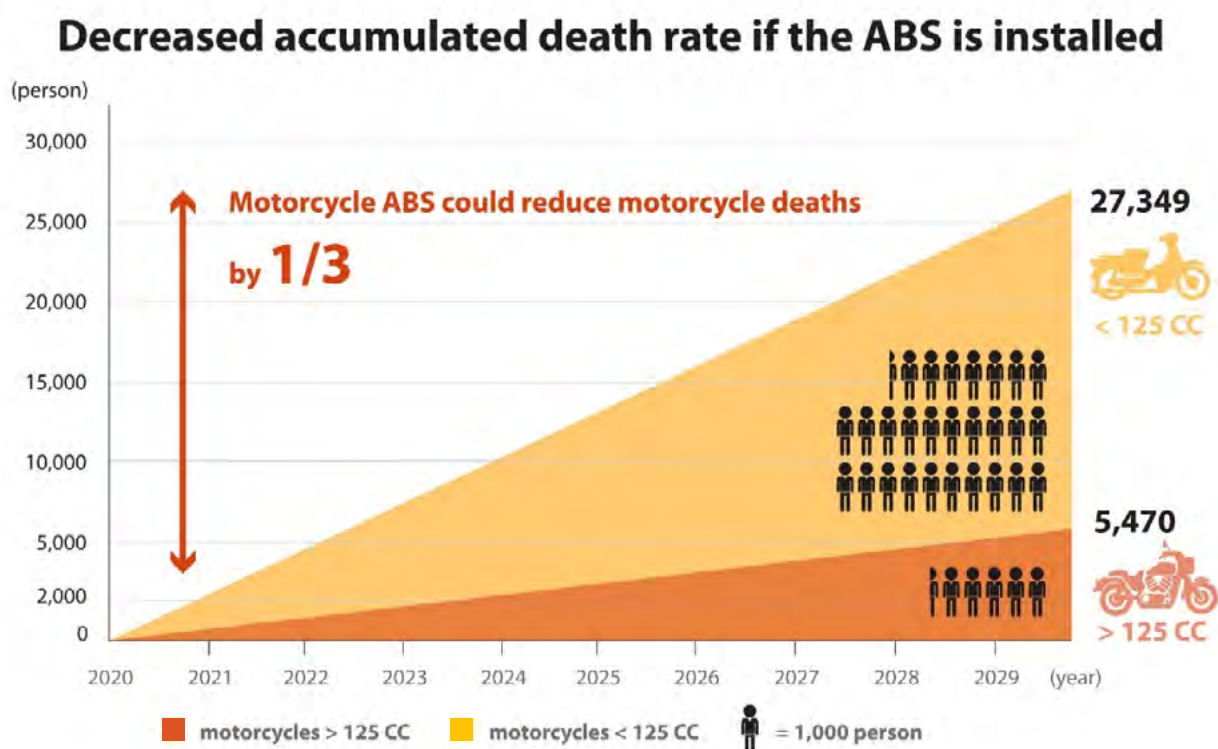
### Future scenario of mandatory motorcycle ABS in Thailand

Motorcycle ABS is particularly relevant for road safety in Thailand. In the Thai context, more than 41% of motorcycle-related crashes are from side crashes and the inability to control the vehicle while crossing intersections<sup>12</sup>. The 2019 study on motorcycle user behaviors in Phuket, Thailand, has also confirmed that half of all motorcycle users who experienced motorcycle-related accidents mentioned risky behaviors and human mistake as the most important causes<sup>13</sup>. By using motorcycle ABS, 39 % of all severe and fatal motorcycle injuries can be avoided<sup>14</sup>.

The Thailand Development and Research Institution (TDRI) has reported that mandatory ABS for new motorcycles could save 6,000–9,000 lives in five years<sup>15</sup>. Another review shows that in terms of costs saved to society according to the estimation using the baseline from TDRI, this model could bring about savings of 10,211-15,316 million THB in year one, and 150-230 billion THB in five years. Due to the high societal cost from motorcycle injuries and deaths, this review also confirms that mandatory ABS policy provides high returns on investment decision, with benefits of about 4 times the amount spent on motorcycle ABS<sup>16</sup>. The recent study of the benefits of ABS effectiveness in other countries also revealed that ABS could reduce motorcycle deaths by 26%–39%<sup>14</sup>.

With an assumption of one-third reduction on mortality, Thailand could save 27,349 lives between 2020 and 2030 if mandatory ABS is applied to all new motorcycles sold. However, the number of lives saved would be down to 5,470 if the regulation is only enforced on big-engine motorcycles of over 126-cc capacity. Thailand would miss its major target group of 21,879 lives that could-be-saved from under-126 cc motorcycles

## ACCUMULATIVE MOTORCYCLE DEATHS POTENTIALLY AVOIDABLE WITH MANDATORY ABS FOR NEW MOTORCYCLES IN THAILAND, 2020–2030



### 3. Debunk the myths for mandatory motorcycle ABS

#### Feasibility – How practical it is to install ABS in Thailand?

- ABS technology is suitable and effective for most types of motorcycles including those less than 126 cc. The main objective for determining the threshold at which ABS should be mandatory should be to offer maximum protection for motorcycle users.

#### Affordability – Is ABS worth it?

- The cost of ABS installation is about 3,500–7,000 THB (or approx. 100-200 Euro) per unit<sup>17</sup>. This adds roughly 10% to the price of the motorcycle. Thai consumers will bear minimal impact, as low as 60 Baht (or approx. 2 Euro) per month spread over a 60-month period, which is the most common motorcycle purchase pattern. Moreover, implementation on a mass scale will significantly bring down the cost per unit and reduce financial impact on individual consumer.

**THE PRICE FOR ABS INSTALLATION IS  
3,500 – 7,000 THB PER UNIT**

**THE PRICE INCREASED LESS THAN**

**10 %**

**FROM THE USUAL COST.**



### Capacity - How fast we can implement ABS regulation?

- Thailand is one of the leading motorcycle manufacturing countries, and exports motorcycles to other countries, such as Japan and Australia, that optionally require the installation of ABS in motorcycles with less than 126 cc capacity. The ABS installation policy can be adopted in a short period of time.
- About 80% of motorcycles registered in Thailand are less than 126 cc capacity; most of these are the same types/models that Thailand produces to export to Japan with ABS installed. The Thai motorcycle manufacturing industry has all the capacity it needs to equip ABS for all motorcycles under 126 cc.

**80% OF MOTORCYCLES  
REGISTERED IN THAILAND ARE LESS THAN 126 CC**



**THE THAI MOTORCYCLE MANUFACTURING INDUSTRY  
HAS ALL THE CAPACITY IT NEEDS TO EQUIP ABS**

Source: Department of Land Transport statistics, 2018<sup>18</sup>

### Economic returns to society

- The recent review shows that mandatory motorcycle ABS is a very worthwhile investment for the Thai society. It can provide quick returns to Thailand, with potentially 1,203–1,806 lives saved, and equivalently boosts the Thai economy by 31-46 billion THB in just the first three years of implementation<sup>16</sup>.

## WHAT GOVERNMENTS CAN DO?

- Introduce regulations for mandatory motorcycle ABS for all new motorcycles entering the market, in compliance with UN Regulation No. 78 or UN GTR No. 3, as well as working across different sectors for enforcement.
- Provide incentives to motorcycle manufacturers, including through taxation concessions.
- Provide incentives for motorcycle users who have ABS fitted, including subsidizing interest rate and insurance premium schemes.
- Raise public awareness, especially among motorcycle users, on the importance of motorcycle ABS.
- Finally, it is important that advancement of ABS policy is not carried out in isolation from other interventions to improve motorcycle safety, as outlined in Table 2.

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